

**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF ALLIED HEALTH SCIENCES
DEPARTMENT OF NURSING AND MIDWIFERY**

**RETROSPECTIVE STUDY ON OUTCOME OF BURN INJURY AND
ASSOCIATED FACTORS AMONG CHILDREN AT FELEGEHIWOT
REFERRAL HOSPITAL, BAHIRDAR TOWN, AMHARA REGIONAL
STATE, ETHIOPIA, 2017.**

**PRINCIPAL INVESTIGATOR
FRIEHIWOT GIRMA GESSESSE (BSc)**

**A THESIS TO BE SUBMITTED TO ADDISABABA UNIVERSITY COLLEGE OF
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PRINCIPAL INVESTIGATOR

FRIEHIWOT GIRMA (BSC NURSING)

ADVISORS

Sr.FIKIRTEMARIAM ABEBE (BSc, MSc.)

Mr. YOSIEF TSIGIE (BSc, MSc.)

JUNE, 2017

ADDIS ABABA, ETHIOPIA.

APPROVAL SHEET
ADDIS ABABA UNIVERSITY
SCHOOL ALLIED HEALTH SCIENCES, DEPARTMENT OF NURSING
AND MIDWIFERY GRADUATE STUDIES

I hereby certify that I have read and evaluated this thesis entitled retrospective study on outcome burn injury and associated factors among children at FelegeHiwot referral hospitals in Bahirdar Town, Ethiopia, 2017 prepared under my guidance by Friehiwot Girma.

Principal Investigator

I recommend that it can be submitted as fulfilling the thesis requirement.

1. _____

2. _____

Advisors

Signature

Date

As a member of the Board of Examiners of the MSc Thesis Open Defense Examination, I certify that I have read and evaluated the Thesis prepared by Friehiwot Girma and examined the candidate. I recommend that this thesis can be accepted as fulfilling the thesis requirements for the degree of Master of Science in Pediatric and Child Health Nursing.

Chair Person

Signature

Date

Examiner

Signature

Date

Examiner Signature Date

Final approval and acceptance of the Thesis is contingent upon the submission of its final copy to the Council of Graduate Studies through the Candidate's Department or School Graduate Committee.

Abstract

Background: Burn is a skin and tissue damage caused by agent like fire, scald, electricity, sunlight, chemical or nuclear radiation. Burn injury is a major contributor to morbidity and mortality in sub-Saharan Africa. Burn in children can have long term physical, psychological, economic and social implication on them and their families with ongoing treatment, rehabilitation and the need for regular interventions.

Objective: The aim of this study was to assess outcome of burn injury and associated factors among children in FelegeHiwot Referral Hospital, Bahirdar town, Amhara regional state, Ethiopia, 2017.

Methods: Institution based retrospective cross sectional study design was conducted from October to June 2017. A total of 102 burn patients were selected by simple random sampling method. Data was collected from patients' medical record by data collection sheet retrospectively from 2011 to 2016. Bivariate and multivariate logistic regression analyses were employed to identify associated factors for outcome of burn injury.

Result: a total of 102 burn patients included in this study. The overall prevalence of burn injury was 0.46%. The mean age of burn patients was 9.56 ± 5.49 years (range: 1 year to 17 years). In almost all age groups the prevalence of burn injury is higher among females. The mean TBSA (total body surface area) burned was 12.56 ± 8.91 with a range of 1–48%. A child burned with >20% of TBSA has 42.4 times higher to recover with scar and disfigurement as compared to children with <10% of TBSA burned [AOR=42.4, 95%CI= (40.25-60)]. Conservative treatment was successful in 91 (89.7%) of cases. Most of the burn patients 60(58%) healed completely and 34(33.3%) of patients recovered with significant scarring and disfigurement at the end of the treatment. Children who were treated by surgical management 54.6 times higher to recover with scar and disfigurement as compared to children treated with conservative management [AOR=54.6, 95% CI(49.1-56.2)].

Conclusion and recommendations: Majority of the burn patients 60(58%) healed completely. Extent and management of burn injury have significant association with outcome of burn injury. I recommend the need for more public health enlightenment on the prevention and initial intervention in burns in children. There should be well equipped burn unit. Availability and accessibility of burn units in all parts of the country will hopefully improve the outcome of burn injury and quality of care

Keyword: Outcome of Burn injuries, children, associated factors, Bahirdar, Ethiopia.

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LIST OF ABBREVIATIONS

AAU.....	Addis Ababa University
BCC.....	Burns Care Centre
LASUTH.....	Lagos State University Teaching Hospital
LMIC.....	Low And Middle Income Countries
LOS.....	Length Of Stay
PI.....	principal investigator
PIMS.....	Pakistan Institute of Medical Sciences
TBSA.....	Total Body Surface Area
WHO.....	World Health Organization

1. INTRODUCTION

1.1 Background

Burn is a skin and tissue damage caused by agents like fire, scald, electricity, sunlight, chemical or nuclear radiation [1]. Scald burn is the most common type and it may be caused by any hot liquid such as hot tap water, boiling water, water-like liquids such as tea or coffee, and thicker liquids such as soup and grease. Scald burn may be a spill/splash type of burn or an immersion burn, the most common of the liquid burn injuries [2]. Home constituted the commonest place of occurrence of burn injury. In home, kitchen was the most frequent site of this accident [3]. Burn injuries rank third among injury-related deaths in children aged 1 to 9 years. In 2001, there were more than 181,000 fire- and burn-related injuries, more than 4200 hospitalizations, and 672 deaths in children aged 0 to 19 years in the United States [10]. Every year more than 300,000 people die from injuries due to fires alone [39].

Burn injury is one of the common injuries in children accompanied by high risk of mortality and morbidity. The morbidity includes acute life-threatening complications (Fluid loss, airway obstruction, renal failure, Super-infection) and Chronic complications (significant disfigurement, disability and Psychological trauma) [4]. Burns in children differ in multiple aspects from those in adults; the extent and depth of the burn injury are often more severe, the child's body proportions differ, resulting in greater evaporative water and heat loss, and fluid requirements are therefore generally greater [5]. Burn injury can vary from very mild to very severe. The severity of a burn injury depends on the total body surface area (TBSA), the depth of the injury and the location of the injury [6].

Initial assessment of a burn includes both an estimate of depth of the burn and an estimation of how large the burn is in comparison to the patient's body or TBSA burned [7]. A way to estimate the measure of the TBSA burned is the Rule of 9's. The Rule of 9's assigns percentages of TBSA based on body parts. In adults, the percentages are as follows: 9% head, 18% front trunk, 18% back trunk, 9% for each arm, 18% for each leg and 1% for the groin. These percentages are slightly different in a child and are as follows: 18% head, 18% front trunk, 18% back trunk, 9% each arm, 13.5% each leg and 1% for the groin. This is a fast and fairly accurate method to estimate TBSA in burns [8, 9].

Burns are classified as superficial thickness, partial thickness and full thickness depending on the depth of injury to the skin [10]. Oftentimes it is difficult to correctly identify the depth of a burn, and it is common to have several depths exhibited in one injury, with the center usually demonstrating a higher degree of burn than the periphery. The thickness of the burn is directly related to the source of the burn and the time the skin is in contact with the source [11].

Superficial thickness burns are classically limited to the epidermis and it's manifested as redness, erythematous, dry, painful and Blanche when pressed, often slough the next day. The most common example is sunburn from ultraviolet exposure. These burns involve the intact epidermis without blistering. Because these burns only involve the outer layer of the epidermis, fluid loss is not a problem, heals spontaneously without intervention [12].

Partial-thickness burns can be classified as superficial partial-thickness or deep partial-thickness burns. Partial thickness-superficial burns involve superficial (papillary) dermis. It is presented with blisters, clear fluid and pain. They have a weeping or moist appearance. Superficial thickness- deep burns involve deep (reticular) dermis. It is presented with whiter appearance or fixed red staining (no blanching), and reduced sensation, even though it's difficult to differentiate [13].

Full-thickness burns are the most severe burns, involves epidermis, dermis, and complete destruction to subcutaneous fat and/or muscle, bone and nerve. They appear, waxy, or leathery and do not bleed or demonstrate any capillary refill, Dry, black or white skin, nonblanching, more edema and loss of sensation. Always requires surgical excision and grafting [14].

Burns can be devastating injuries for children, the immediate effect of which is compounded by ongoing pain, cosmetic and physical disfigurement, impairment, multiple dressing changes and surgical procedures [15]. The ongoing emotional and psychological impact on the child is often shared by the caregiver or parent [16].

Burns account for the greatest length of stay (LOS) of all pediatric hospital admissions for injuries, with many hours of wound care and follow-up visits necessary, sometimes lasting months to years [17]. The management of pediatric burns and their sequelae remains complicated, challenging and extremely costly even in well equipped, modern burn units of advanced affluent societies [18]. Fluid resuscitation is of paramount importance during the initial care of the burned

child. The overall objective of resuscitation is to replace fluid losses and restore euvolemia, while avoiding the detrimental effects of fluid overload [19].

