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The Distribution of COVID-19 Cases and Deaths by Age, Sex, and Race in Georgia in 2021

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An abstract of
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ABSTRACT:

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By Sonya Ajani

Introduction: Georgia has about 1.9 million confirmed cases—ranked 9th of all states--and 30,916 deaths. Georgia is a state in the Southeast with a racially and socioeconomically diverse population with relatively low vaccination uptake. The objective of the study is to conduct a descriptive analysis of COVID-19 cases and deaths by age, sex, and race, and disparities therein, in Georgia from January 2021 to December 2021.

Methods: Data were from the Georgia Department of Public Health’s State Electronic Notifiable Disease Surveillance System (SendSS). Descriptive analysis was conducted to assess the distribution of COVID-19 confirmed and antigen positive cases and deaths by age, sex, and race.

Results: Cumulatively over 2021, children under 18 accounted for 23.2% of cases and 0.1% of deaths, people aged 18-65 accounted for 68.6% of cases and 36.0% of deaths, and people 65 and older accounted for 8.2% of cases and 63.9% of deaths. Females accounted for 53.7% of cases and 45.9% of deaths. White individuals make up 60.2% of the Georgia population and accounted for 52.0% of cases and 64.7% of deaths. Black individuals make up 32.6% of the Georgia population and accounted for 36.4% of cases and 31.5% of deaths. Despite statistically significant differences in the age, sex, and race composition of cases and deaths by month, there were few consistent trends. There was a large increase in the percentage of cases that were <18 years in August and September when schools opened. There was an uptick in the percentage of female cases from November to December. The percentage of cases that were Black steadily rose from 30.6% in January to 42.8% in May, then declined to 27.5% in November, only to spike to 47.8% in December.

Conclusion: We found variability in the demographic composition of cases and deaths from month to month over the 2021 calendar year. Tracking this demographic variation may be useful to public health response. Further tracking of demographic variation at a more granular level (such as county) and across more outcomes (such as hospitalizations, testing access, and vaccinations) may assist with evaluation of ongoing interventions targeting COVID-19 over time.

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CHAPTER 1. INTRODUCTION

As of March 2022, the CDC estimates 79.8 million confirmed cases and 974,277 deaths due to COVID-19 in the United States.¹ The state of Georgia has about 1.9 million confirmed cases and 30,916.² Georgia is a state in the Southeast with a racially and socioeconomically diverse population. COVID-19 cases and deaths are not distributed equally by demographic groups including age, sex, and race/ethnicity. Initial data from the state of Georgia suggest that COVID-19 disproportionately affects persons aged 65 and older. COVID-19 cases and deaths also have a different distribution by sex. Racial minority groups including African American, Hispanic/Latino and Asian populations are also impacted. However, with time, there has been substantial improvements in medical therapies, prevention modalities, awareness of the condition, as well as diffusion of risks. These changes in the ability to prevent and manage COVID-19 may have impacted the demographic distribution of the disease and its severe outcomes. COVID-19 confirmed, and antigen positive cases may be collectively referred to as COVID-19 cases unless specified.

¹ CDC. (2020, March 28). *COVID data tracker*. Centers for Disease Control and Prevention. <https://covid.cdc.gov/covid-data-tracker/>

² *COVID-19 status report*. (n.d.). Georgia Department of Public Health. <https://dph.georgia.gov/covid-19-daily-status-report>

CHAPTER 2. LITERATURE REVIEW AND BACKGROUND

The magnitude of COVID-19 cases and deaths in the United States and Georgia has changed over the past 12 months. Studies have shown that there is a very consistent pattern in the relative risk of COVID-19 death counts by age for individuals younger than 65 years old. According to the American Academy of Pediatrics, as of April 4th, 2022, children under 18 account for about 12,841,170 cumulative cases of COVID-19 or about 20-25% of all cases in the United States. In Georgia, From March 2020-June 2021, there were 10,437 pediatric cases of COVID-19 in Fulton County with a case rate of 431.4 cases per 10,00 children aged 0-18 years. Over the same time period, there were 73,543 cases of COVID-19 with a case rate of 880.3 per 10,000 adults aged 19 years and older reported in Fulton County. Among individuals under 18, almost half of the cases were in children aged 14-18 years old.³ Trends from CDC and Georgia Department of Public Health (GDPH) show that COVID-19 cases among children were especially high in August 2021 in many counties as K-12 (5-17 years) students were returning to in-person learning. There was a 240% increase in cases among school age children in this age group from July 2021 to September 2021 in Georgia after children returned to the classroom. Approximately two-thirds of the COVID-19 cases during this time were among school age children.⁴ Cases continued to rise in the months of November and December. During the week from November 11th to November 18th, 2021, more than 140,000 children tested positive for COVID-19, a significant increase from 107,000 cases occurring in the week ending November 4th. Cases

³ Barrera, Chloe M., Mallory Hazell, Allison T. Chamberlain, Neel R. Gandhi, Udodirim Onwubiko, Carol Y. Liu, Juliana Prieto, Fazle Khan, and Sarita Shah. *Retrospective Cohort Study of COVID-19 among Children in Fulton County, Georgia, March 2020–June 2021*. *BMJ Paediatrics Open* 5, no. 1 (December 1, 2021): e001223. <https://doi.org/10.1136/bmjpo-2021-001223>.

⁴ Kogm (2021, September 5). *Child Covid-19 cases rise in states where schools opened earliest*. *Wall Street Journal*. (Eastern Ed.) <https://www.wsj.com/articles/child-covid-19-cases-rise-in-states-where-schools-opened-earliest-11630834201>

accounted for about 25% of the country's case load for the week. Children under 18 make up about 22% of the overall US population.⁵

Although children are still susceptible to developing COVID-19 and spreading it to other kids and adults around them, they are less likely to develop severe illnesses from COVID and die from the disease. A study analyzing COVID-19 age-associated mortality rates in several countries including the United States, the UK, and Spain compared to all-cause mortality found that the age-associated mortality rate exhibited a U-shaped pattern. The lowest mortality rate was observed in children under 12 years of age that increases throughout life.⁶ Mortality due to COVID-19 is quite low in the United States and in Georgia in 2021. The American Academy of Pediatrics estimates that though children under 18 accounted for about 19% of all COVID-19 cases, less than 0.26% of the cases resulted in death. In Georgia, pediatric deaths are low. Between December 2021 and March 2022, six children under 18 have died from COVID-19 across the state of Georgia. A total of 34 children have died since the start of the pandemic.⁷ Indeed there was limited literature on the trends of COVID-19 cases by age. As such, this descriptive analysis is a humble attempt at providing clarity on COVID-19 cases and deaths by age in Georgia in 2021.

However, trends in COVID-19 cases among people aged 18-65 have steadily increased. For example, people between the ages of 18-29 made up about 29% of new cases in June 2021, an increase from 21% May 2021 and 13% in April 2021.⁸ Research conducted in the United

⁵ Lukpat, A. (2021, November 23). *US Pediatricians say Covid Cases in Children are on the Rise*. The New York Times.

