International Journal of Medical Evaluation and Physical Report E-ISSN 2579-0498
P-ISSN 2695-2181 Vol 9. No. 1 2025 www.iiardjournals.org

Paediatric Burn Injuries in a Regional Burn Centre in a Developing Country

Aria ,O.N.[1,2], Gbeneol, T.J.[1,2]
[1]Rivers State University Teaching Hospital, Port Harcourt, Rivers State, Nigeria
[2]University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria
Correspondence: Dr. Oti Nimi Aria. Email: Otinimi@yahoo.com Plastic and Reconstructive Surgery, Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Nigeria
DOI: 10.56201/ijmepr.v9.no1.2025.pg66.73

Abstract
Introduction: *Burn injuries remain a significant cause of morbidity and mortality with about 90% of burn related deaths occurring in low- and middle-income countries (LMIC). Weak surgical systems compounded by out-of- pocket payments contribute significantly to lack of comparable outcomes with high income countries. Despite ongoing burn prevention initiatives, pediatric burns remain a public health concern. The aim of this report is to quantify the current burden of pediatric burns and identify potential areas for locally contextualized and sustainable interventions targeted at reducing incidence and improving outcomes in low resource settings.*
Method: *This is a retrospective review of the records of patients aged 15 years and below, admitted into the Burn Ward from 2017 to 2022. Data was analysed using IBM SPSS version 22 and results presented as texts, charts and tables.*
Results: *One hundred and seventy-five children (25.4% of all burns admissions) aged between 2 days and 15years were treated for burn injuries. There was a male preponderance with males accounting for 59% and females 41%. Flame burns occurred in 111 (63.4%) and scald burns in 61 (34.9%). The most common mechanism of injury (37.8%) involved refilling of kerosene cooking stoves. The mortality rate was 32%. Burn severity, late presentation and out-of-pocket payment contributed significantly to poor outcomes.*
Conclusion: *The commonest burn mechanism identified and late presentation indicates a need for increased public health interventions towards increasing awareness, prevention and treatment. Innovative healthcare funding mechanisms in LMIC should specifically include burns treatment to improve access to care and overall outcome.*

Keywords: *Burn injury, Paediatric burn, burn prevention, Paediatric Burn in LMIC*

Introduction

Paediatric burn injury is one of the major causes of trauma-related deaths among children world-wide, with developing countries having a relatively higher incidence.[1] The annual estimate of burn- related mortality is approximately 180,000 globally.[2] The dependent and vulnerable nature of children make them more prone to complications from burn injuries such as debilitating scars and even death.[3] Burn injuries are largely preventable; however, they have remained a major public health burden, worsened by limited access to specialised burn care, socioeconomic challenges, and out-of-pocket payments in many developing countries.[4,5]

Socioeconomic challenges are associated with harmful practices such as cooking with open flames, poor housing conditions and low awareness of burn prevention strategies, all of which increase the risk and severity of burn injuries.[5]

Prompt resuscitation is crucial in the management of burn injuries to prevent complications and promote wound healing. The scarcity of burn care specialists and insufficient burn care resources in Low- and Middle-income countries (LMICs), exacerbate the severity of burn injuries resulting in delayed healing and increased mortality.[5] In addition, the prompt commencement of fluid resuscitation and infection control which are key aspects of acute burn management, is often hindered by late presentation to the hospital and financial constraint**.**

Despite ongoing burn prevention initiatives in LMICs, weak surgical systems compounded by out-of-pocket payments contribute significantly to lack of comparable outcomes with high income countries. Thus, paediatric burns remain a major public health concern. This study aims to is to quantify the current burden of pediatric burns and identify potential areas for locally contextualized and sustainable interventions targeted at reducing the incidence and improving outcomes in low resource settings.

Method

The study was conducted at the University of Port Harcourt Teaching Hospital (UPTH), a tertiary institution with a regional burn centre that provides services for patients within the state as well as from surrounding states. A retrospective review of the records of patients aged 15 years and below, admitted into the Burn Ward from 2017 to 2022 was done. Data was analysed using IBM SPSS version 22 and results presented as texts, charts and tables. Ethical approval was obtained from the Ethics committee of UPTH.

