ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

POSTGRADUATE PROGRAM

SURVIVAL STATUS AND PREDICTORS OF MORTALITY AMONG PEDIATRICS BURN VICTIMS ADMITTED TO BURN CENTERS, ADDIS ABABA, ETHIOPIA, 2020

By: ZERIHUN DEMISSE (BSC)

Advisors: GIRUM SEBSISBIE (MSC, ASS'T PROF, PH.D. FELLOW)

TEWODROS TESFAYE (MSC)

A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, SCHOOL OF NURSING AND MIDWIFERY, DEPARTMENT OF NURSING, FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR MASTER DEGREE IN PEDIATRIC AND CHILD HEALTH NURSING.

SEP 2020

ADDIS ABABA, ETHIOPIA

APPROVAL SHEET

APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Zerihun Demisse, accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters in pediatrics and child health nursing.

INTERNAL EXAMINER:

NAME	**RANK**	**SIGNITURE**	**DATE**

RESEARCH ADVISORS:

NAME	**RANK**	**SIGNITURE**	**DATE**
NAME	**RANK**	**SIGNITURE**	**DATE**

DEPARTMENT HEAD

NAME	**RANK**	**SIGNITURE**	**DATE**

APPROVAL SHEET

ADDS ABABA UNIVERSITY

COLLEGE HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF PEDIATRICS AND CHILD HEALTH NURSING

I, the undersigned MSc student, declare that I have submitted my original work on a title survival status and predictors of mortality among pediatrics burn victims admitted to burn centers, Addis Ababa, Ethiopia, 2020, for the examination.

Submitted by:

_____ _____ _____

Name of student Signature Date

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

Approved by:

1. _____ _____ _____

   Name of Major Advisor Signature Date

2. _____ _____ _____

   Name of Co-Advisor Signature Date

ACKNOWLEDGEMENT

First, I would like to thank Addis Ababa University, college of health science, school of nursing and midwifery for giving me the chance to conduct this thesis.

I would also like to forward my heartfelt gratitude to my advisors, Mr. Girum Sebsibie (MSc, Ass't Prof, Ph.D. Fellow) and Mr. Tewodros Tesfaye (MSc) for their timely comments and inputs in the development of this thesis.

My gratitude also extends to data collectors, AaBET hospital and yekatit12 hospital for their cooperation. Especially, burn unit and medical recording room staffs.

ACRONYMS/ ABBREVIATIONS

AaBET	Addis Ababa Burn Emergency and Trauma (Hospital)
AAU	Addis Ababa University
HMIS	Health Management Information System
HIC	Higher Income Countries
LIC	Low Income Countries
LMIC	Low and Middle Income Countries
TBSA	Total Burn Surface Area
STATA	Statistics and Data

Table of Content

List of tables

List of figures

Abstract

Background: burn is damage to the skin and other human tissue occurs after exposure to heat from different mechanism. It is significant general medical issue, because of it, an estimated 265 000 deaths occur each year globally. Countries of low and middle income are accountable for occurrences of more than 96% of severe fire-related burns. In Africa Fire-related mortality rate for children under five is 32.9 per 100,000. Majority of burn victims who survived form this accidental event left with permanent disabilities and scar. Moreover facing stigma and rejection.

Objective: To assess survival status and predictor of mortality among pediatrics burn victims admitted to burn center from 2016-2019, Addis Ababa, Ethiopia, 2020.

Methods: An institution based retrospective cohort study deployed among 412 pediatrics burn victims admitted to Yekatit 12 and AaBET Hospital burn centers from the 1st of January 2016 to the 30th of December 30, 2019, Addis Ababa, Ethiopia. Quantitative approach deployed. Data collected from patient charts using systematic sampling with pretested data extraction tool, entered using Epidata, and analyzed using STATA. Bivariate and multivariate Cox proportional hazard regression used to determine the predictors of mortality. Kaplan–Meier curves and log rank test was analyzed.

Result: Four hundred twelve pediatrics burn victims admitted over the study period with mean age of 5.2 ±5.1SD years old. According to this study finding the median hospital stay found to be 25(95%CI: 30.11, 36.66) and with mean of 33.38 (95%CI: 30.11, 36.66) days. This study also revealed that 8.25 % died and from this, 55.89% were male. Full thickness (AHR 2.51 (95% CI: 1.12, 5.62)), co morbidity while hospital stay (AHR 26.28 (95% CI: 9.19, 75.16)), Nonsurgical intervention (AHR 34.40(9.80, 120.71) were significant predictors.

Conclusion and recommendation: Among total 8.4% of pediatrics, burn victims died during follow up period. The overall incidence rate of 2.4 per 1000 person day. Independent predictors of mortality includes burned neck, those without surgical intervention, full thickness depth of burn and disease developed after admission. More concern needed for children with predictors.

Key words; survival status, predictors, mortality, pediatrics burn victims, time to death

1. Introduction

1.1 Background

Burn is damage to the skin and other human tissue occurred after exposure to heat from different mechanisms. Burn happens when hot liquids, hot solids, flame, radiation, electricity and contact with chemicals destroy skin cells or other human tissues (1).

In nature, children are curious. Immediately as they start to mobile, they want to play with surrounding objects and explore their environment which bound them. Due to this natural learning process, they exposed to objects that can cause burns. As a result intense pain and often long-term consequences, result from playing with fire and touching hot objects. Pediatric burn accidents have an additional risk for injury severity because infants, toddlers, and small children may not be able to escape from the burning object. They often experience a long duration of contact with the hot substance, with a resultant deep burn injury. This creates suffering for the children, their families and the broader community (2,3).

In children, thermal injury is one of the major causes of accidental disfigurement and death. Burn is an area of major concern in pediatrics due to Pain it produce, morbidity it cause, the association with child abuse and it's preventable nature. Hot water, food, appliances, flames, grills, vehicle-related burns, and curling irons are common causes of burn. Burns occur commonly in toddler boys more frequently than in girls (4).

Burn wound classified depending on the depth or skin layer it involves. Includes first-degree burn or superficial: It affects epidermis, red, sunburn like appearance of the skin with no blisters and it is very painful and heals without scar. Second-degree burn or partial thickness: in addition to the epidermis, the dermis is involved. It is pink to dark and has blisters. It is still painful, it is blanching, and it heals with a scar after many weeks. Third degree burn or full thickness: are those full-thickness injuries .it is not blanching, no blister, and no pain sensation, have a pale or charred color and a leathery appearance, and heals by scarring. Fourth-degree burns: in addition to the three layers the underlying fascia, muscle, or bone is involved (5).

Children have body surface area nearly three times and higher fluid losses proportionally when compared to adults. As a result, they require more fluids and loss more water by mechanism of evaporation relatively. Secondary to large BSA to body mass ratio of the child, hypothermia may result which is fatal and should be avoided. Children younger than two years, have thinner skin layer and subcutaneous tissue, which makes them more vulnerable, and this leads to further complication (6).

Burn injuries can be devastating, particularly burns that are large or involve areas such as the face or hand(7). The risk of death may increase by certain factors. This includes increasing age, increasing burn size, and the presence of an inhalational injury, which considered important. Mortality from smoke inhalation mostly from house fire is strong determinant according to Studies from high-income countries suggested. It also strongly associated with mortality of children over three years of age, despite improvements in the care of burn victims(2).

Treatment of burn patients is expensive, complex, and resource intensive. Burn patients may have long periods of rehabilitation and multiple outpatient visits after an initial period of acute care given to them. Most of the time Survival depends on the surface area of the body burned and the specialized treatment provided at burn centers. Due to traumatic event of the injury Survivors of severe burns have long-term physical and psychosocial consequences(7).

1.2 Statement of the problem

Worldwide fire related burn is a major public health problem, each year fire alone responsible for an estimated 265 000 deaths. Countries of low and middle income are accountable for occurrences of more than 96% of severe fire-related burns. Majority of burn victims who survived form this accidental event left with permanent disabilities and scar. Moreover, facing stigma and rejection. In low and middle-income death rate was eleven times higher when compared to high-income countries, which is 4.3 per 100,000 and 0.4 per 100,000 in figure respectively. On the other hand greater regional variability seen regarding burn related death. Poorer regions of the world among the WHO regions of Africa and South-East Asia, and the low-income and middle-income countries of the Eastern Mediterranean take share for greater number of death(2,8).

Mortality from burn in the developing world is much higher than in the developed world. Nepal, having a 20 million population around 1700 burn deaths registered in a year, giving a death rate seventeen times than that of Britain(9).

Ninety nine percent of burn deaths occur in low and middle-income countries (LMIC) Mortality rate among low-income countries (LIC) is eleven times higher when compared to higher income countries (HIC). Children under five and the elderly have the highest burn mortality worldwide. In Africa fire-related mortality rate for children under five is 32.9 per 100,000.The Sixth leading cause of death among 5-14 years age group worldwide(10).

Although burn is highly preventable, it can cause even more heartbreaking difficultly. Higher-income countries have made significant progress to lower burn death rates by establishing combined prevention strategies and advanced improvements in care of burn victims. Most of these progresses in prevention and care have been to some extent incompletely applied in developing and under developed countries including Ethiopia. Considerable reductions of burn related mortality and disability would be brought with potential efforts to do so (8).

A number of initiatives were implemented including ambulance distribution and utilization, provision of training on basic and advanced life support and strengthening of specialty care such as intensive care units, burn services, and trauma care services, to advance public

hospitals quality of emergency services. Efforts are also being made to improve the emergency medical system in Addis Ababa with an Emergency Services Strengthening Project, with Addis Ababa City Administration, to establish a city-wide coordination mechanism(11).

