CLINICAL DEMOGRAPHIC CHARACTERISTICS, AND THEIR PREDICTORS OF OUTCOME AMONG BURN CHILDREN TREATED AT MUHIMBILI NATIONAL HOSPITAL BURN UNIT.

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MMed (General Surgery) Dissertation
Muhimbili University of Health and Allied Sciences
October 2024

Muhimbili University of Health and Allied Sciences

School of clinical Medicine

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By

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A Dissertation Submitted in (partial) Fulfillment of the Requirements of the Degree of Master of Medicine (General Surgery) at

Muhimbili University of Health and Allied Sciences

October 2024

CERTIFICATION

The people below say they have read and agree with the dissertation title "clinical demographic outcome and its predictors among burn children at Muhimbili national hospital burn unit." This is part of the requirements for the Master of Medicine (General Surgery) degree at the Muhimbili University of Health and Allied Sciences (MUHAS) in Dar es Salaam, Tanzania.

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(Co-Supervisor)

Date:_____

DECLARATION AND COPYRIGHT

I, Dr. MAIMUNA IBRAHIM A. ABDATAM, declare that this dissertation is my original work and that I will not submit it to any other university for the award of the same or a different degree.

Signature…… Date……

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ACKNOWLEDGMENT

It wouldn't be possible without the favor of the all-powerful God, from whom we derive everything that is and everything we have. I would like to express my sincere gratitude to my supervisor Prof. Larry Akoko who mentored me through developing and implementing this work of research and for his invaluable patience and feedback.

My gratitude goes out to the surgical departments at MNH and MUHAS, whose faculty was ready to help me in various ways. Thanks to my dear classmates, with whom I have experienced highs and lows as surgical residents at MUHAS and MNH.

DEDICATION

This dissertation is dedicated to my beloved husband, Deng, whose unwavering support and understanding have been my anchor throughout my studies.

To my child, Abrahime, for your patience and encouragement, which have inspired me every day.

To my parents, Ibrahim and Santana, for your constant support and heartfelt good wishes, which have fueled my journey.

And to the patients of the burn unit, whose resilience serves as a powerful reminder of hope and strength.

To all those who have stood by me during this journey, and to my entire family for your unwavering commitment—this work is a testament to the love and support that surrounds me. I owe you all a profound debt of gratitude.

ABSTRACT

Background: Burn victims' children are the local and global medical issue and cause morbidity as well as mortality universally. It can be the source of the worst illness condition and severe pain injuries a child can receive and may lead to prolonged physical and mental effects. About 70% of all burns occur in LMICs, especially in African and Southeast Asian regions, while children under the age of 15 in LMICs are more often burned than children in HICs from scalding or flames. Likewise, in Tanzania, the prevalence of burn injury is reported to be 16% of all injuries; a one-month incidence was calculated to be 1.73%.

Objective: To establish the clinical demographic, outcome and its predictor of mortality among scald injured pediatric patients admitted at MNH burn unit.

Methodology At Muhimbili National Hospital we conducted a retrospective cohort study designee, from January 2019 to December 2020. The study aimed to enroll all children who had scald injuries and were no older than 12 years. We used observation checklist tools to collect data on social demographics and clinical factor variables from the medical records. However, we excluded the files containing missing information and obtained the remaining information through a phone interview with the patient's guardian. We sent the proposal to the MUHAS IRB for review and approval and then sought permission from the MNH research, training, and consultancy bureau. The SPSS Version 23.0 package analyzed the data.

Data analysis: The continuous variable consisted of the median (IQR), while the categorical variables included frequency and proportion. Chi-square was used to test for a significant association between categorical variables and outcomes, and $p < 0.05$ was considered statistically significant.

Results: During the study period, 300 children who sustained scald injury were recruited of which majority (92.3%) were under five years of age. A mortality rate of 25% was observed with factors found to have significant association being residence in a rural area (aOR 23.71, 95% CI 3.82-147.58, p-value <0.001), a TBSA of >20% (OR 19.98, 95% CI 6.00-66.50, p-value <0.001)

Conclusion: Scald injuries in young children pose a substantial risk of mortality, particularly in those living in rural areas and those with extensive injuries. These findings emphasize the need for targeted preventive measures and resources in vulnerable populations to reduce the incidence and severity of scald injuries in children

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LIST OF ABBREVIATIONS

HIC	High Income Countries
LMIC	Low- and middle-income countries
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
OR	Odds Ratio
AOR	Adjusted Odds Ratio
SPSS	Statistical Package for the Social Sciences
TBSA	Total Burn Surface Area
ABSI	A body shape index
SSA	Sub-Saharan Africa
WHO	World health Organization
MUAC	Mid Upper Arm circumference
FFP	Fresh Frozen Plasma

DEFINITION OF TERMS

Scald injury is a burn caused by contact with hot liquid (hot water, chemical, hot oil) and steam.

Clinical- Demographics are the classifiable characteristics of a given population, demographic characteristic most commonly used in public health statistics include: Age, Sex, income or insurance, Education / occupation, And family structure.

Pediatric, is the branch of medicine that involves the medical care of infants, children, and adolescents from neonates to fifteen years. In this instance, we recruited pediatric patients from 2 months to 10 years. Whereby the under 2 months of age are rarely to sustained burn injury.

