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Socioeconomic health disparities in pediatric traumatic brain injury on a national level

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OBJECTIVE Low socioeconomic status is a determinant of pediatric traumatic brain injury (TBI) incidence and severity. In this study, the authors used National (Nationwide) Inpatient Sample (NIS) data to evaluate socioeconomic and health disparities among children hospitalized after TBI.

METHODS This retrospective study identified pediatric patients aged 0 to 19 years with ICD-9 codes for TBI in the NIS database from 2012 to 2015. Socioeconomic variables included race, sex, age, census region, and median income of the patient residential zip code. Outcomes included mechanism of injury, hospital length of stay (LOS), cost, disposition at discharge, death, and inpatient complications. Multivariate linear regressions in log scale were built for LOS and cost. Logistic regressions were built for death, disposition, and inpatient complications.

RESULTS African American, Hispanic, and Native American patients experienced longer LOSs (β 0.06, $p < 0.001$; β 0.03, $p = 0.03$; β 0.13, $p = 0.02$, respectively) and increased inpatient costs (β 0.13, $p < 0.001$; β 0.09, $p < 0.001$; β 0.14, $p = 0.03$, respectively). Females showed increased rates of medical complications (OR 1.57, $p < 0.001$), LOS (β 0.025, $p = 0.02$), and inpatient costs ($p = 0.04$). Children aged 15 to 19 years were less likely to be discharged home (OR 3.99, $p < 0.001$), had increased mortality (OR 1.32, $p = 0.03$) and medical complications (OR 1.84, $p < 0.001$), and generated increased costs ($p < 0.001$).

CONCLUSIONS The study results have demonstrated that racial minorities, females, older children, and children in lower socioeconomic groups were at increased risk of poor outcomes following TBI, including increased LOS, medical complications, mortality, inpatient costs, and worse hospital disposition. Public education and targeted funding for these groups will ensure that all children have equal opportunity for optimal clinical outcomes following TBI.

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KEYWORDS traumatic brain injury; health disparities; social determinants of health; National Inpatient Sample; trauma

Pediatric traumatic brain injury (TBI) accounts for a significant portion of childhood injury in the US annually, as approximately one-third of all injury-related deaths have at least one diagnosis of TBI.[1] Each year, approximately 50,000 children are hospitalized for TBI. Despite considerable public education and injury prevention efforts, TBI continues to have a significant impact on the lives of many children and their families.[1–3] Compared with adults, children have a disproportionately larger head and weaker neck muscles, placing them at increased risk of cranial injury during trauma, in addition to increased risk of intracranial brain matter damage.[4–6] Although many studies have argued that the increased plasticity of a child's brain matter affords adaptability and a better chance for clinical improvement following TBI in comparison with adults, other studies have noted how injury during a time of key anatomical and cognitive development can have lasting impacts on many aspects of function.[7–9] Children experiencing interruption of cerebral development due to TBI at early ages have been found to be more likely to struggle with acquiring language skills and meeting educational goals in school, leading to missed milestones and often lifelong dependence on caretakers.[10,11] Furthermore, children experiencing these injuries are at increased risk of psychological comorbidities such as anxiety and depression later in life. These children, in

ABBREVIATIONS APR-DRG = All Patient Refined Diagnosis Related Group; CCS = Clinical Classifications Software; CDC = Centers for Disease Control and Prevention; dCCS = diagnostic CCS; E-code = external cause-of-injury code; LOS = length of stay; MVC = motor vehicle collisions, bicycle accidents, and all-terrain vehicles, categorized collectively; NIS = National (Nationwide) Inpatient Sample; TBI = traumatic brain injury.

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addition to incurring large medical costs to themselves and their families, may have increased costs due to the loss of future workforce productivity.

While clinical management was once thought to be the main determinant of clinical outcomes, the impact of pre- and posthospital factors is becoming increasingly realized. The mechanism of injury, as children are at high risk of both accidental and nonaccidental trauma, has been shown to play a significant role in later clinical outcomes.[12,13] The interplay between socioeconomic background and the psychosocial dynamic of the family unit can also be considered important pre- and posthospital factors that should not be overlooked.[7,14] For example, participation in intensive rehabilitation is highly correlated with better improvements in functional outcomes following TBI, but many uninsured families do not have access to these resources, putting them at an increased risk of poor outcomes.[15]

