Research paper

Structural racism and risk of SARS-CoV-2 in pregnancy

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ARTICLE INFO

ABSTRACT

Background: Structural racism leads to adverse health outcomes, as highlighted by inequities in COVID-19 infections. We characterized Black/White disparities among pregnant women with SARS-CoV-2 in Cuyahoga County which has some of the most extreme health disparities in the U.S., such as a rate of Black infant mortality that is three times that of White counterparts.

Methods: This was a retrospective cohort study using data collected as part of public health surveillance between March 16, 2020 until October 1, 2020. This study aimed to compare Black and Non-Black pregnant women infected with SARS-CoV-2 to understand how the distribution of risk factors may differ by race. Outcomes included age, gestational age at infection, medical co-morbidities, exposure history, socio-economic status, occupation, symptom severity and pregnancy complications.

Findings: One hundred and sixty-two women were included. 81 (50%) were Black, 67 (41%) White, 9 (0·05%) Hispanic, 2 (0·01%) Asian; and three did not self-identify with any particular race. More than half who supplied occupational information (n = 132) were essential workers as classified by the CDC definition (55%, n = 73). Black women were younger (p = 0·0062) and more likely to identify an occupational contact as exposing them to SARS-CoV-2 (p = 0·020). Non-Black women were more likely to work from home (p = 0·018) and indicate a personal or household contact as their exposure (p = 0·020). Occupation was a risk factor for severe symptoms (aOR 4·487, p = 0·037). Most Black women lived in areas with median income <$39,000 and Black women were more likely to have a preterm delivery (22·2% versus 0%, p = 0·026).

Interpretation: Many pregnant women infected by SARS-CoV-2 are essential workers. Black women are more likely than White counterparts to have occupational exposure as the presumed source for their infection. Limitations in occupational options and controlling risk in these positions could be related to lower socio-economic status, resulting from a long history of structural racism in Cuyahoga County as evidenced by redlining and other policies limiting opportunities for people of color.

Funding: none.

1. Introduction

Within the first few weeks of the pandemic response in March 2020, pregnant women with SARS-CoV-2 infection were identified through case interviewing at the Cuyahoga County Board of Health (CCBH). CCBH began closely following these women for public health surveillance purposes in an effort to ensure their safety and better understand the novel virus and its effect on the maternal-fetal dyad. Mirroring overall patterns within the CCBH jurisdiction, trends towards Black over-representation for pregnant patients were noted in the third month of the pandemic and have continued.

Contemporary racial disparities amplified during the pandemic of SARS-CoV-2 causing COVID-19 in the United States are the direct result of structural racismx [6−9]. This stark reminder of the unfortunate legacy of structural racism is evident in greater Cleveland, Ohio, situated in Cuyahoga County, which is one of the most segregated communities in the country [4,5,10−12]. Within Cuyahoga County, the largest health jurisdiction in the state of Ohio, there are drastic differences in health indicators between those who identify as Black and their White counterparts [12−16]. Black-White differences in both infant mortality and life expectancy—key population health indicators—have repeatedly demonstrated the impact of racism on communities of color within Cuyahoga County [12−15]. For example, infant mortality in Cuyahoga County in 2018 was 15·49 per 1000 births for Blacks and 3·76 for Whites. Additionally,

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Research in context

Evidence before this study

Multiple articles have demonstrated the racial health disparities in the United States and in COVID-19 infections. None have specifically profiled the obstetric population. One epidemiological paper has demonstrated the over-representation of non-Hispanic black women among pregnant cases, but without detailed clinical information. We searched PubMed using the terms "SARS-CoV-2 and pregnancy." Most studies were small and focused on vertical transmission or the lack thereof. Large population-based studies focused on the hospital-based outcomes and not the community-based experience. More studies are needed to understand the mechanism of risk to pregnant women before they reach the hospital for delivery.