Results

Children accounted for 175 (25.4%) of 689 Burn Ward admissions. Figure 1 shows the incidence of paediatric burn injuries in the Burn ward,

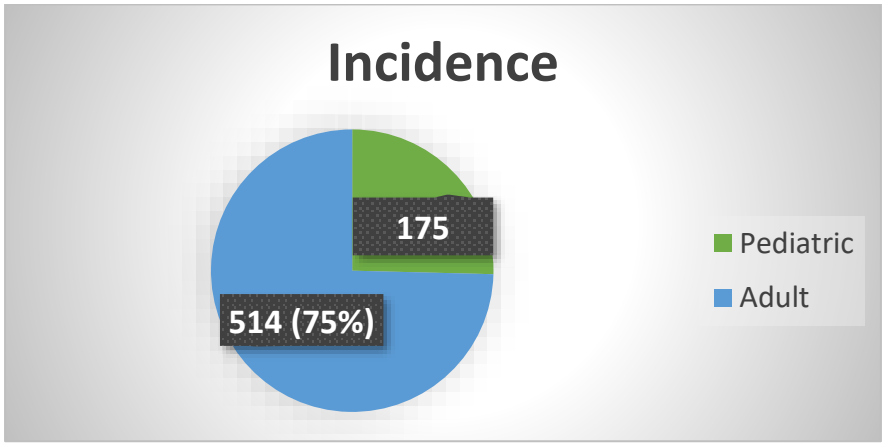

Fig. 1. Incidence of Paediatric Burn Injuries

Age and Gender Distribution

The ages of the children admitted into the Burn Ward were between 2 days and 15years, with 109 (62%) patients with ages 5 years and below. The total number of male children was 103 (59%) while females accounted for 72 (41%). Figure 2 shows the gender distribution of children with burn injuries.

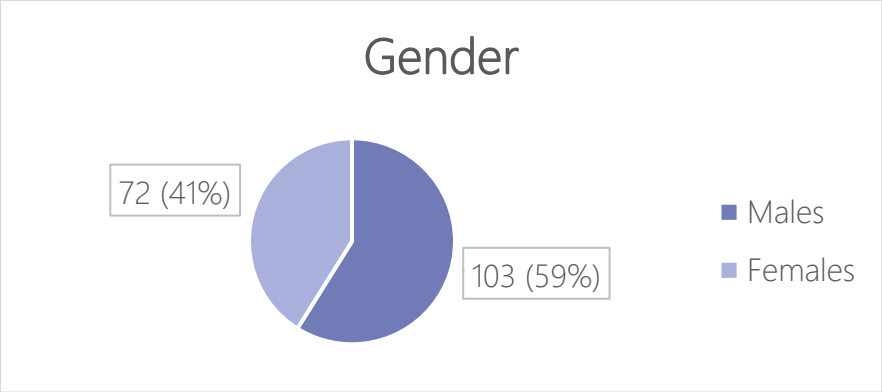

Fig 2. Gender Distribution of Paediatric Burn Injuries

Pattern of Paediatric Burn Injury

Flame burns occurred in 111 (63.4%) and scald burns in 61 (34.9%) and others in 3 (1.7%). Figure 3 shows the pattern of burn injuries among the paediatric population.

