ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
DEPARTMENT OF EMERGENCY MEDICINE

LENGTH OF STAY AND ITS ASSOCIATED FACTORS AMONG PEDIATRIC PATIENTS ADMITTED TO THE PEDIATRIC EMERGENCY UNIT OF TIKUR ANBESSA SPECIALIZED HOSPITAL ADDIS ABABA, ETHIOPIA, 2023

BY: TELAYNEH ADDIS ZELEKE (BSC)

A RESARCH THESIS SUBMITTED TO ADDIS ABABA UNVERSITY COLLEGE OF HEALTH SCIENCE, DEPARTMENT OF EMERGENCY MEDICINE IN PARTIAL FULFILLMENT OF THE REQUIRMENT FOR THE DEGREE OF MASTER OF EMERGENCY MEDICINE AND CRTICAL CARE NURSING

Jan, 2023

ADDIS ABABA, ETHIOPIA

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTMENT OF EMERGENCY MEDICINE

MASTER OF EMERGENCY MEDICINE AND CRITICAL CARE

RESEARCH PROJECT

Principal investigator	Telayneh Addis Zeleke (BSC)
Name of Advisor	Wgari Tuli (BSc, MSc in EMCCN, Lecturer)
Name of co-Advisor	Dr. Muluwork Tefera (MD, pediatrician, Emergency Medicine and critical care specialist, Associate professor)
Full title of the research project	Length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbesa specialized hospital, Addis Ababa Ethiopia 2023
Duration of project	November 1 to April 15, 2023
Study Area	Tikur Anbesa Specialized Hospital, Pediatric emergency Unit
Source of fund	Addis Ababa University
Total cost of the project	28218.75ETB
Address of investigator	Mob +251935854770 E-mail telaynehaddis749@gmail.com

Approval by the board of examination

This thesis by Telayneh Addis is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of master in emergency medicine and critical care Nursing.

External examiner ---------- ---------- ------ / -----/ ---------

Name Signature Date

Internal Examiner ---------- ---------- ------/-------/----

Name Signature Date

Research advisor

1. Mr. Wgari Tuli ---------- -------/----------/---------

2. Dr. Muluwork Tefera ---------- --------/-------/-------

Signature Date

Department Head ---------- ---------- --------/-----/-----

Name Signature Date

Advisor's Approval sheet

This is to certify that the thesis entitled ``Length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa of Specialized Hospital Addis Ababa, Ethiopia 2023 is submitted in partial fulfillment of the MSC with specialization in Emergency Medicine and critical care nursing to the Graduate program of the college of health sciences of Addis Ababa University and has done by Telayneh Addis under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the department.

1. Mr. Wgari Tuli _____ _____/_____/_____

2. Dr. Muluwork Tefera _____ _____/_____/_____

Signature Date

Declaration

I thus declare this MSc thesis is my original work, that it has not been submitted for a degree at any other university, and that all sources of material used in this thesis have been properly acknowledged.

Name: Telayneh Addis

Address: telaynehaddis749@gmail.com

Signature: _____

Date: _____

ACKNOWLEDGEMENTS

Firstly, I would like to express my deepest thanks to my organization, Tikur Anbessa Specialized Hospital (TASH), for creating this opportunity with official sponsorship.

Secondly, I would like to say thanks to Addis Ababa University College of health science, and Department of Emergency Medicine for providing the opportunity to learn the basics of research project work.

Thirdly, my deepest and most heartfelt appreciation goes to my advisor Mr. Wagari Tuli and Dr Muluwork Tefera for their valuable support in commenting on and giving directions in each step of the research project development.

LIST OF ACRONYMS AND ABBREVIATION

AAU	Addis Ababa University
AOR	Adjusted odd ratio
CI	Confidence Interval
CT	Computed Tomography
COVID-19	Coronavirus Disease 2019
ETB	Ethiopian Birr
ED	Emergency Department
EDLOS	Emergency Department length of stay
EEG	Electroencephalogram
ETAT	Emergency triage Assessment and treatment
FMOH	Federal Minister of Health
IQR	Interquartile Range
LOS	Length of stay
MRI	Magnetic resonance imaging
OR	Odd Ratio
PED	pediatric Emergency Department
PI	Principal investigator
SPSS	statistical package of the social science
TASH	Tikur Anbessa Specialized Hospital
WHO	World Health Organization

TABLE OF CONTENTS

Contents page No-

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background: - The length of stay in the emergency department is described as the time between arriving at the emergency department and physically leaving the emergency department (discharge), being referred to another health facility, or being admitted to a hospital bed.

Patient length of stay is a frequently used indicator of hospital performance and it is an important factor to hospital costs and has an effect on the health care system's capacity.

Objective: - To assess the length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia, 2023

Methods and Materials: - Institution-based cross- sectional study design was conducted to assess the length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized Hospital. A systematic random sampling technique was used to select the actual study participants. Semi-structured interviewer administered questionnaires and chart review was used to collect the data. After checking its completeness, it was analyzed by using SPSS software version 27. Binary and multiple logistic regression analysis were used to check variables associated with length of stay.

Result: - A total of 268 patients participated in the study from the total sampled population with a response rate of 97.81%. Majority of the participants were male 157(58.6%) and their median age was 3 years. This study showed that 180(67.2%) of the participants had a prolonged length of stay. The rest were residency (AOR=2.040, CI:1.034-4.025, P=0.040) triage category (AOR=3.247, CI=1.085-9.742, P=0.036) type of diagnosis (AOR=0.192, CI=0.051-0.377, P=<0.001), number of investigations (AOR=2.381, CI=1.038-5.462, P= 0.041) and waiting for imaging (AOR= 4.230, CI= 1.638-10.929, P= 0.003) study were variables which significantly associated with the prolonged length of stay.