<https://www.nytimes.com/2021/11/23/us/covid-cases-children.html>

⁶ Khera, N., Santesmasses, D., Kerepsei, C., & Gladushev, V. N. (2021). *COVID-19 mortality rate is U-shaped*. *Aging*, 13(16), 19954-19962. <https://doi.org/10.18632/aging.203442>

⁷ WSBTV News Staff. (2022, March 17). *Georgia has seen 6 more child COVID-19 deaths since Christmas*. WSB-TV Channel 2 – Atlanta. <https://www.wsbtv.com/news/local/georgia-has-seen-6-more-child-covid-19-deaths-since-christmas/AB33TIEWYFE4ZAAUSV5YCVDHNU/>

⁸ Chen, Y.-H., Glymour, M., Riley, A., Balmes, J., Duchowny, K., Harrison, R., Matthay, E., & Bibbins-Domingo, K. (2021). Excess mortality associated with the COVID-19 pandemic among Californians 18-65 years of age, by occupational sector and occupation: March through November 2020. *PLoS One*, 16(6), e0252454. <https://doi.org/10.1371/journal.pone.0252454>

States and internationally showed that individuals under 65 years old accounted for only 8.3% to 22.7% of deaths among the 13 locations studied in the US. Internationally, this age group accounted for 4.2% to 11.2% of all COVID-19 deaths.⁹ The JAMA network report on various demographic factors, including age, that contribute to cases and deaths in the US. They cite an MMWR report in October 2020 that documented demographic changes by COVID-19 cases and deaths during 2020. Between May and July 2020, the median age of confirmed cases in the US fell from 46 years to 37 years. The age distribution had already shifted by June when incident cases were highest among populations aged 20 -29 years. From August to September 5, the weekly incidence among people aged 18 to 22 doubled from 10.5% to 22.5% of total cases. Of the almost 7 million COVID-19 cases, about 76% occurred among adults aged 18-65, with people aged 18-29 years making up the largest proportion.¹⁰ The latest data show that cases among the 18-65 age group is only increasing in proportion relative to the cases in Georgia. Although this study from JAMA was published in late 2020 and the data has potentially changed, it underscores the importance of analyzing trends in cases and deaths over time (week, month, year) to gain insight on the evolving nature of the pandemic and the various demographic factors that may contribute to it.

As the COVID-19 pandemic approaches the end a second year in March 2022, studies have consistently found the no group suffered the most cases and deaths than populations over the age of 65. A study in the BMC Public Health in late 2020 assessed incidence the relative risk and death across age categories in 16 countries, including countries in Europe, India, Canada, and the United States. Persons aged 65 and older had a 7.7 times higher COVID-19 death rates

⁹ Ioannidis, J. P. A., Axfors, C., & Contopoulos-Ioannidis, D. G. (2020). Population-level COVID-19 mortality risk for non-elderly individuals overall and for non-elderly individuals without underlying diseases in pandemic epicenters. *Environmental Research*, 188(109890), 109890. <https://doi.org/10.1016/j.envres.2020.109890>

¹⁰ Abbasi, J. (2020, November 11). *Younger adults caught in COVID-19 crosshairs as demographics shift*. JAMA: The Journal of the American Medical Association, 324(21), 2141–2143. <https://doi.org/10.1001/jama.2020.21913>

than persons aged 55 to 64 years.¹¹ Older populations have been known to be more vulnerable to COVID-19 infection and death, but additional research analyzing monthly trends by age in 2022 show that 75% of people who have died of COVID-19 or nearly 600,000 of about 800,000 deaths have been among people aged 65 and older. One in 100 persons in this age group has died from the virus compared to people who are under 65 where the ratio is about 1 and 1,400.¹²

The proportion of COVID-19 cases and deaths may be different among males and females. Recent reports from the Brookings Institution on the morbidity and mortality gap among males and females show that women have slightly higher case numbers, potentially because they may make up a greater share of the population undertaking riskier jobs such as healthcare in hospitals, clinics and nursing homes as well as personal care. Such jobs are inflexible to remote work and require close contact with other people. However, men have a higher crude death rates than women. The overall death rate for men is 1.6 times as high as the death rate in women. By the end of August 2021, over 65,000 more men than women died from COVID-19 across the United States. There were about 362,187 male deaths and 296,571 female deaths from January 2021 to August 2021 in the US. Specifically in Georgia and Michigan, Black men have the highest death rates, followed by Black women.¹³

Since March 2020, a myriad of studies have shown the disproportionate rates of COVID-19 cases and deaths among various demographic groups, both nationally as well as in Georgia. The death rate for African American counties were found to be six times higher than the rate observed in white counties. As such, a disproportionate burden of COVID-19 mortality exists

¹¹ Yanez, N. D., Weiss, N. S., Romand, J.-A., & Treggiari, M. M. (2020). COVID-19 mortality risk for older men and women. *BMC Public Health*, 20(1), 1742. <https://doi.org/10.1186/s12889-020-09826-8>

¹² Bosman, J., Harmon, A., & Sun, A. (2021, December 13). *As US, nears 800,000 virus deaths, 1 of every 100 older Americans has perished*. The New York Times. <https://www.nytimes.com/2021/12/13/us/covid-deaths-elderly-americans.html>

¹³ Reeves, Richard V., Deng, Beyond. (2021 November 4). *At least 65,000 more men than women have died from COVID-19 in the US*. Brookings Institution. <https://www.brookings.edu/blog/up-front/2021/10/19/at-least-65000-more-men-than-women-have-died-from-covid-19-in-the-us/>

among minority communities in the US.¹⁴ In the US, Black people accounted for a similar share of cases relative to their share of the population but made up a slightly higher share of deaths compared to their share of the US population. This pattern has been consistent throughout the year in 2021. White people account for a lower share of COVID-19 cases relative to their share of the population. However, White populations account for a larger share of deaths relative to their share of the population. This higher share of deaths relative to the share of the population promulgates a shift since October 2021, when their share of deaths was lower compared to the share of the population. Although in Georgia, Asian populations are categorized as Other races, as of October 2021, Asians made up a lower share of COVID-19 cases and deaths compared to their population share.

County level analyses have also found that the death rate for counties with predominantly African American populations was six times higher than the rate observed in predominantly White counties.¹⁵

The magnitude of the changes in the distribution of COVID-19 outcomes with regards to demographic disparities in age, sex, and race in Georgia over the last 12 months remains unclear. As such, there is a need to investigate the distribution of COVID-19 outcomes with respect to demographic disparities in age, sex, and race in Georgia over the past year. Thus, the objective of the study is to assess the magnitude of demographic disparities by age, sex, and race in COVID-19 outcomes in Georgia from January 2021 to December 2021.

¹⁴ Alcendor, Donald J. "Racial Disparities-Associated COVID-19 Mortality among Minority Populations in the US." *Journal of Clinical Medicine* 9, no. 8 (July 30, 2020): E2442. <https://doi.org/10.3390/jcm9082442>.

¹⁵ Hill, Latoya., Artiga, Samantha. (2022 February 22). *COVID-19 Cases and Deaths by Race/Ethnicity: Current Data and Changes Over Time*. KFF. <https://www.kff.org/coronavirus-covid-19/issue-brief/covid-19-cases-and-deaths-by-race-ethnicity-current-data-and-changes-over-time/>

CHAPTER 3: METHODS

The data are taken from the Georgia Department of Public Health's State Electronic Notifiable Disease Surveillance System (SendSS). The electronic disease surveillance system captures and reports notifiable diseases in Georgia and allows public health agencies to track data and follow-up with affected individuals. SendSS is also used to identify outbreaks and examine disease trends across the state on an ongoing basis.

Development of the analytic sample

SendSS collects patient case status information for COVID-19 including confirmed cases, antigen-positive cases, confirmed deaths, hospitalizations, and underlying conditions, among many other factors. The participant inclusion criteria are individuals living in Georgia of all ages who test positive for COVID-19 through a confirmed PCR test or a probable case. A probable case is defined as the number of individuals with a positive antigen test. Only antigen test results are used in identifying probable cases. The test results are reported to the Georgia Department of Public Health through SendSS. The inclusion criteria also involve people who are deceased from COVID-19. The exclusion criteria were people who do not live in Georgia, and probable deaths. Probable deaths are defined as individuals who are antigen positive or individuals with compatible illness and a known close contact to a case that were either reported to the DPH as deceased by healthcare providers or medical examiners/coroners, identified by death certificates with COVID-19 indicated as the cause of death, or there is evidence that COVID-19 contributed to the individuals death, or individuals with a death certificate that has COVID-19 indicated as the cause of death and there is no laboratory evidence for SARS CoV-2. This analysis utilizes confirmed and antigen positive cases and confirmed and positive deaths from the data. The data are collected by the Georgia Department of Public Health.

