

Burn Injury, Characteristics, and Epidemiology in African American Children in North Carolina

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Introduction

Unintentional injuries represent the leading cause of morbidity and mortality among children in the United States, with burn injuries making up a significant proportion¹. A variety of developmental, situational, and clinical factors create an elevated risk of serious injury or mortality from burns among young children, including immature motor and cognitive abilities, dependence on adult supervision, inability to self-rescue, and a combination of thin dermal skin layers and smaller body surface area that lead to larger, deeper burns². Due to the serious risk of morbidity and mortality in this patient population, identifying risk factors and predictors of clinical outcome is essential in order to devise preventative strategies and inform best treatment practices.

This study aims to assess the burden of burn injury for pediatric patients admitted to the Jaycee Burn Center at UNC Hospitals over the last ten years in order to identify trends in burn incidence and outcome. Specifically, we analyzed how African American children compare to other races in terms of burn characteristics, length of hospital stay, and type of surgical intervention utilized.

Methods

This is a retrospective review of all admitted pediatric burn patients (< 18 years old) to a busy, tertiary burn center in North Carolina from 2009 through 2019. We used bivariate analysis to compare patients based on reported race, comparing African Americans to all other races. Modified Poisson regression was used to model the probability of undergoing autologous skin grafting based on African American race, adjusted for potential confounders. To estimate socioeconomic disadvantage, we used the Area Deprivation Index (ADI), which uses factors for the theoretical domains of income, education, employment, and housing quality to rank groups of geographical blocks from lowest level of disadvantage (1) to the highest (100).

References

- Centers for Disease Control. "Child Injury Report". Feb 6, 2019.
- American Burn Association. "Scald Statistics and Data Resources". Aug 13, 2018.
- University of Wisconsin School of Medicine. "Neighborhood Atlas". 2018.
- Carolina Demography. "2018 County Population Estimates: Race & Ethnicity." Dec 5, 2019.

Results

4,227 children were admitted to the Jaycee Burn Center at UNC between 2009-2019. The median age was 3 years (IQR 1-8) with a male preponderance at 59.8% (n=2,529).

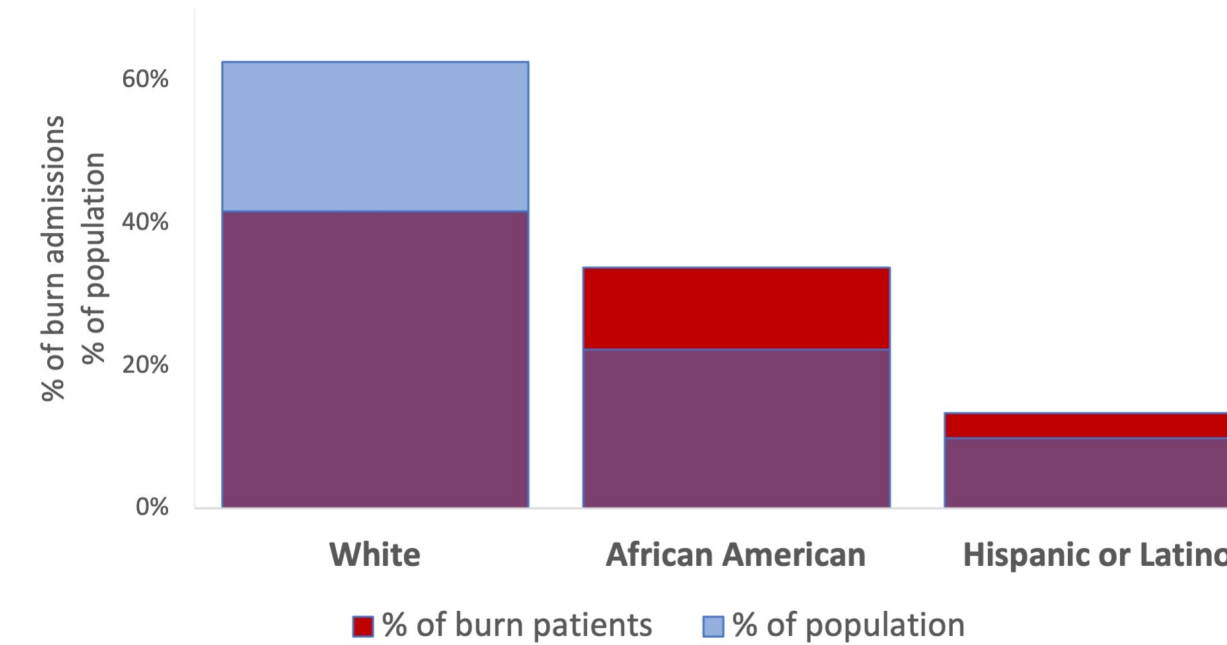
In the hospital, African American (AA) patients had a longer mean length of stay at 5.8 days (SD 13.6) versus 4.9 days (SD 13.8) but were not more likely to be admitted to the ICU with an admission prevalence of 17.1% (n=244) compared to 15.4% (n=430, p=0.13).