After stabilization of the critical care issues in the burn-injured child, attention is directed toward burn wound management. The key elements of conservative burn wound management include cleansing, topical antimicrobial agents, and dressing changes of the burned areas. Pain management is a critical piece in the overall care of the burned child. Severe pain is a major consequence of burn injury, and it has been demonstrated that it is often inadequately treated [21]. Surgical intervention also given for severe burns [8, 20].

1.2. Statement of the problem

Burn injuries, described as a major global public health problem, are amongst the most devastating and traumatic injuries. It is a major contributor to morbidity and mortality in sub-Saharan Africa [22]. Globally; nearly 96,000 children under the age of 20 were fatally injured as a result of a fire-related burn. The majority of burn injuries occur in low- and middle-income countries (LMIC) and the rate of child deaths from burns is currently over eleven times higher in LMIC than in high-income countries [22].

The World Health Organization (WHO) estimates that the annual death toll due to burns is over 310,000, with burns in LMIC accounting for 95% of all annual burn deaths. Among those populations, women and children are the most frequently affected [23]. In high-income countries, children under the age of five have the highest rate of hospitalization from burns, followed by 15–19 year olds [23].

Global estimates revealed that the highest number of pediatric burn admissions is found in the African continent. These injuries were rated as the second most common cause of accidental death in African children younger than 5 years of age [24]. In Africa, children under the age of 5 have almost 3 times the incidence of burn deaths than children worldwide. The burden of burn injury is highest among those children who live in poverty. In sub-Saharan Africa, it is estimated that between 18 000 and 30 000 children under the age of 18 die annually as a result of burn-related injuries [24].

Children have a relatively thinner dermis, so for any given thermal insult will sustain a deeper burn than the adult [25]. Burn injury can impair skin integrity, sensation and lead to hypertrophic scarring. In addition to changes in appearance and function brought about by scarring, deeper burns may result in damage to, or complete loss of functionally or cosmetically important body parts. The impact of physical disfigurement due to burns is far reaching, as social stigma may lead to isolation and other psychological and physical impairments limit one's productivity [26]. Children who sustain burn injuries may also develop posttraumatic stress disorder [34].

There are so many factors related to outcome of burn injuries, such as preexisting medical condition, extent of burn injury, cause of burn injury, management and depth of burn injury are regularly documented [27].

A sufficient knowledge about burn injury and outcome is necessary for their prevention. Sustained research on the epidemiology of burns in many developed and high-income countries such as the United States has made a great contribution to primary and secondary prevention of fires and burns. However, many developing or low- and middle-income countries including Ethiopia mostly focus on communicable diseases and burn injuries given low attention and its epidemiological pattern is unknown[28]. Due to this reason, I become interested to study this problem with the title of retrospective study on outcome of burn injury and associated factors among children at FelegeHiwot referral hospital.

1.3 Significance of the study

The burden and pattern of burn injuries in Africa and other developing areas are poorly known and not well studied. Children in poorer countries and those from poorer families are most vulnerable. Majority of mortality and morbidity due to burn injury among children occur in LMIC. However, in Ethiopia, very little is known about the epidemiology of burn injury and outcome there is paucity of published data in this regard.

This study was assess the outcome of burn injury and associated factors among children. Hence, it will shows on the burden of burn injury among children at FelegeHiwot Referral hospital. Without reliable information, health care planners at all levels are unable to allocate resources so as to achieve the greatest impact in preventing, treating burn injuries and rehabilitating injured persons. So the result of this study may also bring facts that could establish shared responsibility for which they will be accountable and to invest their potential and actual available resource in acceptable approach in line with accepted standards for burn prevention strategies and management.

Thus, the study can be used as a reference for nurse educators, health care professionals especially pediatrics nurses and for others who are interested in carrying out further studies with this regard.

2. LITRATURE REVIEW

Burn injuries remain a major health problem in developing countries which has been cause for hospitalization. Outcome of burn injuries have been associated with significant morbidity and mortality, particularly in children. Childhood burns and outcome place enormous socio-economic burden on individuals, their families and health services [29]. This has been revealed by different studies.

Factors associated with outcome of burn injury

A retrospective cross- sectional study was done on less than 15 year children who were admitted in Burns Center in Imam Khomeini Hospital in Kermanshah, Iran, from 21 March 2011 to March 2013 (two years).The study showed that among 1005 hospitalized patients due to burns 252 (25 %) were children ≤ 15 years of age. The mean age was 5.27 ± 4.52 years; the ages ranged from less than 1 year to 15 years. The 9-12 years age group had the highest proportion of all burn patients. However, the study didn't find significant difference between the mean ages of boys and girls [30].

Another study which was done in Isfahan Provence, Iran determined the incidence and cause of burns in < 15 year children. From the total of 2229 burn patients admitted during the study period, 1014 (45.5%) were < 15 years old. Among these, 610 (60%) were boys and 404 (40%) were girls, and the male-to-female ratio was 1.5:1. Six hundred and sixty-eight (65.7%) cases were from urban areas, while 346 (34.3%) were from rural areas. In urban regions, the most common causes of burn injuries were hot water and steam (368 cases, 55.1%), followed by fire and flame (205 cases, 30.7%), hot liquids (73 cases, 10.9%), electricity (12 cases, 1.8%), and other causes (10 cases, 1.5%). In rural areas, the most common causes of burn injuries were hot water and steam (158 cases, 45.7%), fire (143 cases, 41.3%), hot liquids (32 cases, 9.2%), electricity (4cases, 1.2%), and other causes (9 cases, 2.6%) [31].

A study from Turkey retrospectively surveyed 375 hospitalized pediatric patients from which 225 were males and 150 females with the mean age of 4.07 ± 3.79 years. Majority of burn cases were scalding (321, 85.6%) followed by flame (36, 9.6%), electric current (10, 2.66%), contact (7, 1.88%) and chemical compound (1, 0.26%). Scalding was predominately seen in infancy. The mean TBSA burned was $14.1\% \pm 10.4$; however, there were no differences between the age

groups with respect to mean TBSA. The mean TBSA in flame injuries was found significantly higher than scalding injuries ($p < 0.05$) and electrical burn [32]. The study also stated that 16 (4.3%) burn patients died which were associated with scalding, flame and electrical burns. Electrical burns and flame resulted in significantly higher mortality rates than scalding [32].

Children admitted to the burns units during a period of 14 months were included in a case control study in Lima, Peru. The study revealed that burns most commonly occurred in the patient's home (77.5%) of these more than half of the cases (67.8%) occurred in a room used for cooking. Burns peaked in the summer season and during school vacations ($p < 0.05$). The child was alone at the time of the injury in 5.7% (41/720) of all cases. Mothers were present at the time of the burn in over 50% of the cases and fathers were present in 22% [33].

A two and half years study conducted at Burns Care Centre (BCC) in Pakistan Institute of Medical Sciences (PIMS), Islamabad, showed that household environment constituted the commonest site of acquisition of burns (91.47%, 1578), followed by street (7.71%, 133), and school / market (0.80%, 14). Winter was the most frequent season of sustaining burn injury (62.95%, 1086). This study also showed that the commonest anatomic regions affected were hands/ upper limbs (65.68%, 1133), followed by abdomen/ chest (46.55%, 803), lower limbs (36.69%, 633), back (18.20%, 314), buttocks (6.72%, 116), face (6.20%, 107), and genitals (1.56% 27). The overall affected mean TBSA was $9.37 \pm 9.61\%$, while for the hospitalized subset of children it was $27.07 \pm 10.84\%$. Most of the burn cases (88.89%, $n=1535$) were partial thickness [34].

Other study from Ankara, Turkey determined the anatomical sites of burn injury among 200 children who were younger than seven years. The anterior trunk was affected in 103 (51.5%) children followed by the face in 81 (40.1%) children, the neck in 50 (25%) children, the posterior trunk in 40 (20%) children, one arm in 49 (24.5%) children, both arms in 42 (21%) children, one hand in 21 (10.5%) children, both hands in 12 (6%) children, the perineum in 15 (7.5%) children, one leg in 24 (12%) children, both legs in 48 (24%) children, one foot in 4 (2%) children, and both feet in 13 (6.51%) children. The median TBSA burned was 13.5% with a range of 2–70% [35].

Management of burn cases in different studies depend with respect to anatomical site, depth and extent of burn injuries. For instance, a study conducted on 98 burn patients who were <13 years of age described the management options used by the burn treatment unit of tertiary hospital at Sao Paulo, Brazil. The study showed that dressing was the only treatment in 41 (41.8%) patients. The other 57 (58.2%) patients underwent procedures or surgical treatments such as surgical debridement, skin grafting, skin flap, fasciotomy and escharotomy [36].

