



TREATMENT OUTCOME OF BURN INJURY AND ASSOCIATED FACTORS
AMONG CHILDREN AT BURN UNITS, ADDIS ABABA, ETHIOPIA, 2021.

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**A RESEARCH THESIS SUBMITTED TO ST.PAUL HOSPITAL MILLENNIUM
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ABSTRACT

Introduction: Burn injuries are a global public health problem, accounting for an estimated 180 000 deaths annually. The majority of these occur in low- and middle-income countries. It is among the leading cause of childhood disability and death. It can have long term physical and psychological impact on them and their families with ongoing treatment, rehabilitation and the need for regular interventions.

Objective: The aim of this study was to assess treatment outcome of burn injury and associated factors among children at burn units, Addis Ababa, Ethiopia, 2021.

Method: Institutional based retrospective cross sectional study design was conducted in Burn units from September 2018 to August 2021. Simple random sampling was used to review 263 medical records of children burn victims by using data extraction form. The collected data was entered into EPI info version 7 and exported to SPSS version 25 for analysis. Bivariate and multivariable logistic regression analyses were employed.

Result: Total of 251 burn patients was included in this study with a response rate of 95.43 %. 75.3% of burn patients were discharged without complication and 24.7% of patients were discharged with complication. Children who stayed in hospital for ≥ 30 days had 3.04 times more likely to be discharged with complication as compared to children who stayed less than 30 days in the hospital [AOR=3.04 ,95% CI(1.47-6.3)]. Children burned With 11-20 % of body surface area had 12.5 times more likely to be discharged with burn complication as compared to children with < 10% body surface area burned [AOR: 12.5, 95% CI (5-31.2)]

Conclusion and recommendations: Burn children patients discharged with complication were (24.7%). Total body surface area burned and length of hospital stay have significant association with discharged with complication. So health facilities and health professionals try to care burn with shorter stay in hospital.

Key words: Burn, Children, Treatment outcome, associated factors

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ACRONYMS

IALCH: Inkosi Albert Luthuli Central Hospital

LOS: Length of stay

SPHMMC: Saint Paul hospital millennium medical college

SPSS: Statistical Package for Social Science

TBSA: Total Body Surface Area

WHO: World health organization

1. INTRODUCTION

1.1 Background

Burn is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, electricity, friction or contact with chemical and hot liquids(1).Scald burn is the most common type and it may be caused by any hot liquid such as boiled water, tea and coffee. Scald injuries (59%) tend to be the most common types of thermal injury under the age of 16 years(2).

Burn injuries result in disruption to the skin's various physiologic functions, Loss of the skin's infection barrier function placing individuals at risk for infections due to the damage to the skin's epithelium which often leads to potentially disastrous loss of fluids, electrolytes leads to morbidity and mortality(3).

Pediatrics burn injuries in Africa are considered to be a major health care problem. Sub-Saharan Africa has the highest number of pediatric burn admissions(4).Pediatric burn injuries can be avoided. But regardless of this fact, burn is still a challenge in terms of death and long-term disability, prolonged hospital stays, disfigurement and isolation especially in third world countries including Ethiopia(5,6).

1.2 Statement of Problem

As a global public health problem, burn injuries accounting for an estimated 180 000 deaths annually mainly in low- and middle-income countries and almost two thirds occur in Africa(1).

Burn injuries in children are a significant burden; particularly in low and middle-income Countries were more than 90% of burn-related pediatric deaths occur(7). About one of every five burn victims die from the burns or their complications(2). Across the sub-Saharan regions study was conducted on 14 countries to review of burn policies and related legislation. Children aged 10 years and below represented over 80% of the burn patient population(2).

Burn by its nature tends to prone the pediatrics victims to immune suppression, in addition to this, prolonged stay in hospital and the victim undergoing different procedures for the purpose of diagnosis or for a therapeutic use increases the risk of infection and further complications(8).

In low- and middle-income countries most of the advance's mechanisms in prevention and care of children from burn injuries have been incompletely applied. Even if increased efforts to do so would probably lead to significant reductions in rates of burn-related death and disability, morbidity and mortality related to burn injury in children is still increasing(1).

There are studies in Ethiopia in agreement with global figures, showing children of under eighteen years cover almost half of the burn victims in the population(9). But there are still significant gaps in understanding the contributing factors that leads to burn injury and gaps in showing the actual figures of morbidity and mortality burden in the country.

In addition to lack of study conducted in the areas, the time when some of related studies conducted make it necessary to conduct studies to know current status on burn injury treatment outcome and associated factors among children. So that the purpose of this study is to assess current status of burn injury treatment outcome and associated factors among children at burn units, Addis Ababa, Ethiopia.

1.3 Significance of the Study

Since children are the windows hope for the future development and existence of a country, it is a great deal to concern about their health and safety. It is very crucial for every burn institution to know the outcome of burn injuries for appropriate prevention and treatment. In the developing countries like Ethiopia, there is a wide gap between the number of burn patients and available resources to manage them. There are no enough functional specialized burn units in our country. Burn injuries treatment outcome are least explored in Ethiopia. This study was assess the treatment outcome of burn injury and associated factors among children .Hence, it will shows on the treatment outcome burn injury among children at burn units Addis Ababa which are the prerequisite for improving the effectiveness of services delivered by burn care facilities. This study will also provide baseline information to other researchers to study further.

2. LITERATURE REVIEW

2.1 Prevalence of Burn Injury in Children

Retrospective cross-sectional study in Riyadh (2016) show that children Burn injury incidence was 4.9 %. Children with burns on more than 10% TBSA accounted for 16% incidence (0.8/1000 emergency department patients(10). Other study conducted in Hawassa ,Ethiopia reveled the prevalence of burn injury among burned children patient were 9.79%(11).

2.2. Burn Injury Treatment out Come and Associated Factors in Children

A cross-sectional study conducted in Pakistan on 94 children burn victims reported that, 51.06% were males and 48.93% were females. Burn injuries mainly occurred in domestic setup. 90% mortality was observed in children with TBSA>60%.A significant association was found between TBSA and mortality (p-value <0.000)(12).

