

THE IMPACT OF PUBLIC HEALTH RESTRICTIONS ON PAEDIATRIC INJURY PATTERNS: A COMPARATIVE STUDY AT THE UNIVERSITY OF UYO TEACHING HOSPITAL.

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Author's contributions

This study was a collaborative effort of the author. The authors reviewed and approved the final version of the manuscript for publication.

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ABSTRACT

Paediatric injuries are a leading cause of childhood death and disability globally, with a disproportionate burden in low- and middle-income countries. In Nigeria, road traffic accidents, falls, and burns drive significant morbidity and healthcare costs. However, local epidemiological data at the University of Uyo Teaching Hospital (UUTH) remain scarce, limiting targeted prevention strategies. This study aimed to compare the volume and epidemiological profile of paediatric trauma between a pre-pandemic/restriction period and a post-restriction period at a Nigerian tertiary hospital. This retrospective study analysed paediatric trauma patients (0-17 years) at UUTH from 2019 to 2022. Data on age, sex, diagnosis, and injury mechanism were extracted. Patients were divided into Cohort 1 (pre-pandemic/restriction) and Cohort 2 (post-restriction). A total of 113 paediatric patients presented with 116 injuries: 37 in Cohort 1 and 76 in Cohort 2. Males accounted for 55% (62) and females 45% (51), with a mean age of 8.1 years. Injury prevalence peaked in the 6-11-year age group, followed by the 0-5-year and 12-17-year age groups. Post-restriction injuries increased significantly. Road traffic injuries and falls were the leading aetiologies, while traumatic brain injuries (TBIs) and limb fractures were the most common injury types across both cohorts. Childhood injuries are a major cause of paediatric death and disability. While road traffic injuries remained the leading cause, the significant rise in falls demands broader prevention strategies. Identifying vulnerable children and injury mechanisms is fundamental to targeted community safety interventions.

Keywords: Paediatric injuries, COVID-19, Nigerian Hospital, Prevention, Public health.

INTRODUCTION

Every year, injuries and violence significantly contribute to the deaths of millions of children worldwide (World Health Organization, 2012; United Nations Children's Fund, 2022; Peden *et al.*, 2008). Injury has emerged as a leading cause of childhood mortality, largely driven by urbanization, cultural transition, motorization, and growing exposure to technology. For every child who dies, thousands more survive with permanent disabilities they must learn to manage, thereby creating a major public health burden. The true cost when a child is injured echoes far beyond the hospital walls, affecting families and the economy (Peden *et al.*, 2008). The burden of paediatric injury is disproportionately distributed, with children from low-income families in low- and middle-income countries (LMICs) bearing the highest toll. These children are exposed to unsafe roads, have limited access to preventive education, and lack access to quality trauma care when injured (United Nations Children's Fund, 2022; World Health Organization, 2022).

The United Nations Convention on the Rights of the Child defines a child as any human being under 18 years of age (Peden *et al.*, 2008; United Nations, 2002). Road traffic injuries (RTIs), falls, burns, and drowning are among the leading causes of death and lifelong disability for children aged 5 to 18 years (World Health Organization, 2022; Kiragu *et al.*, 2018; Onyarugha *et al.*, 2019). The epidemiology of childhood injury is characterized by marked geographic variation, with leading causes varying by the environments in which children live (Peden *et al.*, 2008). Hospital-based studies from countries like Nigeria, India, and Vietnam identify motor vehicle crashes as the predominant cause of paediatric injuries (Ekpemo *et al.*, 2019; Buowari *et al.*, 2025; Onyearugha *et al.*, 2019; Kumar *et al.*, 2023; Pham *et al.*, 2026). However, research from China and Oman identifies falls from height as the primary aetiology of childhood injuries (Bao *et al.*, 2025; Jeswani *et al.*, 2025). The multicentre Paediatric Acute and Emergency Trauma in Africa (PAPSA) studies also implicate road traffic injuries and falls as the leading aetiology of childhood injuries in LMICs (Bradshaw *et al.*, 2018; Ali *et al.*, 2024). This variation highlights the need for effective paediatric injury prevention strategies to be tailored to local realities. The injury prevention model is structured on three levels: primary prevention averts the occurrence of injury, secondary prevention minimizes its severity, and tertiary prevention reduces subsequent disability (Peden *et al.*, 2008). In developing countries, the focus is often on infectious diseases, malnutrition, and maternal and child healthcare, while trauma, referred to as the "neglected disease of modern society," is frequently overlooked (World Health Organization, 2012; United Nations Children's Fund, 2022). It would be a profound loss when a child saved from disease and malnutrition through health investments subsequently dies from a preventable injury. Therefore, it is essential to integrate injury prevention strategies and programs into other child survival initiatives (Peden *et al.*, 2008; Linnan *et al.*, 2007).