It has been demonstrated in many areas of medicine that health disparities exist and detrimentally affect children from lower socioeconomic backgrounds; therefore, it logically follows that such disparities likely persist in the area of pediatric TBI as well.[16–21] Despite the likelihood of this phenomenon, few previous studies have addressed this topic on a national level. The studies that do address this question typically focus solely on institutional or regional effects, on adults primarily, or only include data from the 1st decade of the 2000s.[22–24] As a result of the persistent nature of these injuries in recent years and the significant consequences posed to children of lower socioeconomic status, there is a need to evaluate the existence of socioeconomic health disparities in the field of pediatric TBI on a national scale. We hypothesized that children with lower socioeconomic status experienced worse clinical outcomes in multiple domains, including hospital length of stay (LOS), inpatient complications, and discharge disposition. In this study, we aimed to evaluate the existence of socioeconomic health disparities in the pediatric TBI patient population in terms of clinical outcomes from 2012 to 2015 to further inform the existing literature on this topic.

Methods

Patient Selection

The National (Nationwide) Inpatient Sample (NIS) is a set of longitudinal hospital inpatient databases encompassing more than 35 million hospital stays each year and representing a 20% stratified sample of more than 97% of the US inpatient population. Pediatric patients aged 0 to 19 years who had been evaluated for TBI from 2012 through quarter 3 of 2015 in the NIS were identified. Patients were included if they were evaluated for TBI, which was defined as any ICD-9 code in the following ranges: 800.1–800.9, 801.1–801.9, 803.1–803.9, 804.1–804.9, 850.x, 851.x, 852.x–853.x, 854.x.[25,26] Admissions associated with an in-hospital birth were excluded in order to remove birth-associated trauma from our patient cohort.

Study Variables

Study variables included age, sex, race, income quartile, and geographic region. Patient ages were divided into quartiles with a young category of 0 to 4 years, middle-childhood category of 5 to 9 years, early-adolescence category of 10 to 14 years, and late-adolescence category of 15 to 19 years. Race was characterized by existing definitions in the NIS database, which are derived from the US Census Bureau classifications and include designations of White, Black or African American, Hispanic, Asian or Pacific Islander, Native American, or other. The median income of the zip code of residence was used as a proxy for patient family income, and patients were further stratified into income quartiles, with 1 representing the lowest and 4 representing the highest income quartile. States were subdivided into geographic regions based on the current designations from the US Census Bureau as Mountain, Pacific, West North Central, West South Central, East North Central, East South Central, South Atlantic, Middle Atlantic, and New England.

Outcome Measures

The primary outcome measures were mechanism of injury, presence of inpatient complications, discharge disposition, in-hospital mortality, LOS, and cost. The mechanism of injury was categorized into 4 groups: fall, firearm injury, nongunshot nonaccidental trauma and abuse (called nonfirearm assault), and all vehicular accidents including motor vehicle collisions, bicycle accidents, and all-terrain vehicles, categorized collectively as MVC. The mechanism of injury was collected and defined according to Centers for Disease Control and Prevention (CDC) external cause-of-injury code (E-code) groupings: MVC (E810–E819, E958.5, E968.5, E988.5), firearm (E922.0–E922.3, E922.8, E922.9, E955.0–E955.4, E965.0–E965.4, E979.4, E985.0–E985.4, E970), fall (E880.0–E886.9, E888, E957.0–E957.9, E968.1, E987.0–E987.9), and nonfirearm assault (E960–E969, E979, E999.1, except firearm codes as above).

LOS was evaluated as a continuous variable based on the number of days from patient admission through discharge after the incipient trauma. The presence of inpatient complications was evaluated as a binary variable depending on if the patient had one or more complications or no complications. Patients were evaluated for development of inpatient hospital complications using ICD-9 codes and diagnostic Clinical Classifications Software (dCCS; Agency for Healthcare Research and Quality) codes. CNS infection was identified using dCCS codes for meningitis (76), encephalitis (77), and other CNS infection and poliomyelitis (78). Surgical neurological complications were identified with ICD-9 codes 997.01, 997.02, and 997.09 to include iatrogenic cerebrovascular infarction, hemorrhage, or CSF leaks, among others. Medical complications were defined as deep vein thrombosis (ICD-9 453.40, 453.41, 453.42), pulmonary embolism (ICD-9 415.11, 415.12, 415.13, 415.19), occurrence of shock (ICD-9 785.50, 785.51, 785.52, 785.59), coma (ICD-9 780.01, 780.03), pneumonia (CCS overview code 112), urinary tract infection (CCS overview code 159), and adverse medication reactions (CCS summary codes 2613 and 2617; E-codes E850–858, E930–949). Superficial wound complications were captured with ICD-9 codes 998.3 and 998.5.