Duration of hospital stay for <15 children burn patients was reported by a study from Tehran, Iran. Among 1196 study participants, 278 (23.2%) patients were hospitalized for 1 to 5 days, followed by 299 (25%) patients for 6 to 10 days, 412 (34.4%) patients for 11 to 20 days, 154 (12.9%) for 21 to 30 days, 50 (4.2%) patients for 31 to 60 days and the remaining 3 (0.3%) patients hospitalized for 61 to 81 days. Among all, 932 (77.9%) patients were discharged from the hospital with complete remission, 124 patients (10.4%) were discharged with partial remission, and 44 patients (3.7%) were discharged with personal satisfaction. Ten (0.8%) patients suffered from an exacerbation and 86 (7.2%) patients died of burns [37].

A number of studies in Africa revealed the cause, level of injury, anatomical site, management and outcome of burn. For instance, a cohort study done in Cape Town, South Africa included burned children admitted to the Red Cross Children's Hospital. The study showed that the majority of children (244, 83.0%) were burnt by hot liquids which includes hot beverages being spilt (25.0%), boiled water spilt from a pot (8.0%), hot liquid from a kettle being spilt (48.0%), accidentally placing a child in boiling bath water (1.7%) and hot oil splashes (1.0%). In contrast, 44 (15.0%) children were burnt with fire, of which 70.0% of those burns were due to primus stoves being knocked over. The remaining 5 (1.7%) children were burnt by exposed electrical wires. Most of the children (71.4%) sustained deep partial thickness burns; full thickness burns (11.6%). Fire burns, specifically due to flash fires and children's clothing catching alight, were responsible for 25.0% of the full thickness burns [39].

Three hundred forty two children with burn injury were also studied in Northwestern Tanzania to determine the cause, anatomical site and level of burn injury. Majority of pediatric burn injury (310, 90.6%) occurred at home mainly in the kitchen, bathroom, sitting room and outdoors. Twenty-one (6.1%) patients sustained burns in the streets. For the remaining 11 (3.2%) patients, the report could not establish the exact place of burn injury. This study also showed that the vast

majority of burns (332, 97.1%) were unintentional. Intentional burns occurred in 10 (2.9%) patients mainly due child abuse. superficial burns occurred more (164, 48.0%) followed by deep burn (98, 28.7%) and mixed burns (80, 23.4%). Patients with superficial burns had significant short LOS and low mortality rate compared to patients with deep or mixed burns ($P < 0.001$). [40].

A study from Lagos State University Teaching Hospital (LASUTH), Nigeria showed that burn involved more than one anatomical part among 97.3% (290) cases. All the anatomical parts were involved in 30% of the cases. The upper limbs were the most involved sites in 90.42% (269) of the cases followed by the lower limbs in 80.85% (241). The study also revealed that 35.23% (105) burn patients were provided surgical management including fasciotomies, escharotomies, tangential excisions and split/meshed skin grafting procedures. A total of 209 (70.1%) cases were successfully managed and discharged while 29.9% died [41].

In Ethiopia, there are limited studies which have shown the magnitude and outcome of burn injury. A retrospective study at Yekatit 12 hospital showed that among 24,984 patients who visited inpatient and outpatient departments 1599 (6.4%) were because of burn injury. Among these 1599 burn patients, only 326 (20.3%) of them were admitted to the burn unit while the remaining had been managed on the outpatient basis. The study selectively studied 422 burn patients from which 203 (48.1%) patients were males and 219 (51.9%) were females. The mean age was 4.77 years. Children less than 3 years of age had the highest proportion of burn patients (53.3%) and the number of children who sustained a burn injury decreases as their age increases [43]. Majority of burn victims (64.5%, 272) had partial thickness burns followed by full thickness burns (18.5%, 78) and the rest had experienced superficial thickness burns. The study also revealed that 33 (7.8%) of patients most of whom (84.8%) had flame burn injuries had died. The remaining burn patients healed either with no complication or with minor scar [43].

On the other hand, a community based cross sectional survey which was done at Mekelle town. Indicated that children less than five years old had the highest incidence 4.8% (36/746) among which 17 (48%) were boys and 19 (52%) were girls. All the burn injuries that occurred in the 10 to 14 year old children were seen among girls [44].

A prospective hospital based study carried out from Dec 2010 to Feb 2011 at Yekatit 12 hospital revealed that the most common cause of burn was exposure to hot liquid or steam scald 27 (65.9%) followed by flame 10 (24.4%) and electrical injuries 4 (9.8%). Most of burn injuries were at home 30 (73.2%). Anatomically the majority of the burns were confined to the extremities 21 (51.2%) followed by on the extremities, head and trunk 7 (17.1%) and extremities and head 4 (9.8%). The total burned surface area (TBSA) ranged from 2.0 % to 59.0 % with a mean of 11.9% and standard deviation of 11.7. Most of the patients (65%) had less than 10% TBSA. The reported depth of the burn was full thickness in 8 (19.5 %) patients and partial thickness in 33 (80.5%) patients [45].

Even though burn injury has such a huge impact; it remains under investigated and studied especially in LMIC including Ethiopia. The most effective burn management is also the prevention of burn accidents from occurring it reduces outcome of the child mortality and morbidity related to burn injury [46].

2.1 Conceptual framework

Outcome of burn injury is affected by different factors. These factors divided into four groups. The conceptual framework shown in figure below helps to summarize the relationship between outcomes of burn injury with its associated factor.

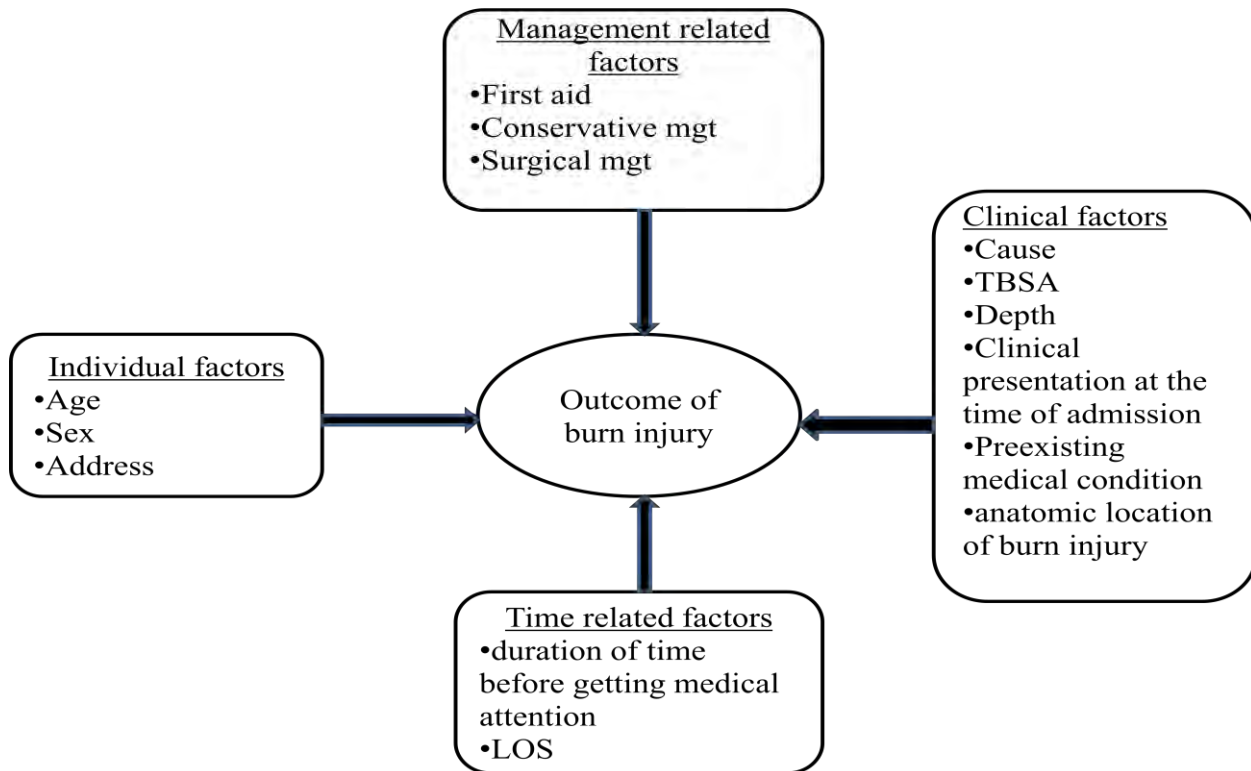


Figure 1: Conceptual frame work for outcome of burn injury

3. OBJECTIVES OF THE STUDY

3.1. General objective

The aim of this study is to assess outcome of burn injury and associated factors among children at FelegeHiwot Referral Hospital, Bahirdar Town, Amhara regional state, Ethiopia, 2017.

3.2 Specific objectives

1. To determine the prevalence of burn injury among children at FelegeHiwot Referral Hospital, Bahirdar Town, Amhara regional state, Ethiopia, 2017.
2. To identify the outcome of burn injuries among children at FelegeHiwot Referral Hospital, Bahirdar Town, Amhara regional state, Ethiopia, 2017.
3. To identify the factors associated with outcome of burn injury among children at FelegeHiwot Referral Hospital, Bahirdar Town, Amhara regional state, Ethiopia, 2017.