Study conducted in Motahari Referral Hospital burn care center, Tehran, Iran on 1717 pediatrics burnt patients revealed that the majority of the victims 63% were male as compared to female 37%.And hot liquids were the most common cause of pediatrics burn injuries that cover 73.2%.Among the children-burn patients $\geq 21\%$ total body surface area burned had 10.9% death. The mortality rate was identified 4.5%.,and 85.3% burnt patient were discharged by physicians(13). In South Africa study show that toddlers aged were predominantly experienced burn injuries (39.6%)(14). A study done at IALCH [Ininkosi Albert Luthuli Central Hospital], Durban, South Africa show that, from admitted burn patients 58% were children. The female to male ratio was 1:1.13. scald or hot lliquids(71%) were Common causes for the burns in children.Mortality In children was (5.7%), Complications occurred in 21.6% of children(15).

In Tanzania, Bugando Medical Centre males were mainly affected, 87.1% of the burn victims had conservative treatments only with fluid, anti-pain, antibiotics and wound care. The rest of them had undergone surgical treatments (12.9%). skin graft was done for 65.9% while, fasciotomy and escharotomy was done for 11.4% of them, the remaining of t hem went through debridement and amputation. overall mean ,length of hospital stay(LOS) was 22.12 ± 16.62 days. Mortality rate was 11.7%. Age of the patient, %TBSA and severity of burn were to be significantly associated with LOS($p < 0.001$) (16).

A study conducted in Cameroon at Douala General Hospital showed that of 125 cases of pediatric burns were recorded over the study period. A total of 69 (55.65%) were males. The median age was 4 years. The mean length of hospital stay was 7 days, more than half of the patients had no complications during admission. Among those that developed complications, 19 (35%) developed sepsis. Mortality rate of pediatric burns obtained in this study was 29%.TBSA of $>25\%$ ($p=0.001$) were statistically significant predictors of mortality(17).

In Kenya retrospective study was conducted on burn injuries out come on children aged below 18 years show 76%of children burns were due to scalds. The commonest burn locations were extremities (56%).97% of children burnt at home. Epilepsy was one of co morbidities accounted 16%.The median Total Burn Surface Area (TBSA) was 14.5% and 36.3% developed complications while being treated for burns in the hospital. Commonest complication was wound infection, respiratory complications and death. . A TBSA of $\geq 21\%$ ($p = 0.01$) was associated with presence of burn complications (AOR 4.96, 95% CI (1.59-15-49)).In this study, death was likely to occur in one in ten patients admitted with burns and TBSA was a predictor of presence of burn complications and length of hospital stay(18).

A study conducted in Eritrea show that the mean age of the study group was 4.2 ± 3.7 years while the average length of hospital stay was 4.6 ± 8.4 days. In 94.8% of burn patients, the body surface area involved was 1–10%.The body surface area involved was 1–10%. Skin graft was done in 6.9% of the patients, debridement in 3.8%, and 2.3% of the patients presented late to the unit with contracture, and contracture release was done. And burn patients total body surface area of $\geq 11\%$ discharged without complication was 85.2% while discharged with complication was 14.8%(19).

In Ethiopia retrospective study was conducted in Tigray region on pediatric burn victim's show that 82.7% patients were discharged without complication and 17.3% discharged with complication. while10.2% of them had significant morbidity in the form of contractures, 0.3% developed disfigurement, 1.6% have amputation of the extremities, 3.9% constituted scar of skin graft, and 1.3% were dead(9).

2.3 Conceptual frame work.

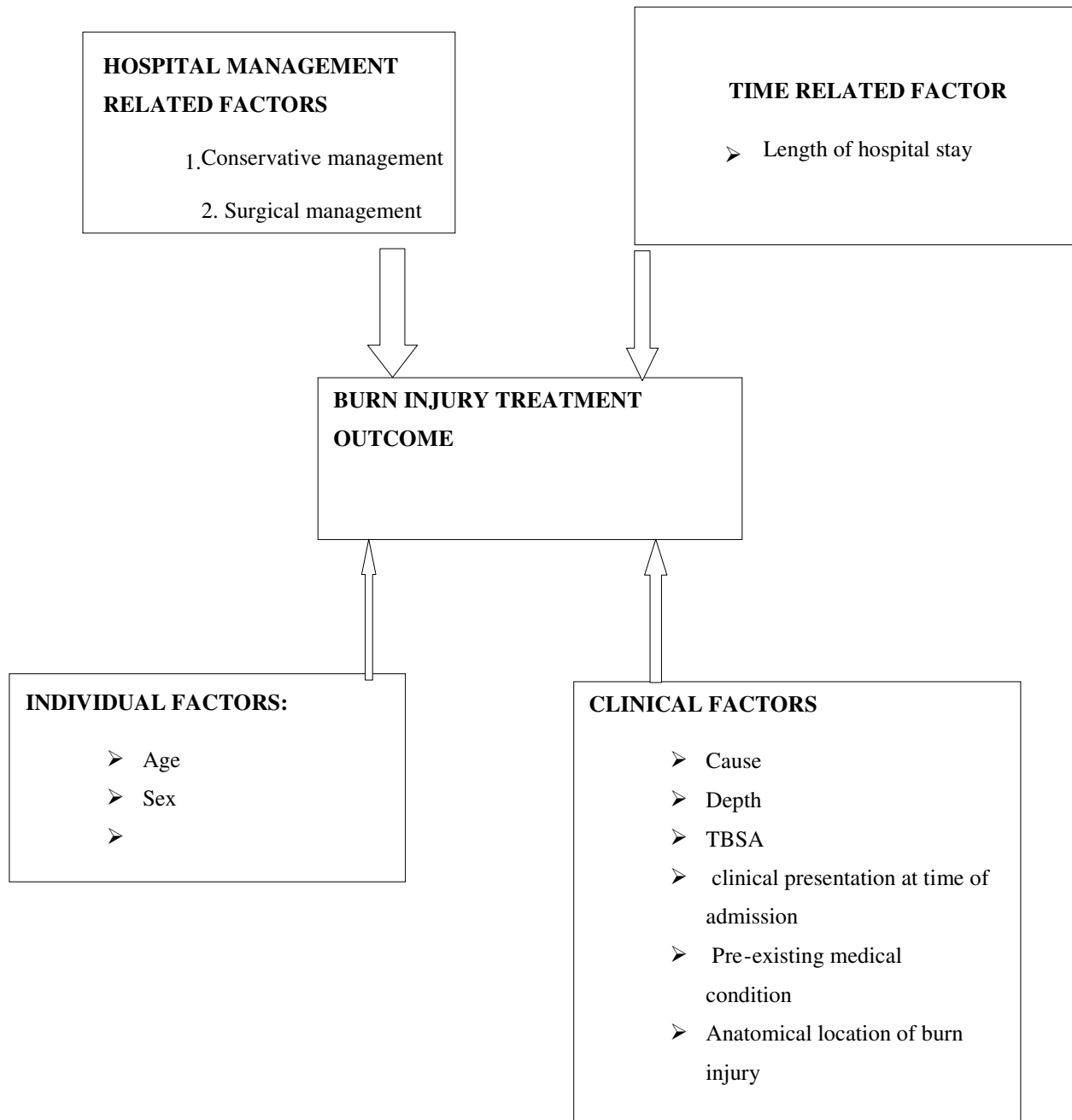


figure 1: Relationship between burn injury treatment outcomes and associated factors(20)

3. OBJECTIVES

3.1 General Objective

To assess treatment outcome of burn injury and associated factors among children at burn units, Addis Ababa, Ethiopia, 2021.