Coronavirus disease 2019 (COVID-19) was first identified in Wuhan, China, and was declared a pandemic by the World Health Organization on March 11, 2020 (World Health Organization, n.d.). In Nigeria, a complete lockdown was enforced on March 30, 2020, due to the COVID-19 pandemic. Public health measures were implemented to promote social distancing, including the closure of schools, religious venues, and malls. A curfew kept adults and children off the streets, allowing only essential workers on the roads. The lockdown policies, which were intended to ensure public safety, presented a dual effect on the risk of injury in children. Though they likely reduced road traffic injuries, which is a major cause of childhood morbidity, there was increased exposure to home-based risks. Aligning with other studies in the literature, a key question was whether the pandemic lockdown altered the pattern, not just the volume of childhood injuries (Williams *et al.*, 2020; Nabian *et al.*, 2020; Palmer *et al.*, 2021; Rasmussen *et al.*, 2022). This study aimed to compare injuries among paediatric patients between two time periods: a Pre-restriction/Restriction period (2019/2020) and a Post-restriction period (2021-2022) at the University of Uyo Teaching Hospital (UUTH).

METHODS

The study design was a retrospective cohort study comparing Paediatric injuries at the University of Uyo Teaching Hospital from January 2019 to December 2020 (Cohort 1) and from January 2021 to December 2022 (Cohort 2). The study period (2019-2022) captured distinct phases of Nigeria’s COVID-19 pandemic policy. The pre-restriction baseline in 2019 was followed by a period of restricted movement and activities in 2020. The year 2021 represented a transitional phase with the easing of restrictions on movements and activities. Finally, the year 2022 was the post-restriction phase, characterised by the cessation of all distancing policies, COVID-19 vaccinations, and economic recovery. Based on these policy periods, the years were categorised as follows: Cohort 1 (Pre-restriction/Restriction Period; 2019-2020) and Cohort 2 (Post-restriction Period; 2021-2022). The study analysed data from the paediatric emergency department trauma database, which contained patient demographics (age and sex), diagnosis, and mechanism of injury. No contact was made with the patient, their parents, or guardians. The inclusion criteria were paediatric patients under 18 years of age who presented with acute injuries during the study period, while the exclusion criteria were records with insufficient data or those who were dead on arrival. Ethical approval for this study was granted by the Hospital’s Ethics Committee. All data extracted from the trauma database were anonymised before analysis, with no personal identifiers (such as names, addresses, or hospital numbers) recorded in the study dataset. Strict confidentiality was maintained through password-protected data storage and limited access. Data were analysed using Microsoft Excel and the Statistical Package for the Social Sciences, version 22. Chi-square and Fisher’s exact tests were used to compare categorical variables, with statistical significance set at $p < 0.05$.

RESULTS

A total of 116 injuries were identified among 113 pediatric patients who presented to the emergency department, with some patients experiencing multiple injuries. Cohort 1 consisted of 37 patients (21 males and 16 females), while Cohort 2 comprised 76 patients (41 males and 35 females). There were a total of 62 males (55%) and 51 females (45%), resulting in a male-to-female ratio of 1.2:1. The age range was 2 days to 17 years, with a mean age of 8.1 years. In both cohorts, the highest prevalence was observed among children aged 6-11 years, followed by those aged 0-5 years and then adolescents aged 12-17 years