Added value of this study

Our study is the first and only community survey of SARS-CoV-2 infection among pregnant women. With 162 women enrolled and interviewed at the time of illness, real-time experiences of SARS-CoV-2 is captured and includes their pregnancy and birth outcomes. Our findings demonstrate the over-representation of black women among those infected with COVID during pregnancy. Associations found in this community are younger age, obesity, poverty, and working on the front-line. Occupational exposures to SARS-CoV-2 are higher in the black pregnant population, whereas their white counterparts were more likely able to work from home. Occupation was also associated with more severe illness. Furthermore, black women with SARS-CoV-2 during pregnancy also were more likely to have a preterm delivery.

Implications of all the available evidence

Our findings shed light on an under-studied population that may be experiencing especially detrimental effects of SARS-CoV-2 during pregnancy. In the worst cases, the infection during pregnancy even led to death. These disparate outcomes for black women are intrinsically tied to a history of structural racism that may lead to less control over exposure risks, especially related to occupation. These findings are a bellwether for other communities with racially-driven health disparities.

neighborhoods only two miles apart in geographical distance have a life expectancy difference of 23 years [2,17].

The history of structural racism in Cuyahoga County includes a history of redlining in the 1930s, during which communities of color were excluded from opportunities to build wealth through home ownership simply on the basis of race [3]. The distribution of historic redlining within Cuyahoga County closely approximates recent maps showing the geographic distribution of residents identifying as Black, of poverty, of decreased life expectancy, of increased infant mortality, and of elevated incidence of other health conditions, including chronic disease, lead poisoning, and malignancies [12−15]. Furthermore, other regional policies regarding housing, education, employment and transportation among others, are the direct result of structural racism and have historically limited opportunities for people of color in Cuyahoga County [4,5]. These historical policies are part of a dynamic community system that have combined to create a racially segregated community that exhibits a concentration of poverty within predominantly Black neighborhoods resulting in negative student school performance and employment prospects further deepening the impacts of poverty [4,5].

During the first week of March 2020, community spread of SARS-CoV-2 was documented in Cuyahoga County [18]. Black-White racial inequity indices throughout the pandemic within Cuyahoga County have demonstrated stark differences in the both the risk of infection and hospitalization [18]. For the Cuyahoga County Board of Health (CCBH) jurisdiction, which excludes the City of Cleveland, the Black-White inequity ratio for cases has ranged from 2·7−3·8 and for hospitalizations from 3·5−3·82 [18].

Across the US, it has been demonstrated that non-Hispanic Black women are disproportionately affected by SARS-CoV-2 during pregnancy [19]. It appears that the effects of a global pandemic are exacerbated in vulnerable communities, specifically those experiencing racism, which serves as a powerful structural determinant of health.

The objective of this study is to compare Black and Non-Black pregnant women infected with SARS-CoV-2 to understand how the distribution of risk factors may differ by race. Specifically, we are interested in what additional risk factors are associated with each group. Outcomes include age, gestational age at infection, medical co-morbidities, exposure history, socio-economic status, occupation, symptom severity and pregnancy complications. We hypothesized that medical co-morbidities of hypertension, obesity and asthma would be associated with increased risk of SARS-CoV-2 infection among Black pregnant women.

2. Methods

2.1. Study design

This is a retrospective cohort study. Data were collected by a public health surveillance team at CCBH from March 16, 2020 until October 1, 2020. Women who tested positive for SARS-CoV-2 by PCR and responded "yes," when asked by CCBH if they were currently pregnant were eligible and considered cases. Women who had already delivered were excluded. Cases were contacted by telephone after their diagnosis and again within a month of delivery. Of note, most cases were tested in the community due to symptoms and a minority were asymptomatic and screened positive on labor and delivery in the hospitals. Contact tracing was done through the board of health from the very beginning of the pandemic. The reliability of exposure history is based on the patient's recollection, which of course is subject to bias. The surveillance team consisted of three physicians and a nurse (RP, JM, HW, and RB). They asked about symptoms, comorbidities, health and social needs, and offered assistance with prenatal and other medical care. This information was obtained shortly after diagnosis and again immediately after delivery.

