

# Demographic and Clinical Risk Factors for COVID-19 In-Hospital Deaths in Mississippi, 2020

**Background:** Mortality rates for COVID-19, especially among elderly and patients with chronic comorbidities, are high. An in-depth analysis of the contributing causes to such deaths will help target vulnerable populations with the appropriate public health interventions. To examine the demographic and clinical risk factors associated with COVID-19 hospitalizations in Mississippi, we performed a retrospective analysis of Mississippi's hospital discharge data for 2020 (03/01/2020-12/31/2020). We examined all hospitalizations with a COVID-19 diagnosis and categorized comorbidities using the Elixhauser Comorbidity Index. The study included only Mississippi residents.

**Overview:** The hospital discharge dataset for 2020 includes 23,403 COVID-19-associated hospitalizations. Of these, 22,111 (94.5%) were among Mississippi residents. The total number of in-hospital deaths, COVID-19 and non-COVID-19, among residents was 10,823; of these 3,141 had a COVID-19 diagnostic code. This represented a 39.9% increase in in-hospital deaths compared to 2019 (Figure 1 and Figure 2). Twenty percent of all COVID-19 in-hospital deaths occurred during December—the month with the highest transmission rates in 2020.

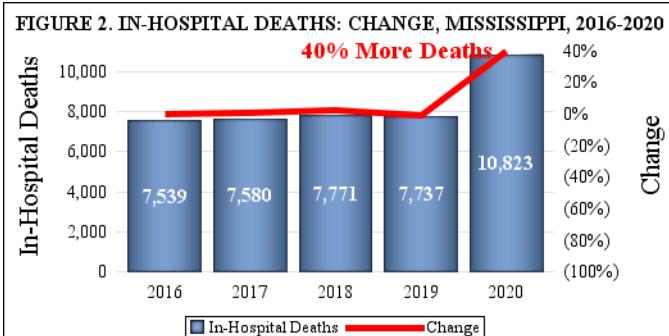
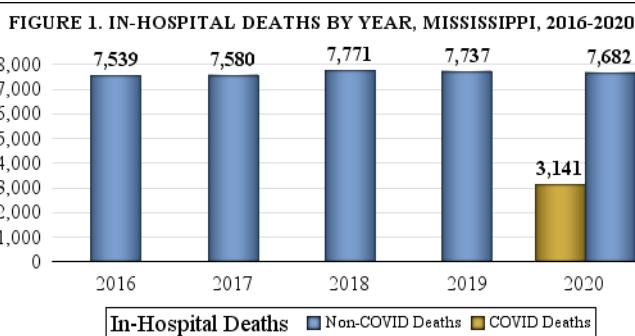
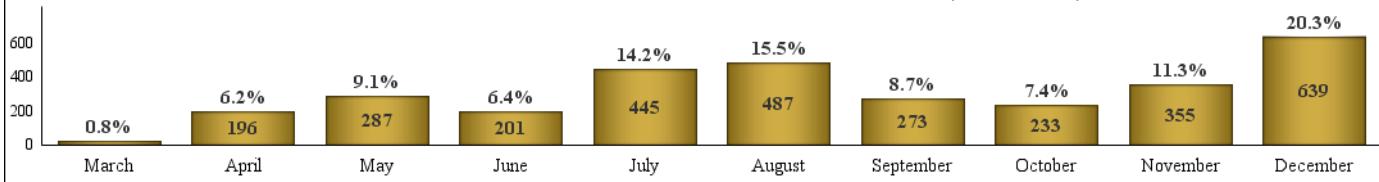
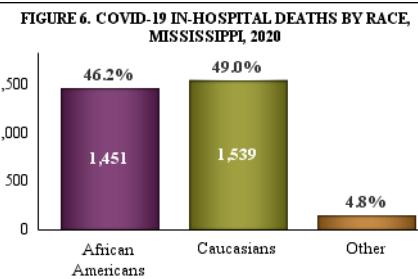
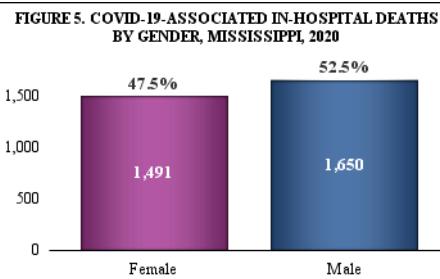
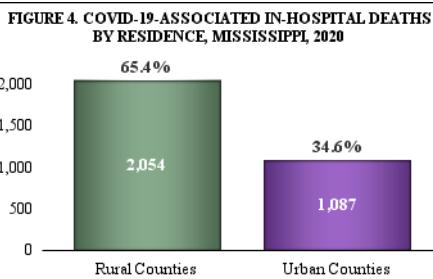


