

A Four-Year Review of the Pattern and Management outcome of Burn injuries in Maiduguri; Northeastern Nigeria

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ABSTRACT

Background: Burn injuries remain a major cause of morbidity and mortality, particularly in low- and middle-income countries where preventive measures and access to specialized care are limited. **Objective:** To evaluate the pattern of burn injuries and management outcomes at the University of Maiduguri Teaching Hospital, focusing on causes, severity, treatment modalities, and outcome determinants. **Methods:** This retrospective study reviewed cases of burn patients managed at the Burns Centre of the University of Maiduguri Teaching Hospital, Northeastern Nigeria, from January 2022 to December 2025. Data was obtained from patient records and analyzed using SPSS version 25. Management included resuscitation, wound debridement, and supportive care, with selected cases undergoing early excision and skin grafting. Wound care involved open or closed dressing techniques, supported by antibiotics, nutritional therapy, physiotherapy, and microbiological assessment. **Results:** A total of 373 patients were studied, with males accounting for 57.1%. Children aged 1–10 years constituted 73.5% of cases. Scald injuries were most common, followed by flame burns, with predominantly second-degree or mixed-depth injuries. Mean total body surface area (TBSA) involved was higher among non-survivors ($38.49 \pm 18.64\%$) than survivors ($13.87 \pm 9.14\%$). Inhalation injury and flame burns were significant predictors of mortality ($p < 0.001$). Most patients (70%) healed with conservative management, while 21% required split-thickness skin grafting. **Conclusion:** Burn injuries predominantly affect children. Injury severity, especially TBSA and inhalation injury, strongly influenced outcomes. Early presentation, and access to specialized care are essential to reduce morbidity and mortality associated with burns.

Key words: Burn injury, total body surface area (TBSA), internally displaced persons (IDP), Burn outcomes

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Introduction

Burn injuries remain a major global public health problem, contributing significantly to morbidity and mortality, particularly in low- and middle-income countries where access to specialized burn care is limited.^{1,2} They account for a substantial proportion of trauma-related hospital admissions worldwide, with the burden disproportionately affecting vulnerable populations, especially children.^{3,4} In these settings, factors such as poverty, overcrowding, unsafe cooking practices, and limited public awareness contribute to the high incidence of preventable burn injuries and high mortality.^{5,6} The severity of burn injuries is influenced by several factors, including total body surface area (TBSA), depth of burn, and the presence of inhalation injury. Among these, TBSA remains one of the most important predictors of outcome, with larger burn sizes being associated with increased risk of complications such as sepsis, multi-organ failure,

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and death.^{7,8} Inhalation injury and burn wound infection, and pediatric burns are associated increased morbidity and mortality in burn patients.⁹⁻¹¹

Despite advances in burn care, mortality remains high in resource-limited settings due to delayed presentation, inadequate initial management, and limited access to specialized care.^{6,12} In Nigeria and other parts of sub-Saharan Africa, burn injuries constitute a significant cause of hospital admissions and are associated with considerable socioeconomic impact.¹³⁻¹⁵ Pediatric burns, in particular, represent a major concern, with children under the age of 10 years being the most affected group.¹⁶⁻¹⁹ This has been attributed to inadequate supervision, the use of open fires, and the common practice of placing hot liquids within reach of children.¹¹

Recent global analyses have further demonstrated persistent disparities in burn outcomes across regions, particularly in low-income countries where infrastructure and trained personnel are limited.²⁰⁻²³ Understanding local epidemiology and outcome patterns is therefore essential for developing effective preventive and management strategies. However, there is limited recent data from North-Eastern Nigeria. This study aims to evaluate the pattern, severity, and outcomes of burn injuries managed at the University of Maiduguri Teaching Hospital (UMTH).

Method

The study is a retrospective review of all patients with burns injury managed at the UMTH Borno State, Northeastern Nigeria from January 2022 to December 2025. Data was extracted from spreadsheet domiciled in the center. Permission for the study was granted by the hospital ethics committee.

Initial management involved resuscitation with intravenous fluid, antibiotics (ceftriaxone and metronidazole), tetanus toxoid, analgesic and blood transfusion where indicated. Investigations done include packed cell volume, urinalysis, blood chemistry, and random blood sugar.

Wound debridement and escharotomy, and fasciotomy under local, regional or general anaesthesia with prophylactic antibiotics at induction. Limbs were splinted after debridement with plaster of Paris where applicable.

In few selected cases early wound excision plus skin grafting were carried out, and some patients had

serial wound debridement subsequently, and skin cover achieved through various techniques ranging from split thickness skin grafting, full thickness skin grafting and meshed skin grafting with meshing machine. The recognition of inhalational burns was based on the features of clinical presentation, while severity was graded using laboratory findings.