Case definitions and ascertainment

Confirmed and antigen positive cases of COVID-19 and confirmed and probable deaths due to COVID-19 are continuously reported to SendSS through laboratory reporting. SendSS collects key data elements about the Patient Under Investigation including confirmed or antigen positive case, confirmed or probable case of COVID-19, dates of symptom onset, hospitalization details including ICU admission, length of stay, and discharge, underlying health conditions, Health Care Worker (HCW) status, incarceration history, and symptom reduction. The database also contains additional PUI information such as patient address and phone number, age, sex, race/ethnicity, and comorbidities.

Demographic covariates

This analysis focused on three demographic variables: age, sex, and race. Age was grouped as < 18, 18-65, 65+. Sex was grouped as male and female. Race was grouped as White, Black, and Other.

Analysis

PUI data were used for the entire analysis. Descriptive analyses were conducted for all variables assessing COVID-19 cases and deaths by age, sex, and race. Confirmed cases and antigen positive case variables were combined to create a case variable. Confirmed and probable deaths were combined to create a death variable. Chi Square analyses were conducted for COVID-19 confirmed antigen positive cases and deaths by age, sex, and race. Series plots were created to show the number of cases and deaths by month for age, sex, and race to show trends in cases and deaths from January 2021-December 2021.

All analyses were conducted using SAS version 9.4 software (SAS Institute. Cary, NC, US).

CHAPTER 4. RESULTS

Table 1 shows the demographic composition of COVID-19 cases, probable cases, and deaths in Georgia. Age group is grouped by < 18, 18-65, and 65+, sex is grouped by male and female, and race is grouped by White, Black, and Other. The sample size available to analyze COVID-19 confirmed and antigen positive cases and COVID-19 deaths was 864,945 observations.

Among COVID-19 confirmed and antigen positive cases in Georgia between January 2021 to December 2021, 23.2% [95% CI: 21.8%, 24.5%] occurred in people under 18. However, people under 18 only accounted for 0.1% of COVID-19 deaths in Georgia. Individuals aged 18-65 accounted for 68.6% [95% CI: 67.0%, 70.1%] of confirmed and antigen positive cases, and 36.0% [95% CI: 35.3%, 36.8%] of deaths. People aged 65 and older accounted for 8.2% [95% CI: 7.2%, 9.0%] of confirmed and antigen positive cases, and 63.9% [95% CI: 63.1%, 64.5%] of COVID deaths. 1669 observations were missing among age.

862,020 observations were available to analyze COVID-19 confirmed and antigen positive cases and COVID-19 deaths by sex (Table 1). Males accounted for 46.3% [95% CI: 44.5%, 48.3%] of confirmed and antigen positive cases, and 54.1% [95% CI: 53.3%, 54.9%] of deaths. Females accounted for 53.7% [95% CI: 52.0%-55.3%] of confirmed and antigen positive cases, and 45.9% [95% CI: 45.1%, 46.7%] of deaths. 5594 observations were missing.

735,147 observations were available to analyze COVID-19 confirmed and antigen positive cases and deaths by race (Table 1). White people account for 52.0% [95% CI: (50.4%, 53.5%)] of confirmed and antigen positive cases, and 64.7% [95% CI: 63.9%, 65.4%] of COVID-19 deaths. Among COVID-19 confirmed and antigen positive cases, 36.4% [95% CI: 35.5%, 37.3%] occurred Black or African American people, and 31.4% [95% CI: 30.6%, 32.0%] of

deaths. Other races account for 11.6% [95% CI: 10.2%, 12.9%]) of confirmed and antigen positive cases and 3.8% [95% CI: 3.5%, 4.1%] of deaths. 131,467 observations were missing.

Table 2 shows monthly demographic characteristics of COVID-19 confirmed and antigen positive cases and deaths by age, sex, and race in Georgia in 2021. In Table 2a, Georgians under 18 account for 12.3% of all COVID-19 cases in January. This number rose to 28.0% in August, ending at 15.8% in December 2021. In the 18-65 age group, confirmed and antigen positive cases remained relatively stable. However, in the 65 and older group, the percentage of COVID-19 cases decreased from 13.5% in January 2021 to 7.6% in August, ending the year with 6.4%. Georgians 18-65 account for 74.2% of confirmed and antigen positive cases in January.

Bar plots and series plots for COVID-19 confirmed and antigen positive cases and COVID-19 deaths were plotted to show trends by month by age, sex, and race. Figure 1a and 1b show that among COVID-19 cases by age from January to December 2021, 12.0% to 28.0% of COVID-19 cases occurred in people under 18. According to the Georgia Census in 2020, people under 18 account for 23.6% of the population. 64.4% to 77.8% of cases occurred in people aged 18-65. The 2020 Georgia census reports that 62.1% of the population are between the ages of 18-65 years. Among COVID-19 confirmed and antigen positive cases, 6.4% to 13.5% occur in people aged 65 and older. The 2020 Georgia Census reports that persons aged 65 and older make up 14.3% of the population. The chi square value for monthly COVID-19 confirmed and antigen positive cases by age in Georgia in 2021 is 23639.3 with a corresponding p-value of <0.0001. Therefore, the age composition statistically significantly differed by month from January 2021 to December 2021.

Males in January 2021 accounted for 45.7% of COVID-19 cases, while females accounted for 54.3% of cases. This number remained relatively stable throughout the year. In

December 2021, males accounted for 41.7% of COVID-19 confirmed and antigen positive cases while Females accounted for 58.3%. Figure 1c and 1d demonstrate that the population that were male increased from 41.7% in January 2021 to 47.4% in December 2021 and the population that were female decreased from 62.0% in January 2021 to 54.4% in December 2021. Males account for 48.6% and females account for 51.4% of the population according to the 2020 Georgia Census.

The chi square value for monthly COVID-19 confirmed and antigen positive cases is 1113.9 with a corresponding p-value of <0.0001 . As such, the composition of cases among males and females statistically significantly differed by month from January 2021 to December 2021.

Percentages remained relatively stable among each of the race groups throughout the year. White populations account for 54.2% of COVID-19 cases in January. In May, it decreased to 47.8%, rose to 61.8% in November. In December, White populations accounted for 41.7% of COVID-19 cases in December 2021. Black populations accounted for 30.6% of cases at the beginning of the year. In May, it rose to 42.8% of cases. Although it decreased to 27.5% in November, it rose to 47.8% at the end of the year. Other races accounted for 15.2% of COVID-19 cases in January. In May, it decreased to 9.4%. At the end of the year, Other races accounted for 10.5% of cases in Georgia. Figure 1e and 1f show that from January to December, 41.7% to 55.9% occurred in White populations. The 2020 Georgia Census reports that they account for 60.2% of the total population. Black populations make up for 27.5% to 47.8% of the COVID-19 confirmed and antigen positive cases in 2021. The 2020 Georgia Census reports that they account for 32.6% of the total population. Other races made up of 8.0% to 15.2% of COVID-19 cases from January to December. The Georgia Census reports that Other races account for 7.2% of the population.

The chi square value for monthly COVID-19 cases by race in Georgia in 2021 was 12537.4 with a corresponding p-value of <0.0001 . Therefore, race statistically significantly differed by month among COVID-19 cases in 2021.

COVID-19 deaths by age, sex, and race, are also computed in Table 2b. Georgians under 18 accounted for less than 0.5% of COVID-19 deaths in Georgia in 2021. From March to May, and in July, children under 18 did not account for any deaths in Georgia. Persons aged 18-65 accounted for 23.0% of COVID-19 cases in January. The percentage of cases from 23.9% in February to 48.1% in October. In November and December, COVID-19 cases stayed relatively stable, ending with 42.3% in December 2021. People aged 65 and older accounted for 76.9% of deaths in January, and decreased to 51.6% in October. In November, people aged 65 and older accounted for 57.0%, and rose to 57.4% in December 2021.