The presence of common risk factors for COVID-19 exposure and disease severity was examined by race, defined as Black or non-Black due to the small numbers of races other than black or white. Risk factors for exposure included occupation and sick contacts. Occupation was stratified according to the Centers for Disease Control and Prevention's (CDC) differentiation of high-density and low-density exposures with a specific focus on health care personnel [20]. Risk factors for disease severity were medical comorbidities including hypertension, diabetes, asthma, and obesity defined as body mass index (BMI) >30. Symptoms were stratified as follows: Asymptomatic, Mild illness: fewer than five symptoms, Moderate illness: five or more symptoms including dyspnea and/or hospitalization (e.g. requiring oxygen therapy), and severe illness: requiring intensive care and/or resulting in death. Income was determined using 2019 US Census tract data on median income in order to contextualize the socio-economics of the participants. Subjects' addresses were geocoded to specific census tract, and median census tract income was obtained from US Census data. Following delivery, individuals were questioned about antepartum and postpartum complications, including gestational diabetes mellitus, bleeding, thromboembolism, pre-eclampsia, or any neonatal complications requiring neonatal intensive care.

This study was approved by the institutional review board of University Hospitals Cleveland Medical Center. All participants gave verbal consent to participate as written was not possible given the infectious nature of SARS-CoV-2.

2.2. Statistical analysis

All authors had access to the data as part of the public health COVID-19 physician response team. Data were analyzed by PG and JR. As this was a convenience sample, no a priori power calculation was done. Descriptive statistics for categorical variables were described using frequencies and percentages. In order to further examine apparent inequities in SARS-CoV-2 infection among black women, black race was compared to white and "other" races combined. Continuous variables were summarized using means and standard deviations. Differences in characteristics across race were assessed using Pearson chi-squared test for categorical variables. Mann-Whitney tests were used to compare continuous variables. In addition, for testing trends of median household income and symptom severity we used Cochran-Armitage tests to analyze whether there were differences between proportions. Multivariate logistic regression analysis adjusted for covariates (age, race, income, the presence of high-risk comorbidities, obesity, hypertension, asthma and occupation) was used to assess effects of various demographic, occupational, and health and pregnancy factors on a dichotomized symptom severity based on having mild or no symptoms and having moderate to severe symptoms as defined above. Dichotomizing symptom severity was justified by comparing models for dichotomized symptom severity and ordinal regression - the dichotomized model was selected since it had a lower Akaike Information Criteria (AIC) and Bayesian information criterion (BIC) value (AIC/BIC = 50.1/65.3 dichotomized vs 78.3/94.6 ordinal). Odds ratios (ORs) and their confidence intervals are reported. Statistical analysis was carried out using Stata 14·2 (Stata Corporation, Texas, USA). Sample size was adjusted for the given variable based on any missing data.

2.3. Role of the funding source

There was no funding for this surveillance outside of internal funding from CCBH.

3. Results

3.1. Demographics

Of the 183 women who were pregnant and tested positive for SARS-CoV-2 between March and September 2020, 162 women were successfully contacted and provided interviews for surveillance purposes. The others either did not answer the phone or did not give consent to participate. Of the 162, 81 (50%) were Black, 67 (41%) White, 9 (0·05%) Hispanic, 2 (0·01%) Asian; and three did not self-identify with any particular race or ethnicity. Characteristics of the cohort are listed in Table 1. Fig. 1 depicts cumulative incidence per 1000 women of reproductive age in Cuyahoga County by race over the study period. A noticeable gap between Black and White incidence appeared in the third month of the pandemic (see Fig. 1), and this gap has widened over time.

3.2. Medical risks for severe COVID-19

Black women were statistically significantly younger than their counterparts (p = 0·0062), with higher parity than Non-Black women (0·0326). A majority of the women in this cohort were classified as obese, though the difference between races was not statistically

Table 1
Demographics and risk factors.