Compared to other races, African American patients were more likely to have autologous skin grafting at their initial operation, with an adjusted RR of 1.49 (95% CI 1.22-1.82) when controlling for age, Area Deprivation Index (ADI) national rank, TBSA, and burn type.

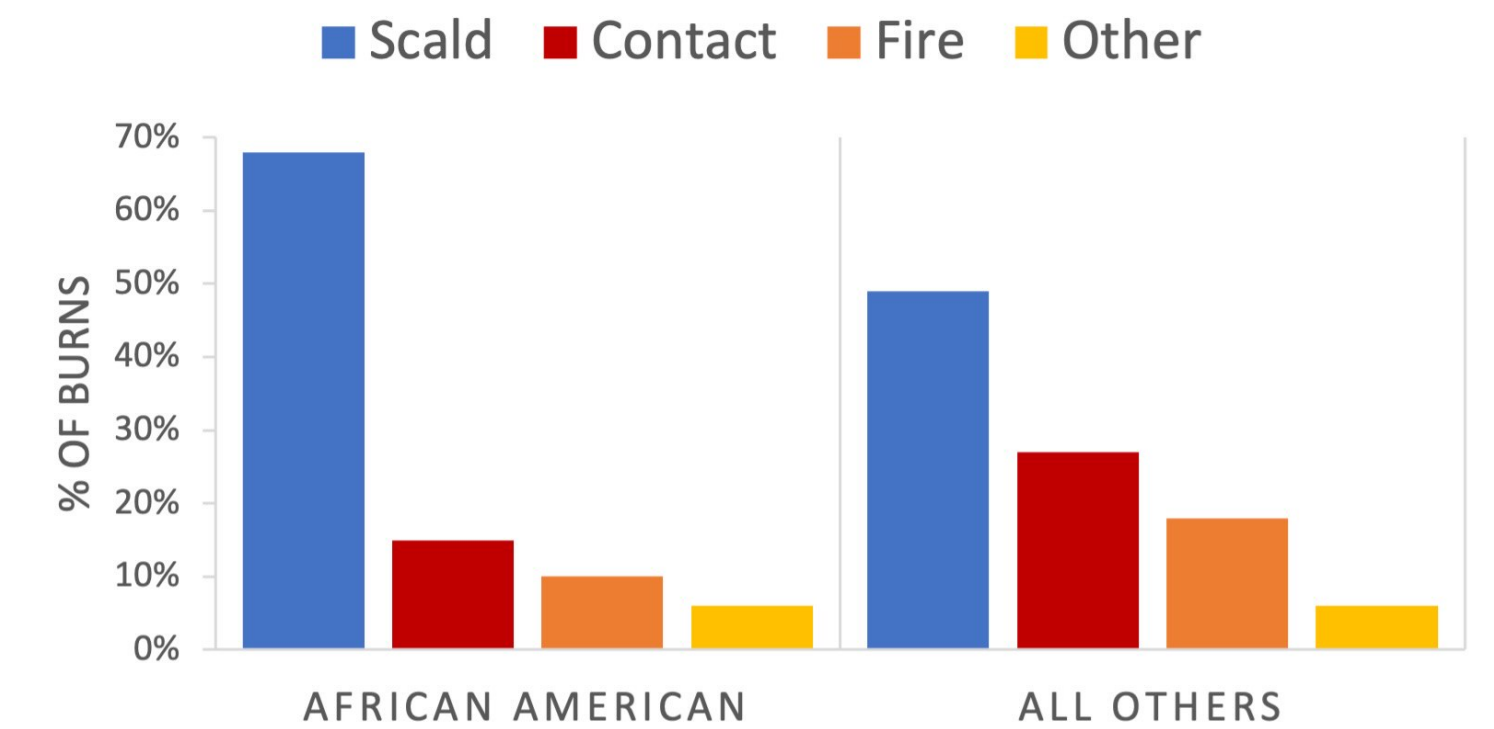
The median TBSA was 2% (IQR 1-5). African American patients had a slightly larger TBSA with a median of 3% (IQR 1-6) compared to 2% (IQR 1-5, p<0.001).