3.2 Specific Objectives

1. To assess treatment outcome of burn injuries among children at burn units, Addis Ababa Ethiopia, 2021.
2. To identify the factors associated with treatment outcome of burn injury among children burn units, Addis Ababa Ethiopia, 2021.

4. METHODS

4.1 Study Area

There are two burn units in Addis Abeba city at AaBET and Yekatit 12 hospitals. In 2015, AaBET hospital was inaugurated as a public hospital under St. Paul hospital millennium medical college. It is one of the first health sectors with an entire trauma and burn unit. The hospital serves over 7000 patients annually with a total of 250 beds. And also Yekatit 12 hospital is one of the hospitals under Addis Ababa city administration health bureau that has been giving routine health services for Addis Ababa and other referral cases from different regional states of Ethiopia (21,22).

4.2 Study Period

The study was conducted at AaBET and Yekatit 12 hospitals Addis Ababa, Ethiopia from December 15/2021 - January 10/2022.

4.3 Study Design

Institution based cross-sectional study design was conducted by using retrospective document review.

4.4 Populations

4.4.1 Source Population

The source population for this study was all children's cards under 18 years of age admitted because of burn injury at AaBET and Yekatit 12 hospitals burn units.

4.4.2 Study Population

The study population for this study was under 18 patient's charts who were admitted because of burn injury at AaBET and Yekatit 12 hospitals Addis Ababa from September 2018 to August 2021.

4.4.3 Study Unit

Individual burn children patient's medical record was taken as the study unit.

4.5. Sample Size Determination

The sample size was calculated by using single population proportion formula by considering the following assumptions:

P =50 % of treatment outcome of pediatric burn injury

Level of confidence= 95%

Margin of error (d) = 5%

$$n = (Z_{\alpha/2})^2 \times P(1-P)/d^2$$

n= the minimum sample size required

d= Margin of error

$Z_{\alpha/2}$ = Standard normal value at (1- α) 95 % confidence level

$$n = (1.96)^2 \times 0.5(1-0.5)/ (0.05)^2$$

n= 384 since the sources of populations were 630 which was below 10,000, the finite population correction is; $nf = n / 1 + n/N = 384 / 1 + 384/630 = 239$.

Where N=total population. 10% contingency was added considering for incomplete cards. Hence, the minimum sample size was 263 burn pediatrics patients' medical record.

4.6. Sampling Procedure

Burn patient's medical records for the specified period were reviewed from AaBET and Yekatit 12 hospitals Addis Ababa, Ethiopia, 2021. The number of study subject for each year was selected proportionally after identifying the number of burn patients in each year. Study Subjects was selected using simple random sampling. From the logbook the patient's card number was taken and the study units were selected by lottery method.

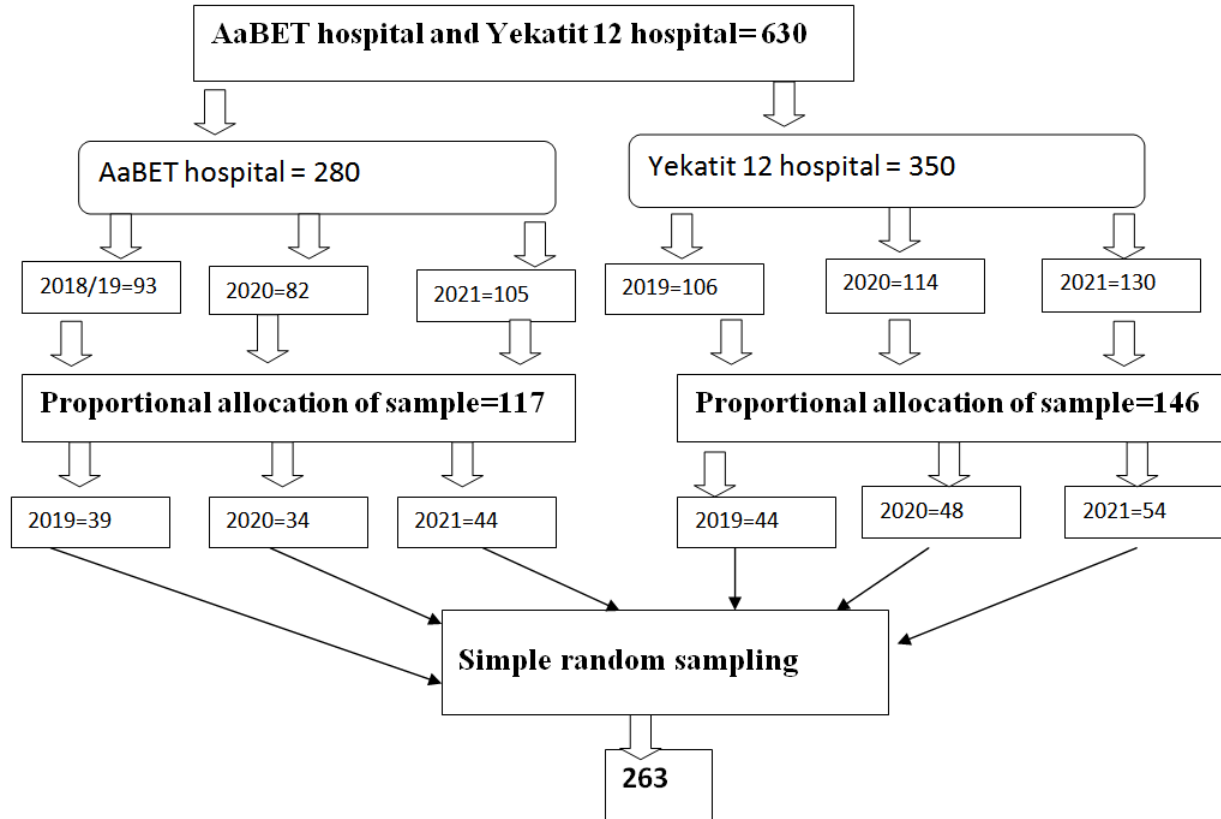


Figure 2: Sampling procedure of the two hospitals patients chart

4.7. Study Variables

4.7.1 Dependent Variable

Burn injury treatment outcome

4.7.2 Independent Variables

Age

Sex

Address/region

Preexisting medical condition

Cause of burn injury

Anatomic location of burn injury

Depth of injury

Extent of burn injury (TBSA)

Clinical presentation at the time of admission (shock, airway compromise,)

Pre-hospital intervention

Length of hospital stay

Hospital intervention (surgery, conservative treatment)

4.8. Eligibility Criteria

4.8.1 Inclusion Criteria

The inclusion criteria include all selected patient's chart of children of under 18 years of age with burn injury.