Wound were dressed continually as open or close dressing using povidone iodine, honey, derma zine cream and liquid paraffin. They all had nutritional support with high protein pap, eggs and hematinic. During the treatment infection were determined by clinical presentation, wound biopsy, microscopy and culture and subsequently treated based on sensitivity pattern. Early physiotherapy was instituted where applicable. Psychological support was rendered by neuropsychiatric where applicable. Follow up period ranged from 6 months to 2 years with a mean of 1 year.

Results

A total of 407 patients with burn injuries were managed during the study period, 34 patients were excluded due to incomplete or loss of data and documents, while 373 patients were analyzed. There was a male predominance, with males accounting for 213 (57.1%) of cases, while females constituted 160 (42.9%).

The age distribution showed that children aged 1-10 years were the most affected group, representing a significant proportion of admissions. The mean age of patients varied across outcome groups, with discharged patients having a mean age of 8.26 ± 11.87 years, compared to 15.77 ± 18.94 years among those who died, while the age range of the patients was from 1 month to 60 years.

Scald injuries were the most common aetiological factor, followed by flame burns. The majority of patients sustained second-degree or mixed-depth burns. Pre-morbid medical conditions were Malnutrition 71(19.03), Diabetics 12(3.22), Hypertension 15 (4.20%), Sick cell disease 10(2.68%), Epilepsy 5(1.345) and HIV 3(0.80%)

Treatment healing by primary intention 261 (70%), partial thickness skin grafting 78 (21%), full thickness skin grafting 5(1.34%), and flap cover 3(0.80%).

The mean burns TBSA among discharged patients was $13.87 \pm 9.14\%$, while patients who died had a significantly higher mean burns TBSA of $38.49 \pm 18.64\%$. Patients who were discharged against medical advice (LAMA) had a mean burns TBSA of $11.54 \pm 9.19\%$.

Statistical analysis demonstrated that burns TBSA, burn aetiology, and inhalation injury were



significantly associated with patient outcomes ($p < 0.001$). Inhalation injury and flame burns were identified as strong predictors of mortality.

The mean duration of hospital stay was 2.81 ± 1.22 days for discharged patients, 1.79 ± 0.72 days for LAMA patients, and 2.37 ± 2.40 days for patients who died.

Demographic Patterns

The demographic distribution shows a higher incidence among males (57.1%) compared to females (42.9%). The most affected age group is children aged 1-10 years, representing a significant portion of the total admissions.

Aetiology and Burn Depth

Thermal burns (scalds) are the leading cause of injury, followed by flame burns, figure 1. Most burns are either 2nd degree or mixed type injuries, figure 2.

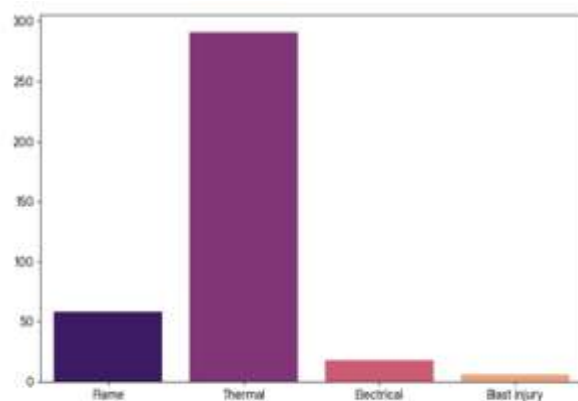


Fig 1: Aetiology of Burns

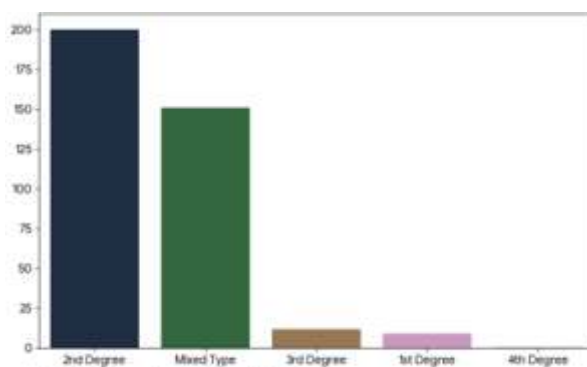


Fig 2: Burns Depth Distribution

Clinical Severity and Outcomes

The average TBSA for discharged patients was 13.9%, while for those who did not survive, was significantly higher at 38.5%, figure 3.