TABLE 1. Demographics of pediatric TBI hospitalizations, 2012–2015

Patient Characteristic	Value
Median age, yrs (IQR)	11.0 (2.0, 16.0)
Sex	
M	13,196 (66)
F	6,652 (34)
Race	
White	9,931 (55)
Black or African American	2,593 (14)
Hispanic	3,898 (22)
Asian/Pacific Islander	511 (3)
Native American	179 (1)
Other	867 (5)
Age, yrs	
0–4	6,680 (34)
5–9	2,737 (14)
10–14	3,385 (17)
15–19	7,031 (35)
Income by zip code quartiles*	
1	5,780 (30)
2	4,863 (25)
3	4,863 (25)
4	4,073 (21)
Geographic region	
New England	647 (3)
Middle Atlantic	2,639 (13)
East North Central	2,584 (13)
West North Central	1,366 (7)
South Atlantic	3,623 (18)
East South Central	1,259 (6)
West South Central	2311 (12)
Mountain	1,763 (9)
Pacific	3,656 (18)

Values represent the number of patients (%) unless stated otherwise.
* For income quartiles, 1 represents the lowest and 4 represents the highest.

Discharge disposition and inpatient mortality were treated as binary variables. Poor discharge disposition included discharge to a long-term acute-care facility or death. All other discharge dispositions were considered good, including discharge to home or other short-term care facilities such as rehabilitation. The cost of the hospital stay was calculated from the reported total charge by using Healthcare Cost and Utilization Project cost-to-charge ratios for each hospital.

Statistical Analysis

Statistical analysis was completed using R version 3.6.1 (The R Foundation). Multivariate linear regression models in log scale were built for LOS and cost. A logistic regression model was built for discharge disposition, death, and inpatient hospital complications. All models were adjusted with features of injury severity including the All Patient Refined Diagnosis Related Group (APR-DRG) risk-of-mortality score, intracranial monitor, craniotomy or craniectomy, ventriculostomy, and the presence of other traumatic injury; these served as proxy variables to address the limitation of the absence of an injury severity score. The APR-DRG mortality score is the calculated likelihood of inpatient mortality based on the primary diagnosis, presence of a secondary diagnosis, age, and performance of certain procedures. This score is developed from a tool created by 3M systems.[26–28] The mechanism of injury was not included as a control in multivariate linear regression models due to a lack of enough degrees of freedom for statistical analysis. Statistical significance was set a priori at $p < 0.05$ for all analyses. All effect sizes are reported with 95% confidence intervals.

Results

Patient Demographics

Our study identified 19,848 patients who met inclusion criteria; the median age was 11 years (IQR 2–16 years). The majority of patients were male (66%) and White (55%). Of the patient racial distribution, 14% were Black or African American, 22% were Hispanic, and 1% were Native American (Table 1). A total of 11,257 patients had a recorded mechanism of injury, with the majority of patients experiencing TBI from either an MVC (42%) or fall (50%).

Mechanism of Injury

The mechanisms of injury for patients were divided into 4 categories as firearm, MVC, nonfirearm assault, and fall. Nonfirearm assault included patients who experienced nonaccidental trauma and abuse. Patients with an older age, specifically those 10 to 14 years (OR 4.377, 95% CI 2.54–7.54; $p < 0.001$) and those 15 to 19 years (OR 8.80, 95% CI 5.52–14.04; $p < 0.001$), were observed more frequently to have TBI due to a firearm. Black or African American (OR 6.715, 95% CI 5.00–9.03; $p < 0.001$) and Hispanic (OR 1.50, 95% CI 1.03–2.21; $p = 0.038$) patients experienced a significantly increased risk of TBI by firearm (Table 2). Certain geographic regions of the US had increased rates of TBI by firearm including East North

TABLE 2. Effects of Black, Hispanic, and Native American status on primary outcomes

	Black	Hispanic	Native American
LOS	β 0.06, p < 0.001	β 0.03, p = 0.03	β 0.13, p = 0.02
Inpatient cost	β 0.13, p < 0.001	β 0.09, p < 0.001	β 0.14, p = 0.03
Risk of TBI by assault	OR 1.92, p < 0.001	OR 1.66, p < 0.001	OR 1.99, p = 0.02
Risk of TBI by firearm	OR 6.72, p < 0.001	OR 1.50, p = 0.04	NA

NA = not available.