4.8.2 Exclusion Criteria

The exclusion criteria include children who were admitted in a burn unit but left against medical advice.

4.9 Operational Definitions

- Outcome of burn injury: The end consequences of burn injury at the end of the treatment mentioned on patients card (discharged without complication or discharged with complication)
- Discharged without complication: when the patient was discharged with improvement as recorded on patient's charts.
- Discharged with complication: when the children were discharged with contracture, disfigurement, amputated, scar of skin graft, death.
- Conservative management: one of the burn patient's treatment options which are includes fluid administration, wound care, administration of antibiotic and analgesics only or in combination.

4.10 Data Collection Instruments

A quantitative data collection tools/data extraction format was adopted from previous works of literatures(23,24).

4.11 Data collection Procedures

The data was collected by six trained BSC nurses working in burn units of AaBET and Yekati hospitals by using data extraction form by assessing the available information on the patient chart, registration book. Three years data from (September 2018 to August 2021) was taken. After obtaining the card numbers of burn injured pediatric victim from burn unit's registration book. Clinical data was extracted from patients medical records using a pre tested and pre prepared data extraction form. The data collectors then were use this card numbers to filter the patients chart from the medical record room. The data extraction form was completed by looking through the patients charts for relevant information

4.12 Data quality Control

Data collectors and supervisors were trained for two days. The quality was assured through close supervision of data collection procedures. Supervision was carried out on daily to check completeness and consistency by the supervisors and principal investigator to keep high data quality. The final completed data extraction form was collected from data collectors by supervisors and was submitted to principal investigator. In addition to this, prior to the actual data collection, pretest was done at 5% of the study population at AaBET hospital which was out of actual study unit.

4.13 Data Entry and Analysis

All questionnaires were checked for completeness and entered into EPI info version 7 computer programs to minimize data entry error and exported to SPSS version 25 for statistical analysis. Results were summarized using frequencies, percentage, mean, standard deviation, and presented

using figures, tables and text. Bivariate and multivariable logistic regression analysis was used to show the relationship between independent and dependent variables.

Those variables with a p-value less than 0.05 in the bivariate analysis were included in multivariable logistic regression. The relationship between independent and dependent variables was tested by odds ratio at 95% confidence interval and $p\text{-value} \leq 0.05$ was considered as significant.

4.14 Ethical Considerations

Ethical approval was obtained from Saint Paul hospital millennium medical college Institution Review Board (IRB) before conducting the study. By participating in this study no harm or manipulation to the already recorded data was done. The data collected was kept secured and in no situation will be transferred or sold for the purpose of personal gain.

4.15 Dissemination of the Result

The finding of the study will be presented to the department of school of Nursing of SPHMMC. It will be disseminated through presentations in different annual conferences, different seminars, and workshops. The paper will be submitted to peer reviewed scientific journals for possible publication.

5. RESULTS

5.1. Socio-demographic characteristics of the study participants

Out of 263 patients medical records 251 were included in the study with response rate of 95.43%. The most burn affected age group was 1–3 years (53.8%), with mean age of all burn patients was 5.6 ± 4.545 years ranged from 1-16 years. Female victims were 51.4 %, and the majority of them were from Addis Ababa region in residency (55%).

Table 1: socio-demographic distribution of 251 pediatric burn patients in burn units of AaBET and yekatit 12 hospitals from 2018-2021(n=251).

Characteristics		Frequency (n)	Percentage (%)
Gender	Male	122	48.6
	Female	129	51.4
Age	1-3	135	53.8
	4-6	30	12
	7-12	54	21.5
	13-16	32	12.7
Regions	Addis Ababa	138	55
	Oromiya	93	37.1
	SNNPRG	6	2.4
	Amhara	13	5.2
	Somali	1	0.4

Note; n- number, %- percent, SNNPRG- southern nation nationality and people regional government.

5.2. Clinical Characteristics of the Burn Patients

In this study, scald type of burns was the most common cause, affecting 158 (62.9%) of all burn injuries followed by open flame 70 (27.9%) and electrical burn 18 (7.2 %), while chemical and others burn accounted 4 (1.6%) and 1 (0.4 %) respectively. Regarding age factors of burns, toddlers (1-3 years) of age (42.6 %) and pre-school children from 4-6 years (8.4 %) are majorly affected by scald burns. while those in their school aged , from 7-12 years, are mainly affected by flame burns (10.4 %). Majority of burn incidents occurred in home settings, 245 (97.6 %), And 4 (1.6 %) was occurred in the school, and the remaining 2 (0.8%) burn were occurred on Street and others. Second degree burns were the commonest presentation (63.7%). The most frequently involved body part was the lower extremity 86 (34.3%), upper extremity was involved in 67 (27.7 %) of patients, trunk covers 42 (16.7%), while face/neck, buttock/genitalia and multiple body part, were involved in 10 (4 %), 5 (2 %), 41 (16.3 %) of the patients respectively.

Table 2: Distribution of clinical characteristics of burn victims at AaBET and YEKATIT 12 hospitals, Addis Ababa, Ethiopia, 2022(n=251).