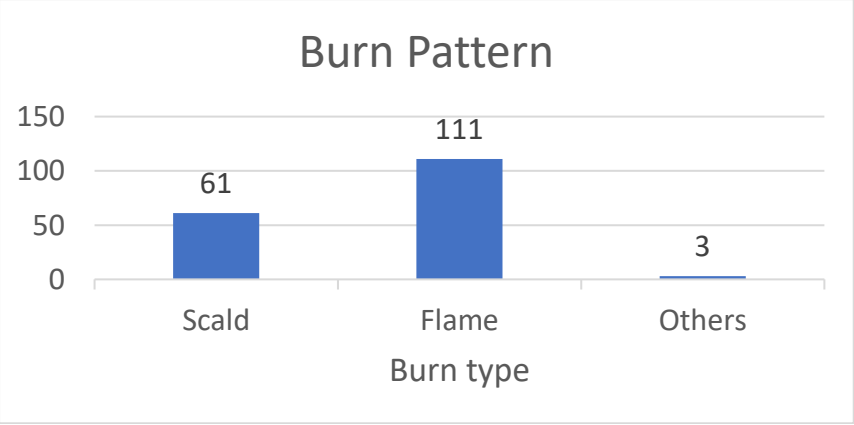

Fig. 3 Pattern of Paediatric burn injuries

Mechanism of Paediatric Burn Injury

Injuries sustained while refilling kerosene stoves had an incidence of 77 (44%), and was followed by injuries from hot liquids 61 (34.9%). Table 1 shows the mechanism of paediatric burn injuries.

Table 1. Mechanism of Paediatric Burn Injuries

Burn Agent	Incidence	Percentage
Hot liquids	61	34.9
Kerosene	77	44.0
Cooking Gas	18	10.3
Petrol	12	6.9
Candle	4	2.2
Others	3	1.7
Total	**175**	**100**

The Incidence of Paediatric Burn Injury per Total Burn Surface Area (TBSA)

Children with total burn surface area less than or equal to 20% accounted for 74 (42%), while those with TBSA greater than 40 % accounted for 47 (27%). Table 2 shows the incidence of paediatric burn injury per TBSA.

Table 2. Incidence of Paediatric Burn Injuries per Total Burn Surface Area (TBSA)

Total Burn Surface Area	Incidence (%)
≤20%	74 (42%)
21 – 40%	54 (31%)
>40%	47 (27%)

Total	**175**

Outcome of Paediatric Burn Injury

The number of children who were discharged was 93 (53.2%), while the mortality was 56 (32%). Table 3 shows the outcome of paediatric burn injuries.

Table 3. Outcome of Paediatric Burn Injury

Outcome	Percentage
Discharged	93 (53.2%)
Deceased	56 (32.0%)
Signed against medical advice	20 (11.4%)
Others (e.g. Absconded)	6 (3.4%)
Total	**175**

DISCUSSION

The burden of burn injuries among children in LMICs is relatively higher than that in the developed nations.[6] Several factors such as poor awareness of burn prevention strategies and hazardous housing conditions contribute to the increased incidence of burn injuries in developing countries.[7] In addition, out-of-pocket payments amidst financial constraint, and limited availability to specialised burn care services are some of the factors which lead to poor outcomes in LMICs.[8] This study highlights the prevalence, pattern, mechanism of injury and outcome of paediatric burn injuries in a regional burn centre in a low resource nation.

The prevalence of paediatric burn injuries in this study was 25.4%, which is slightly lower than the findings of a cross-sectional survey conducted across Asia, Africa and Latin America with a paediatric burn prevalence of 36%.[9] Another study conducted in Ethiopia reported a paediatric burn prevalence of about 40%.[10] These findings portray a high prevalence of burn injuries in the very young, thus emphasizing the need to focus global health efforts to reduce this burden. The ages of paediatric burn injured patients in this study ranged from 2 days old to 15 years old, with over 60 percent of the children being less than 5 years old. This finding is similar to the findings of a descriptive analysis of the WHO Global burn registry with children less than 5 years old comprising 62%.[11] This higher prevalence of burn injuries amongst toddlers, and the high incidence of

refilling of kerosene stoves as the mechanism of injury in 77 cases (44%), buttresses previous findings that unsafe housing and cooking conditions expose children to these devastating injuries.[5]