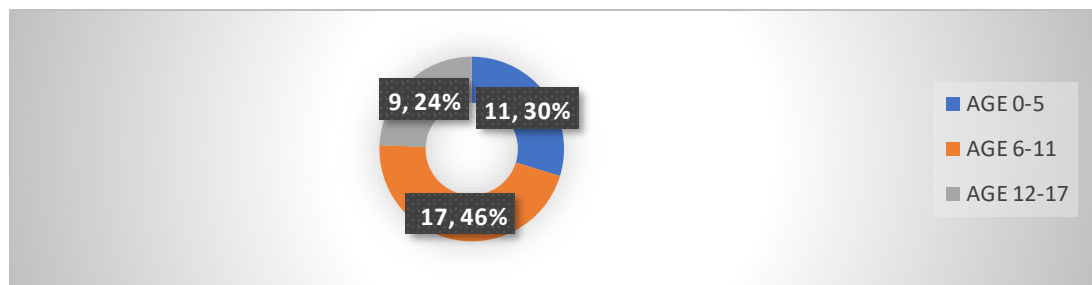


Figure 1. Age Distribution Cohort 1

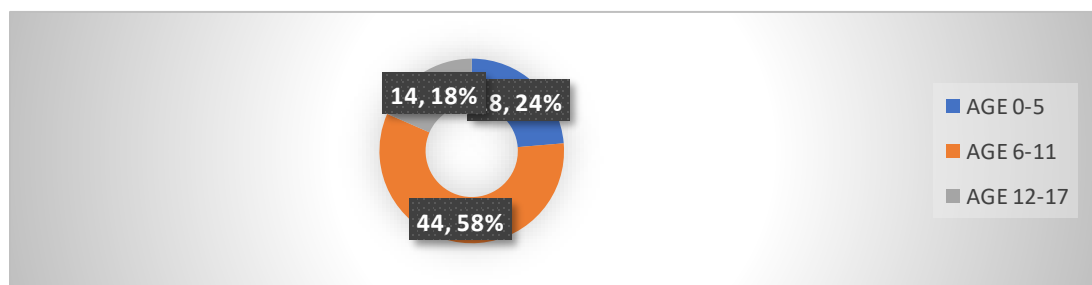


Figure 2. Age Distribution Cohort 2

As shown in Tables 1 and 2, road traffic injuries (RTIs) were the most common cause of injury in both cohorts, followed by burns and falls.

Table 1. Aetiology Based on Mechanism of Injury, Cohort 1

Mechanism of Injury	Number of Male Patients	Number of Female Patients
Road Traffic Injuries	15	10
Burns	2	4
Falls	2	3
Non-Accidental Injury	1	0

Table 2. Aetiology Based on Mechanism of Injury, Cohort 2

Mechanism of Injury	Number of Male Patients	Number of Female Patients
Road Traffic Injuries	25	18
Burns	6	4
Falls	8	11
Sports Injury	2	1
Birth Injury	0	1

Table 3. Injury Types Across Both Cohorts

Diagnosis	Cohort 1	Cohort 2
Traumatic brain injury	16	20
Limb fractures	7	27
Burns	6	10
Multiple injury	3	5
Soft tissue injury	1	3
Chest injury	1	4
Abdominal injury	1	2
Traumatic amputation	1	2
Dislocation	1	1
Cervical spine injury	0	1
Maxillofacial injury	0	1

As shown in Table 3, there was an increase in the frequency of most injury types in cohort 2.

Table 4. Cohort Comparison and Statistical Significance

Variable	Cohort 1 (n=37)	Cohort 2 (n=76)	p-value
Number of Cases	37	76	0.00031
Mechanism of injury			0.461
RTIs			
Burns	25	43	0.263 (0.320 [‡])
Falls	6	10	0.643 (0.784 [‡])
	5	19	0.155 (0.188 [‡])
Injury Type			0.187
TBIs	16	20	0.086 (0.117 [‡])
Limb fractures	7	27	0.071 (0.130 [‡])

Burns	6	10	0.643 (0.784 [‡])
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[‡] Fisher's exact test

Table 4. A significant disparity in the number of cases was observed between the two cohorts (p -value = 0.00031). While RTIs predominated across both groups and Cohort 2 exhibited more limb fractures, no individual injury category reached statistical significance.

DISCUSSIONS

Globally, the past decade has seen the formal recognition of paediatric trauma as a significant public health issue with a disproportionate impact on resource-limited settings (Mock *et al.*, 2009). However, the epidemiology of paediatric trauma in Africa is poorly understood due to the scarcity of data, therefore hindering effective prevention and resource planning. The study compared paediatric injury patterns between a pre-restriction/restriction period and a post-restriction period. It found a significant increase in paediatric injuries during the post-restriction period (67%), compared with 33% observed during the pre-pandemic/restriction period. This rise in total caseload was statistically significant and aligns with patterns described in the literature (Williams *et al.*, 2020; Nabian *et al.*, 2020; Rasmussen *et al.*, 2022; Hamill *et al.*, 2020). However, there was no significant change in the mechanism or type of injury.