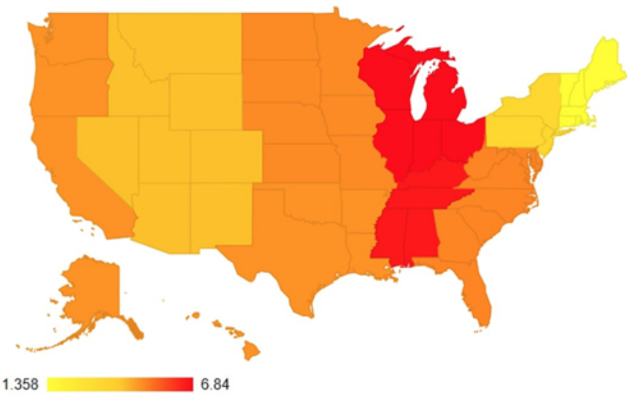

FIG. 1. US map divided by census region and color-coded by annual rate of firearm-related pediatric TBI hospitalizations per million people. The numbers in the color scale represent the annual rate of firearm-related pediatric TBI hospitalizations per million people. East North Central and East South Central showed the highest rates, while New England showed the lowest rate. Map generated using the Geographic Heat Map App in Microsoft Excel. Figure is available in color online only.

Central (OR 4.07, 95% CI 1.21–13.71; p = 0.024), West North Central (OR 4.06, 95% CI 1.11–14.84; p = 0.034), South Atlantic (OR 3.50, 95% CI 1.05–11.65; p = 0.041), and Pacific (OR 3.74, 95% CI 1.11–12.66; p = 0.034) (Fig. 1). Notably, patients from families in the higher income quartiles, 3 (OR 0.611, 95% CI 0.44–0.86; p = 0.005) and 4 (OR 0.392, 95% CI 0.25–0.63; p < 0.001), had a significantly lower likelihood of TBI by firearm.

Assault by nonfirearm was more likely to occur in patients in the oldest age category of 15 to 19 years (OR 1.558, 95% CI 1.33–1.83; p < 0.001). Black or African American (OR 1.92, 95% CI 1.60–2.32; p < 0.001), Hispanic (OR 1.66, 95% CI 1.38–1.99; p < 0.001), and Native American (OR 1.99, 95% CI 1.11–3.57; p = 0.02) patients were also more likely to experience TBI from assault. Conversely, those in the higher income quartiles, 2 (OR 0.81, 95% CI 0.68–0.97; p = 0.023), 3 (OR 0.79, 95% CI 0.65–0.95; p = 0.011), and 4 (OR 0.61, 95% CI 0.49–0.76; p < 0.001), were less likely to have TBI from assault.

For those patients with TBI due to MVC, children in the oldest two age groups of 10 to 14 years (OR 2.94, 95% CI 2.58–3.34; p < 0.001) and 15 to 19 years (OR 5.06, 95% CI 4.53–5.65; p < 0.001) were found to be most at risk. These same age groups were less likely to have TBI by fall (OR 0.26, 95% CI 0.24–0.29; p < 0.001, and OR 0.186, 95% CI 0.17–0.20; p < 0.001, respectively.

Length of Stay

The median LOS for patients in our study was 2 days (IQR 1.00–3.00 days). When adjusting for APR-DRG mortality scores using multivariate linear regression models, female patients (β 0.017, 95% CI 0.004–0.045; p = 0.017) and Black or African American (β 0.06, 95% CI 0.03–0.09; p < 0.001), Hispanic (β 0.03, 95% CI 0.00–0.06; p = 0.027), and Native American (β 0.13, 95% CI 0.03–0.23; p = 0.015) patients were found to have an increased LOS. Furthermore, patients in the West South Central US, which comprises Texas, Arkansas, Oklahoma, and Louisiana, had a longer LOS compared with other geographic regions of the country (β 0.06, 95% CI 0.00–0.12; p = 0.038).

Inpatient Medical Complications

When controlling for the APR-DRG mortality score, female patients were found to have increased numbers of inpatient complications compared with males (OR 1.57, 95% CI 1.34–1.85; p < 0.001). Additionally, patients aged 15 to 19 years had increased complications (OR 1.84, 95% CI 1.49–2.28; p < 0.001). Those in the geographic region of East South Central, which comprises Alabama, Kentucky, Tennessee, and Mississippi, also had increased rates of inpatient medical complications during hospitalization for TBI (OR 1.97, 95% CI 1.12–3.47; p = 0.018).