African American children were disproportionately represented among pediatric burn patients, comprising 33.7% of all patients, compared to an AA state population of 22.2%.

RACE OF PEDIATRIC BURN PATIENTS COMPARED TO PERCENT OF POPULATION



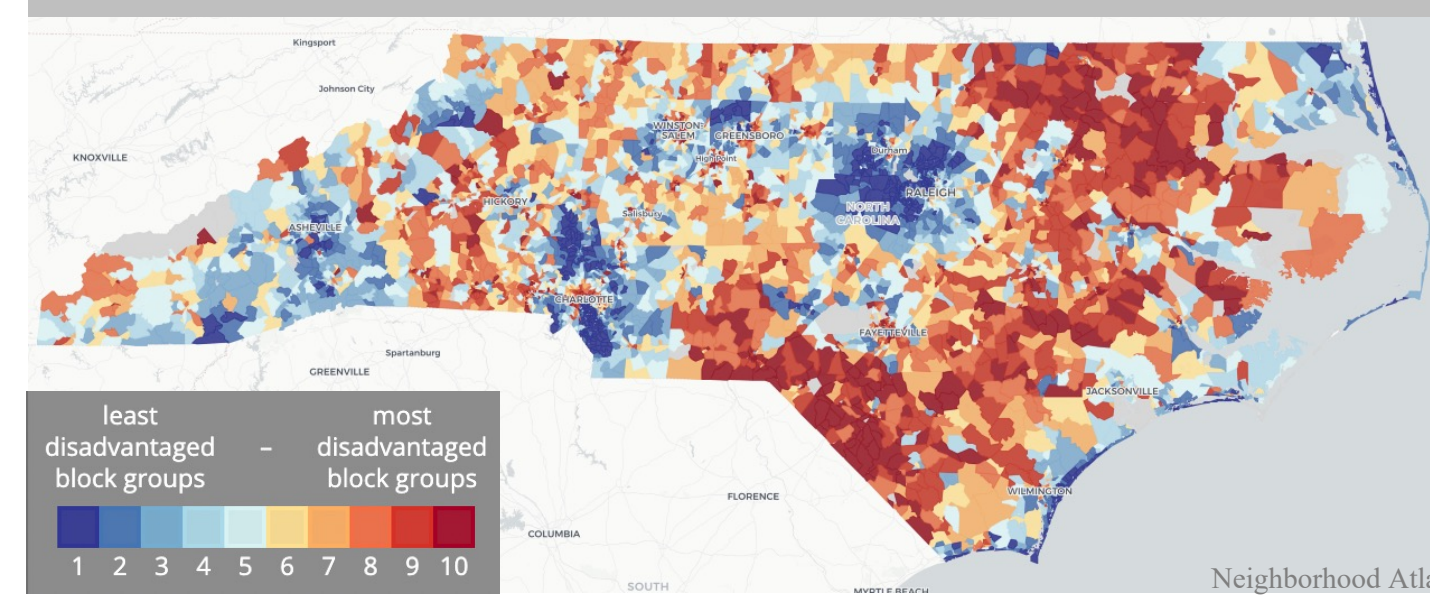
BURN TYPE: AA VS. OTHER RACES



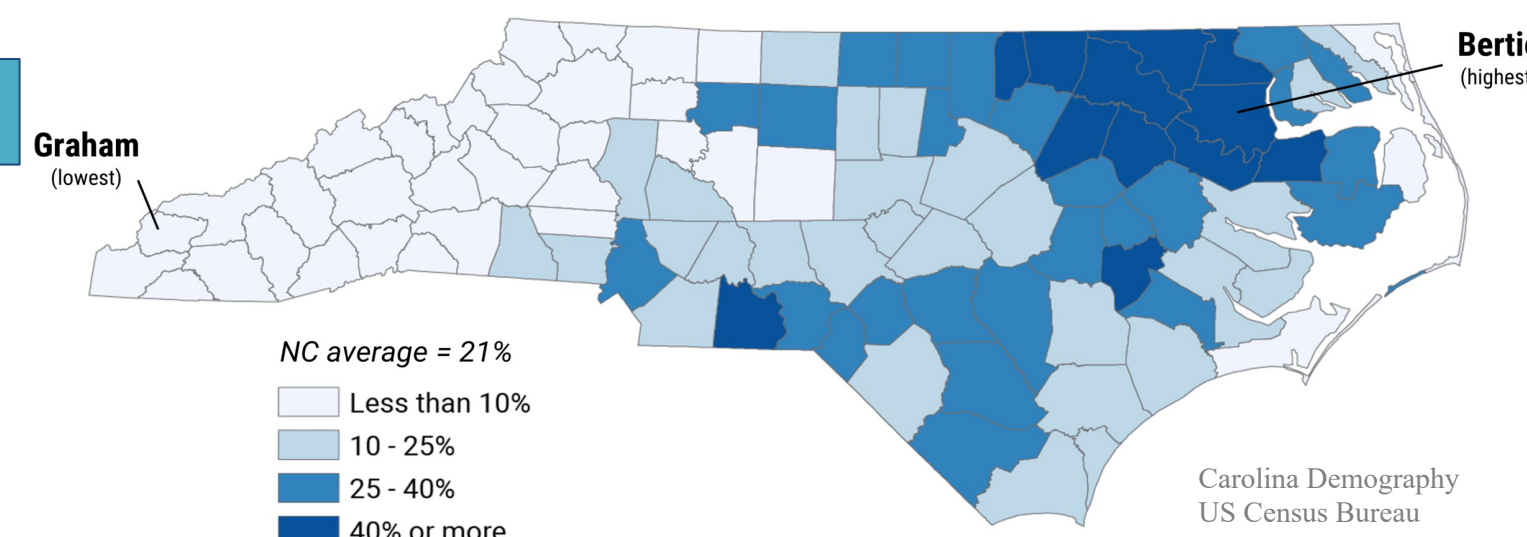
African American patients were more likely to have scald burn injuries compared to other races at 68.5% (n=976) compared to 49.3% (1,382, p<0.001) with both fire and contact injuries less common in African American children.

Discussion

AREA DEPRIVATION SCORES, STATE-ONLY DECILES



SHARE OF COUNTY THAT IS AFRICAN AMERICAN



The burden of burn injuries worldwide falls disproportionately on economically disadvantaged groups. In North Carolina, this is most pronounced in the African American population, with African American children having not only a higher incidence of burns compared to other races, but also larger total burn surface area, higher rates of scald burns compared to other types of burns, and longer overall hospital stays. When comparing the Area Deprivation Index for North Carolina to the distribution of African Americans by county, this follows established trends regarding the correlation between socioeconomic disadvantage and burn injuries.

Interestingly, we also found that even when controlling for age, ADI national rank, TBSA, and burn type, African American patients were more likely to have autologous skin grafting at their initial operation than any other race. We hypothesize that the increased use of autologous skin grafting in this group may be accounted for by the difference in perceived injury severity based on the stark contrast between darker skin and underlying dermal tissue; however, further study is required to understand this trend.

In order to guide treatment decisions, inform prevention strategies, and accurately assess mortality risk, a better understanding of the risk factors for burn injury and the demographics of pediatric burn patients in North Carolina are needed. Our future research will focus on further evaluating how ADI may correlate with or be used to predict various aspects of burn injury and treatment.