Figure 2a and 2b demonstrate that over the course of January to December by age, people less than 18 account for 0% to 0.2% of deaths and make up 23.6% of the Georgia population according to the 2020 census. Individuals aged 18-65 years make up 51.6% to 76.9% of deaths in 2021 and make up 62.1% of the Georgia population. Persons aged 65 and older accounted for 51.2% to 76.9% of the deaths from January to December and make up 14.3% of the Georgia population.

The chi square value for COVID-19 deaths by age was 838.8 with a corresponding p-value of <0.0001 . As such, age statistically significantly differed by month in 2021.

Male populations in Georgia accounted for 55.6% of COVID-19 deaths in Georgia. By compliment, females accounted for 44.4% of deaths in the same period. Deaths for both males and females in Georgia stayed relatively stable throughout the year. Figure 2c and 2d show that among COVID-19 deaths over the course of January to December 2021, male populations made

up 53.5% to 71.4% of COVID-19 deaths from January to December 2021 while female populations made up 44.4% to 50.8% of deaths over the course of 2021. Male populations accounted for 48.6% of the Georgia population while females made up 51.4% according to the 2020 Georgia Census.

The chi square value for monthly deaths due to COVID-19 by sex in Georgia in 2021 was 20.0 with a corresponding p-value of 0.0447. As such, sex statistically significantly differed by month in Georgia in 2021.

White populations accounted for 70.2% of COVID-19 deaths and decreased to 55.5% in June. In July, White populations accounted for 71.4%, and decreased to 69.2% in August. From August to November deaths stayed relatively stable. At the end of the year, White populations made up 58.4% of deaths. Black populations accounted for 26.0% of COVID-19 deaths at the beginning of the year and rose to 41.1% in May 2021. In December, Black populations made up 33.0% of COVID-19 deaths. Other races accounted for 3.8% of deaths in January. Although the percentage of deaths remained relatively stable for most of the year, there was an uptick in deaths at the end of the year, as Other races accounted for 8.6% of COVID-19 deaths in December 2021. The chi square value for the racial composition of confirmed and probable cases by month in Georgia in 2021 is 241.9 with a corresponding p-value of <0.0001. As such, race was statistically significantly different by month in 2021.

Among COVID-19 deaths by race from January to December 2021, White populations accounted for 53.5% to 71.4% of deaths, and make up 60.2% of the population in Georgia in 2020. Black populations account for 26.0% to 41.1% of deaths and make up 32.6% of the Georgia population in 2020. Other races made up of 2.2% to 8.6% of deaths, and 7.2% of the population in Georgia in 2021.

Table 1: Demographic Composition of COVID-19 Cases, Probable Cases, and Deaths in Georgia in 2021

Characteristic	Among COVID-19 Cases (Confirmed and Antigen Positive)		Among COVID-19 Deaths		Georgia Population
	%	Confidence Intervals	%	Confidence Intervals	
Age group					
n= 864945	%	Confidence Intervals	%	Confidence Intervals	
< 18	23.2%	(21.8%-24.5%)	0.1%	(0.04%-0.14%)	23.6%
18-65	68.6%	(67.0%-70.1%)	36.0%	(35.3%-36.8%)	62.1%
65 +	8.2%	(7.2%-9.0%)	63.9%	(63.1%-64.5%)	14.3%
Missing Age, n	1669			545	
Sex					
n= 861020					
Male %	46.3%	(44.5%-48.3%)	54.1%	(53.3%-54.9%)	48.6%
Female %	53.7%	(52.0%-55.3%)	45.9%	(45.1%-46.7%)	51.4%
Missing Sex, n	5594			688	
Race					
n = 735147					
White %	52.0%	(50.4%-53.5%)	64.7%	(63.9%-65.4%)	60.2%
Black or African American %	36.4%	(35.5%-37.3%)	31.4%	(30.6%-32.0%)	32.6%
Other %	11.6%	(10.2%-12.9%)	3.9%	(3.5%-4.1%)	7.2%
Missing Race, n	131467			47885	

Table 2a: Monthly COVID-19 Cases by Age in Georgia in 2021¹⁶

Month	< 18		18-65		65+		Chi Square	P-Value
	n	%	n	%	n	%		
							23639.3	<0.0001
January	22249	12.3%	13449	74.2%	24445	13.5%		
February	10282	15.0%	50039	73.0%	8263	12.0%		
March	5462	15.8%	25751	74.8%	8263	9.4%		
April	4203	14.9%	21684	76.9%	2134	8.2%		
May	2714	16.0%	12805	75.3%	1487	8.7%		
June	1007	12.0%	6471	77.3%	893	10.7%		
July	4942	15.8%	23592	75.6%	2670	8.6%		
August	44102	28.0%	101285	64.4%	11938	7.6%		
September	31375	23.8%	89186	67.6%	11333	8.6%		
October	9654	22.4%	29114	67.7%	4262	9.9%		
November	4072	19.6%	14646	70.5%	2060	9.9%		
December	21380	15.8%	104897	77.8%	8644	6.4%		
Jan-Dec	161442		492919		86392			
GA Census 2020		23.6%		62.1%		14.3%		

¹⁶ Data was extracted from the Georgia Department of Public Health SendSS Database

Table 2b: Monthly COVID-19 Cases by Sex in Georgia in 2021

Month	Male		Female		Chi Square	P-Value
	n	%	n	%		
					1113.9	<0.0001
January	82565	45.7%	98051	54.3%		
February	32024	46.9%	36298	53.1%		
March	16433	48.0%	17863	52.0%		
April	13096	46.7%	14961	53.3%		
May	7855	46.4%	9068	53.6%		
June	3972	47.7%	4354	52.3%		
July	14211	45.6%	16947	54.4%		
August	72013	45.9%	84814	54.1%		
September	61019	46.6%	69999	53.4%		
October	20090	47.3%	22333	52.7%		
November	9781	47.4%	10860	52.6%		
December	56039	41.7%	78363	58.3%		
Jan-Dec	389098		463911			
GA Census 2020		48.60%		51.4%		

Table 2c: Monthly COVID-19 Cases by Race in Georgia in 2021

Month	White		Black		Other		Chi Square	P-Value
	n	%	n	%	n	%		
							12537.4	<0.0001
January	88045	54.2%	49805	30.6%	24755	15.2%		
February	32837	53.3%	20875	33.9%	7290	12.8%		
March	16820	53.7%	10489	33.5%	4002	12.8%		
April	12209	47.8%	10316	40.4%	3025	11.8%		
May	7364	47.8%	6608	42.8%	1450	9.4%		
June	3827	51.9%	2873	38.9%	681	9.2%		
July	14306	51.0%	11474	41.0%	2255	8.0%		
August	69843	52.2%	50555	37.8%	13402	10.0%		
September	61457	55.9%	37941	34.5%	10586	9.6%		
October	19571	55.3%	11761	33.3%	4031	11.4%		
November	10570	61.8%	4705	27.5%	1838	10.7%		
December	41715	41.7%	47778	47.8%	10530	10.5%		
Jan-Dec	378564		265180		83845			
GA Census 2020		60.2%		32.6%		7.2%		

Table 3a: Monthly Deaths due to COVID-19 by Age in Georgia in 2021¹⁷.