Despite those measures, taken still burn continues to be a major public health problem and cause of death for a number of children, which is difficult to estimate due to lack of data in Ethiopia. Despite the fact that several studies conducted in different parts of the world regarding survival status and predictor of mortality among pediatrics burn victims, there is scarcity of related studies in this area in Ethiopia. Therefore, this study aims to determine survival status and predictor of mortality among pediatrics burn victims admitted to burn centers in Addis Ababa, Ethiopia.

Regardless of those measures, taken despite everything consume keeps on being a significant general medical issue and reason for death for various youngsters, which is hard to appraise because of absence of information in Ethiopia. In spite of the way that few investigations led in various pieces of the world in regards to endurance status and indicator of mortality among pediatrics consume casualties, there is shortage of related examinations here in Ethiopia. Along these lines, this investigation expects to decide endurance status and indicator of mortality among pediatrics consume casualties confessed to consume focuses in Addis Ababa, Ethiopia.

1.3 Significance of the study

Children living in low and middle-income countries are mostly victims and vulnerable of injury especially, those from underdeveloped country and poor families. The burden and pattern of burn injuries in Africa and other developing areas poorly known and not well studied. Majority of mortality and morbidity due to burn injury among children occur in LMIC. However, in Ethiopia, very little known about the effect of burn injury and its outcome, there is lack of published data in this regard.

This study will assess survival status and predictors of mortality. The results of the study will used as base line information to design appropriate policies, strategies, and intervention, and treatment guideline, which can improve the care given to the pediatrics burn population.

The study conducted in the two burn centers, which found in Addis Ababa Ethiopia. It serves a population of Addis Ababa and referral cases from different corner of the country. Therefore, this study will contribute a lot to the national data as well as to the surgeons, nurses and others clinicians regarding predictors of burn and survival of pediatrics burn victims.

The results of the study will also add the evidence regarding burn mortality and give background information for further studies in child health and survival.

2. Literature review

2.1 mortality among pediatrics burn victims admitted to burn centers

A number of studies conducted in developed as well as in developing countries to determine the survival among pediatrics burn victims that admitted to burn centers. In developed countries, a different cohort study conducted in USA showed that the mortality rate of pediatrics burn victims is 3.3%, from those, 52.0% dead within 7 days after admission(12), according to the study done in India, 149 patients (31.3%) dead and 326 patients (68.6%) survived. The mean age of patients who dead was 8.68 years while the mean age of patients who survived was 5.54 years. It also revealed that significant difference between the mortality rates of children from rural areas (41.2%) and urban areas (27.1%).Mortality was lower (22.5%) in partial thickness burns. It also revealed that from the 34 patients that suffered electric burns, 11 died (32.4%) and among 232 scalds burn patients, 43 (18.5%) patients died. Mortality was highest in thermal burns where 96 out of 206 (46.6%) patients died (13).

Another study conducted in Brazil revealed that 15% of pediatrics burn victim died and most of them due to infection related causes (14).In another study conducted to identify mortality risk factors in children burn revealed that 1.36% dead from a total of 514 burn patients(15). Study in Kurdistan region, Iraq also revealed 4.7 % which is 61 in number were dead from total of 1305 under 15 burn victim children(16). Another study conducted in USA discovered overall mortality rate of 0.85%(17).

According to the study conducted on Mortality and causes of death of Dutch burn patients2730 patients, 88 (3.2%) patients died because of their burn injury. It also revealed No significant differences identified when the groups were compared regarding the presence of inhalation trauma(18).

Moreover, different institution and community-based retrospective and prospective cohort studies conducted in developing countries to assess the occurrence of mortality among pediatrics burn victims. An institution based retrospective study conducted at Cameron with the mean length of hospital stay at burn center was seven days showed that 29 % burn victims died and the rest of patients 60.5% were improved(19). Mortality is 11% in study conducted

in Bangalore Tanzania(20). Another study conducted in east Africa also revealed that Fifteen of 211 patients died which makes the mortality 7.1%(21).

In Ethiopia Retrospective Study done in Mekele town on Patterns of Burn Injuries in Ayder Comprehensive Specialized Hospital revealed that 450 burn injury patients admitted and managed. This study showed that the median hospital stay was 13 days range from minimum1 to maximum 515 days. Regarding outcome of burn injury 360(80.0%) patients were discharged improve, and 27(6.0%) patients died(22).

2.2 predictors of pediatrics burn victims mortality admitted to burn centers

According to Multi-institutional analysis of independent predictors for burn mortality in the United States revealed that Patients in the mortality cohort, more frequently female, and had more pre-existing co morbidities. This study also stated that total body surface area (TBSA), inhalation injury, hospitalization time, and occurrence of complications, lack of insurance, diabetes, any complication and the need for operative procedures are major predictors(12).

Another cohort study conducted in USA on burn size and survival probability in pediatric burn victims' shows that as burn size increases mortality also significantly increase. Pediatrics burn victims' with groups of greater and less than 60% of Total burn surface area shows different survival probability with Kaplan Meier curve. This study also revealed solid predictor of mortality, including gender, age, TBSA greater than 60%,inhalation injury and burn to admit time (23).

According to a cohort, study conducted in tertiary burn center of northern India, which involved 475 pediatric burn patients, revealed that, the majorities 59.1% were males and most of the patients (50.1%)belonged to age group of 1–5 years. Totally, 23.3% of patients had TBSA involvement of more than 50%. The study also revealed factors for increased mortality which includes, age > 11 years, female, suicidal burns, TBSA of >25%, inhalation injury, deeper burns considerably decreased risk of mortality was seen in patients belonging to urban areas, nuclear families, and in patients who were admitted during October to December(13).

A pre-hospital prospective observational study conducted in India on timely access to care for patients with critical burns revealed that TBSA, inhalation injury, intentionality and gender are Predictors of mortality(24).

According to study done at J. P. Garrahan Hospital Burn Center in Brazil on risk factor of mortality in pediatrics burn patients which involved 110 patients revealed the median age of 31.5 months (range: 1–204), and patients 65% were male. It also revealed mechanism of burn that is responsible for admission of pediatrics burn victims were flame, scalds and inflammable liquids. The median hospital stay was 37 days with a minimum of 1 days up to 139 maximum days. It also revealed 15 % mortality and independent variables significantly related with mortality was age ≤4 years, colistin use, mechanical ventilation and graft (25).

Another study conducted in doula general hospital of Cameron on predictors of mortality of pediatrics burn patients revealed a male predominance of 69 (55.65%) and factors that associated with patients' death includes resulting TBSA over 25%, electrical and flame mechanism remained significant predictors of death from burns. (19).

According to the study conducted in Sekou Toure pediatric burn unit of east Africa. Two hundred eleven patient records reviewed, 59.7% were male. The study also identified for 1% increase in percentage TBSA, age for each 1-year increase in age, female gender, weight (1.36 for 1 kg increase in weight; 0.91–2.03) and burn location as predictors of mortality. However length of hospital stay (LOS) was not an independent predictor of mortality (26).

2.3 Conceptual Frame Work

The following abstract frameworks figure shows the interaction of different variables with outcome variables of the study which that contains demographic factors, time factors and clinical data of pediatrics burn factors which is adapted from different articles and to some extent modified.