Characteristics		Frequency (n)	Percentage (%)
Cause	Scald	158	62.9
	Flame	70	27.9
	Electric	18	7.2

	Chemical	4	1.6
	Others	1	0.4
Anatomic location of burn injury	Lower extremity	86	34.3
	Upper extremity	67	26.7
	Anterior trunk	36	14.3
	Posterior trunk	6	2.4
	Head, face and neck	10	4
	Buttock and genitalia	5	2
	Multiple body part	41	16.3
Depth of burn	First degree	2	0.8
	Second degree	160	63.7
	Third degree	88	35.1
	Fourth degree	1	0,4
Extent of TBSA burned	1-10%	131	52.2
	11-20%	86	34.3
	≥21%	34	13.5

TBSA=Total body surface area

5.3. Preexisting Medical Condition and Clinical Presentation at the Time of Admission

Two hundred forty eight (98.8%) patients were healthy before the burn incident and the rest had concomitant medical condition epilepsy 3 (1.2%). Pertaining to the clinical presentation of burn patients at the time of evaluation, only 5 (2%) patients were presented with shock.

5.4. Pre-Hospital Intervention, Hospital Management and Length of Stay

Among 251 patients, Pre hospital intervention was provided only for 4 (1.6%) patients immediately after burn injury occurred. The common Pre hospital intervention given for these burn patients were cold water 2 (0.8%) and herbal 2 (0.8%).

Among 251 patients Antibiotic, Wound Care, and Fluid Resuscitation were given simultaneously in 165 (65.5%) of patients. Of all the burn patients, 86 (34.5%) of them had undergone surgery. From them 62 (24.7%) had skin graft, 12 (4.8%) had debridement, 2 (0.8%) of them had contracture release, 3 (1.2%) had undergone Escharotomy, 7 (2.8%) had undergone limb amputation.

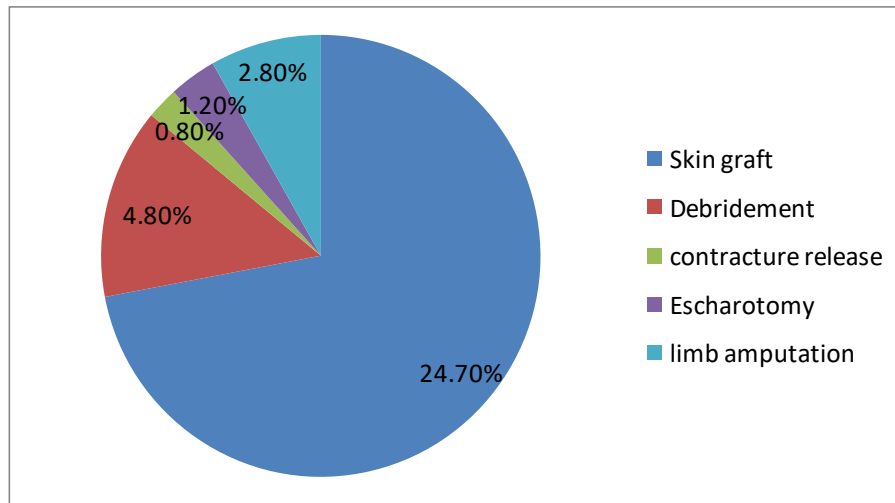


Figure3 .Distributions of types of surgery performed (n=251)

All 34(13.5%) patients with scaled burn and 21 (8.4%) of patients with flame burn had undergone surgery for skin graft and 5 (2%) of patients with electrical burn had undergone surgery for debridement. And Length of hospital stay ranged from 2 to 73 days, with a mean of 21.741 days (14.27 SD). Majority of patients with second degree burn 51.4% had hospital stay of less than 30 days, while 24 (9.6%) patients with third degree burn had hospital stay of greater than 30 days.

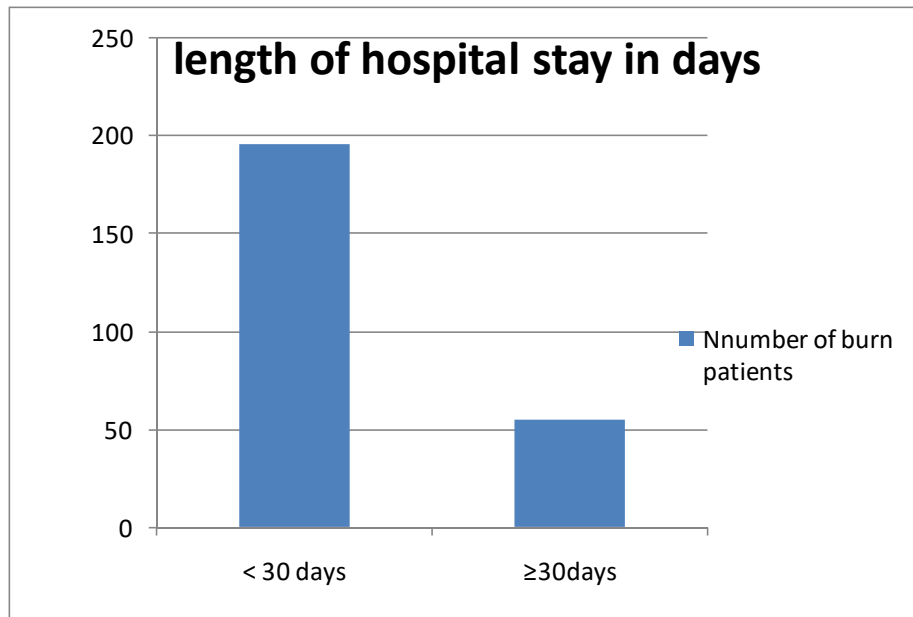


Figure4: Distribution of burn victims according to LOS (Days) in AaBET and Yekatit 12 hospitals, Addis Ababa, Ethiopia, 2022.

5.5 Burn Injury Treatment Outcome

Most of the burn patients 189 (75.3 %) discharged without complication, 62 (24.7%) of patients discharged with complication (burn wound infection developed 11.2% , contracture 2.4%, amputation 2 %, scaring and disfigurements 2% and death 7.2 % during discharge.