Mortality is the number of deaths due to specific illness or conditions within a particular society and period of time, also can be defined as the incidence of death in the population in a given period.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Children of burn victims represent a significant local and global medical concern, contributing to both morbidity and mortality on a global scale. It can be the source of the worst illness conditions and severe pain injuries a child can receive, and it may lead to prolonged physical and mental effects (1, 2). Globally, 265,000 deaths among burnt children occur annually, with low and middle-income countries (LMICs) accounting for about 4.3 per 100,000 while high-income countries (HICs) account for 0.4 per 100,000 (1Scalding, electric burns, or chemical burns cause this high fatality rate. urn. Similarly, LMICs, particularly in African and Southeast Asian regions, account for about 70% of all burns, with children under the age of 15 experiencing more frequent burns from scalding or flames in LMICs than in HICs.

In Africa, the World Health Organization (WHO) estimated that fire-related burns account for approximately 18 000 to 30 000 deaths in pediatrics under the age of five. Unfortunate admission to essential consideration accounts for all mortality, while the exorbitant management of burn patients impacts the economy, health facilities, and the quality of life of patients. In sub-Saharan Africa (SSA), burn mortality represents 64% of the world's deaths in the 0-4-year-old age group and 78% of burn mortality in the long-term age group (6).

Similarly, in Tanzania, burn injuries account for 16% of all injuries, with a one-month incidence of 1.73% (7). And pediatricians suffer the major form of burn injuries; one study done in Buganda Hospital revealed that a scald burn is dominant in about 56.1% (8). In the same aspect, the study done at the MNH burn unit on the pattern and management of pediatric burn injuries revealed that the scald injury mortality rate was 93.7% (9); research has been conducted in scald burn injuries. This study aims to

investigate the predictors of mortality among children and injured patients admitted to the Muhimbili National Hospital burn unit.

1.2 Problem statement

The mortality rate of scald victims in children in east African countries is high. Tanzania contributes **11.7%** of all burns. Each month, Muhimbili National Hospital receives more than 20 cases, 85% of which are scald injuries, and admits them to the burn unit in critical condition. Despite the hospital receiving such cases, documentation on the expected outcomes of these patients and the factors influencing these outcomes remains limited. One study concentrated on the general management of burn injuries, but it did not address the impact of other factors such as clinical demographics, clinical pathology, and their correlation with mortality in scald injuries. Furthermore, the study's predictors for outcomes such as mortality lack a solid foundation. Therefore, it is crucial for studies to pay attention to this gap.

1.3 Rationale of the study

These will help formulate evidence-based local standards, which will serve as a platform for quality improvement in the management of scald injuries among children in Muhimbili National Hospital. By assessing the factors that contribute to the outcome of scald burn injuries among children, the findings will assist health care providers in devising appropriate interventions. The generated evidence will aid in enhancing Tanzania's general surgery department, particularly in plastic surgery, as well as other service delivery points

1.4 Conceptual Framework

Scald pediatric injuries as shown in the conceptual framework is affected by different factors such as, clinical and demographic factors. Therefore, the conceptual framework shown in the figure below helps to summarize the relationship among dependent variables which is pediatric mortality among scald injured and independent variables

which are associated factors among the children with burn injury mentioned in the conceptual framework. Mentioned in the conceptual framework.