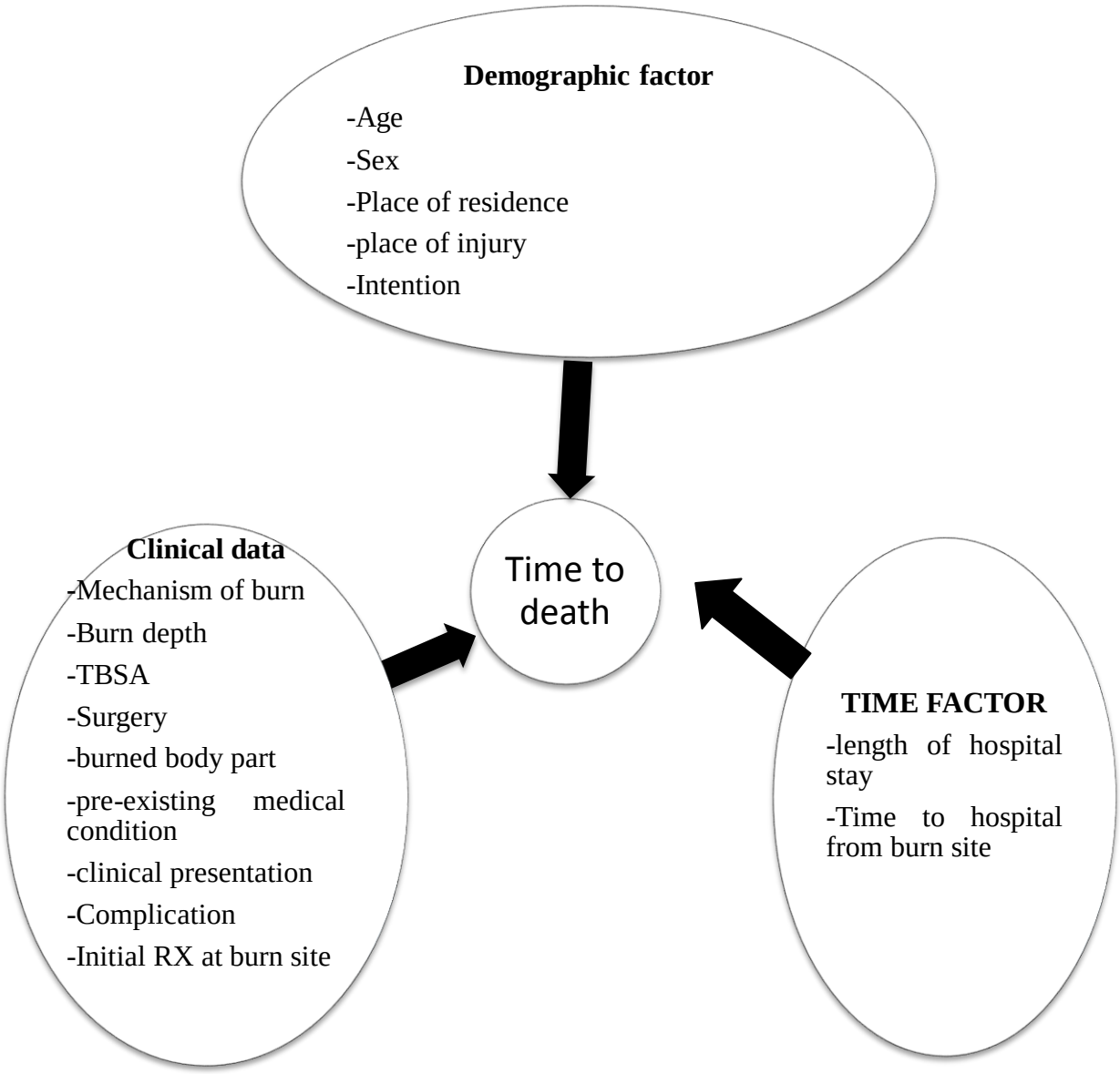

Figure 1: Conceptual framework of Survival status and predictor of mortality among pediatrics burn victims admitted to burn centers from 2016-2019 Addis Ababa, Ethiopia, 2020(14,19,23,24,25)

3. Objective of the study

3.1 General Objective

To assess survival status and predictor of mortality among pediatrics burn victims admitted to burn center, Addis Ababa, Ethiopia, 2020.

3.2 Specific Objectives

To determine survival status among pediatrics burn victims admitted to burn centers in Addis Ababa, Ethiopia, 2020.

To identify predictors of mortality among pediatrics burn victims admitted to burn centers in Addis Ababa from, Ethiopia, 2020.

4. Methods and materials

4.1 Study area and period

The study conducted at burn centers in Addis Ababa. It has twelve governmental and nine nongovernmental hospitals with two burn centers including Yekatit 12 millennium medical College and Addis Ababa burn emergency trauma AaBET of St Paul millennium medical College hospital. Yekatit 12 Hospital are 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. The hospital provides services for a population of approximately 4 million people. It has nine departments and six units and has 265 beds. It has been the main referral hospital for treatment of burns patients for many years. The burn unit has 19 beds, 12 of them for adults and seven for pediatrics and AaBET hospital has 19 bed units seven for pediatrics and 12 adults 20 nurses specially trained in burn care and three plastic surgeons. The study conducted from 1st January 2016 to December 31st2019**.**The study conducted at burn centers in Addis Ababa, a capital city of Ethiopia.

4.2 Study design

An institution based retrospective cohort study deployed among pediatrics burn victims admitted to burn centers from January 1, 2016 to December 30, 2019, Addis Ababa, Ethiopia.

4.3 Populations

4.3.1 Source population

All pediatrics burn victims admitted to burn centers in Addis Ababa.

4.3.2 Study population

All selected charts of pediatrics burn victims admitted to burn centers from January 1, 2016-December 31, 2019

4.4 Eligibility criteria

4.4.1 Inclusion criteria

All charts of pediatric burn victims admitted to burn centers throughout study period and age less than eighteen years.

4.4.2 Exclusion criteria

Pediatrics burn victims with incomplete records

Records not available

4.5 Sample size determination and Sampling procedure

Single population proportion formula deployed to determine sample size.

The following assumptions are considered:-

P = proportion of mortality of admitted pediatrics burn victims, 6%, from study conducted in Ayder hospital Mekele (22).

$Z_{\alpha/2}$ = Z-score of 95% confidence interval

d= Marginal error 5%.

$n = (z\alpha/2)2 \times P(1-P) / (d)\,2,$

$n= (1.96)^2*0.06*0.94/ (0.05)^2 =$ **87**

Ten percent contingency rate added and finally the sample size becomes **96.**

Double population proportion formula utilized to calculate sample size for predictors by using CDC:Epi Info™ version 7.1.2.0 software.

$$n_1 = \frac{\left[Z_{\alpha/2}\sqrt{\left(1+\frac{1}{r}\right)P(1-P)} + Z_{\beta}\sqrt{\frac{P_1(1-P_1)+P_2(1-P_2)}{r}}\right]^2}{(P_1-P_2)^2}$$

Considering:

P_1: Exposed with the outcome

P_2: Non-exposed with the outcome

$Z_{\alpha/2}$: is taking CI 95%

Z_{β}: 80% power and, r is the ratio of exposed to non-exposed 1:1

Table 1: determination of sample size to assess survival status and predictors of mortality among pediatrics burn victims admitted to burn centers in Addis Ababa, Ethiopia, 2020.

Variables	Assumption	Total	adding 10%	Reference
House location (place of residence)	P1=0.27 P2=0.41	386	423	(13)
Inhalational injury	P1=.74 P2=.23	36	40	(13)

The Burn centers in Addis Ababa are included. The desired number of pediatrics burn victims was determined based on the amount of patient of admission in each health facilities using proportional allocation. Study participants chart selected by using systematic random sampling technique. Sampling interval calculated and k was equal to three. Burn victims' chart were selected from HMIS registry every three chart until required sample size obtained and the first chart was selected by lottery method. The data collected from Yekatit 12 millennium medical college hospital and Addis Ababa burn and trauma centre affiliate of St. Paul medical college hospital.

N in health facility = $\underline{\text{NF*N\_in health facility}}$

N_{total}

Where: n in health facility = proportion of admitted burn victims in a given burn center

N-total = total number of pediatrics burn victims admitted from 2016-2019

NF = Total sample size

N in a health facility= average number of patient admission in a given burn center.

N in Yekatit 12 = 423*538/1067= 214

N in AaBET= 423*502/1067=199

Sampling interval (K)=N in health facility/NF

K in Yekatit 12= 538/214=2.51 K in AaBET=502/199=2.52

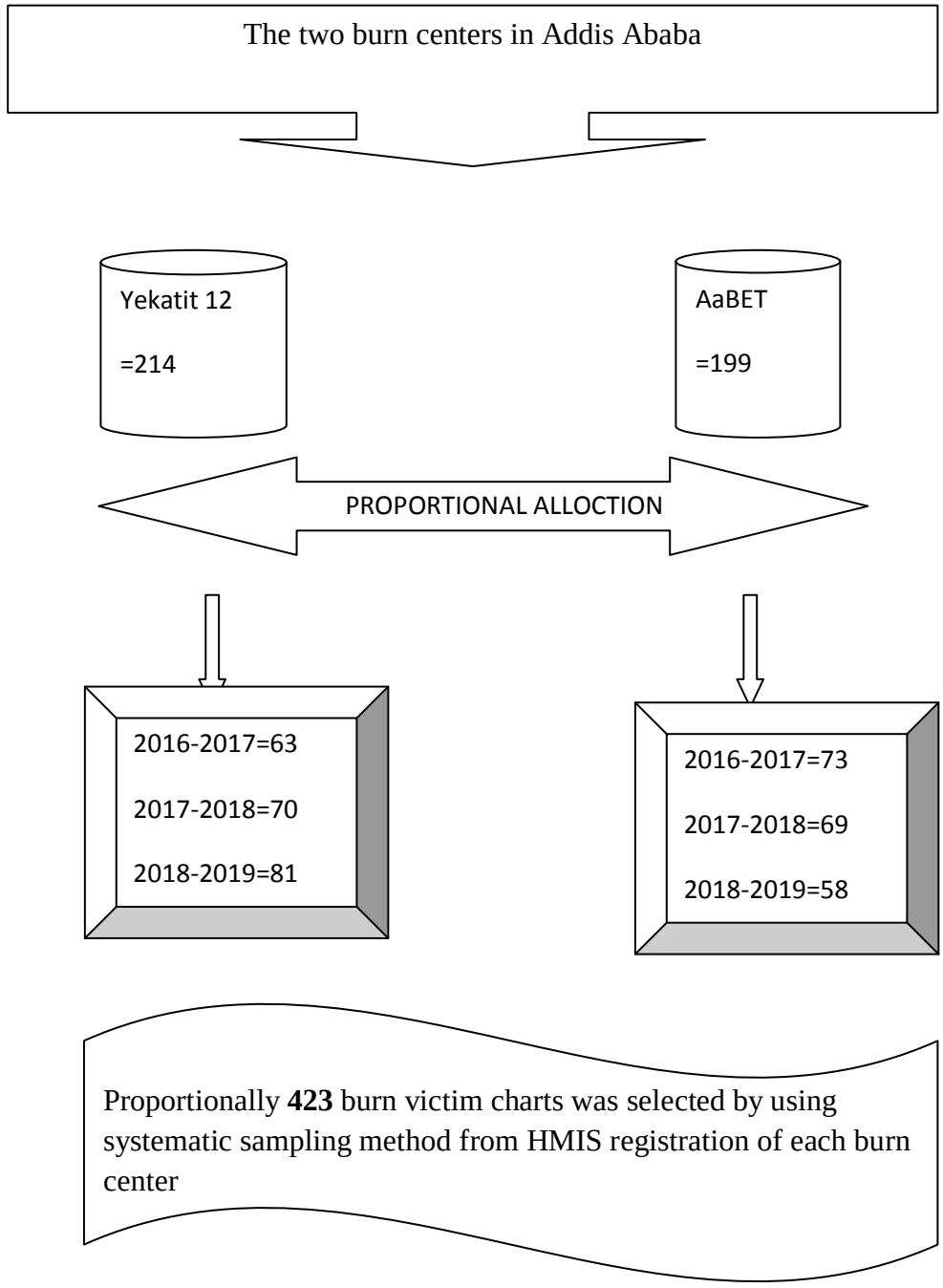

Figure 2: Schematic presentation sampling procedure to assess Survival status and predictor of mortality of pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

4.6. Study variables

4.6.1. Dependent variable

Time to death

4.6.2 Independent variables

Independent variables including, place of injury, depth of burn, age, TBSA, time to hospital from burn site, gender, pre hospital intervention, preexisting medical condition, length of stay, disease developed while hospital stay, mechanism of injury and anatomic location burned were chosen to predict mortality.