Month	< 18		18-65		65+		Chi Square	P-Value
	n	%	n	%	n	%		
							838.8	<0.0001
January	1	0.04%	617	23.0%	2055	76.9%		
February	1	0.04%	594	23.9%	1889	76.0%		
March	0	0%	440	28.3%	1114	71.7%		
April	0	0%	278	29.0%	681	71.0%		
May	0	0%	186	36.5%	324	63.5%		
June	1	0.2%	161	36.7%	277	63.1%		
July	0	0%	90	36.7%	155	63.3%		
August	1	0.1%	426	44.6%	529	55.3%		
September	4	0.1%	1378	48.7%	1449	51.2%		
October	6	0.2%	1152	48.1%	1235	51.6%		
November	1	0.1%	362	42.9%	481	57.0%		
December	1	0.1%	314	42.3%	426	57.4%		
Jan-Dec	16		5998		10615			
GA Census 2020		23.6%		62.1%		14.3%		

¹⁷ Data was extracted from the Georgia Department of Public Health SendSS Database

Table 3b. Monthly Deaths due to COVID-19 by Sex in Georgia in 2021

Month	Male		Female		Chi Square	P-Value
	n	%	n	%		
					20.0	0.0447
January	1485	55.6%	1188	44.4%		
February	1375	55.4%	1108	44.6%		
March	843	54.2%	711	45.8%		
April	471	49.2%	487	50.8%		
May	268	52.6%	242	47.4%		
June	221	50.3%	218	49.7%		
July	123	50.2%	122	49.8%		
August	513	53.7%	443	46.3%		
September	1561	55.1%	1270	44.9%		
October	1282	53.6%	1110	46.4%		
November	455	54.0%	388	46.0%		
December	389	52.6%	351	47.4%		
Jan-Dec	8986		7638			
GA 2020 Census		48.6%		51.4%		

Table 3c. Monthly Deaths due to COVID-19 by Race in Georgia in 2021

Month	White		Black		Other		Chi Square	P-Value
	n	%	n	%	n	%		
							249.1	<0.0001
January	1876	70.2%	694	26.0%	101	3.8%		
February	1645	66.4%	709	28.6%	123	5.0%		
March	888	57.2%	603	38.9%	60	3.9%		
April	558	58.3%	351	36.7%	48	5.0%		
May	273	53.5%	209	41.1%	27	5.3%		
June	242	55.5%	170	39.0%	24	5.5%		
July	175	71.4%	64	26.1%	6	2.5%		
August	660	69.2%	273	28.6%	21	2.2%		
September	1915	68.0%	832	29.5%	70	2.5%		
October	1547	65.0%	762	32.0%	73	3.0%		
November	516	61.7%	290	34.7%	30	3.6%		
December	413	58.4%	234	33.0%	61	8.6%		
Jan-Dec	10708		5191		644			
GA 2020 Census		60.2%		32.6%		7.2%		