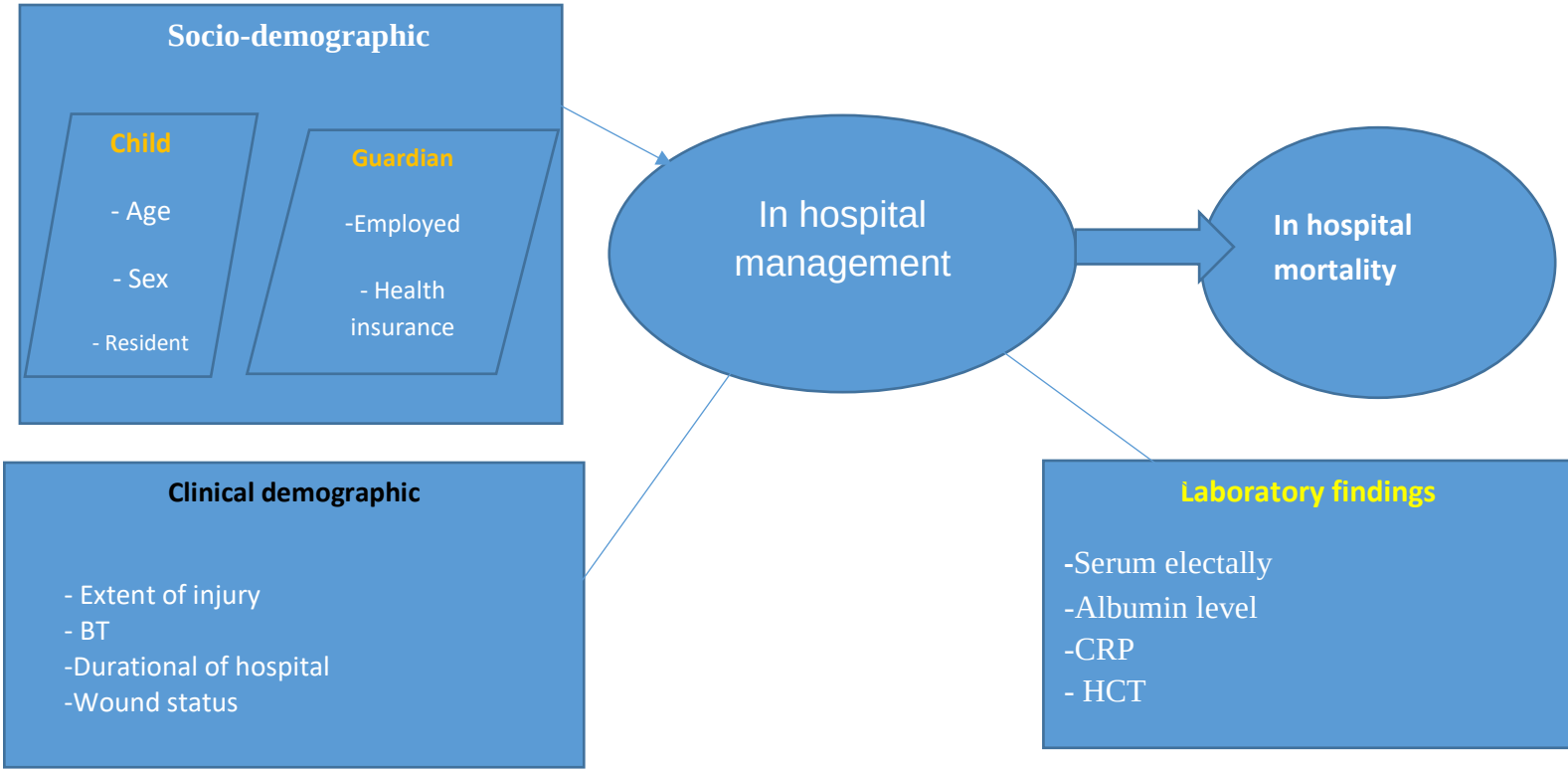


Figure 1 : Conceptual frameworks showing Clinical demographic characteristics, and their predictors of in hospital mortality among pediatric scald burn patients treated at Muhimbili national hospital burn unit.

1.5 Research questions

1.5.1 Primary research question

Do clinical- demographic characteristics influence the mortality of burn pediatric patients admitted at Muhimbili National Hospital burn unit from 2019 and 2020?

1.5.2 Secondary research questions

i. What the clinic demographic characteristic and predictor of mortality among burn pediatrics patients, admitted at MNH burn unit?
ii. What the mortality of pediatrics burn patients at MNH burn unit.
iii. What the clinic pathological factor that predict the mortality among pediatrics burn patients attended at MNH burn unit?
iv. What the association between clinic pathological characteristic and mortality among pediatrics burn attended at MNH burn unit?

1.6 Objectives

1.6.1 Broad Objective

To determine clinical- demographic characteristics and predictor of mortality among burn pediatric patients admitted at Muhimbili National Hospital burn unit from 2019 and 2020?

1.6.2 Specific Objectives

i. To determine the clinic demographic characteristic and predictor of mortality among burn pediatrics patients, admitted at MNH burn unit.
ii. To determine the mortality of pediatrics burn patients at MNH burn unit.
iii. To determine the association between clinic pathological characteristic and mortality among pediatrics burn attended at MNH burn unit.
iv. To determine the clinic pathological factor that predict the mortality among pediatrics burn patients attended at MNH burn unit.

CHAPTER TWO

2.0 LITERATURE REVIEWS

2.1 The relationship between clinical demographic and mortality.

2.1.1 Mortality

Burn injuries are a major cause of death and disability on a global scale. The mortality rate of children due to burn injuries mirrors the disparity of hazard factors and care limits, such as nutrition support for patients who have been scalded. Therefore, the causes and treatment of pediatric burns require exceptional attention to reduce the risk of mortality (14).

Similarly, a review was conducted in East Africa, specifically in Rwanda, on the study of disease transmission of burns at the Teaching Hospital University of Kigali. We used a total of 560 patients as test subjects, gathering information through interviews and some data from the diagrams. The results indicated that 12 deaths occurred within 30 days post-injury, with burn wounds being the most common cause of death. Higher mortality was essentially connected with expanded TBSA. Therefore, burn primarily affects children aged 1 to 5 years, with scalding being the most commonly identified cause of burn injuries. However, some patients experience malnourishment prior to burn damage.

2.2 The clinical demographic of scald injury.

2.2.1 Patient age

Burn injuries are a worldwide general medical issue, representing an expected 265,000 deaths a year. Burn injuries, occurring between the ages of 0 and 12 years, account for over a portion of the incapacity-changed life years lost globally. Currently, the rate of child deaths due to consumerism is approximately seven times higher within the first

30 days and is more prevalent in low- and middle-income countries compared to high-income countries. This is primarily due to a lack of mindfulness and a lack of proper weight management among patients. The review advocates for the application of counteraction techniques, such as enhancing mindfulness, implementing a balanced diet for patients, and developing and maintaining effective strategies. Consequently, the insights from these reviews will serve as a valuable reference for examining the causes of consumer injury, which will aid analysts in making informed decisions about outcomes [1].