The pattern of burn injuries in this study showed a higher incidence of flame burns (63.4%) than scald burns (34.9%) which is similar to the findings in the WHO Global Burn Registry with a higher incidence of flame burns amongst children above 5 years of age, but a higher incidence of scald burns among children less than 5 years of age.[11] However, this finding clearly differs from other hospital based studies with overall higher incidences of paediatric scald burns injury of 71.1% and 70.1% respectively.[10,12] This study showed that majority sustained major burn injuries with over 55% of children having a total burn surface area of greater than 20%. This finding suggests more severe burn injuries compared to the findings of an epidemiological study with majority of paediatric TBSA reported as less than 10%.[13] In this study, as high as 11.2% of the patients' parents requested for discharge against medical advice and a few patients absconded, possibly due to financial constraints. The mortality rate in this study was 32% which was higher than the mortality rate of 8.25% reported in similar study carried out in Ethiopia.[14] However, the Ethiopian study also reported that majority (73.1%) of the paediatric burn injured patient had TBSA less than 20% suggesting much less severe burn injuries. A hospital-based study in Cameroun, reported a higher mortality rate of 41.2% among children with severe burn injuries.[15] Lastly, the study centre is a regional burn centre, which serves as a referral centre for patients with severe burn injuries which are usually associated with a higher risk of mortality.

Limitations

A limitation of this study is the retrospective method which may be affected by potential confounders. In addition, a study involving multiple institutions would give results that are more representative of the general population.

Recommendations

The findings of this study buttress the need for increased public health awareness on burn prevention strategies such as safe cooking practices and early presentation to the hospital for burn treatment. Policymakers should be engaged with evidence-based data to guide policies that improve access to specialised burn care services. The government has a role to play by improving access to low-cost alternatives to the kerosene stove and establishing innovative healthcare funding mechanisms in LMICs. The government can also invest in the training of health care workers in burn care and in setting up burn units in, or close to the rural communities

Conclusion

Paediatric burn injury though largely preventable remains a significant public health problem in developing countries largely due socioeconomic, environmental and health system-related factors. Burn severity and out-of-pocket payments contribute significantly to poor outcomes. Efforts to reduce the burden of pediatric burn injuries in low- and middle-income countries should include burn prevention strategies, improved access to appropriate burn care, and the active intervention of the policymakers and the government to enact and implement the relevant burn management policies. The need for innovative burn care funding mechanisms in LMICs cannot be overemphasized.

Conflicts of Interest

The authors declare no conflict of interest.

Acknowledgement

The authors acknowledge Dr. Tamunosa Allison and Dr. Ikechukwu Obasi who participated in the data collection.

References

1. Rybarczyk, M.M., Schafer, J.M., Elm, C.M., Sarvepalli, S., Vaswani, P.A., Balhara, K.S., Carlson, L.C.,& Jacquet, G.A. (2017) A systematic review of burn injuries in low- and middle-income countries: Epidemiology in the WHO-defined African Region. Afr J Emerg Med, 7(1):30-37.
2. Yin, B., He, Y., Zhang, Z., Cheng, X., Bao, W., Li, S., Wang, W., & Jia, C. (2024). Global burden of burns and its association with socio-economic development status, 1990–2019. Burns, 50(2):321-374
3. Huo, L., Richardson, S., Issufo, C., Chicamba, V., Chilundo, B., Fernandes, N. & Amanda, V. (2024) Characteristics of pediatric burns complications in the main referral hospital of Mozambique. Burns Open, 8. 100362. 10.1016/j.burnso.2024.100362.
4. Seyi-Olajide, J.O., & Chukwu, I. (2023) Global children's surgery: Economic and policy priorities. Semin Pediatr Surg, 32(6):151347. doi: 10.1016/j.sempedsurg.2023.151347. Epub 2023 Nov 20. PMID: 38006692.
5. Botman, M., Hendriks, T.C.C., de Haas, L.E.M., Mtui, G.S., Binnerts, J., Nuwass, E.Q., Niemeijer, A.S., Jaspers, M.E.H., Winters, H.A.H., Nieuwenhuis, N.K., & Zuijlen, P.P.M. (2022) Access to Burn Care in Low- and Middle-Income Countries: An Assessment of Timeliness, Surgical Capacity, and Affordability in a Regional Referral Hospital in Tanzania. J Burn Care Res, 43(3):657-664. doi:10.1093/jbcr/irab191
6. Hendriks, T.C.C., Botman, M., Binnerts, J.J., Mtui, G.S., Nuwass, E.Q., Meij-de Vries, A., Winters, H.A.H., Nieuwenhuis, M.K., & Van Zuijlen, P.P.M. (2022) Acute burn care in resource-limited settings: A cohort study on treatment and outcomes in a rural regional referral hospital in Tanzania. Burns, 48(8): 1966-1979
7. Tolouei, M., Bagheri Toolaroud, P., Letafatkar, N., Feizkhah, A., Sadeghi, M., Esmailzadeh, M., Daghighi Masooleh, M., & Mobayen, M. (2023). An 11-year