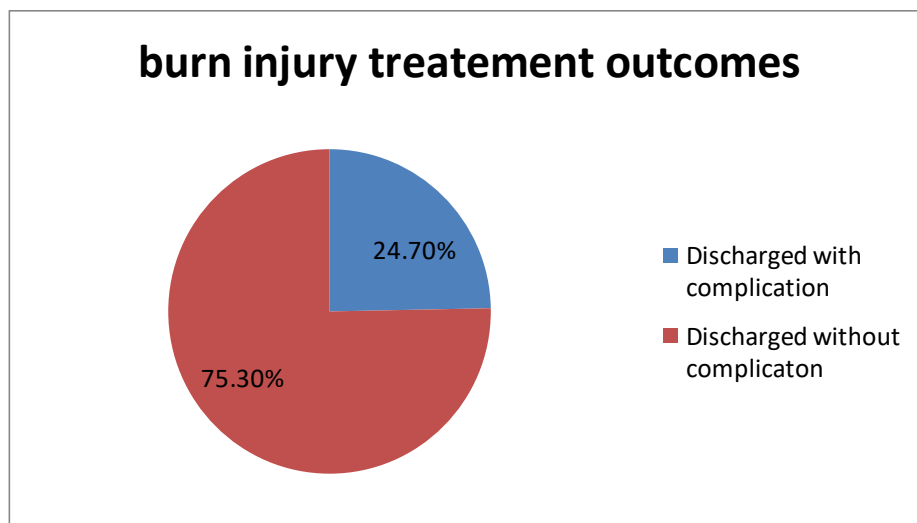


Figure 5: distribution of burn victim's treatment outcome at AaBET and Yekatit 12 hospitals, Addis Ababa, Ethiopia, 2022. n= 251

5.6. Factors Associated With Burn Injury Treatment Outcome

To identify factors associated with burn injury treatment outcome each variable were assessed independently whether they were predictor of burn injury treatment outcome or not. First variables were tested using bivariate analysis. Variables which had P-value <0.25 in the bivariate logistic regression analysis were affected anatomical location, extent of burn injury, age group, hospital care given and length of hospital stay. Variables which had P-value <0.25 in the bivariate analysis were taken to the final multivariable analysis to identify the independent predictors of burn injury treatment outcomes. After adjusting for potential confounders in multivariable logistic regression analysis; extent of burn injury, length of hospital stay and age group remained significant with burn injury treatment outcome. But affected anatomical location and hospital care given lost their significance.

Children who stayed in hospital for more than 30 days had 3.04 times more likely to be discharged with complication as compared to children who stayed less than 30 days in the hospital [AOR=3.04 ,95% CI(1.47-6.3)]. Pre schooled age children had 3.79 times more likely to be discharged with complication as compared to children toddlers AOR=3.79, 95% CI (1.49-9.65)]. A child burned with 11-20 % total body surface area burned has had 12.5 times more likely to be discharged with burn complication compared to children with ≤ 10 % TBSA [AOR:12.5, 95% CI(5-31.2) P-value 0.001].

Table 3: Bivariate analysis showing the association between burn injury treatment outcomes and associated factors in children at Yekatit 12 and AaBET hospitals, Addis Ababa, Ethiopia, 2022 (n=251).

Burn injury treatment outcome					
Independent variables		D/woC n (%)	D/WC n (%)	COR(95%CI)	P-B
Age group	1-3 years	111(82.2)	24(17.8)	1	0.001
	4-6 years	26(86.7)	4(13.3)	2.45(1.08-5.58)	0.001
	7-12 years	35(64.8)	19(35.2)	1.74(4.9-6.15)	0.007
	13-16 years	17(53.1)	15(46.9)	6.15(2.52-15.0)	0.285
Burned anatomic location	Upper extremity	48(71.6)	19(28.4)	1	0.031
	Lower extremity	69(80.2)	17(19.8)	4.58(2.04-10.32)	0.060
	Anterior trunk	32(88.9)	4(11.1)	2.85(1.27-6.42)	0.002
	Posterior trunk	6(100)	0(0)	1.45(0.432-4.48)	0.02
	Head face and neck	7(70)	3(30)	0.000(0.000)	0.999
	Buttock and genitalia	5(100)	0(0)	4.96(1.12-21.92)	0.355
	Multiple body part	22(53.7)	19(46.3)	0.000(0.000)	0.999
Extent of burn injury (TBSA)by percentage	1-10	111(84.7)	20(15.3)	1	0.001
	11-20	65(75.6)	21(24.4)	11.2(4.8-25.8)	0.001
	≥21	13(38.2)	21(61.8)	20(8.6-46.7)	0.001
Hospital care given	Conservative	134(81.20)	31(18.8)	1	0.011
	Surgery	55(64)	31(36)	4.1(2.28-7.39)	0.003
Length of hospital stay	<30 day	161(82.1)	35(17.9)	1	0.893
	≥ 30 days	28(50.9)	27(49.1)	2.25(1.19-4.29)	0.001

D/WOC=Discharged without complication/WC=discharged with complication, P-B=P value of Bivariate. COR= Crude odds ratio, CI= confidence interval.

Table 4: multivariable analysis showing the association between burn injury treatment outcomes and associated factors in children at Yekatit 12 and AaBET hospitals, Addis Ababa, Ethiopia, 2022 (n=251).

		D/woC n (%)	D/WC n (%)	AOR(95 %CI)	P-M
Age group	1-3 years	111(82.2)	24(17.8)	1	0.017
	4-6 years	26(86.7)	4(13.3)	3.79(1.49-9.65)	0.042
	7-12 years	35(64.8)	19(35.2)	1.31(0.31-5.6)	0.006
	13-16 years	17(53.1)	15(46.9)	7.07(2.52-19.83)	0.510
Extent of burn injury (TBSA)	1-10%	111(84.7)	20(15.3)	1	
	11-20%	65(75.6)	21(24.4)	12.5(5-31.2)	0.001
	≥21%	13(38.2)	21(61.8)	2.3(0.9-5.85)	0.002
Length of hospital stay	<30 day	161(82.1)	35(17.9)	1	0.001
	≥ 30 days	28(50.9)	27(49.1)	3.04(1.47-6.3)	0.001

D/WOC=Discharged without complication/WC=discharged with complication.P-M= P-value of multivariable, AOR= Adjusted odds ratio, CI= confidence interval.

6. DISCUSSION

In this study Female burn cases were higher (51.4%) compared to male burn cases. However, other studies conducted in Pakistan, Iran, and Cameroon found male burn cases to be higher than female cases respectively(12,13,17). The probable reason might be due to male burn cases hadn't increased exposure to house hold activities such as cooking and baking.

Moreover, majority of pediatric burn injuries in this study occurred at home (97.6%) and this finding was comparable with other studies in Kenya and Eritrea respectively burn cases occurred at home(18,19). This could be probably due to children's tendency to spend most of their time with their mothers at home or in kitchen.

The most frequent cause of burn injuries in this study was scald (62.9%). This finding is in agreement with the finding in Tehran Iran, South Africa and Kenya respectively(13,15,18). And in which scald burn was reported high compared to other causes of burn injury. This might be due to children's attitude in playing (stay) at home or in the kitchen with their mothers where drinks and liquid foods are being prepared. The difference might be due to differences in life style between different populations. Scald burn occurred more in toddlers (42.6%) compared to their elders. This finding is consistent with the study in South Africa which reported that toddlers were more affected by scald burn(14). This could be because this age group is where children start to investigate their environment and learn walking by grabbing different equipment due to unstable.