FIGURES

Figure 1a. Monthly Confirmed COVID-19 Cases by Age in Georgia in 2021

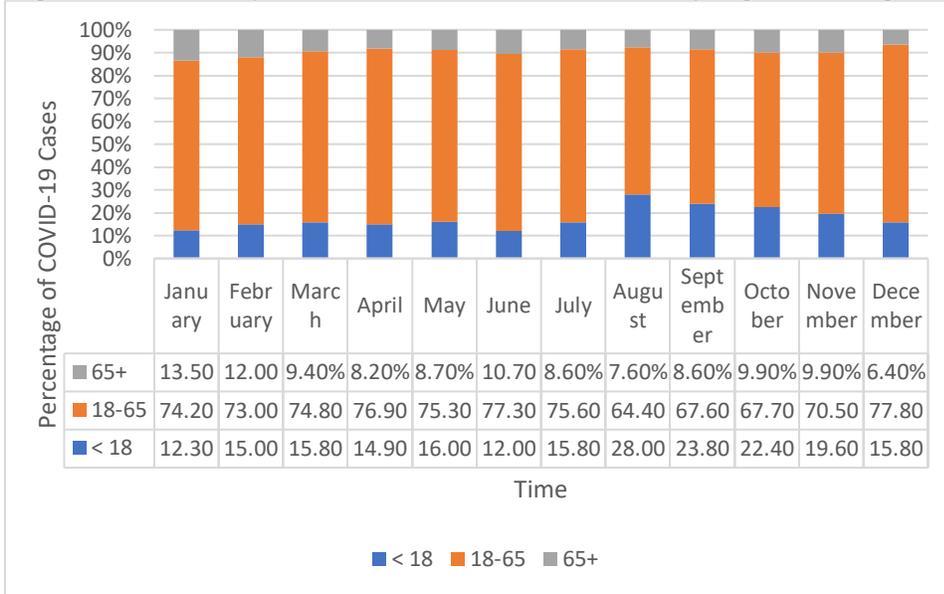


Figure 1b. Monthly Confirmed COVID-19 Cases by Age in Georgia in 2021

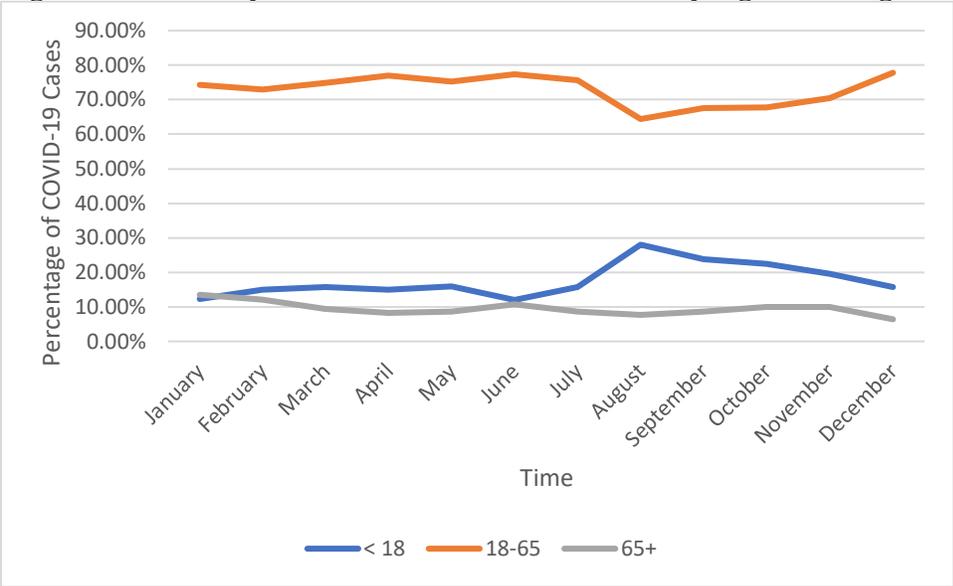


Figure 1c. Monthly Confirmed COVID-19 Cases by Sex in Georgia in 2021

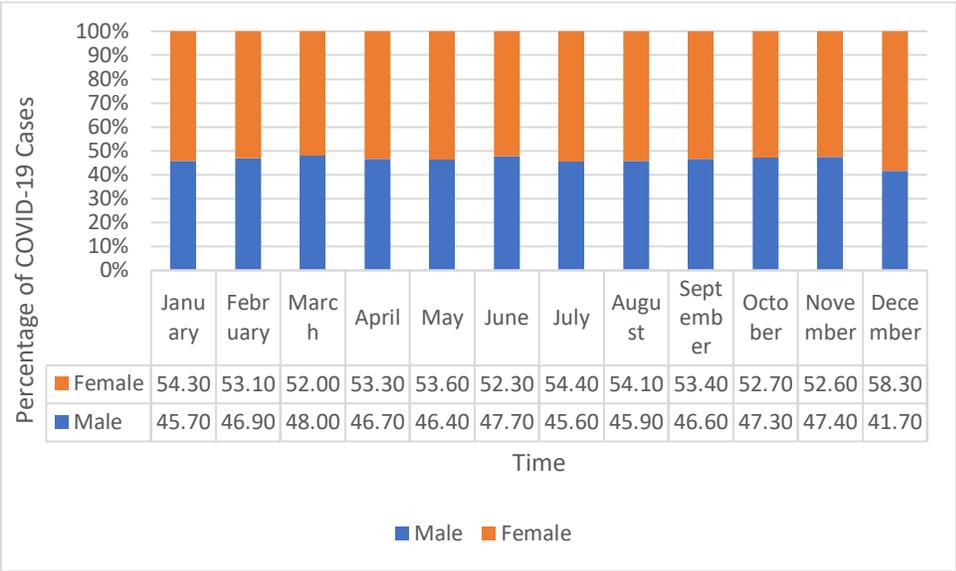


Figure 1d. Monthly Confirmed COVID-19 Cases by Sex in Georgia in 2021

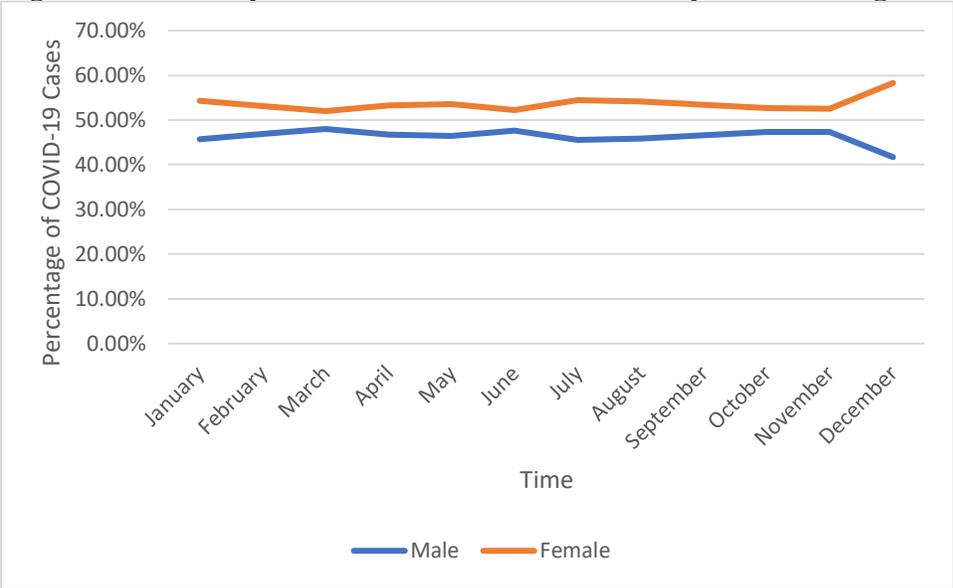


Figure 1e. Monthly Confirmed COVID-19 Cases by Race in Georgia in 2021

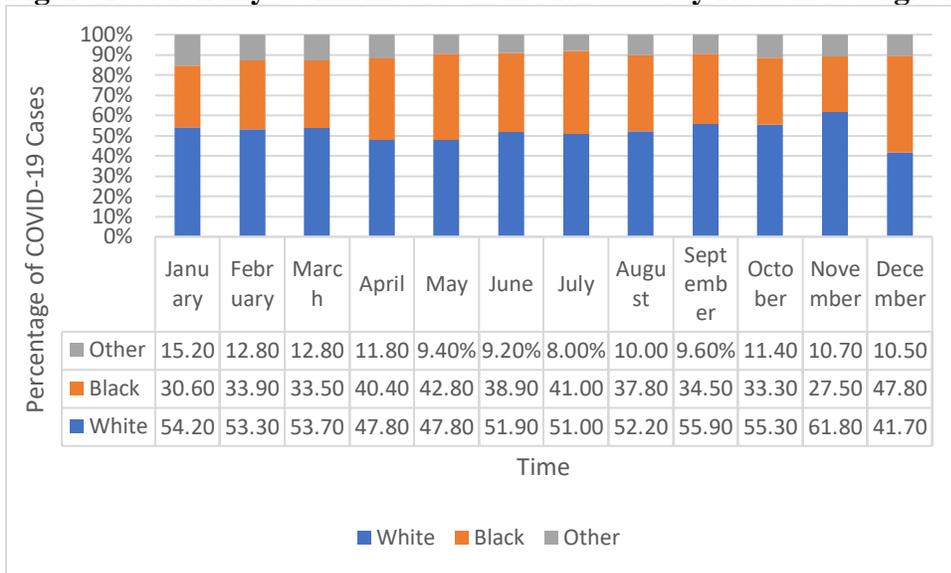


Figure 1f. Monthly Confirmed COVID-19 Cases by Race in Georgia in 2021

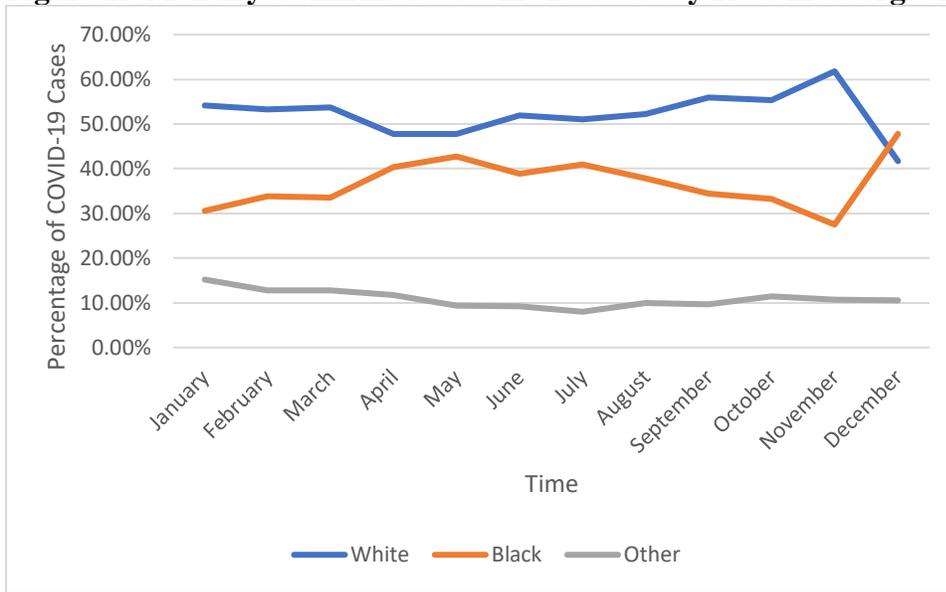


Figure 2a. Monthly COVID-19 Deaths by Age in Georgia in 2021

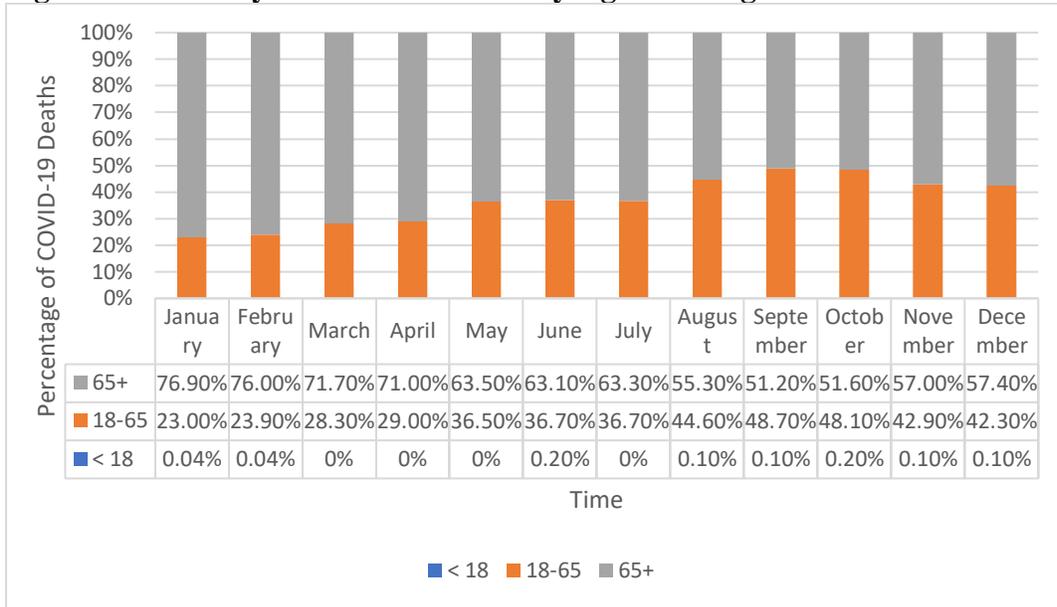


Figure 2b. Monthly COVID-19 Deaths by Age in Georgia in 2021

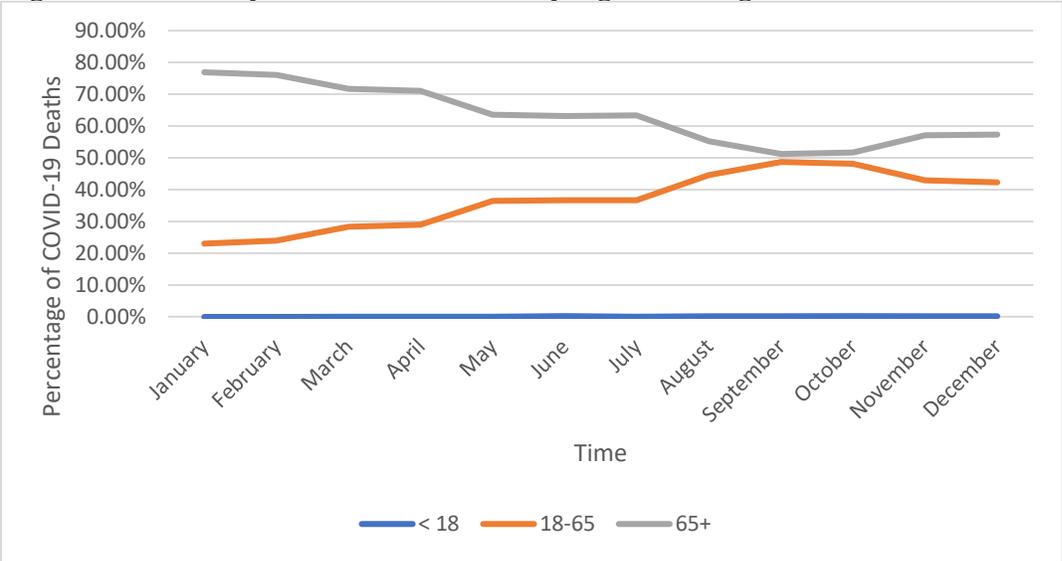


Figure 2c. Monthly COVID-19 Deaths by Sex in Georgia in 2021

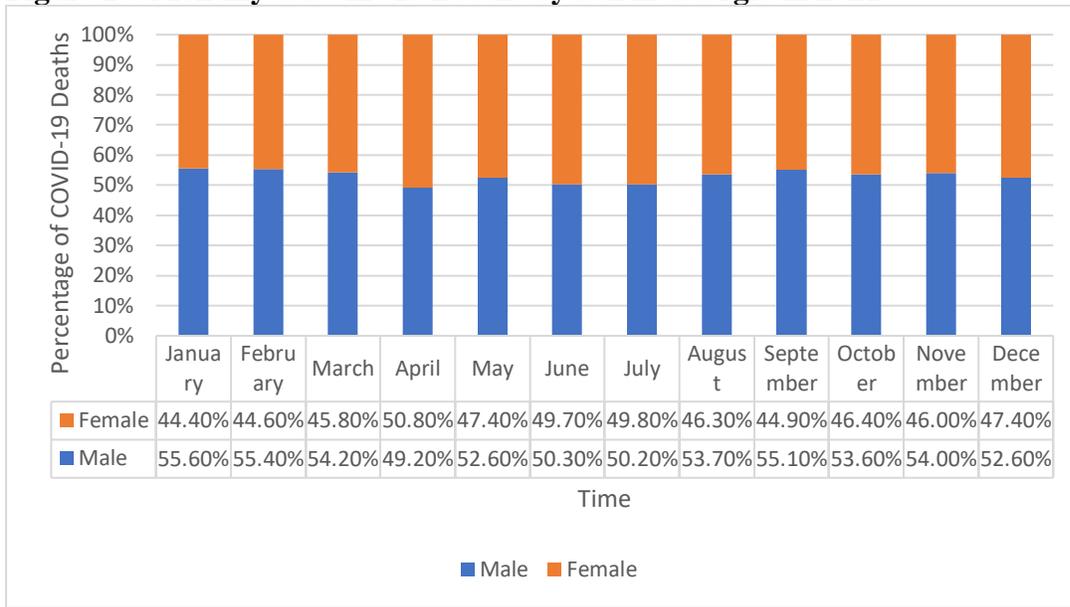


Figure 2d. Monthly COVID-19 Deaths by Sex in Georgia in 2021

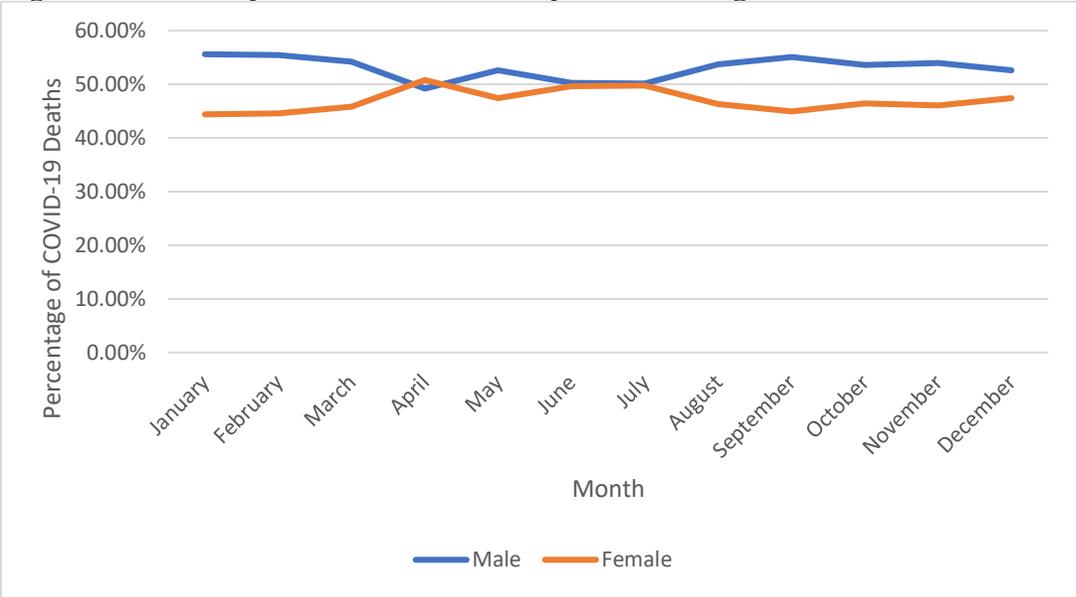


Figure 2e. Monthly COVID-19 Deaths by Race in Georgia in 2021

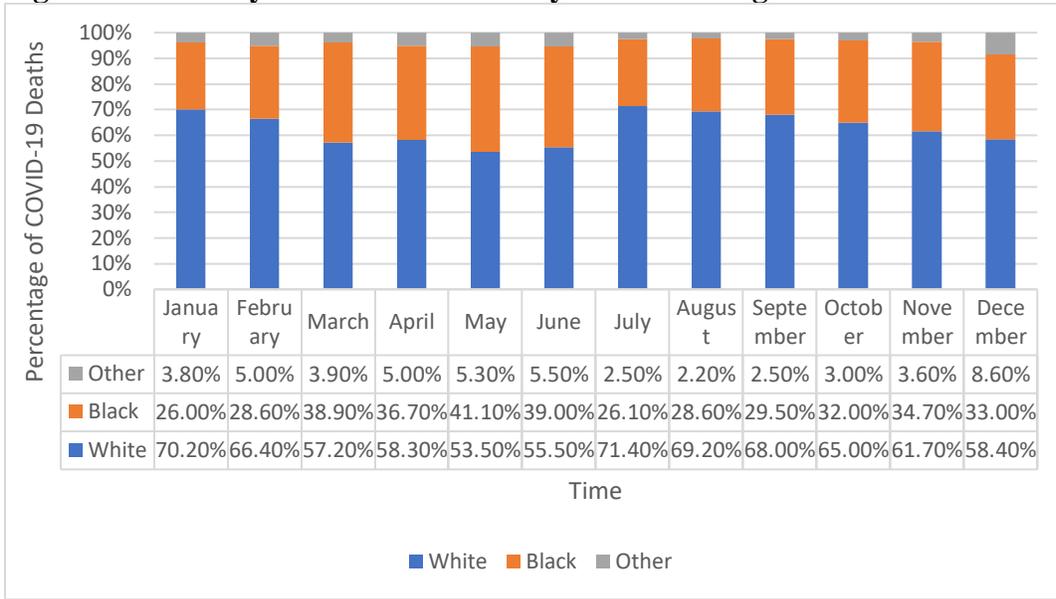
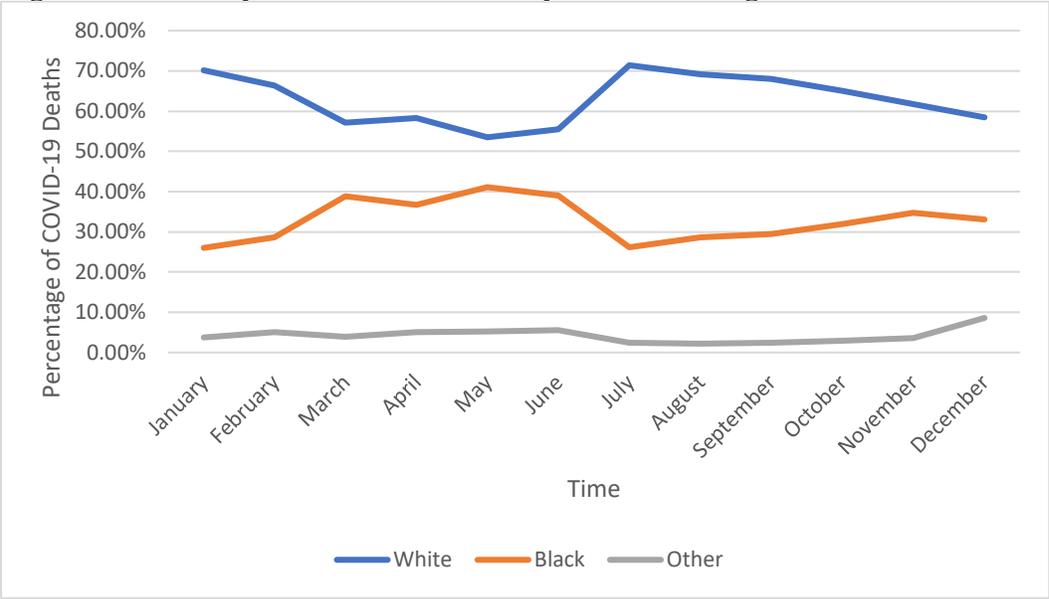


Figure 2f. Monthly COVID-19 Deaths by Race in Georgia in 2021



CHAPTER 5. DISCUSSION

The 18-65 age group made up the largest percentage of cases while the 65 and older age group made up the highest percentage of deaths. We observed that people in Georgia aged 18-65 consistently made up the largest percentage of cases throughout the year, and while the contribution of the 65 years and older age group to total cases consistently remained under 20% during the same period. However, people aged 65 and older contribute to a much higher percentage of deaths in Georgia in 2021 than adults aged 18-65 and children under 18. A larger fraction of cases were females while a larger fraction of deaths due to COVID-19 were males in Georgia. White populations, followed by Black and Other race groups, made up the highest percentage of COVID-19 cases and deaths. The results detailing COVID-19 confirmed and antigen positive cases and deaths by age, sex, and race in Georgia can provide state and local health departments like the Georgia Department of Public Health insight on which demographic groups including age, sex, and race are disproportionately affected by COVID-19 (cases and deaths). As a result, it may lead to better resource allocation including prioritizing testing, vaccinations, and contact tracing endeavors.