The decline in injuries in cohort 1 can be attributed to lockdown measures introduced during the pandemic year, which limited outdoor activities, community mobility, street hawking, and school attendance. Furthermore, access to hospitals was restricted. However, the increase in cohort 2 reflects the rebound following the lifting of restrictions, characterised by the resumption of school, work, and social activities, thereby restoring pre-pandemic patterns of risk exposure and healthcare-seeking behaviour. This result is consistent with findings from similar studies (Williams *et al.*, 2020; Nabian *et al.*, 2020; Rasmussen *et al.*, 2022; Hamill *et al.*, 2020). The lack of significant change in injury mechanisms and types is a key finding, highlighting the persistent leading role of road traffic injuries, which result in injuries such as TBIs and fractures. These findings indicate that movement restrictions temporarily reduced road exposure, which resumed after the movement restrictions were lifted; however, they did not modify the inherent risk children face in their daily environment. In low- and middle-income countries, these risk factors include the absence of basic road safety infrastructure (e.g., sidewalks, traffic lights) and poor regulation, which expose children to a high risk of RTIs, especially among those who walk to school or hawk goods on the road (Pham *et al.*, 2026; Chinkonda *et al.*, 2024; World Health Organization, 2023). Furthermore, the lack of accessible, safe recreational spaces, such as parks or playgrounds, often forces play and informal sports onto the very roadways that pose a significant threat, creating a cyclical risk environment. This study aligned with existing literature that identified the 6-11 age group as having the highest injury incidence, followed by the 0-5 age group in both cohorts (Bao *et al.*, 2025; Williams *et al.*, 2020; Akinmokun *et al.*, 2022; Esin *et al.*, 2013). However, these findings contrast with other studies that identified children aged 0-5 years and adolescents as the most vulnerable age groups (Ali *et al.*, 2024; Onyemaechi *et al.*, 2020). The age distribution pattern can be linked to changes in exposure and supervision. Infants and preschoolers benefit from closer parental supervision and a more protected home environment. School commencement for the 6-11 age group has been noted to increase their exposure to the risk of RTIs and playground injuries, as they walk to and from school and participate in unsupervised play (Schwebel *et al.*, 2007). Adolescents generally have better judgment, capacity to assess danger, and do not engage in unstructured play as the 6-11 age group (Defoe *et al.*, 2019; Albedewi *et al.*, 2021). The predominance of males in both cohorts is a consistent finding in paediatric trauma literature and is attributed to increased impulsivity and risk-taking in boys, compounded by sociocultural factors that grant them freedom and exposure to injury-prone settings (Bradshaw *et al.*,

2018; Nabian *et al.*, 2020; Albedewi *et al.*, 2021; Morrongiello *et al.*, 2022). Cohort 2 recorded more emergency room attendances than Cohort 1 due to RTIs, falls, and burns.

Road traffic injuries were the leading cause of injury in both time periods, despite the inclusion of a lockdown phase in Cohort 1. RTI has been established as the leading aetiology in paediatric trauma in multiple studies (Ekpemo *et al.*, 2019; Buowari *et al.*, 2025; Albedewi *et al.*, 2021). However, our data contrasts with other studies that reported falls as the leading cause of paediatric injuries in their setting (Jeswani *et al.*, 2025; Ndung'u *et al.*, 2019, Matari *et al.*, 2023). The rise in fall-related paediatric injuries in Cohort 2 may be linked to the resumption of work, school, and social activities, as well as a decline in parental supervision at home. This finding warrants further investigation, as it may represent an important and potentially overlooked contributor to injuries in children in our setting. TBIs, limb fractures, and burns were the most common injury types across both cohorts, a finding that is consistent with existing paediatric trauma literature (Bradshaw *et al.*, 2017; Esin *et al.*, 2013; Albedewi *et al.*, 2021; Ndung'u *et al.*, 2019). The principal finding of this study was a doubling of paediatric injury incidence in the post-restriction period, without a corresponding shift in the distribution of injury mechanisms or types. This stability in the epidemiological profile suggests that the short-term lockdown was insufficient to modify the underlying environmental and behavioural determinants of trauma in our setting. This finding contrasts with the report by Baxter and colleagues, who documented a reduction in paediatric trauma admissions during lockdown alongside a notable change in injury mechanisms specifically, a decline in road traffic injuries and a relative increase in domestic accidents (Baxter *et al.*, 2020). Furthermore, while RTIs predominate in our region, falls remain the leading cause of paediatric injury in other settings, reflecting significant geographical variation in injury epidemiology. This disparity underscores a critical principle: injury prevention strategies must be grounded in local epidemiological data rather than generalised models imported from other contexts. What works in a high-income country with safe pedestrian infrastructure will not necessarily succeed in our setting where children routinely navigate unmarked roads and lack supervised play areas.

Limitations: Our findings may not be generalisable to all regions of Nigeria because the study had a retrospective and single-centre design. The cohorts were designed to reflect transitional periods, with Cohort 1 capturing the shift into restriction and Cohort 2 capturing the shift out of it. Although this design limits the ability to isolate the effect of any single policy, it helped model the complete epidemiological trajectory from baseline through disruption and into recovery.

CONCLUSION

The public health restrictions implemented during the pandemic altered the volume of paediatric injuries but did not change the predominant causes or types of paediatric injuries at our centre. The rapid return to pre-pandemic injury patterns once restrictions were lifted exposes the deep-rooted nature of local environmental hazards. Protecting children from trauma demands not short-term lockdowns but lasting investments in safer roads, homes, and communities. The study also highlighted a dual burden: while road traffic injuries remained the leading cause of paediatric trauma, the rise in falls necessitates prevention strategies that extend beyond road safety to address domestic and environmental hazards. We recommend that community-based child injury prevention programmes should be integrated into schools, religious centres, and community health outreach activities to reduce paediatric injuries effectively. Furthermore, a standardized national paediatric trauma registry must be developed to provide the consistent, high-quality data needed to guide these efforts.

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