4.7 Operational definition and definitions

Censored: Pediatrics burn victims admitted to burn center with predictors, but still will be alive upon completion of the study or lost to follow up including discharged to home, discharged against medical advice or transfer out to other health institutions without knowing the outcome.

Follow up time: Starting from admission time until either an event or censorship occurs.

Survival status: Is the outcome of pediatrics burn victims.

Survival time: Measures the follow-up of time from a defined starting point/from admission in burn center up to the occurrence of the outcome.

4.8 Data collection tool and procedure

The patient chart first observed and appropriate data extraction checklist in English made. The data extraction checklist also adopted and modified from different related studies. The starting point for retrospective follow-up were the time from first admission date and the endpoint will be date of death and censored. All charts of burn victims, diagnosed in between January 1st 2016 to 31 December 2019 at burn centers were reviewed from registries. Eligibility criteria considered to select pediatrics burn victim's charts. Records selected according to the eligibility criteria. The survival status of patients, obtained from the medical record. Survival time calculated as the time between the dates of admission to the date of death, censored otherwise end of study.

Then all medical records of pediatrics burn victims admitted to burn centers at Yekatit 12 hospital and AaBET from 1st January 2016 to December 31st2019 retrospectively reviewed by health professionals. Medical death certificate attached on charts seen to confirm death of pediatrics burn victims.

4.9. Data quality control

Appropriate data abstraction tool made to increase data quality. Experienced researchers evaluated the adopted and developed checklist. Pretest were employed on (21)5% of the patient charts with a structured checklist on admitted pediatrics burn patients at one of the two burn centers two weeks prior to the actual study to compare for recorded variables on the patient's medical record and data abstraction checklist. Therefore, some modification made and unrecorded variables reduced from the abstraction checklist. The data collector and supervisor were experienced nurses and effectively trained regarding the data abstraction checklist and data collection process for two days. Careful monitoring implemented by supervisor and investigator during the data collection time, to make sure data quality. The data evaluated daily for completeness and encountered difficulties managed. Lastly, supervisor and investigator checked gathered data consistency and completeness during the data management, storage, and analysis. Principal investigator randomly selected cards and checked for gathered data quality.

4.10. Data process and analysis

Before data entry, the abstraction checklist checked for completeness. Cleaned and coded data entered into Epi Data 4.6 version and analysis of the data conducted by using STATA version 15 statistical software. Cox proportional hazard model assumption checked using Schoenfeld, residual test. Patients' cohort characteristics for continuous data described in terms of central tendency (mean or median) and dispersion (standard deviation). Frequency distribution used for categorical data. Estimation of survival time done by using Kaplan Meier survival curve and survival curves compared by log rank. Bivariate regression model fitted for each explanatory variables and multivariable Cox model used to detect mortality predictors of pediatrics burn victims. Adjusted Hazard Ratio with its 95% confidence interval used for

potential risk factors in the multivariable model. P-value ≤ 0.05 considered as statistically significant association.

4.11. Ethical consideration

Letter of ethical clearance obtained from AAU, College nursing and midwifery research committee. Then letters of cooperation written to Yekatit 12 hospital, AaBET hospital affiliate of St. Paul millennium medical college and concerned bodies. Permission obtained from clinical director and subsequent department and unit heads of the hospital. Following these, searching and obtaining of the selected samples' medical record processed with the assigned person. Since the study conducted through reviewing of medical records, the individual patients not subjected to harm as much as the confidentiality kept. To keep the confidentiality all collected data coded and names excluded from data collection format.

4.12. Dissemination

Result of the study will presented to Addis Ababa University, College of Health Sciences, school of Nursing and Midwifery as a partial fulfillment of masters in pediatric and child health nursing and in local or internationally hold seminars and workshops. This thesis document will submitted to Yekatit 12 medical college hospital, AaBET hospital affiliate of St. Paul millennium medical college. Known journals will be selected for publication of this paper.

5. Result

5.1. Socio-demographic characteristics of burn victims

Totally four hundred twenty three pediatrics charts reviewed, 412 (97.39%) records were met enrollment criteria in the final analysis; 11 charts were excluded (seven incomplete data and four of the charts were not available). Of which, about 214 (51.9 %) were males and majority of 233(56.6%) participants came from urban area. Pediatrics burn victims mean age found to be 5.2 ±5.1SD years old. Most of burn accidents happened at home, which is responsible for 30(88.24%) death.

Table 2: Socio demographic of pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

Variable	**All episodes, n (%)**	**Censored, n (%)**	**Non-survivor, n (%)**
	(n=412)	(n=378)	(n=34)
Age	5.2 (±5.1)	5.0 (±4.99)	8.37(±6.60)
Gender			
Female	214 (51.9%)	183(48.41%)	15(44.12%)
Male	198 (48.1%)	195(51.59%)	19(55.89%)
Total	412	412	34
Age			
<5	275(66.7%)	260(68.78%)	15(44.12%)
≥5	137(33.3%)	118 (31.22%)	19(55.89%)
Total	412	378	34
Residence			
Urban	233(56.6%)	218(57.67%)	15(44.12)
Rural	179(43.4%)	160(42.33%)	19(55.89%)
Total	412	378	34
Place of injury			
Home	388(94.2%)	359(94.97%)	30(88.24%)
Street	20(4.9%)	17(4.49%)	3(8.82%)
Others*	4(0.97%)	2 (0.53%)	1(2.94%)
Total	412	378	34
Mechanism of burn			
Scald	285(69.2%)	272(71.96%)	13(38.24%)
Flame	100(24.3%)	82(61.29%)	18(52.94%)
Electrical	25(6.1%)	22(5.82%)	3(8.82%)
Chemical agents	2(0.49%)	2(0.53%)	---
Total	412	378	34
Cause of death			

Sepsis			7 (20.59 %)
Cardiopulmonary arrest			12 (35.29%)
MOF			10 (29.41%)
Others**			5(14.71%)
Total			34

NB. *work place ** severe burn. MOF(multi organ failure)

5.2 Clinical data of pediatrics burn victims

The mean total burn surface area of pediatrics burn victims accounts 15.54±11.83SD percent and from the total only 111(26.94%) have TBSA of greater than 20%; it was responsible for 21(61.76%) death. From the total 412 pediatrics burn victims admitted to burn centers 78 (18.93%) with full thickness burn depth, accounts for around 17 (50.00%) of mortality. Most of the burn victims 383(92.96 %) do not have any pre-existing medical problem. Those burn victims who developed any disease while hospital stay accounts 67(17.72 %) and from those 29(85.29%) died.

Table 3: Clinical data of pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

Variable	**All episode, n (%)**	**Censored, n (%)**	**Non-survivor, n (%)**
	(n=412)	(n=378)	(n=34)
Depth of burn injury			
Partial thickness	321(77.91%)	305(80.68%)	16(47.06%)
Full thickness	78 (18.93%)	61 (16.14%)	17 (50.00%)
Superficial	13 (3.16%)	12 (3.17%)	1 (2.94%)
Total	412	378	34
%TBSA	15.54(±11.83)		
TBSA%			
≤20	301(73.06%)	288(76.19%)	13(38.24%)
>20	111(26.94%)	90(23.81%)	21(61.76%)
Was the injury intention			
No	405(98.30%)	373(92.10 %)	32(94.12%)
Yes	7(1.70%)	5 (7.90%)	2(5.88%)
Total	412	378	34
Any pre-existing medical condition of the child			
None	383(92.96 %)	354(93.56%)	29(88.24%)
Epilepsy	17(4.13%)	16(94.12%)	1(2.94%)