Disposition of Discharge and Mortality

A total of 779 patients died while hospitalized for TBI, representing 4% of our total cohort. When controlling for the APR-DRG score using multivariate linear regression models, a higher incidence of mortality was observed in patients in the 15- to 19-year age group than in other age groups (OR 1.32, 95% CI 1.03–1.70; p = 0.028). Poor disposition was defined as patients who were discharged to a long-term care facility and inpatient mortality, compared with good disposition for patients discharged to home or a short-term care facility. Furthermore, patients in the 10- to 14-year age group (OR 2.13, 95% CI 1.66–2.72; p < 0.0001) and the 15- to 19-year age group (OR 3.99, 95% CI 3.26–4.89; p < 0.001) who did survive the hospital stay were more likely to experience a poorer discharge disposition.

Cost

The inpatient cost for treatment of TBI differed among socioeconomic groups when controlling for APR-DRG scores in multivariate linear regression. Increased cost was demonstrated in patients aged 5 to 9 years (β 0.08, 95% CI 0.05–0.12; p < 0.001), 10 to 14 years (β 0.17, 95% CI 0.14–0.21; p < 0.001), and 15 to 19 years (β 0.21, 95% CI 0.18–0.24; p < 0.001). Cost was also found to be increased for female patients (β 0.03, 95% CI 0.00–0.05; p = 0.037) as well as those residing in the Pacific region of the US (β 0.25, 95% CI 0.18–0.32; p < 0.01). In terms of racial distribution, Black or African American (β 0.13, 95% CI 0.10–0.17; p < 0.001), Hispanic (β 0.09, 95% CI 0.06–0.12; p < 0.001), and Native American (β 0.14, 95% CI 0.02–0.27; p = 0.026) patients were all found to have increased costs. Lastly, the higher income quartiles of 3 (β 0.06, 95% CI 0.02–0.09) and 4 (β 0.06, 95% CI 0.03–0.10; p < 0.001) were found to have higher inpatient costs.

Discussion

TBI can have significant impacts on children in later life including physical, psychological, and societal consequences.[29] Despite national efforts to optimize clinical outcomes in these patients, pediatric TBI has remained a significant public health burden in the past decade.[30] Socioeconomic health disparities in children have been recognized in the literature with regard to clinical outcomes for patients in racial minority groups and lower gross-income groups. Our analysis identified a significant relationship between indicators of socioeconomic status (including race and low-income status) and poor clinical outcomes for pediatric patients with TBI.

Our study of the NIS database demonstrated that children in racial minority groups and female patients experience worse clinical outcomes. In particular, Black or African American, Hispanic, and Native American children had increased LOSs and increased inpatient hospital costs following TBI. Similarly, female patients had increased LOSs and costs as well as increased rates of medical complications during the course of treatment. Previous studies have noted a lack of investigation into the outcomes of females following traumatic injury, suggesting that this topic is underrepresented in the field of clinical research.[31] These findings are also consistent with past literature studying racial minority patients who were treated in an intensive care setting, and demonstrate how these health disparities have persisted for TBI within pediatric neurosurgery.[32] The mechanism of injury was further found to significantly differ for racial minority groups, whereby patients were more likely to have TBI from assault or firearms. On the contrary, children from families of the 2 highest income quartiles were less likely to experience TBI by these mechanisms. The violent nature of these mechanisms identifies a population of children at particular risk and a need for public health intervention.

According to the CDC, the children most at risk for TBI are those aged 0 to 4 years and 15 to 19 years.[33] In particular, past literature has shown that children in the late-adolescence age group are at increased risk of experiencing TBI due to MVCs, while children aged 0 to 4 years have increased risk of falls.[34–36] Our study findings are consistent with the literature in this regard. Our study also expanded on this current understanding to identify how children in the older age groups of 10 to 14 and 15 to 19 years have a worse discharge disposition and increased rates of inpatient hospital costs. Teenage patients, aged 15 to 19 years, had the highest rate of medical complications compared with their younger counterparts, as well as the highest rates of inpatient mortality following TBI. Although the exact factors causing these discrepancies are unclear, the evidence suggests that older children are particularly at risk for poor outcomes following TBI. All multivariate models controlled for the independent factors of age, sex, hospital region, race, zip code income quartile, APR-DRG mortality score, presence of an intracranial monitor, performance of craniotomy, craniectomy, or ventriculostomy, as well as the presence of other traumatic injury. However, in this study, due to a lack of sufficient degrees of freedom for statistical analysis, mechanism of injury was not used as a control in multivariate linear regression models. It is possible that this factor could account for some of these discrepancies, and future studies should include this element in analysis.