retrospective study on the epidemiology of paediatric burns in the north of Iran. International wound journal, 20(9), 3523–3530. https://doi.org/10.1111/iwj.14225

8. Denekew, B., Hebron, C., Mekonnen, A., Ayele, M., Negash, K., Muluneh, M., Price, P., & Potokar, T. (2021) Investigating burn cases, knowledge, attitudes and practices to burn care and prevention in Ethiopia: a community-survey. Journal of Global Health Reports, 5:e2021050. doi:10.29392/001c.24353
9. Quinn, L., Ahmed, T., Falk, H., Miranda Altamirano, A., Muganza, A., Nakarmi, K., Nawar, A., Peck, M., Man Rai, S., Sartori, J., Philipe Molina Vana, L., Wabwire, B., Moiemen, N., & Lilford, R. (2023). Burn Admissions Across Low- and Middle-income Countries: A Repeated Cross-sectional Survey. Journal of burn care & research : official publication of the American Burn Association, 44(2), 320–328. https://doi.org/10.1093/jbcr/irac096
10. Asefa, L., Abebe, M.W., & Negussie, A.G. (2024) Patterns and Outcomes of Pediatric Burn Injuries in a Tertiary Hospital's Burn Unit. Burns Open, 8(2): 87-91,
11. Jordan, K.C., Di Gennaro, J.L., Von Saint André-von, A.A., & Stewart, B.T. (2022) Global trends in pediatric burn injuries and care capacity from the World Health Organization Global Burn Registry. Frontiers in Pediatrics, 10(954995).
12. García-Díaz, A., Gacto-Sánchez, P., Durán-Romero, A.J., Carrasco-GarcÃ-a, S., Ruiz-Moya, A., Molina-Morales, J., SÃ¡nchez-Tatay, M., GÃ³mez-CÃ-a, T., & Pereyra-RodrÃ-guez, J. (2022) Pediatric major burns: a monocentric retrospective review of etiology and outcomes (2008–2020). Eur J Plast Surg, 45:967–975. https://doi.org/10.1007/s00238-022-01957-y
13. Forjuoh, S.N. (2006) Burns in low- and middle-income countries: a review of available literature on descriptive epidemiology, risk factors, treatment, and prevention. Burns, 32:529–37.
14. Bushen, Z.D., Ashine, T.M., Teshome, G.S., Tesfaye, K.T., & Adeba, T.S. (2024) Survival Status and Predictors of Mortality Among Pediatrics Burn Victims Admitted to Burn Centers of Addis Ababa Public Hospitals, Ethiopia: A Retrospective Cohort Study. Global Pediatric Health, 11. doi:10.1177/2333794X241277341
15. Fomukong, N. H., Mefire, A. C., Beyiha, G., Lawrence, M., Edgar, M. M. L., Nkfusai, N. C., & Cumber, S. N. (2019). Predictors of mortality of pediatric burn injury in the Douala General Hospital, Cameroon. The Pan African medical journal, 33, 189. https://doi.org/10.11604/pamj.2019.33.189.18498