2.2.2 Sex.

Ethiopia, a developing country in sub-Saharan Africa, conducted a study on the results of burn injuries and related factors among patients who visited Addis Ababa's burn, emergency, and trauma hospitals. We used a total of 241 patients as a sample size and collected the data using structured checklist tools. The results revealed that 132 (55.2%) patients are males and 108 (44.8%) are females, with a male-to-female ratio of 1.23:1. Additionally, electrical burns disproportionately affect adult males, while flame burns primarily affect adult females and the elderly. The study concluded that while scald burns are common in all age groups, they are more common in adult and elderly age groups.

2.2.3 Residency.

Similarly, a study was conducted in Tanzania at St. Francis Referral Hospital Morogoro to investigate the prevalence of burn injuries among children. The study used a sample of 9125 children and collected data through the use of medical records. The findings showed that burn injuries in children occur in urban areas at a rate of approximately 25% to 43.3%, with the majority occurring at home during domestic activities, while in rural areas, the rate is approximately 56.7%. The study suggests that scalds account for the majority of childhood burn injuries at this hospital, with the majority of affected children being two years old and males predominating. Therefore, the insights gained

from this study will empower the researcher to carry out further research and bridge the gaps it leaves [12].

2.2.4 Cause of burn

Around the world, children with incomplete verbal development are the most vulnerable to burn injuries. Researchers in Turkey completed a study on the etiology of burn injuries among 0–6-year-olds at a university hospital burn unit in Bursa, gathering information from burn-injured children between January 2001 and December 2008 using clinical records as a collection tool. The outcomes showed the results indicated that the majority of burns were caused by contact with hot substances such as scald, electrical, flame, hot surfaces, or hot fluids due to an accident, with the home environment being the primary cause of burn injuries. Vend that a lack of management and awareness are the primary causes of burn injuries in children.

2.2.5Total body surface area

However, in Western Kenya on the African mainland, researchers evaluated the clinical patterns and early outcomes of burn injuries in patients admitted to the Moi teaching and referral hospital in Eldoret. The review applied to 189 patients to gather the information through interviews and poll instruments. The results revealed a correlation between a TBSA of 20% to under 30% and the presence of burn difficulties, while a TBSA of less than 10% and the duration from consumption to confirmation were linked to the length of stay in the medical clinic [20]. Therefore, it is necessary to continue educating the general population about health and safety to ensure a secure home environment for children. Additionally, scientists can use these insights to guide their research into the factors that influence the duration of hospital stays and the mortality rate among children with burn injuries.

2.2.6 **Burn depth**

At the local level, Northwestern Tanzania conducted a review on the impact of childhood burn injuries and their management outcomes at Bugando Clinical Center. They tested 342 burn children and collected information through surveys and measurable examinations. The results showed that the majority of the patients, 164 (48.0%), suffered from superficial burns. The leftover patients had either depth burn 98 (28.7%) or blended burn 80 (23.4%). Individuals suffering from a shallow burn experienced a significantly shorter length of stay (LOS) and a lower death rate, compared to those suffering from a deep or mixed burn, which are more likely to have contamination. The review suggests that youth burn injury actually remains a danger in our current circumstance with essentially unsatisfactory high grimness and mortality.

At the local level, researchers in Northwestern Tanzania conducted a review on the impact of childhood burn injuries and their management outcomes at the Bugando Clinical Center. They tested a total of 342 burn children, gathering information through surveys and measurable examinations. The results showed that the majority of the patients, 164 (48.0%), suffered from superficial burns. The leftover patients had either depth burn 98 (28.7%) or blended burn 80 (23.4%). Individuals suffering from a shallow burn experienced a significantly shorter length of stay (LOS) and a lower death rate, compared to those suffering from a deep or mixed burn, which are more likely to have contamination. The review suggests that youth burn injury actually remains a danger in our current circumstance with essentially unsatisfactory high grimness and mortality.

CHAPTER THREE

3.0 MATERIAL AND METHODOLOGY

3.1 Study design

We applied a retrospective hospital-based cohort study and used quantitative methods for data collection.

3.2 Study area

We conducted the research at Muhimbili National Hospital Burn Unit in Upanga, which is the largest referral hospital in the United Republic of Tanzania. The research center houses a 30-bed burn unit, a pediatrics ICU, and a complex operating theater. It admits 325 burn children annually from various municipal hospitals in Dar es Salaam and its surrounding regions, with 15 nurses caring for these patients. The team managed these cases effectively. The burn unit is located in the pediatric complex block. Specialists and senior residents attend a referral clinic that reviews approximately 600 follow-up patients monthly.

3.3 Study duration

We conducted this study between January 2019 and December 2020.

3.4 Study Population

The burn unit at MNH admitted all pediatric scald injury victims who survived a cut phase from January 2019 to 2020.

3.5 Inclusion Criteria and Exclusion Criteria

3.5.1 Inclusion criteria

The MNH burn unit admitted all pediatric patients with scald injuries and 10% or more TBSA who had survived a cut phase of burn injury between January 2019 and December 2020.

3.5.2 Exclusion criteria

- Patients with non-scald injuries were admitted to the MNH burn unit.
- After one week, the MNH burn unit admitted all patients with scald injuries.
- 75% of the files are incomplete, and 75% of the MNH medical records have missing data.