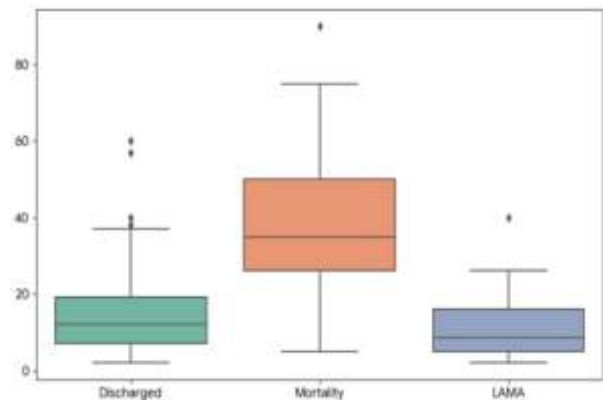


Fig 3: Burn TBSA Distribution by Outcome

Predictors of Mortality

Inhalation injury and flame burns are strong predictors of mortality. Burn TBSA, burn cause, and inhalation status are all highly significant factors associated with patient survival ($p < 0.001$).

Discussion

This study highlights the epidemiological pattern, clinical characteristics, and outcomes of burn injuries in a resource-limited, conflict-affected setting. The observed male predominance is consistent with findings from previous studies in Nigeria and other developing regions, where males are more frequently exposed to environmental and occupational hazards.^{13,14}

The predominance of children, particularly those aged 1–10 years, underscores their vulnerability to burn injuries. A notable proportion of these patients were from internally displaced persons (IDP) camps, reflecting the impact of ongoing insurgency in the region. Overcrowding, unsafe cooking practices, and limited supervision in such settings significantly increase burn risk.^{5,18} This highlights the broader public health implications of displacement and conflict. Effective burn prevention strategies, including public education, safer cooking practices, and environmental modifications, have been shown to significantly reduce burn incidence.¹¹

Scald injuries were the most common cause of burns, particularly among children, while flame burns were more frequent in adults and were significantly associated with mortality. This pattern is consistent with previous African studies.^{18,19} Flame burns are often associated with deeper injuries, larger burn TBSA involvement, and inhalation injury, all of which contribute to poorer outcomes.^{6,9}

Pre-morbid conditions, particularly malnutrition, were prevalent and likely contributed to poor outcomes. Malnutrition is known to impair wound healing and increase susceptibility to infection.²⁴ Other comorbidities such as diabetes and sickle cell disease may further complicate recovery and increase morbidity.

The majority of patients sustained second-degree or mixed-depth burns, with most managed conservatively. However, a significant proportion required surgical intervention, particularly debridement, split-thickness skin grafting, and long term outcome is good. This reflects the burden of deeper burns and aligns with findings from other tertiary centers in Nigeria.¹⁵

Burn TBSA was a strong predictor of mortality, with significantly higher values observed among patients who died. This finding is consistent with established literature demonstrating a direct relationship between burn size and mortality.^{7,8} Inhalation injury was also identified as a significant predictor of poor outcome, consistent with global evidence.⁹ Recent studies have further reinforced that factors such as advanced age, larger burn TBSA, and delayed presentation significantly increased mortality risk in burn patients.^{24,25} Systematic analyses and contemporary epidemiological studies continue to demonstrate similar trends across different regions.²⁰⁻²³

The relatively short duration of hospital stays, particularly among patients who died, likely reflects severe injuries and early mortality. Additionally, early discharge against medical advice may be influenced by financial constraints and healthcare accessibility challenges, which are common in low-resource settings.¹³

Overall, this study emphasizes the interplay between injury severity, burn etiology, comorbid conditions, and socioeconomic factors in determining outcomes. Importantly, the contribution of displacement and IDP camp conditions represents a key contextual factor that must be addressed in prevention strategies.

The establishment of the Burn Centre at the University of Maiduguri Teaching Hospital has greatly improved the care and outcomes of burn patients. With a dedicated team and structured management approach, patients now benefit from quicker resuscitation, better wound care, early surgical treatment, and coordinated rehabilitation.

This has led to improved survival, faster healing, and fewer complications. Overall, the center has significantly strengthened burn care services and reduced the burden of morbidity and mortality in the region.

Conclusion

Burn injuries remain a major public health problem in Northeastern Nigeria, predominantly affecting children. Scald burns were the most common cause, while flame burns and inhalation injuries were associated with higher mortality. Burn TBSA was a significant predictor of outcome. The high incidence among children, particularly those in internally displaced persons (IDP) camps, underscores the role of socioeconomic and environmental factors. Strengthening preventive measures, early presentation, and access to specialized burn care is essential to improve outcomes.

Study limitations: This study has several limitations that should be considered when interpreting the findings. First, the retrospective design and single-center setting rely on the accuracy and completeness of medical records, which may be subject to missing or inconsistently documented data, and may also limit the generalizability of the findings to other regions or healthcare settings. Important variables such as burn depth, pre-hospital care, and socioeconomic status were not consistently recorded, potentially affecting the robustness of the analysis and also the absent of fiberoptic bronchoscopy limit the assessment of abbreviated injury score (AIS)SS . In addition, referral bias is likely, as more severe cases are preferentially managed at the center, possibly leading to an overestimation of severity and mortality rates.