Our analyses indicate that there were changes in the demographic composition of COVID-19 confirmed and antigen positive cases and deaths by month over the 2021 calendar year. Our findings indicate that there was a substantial rise in cases among children under 18 from July 2021 to August and September, when school went in back in person. We observed that females consistently made up a larger share of cases than males in Georgia in 2021, and there was a slight uptick in the female share of cases between November and December. Females also account for 51.4% of the Georgia population while males account for 48.6% of the population. While White populations make up 62% of the Georgia population according to the 2020 census,

their share of total cases was far below that (ranging from 41% to 56%) in all months except for November (61.8%). However, In contrast, Black populations make up 32.6% of the Georgia population but made up over 40% of all cases in several months (April, May, July, and December). Other races make up only 7.2% of the Georgia population, but account for between 8% and 15% of all cases. Therefore, Black and Other race groups disproportionately accounted for confirmed and antigen positive cases relative to their share of the Georgia population.

Children under 18 contributed the least to deaths compared to people aged 18-65 and 65+. This result is consistent with the literature, as the study by Khera et al found that age-associated mortality from COVID-19 exhibits a U-shaped pattern such that the lowest mortality rate was observed in children under 12 years of age in the US that increases throughout life. The American Academy of Pediatrics estimates that though children under 18 accounted for about 19% of all COVID-19 cases, less than 0.26% of the cases resulted in death. Georgians aged 65 and older have the highest percentage in deaths primarily in the first and second quarter of the year. However, this age group only makes up only 14.3% of the Georgia population in 2020. Thus, it may be plausible to conclude that Georgians aged 65 and older are disproportionately dying from COVID-19 compared to the other age groups analyzed.

During the months of January to March, males accounted for more deaths than females. However, as 2021 progressed, deaths among males decreased and deaths among females increased until they reached a point in April where deaths among females were slightly higher than deaths among males. In December males had a higher share of deaths than females.