	Black N = 81	White, Asian, Hispanic, Other N = 81	p value
Age mean (SD)	26·8 (5·9)	29·2 (5·3)	0·0062
Pregnancy Indicators			
Gravidity median (IQR)	3 (2−4)	2 (1−4)	0·3777
Parity median (IQR)	2 (1−2)	1 (0−2)	0·0326
Gestational Age at Infection (weeks)	24·3 (11·9)	24·9 (10·6)	0·7626
Trimester	65	55	0·360
First	17 (26·2)	11 (20·0)	
Second	15 (23·1)	19 (34·5)	
Third	33 (50·8)	25 (45·5)	
Medical Comorbidities			
Hypertension	5/57 (8·8)	2/58 (3·4)	0·233
Diabetes	2/63 (3·2)	2/66 (3·0)	0·611
Asthma	12/62 (19·4)	8/65 (12·3)	0·276
Obesity	25/38 (65·8)	20/45 (44·4)	0·052
Exposure History			
Unknown	27 (55·1)	25 (45·5)	0·326
Occupational Contact*	11 (22·4)	4 (7·3)	0·028
Personal contact* (household spread)	11 (22·4)	24 (43·6)	0·022
Both personal and occupational exposure possible	0 (0·0)	2 (3·6)	0·178
Median Household Income (USD $)			
0−19,000	10 (14·9)	1 (4·5)	0·000
20,000−29,000	17 (25·4)	1 (4·5)	
30,000−39,000	15 (22·3)	4 (7·3)	
40,000−49,000	8 (11·9)	8 (14·5)	
50−74,000	13 (19·4)	30 (54·5)	
75,000−99,000	1 (1·5)	8 (14·5)	
100,000−149,000	2 (3·0)	2 (3·6)	
150,000−249,000	1 (1·5)	3 (5·5)	
250,000	0 (0·0)	0 (0·0)	
Occupational Risk Category			
Unemployed	14 (21·9)	6 (8·8)	0·037
Working from home	9 (14·1)	19 (27·9)	0·051
Onsite Low-density Contact	5 (7·8)	5 (7·4)	0·921
Onsite High-density Contact	36 (56·3)	38 (55·9)	0·966
HealthCare worker	25 (39·1)	24 (35·8)	0·702
Frontline worker	36 (56·3)	37 (55·2)	0·906
Symptom Severity			
Asymptomatic	10 (13·3)	6 (7·9)	0·218
Mild Symptoms	51 (68·0)	47 (61·8)	
Moderate Symptoms	12 (16·0)	22 (28·9)	
Severe Symptoms	2 (2·7)	1 (1·3)	
Pregnancy Outcomes			
Preterm delivery	4/18 (22·2)	0/20 (0·0)	0·026

*Of those who knew their infectious contact.
† Comparison of unemployment and the ability to work from home alone: p-value = 0·018.

significant (p = 0·052). There was no difference between risk factors for SARS-CoV-2 infection based on race (see Table 1.). Few women reported hypertension (8·8% Black and 3·4% non-Black). Asthma was an inciting reason for women to be given pulse-oximeters for home-monitoring, but it did not lead to hospitalizations for hypoxia, shortness of breath or respiratory complications.
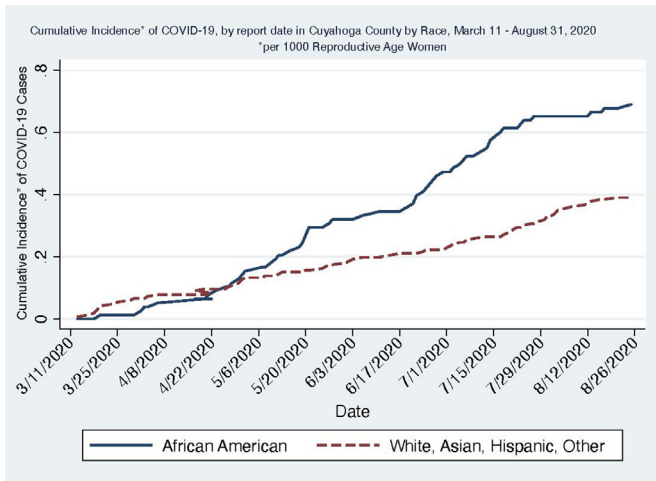
Fig. 1. Incidence of COVID-19 by race.