Recommendations

Public health education should be strengthened to promote burn prevention, especially among caregivers and in high-risk settings such as IDP camps. Efforts should focus on safer cooking practices, proper supervision of children, and environmental safety.

Improving access to healthcare through early presentation and strengthening primary care referral systems is essential. There is also a need to enhance burn care facilities by providing specialized units, trained personnel, and necessary treatment resources.



Nutritional support should be integrated into patient care due to the high rate of malnutrition. Continuous training of healthcare workers in modern burn management is equally important.

Further prospective and multicenter studies are recommended to provide broader data for planning and policy development.

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Conflict of interest

There is no conflict of interest

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References

1. Peck MD. Epidemiology of burns throughout the world. *Burns*. 2011;37(7):1087–1100.
2. World Health Organization. Burns [Internet]. Geneva: World Health Organization; 2023 [cited 2026 Apr 27]. Available from <https://www.who.int/news-room/fact-sheets/detail/burns>
3. Brusselaers N, Monstrey S, Vogelaers D, Hoste E, Blot S. Severe burn injury in Europe: a systematic review. *Burns*. 2010;36(6):780–789.
4. Forjuoh SN. Burns in low- and middle-income countries: a review of available literature. *Burns*. 2006;32(5):529–537.
5. Mock C, Peck M, Peden M, Krug E. A WHO plan for burn prevention and care. Geneva: WHO; 2008.
6. Jeschke MG, van Baar ME, Choudhry MA, Chung KK, Gibran NS, Logsetty S. Burn injury. *Nat Rev Dis Primers*. 2020;6(1):11. doi:10.1038/s41572-020-0145-5.
7. Greenhalgh DG. Management of burns. *N Engl J Med*. 2019; 380:2349–2359. doi:10.1056/NEJMr1807442.
8. Wardhana A, Basuki A, Prameswari K. Predicting mortality in burn patients: a systematic review. *Ann Burns Fire Disasters*. 2023;36(1):3–10.
9. Pham TN, Cancio LC, Gibran NS. American Burn Association practice guidelines: inhalation injury. *J Burn Care Res*. 2009;30(1):143–149.
10. Church D, Elsayed S, Reid O, Winston B, Lindsay R. Burn wound infections. *Clin Microbiol Rev*. 2006;19(2):403–434.
11. Atiyeh BS, Costagliola M, Hayek SN. Burn prevention mechanisms and outcomes. *Burns*. 2009;35(2):181–193.
12. Ahuja RB, Bhattacharya S. Burns in the developing world. *BMJ*. 2004;329:447–449.
13. Abubakar AI, Opara KO, Nwachukwu IE. Pattern of burn injuries in Northern Nigeria. *Niger J Clin Pract*. 2023;26(12):1916–1920.
14. Ademola SA, Fadeyibi IO, Jewo PI. Epidemiology of burns in South-West Nigeria. *J Burn Care Res*. 2024;45(1):190–199.
15. Oladele AO, Olabanji JK, Afolabi AO. Burns in Nigeria: a review. *Ann Burns Fire Disasters*. 2010;23(3):120–127.
16. Nnabuko RE, Egwuonwu AO. Burns in Enugu, Nigeria. *Ann Burns Fire Disasters*. 2009;22(2):84–87.
17. Gbeneol TJ, Dakum NK, Katchy AU. Burn injuries in Port Harcourt. *Port Harcourt Med J*. 2023;17(2):85–92.
18. Banerjee S, Oludara MA. Pediatric burns in sub-Saharan Africa. *Afr Health Sci*. 2020;20(4):1800–1810.
19. Karikari JK, Wurapa F. Burn outcomes in Ghana. *Burns Open*. 2025;9(1):12–18.
20. Li P, Zhang L. Epidemiology of burn injuries: global trends. *Burns Trauma*. 2025;13:tkad012.
21. Zhao X, Liu Y. Pediatric burn characteristics and outcomes. *Burns Trauma*. 2025;13:tkad021.
22. Zhao X, Liu Y. Mortality risk factors in pediatric burns. *Transl Pediatr*. 2025;14(2):145–153.
23. Lee N, Kim J. Global burden of burns: systematic analysis. *Healthcare (Basel)*. 2025;13(16):2077.
24. Rahimpour A, Zarei MR. Predictors of mortality in burn patients. *Burns*. 2025;51(3):456–463.
25. Zeaiter N, Alghamdi A. Factors affecting mortality in burn patients. *Med Sci Monit*. 2025;31:e940123.

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