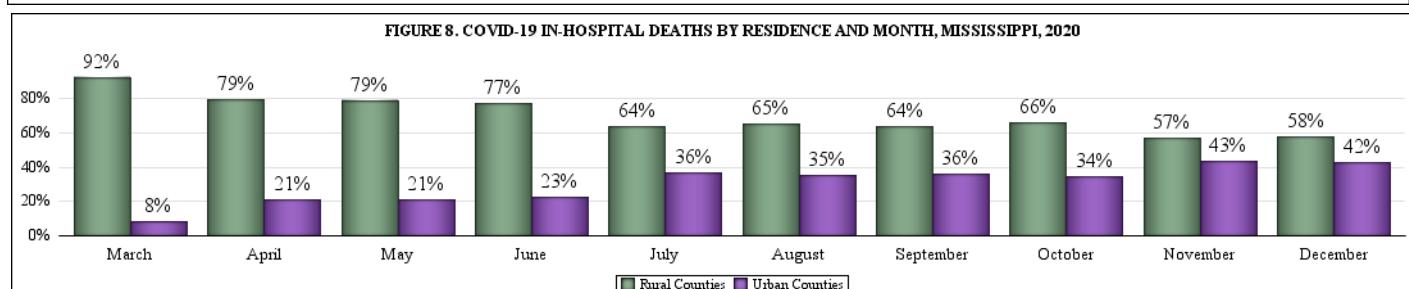
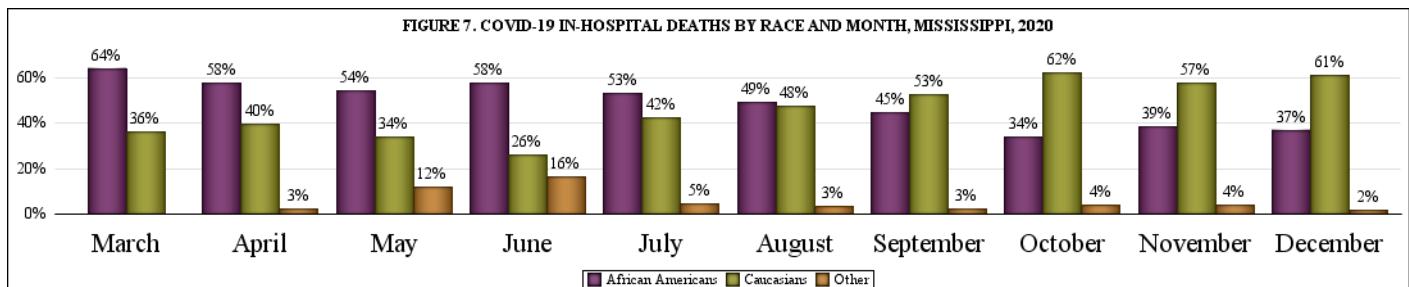
FIGURE 3. COVID-19-ASSOCIATED IN-HOSPITAL DEATHS BY MONTH, MISSISSIPPI, 2020



**Demographics:** In-hospital deaths were highly prevalent among rural residents. Two-thirds (65.4%) of such deaths occurred among COVID-19 patients residing in rural areas. There were more women admitted with a COVID-19 diagnosis than men in 2020 (53.8 vs. 46.2). Among COVID-19 deceased patients, however, men had higher in-hospital mortality than women (52.5% vs. 47.5%) (Figure 5). This finding may suggest that men tend to seek medical help for COVID-19 after complications develop. The proportion of fatal COVID-19 hospitalizations was slightly higher among Caucasians (49.0%) than African Americans (46.2%) (Figure 6).