4. METHOD AND MATERIAL

4.1. Study area and period

The study was conducted in FelegeHiwot Referral Hospital from March 25 to April 25 2017. FelegeHiwot referral hospital is found at Bahirdar town. Bahirdar town is a capital city of Amhara regional state which is 565 km away from Addis Ababa, Ethiopia. The town was established in 1922 E.C. There are a total of 19 kebeles with a total population of 155,428 in the town. Most of them (89.72%) are orthodox Christians, followed by Muslims (8.47%), protestants (1.62%) and others represent the remaining. Its astronomical location is 11°38' north latitude and 37°15' east longitude. Bahirdar town is one of the leading tourist destinations in Ethiopia, with a variety of attractions in the nearby Lake Tana, Blue Nile River, and its monasteries. Bahirdar town is one of the twelve cities that was conferred the UNESCO learning cities award 2015. It has 2 governmental hospitals, 1 private hospital and 3 higher clinics. FelegeHiwot referral hospital has a total of 400 beds, in this hospital there is no burn center because of this pediatric burn patients admitted in pediatric ward [47].

4.2. Study design

Institution based retrospective cross-sectional study design was used to assess outcome of burn injuries and associated factors among children at FelegeHiwot Referral Hospital, Bahirdar town, Amhara region, Ethiopia, 2017.

4.3 Populations

4.3.1 Source population

The source population for this study was those patients less than 18 years of age who visited inpatient and outpatient departments' of FelegeHiwot Referral Hospital for medical care in the past five years (October 2011- September 2016).

4.3.2 Study population and study unit

The study population for this study was those patients less than 18 years of age who visited inpatient and outpatient departments' of FelegeHiwot Referral Hospital within the specified

period for getting help for their burn injuries. Individual burn patients with respect to their medical record were taken as the study units of this study.

4.4 Eligibility criteria

4.4.1 Inclusion criteria

- Burn patients less than 18 years of age
- Admitted and outpatient children with burn injuries

4.4.2 Exclusion criteria

- Incomplete card.
- Cards with illegible hand writing
- Burn patient greater than 18 years of age

4.5 Sample Size and Sampling Procedure

4.5.1 Sample Size Determination

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

P = 6.4% prevalence of burn injury among children (43)

Level of confidence = 95%

Margin of error (d) = 5%

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

n- The minimum sample size required

P- Prevalence of burn injury less 18 years old

d- Margin of error

$Z_{\alpha/2}$ - Standard normal value at (1- α) 100% confidence level

$$n = \frac{(1.96)^2 \times 0.064(1-0.064)}{(0.05)^2} = 92$$

10% contingency was added considering for illegible hand writing and incomplete cards. Hence, the minimum sample size was **102** burn patients.

4.5.2 Sampling technique and procedure

Burn patient's medical record for the specified period was reviewed from FelegeHiwot referral hospital. The number of study subject for each year was allocated proportionally after identifying the number of burn patients in each year. Study Subjects were selected using simple random sampling; cards which contain incomplete information and illegible handwriting were replaced by the next card and then continued in similar pattern until the required numbers of samples were collected. During the last five years (October 2011-september 2016) 325 burn patients <18 year were visited for the FelegeHiwot referral hospital. Out of them 45 visited in year 1 (October 2011-September 2012), 52 in year 2 (October 2012-September 2013), 75 in year 3 (October 2013-September 2014), 70 in year 4 (October 2014-September 2015) and the rest 78 children in year 5 (October 2015-September 2016).Based on proportional allocation, 102 study subjects were distributed to each year using the following formula (Figure 2).

$$n_k = \frac{n \times N_k}{N}$$

$$n_y = \frac{n \times N_y}{N}$$

Where; n_y =required sample size from each year (Year1, Year 2, Year 3, year 4, year 5)

n =the total sample size=102

N_y =total number of burn patient less than 18 year in each year (N_{y1} , N_{y2} , N_{y3} , N_{y4} , N_{y5})

N =total number of burn patient less than18 year within five years

After that the sample size was allocated to each year as follows;

$$n_{y1} = \frac{n \times N_{y1}}{N} = \frac{102 \times 45}{325} = 14$$

$$n_{y2} = \frac{n \times N_{y2}}{N} = \frac{102 \times 52}{325} = 16$$

$$n_{y3} = \frac{n \times N_{y3}}{N} = \frac{102 \times 75}{325} = 24$$

$$n_{y4} = \frac{n \times N_{y4}}{N} = \frac{102 \times 70}{325} = 22$$

$$n_{y5} = \frac{n \times N_{y5}}{N} = \frac{102 \times 78}{325} = 24$$

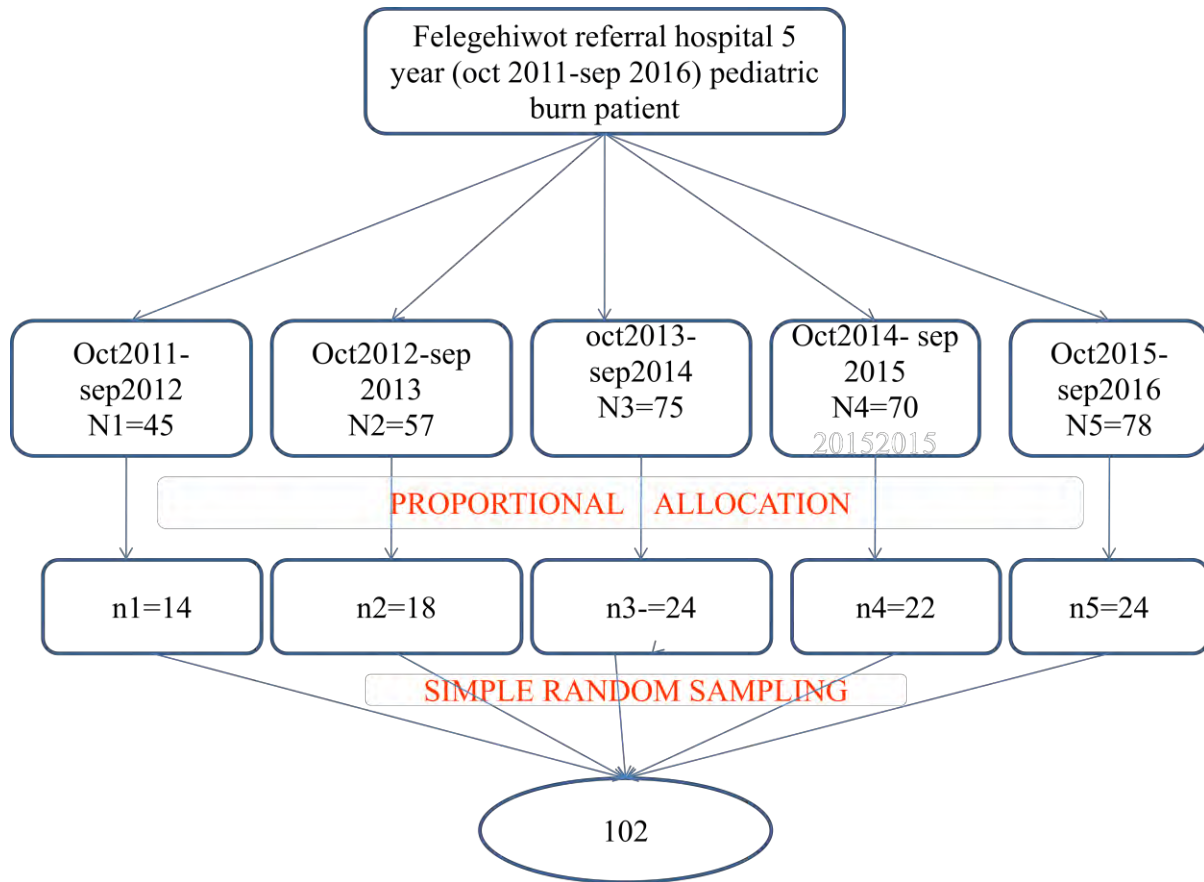


Figure2: schematic representation of sampling procedure

4.6 Study variables

4.6.1 Dependent variable

- Outcome of burn injury

4.6.2 Independent variables

- Age
- Sex
- Address
- Preexisting medical condition
- Cause of burn injury
- Anatomic location of burn injury
- Depth of injury
- Extent of burn injury (TBSA)
- Duration of time before getting medical attention
- Clinical presentation at the time of admission (shock, airway compromise, ...)
- Pre-hospital intervention (First aid)
- Management of burn injury
- Length of stay(LOS)

4.7 Operational Definitions

Age group: toddler = [1-3] years

Preschool = [4-6] years

School age= [7-13] years

Pubertal= [14-18) years

Children<18 years

Conservative management: one of the burn patient's treatment options which are includes fluid administration, wound care, administration of antibiotic, analgesics and tetanus toxiod only or in combination.

Outcome of burn injury: The end consequences of burn injury at the end of the treatment mentioned on patients card (complete recovery and recovery with scar or disfigurement).