Extremities were the most frequently affected anatomical sites (61%) of burn patients in this study. In agreement with this finding, In western Kenya also found that burns involving the extremities were most frequent (56%)(18). This might be attributed to how a burn injury occurs to a child usually, hot substances spill on the children's extremities while playing.

In this study the mean TBSA was 13.12 ± 9.99 . Majority of patients (52.2%) had sustained 10% or less of TBSA. Comparable to this result, in Eritrea found 94.8% of patients had a TBSA of 10% or less(19). This discrepancy may be due to the differences in causes of burn injury and respective duration of contact with burning agent.

This study also found that the mean length of hospital stay was 21.741 ± 14.271 days. The finding of this study was significantly lower ($p=0.001$) than a finding in Bugando Northwestern Tanzania with overall mean length of hospital stay (LOS) was 22.12 ± 16.62 days (23). The difference in LOS between studies could be attributed to the differences in the extent of wounds as well as patient health condition. Extensive wounds, for instance, require more time to heal (needs cleaning and dressing for a number of days).

In this study most of 65.5% of the burn victims had received only conservative treatments (fluid, antibiotics, wound care and anti pain without surgery within their presentation, while 34.5% of the burn victims had undergone surgical intervention (skin graft (24.7%), (debridement 4.8%), limb amputation (2.8%), contracture release, (1.2 %)). Similarly, a study done in Tanzania showed only (12.9%) of the patients had undergone surgery, the rest (87.1%) of the patients had conservative treatments at their hospital stay. This study found that the mean hospital LOS was 21.741 days. While in Tanzania the mean LOS was 22.12 days (16).

This study revealed that of (24.7%) burn patients discharged with complication (burn wound infection, (11.2%), contracture (2.4%), amputation (2 %), scarring and disfigurements (2%) and (7.2 %) were died.). This finding is higher than a finding from Ayder hospital, mekelle (17.3%) patients were discharged with complication. This discrepancy might be due to the difference of preexisting medical condition, extent and depth of burn injury, and quality of care (9).

In this study a child burned with 11-20 % of TBSA has 12.5 times more likely to discharge with burn complication as compared to children with < 10% TBSA burned [AOR: 12.5 , 95% CI (5-31.2)]. This is in line with research findings in Eritrea (AOR 4.1, 95% CI 1.12-15.19) (19).

7. STRENGTH AND LIMITATIONS

Strength of the study: As there is no published data on Burn injury treatment outcome and associated factors of children at burn units, Addis Ababa, Ethiopia, the results of this study can provide information to the hospitals.

Limitations of the study: Since the study was retrospective document review, it was difficult to review all the necessary information's due to inconsistent documentation of patient's clinical features in the patient's card. In addition to this incomplete data of patient medical records were the challenges faced

8. CONCLUSION

Burn children patients discharged with complication were (24.7%). Total body surface area burned, age group and length of hospital stay have significant association with discharged with complication.

9. RECOMMENDATIONS

For health facility: It is better if health facilities and health professionals try to care burn with shorter stay in hospital.

Priority needs to be given to burn patients with burn associated complication (infection prevention measures should be promoted to prevent hospital acquired burn wound infections and contractures).

To researchers: I also recommend the need for further studies that determine quality of care given at health institution.

10. REFERENCE

1. Revention and. 2014; Available from: <https://www.who.int/news-room/fact-sheets/detail/burns>].
2. Nthumba PM. Burns in sub-Saharan Africa: A review. *Burns* [Internet]. 2016;42(2):258–66. Available from: <http://dx.doi.org/10.1016/j.burns.2015.04.006>
3. Toon MH, Maybauer DM, Arceneaux LL, Fraser JF, Meyer W, Runge A, et al. Children with burn injuries-assessment of trauma, neglect, violence and abuse. *J Inj Violence Res*. 2011;3(2):99–111.
4. Albertyn R, Rode H, Numanoglu A. Pediatric burn care in sub-Saharan Africa. *African J Trauma*. 2014;3(2):61.
5. Dans B, Tiers LE, Des M, Satisfaire BÀ, Stokes MAR, Johnson WD. 5Stokes 2017 Ann-Burns-and-Fire-Disasters-30-243. 2017;XXX(December):243–6.
6. Chichom-Mefire A, Fokou M. Epidemiology of paediatric injury in low income environment: Value of hospital based data prior to the institution of a formal registration system. *African J Paediatr Surg*. 2013;10(3):265–70.
7. Wesson HKH, Bachani AM, Mtambeka P, Schulman D, Mavengere C, Stevens KA, et al. Pediatric burn injuries in South Africa: A 15-year analysis of hospital data. *Injury* [Internet]. 2013;44(11):1477–82. Available from: <http://dx.doi.org/10.1016/j.injury.2012.12.017>
8. Lachiewicz AM, Hauck CG, Weber DJ, Cairns BA, Van Duin D. Bacterial Infections after Burn Injuries: Impact of Multidrug Resistance. *Clin Infect Dis*. 2017;65(12):2130–6.
9. Alemayehu S, Afera B, Kidanu K, Belete T. Management Outcome of Burn Injury and Associated Factors among Hospitalized Children at Ayder Referral Hospital, Tigray, Ethiopia. *Int J Pediatr (United Kingdom)*. 2020;2020.
10. Alharthy N, Al Mutairi M, Alqueflie S, Nefesa A Bin, Manie N Bin, Nafesa S Bin, et al.

Pattern of burns identified in the Pediatrics Emergency Department at King Abdul-Aziz Medical City: Riyadh. *J Nat Sci Biol Med.* 2016;7(1):16–21.