3.6 Sample size estimation

The sample size N was calculated as follows;

$$n = \frac{(Poq\sqrt{[P1\,(1- P1) + P0(1- P0)]} + Z\alpha\sqrt{[2\,\bar{p}\,(1- \bar{p})]}\}2}{(P0-P1)2}$$

Where,

n = Sample size for each group

P1 = the proportion of scald injury patients who die (died)

P0 = the proportion of scald injury patients who survived (alive)

$\bar{p}$ = The average proportion exposed

Average proportion exposed ($\bar{p}$) = (P1+ P0)/2

Zβ= 0.84 for power (1-β) of study is 80%

Zα= Desired level of statistical significance, for 0.05 significance level= 1.96

(Zα= the standard normal deviation at 95% confidence level=1.96 for two-sided comparisons depending on the hypothesis being tested).

Thus, assuming that,

The Odds Ratio= 2

r (ratio of controls to cases) = 1:1

Zβ= for 80% power is 0.84,

Zα= for 0.05 significance level= 1.96

$n = \{0.84\sqrt{[0.186\ (1- 0.186) + 0.0095(1- 0.0095)]} + 1.96\sqrt{[2\ x0.09775(1- 0.09775)]}\}2$

Sample size (n) = 220.

With 55 deaths and 165 survivors among pediatric burn patients at MNH , the study had a power of 80% to detect an odd ratio of 0.3 two tailed type -1 error of less than 5% and type two error of 0.2.

3.7 Recruitment procedures

The study participants were selected from the books of all burn injured patients. Children treated at the burn unit of MNH during the study period from January 2019 to December 2020 were reviewed. We considered all patients who had scald injuries during the study period as study candidates, dividing them based on their hospital mortality and survival rates. In one year, there were 300 children, and we estimated the sample size to be 220.

3.8 Variables

3.8.1 Dependent variable

In this study, the dependent variable is the outcome after a pediatric stroke injury, specifically hospital mortality.

This study will measure the dependent variable in the following manner:

We will measure mortality as a categorical variable on a scale of 0-1, with "1" denoting the occurrence of death and "0" denoting survival.

3.8.2 Independent variables

The study measured the clinical demography of scald burn injuries among patients in the MNH burn unit as independent variables.

Clinical demography was measured as a categorical variable except for % of burn, which will be given numbers/continuous variables.

Hospital management was measured using categorical variables on a scale of 0-1. A score of 1 indicated the presence of hospital management practices such as fluid resuscitation, wound dressing, and receding of blood products, while a score of 0 indicated the absence of missing information.

3.9 Data collection procedure

Prior to data collection, the supervisor, acting as a research assistant, conducted training on research assistance and enrollment, followed by a pretest of the study, after which the researchers collected the data. Researchers used the checklist tool to gather data from the patient's file or medical records, following a doctor's consultation.

3.10 Data management

We sorted and checked the collected data on a daily basis to ensure completeness. We checked the medical records again to make necessary adjustments in case of discrepancies or missing data

3.11 Data analysis

The Statistical Package for Social Sciences (SPSS) version 23 performed the data analysis. We summarized categorical variables using frequency proportion. We summarized continuous variables using means and standard deviations. We analyzed objective one using crosstabs and the chi square test to compare the mortality proportion among cases and controls. We conducted a chi-square test at the bivariate

stage to analyze objectives 1 and 2, determining associations for categorical and outcome variables, and a t-test for continuous variables. All the variables that showed significance ($p<0.05$) in the bivariate analysis were then put through a multivariate analysis to find out what effect each variable had on its own. Variables with $p<0.05$ and a 95% confidence interval (CI) >1 were thought to be statistically significantly risky.

3.12 Study limitation

Difficulty in measuring occurs when one uses records that are not designed for the study; the available data may be of poor quality due to recalling of information. Also, there is frequently an absence of data on potential confounding factors if the data was recorded in the past.

3.13 Study Mitigation

We excluded files with missing information from the study. We also obtained additional information from the interview with the patient's guardians.

3.14 Ethical issues

The ethical clearance to conduct the study was sought from MUHAS Research and Publication Committee under Ref.No.DA.282/298/01.C/1818.Muhimbili National Hospital research, training and consultancy bureau for permission Ref .No.MNHof/CRTCU/Perm/2023/469. Informed consent was not be requested as this study deals only with patient files the confidentiality was assured and checklists were not containing client names only MR numbers were used.

CHAPTER FOUR

4.0 RESULTS

The MNH pediatric burn unit treated 300 children who sustained burn injuries between 1st January 2019 and 31st December 2021.Of these, Only 220 case notes, retrieved from the medical records for data abstraction, met the study inclusion criteria, out of the 300 children. The rate was 25%, representing 55 deaths among the 220.