4.8 Data collection procedure and instrument

Data was collected from patient's medical record by using pre tested data collection check list adopted from previous research done on similar studies[43].Data was gathered from Records of pediatric patient registry for the last five years (from October 2011 to September 2016) were reviewed. This involves going through Log book records of children with the diagnosis of burn injury on the specified period. Clinical information was identified from medical files of patients. During the data collection Four BSC nurses (3 data collectors and 1 supervisor) were recruited and trained on data collection procedure

4.9 Data quality assurance

Before data collection, the questionnaire was pre-tested on 5% of the calculated sample size. Hence, 5 patient cards (one from each year of study) were used to test the data collection sheet. These five patient cards were only used for the pre-test and they were excluded from the study. Based on the results of the pre-test, adjustments were made.

Half day training was given for data collectors and supervisor by principal investigator. The training focused on introducing the data collection tools, the initial and end of the data collection period, how to access records and approach each item in the instrument, wisely using of time and data handling, It was conducted before the actual data collection period. During the data collection time close supervision and monitoring was made by supervisor to insure the quality of the data. Finally the collected data was checked, cleaned and compiled by the investigator on daily basis.

4.10 Data processing and analysis

The data was checked manually for completeness and consistencies, and then coded and entered into Epi-data version 3.1 then exported to SPSS (Statistical Package for Social science) version 21 for analysis. Data entry was made by the principal investigator. Frequency, proportion means and SD was used to describe variables. Binary logistic regression analysis was used to determine the association between dependant and independent variable. First bivariate logistic regression was performed to assess association of each independent variable with the outcome variable and those variables with a p-value < 0.05 were included in the multivariate analysis. The degree of

association between dependent and independent variables was examined using odds ratio with 95% CI. P-value less than 0.05 were considered as significance level for associations between dependent and independent variables. Finally, frequency tables, chart and graphs were used to present the findings.

4.11 Ethical considerations

Ethical clearance was obtained from AAU, department of nursing and midwifery ethics review committee. Official letter of permission from the department was submitted to FelegeHiwot referral hospital in order to conduct the research. The recorded data was not accessed by a third person except the members of the research team and was kept confidentially. Any name and/or other personal information with respect to study subject was not used.

5. RESULT

In the five years of retrospective study from October 2011 to September 2016, a total 70,652 patients aged less than 18 had visited at FelegeHiwot referral hospital both in the inpatient (11,775) and outpatient (58,877) departments for any medical care. Of which 325 (0.46%) patients had sustained a burn injury. Among patients sustained burn injury 325 burn cases 80(24.6) were managed in outpatient basis and the remaining were admitted in pediatric ward. Among 102 burn patients 80(78.4%) were managed in inpatient basis and the rest were managed on the outpatient basis.

5.1 Individual factor

Socio-demographic characteristics

The mean age of burn patients was 9.56 ± 5.49 years (range: 1 year to 17 years). The mean age of female and male burn cases were (10.3 ± 5.7 and 8.29 ± 4.8) respectively. Among these 102 burn cases, majority of them were females (64, 62.7%) with female to male ratio of (F: M 1.7:1). Female predominance prevails in almost all age groups. For instance, female burn cases are significantly higher in children aged 14-18 years compared to children's aged 7-13 ($p=0.029$) as shown in Table 1.

Fifty two (51%) of the total study subjects were from urban area while the remaining 50(49%) were from rural area. With regard to the site where the burns occurred, the majority of burn injury occurred at home 98(96.1%) and the remaining burn injuries occurred at school.

Table 1. Age and gender distribution of burn patients at FelegeHiwot referral hospital, Bahirdar town, Ethiopia, 2017 (n=102).

Age group	Sex		Total N (%)*	OR (95% CI)	P-value
	Male N (%)	Female N(%)			
1-3	9 (39.1)	14 (60.9)	23 (22.5)	0.42(0.13-1.37)	0.149
4-6	6 (50)	6 (50)	12 (11.8)	0.27(0.07-1.10)	0.067
7-13	16 (47.1)	18(52.9)	34 (33.3)	0.30(0.10-0.89)	0.029
14-18	7 (21.2)	26(78.8)	33 (32.4)	1.00	

5.2 Clinical factors of outcome of burn injury

Causes of burn injuries

Burn cases caused by scald were higher 42.2% (43) than those caused by flame 40.2% (41), electricity 12.7% (13) and chemicals 4.9% (5). However, none of the children had contact burns. Scald burns predominated in toddlers (1-3 years) (87%) while flame was the predominant cause of burn among pubertal (14-18 years of age) (66.7%). Of all scald burn injuries, 30.2% (13) of them were due to hot milk and the remaining were due to, hot tea 23.2% (10), hot soup/food 18.6% (8), hot water 18.6% (8) and hot oil 9.3% (4).

The proportion of scalds decreased from 87% in the 1-3 year's age group to 33.3% in the 4-6 years age group. In addition, the ratio of flame and electrical burns increased from 8.7% and 4.3% in the toddler age group to 50% and 8.3% in the preschool age group, respectively. As described in Table 2, the age of the burn patients was significantly associated with cause of burn injury ($p < 0.001$). Moreover, among the total 102 burn injuries, 99.1% were accidental while the remaining was established as intentional. The cause of burn injury was intentionally reported to be by parent as a way of punishment.

Table 2. The distribution of burn patients according to cause of burn injury at FelegeHiwot referral hospital, Bahirdar, Ethiopia, 2017(102).

		cause of burn injuries				Total N (%*)	p
		Scald N (%)	Flame N (%)	Electric N (%)	Chemical N (%)		
Age group	[1-3]	20(87)	2(8.7)	1(4.3)	0(0)	23(22.5)	<0.001
	[4-6]	4(33.3)	6(50)	1(8.3)	1(8.3)	12(11.8)	
	[7-13]	12(35.3)	11(32.4)	7(20.6)	4(11.8)	34(33.3)	
	[14-18]	7(21.2)	22(66.7)	4(12.1)	0(0)	33(32.4)	
Age	Median	5	14	10	10		<0.001
	mean \pm SD	6.81 \pm 5.4	12.56 \pm 4.86	10.69 \pm 4.53	9 \pm 1.7		
Sex	Male	14(36.8)	15(39.5)	8(21.1)	1(2.6)	38(37.3)	0.228
	Female	29(45.3)	26(40.6)	5(7.8)	4(6.2)	64(62.7)	
Address	urban	28(53.8)	11(21.2)	9(17.3)	4(7.7)	52(51)	0.016

	rural	15(30)	30(60)	4(8)	1(2)	50(49)	
Depth of injury	First Degree	9(56.2)	6(37.5)	1(6.2)	0(0)	16(15.7)	0.001
	Second Degree	29(37.7)	34(44.2)	12(15.6)	2(2.6)	77(75.5)	
	Third Degree	5(55.6)	1(11.1)	0(0)	3(33.3)	9(8.8)	
Extent of burn injury	<10%	26(44.8)	21(36.2)	8(13.8)	3(5.2)	58(56.9)	0.893
	10-20%	11(34.4)	15(46.9)	4(12.5)	2(6.2)	32(31.4)	
	>20%	6(50)	5(41.7)	1(8.3)	0(0)	12(11.8)	
TBSA	mean ± SD	12.84±10.5	13.46±8.17	10 ± 6	9.4± 5.17		0.545
	median	10	10	9	7		
LOS	≤30 days	38(42.7)	33(37.1)	13(14.6)	5(5.6)	89(87.3)	0.225
	> 30 days	5(38.5)	8(61.5)	0(0)	0(0)	13(12.7)	
	(mean ± SD)	12.23±12.6	17.54 ±18	7.69 ±7	19.4±11.43	12.23±12.6	0.113

Affected anatomical sites of burn injury

As shown in figure 3, 43 (42.2%) children with burns had multiple anatomical sites of injury followed by the lower extremity was affected in 26 (25.5%) burn cases.

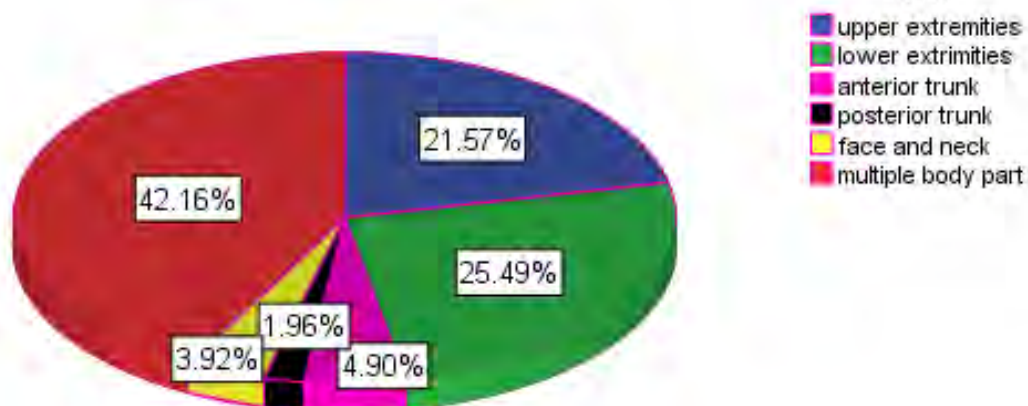


Figure 3. Affected anatomical location of burn injury among children at FelegeHiwotreferral Hospital, Bahirdar ,Ethiopia, 2017.