Malnutrition	7(1.70%)		6 (4.23%)	1(2.94%)
Other *	5(1.21%)		2 (0.53%)	3(8.82%)
clinical presentation at admission				
None	316(76.70%)		295(78.04%)	21(61.76%)
Other**	73(17.72%)		64(16.93%)	9(%)
loss of consciousness	14(3.40%)		12(3.17%)	2(%)
shock	6(%)		4 (%)	2(%)
airway compromise	3(%)		3 (%)	0
Duration of time before getting medical attention				
≤8 hours	337(81.80 %)		314(83.07%)	23(67.65%)
>8 hours	75(18.20%)		64(16.93%)	11(32.35%)
Pre-hospital intervention provided.				
No	285(69.17%)		266(70.37%)	15(44.12%)
Yes	127(30.83%)		127(33.60%)	19(55.88%)
If yes, what is provided?				
first aid at health facility	98(77.17 %)		85(75.89%)	13(86.67%)
first aid at home	29(22.83%)		27(24.11%)	2(13.43%)
Total	127		112	15
Any disease developed while hospital stay				
No	339(82.28%)		334(88.36%)	5(14.71%)
Yes	67(17.72 %)		44 (11.64%)	29(85.29%)
Type of disease developed while hospital stay				
Anaemia	No	52 (70.27%)	34 (75.56 %)	18(62.07%)
	Yes	22(29.73%)	11 (24.44%)	11 (37.93%)
Malnutrition	No	58(82.43%)	37 (84.09%)	21 (84.00%)
	Yes	13(17.57%)	7 (13.91%)	4 (16.00%)
GI focus sepsis	No	61(82.43%)	35 (79.55%)	16 (55.17%)
	Yes	13(17.57%)	9 (20.45%)	13 (44.83%)
Sepsis wound focus	No	40(45.95%)	21 (46.67%)	13 (44.83%)
	Yes	34(54.05%)	24 (53.33%)	16 (55.17%)
Anatomic position affected				
Head	No	314(76.21%)	287 (75.93%)	27 (79.41%)
	Yes	98 (23.79%)	91 (24.07 %)	7 (20.59 %)
Neck	No	341(82.77 %)	317(83.86%)	24(70.59%)
	Yes	71(17.23%)	61(16.14%)	10(29.41%)
Anterior trunk	No	218 (52.91%)	207 (54.76%)	11 (32.35%)
	Yes	194(47.09%)	171 (45.24%)	23 (67.65 %)
Posterior trunk	No	307(74.51%)	287 (75.93%)	20 (58.82%)
	Yes	105(25.49%)	91 (24.07%)	14 (41.18%)
Right arm	No	220(53.40%)	209 (55.29%)	11 (32.35%)

	Yes	192(46.60%)	169 (44.71%)	23 (67.65%)
Left arm	No	247 (59.95%)	235 (62.17%)	12 (35.29%)
	Yes	165 (40.05%)	143 (37.83%)	22 (64.71%)
Genitalia	No	355(86.17%)	327 (86.51%)	28 (82.35%)
	Yes	57 (13.83%)	51 (13.49%)	6 (17.65%)
Buttocks	No	365 (88.59%)	340 (89.95%)	25 (73.53%)
	Yes	47(11.41%)	38 (10.05%)	9 (26.47%)
Right. Leg	No	238(57.77%)	229 (60.58%)	9 (26.47%)
	Yes	174(42.23%)	149 (39.42%)	25 (73.53%)
Left. leg	No	260(63.11%)	250 (66.14%)	10 (29.41 %)
	Yes	152(36.89%)	128 (33.86%)	24 (70.59%)
Treatment provided				
Resuscitation	Yes 229(55.58%)		197 (86.03%)	32 (94.12%)
	No 183(44.42%)		181 (98.91%)	2 (5.88%)
Wound care	Yes 412 (100%)		---	---
Antibiotic	Yes 347(84.22%)		313 (82.80%)	34 (100%)
	No 65(15.78%)		65 (17.20%)	0 (0.00%)
Anti-pain	Yes 397(96.36%)		363 (94.95%)	34 (100.0%)
	No 15(3.64%)		15 (3.97%)	0
TAT	No 387(93.93%)		357 (96.03%)	30 (88.24%)
	Yes 25(6.07%)		21 (84.00%)	4 (11.76%)
Surgery	No 278 (67.48%)		253 (66.93%)	25 (73.53%)
	Yes 134(32.52%)		125 (33.07%)	9 (26.47%)
Other***	No 336(81.55%)		318 (84.63%)	18 (52.94%)
	Yes 76(18.45%)		60 (15.83%)	16 (47.06%)

*Psychiatric problems** pain and fever ***blood transfusion, iron, multi vitamin supplement and other drugs

5.3 Survival status of pediatrics burn victims

Totally, four hundred twelve-pediatrics burn victims admitted to pediatrics burn centers followed from zero to three years. According to this study finding the median hospital stay found to be 25(95%CI: 30.11, 36.66) and with mean of 33.38 (95%CI: 30.11, 36.66) days. The pediatrics burn victims follow time ranges from a minimum 1 days up to maximum of 269 days. This study also revealed that, during follow up time from the total admitted pediatrics burn victims 34 (8.25 %) died and from this 19(55.89%) were male. From pediatrics included in the analysis, 378 (91.75) were censored (from which, 313(95.50%) were discharge to home, 5 referred and 15(3.96%) of them discharged against medical advice) upon completion of the study. The incidence rate found to be 2.4 death per 1000 person day observation (95%CI: 1.77, 3.46) with total follow up extent of 13753 person-day.

5.3.1 Survivorship

The overall survival probability of pediatrics burn victims as revealed by Kaplan- Meier estimate, on day one of hospital admission it is found to be maximum (99.76%) survival observed with a standard error of 0.0024 (95CI:0.9829, 0.999. This probability decreases as follow up time increases. The over all probability of survival of pediatrics burn victims was 78.34% with a standard error 0.04(95%CI: 0.67, 0.85).

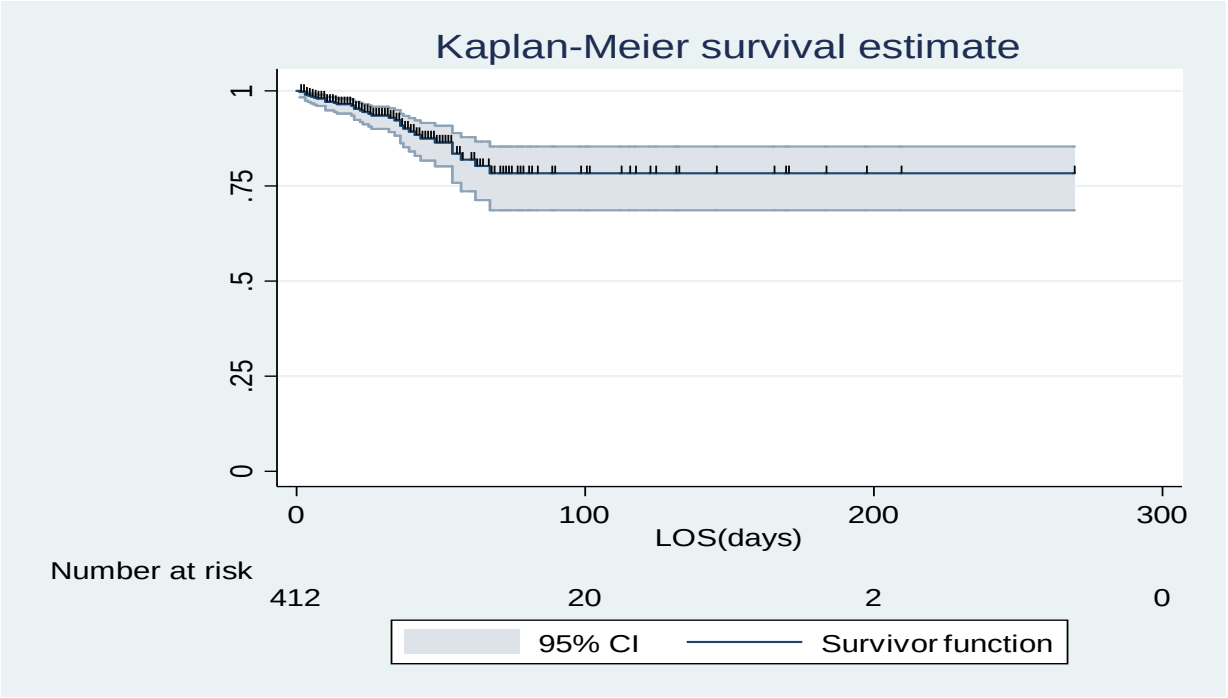

Figure 3: Overall Kaplan-Meier survival estimate of among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

5.3.2 Categorical variables Survival function and Comparison of Survivorship Functions

Estimation of survival function obtained from separately constructed graphs of Kaplan-Meier curves to compare groups of covariates as shown below. To test equality of survival curves of different categorical explanatory variables Cochran-Mantel Haenszel Log rank test performed (table 4).The test statistics, which is obtained from log rank test (table 4), showed that there is a significant difference in survival function (curve) for different categorical variables. In this study, pediatrics burn victims with TBSA of less than 20% has lower survival time (median age 20 days) with 95% CI:6,36) as compared to TBSA greater than 20%.The overall survival of TBSA less than 20% and greater than 20% found to be 85%and 68 %respectively (figure 4). Significant difference observed with p value = 0.01