Strengths of the study include that the SendSS database used for the analysis was the most comprehensive database of COVID-19 confirmed and antigen positive cases and deaths. The database had enough observations to conduct descriptive analysis over time. In addition, we

had the capacity to use demographic variables to examine disparities in COVID-19 cases and deaths in Georgia. In addition, there were fewer missing observations for age, and sex for both COVID-19 cases and deaths. Although there is a myriad of research examining COVID-19 confirmed and antigen positive cases and deaths by various demographic factors, few studies thus far explore trends in COVID-19 cases and deaths by age, sex, and race, especially in a diverse state as Georgia. As such, this study aims to close the knowledge gap and provide additional insight on trends by various demographic factors.

Limitations of the study include that some people may have had COVID-19 reinfection or may have developed COVID-19 twice and are double counted. Some people may never be detected or reported to contribute to the monthly counts. In addition, demographic factors should also be analyzed against each other to provide a crisper story of COVID-19 by demographic characteristics. Finally, there were over 100,000 missing observations for race.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

Ultimately, studying the magnitude of COVID-19 confirmed and antigen positive cases and deaths by various demographic factors not only solidified findings in the literature, but also underscored the necessity for continued COVID-19 surveillance, while also considering various demographic factors that may contribute to cases and deaths. Moreover, this analysis filled in key knowledge gaps by providing monthly trends of COVID-19 confirmed and antigen positive cases and deaths by demographic factors and additional insight about the variability in demographic contribution of cases and deaths over the span of a year. The time sensitive nature of COVID-19 promulgates a need for continued research and analysis of morbidity and mortality, vaccinations, hospitalizations, resource-allocation for COVID-19 including prioritizing testing, vaccinations, and contact tracing endeavors by demographic factors at both the county-level and state-level. Ultimately, the continued presence of COVID-19 in the world warrant additional emphasis on conducting research to better understand the social and demographic factors that drive the course of the pandemic and the health and quality of life of populations in the future.

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