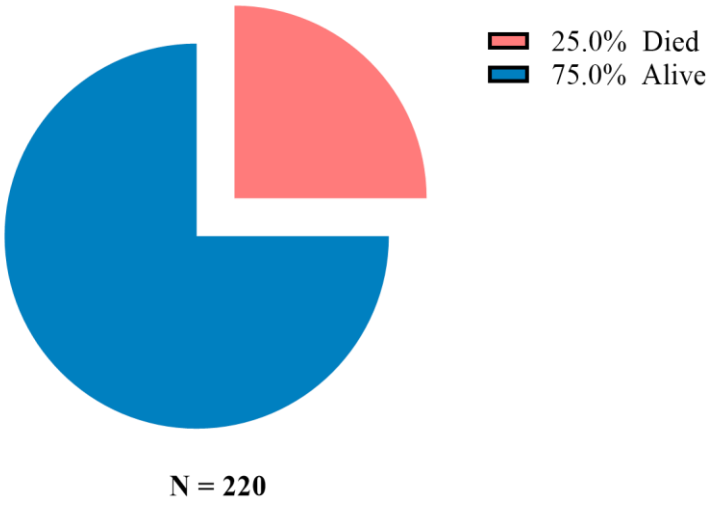


Figure 2: it shows the patients who died and alive with scald burn injury

In **Table 1, Relationship between the clinical demographic factors and mortality.** We present the social demography of burn children, including their age, sex, residency status (urban versus rural), availability of health insurance, the depth of their burn injuries, the total surface area of their burns, and the region of their body that was burned. The majority of the burn children were under five years of age at 203 (92.3%), with male child and urban residency predominance at 135 (61.4%) and 197 (89.5%), respectively. Only 47 (29.5%) of the children had health insurance. The majority had a partial thickness burn injury, with 190 (86.4%) and 156 (70.9%) sustaining <40% total body burnt surface area. Trunk and limbs were the most burned body regions compared to head/neck regions, 148 (67.3%) vs. 72 (32.7%), respectively. The majority, 187 (85.0%), had a hospital stay of less than one month.

Table 1:Distribution of clinical demographic characteristics among pediatrics scald burn at MNH burn unit.

Variable	Frequency (%)
Age (yrs)	
< 5	203 (92.3)
> 5 yrs	17 (7.7)
Sex	
Male	135 (61.4)
Female	85 (38.6)
Residence	
Urban	197 (89.5)
Rural	23 (10.5)
Patient category	
Insured	47 (21.4)
Not insured	173 (78.6)
Depth of burn injury	
Partial thickness	190 (86.4)
Full thickness	30 (13.6)
%TBSA of burn	
< 40%	156 (70.9)
> 40%	64 (29.1)
Region burned	
Head/neck	72 (32.7)
Body/limbs	148 (67.3)

Having health insurance was linked to a significant decrease in deaths from burns (28.6% less deaths), living in a rural area was linked to a 39.3% higher death rate (p-value <0.00001), and having a burn surface area greater than 40% was linked to a 48.5% higher death rate compared to those with a burn surface area of less than 40% (p-value <0.001). A burn in the head or neck region was linked to a 32.7% higher death rate, which is also a significant finding (p-value <0.001). The mortality rate among children under five years of age was observed to be higher, but it narrowly failed to reach significant levels (p-value 0.058).

Table 2: multivariable Showing clinical demography and their association with mortality among scald injured children treated at MNH

Variable	Dead N = 55 n (%)	Alive N = 165 n (%)	P - value
Age (yrs.)			
< 5	54 (26.6)	149 (73.4)	0.058
> 5 yrs.	1 (05.9)	16 (94.1)	
Sex			
Male	30 (26.7)	105 (73.3)	0.23
Female	25 (29.4)	60 (70.6)	
Residence			
Urban	36 (18.3)	161 (81.7)	< 0.001
Rural	19 (57.6)	4 (42.4)	
Patient category			
Insured	2 (4.3)	45 (95.7)	< 0.001
Not insured	53 (30.6)	120 (69.4)	
Depth of burn injury			
Partial thickness	45 (23.7)	145 (76.3)	0.257
Full thickness	10 (33.3)	20 (69.7)	
%TBSA of burn			
< 40%	17 (10.9)	139 (89.1)	< 0.001
> 40%	38 (59.4)	26 (40.9)	
Region burned			
Head/neck	29 (40.3)	43 (59.7)	< 0.001
Body/limbs	26 (17.6)	122 (82.4)	

4.2 Unilabiate and multivariable analysis of the factors associated with mortality

In the multivariable analysis, social demographic and clinical characteristics, as well as management factors, appeared to be associated with the deaths of pediatric burn-injured patients from scald burns. However, after adjusting for potential confounding by each of the socio-demographic and burn factors that appeared to have an association with burn death in the multivariate analysis,

Participant who resided in a rural area were 21 times more likely to die compared to participant who resided in an urban area, and such association persisted after controlling confounder, whereby participant who resided in rural areas were 23 times more likely to die compared to participant who resided in an urban area (aOR = 23.71, 95% CI 3.82-147.58, P<0.001).

The participant who sustained a large total body surface area of 21–60% was 11 times more likely to die compared with the participant who sustained a small body surface area of 1-20%, and such association persisted after controlling confounders, whereby participants with 21–60% TBSA were 19 times more likely to die compared to those with 1-20% TBSA (aOR 19.98, 95% CI 6.00–66.50, P<0.001).