Depth and Extent of burn injury

The majority of children 77 (75.5%) presented with second degree/partial thickness burns, followed by first degree/superficial thickness burn 16(15.7%) and the remaining 9(8.8%) suffered from third degree burns/full thickness burn. Among burn patients who came with the First degree /Superficial burn and third degree/full thickness burn scald was the predominant cause (56.2%, 55.6%) respectively. However, among patient with second degree/partial thickness burn, flame was the predominant cause of burn injury (89.2%). There is significance association between cause of burn and depth of burn injury ($p=0.001$) (table 2).

The median TBSA burned was 10% with a range of 1–48% (mean: 12.56 ± 8.91). A total of 58 (56.9%) patients had TBSA less than 10%, 32 (31.4%) patients had TBSA 10-20% and the remaining patient had TBSA greater than 20%. The mean TBSA was found to be higher in flame burn than other cause of burn injury. However, the difference was not statistically significant ($p=0.545$).The TBSA significantly influenced the length of hospital stay ($p<0.001$).Among the patients comes with $>20\%$ of TBSA burned majority of cases recovers with scar and disfigurement (Figure 4).

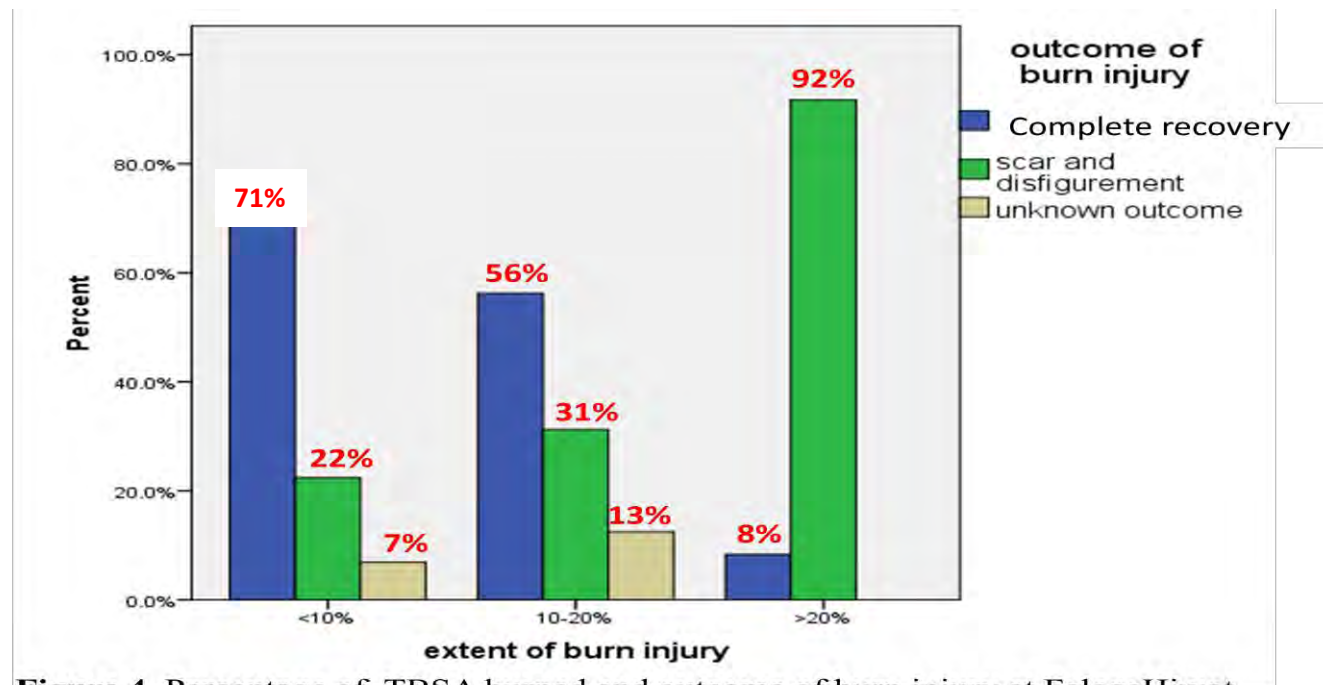


Figure 4. Percentage of TBSA burned and outcome of burn injury at FelegeHiwot referral hospital, Bahirdar, Ethiopia, 2017(n=102).

Preexisting medical condition and clinical presentation at the time of admission

Eighty six (84.3%) patients were healthy before the burn incident and the rest had concomitant medical conditions like epilepsy 8 (7.8%), HIV/AIDS 5 (4.9%), malnutrition 2(1.9%) and anemia 1(0.98%). Pertaining to the clinical presentation of a burn patients at the time of evaluation, 10(9.8%) patients presented with loss of consciousness, 4(3.9%) patients presented with airway compromise, 2(1.9%) patients with shock and 9(8.8%) patients presented with either of post burn contracture, diarrhea and vomiting, and skin discoloration.

Table 3.Clinical factors of outcome of burn injury among children at FelegeHiwot referral hospital, Bahirdar town, Ethiopia, 2017(102).

characteristics		Frequency (n)	Percentage (%)
Cause	Scald	43	42.2
	Flame	41	40.2
	Electric	13	12.7
	Chemical	5	4.9
	contact	0	0
Anatomic location of burn injury	upper extremity	22	21.6
	lower extremity	26	25.5
	anterior trunk	5	4.9
	posterior trunk	2	2
	face and neck	4	3.9
	multiple body part	43	42.2
Depth of burn injury	First degree	16	15.7
	Second degree	77	75.5
	Third degree	9	8.8
Extent of burn injury	<10%	58	56.9
	10-20%	32	31.4
	>20%	12	11.8
Preexisting medical condition	Yes	16	15.7
	No	86	84.3
Clinical presentation at the time of admission	Yes	25	24.5
	No	77	75.5

5.3 Time related factors of outcome of burn injury

Duration of time before getting medical attention and Length of Hospital Stay

Most of the patients 79(77.5%) seek health care within <24 hours and 7(6.9%) of the subjects seek healthcare within 24-48hours, 5(4.9%) within 49-72 hours and the remaining patients came after 72 hrs. of burn injury. Among 52 burn cases that were from urban area 45(86.5%) cases present in health institution within 24 hr, Even though there is no significant association between time of presentation and address ($P=0.095$).The mean length of hospital stay was 14.14 days \pm 14.82 (median: 7; range: 1-66 days). Eighty nine (87.3) cases discharged within 30 days of hospital stay and the remaining cases discharged after 30 days of hospital stay. Toddlers had shorter length of stay. However, the difference was not statistically significant ($P=0.145$) (Figure5).

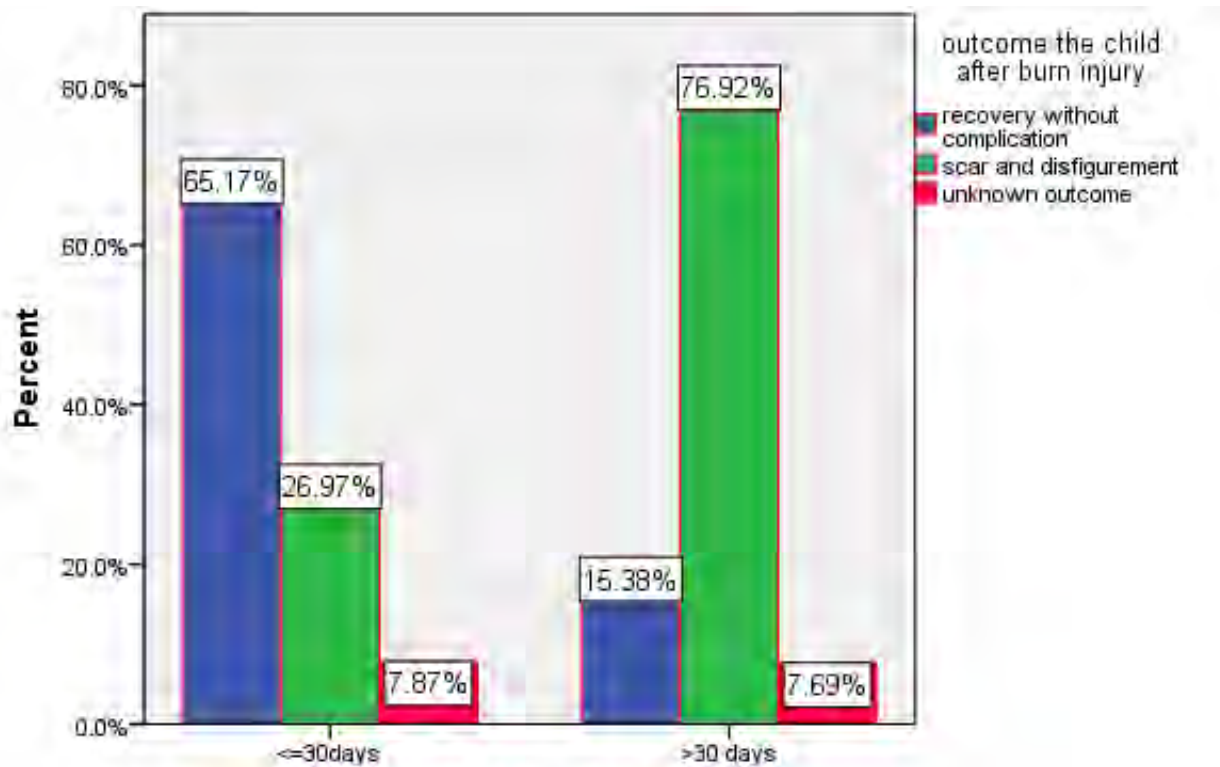


Figure 5.Duration of hospital stays with outcome of burn injury at FelegeHiwot referral hospital, Bahirdar, Ethiopia, 2017(102).