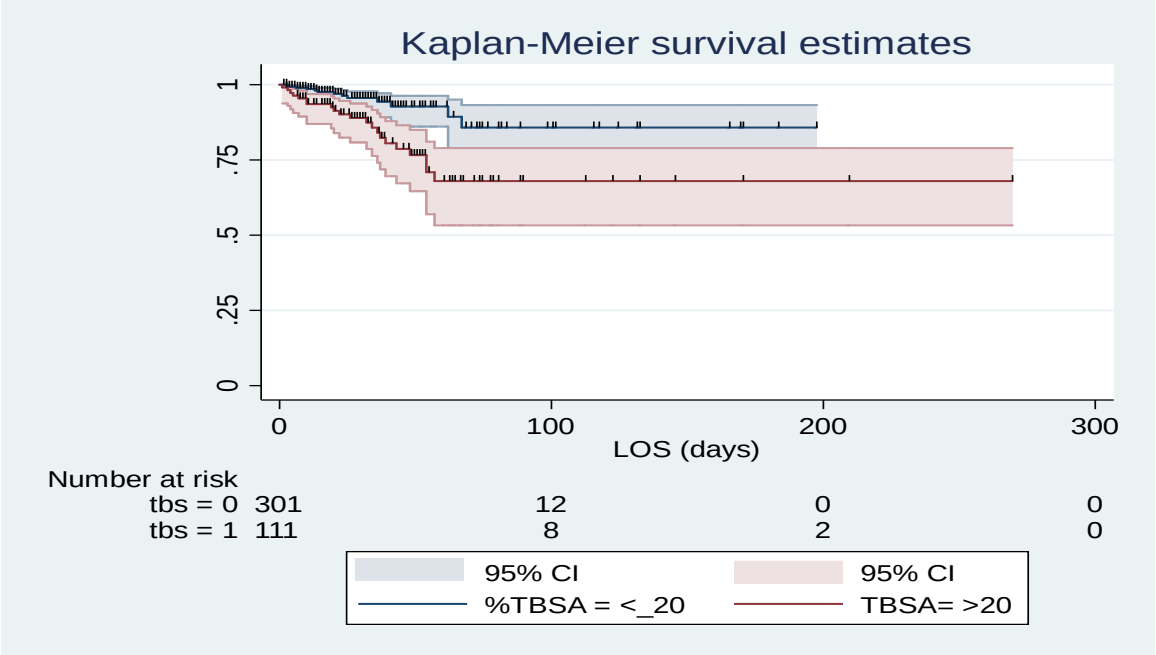

Figure 4: Survival time comparison of pediatrics burn victims TBSA of among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

Similarly, the survival time for those pediatrics burn victims developed any disease after hospital admission had a lower survival time than those who do not developed with overall survival of 22.5% and 53%. Significant difference observed with p-value = 0.000as shown in figure below.

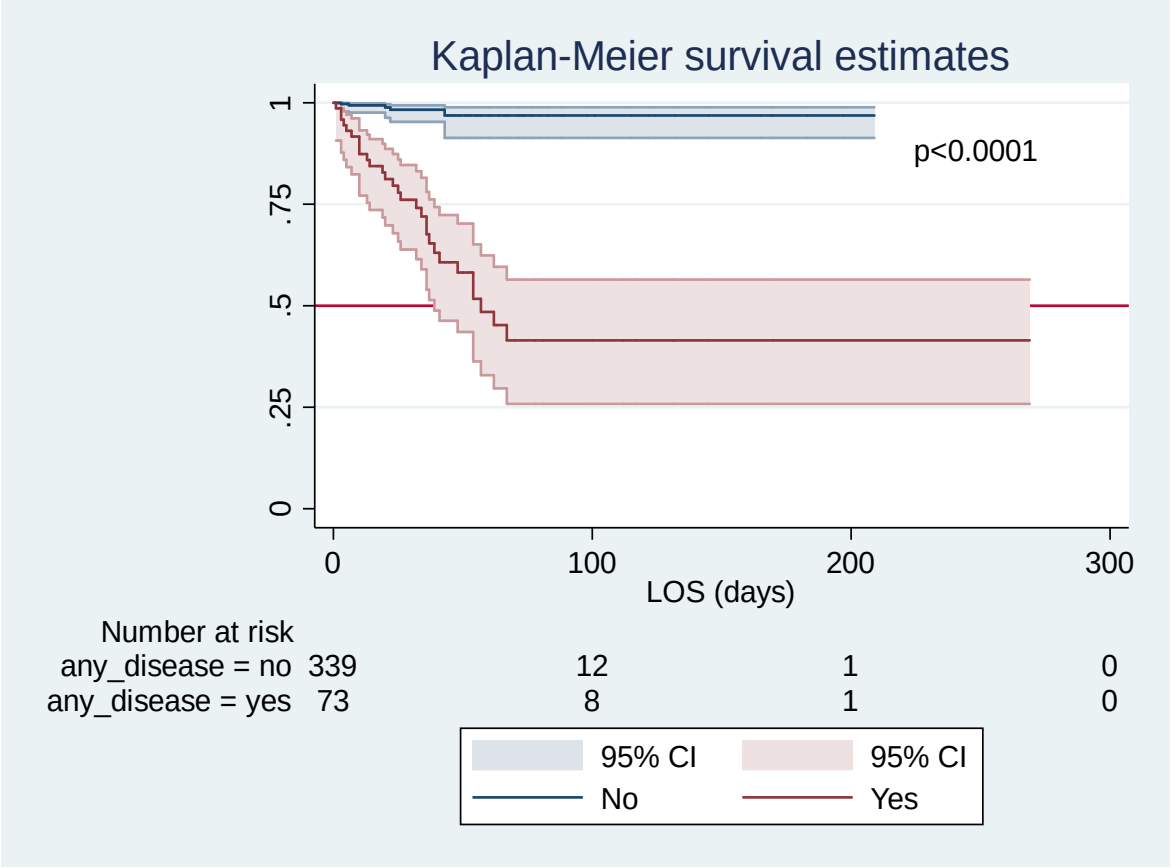

Figure 5; Shows KM Survival time comparison of development of disease after admission of among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

The median survival time of pediatrics burn victims with surgical intervention (median 48 days) with 95% CI: 14, 57) as compared to burn victims with no surgical intervention (median 20 days with 95% CI: 7, 32). The overall survival of burn victims with surgical intervention are 86% and 65 % respectively. As shown in the figure below, the significant difference observed with p value < 0.0000.

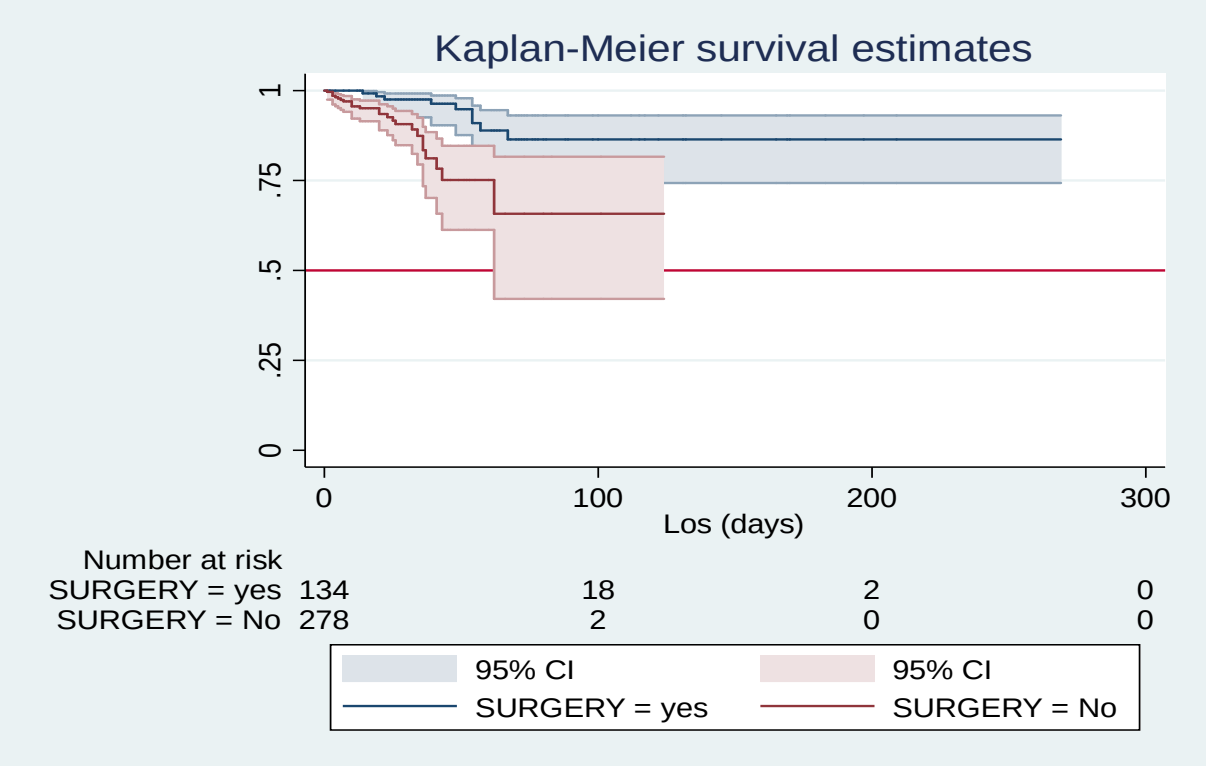

Figure 6: Survival time comparison of pediatrics burn victim's surgical intervention among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

Log-rank test conducted in this study as listed in the table below to illustrate the existence of significant difference among categorical predictor variables. The listed covariant in the table below are statistically significant (P-Value<0.25).