Table 3: Univariable and multivariable analysis of the factors associated with death among children with burns

Variable	Category	Univariable analysis			Multivariable analysis		
		cOR	**95% CI**	**P - value**	**aOR**	**95% CI**	**P - value**
Age group (years)	0 – 4	5.80	0.75 – 44.78	0.092	6.87	0.03 – 1803.50	0.498
	5 – 12	1[a]					
Sex	Female	1.46	0.79 – 2.71	0.232			
	Male	1[a]					
Residence	**Rural**	**21.24**	**6.81 – 66.23**	**< 0.001**	**23.75**	**3.82 – 147.58**	**< 0.001**
	Urban	1[a]					
Couse of injury	Boiled water/milk	3.76	0.83 – 16.95	0.085	3.32	0.37 – 29.67	0.282
	Hot cooking oil	0.65	0.05 – 8.02	0.740	0.44	0.01 – 15.83	0.650
	Hot porridge	1.65	0.30 – 9.06	0.567	1.52	0.13 – 17.68	0.736
	Hot food	1[a]					
Extent of injury	Thickness	1.45	0.47 – 4.54	0.521			
	Mixed	2.25	0.60 – 8.45	0.230			
	Superficial	1[a]					
TBSA	**21 – 60%**	**11.95**	**5.88 – 24.28**	**< 0.001**	**19.98**	**6.00 – 66.50**	**< 0.001**
	1 – 20%	1[a]					
Healthnsurance							
	Insured	2 (4.3)	45 (95.7)	**< 0.001**	3.42	0.03	0.370
	Not insured	53 (30.6)	120 (69.4)				

y: cOR: Crude Odds Ratio, aOR: Adjusted Odds Ratio, 1a: Reference category

CHAPTER FIVE

5.0 DISCUSSION

2The study uncovered several factors, ranging from socio-demographic traits to clinical features that contribute to the mortality burden among pediatric burn patients. This study found that the patient's age had no effect on the mortality among the study population, despite the majority of cases being under 5 years of age. This was in contrast to the study findings among pediatric burn patients studied in several regions in East Africa, whereby lower age was one of the strongest predictors of mortality (23).

However, the study discovered that 96.2% of pediatric burn patients who passed away lacked insurance. Tiruneh et al. also reported a similar finding, indicating that pediatric burn victims without medical insurance faced a mortality risk approximately four times higher than those with medical insurance (24). Lack of medical insurance simply implies health insecurity, which in turn reduces the likelihood of timely access to healthcare services, particularly in unforeseen calamities like burn accidents, thereby increasing the chances of mortality among the victims.

Along with socio-demographic characteristics, the majority of patients who died in the study were victims of scald burn injury due to boiled water, which was a similar finding in studies conducted in Ghana and Ethiopia (25, 26). Additionally, Bharwana et al.'s study revealed a high incidence of scalds among children aged 1-5 years and even toddlers who came into contact with boiling water. Furthermore, the WHO reports that the majority of pediatric burns happen in the age range of 0 to 5 years (27, 28). Researchers primarily attributed the findings in this age group to their eagerness to explore their surroundings, emphasizing the importance of increased supervision as the child develops their loco motor and manipulative skills. Children of this age group are primarily at risk for burns due to their constant play in the kitchen and the absence of parental supervision (25, 29).

After controlling for confounders, it was found that residing in rural areas was significantly associated with the mortality rate of pediatric burn patients, with victims residing in rural areas having a 23-fold higher risk of death compared to those residing in urban areas. Studies conducted in Ethiopia and North India similarly observed a higher mortality rate among burn patients from rural areas compared to those residing in urban areas (24, 31). The majority of patients from rural areas likely faced several obstacles in accessing healthcare services from the time of their burn accidents, thereby putting their lives at greater risk.

The study also found out that participants with 21–60% TBSA had higher odds of mortality than those of minimal extent of burn injury. A study in Argentina, Cameroon, and North India (32–33) also noted higher odds of mortality among patients with TBSA >25%. This is mainly attributed to the extent of the skin coverage affected by the burn injury, thus compromising the normal body protection against body fluid loss and the barrier against infections. The wider the burn, the more fluid loss occurs, leading to the patient's descent into shock. Patients are also more susceptible to infection due to losing the protective skin layer (35). It is for this reason that the management of burn cases requires adequate body fluid replacement with intravenous hypertonic fluids and the use of topical antibiotics to minimize the risk of burn shock and infections, respectively (36).

Additionally, the loss of one of the temperature regulators can disturb the body temperature variations of burn victims. Hyper- and hypothermic states can affect the body's enzyme function, leading to unbalanced metabolism and states that result from excessive inflammatory responses secondary to thermal injury (38).

CHAPTER SIX

6.0 LIMITATION OF STUDY MITIGATION, CONCLUSION AND RECOMMENDNATION

6.1 Limitation of study

The study was retrospective study design which lost a significant number of children with scald burn injury due to missing of essential data for the study.

6.2 Study Mitigation

Files with large missing information were excluded from the study. Also other information was obtained through phone call interviews with the patient's guardians.

6.3 Conclusion

In conclusion, this study has investigated the clinical demographic burden and their impact on mortality rates among pediatric burn patients with scald injuries. The findings highlight the multifaceted nature of factors influencing mortality in this population, including the severity of burns, having medical insurance, and residential areas. Understanding these complex interactions is crucial for devising effective interventions to reduce mortality rates and improve outcomes among pediatric scald injured patients.

6.4 Recommendations

However, the study’s findings underscore the importance of considering socio-demographic variables such as age, gender, and access to health care in predicting mortality outcomes among this vulnerable population. Understanding these factors can inform targeted interventions and healthcare policies aimed at reducing mortality rates and improving outcomes for scald injured pediatric patients. To develop more effective strategies for patient care and support, researchers should focus on the intricate interplay between socio-demographic factors and mortality.

Healthcare providers should prioritize comprehensive assessments that address both the clinical and nutritional needs of these patients to optimize care and minimize mortality risks. Further research focusing on tailored interventions and multidisciplinary approaches is essential to enhance the management of pediatric burn injuries and ultimately decrease mortality rates in this vulnerable population.