5.4 Management related factor

Pre hospital intervention and hospital Management

Among 102 patients first aid was provided only for 36 (35.3%) patients immediately after burn injury occurred. The most common first aid measures given for these burn patients represent harmful practices such as applying traditional medicine(herbs) 15 (41.6%), oil 3(8.3%), egg 3 (8.3%) and apply ice 2(5.5%). Of those patients who had received pre hospital interventions only 13 (36.1%) of them received interventions which are considered to be appropriate. These included cold water irrigation (9, 25%) and gentian violet (4, 11.1%).

Conservative treatment was successful in 91(89.7%) of cases including, 80 wound cleaning and dressing, 62 antibiotic, 43 tetanus toxiod ,33 cases fluid replacement ,14 analgesics and 3 physiotherapy. A total of 15 surgical interventions were carried out for 11 (10.3%) children, including 7 patients contracture release, 5 patients underwent debridement and 3 patients underwent grafting procedures. Although patients with flame and chemical burn were more surgical intervention performed than scald and electrical burn patients.

5.5 Clinical outcome of burn injury

Most of the burn patients 60(58.8%) healed without complication, 34(33.3%) of patients recovered with significant scarring and disfigurement at the end of treatment and 8(7.8%) patients were discharged with a summary of discharge saying ‘Discharged against medical advice’ hence, their outcome was unknown in the study period.

5.6 Factors associated with outcome of burn injury

To identify factors associated with outcome of burn injury each variable were assessed independently whether they were predictor of outcome of burn injury or not. First variables were tested using bivariate analysis. Variables which were associated in the bivariate logistic regression analysis ($p < 0.05$) were extent of burn injury, clinical presentation at the time of admission, management of burn injury and LOS. Variables which were associated in the bivariate analysis were taken to the final multivariate analysis to identify the independent predictors of burn injury outcomes. After adjusting for potential confounders in multivariate logistic regression analysis; extent of burn injury and management remained significant in the outcome of burn injury. But LOS and clinical presentation at the time of admission lost their significance.

A child burned with >20% of TBSA has 42.4 times more likely to recover with scar and disfigurement as compared to children with <10% of TBSA burned [AOR=42.4, 95%CI=(40.25-60)]. Children who were treated by surgical management 54.6 times more likely to recover with scar and disfigurement as compared to children treated with conservative management [AOR=54.6 ,95% CI(49.1-56.2)].

Table 4. Bivariate and multivariate analysis showing the association between outcome of burn injury and associated factors in children at Felegehiwot referral hospital, Bahirdar, Ethiopia, 2017 (n=94).

		Outcome of Burn Injury			
		CR(n,%)	S&D(n,%)	COR(95%CI)	AOR (95%CI)
Age	[1-3]	15(71.4)	6(28.6)	1.00	
	[4-6]	5(45.5)	6(54.5)	3(0.66-13.69)	
	[7-13]	20(64.5)	11(35.5)	1.37(0.42-4.56)	
	[14-18)	20(64.5)	11(35.5)	1.37(0.415-4.561)	
Sex	Male	22(62.9)	13(37.1)	1.00	
	Female	38(64.4)	21(35.6)	0.94(0.39-2.23)	
Address	urban	35(71.4)	14(28.6)	1.00	
	rural	25(55.6)	20(44.4)	2(0.851-4.7)	
Cause	Scald	27(69.2)	12(30.8)	1.00	
	Flame	21(55.3)	17(44.7)	1.8(0.72-4.63)	
	Electrical	11(84.6)	2(15.4)	0.4(0.08-2.14)	
	Chemical	1(25)	3(75)	6.8(0.64-71.71)	
anatomic location	upper extremity	13(65)	7(35)	1.00	
	lower extremity	19(82.6)	4(17.4)	0.39(0.095-1.6)	
	anterior trunk	3(75)	1(25)	0.62(0.54-7.12)	
	posterior trunk	2(100)			
	face and neck	1(25)	3(75)	5.57(0.48-64.08)	
	multiple body part	22(53.7)	19(46.3)	1.6(0.53-4.84)	
Extent of burn injury	<10%	41(75.9)	13(24.1)	1.00	1.00
	10-20%	18(64.3)	10(35.7)	1.75(0.65-4.73)	1.8(0.50-6.98)
	>20%	1(8.3)	11(91.7)	34.7(4.08-294.9)*	42.4(40.25-60)*
preexisting medical condition	Yes	7(50)	7(50)	1.00	
	No	53(66.2)	27(33.8)	1.96(0.62-6.17)	
clinical presentation	Yes	11(45.8)	13(54.2)	1.00	
	No	49(70)	21(30)	0.36(0.14-0.939)*	
Duration of time before presentation	<24 hr	50(69.4)	22(30.6)	1.00	
	24-48 hr	4(57.1)	3(42.9)	1.7(0.35-8.27)	
	49-72 hr	2(40)	3(60)	3.4(0.53-21.86)	
	>72 hr	4(40)	6(60)	3.41(0.87-13.29)	
Pre-hospital intervention	Yes	20(58.8)	14(41.2)	1.00	
	No	40(66.7)	20(33.3)	0.71(0.30-1.70)	
Hospital management	conservative	59(71.1)	24(28.9)	1.00	1.00
	surgical	1(9.1)	10(90.9)	24.6(2.98-202.7)*	54.6(49.1-56.2)*
LOS	≤30 day	58(70.7)	24(29.3)	1.00	
	>30 day	2(16.7)	10(83.3)	12(2.46-59.31)*	

CR= Complete recovery, S&D= Scar and disfigurement, COR= Crude odds ratio, AOR= Adjusted odds ratio, CI= confidence interval, *=p-value<0.05, LOS=length of hospital stay

6. DISCUSSION

In this study the prevalence of pediatric burn injuries was found to be 0.46% which is lower than the findings of the study which was conducted at Yekati 12 hospital (6.4%) [43]. The higher prevalence in Yekati 12 hospital could be explained by the fact that the study was conducted in a burn center where burn cases are expectedly high.

Female burn cases in this study were higher (62.7%) compared to male burn cases. A similar finding from Rimmer RB, et al (54%) and Temu et al (50.4%) reported that female burn cases were higher than male burn cases [16, 42]. The main reason why female burn cases were higher may be possibly due to increased exposure of females to household activities such as cooking and baking. However, other studies conducted in Iran, Turkey, and Switzerland found male burn cases to be higher than female cases (69%, 54% and 56%, respectively) [31, 35, and 38]. The probable reason might be due to male children are more active by nature than females.

Moreover, majority of pediatric burn injuries in this study occurred at home (96.1%) and this finding was comparable with other studies in Palestine [26], Pakistan [34] and Peru [33] in which 96%, 91.5% and 77.5% (respectively) burn cases occurred at home. 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. This finding is in agreement with the finding in Kenya [23], Brazil [36], and Tanzania [42] 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 mother or guardians where drinks and liquid foods are being prepared. In line to this, scald burn in this study was commonly caused by hot or boiling milk and water. On the other hand, a study from Switzerland showed that flame was the highest cause of burn injury [38]. The difference might be due to differences in life style between different populations.

The findings of this study showed Scald burn, occurred more in toddlers compared to their elders. This finding is consistent with the study in Peru which reported that toddlers were more affected by scald burn [33]. This could be because this age group is where children's start to investigate their environment and learn walking by grabbing different equipment due to unstable

ambulatory development especially when they are left unattended near hot fluids such as hot or boiling milk, water and tea.

Moreover, flame burn injuries were the second most common (40.2%) frequent cause of burn trauma in this study and it occurred more in children aged >7 years of age. This finding is in agreement with the finding in Turkey in which flame burn injuries occurred more in children aged 7-16 [32]. This might be due to increasingly independent physical mobility of children in this age group who might be exposed to risky activities such as cooking by open fire and lighting fires to burn rubbish.

Majority of these study participants (77.5%) presented to the emergency department within 24 hours of injury. This finding is greater than the finding in Nigeria in which only 56.7% of burn injuries were presented to emergency department within 24 hours of injury [48]. This could be explained by the probable difference in public awareness regarding health seeking behavior.