Our study also found that patients from families with higher incomes reported higher costs for inpatient stay following traumatic injury. Racial minority patients reported higher costs for inpatient hospitalization following TBI as well. The reason for these results is unclear and could be due to a multitude of factors. Minority patients may have less access to outpatient resources or lower health literacy, necessitating a longer stay before discharge and, therefore, increased cost. Families with higher income incurring higher costs could be affected by general differences in median income for different geographic regions in the country. It would be valuable in future studies to examine this result more extensively.

On a national scale, children across the country did not have equivalent patient outcomes or equal risk of TBI by firearm or assault. Patients in the West South Central portion of the US had the longest LOSs when compared with children treated for TBI in other portions of the country. Furthermore, patients in the East South Central region had increased rates of inpatient complications while being treated for TBI. Past studies have demonstrated a similar pattern in adult populations with TBI in these areas of the US, but no studies to date have identified a similar pattern for pediatric patients with TBI.[37,38] Current theories about this discrepancy include recognition that these regions have higher rates of comorbidities, such as diabetes and heart disease, which might contribute to worse overall clinical outcomes following traumatic injury. However, these comorbidity trends have been demonstrated in the adult population, not the pediatric population.

Certain geographic regions were also found to differ in the mechanism of injury for pediatric patients with TBI. Children in the East North Central, West North Central, South Atlantic, and Pacific regions were found to have increased rates of TBI from firearms. In 2017, Fowler et al. found a similar pattern with regard to firearm injuries in children being more prevalent in the Southern, Midwestern, and Western states of the country compared with others.[39] That study also highlighted how children were more likely to experience firearm injury from being unintentionally shot rather than through self-inflicted injury. As these states have a greater relative number of registered firearms, per 2019 data, as well as less child access prevention laws, it logically follows that children residing in these areas of the country are at increased risk of TBI from firearm-related injury.[39,40]

Limitations

In this study, certain variables were used as a proxy for socioeconomic status, such as race, income quartile, and geographic region of residence. Additional variables indicative of socioeconomic status, such as those describing the family unit, number of children in the household, and education level of adults, were not available in the NIS database and might have better captured the complicated interactions that comprise true socioeconomic status. The NIS uses APR-DRG scores in place of Injury Severity Scores, which presents another limitation. However, all models were adjusted to control for the proxy variables for traumatic injury, including the mortality score and performance of certain surgical procedures, such as craniotomy or craniectomy. Furthermore, although the NIS database is considered generally representative of hospital data throughout the country, approximately 3% of hospital data are not included, leaving the possibility that a portion of the population is underrepresented in our analysis. Due to the large sample size of this study, however, we anticipate the effect of this difference to be minimal.

The use of zip code in this study to represent general income status was a nongranular measurement of a patient's home and is not necessarily indicative of injury or treatment location. As the NIS does not report individual family income, median income by zip code is used as a proxy for this component of a child's socioeconomic status, posing a limitation in this study. Future studies to analyze the most recent data on this topic are necessary to identify trends in health disparities in the previous 5 years, as our study only uses data up to 2015, and although unlikely, these trends might have changed. Finally, this is a retrospective, observational study and therefore we can only comment on association and not causation between our study variables and outcomes.

Conclusions

Overall, our study demonstrated that children in lower income groups, racial minority groups, of female sex, and residing in certain areas of the country have worsened clinical outcomes after treatment for TBI. As TBI continues to be a significant public health burden for the US, identifying these disparities remains of utmost importance to allow continued efforts to bridge these gaps. Although many public health efforts have tried to mitigate these effects, this study highlights the need for additional focus on this issue to eliminate health disparities for these patients. Our study also demonstrated that children in racial minority groups and in certain areas of the country were more likely to have TBI from firearm or assault. Targeted public education efforts for at-risk patient populations might better enable certain communities to prevent injury. Regardless of future intervention strategies, recognition of these disparities is an important component to moving toward equity in care for all pediatric patients in the US. With more recent analysis and a wider, national scope of study, we hope this research can contribute to the existing literature on health disparities in the pediatric TBI population.

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Disclosures

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Author Contributions

Conception and design: Kelly, Patel, Naftel. Acquisition of data: Kelly, Patel. Analysis and interpretation of data: Kelly, Patel. Drafting the article: Kelly, Patel, Salwi. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Kelly. Administrative/technical/material support: Kelly, Naftel. Study supervision: Lovvorn, Naftel.

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