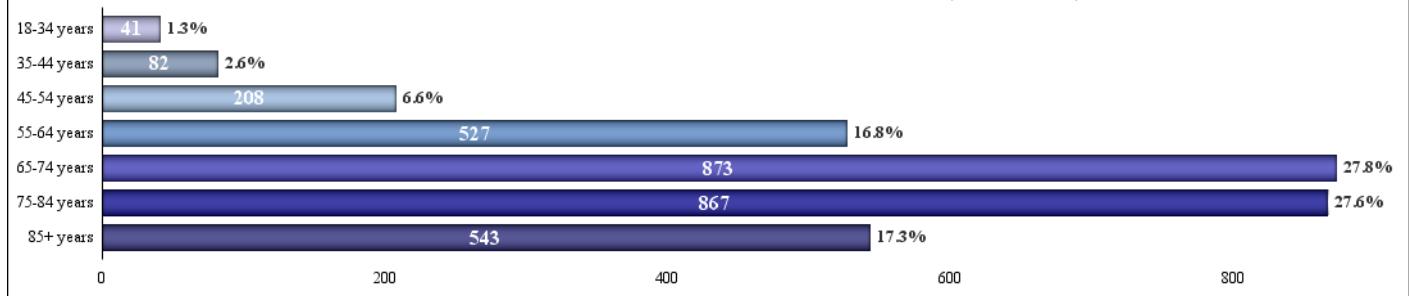
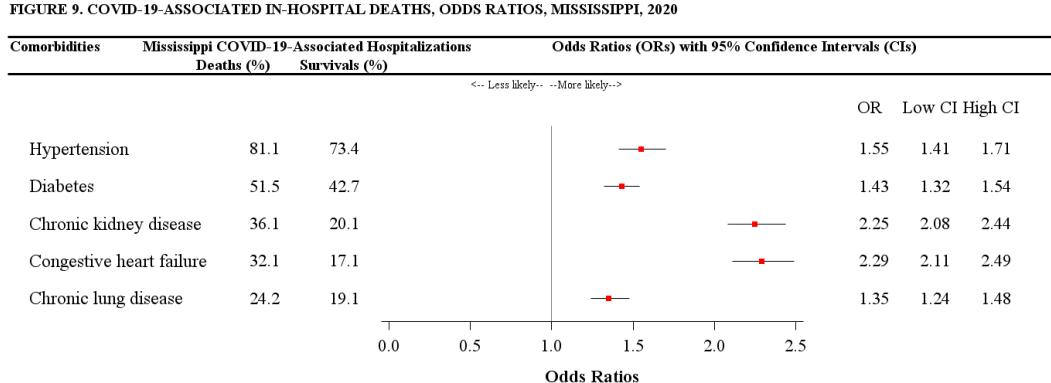


**Shift in the Demographic Distribution:** There was a shift in the racial distribution of in-hospital deaths, however. Between March and August, there were more in-hospital deaths among African Americans than Caucasians. In September, this trend reversed. Between September and December, there were more in-hospital deaths among Caucasians. (Figure 7). Likewise, the proportion of deceased patients from urban areas increased over time (Figure 8).



**Comorbidities:** Further analyses revealed that COVID-19 deceased patients had more comorbidities (mean, 5.0 vs. 3.5) and a higher proportion of severe coexisting illness including, hypertension (81.1% vs 73.4%), diabetes (51.5% vs. 42.7%), chronic renal failure (36.1% vs. 20.1%), congestive heart failure (32.1% vs. 17.1%), and chronic pulmonary disease (24.2 vs. 19.1%). The above-mentioned differences were statistically significant at  $p < .001$ . After controlling for covariates by multivariable analysis, age was the strongest predictor for in-hospital COVID-19-associated deaths. Among patients hospitalized with COVID-19, the age group 65+ had a seven-fold higher risk for dying compared to the 18-34 group. Yet, such deaths did occur among younger patients. In fact, 27.3% of all COVID-19-associated in-hospital deaths were among patients younger than 65 years of age (Figure 10).

**FIGURE 9. COVID-19-ASSOCIATED IN-HOSPITAL DEATHS, ODDS RATIOS, MISSISSIPPI, 2020**



**Data and Methods:** All Mississippi hospitals, except for federal facilities, are required to report their hospital discharge data to the Inpatient Outpatient Data System. In addition to clinical diagnoses and procedures performed, these data contain information on patient demographics, expected payers, hospital charges, and length of stay. To select COVID-19 cases, we used the following International Classification of Diseases (ICD-10-CM) diagnosis codes: B97.29 and B34.2 before 1 April 2020 and U07.1 from 1 April 2020 onward. To categorize residence status, we applied the Urban-Rural Classification Scheme for Counties developed by the National Center for Health Statistics (NCHS Urban-Rural Classification Scheme for Counties. National Center for Health Statistics. Vital Health Stat 2(166). 2014.)

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