Table 4: Log-rank test and median survival time for predictors among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

Predictor	Category	Survival	Log-rank test (x^2)	$p>X^2$
		Median(95%CI)		
Depth of burn injury	Partial thickness	14(7,37)	26.81	0.000
	Full thickness	22(4,39)		
TBSA%	>20	26(10,37)	53.83	0.001
	≤20	20(6,36)		
Duration of time before getting medical attention	≤8	20(10,37)	127.89	0.000
	>8	23(4,36)		
Any disease developed while hospital stay	Yes	25(10,36)	167.30	0.000
	No	20(3,.)		
Neck	Yes	32(3,43)	7.07	0.09
	No	20(10,36)		
Rt. arm	Yes	22(13,34)	4.83	0.02
	No	23(5,41)		
Lt. arm	Yes	22(10,36)	6.65	0.01
	No	14(5,41)		
Rt. Leg	Yes	22(7,36)	8.68	0.002
	No	25(10,54)		
Lt. leg	Yes	22(10,36)	11.53	0.000
	No	20(1,41)		
Resuscitation	Yes	22(10,36)	13.47	0.0000
	No	14(14,.)		
Surgery	Yes	48(14,57)	12.86	0.0003
	No	20(7,32)		

5.4 Cox proportional hazard model of pediatrics burn mortality predictors

To analyze association between the standard variables and mortality hazard, Cox proportional hazard regression model used. In bivariate analysis clinical factors like full thickness depth of burn, TBSA greater than 20% , any disease or complication developed while hospital stay, body parts like neck arm and lower extremity affected, treatment given are statistically significant at p-value < 0.25predictors of pediatrics burn victims mortality as shown in table below. Additionally, predictors significant in bivariate included in multivariate cox regression. As a result, to be not undergoing surgery as treatment intervention, burned neck, developing any disease after hospital admission and full thickness depth of burn predictors found in multivariate analysis.

Multivariate analysis result shows that pediatrics burn victims whose developed other disease after admission 26 times to die more likely when compared to burn victims without other disease after admission (AHR:26(95%CI:9.19,75).The hazard ratio for pediatrics burn victims admitted to burn centers whose neck burned were 2.8 times to die more likely when compared to pediatrics burn victims other body area burned (AHR:2.8(95%CI:(1.0,7.7)). Hazard ratio for death was 2.5 times (AHR: 2.51(95%CI:(1.12, 5.62)) higher in patients with full thickness burn when compared to superficial and partial thickness burn depth pediatrics burn victims. This study also revealed that, burn victims without surgical intervention is 36 times to die more likely than burn victims undergone surgical intervention (AHR: 34.40(95%CI:(9.80, 120.71)).

Table 5: Cox proportional hazard model of predictors among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020

Predictor	Category	CHR (95% CI	AHR (95% CI
Depth of burn injury	Partial thickness	1	
	Full thickness	1.09(.14,8.30)*	2.51(1.12,5.62)*
-TBSA%	>20	3.01(1.50,6.05)*	1.31(.56,3.10)
	≤20	1	
Duration of time before getting medical attention	≤8	2.46(1.20,5.05)*	1.32(.60,2.88)
	>8	1	
Any disease developed while hospital stay	Yes	20.59(7.93,53.30)**	26.28(9.19,75.16)**
	No	1	
Neck	Yes	1.870375(.89,3.92)*	2.82(1.04,7.68)*
	No	1	
Rt. arm	Yes	2.19(1.07,4.50)*	.74(.24,2.28)
	No	1	
Lt. arm	Yes	2.45(1.21,4.95)*	.87(.28,2.70)
	No	1	
Rt. Leg	Yes	2.99(1.39,6.44)*	.43(.14,1.28)
	No	1	
Lt. leg	Yes	3.22(1.53,6.77)*	.44(.15,1.28)
	No	1	
Resuscitation	No	.11(.03,.47)**	.21(.04,1.05)
	Yes	1	
Surgery	No	4.12(1.82,9.30)**	34.40(9.80,120.71)**
	Yes	1	

NB: *· significant with P-value < 0.05, ** significant (p-value<0.001); Crude HRs reflect bivariate modeling results, whereas adjusted HRs are taken from a multivariate model containing all variables in the table and categories labeled as 1 are considered as reference categories.

6. Discussion

Assessing survival status and predictors of mortality among pediatrics burn victims admitted to burn centers was the intention of this study. The finding of this study revealed that Mortality was 34(8.25%) according to the finding of this study which slightly higher compared to study conducted in Mekele which was 6.0% (22). Similarly, the finding is higher than study conducted in east Africa 7.1%(21) and studies conducted in USA 0.85%(17). It is also higher than study conducted in Iraq which is 4.7 % (16) and study conducted in Dutch, (3.2%) (18). On the contrary the finding is lower than the study conducted in Cameron mortality rate of 29%(19) and which is 11% in the study conducted in Tanzania(20). Similarly the finding is lower than the study conducted in India, which is 31.3% (13) and study conducted in Brazil 15%(14). Several possible reasons might listed for the observed differences, from this the difference in sample size, methodology, the difference in the study period and level of the hospital.

In this study, there is very clear differences among the various group's survival ship of pediatrics burn victims with TBSA of greater than 20% has lower survival time (median 20 days) compared to TBSA less than 20%. The overall survival of TBSA less than 20% and greater than 20% found to be 86% and 68 % respectively, which supported by the study conducted in USA (23). This similarity may due to disruption of normal physiology. Children have higher body surface area, which leads to higher fluid loss and evaporation due to this more fluid resuscitation required and hypothermia results. Further increase in metabolic rate and oxygen consumption lead into other complication which compromise survival.

The overall median hospital stay was 25 days with a minimum and the maximum follow up time of 1 and 269 days, which is lower than the study conducted in India Median length of hospital stay was 37 days (range 1–139 days) (25). This difference explained by admission criteria, the availability of resources in the hospital and the quality of care given.

After multivariate cox proportional regression model adjusted, in multivariate analysis variables including not undergoing surgery as treatment intervention, burnt neck, developing

any disease after hospital admission and full thickness depth of burn are predictors of mortality.

According to this study developing others diseases after admission found to be an important predictor of pediatrics burn victim's mortality. Pediatrics burn victims those who developed other disease after admission, 26 times to die more likely when compared to burn victims without disease after admission, this finding was similar with study conducted in USA (23). The similarity may explained by the fact that burn itself leads to different body system malfunction and those with additional disease cannot cope with this process.

This study also identified full thickness burn as independent predictor of pediatrics burn victim's mortality, which is similar to study conducted in northern India(13). This similarity may due to most complications that lead to death arising from deeper burn. For example, a number of complications may occur, with infections being the most common and deep burn being one of common risk factor. Deep burn also lead to anemia and fluid losses and metabolic disturbances associated with these injuries are more serious.

This study also revealed that, burn victims without surgical intervention found to die more likely than pediatrics burn victims with surgical intervention, which was the same with study conducted in USA (23). The similarity may be due to early excising of the Escher and covering of the wound would help to prevent infection, which is a critical mortality factor.

7. Limitation and strength of the study

Strengths

The two burn centres in Addis Ababa included and proportionally allocated diverse years of observations considered, this may increase the quality of data and number of events. Data quality insured by assigning trained health professionals to collect the data. This study left foundation for researchers interested to conduct prospective study. Time and censoring are considered in this Retrospective study with survival analysis.

Limitations

The source of data for this study was secondary, as a result predictors that contribute to paediatrics burn mortality for instance, socio-demographic including nutritional status of the child, educational level of the child and parents, living condition, housing condition, income, source of energy and others can be missed. Only the two burn centres in Addis Ababa included; due to this it is difficult to generalize to all hospitals in the country. It also contributes to the introduction of selection bias because of excluded paediatrics burn victims' charts with incomplete records. So that, the incidence of death estimation compromised. Due to several reasons overall median survival time was not calculated.

8. Conclusion

Among total 8.4% of paediatrics burn victims died during follow up period. The mean and median hospital stay survival time found to be 33 and 30 days respectively with overall incidence rate of 2.4 per 1000 person day. Independent predictors of mortality are found to be burned neck, those without surgical intervention, full thickness depth of burn and disease developed after admission in multivariate proportional hazard. TBSA, gender and place of injury are not predictors of mortality according to this study.

9. Recommendations

Health care providers of working in burn centres should able to carefully identify and provide track for paediatrics burn victim particularly those identified with predictor of mortality in this study. It would be better to give more attention for patients who developed disease after hospital admission, having full thickness burn depth, those requiring different surgical procedure and having burned neck.

It would be better if upcoming researchers conduct a prospective cohort study to follow paediatrics burn victims because it would be highly beneficial to identify the long-term outcomes of paediatrics burn, and to identify other predictors including socioeconomic, environmental, course of treatment and other factors as well as reason specific predictors. Further community based study recommended on survival status of paediatrics burn victims after censored which may avoid the estimation effect.

10. References

1. WHO U. world report on child injury prevention [Internet]. Available from: http://www.who.int/violence_injury_prevention/child/en/

2. Story VS. Adapted from the Children of Fire web site (http://www.fi rechildren.org, accessed 9 June 2008). 2008;(June).

3. Hansbrough JF, Hansbrough W. Pediatric Burns. 2019;20(4).

4. Levin MJ. current Pediatric Diagnosis and treatment. Seventh ed. 2004.

5. FDREMOH. Emergency Triage Assessment and Treatment (ETAT + Ethiopia) Publications of the World Health Organization. In 2016.

6. Sharma RK, Parashar A. Review Article on Special considerations in paediatric burn patients. 2010;43.

7. Hospitalised burn injuries Australia, Hospitalised burn injuries Australia 2013–14 Injury Research And Statistics Series No. 102 [Internet]. 2015. Available from: www.aihw.gov.au

8. Violence and Injury Prevention [Internet]. 2019. Available from: https://www.who.int/violence_injury_prevention/other_injury/burns/en/#content htm

9. Hettiaratchy S, Dziewulski P. ABC of burns - Introduction Introduction. 2016;(March).

10. Løfberg K, Farmer D. Pediatric Burn Injuries in the Developing World. 2012;

11. MOH. Ethiopian Health Sector Transformation Plan. 2015.

12. Zavlin D, Chegireddy V, Boukovalas S, Nia AM, Branski LK, Friedman JD, et al. Multi-institutional analysis of independent predictors for burn mortality in the United States. Burn Trauma. 2018;6(1):1–10.