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APPENDEX1: PATIENT' FILE OBSERVATION CHECKLIST

RESEARCH TITLE: Predictors of mortality among undernourished pediatric burn injured patients admitted at Muhimbili National Hospital Burn Unit.

GENERAL OBJECTIVE: To determine the predictors of mortality among undernourished pediatric burn injured patients admitted at Muhimbili National Hospital Burn Unit.

Course: MMED GENERAL SURGERY
Date:……

Observer: MAIMUNA IBRAHIM

Social demographic factors	**Observed?**	**Comments**
Patient age	☐ 0 – 4 ☐ 5 - 8 ☐ 9 - 12	
Patient sex	☐ Male ☐ Female	
The education level	☐ Not yet ☐ Nursery ☐ Primary	
Resident	☐ Urban ☐ Rural	

Use of health insurance for treatment	☐ Yes ☐ No	
Informative	☐ Mother ☐ Father ☐ Sibling ☐ Other	
Clinical factors	**Observed?**	**Comments**
Nutritional status	☐ Well nourished ☐ Undernutrition ☐ A-wasted ☐ B- stunted ☐ C- underweight	
Cause of scald injury	☐ Boiled water ☐ Hot cooking oil	

	☐ Hot porridge ☐ boiled milk ☐ Hot food	
Extent of injury	☐ superficial ☐ partial thickness ☐ full thickness ☐ mixed	
The location of injury	☐ Scalp ☐ Front head ☐ Face ☐ Neck ☐ Truck ☐/ p☐ ☐ upper limb ☐/☐ ☐ abdomen	

	☐ perineum ☐ UP lower limb ☐ / ☐			
Total body surface area	☐ 1-20% ☐ 21-40% ☐ 41-60% ☐ 61-80% ☐ 81-100%			
The patient's temperature was	☐ High ☐ Normal ☐ Low			
Duration of patient stayed at hospital	☐ ≤ 1 month ☐ 2 months ☐ 3 months ☐ >3 months			
Investigations	Electrolyte	**Y**	**N**	
		☐	☐	

	FBP			
	RCP			
	RFT			
	Albumin			
Patient's presentation	☐ acude burn wound ☐ chronic burn wound ☐ ineffected burn wound			
Management factors	**Observed?**			**Comments**
First Aid before health service**s**	☐ Yes ☐ No			
Kind of home remedies use for first aid	☐ Cool water ☐ Honey ☐ Aloe vera ☐ Blanket ☐ Other			

Treatment at the referral health facility	☐ **Yes** ☐ **No**			
Management offer		**Y**	**N**	
	Fluid resuscitation			
	Fluid maintenance			
	Glucose monitor			
	Antibiotics			
	Blood transfussion			
	PRBCs ☐ FFP ☐ PLAT ☐			
Dressing method	☐ Chemical ☐ Surgecally ☐ Biological ☐ mechanical			
Fluid management		**Y**	**N**	
	NGT			

	Canula Urenary			
Wound status	☐ Clean ☐ contaminate ☐ durty			
Referral status	☐ Referred form health facility ☐ Self referral			
Associated comorbidity	☐ Epilesy ☐ Cerebral palsy ☐ Congenital anomaly ☐ Syndrome baby ☐ Other			

Appendix 2: Ethical Clearances

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/1818 Date: 24/07/2023

MUHAS-REC-07-2023-1818
MAIMUNA IBRAHIM A. ABDATAM
SCHOOL OF MEDICINE
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: PREDICTORS OF MORTALITY AMONG UNDERNOURISHED PEDIATRIC BURN INJURED PATIENTS ADMITTED AT MUHIMBILI NATIONAL HOSPITAL BURN UNIT

Reference is made to the above heading,

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 24/07/2023
EXPIRATION DATE OF APPROVAL: 24/07/2024

STUDY DESCRIPTION:
Purpose:

Nutritional support is of significant importance in scald injury pediatricians, as they are at higher risk of malnutrition and growth impairment due to the high metabolic demands of wound healing and tissue repair. Children have higher energy and protein requirements than adults due to their growth and development, and burn injury can further increase.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:

https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014856.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research, Publications & Innovations
Box 65001

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/S.273/2021

27th July, 2023

The Executive Director,
Muhimbili National Hospital,
P.O. Box 65000,
DAR ES SALAAM

MUHIMBILI NATIONAL HOSPITAL
RECEIVED
09 AUG 2023
REGISTRY
File No:

Re: INTRODUCTION LETTER

The bearer of this letter is Maimuna Ibrahim A. Abdatam (HD/MUH/S.273/2021), a student at Muhimbili University of Health and Allied Sciences (MUHAS) " pursuing MMed. Surgery.

As part of her studies, she will be doing an elective research titled: "**Predictors of Mortality Among Undernourished Pediatric Burn Injured Patients Admitted at Muhimbili National Hospital Burn Unit."** she is being supervised by Dr. Lary Akoko from MUHAS and Dr. Godbless Masawe from MNH.

The research has been approved by the Chairman of University Senate.

Kindly provide her the necessary assistance to facilitate the conduct of her research.

We thank you for your cooperation.

Mr. Seba Mohamed
For: DIRECTOR, POSTGRADUATE STUDIES

c.c Maimuna Ibrahim A. Abdatam

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