3.3. Occupational risks

More than half of both racial groups were essential workers (56·3% Black and 53·6% non-Black), defined by CDC as working in high-density settings where they would be exposed to individuals with SARS-CoV-2, such as hospitals, congregate care facilities, or in the food industry [20]. This was not statistically significantly different between race ($p = 0.082$). Table 2 illustrates the variety of occupations held. There was no statistically significant difference between race and these high-risk jobs considered front-line or essential (hospital worker with direct patient care $p = 0.114$, assisted living facility workers $p = 0.134$, food services $p = 1.0$, etc.)

Of those who could identify their sick contact, more Black women identified an occupational contact such as a co-worker, boss or a patient ($n = 11$, 22·4% vs. $n = 4$, 7·3%, $p = 0.028$) whereas Non-Black women were more likely to identify a personal or household contact as their potential positive exposure ($n = 11$, 22·4% in Blacks vs. $n = 24$, 43·6% in others, $p = 0.022$). However, interviewers made note that for many Black women who listed a household contact, that contact's exposure was due to an essential job. Anecdotes from the interviews and the setting to illustrate the complexity of exposure are as follows:

20 year-old Black primigravida essential worker begins her family medical leave three weeks prior to her due date in effort to avoid exposure to SARS-CoV-2. She lives with her mother, who works in food services in a skilled nursing facility and becomes ill. The pregnant woman soon thereafter becomes ill and tests positively for SARS-CoV-2.

23 year-old Black pregnant woman in Cleveland, Ohio is highlighted in the news after she dies due to complications from SARS-CoV-2. She

was a student sheltering in, and her husband is a driver for the city's public transportation (https://fox8.com/news/coronavirus/couple-gets-covid-19-mother-gives-birth before-dying-of-virus/).

Many Non-Black women were able to work from home, whereas more Black women were unemployed ($p = 0.018$). Occupations that allowed for work from home were administrative positions that could be done remotely, school staff who were home due to state-mandated school closures, and individuals who identified as "stay at home mothers."

3.4. Socio-economic status

Given the impact of racism on economic stability and health, race was also analyzed in the context of socio-economic status, and income brackets were compared based on race. It was found that most Black women lived in areas where the median income <$39,000, compared to Non-Black women who mostly lived in areas of median income $50,000−$74,000 ($p < 0.0001$).

3.5. Severity of symptoms

Severity of symptoms was analyzed based on race. There was no statistically significant difference in medical outcomes (admission to the hospital or need for medical attention) or in obstetric outcomes (pre-term labor, hypertensive complications, hemorrhage, infection, or need for intensive care, etc.), except for preterm delivery, (30−36 6/7 weeks gestational age), where this rate was higher among Black women (22·2% versus 0%, $p = 0.026$). For the outcome of moderate to severe disease, the adjusted odds ratio for occupational exposure was 1.58 (95% CI = 1·022−2·445). Table 3 summarizes results of multivariate logistic regression analysis with an outcome of moderate to severe symptoms. In the adjusted analysis, age (aOR = 0·986; 95% CI = 0·817−1·191), race (aOR = 0·235; 95% CI = 0·029−1·900), high risk comorbidity (aOR = 5·267; 95% CI = 0·535−51·883), obesity (aOR−2·534; 95% CI = 0·416−15·436) and income (aOR−1·726; 95% CI 0·921−3·236) were not significant at $p < 0.05$. While occupation (aOR = 4·487; 95% CI = 0·096−18·364) is positively associated with increased symptom severity.

4. Discussion

As the COVID-19 pandemic has highlighted numerous weaknesses within our health system, the racial health inequities borne from structural racism have glaringly surfaced. The literature has shown that pregnant women are at risk for severe illness from SARS-CoV-2 infections and pre-term birth, and additional prevention measures for their infection should be considered [21−23]. The few studies on pregnancy and race have yet to demonstrate increased risk of

Table 2
Frontline and essential workers.