13. Dhopte A, Bamal R, Tiwari VK. A prospective analysis of risk factors for pediatric burn mortality at a tertiary burn center in North India. Burn Trauma. 2017;5(1):1–10.

14. Rosanova MT, Stamboulian D, Lede R. Risk factors for mortality in burn children. Brazilian J Infect Dis [Internet]. 2014;18(2):144–9. Available from: http://dx.doi.org/10.1016/j.bjid.2013.08.004

15. Karimi H, Motevalian SA, Momeni M, Safari R, Ghadarjani M. Etiology, Outcome and Mortality Risk Factors in Children Burn. Surg Sci. 2015;06(02):42–9.

16. Gerontology MOJ. Characteristics of Burn Injury and Factors in Relation to Infection among Pediatric Patients. 2017;1(3):1–11.

17. Hodgman EI, Saeman MR, Subramanian M, Wolf SE. The Effect of Burn Volume on Mortality in a Pediatric Population. J Burn Care Res. 2016;37(1):32–7.

18. Dokter J, Felix M, Krijnen P, Vloemans JFPM, Van Baar ME, Tuinebreijer WE, et al. Mortality and causes of death of Dutch burn patients during the period 2006-2011. Burns. 2015;41(2).

19. 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.

20. Chalya PL, Mabula JB, Dass RM, Giiti G, Chandika AB, Kanumba ES. Pattern of childhood burn injuries and their management outcome at Bugando Medical Centre in Northwestern Tanzania. 2011;

21. Chelidze KI, Lim CC, Peck RN, Giiti G, Leahy N, Rabbitts A, et al. Predictors of Mortality Among Pediatric Burn Patients in East Africa. 2014;154–60.

22. Mizan Kidanu*1, Amdesilasie1 F, Kassa1 A, Tadelle1 Y, Befekadu M. Patterns of Burn Injuries in Ayder Comprehensive Specialized Hospital: a 5-year Retrospective Study, Mekelle, Ethiopia. ast Afr J Heal Sci. 2019;1(1).

23. Kraft R, Herndon DN, Al-Mousawi AM, Williams FN, Finnerty CC, Jeschke MG. Burn size and survival probability in pediatric patients in modern burn care: a prospective observational cohort study. Lancet. 2012; 379 (9820):1013-1021.Doi:

10.1016/S0140-6736(11)61345-7

24. Newberry JA, Bills CB, Pirrotta EA, Barry M, Ramana Rao GV, Mahadevan S V., et al. Timely access to care for patients with critical burns in India: A prehospital prospective observational study. Emerg Med J. 2019;36(3):176–82.

25. Leland HEC, Davies K, Johnson EL, Hollén L, Jones HM, Lyttle MD, et al. Risk factors for mortality in burn children. Burn Trauma [Internet]. 2019;1(1):1–7. Available from: http://dx.doi.org/10.1016/j.bjid.2013.08.004

26. Mitchell KB, Giiti G, Gallagher JJ. Survey of Care and Evaluation of East African Burn Unit Feasibility : An Academic Burn Center Exchange. 2013;78–81.

27. Haftu H, Hailu T, Medhaniye A, Gtsadik T. Assessment of pattern and treatment outcome of patients admitted to pediatric intensive care unit, Ayder Referral Hospital, Tigray, Ethiopia, 2015. BMC. 2018;11(1):11–6. Available from:https://doi.org/10.1186/s13104-018-3432-4

28. CDC:Epi Info™ version 7.1.2.0,2019.

29. Epidata Manager v4.6.0.2 Jan 2020.

30. StataCorp. 2017. Stata: Release 15. Statistical Software. College Station, TX: StataCorp LP.

Appendix

Annex I: Information sheet

Title of the Research Project: Survival status and predictor of mortality among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

Name of Investigator: Zerihun Demisse (BSc)

Name of the Organization: Addis Ababa University College of health science, school of nursing and midwifery, department of pediatrics and child health nursing.

Name of the Sponsor: Addis Ababa University.

Introduction: The aim this information sheet is to make Yekatit 12 hospital, AaBET hospital administrators and burn centers coordinating office clear about the purpose of research, data collection procedures and get permission to conduct the research.

Purpose of the Research Project: To determine Survival status and predictor of mortality among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020.

Procedure: Information necessary for the study, taken from pediatrics burn victims' chart.

Risk: Source of information will be medical charts and it will not harm patients. The information retrieved only used for the study purpose.

Benefits: The research have no direct benefit for one whose record is included in this research. In all, the research work has a paramount direct benefit for health care planners and managers.

Confidentiality: Name will not be included on the checklist and the collected data will be confidential.

Person to contact: This research project reviewed and approved by the institutional review board of College of Health Science, school of nursing and midwifery, Addis Ababa University. If you have any question, you can contact any of the following individuals

Zerihun Demisse, Addis Ababa University, College of Health Science, school of Nursing and midwifery: principal investigator

Cell phone: +251- 09 12392315, E-mail paromaba@gmail.com

Girum Sebsibie (PHD Candidate .Ass. prof) Addis Ababa University, College of Health Science, school of nursing and midwifery: Main Advisor.

Annex II: English version checklist tool

Addis Ababa University, college of health science, School of Nursing and Midwifery.

Abstract checklist tool: To determine survival status and predictors of mortality among pediatrics burn victims admitted to burn centers from 2016-2019, Addis Ababa, Ethiopia, 2020, Ethiopia.

Check list number		Possible answer
I. Socio-demographic data of the child		
	Date of admission	---/---/----
	Age	_ -
	Place of injury	Home ☐ School ☐ Street ☐ Others (specify)----------
	Sex	M ☐ F ☐
	Residence	Urban ☐ Rural ☐
II. Clinical data		
1.	Mechanism of burn	Scald ☐ Flame ☐ Electricity ☐ Chemical agents ☐ Contact ☐
2.	Depth of burn injury	Partial thickness ☐ Full thickness ☐

3.	% TBSA	_____
4.	Was the injury intentional	Yes ☐ No ☐
5.	Any pre-existing medical condition of the child	No ☐ HIV/AIDS ☐ Diabetes mellitus ☐ Malnutrition ☐ epilepsy ☐ Others (specify)_____
6.	Sign and symptom at admission	Airway compromise ☐ Arrhythmia ☐ Shock ☐ Loss of consciousness ☐ Others (specify)_____ None ☐
7.	Duration before getting medical attention	_____
8.	Pre hospital intervention provided	Yes ☐ No ☐
9.	If the answer to question number 9 is yes, what was the care provided before hospitalization	Care at health facility ☐ First aid at home ☐
10	Any disease developed while hospital stay	Yes ☐ No ☐
11	If yes	Sepsis ☐ Anemia ☐ Malnutritin ☐ Other --------
12	Anatomic location burned	Head **Yes** ☐

			No ☐
		Neck	**Yes** ☐
			No ☐
		Anterior trunk	**Yes** ☐
			No ☐
		Post trunk	**Yes** ☐
			No ☐
		Left arm	**Yes** ☐
			No ☐
		Right arm	**Yes** ☐
			No ☐
		Genitalia	**Yes** ☐
			No ☐
		Buttock	**Yes** ☐
			No ☐
		Right leg	**Yes** ☐
			No ☐
		Left leg	**Yes** ☐
			No ☐
12.	Length of hospital stays	_____	
13.	What was the Intervention provided during hospitalization,	Fluid replacement ☐ Burn wound management ☐ Antibiotic ☐ Pain management ☐ Tetanus toxoid ☐	

		Surgery ☐ Other(specify)_____
14.	Outcome of a child who had sustained a burn injury	Recovery(improved) ☐ referred ☐ died ☐ AMA ☐ If other specify----------
15.	Discharge date	---/----/----
16.	Date of death	____/___/___

Annex III: Analysis tables and graph

A. Multi-collinearity check for pediatrics burn victims admitted to burn centres in Addis Ababa, Ethiopia, 2020.

VARIABLES	VIF	1/VIF
TBSA%	1.71	0.584029
Duration of time before getting medical attention	1.03	0.973128
Surgery	1.13	0.883971
Fluid replacement	1.45	0.687485
Left leg	1.64	0.610935
Right leg	1.64	0.611070
Left arm	1.37	0.727407
Right arm	1.38	0.722563
Neck	1.08	0.925007
Disease after admission	1.12	0.893258
Depth of burn	1.14	0.875118
MEAN VIF	1.34	

Test of proportional hazard assumption

Multivariate analysis by including all variables based on bivariate output and multicollienarity result and Schoenfeld Residuals test for proportionality assumption.

B. Test of proportional-hazards assumption for paediatrics burn victims admitted to burn centres in Addis Ababa, Ethiopia, 2020.

Covariates	rho	X^2	P- value
TBSA%	0.22195	1.64	0.2003
Duration of time before getting medical attention	-0.04014	0.06	0.8047
Surgery	0.00800	0.00	0.9526
Fluid replacement	0.10670	0.40	0.5276
Left leg	-0.17469	0.97	0.3235
Right leg	0.23879	2.08	0.1492
Left arm	-0.14803	0.50	0.4784
Right arm	0.04443	0.05	0.8259
Neck	-0.11624	0.39	0.5344
Disease after admission	0.23060	2.85	0.0911
Depth of burn	-0.26606	2.19	0.1388
Global test		10.29	0.5041