11. Biru W, Mekonnen F. Epidemiology and outcome of childhood burn injury in Hawassa University Comprehensive Specialized Hospital, Hawassa, Southern Ethiopia. *Indian J Burn.* 2020;28(1):51.
12. Tirmizi SZ, Mirza FH, Mangi P, Yaseen S WS. Pattern of Burn Injuries and Outcome in Children. *J Dow Uni Heal Sci.* 2013;7(1):41–5.
13. Kazemzadeh J, Vaghardoost R, Dahmardehei M, Rabiepoor S, Farzan R, Asghar Kheiri A, et al. Retrospective epidemiological study of burn injuries in 1717 pediatric patients: 10 years analysis of hospital data in Iran. *Iran J Public Health.* 2018;47(4):584–90.
14. Gevaart-Durkin A, Swart D, Chowdhury Z. A study of energy-related injuries from hospital admissions among children and adults in South Africa. *Burns* [Internet]. 2014;40(6):1209–18. Available from: <http://dx.doi.org/10.1016/j.burns.2013.12.014>
15. Den Hollander D, Albert M, Strand A, Hardcastle TC. Epidemiology and referral patterns of burns admitted to the Burns Centre at Inkosi Albert Luthuli Central Hospital, Durban. *Burns* [Internet]. 2014;40(6):1201–8. Available from: <http://dx.doi.org/10.1016/j.burns.2013.12.018>
16. Chalya PL, Rambau P, Mabula JB, Kanumba ES, Giiti G, Chandika AB, et al. Patterns and outcome of surgical management of goitres at Bugando Medical Centre in northwestern Tanzania. *Tanzan J Health Res.* 2011;13(3):242–51.
17. Fomukong NH, Mefire AC, Beyiha G, Lawrence M, Edgar MML, Nkfusai NC, et al. Predictors of mortality of pediatric burn injury in the Douala General Hospital, Cameroon. *Pan Afr Med J.* 2019;33:1–7.
18. Odondi RN, Shitsinzi R, Emarah A. Clinical patterns and early outcomes of burn injuries in patients admitted at the Moi Teaching and Referral Hospital in Eldoret, Western Kenya. *Heliyon* [Internet]. 2020;6(3):e03629. Available from: <https://doi.org/10.1016/j.heliyon.2020.e03629>

19. Mohammed M, Mekonen Y, Berhe H. Clinical Profile of Pediatric Burn Patients in Burn Care Unit of Halibet Hospital in 2018: Asmara, Eritrea. *Pediatr Heal Med Ther*. 2021;Volume 12:13–21.
20. Gessesse FG, Yitayew YA. Epidemiology of burn injury among children ' s attended felege hiwot referral hospital in bahir dar town , amhara regional state , Ethiopia , 2017. 2020;10(1):21–7.
21. ICAP. Global Nurse Capacity Building Program. 2019; Available from: <https://interburns.org/news/dfid-funding-ethiopia>.
22. Abebe Y, Dida T, Silvestri D, Yisma E. Analyzing the Emergency Triage Logbook Components of Road Traffic Accident Victims at AaBET Hospital in Addis Ababa, Ethiopia. *Ann Glob Heal* [Internet]. 2015;83(1):71. Available from: <https://www.roshreview.com/giving/global-foundation/profile/addis-ababa-burn-emergency-and-trauma-hospital-emergency-medicine-and-critical-care-training-program-addis-ababa-ethiopia>.
23. Tyson AF, Gallaher J, Mjuweni S, Cairns BA, Charles AG. The effect of seasonality on burn incidence, severity and outcome in Central Malawi. *Burns* [Internet]. 2017;43(5):1078–82. Available from: <http://dx.doi.org/10.1016/j.burns.2017.01.037>
24. Ringo Y, Chilonga K. Burns at KCMC: Epidemiology, presentation, management and treatment outcome. *Burns* [Internet]. 2014;40(5):1024–9. Available from: <http://dx.doi.org/10.1016/j.burns.2013.10.019>

ANNEXES

Annex I: Hospital consent form

My name is YikeberDagnaw and I am a post graduate student in critical care nurse Practitioner at Saint Paul hospital millennium medical college.

I am requesting your office to give me permission to conduct a retrospective study on assessment burn injury treatment outcome and associated factors among children in these hospitals. Please read the following information for further understanding

Research Title treatment outcome of burn injury and associated factors among children burn units Addis Ababa, Ethiopia, 2022

Study procedure: I will conduct by using data extraction form to collect necessary data from the records and patient file. The research data extraction form will include questions about socio-demographic and clinical data of the children burn patient.

Confidentiality: The recorded data will not be accessed by a third person except the members of the research team and will be kept confidentially. Any name and/or other personal information with respect to study subject will not be used.

Contact Address of the Principal Investigator

Name YikeberDagnaw

Phone no 0918567680

E-mail YikberDagnaw @gmail.com

Annex II: Data collection extraction form (questionnaires)

001. Data collector: code _____

002. Date of data collection _____

003. Checked by Supervisor: Signature _____

I. Socio-demographic data

1. Age 2. Sex 3. Address/region

II. Clinical data

1. Place of injury

A. home B. school C. street D. others (specify)-----

2. Cause of burn trauma

A. scalds B. flame C. electricity D. chemical agents E. others (specify)

3. Affected anatomic location/s of the burn

A. Upper extremities B. Lower extremities C. Anterior trunk D. Posterior trunk E. head, face and neck F. buttock and genitalia G. multiple body parts

4. Degree of burn injury

A. First degree burn B. Second degree burn C. Third degree burn D. Fourth degree

5. Extent of burn injury (% of total burn surface area burned) _____

6. Any preexisting medical condition of the child

A. Epilepsy B. psychiatric disorders C. Diabetes mellitus D. Others E. none

7. Clinical presentation at the time of admission

A. Airway compromise B. Shock C. Loss of consciousness D. Others (specify) E. None

8. Duration of time in home before getting medical attention after burn injury_____

9. Pre hospital intervention provideda. Yes b. No

If the answer to question number 9 is yes, what was the care provided before hospitalization_____

10. Length of hospital stays ____

11. What was the Intervention provided during hospitalization,

A. Fluid replacement B. Burn wound management C. Antibiotic D. Pain management F. Surgery

12. If the surgery was done, what type of surgery performed?

A. Skin graft B. Escharotomy C. Debridement D. Contracture release F. Amputation

III Outcome of a child who had sustained a burn injury

Improve or discharge without any complication A. Yes B No

14. Discharge with complication (A. Burn wound infection B. Contracture C Amputation D. disfigurement E. death

ASSURANCE OF PRINCIPAL INVESTIGATOR

I the undersigned agree to accept all responsibilities for the scientific and ethical conduct of the research project. I will provide timely progress report to my advisor and seek the necessary advice and approval from my primary advisors in the course of the research. I will communicate timely to my advisors all stakeholders involved in the study including any source of funding for this research.

Name of the student: _____

Signature: _____

Date: _____

Approval of the Primary Advisor

Name: _____

Signature: _____

Date: _____

Approval of the Co-Advisor

Name: _____ Signature: _____ Date: _____

Approval of examiner

Name: _____

Signature: _____

Date: _____