	Black N = 81	White, Asian, Hispanic, Other N = 81	p value
Hospital worker (Direct patient care)	7 (25·9)	15 (46·9)	0·114
Hospital worker (Not patient care)	2 (7·4)	0 (0·0)	0·205
Nursing home/Assisted living facility worker	9 (33·3)	5 (15·6)	0·134
Food Services	4 (14·8)	4 (12·5)	1·0
Retail Services	2 (7·4)	4 (12·5)	0·678
Personal Care Services (Beauty/hair/nails)	1 (3·7)	3 (9·4)	0·617
Corrections	0 (0·0)	1 (3·1)	1·0
Daycare	0 (0·0)	2 (7·4)	0·205

Table 3
Logistic regression analyses for the odds of having more severe symptoms.

	Crude OR (95% CI)	Adjusted OR (95% CI)
Age	1·0 (0·93−1·07) $p = 0.981$	0·986 (0·817−1·191) $p = 0.885$
Race	0·474 (0·214−1·05) $p = 0.065$	0·235 (0·029−1·900) $p = 0.175$
Income	1·317 (0·992−1·751) $p = 0.057$	1·726 (0·921−3·236) $p = 0.088$
High Risk Comorbidity	1·905 (0·718−5·051) $p = 0.195$	5·267 (0·535−51·883) $p = 0.155$
Obesity	1·412 (0·451−4·415) $p = 0.553$	2·534 (0·416−15·436) $p = 0.313$
Occupation	1·58 (1·022−2·445) $p = 0.040$	4·487 (1·096−18·364) $p = 0.037$

* At $p < 0.1$ significance level, the variables were added in the following order: income, occupation.

adverse obstetric or neonatal outcomes, but have not focused on a community-level population [24,25].

Cuyahoga County data demonstrate only 30% of the population is Black, therefore, it is readily apparent that pregnant Black women with SARS-CoV-2 are disproportionately represented as 50% of the total cases. Of all groups, more White women were able to work from home and were more were likely to identify a personal or household contact leading to their infection as compared with their Black counterparts. Black women were also more likely to identify an "occupational contact," such as a co-worker, boss or a patient. It is unclear why Black women appear to be at greater risk in occupational settings when a large proportion of the white cohort also constitutes essential workers. While more Black women were unemployed, we do not know if women lost their jobs during the pandemic. Regardless, it seems that certain protections for pregnant women working front-line or essential jobs were not in place or not sufficient to prevent COVID-19 infection. At the start of the pandemic, personal protective equipment was limited in Cuyahoga County in all sectors resulting in a high proportion of overall cases among healthcare workers (HCWs) [18]. For example, between March-April 2020, 26−33% of new cases were among HCWs [18].

The ability to work from home, including the existence of adequate Internet access, protects pregnant women from SARS-CoV-2 infection. It is interesting however, that these individuals still acquired the illness presumably from a household or personal contact. While this study looks at exposure risks, it is unable to determine behavioral risks such as sheltering in, mask-wearing, and limiting out-of-home travel. Therefore, there is a lack of data on compliance with mitigation measures and living conditions between groups. While type of high-risk occupations were not different between races, Black women were still over-represented in the number of COVID-19 cases. If the anecdotes found by the surveillance team are representative of other Black women, it would appear that it is more difficult for Black women to control their exposures due to other household members also holding essential occupations exposing them to SARS-CoV-2.

Not only are Black women over-represented in this cohort, women working in the health care industry constitute the majority of pregnant cases. As Cuyahoga County's major employers are health care systems, this has important implications for women of reproductive age while coping with an evolving pandemic resulting from a novel virus. Additionally, access to work that might allow for paid or unpaid leave during pregnancy priory to delivery may mitigate disproportionate levels of contracting SARS-CoV-2 infection during pregnancy.