The mean TBSA burnt in this study ($12.56\% \pm 8.91$) was significantly lower ($p < 0.001$) than reported in Istanbul, Turkey ($16.6\% \pm 12.57$) and Lagos, Nigeria (29.67 ± 21.98) [32, 41]. However, this finding was significantly higher ($p = 0.001$) than the mean TBSA shown from Kenya ($6.5\% \pm 8.1$) and Pakistan (9.37 ± 9.61) [23, 34]. This discrepancy may be due to the differences in causes of burn injury and respective duration of contact with burning agent.

We also found that the mean length of hospital stay was 14.14 ± 14.83 days. The finding of this study was significantly lower ($p = 0.003$) than a finding in Lagos State University Teaching Hospital which reported that the overall mean hospital stay was 18.61 ± 24.18 days [41]. On the other hand, a study from Iran showed a much lower mean hospital stay than this study which was 7.5 ± 3.2 days ($p < 0.001$) [31]. 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).

Extremities were the most frequently affected anatomical sites (47.1%) of burn patients in this study. In agreement with this finding, Derebe A also found that burns involving the extremities were most frequent (51.2%) [45]. This might be attributed to how a burn injury occurs to a child usually, hot substances spill on the children's extremities while playing.

Pre-hospital intervention was given to 35.3% of this study subjects. A lower finding was reported from Tanzania in which only 6.7% of pediatric burn victims got pre-hospital interventions [40]. On the contrary, a study from Yekatit 12 hospital showed that 77% of burn cases had received pre-hospital intervention which is much higher than this finding [43]. However, only 36.1% of burn patients in this study and 17.3% burn patients from a study in Yekatit 12 Hospital had received first aid measures which is considered appropriate such as cold water irrigation and application of gentian violet. Moreover, among burn patients who received pre-hospital interventions, 63.9 % of them were considered as harmful practices such as herbs, oil, egg and ice. This discrepancy may be attributed to difference in public awareness and knowledge about first aid procedures for burns from one country to another and from place to place within the country.

In this study, conservative treatment was successful in 89.7% of burn cases. This finding is higher than a finding from Turkey in which 57.6% of burn cases were managed conservatively [32]. This might be due to difference of TBSA burnt for instance, the mean TBSA of burn cases of a study in Turkey is higher than the mean TBSA of this study. As a result the patients were treated surgically rather than conservatively.

This study revealed that 58.8% of patients healed completely and this finding is lower than a finding from Tehran, Iran in which 77.9% of burn patients healed without sequelae [37]. This discrepancy might be due to the difference of preexisting medical condition, extent and depth of burn injury, and quality of care.

In this study, the percentage increase in TBSA burnt was significantly associated with occurrence of recovery with scar and disfigurement. This is in line with research findings in Tanzania (40). This might be because the burn injury which involves large surface area is difficult to reunite the skin and tissue hence, recovers with scar and disfigurement.

7. LIMITATION OF THE STUDY

- Since the study was retrospective documentary review, I faced the following challenges.
 - Incomplete data in the patient card
 - Unable to get clear information for some variables
 - Inconsistent documentation of clinical features of patients in the patient card.
- Some features that could only be assessed by observation or by taking history were missed.

8. CONCLUSION

The prevalence of burn injury among children in the study area was low. Majority of the burn injuries were partial thickness burn and scald burn injuries predominate. Extremities were the most frequently affected body parts. Pre-hospital interventions following burn injury were mostly harmful practices. Conservative treatment was successful in majority of cases who recovers completely without scar and disfigurement.

Moreover, extent of burn injury and hospital management were identified as independent predictors of outcome of burn injury.

9. RECOMMENDATIONS

To health professionals

- I recommend the need for more public health enlightenment on the prevention and initial intervention in burns in children. Prevention information should be addressed directly to the parents; they will become aware of the daily dangers in their home environment.
- Health education should be given to the society regarding the first aid measures to be considered when burn injury occurs and on fire-safety.

To researchers

- I also recommend the need for further community based studies that determine the risk factor, severity of burn injuries, the outcome, and quality of care given at health institutions.

To Regional health bureau and Bahirdar town health office

- There should be well equipped burn units. Availability and accessibility of burn units in all parts of the country will hopefully improve the outcome and quality of care.

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11. ANNEXES

Annex I: Information sheet to medical director of the Hospital Addis Ababa University, College of Health Science, School of Allied Health Science, department of Pediatrics and Child Health nursing

This sheet was read for medical director of the Hospital before collecting any information from the registries.

Hello. My name is Friehiwot Girma and I am a post graduate student in Pediatrics and Child health nursing at Addis Ababa University, college of health Science School of allied health sciences department of nursing and midwifery.

This Governmental Hospitals selected to conduct the proposed study “retrospective study on outcome burn injury and associated factors among children ”.

I am requesting your office to give me permission to conduct the stated study in this hospital. Please read the following information for further understanding:

What the study is about: The purpose of this study is to determine outcome of burn injury and associated factor in children. Design of the study: The study is retrospective study on burn injury among children.

What I will ask you to do: If you agree to do this study, I will conduct by using a questioner to collect necessary data from the records and patient file. The checklist will include questions about socio-demographic and clinical data of the pediatric burn patient. I would very much appreciate your cooperation in this study.

Risks and benefits: The result of the study to help responsible body to increase burn centers and promotion health education which support them to improve their knowledge regarding the problem.

Confidentiality; All information gathered from the log book and patient file was kept confidential. Any of patient’s personal information was not registered. The records of this study were kept private. In any sort of report, we make public we were not including any information that was making it possible to identify the patient. Research records were kept in a locked file; only the researcher had access to the records.

Contact Address of the Principal Investigator

Name: Friehiwot Girma Gessesse

Cell –Phone: 0975176843

E-Mail: fglovek@gmail.com

Annex II: English version Questionnaire

Addis Ababa University, School of Graduate Studies

Department of Nursing and Midwifery

Questionnaire used to assess outcome of burn injury and associated factors among children at FelegeHiwot referral hospital, Bahirdar town, Ethiopia.

001. Data collector: code ___/___/___ Name _____

002. Date of data collection ___/___/___ Time _____

003. Checked by Supervisor: Signature _____ day _____ month _____ year _____

I. Socio-demographic data of the child

i. Serial number _____

ii. Card number _____

iii. Age _____

iv. Sex _____

v. Address _____

vi. Place of injury

- a. Home
- b. School
- c. Street
- d. Others (specify)-----

II. Clinical data (circle)

1. Cause of burn trauma
 - a. Scald
 - b. Flame
 - c. electricity
 - d. chemical agents
 - e. contact
 - f. others (specify)
2. Affected anatomic location/s of the burn
 - a. Upper extremities
 - b. Lower extremities
 - c. Anterior trunk
 - d. Posterior trunk
 - e. Head
 - f. Perineum
 - g. Face and neck
3. Depth of burn injury
 - a. Superficial/first degree burn
 - b. Partial thickness/second degree burn
 - c. Full thickness/third degree burn
4. Extent of burn injury (% of total burn surface area burned) _____
5. Was the injury intentional
 - a. Yes

- b. No
- 6. Any preexisting medical condition of the child
 - a. No
 - b. HIV/AIDS
 - c. Diabetes mellitus
 - d. Malnutrition
 - e. epilepsy
 - f. Others (specify)_____
- 7. Clinical presentation at the time of admission
 - a. Airway compromise
 - b. Shock
 - c. Arrhythmia
 - d. Loss of consciousness
 - e. Others (specify)_____
 - f. None
- 8. Duration of time in home before getting medical attention after burn injury_____
- 9. Pre hospital intervention provided
 - a. Yes
 - b. No
- 10. If the answer to question number 9 is yes, what was the care provided before hospitalization_____
- 11. Length of hospital stays _____
- 12. What was the Intervention provided during hospitalization,
 - a. Fluid replacement
 - b. Burn wound management
 - c. Antibiotic
 - d. Pain management
 - e. Tetanus toxiod
 - f. Surgery
 - g. Other (specify)_____
- 13. If the surgery was done ,what type of surgery performed
 - a. Fascioctomy
 - b. Escharotomie
 - c. Skin graft
 - d. Skin flap
 - e. Contracture release
 - f. debridement
 - g. Other_____
- 14. Outcome of a child who had sustained a burn injury
 - a. Recovery without any complication
 - b. Scarring or disfigurement
 - c. disability
 - d. Death
 - e. If other specify-----

Annex III: Declaration

I declare that this research paper titled as retrospective study on outcome of burn injury and associated factors among children at Felegehiwot referral hospital Bahirdar town Amhara region ,Ethiopia 2017 is my original work has not been presented for master’s degree in this or another university and that all sources of material used for this paper have been fully acknowledge.

Name of Investigator:_____ Signature_____ Date_____

This thesis work has been submitted for examination with my approval as university advisor.

Name of Advisors

1. Name of principal advisor

Signature _____ Date _____

2. Name of co-advisor

Signature _____ Date _____