As is consistent with prior community health research in Cuyahoga County, most Black women lived in areas where the median income was less than $39,000 [14]. Strikingly, 40·3% of the Black cohort live in areas where the median income was less than $29,000, which suggests that many pregnant women are living below the poverty line. In the logistic regression analysis, both crude and adjusted ORs are trending towards significance for low-income as a risk factor for severe symptoms. These patterns of poverty link directly back to historical practices of redlining, limiting generational wealth opportunities for communities of color in Cuyahoga County highlighted in the last three Cuyahoga County community health assessments [4,5,12−15] The higher pre-term birthrate among Black women mirrors pre-COVID inequities. Where the pre-term birth rate for Black mothers was 14·8% in 2019, it was 11.6% for the whole county [17].

Racial and ethnic disparities in COVID-19 incidence and mortality have been demonstrated by other studies [26−28]. Data from Boston University's Center for Antiracist Research COVID-19 Data Tracker indicated that racial and ethnic minorities are over-represented in COVID-19 incidence [26]. Although stay-at-home orders were enacted early on in the pandemic, Black women are over-represented in those occupations that are deemed essential workers [29].

Additionally, individuals who are Black, American Indian, or live in low- income households are more likely to have conditions associated with increased risk illness due to COVID-19 infection [30]. A study in Louisiana found an over-representation of death among Black individuals; where 70·4% of the ill cohort was black and 70·6% of those who died were black, while only 31% of the setting population is Black. This study also found an over-representation of female patients and a higher prevalence of underlying co-morbidities that are also risks for worse outcomes with COVID-19 among Black patients (obesity, diabetes, hypertension, and chronic kidney disease) [31]. However, a large retrospective cohort of over 5 million veterans across the US found that Black and Hispanic individuals experience an "excess burden," of COVID-19 not explainable by underlying medical conditions [32]. Similarly in our study, we did not find a statistically significant difference between medical comorbidities and race. Therefore, the impacts of structural racism must be considered as a driver of racial inequities in COVID-19, such as in life expectancy, infant mortality, malignancies and multiple chronic diseases [1,8].

This study's strength is in presenting population findings from community-diagnosed cases and experiences, which to our knowledge, has not yet been presented on pregnant women.

Weakness of the study, however, include the retrospective nature of the data analysis, inability to access medical records to confirm the self-reported information given on risks and outcomes, and the possibility of selection bias associated with answering phone interview questions from the surveillance team. Of note, as this is a localized study, the generalizability of the findings cannot be assumed.

Black women are disproportionately represented in the number of pregnant cases with SARS-CoV-2 with occupational exposures and limitations in controlling risk that could be related to associated lower socio-economic status resulting from a long-history of structural racism in Cuyahoga County. Additionally, pregnant women who were themselves essentials workers or contacts of essential workers, had higher rates of infection. Access to testing, medical care and preventive public health measures all could be contributing to these disparate outcomes, but further studies are needed. Specifically, qualitative studies to understand the complexities of exposure, behaviors and attitudes around the public health interventions, and occupational protections or lack thereof for a high-risk group such as pregnant women in the essential workforce would be elucidating.

Cuyahoga County is a bellwether for other communities across the country, highlighting the disproportionate impact of racism in the context of an evolving pandemic resulting from the novel virus SARS-CoV-2. Our COVID-19 data coupled with nearly a decade of local research on the impact of structural racism on health and economic outcomes in Cuyahoga County highlight profound inequities impacting communities of color and underscore the remarkable urgency with which this powerful determinant of health must be addressed.

Authors' contributions

RP, PG, JM, and HG conceived of the study and created the initial methodology with input from JR, and TA. RP, JM and RB collected the data. PG analyzed the data with input and supervision by JR. RP drafted the first manuscript and all authors equally edited and contributed specific elements of their expertise. All authors edited and approved the final manuscript.

Data sharing statement

A full COVID-19 data set by zip code is available at the Ohio Department of Health website: https://coronavirus.ohio.gov/wps/portal/gov/covid-19/dashboards/key-metrics/cases-by-zipcode.

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