Conclusion: - The finding of this study shows that a large number of pediatric patients stayed greater than 24 hours in the emergency room. Residency, tirage category, type of diagnosis, number of investigations and having imaging studies were significant factors that were associated with the prolonged length of stay.

Key Words: length of stay, pediatric Emergency department, Tikur Anbessa Specialized Hospital, Ethiopia

1. Introduction

1.1. Back ground

The emergency department is a very important environment for emergent and urgent care, and provides for basic care in many places, and it is the front -line defense of any health care system, both for daily events and any other disasters(1). Assessing the movement of the patient from the entrance to the exiting door of the emergency department (ED), which is the time a patient spends in the ED, or length of stay, is the key to increasing clints satisfaction and ED services. The emergency department in the hospital is designed for rapid assessment and stabilization when the patient arrives in need of immediate care. It must be accessible 24 hours a day (2).

The length of stay (LOS) in the emergency department is described as the time between arriving at the ED and physically leaving to the ED (discharge), being referred to another health facility, or being admitted to a hospital bed(2, 3). The LOS in the emergency department has been used as a quality indicator to reflect emergency care's overall efficiency. Identifying factors associated with LOS is critical for monitoring overcrowding and providing the emergency department's efficient throughput function (4, 5). Patient (LOS) is a frequently used indicator of hospital performance. It is an important factor to hospital costs and has an impact on the health care system's competence (6). While LOS is not the only indicator of efficiency, it is an important one. Reducing the amount of time a patient spends in the hospital emergency department within clinically appropriate time frames is more efficient because it frees up beds for other patients and lowers costs per patient (7, 8). When referring to LOS, different countries use different criteria. Prolonged emergency department length of stay is described in several studies as a duration of stay at the ED of greater than six hours; it is used as performance measure to assess the quality of care in the ED, and evidence suggests that EDLOS of greater than six hours is associated to higher mortality rate(9-11). In most developed countries, the cut points-off for LOS in the ED are less than 4 hours(6, 12-14). However, the Ethiopian Hospital transformation Guideline of 2016 states that the LOS for patients in the emergency department Should not exceed one day (15). When patients occupy a bed in the ED for more than 24 hours, the ED becomes overcrowded. Furthermore, a shorter Hospital stay reduces the risk of infections and drug side effects, reduces unnecessary medical expenses, and increases the bed turnover rate, which helps increase the facility’s profit margin and improve the quality of treatment(16-19).

Numerous factors contributed to the longer pediatric emergency department length of stay, despite the fact that ED LOS varies(20, 21). Common factors contributing to prolonged pediatric ED length of stay include a country's healthcare capacity, professionals' inability to correctly triage patients, a lack of decision-making, the use of medical services such as imaging or laboratory tests(22-28). Previous research found that variable related to length of stay in the emergency department include patient-specific factors like age, triage level and diagnosis as well as facility-specific variables like hospital size and specialist consultation (24, 26-30).

1.2. Statement of the problem

Globally, there has been an imbalance between the supply and demand for emergency services during the past 20 years (31, 32). Annual ED visits increased faster than population growth, which resulted in a rise in ED visits and lengthened ED stays. About 30 million children in the US need emergency care each year, with pediatric ED visits on the rise(3, 33). Internationally, patients' length of stay in the ED has been a concern due to its impact on patient safety and satisfaction(34). Various studies have indicated that prolonged ED stays increased mortality rates by 15-30 % and evidenced for poor hospital performance; they have also identified prolonged ED stays as a risk factor for pneumonia, COVID 19, additional hours increased the risk by around 20%(19, 31, 35, 36).

Prolonged pediatric EDLOS is a global issue with varying prevalence in developed and developing countries (31, 33)**.** Overcrowding in the hospital ED can reduce ED staff efficiency and influence the quality of the health care service system, and is regarded as a public health issue worldwide (8, 22, 37, 38). As a result, the World Health Organization (WHO) and the Federal Minister of Health (FMOH) have developed an Emergency Triage Assessment and Treatment (ETAT) training manual and triage standards for health care providers as a possible solution to facilitate emergency treatment. However, prolonged EDLOS remains a global issue(1).

The pediatric emergency department wait time is not only associated with lower quality of care, but it also has an effect on socioeconomic problems for families, communities, and countries, lowering hospital admission rates, increasing utilization of health-care resources, and having a significant impact on patient care by increasing the risk of hospital-acquired disease, morbidity and mortality, as well as decreasing patient satisfaction(7, 16, 19, 31, 34, 35, 39).

Developing countries lack a well-developed pediatric emergency subspecialty, and pediatric emergency unit care is provided by a general pediatrician with limited expertise in pediatric emergency medicine. Thus, critical gaps in pediatric emergency care exist that may negatively affect patient outcomes, and this situation is worse in Ethiopia, where the ratio of pediatricians per population is low and there are a few pediatric emergency physicians(1, 36, 40).

In developing countries like ours, there is a wide gap between the number of patients and the use of resources in the ED. Knowing EDLOS is crucial for maintaining and assessing the quality of care in order to reduce patient morbidity and mortality and increases patient resources and

satisfaction. Children are easily exposed to infection, and if they stay longer in the emergency room, the higher the risks are; therefore, identification of possible factors for LOS will help with a targeted intervention that is important for decreasing pediatric prolonged LOS. Despite the fact that pediatric prolonged LOS is one of the most common emergency room problems, there has been very little study on it in our country. There is a scarcity of data on the pediatric emergency department length of stay and its associated factors among pediatric patients visiting the ED, particularly in low-resource settings where emergency medicine is a new and growing specialty. As a result, the aim of this study was to assess the length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized Hospital.

1.3. Significance of the study

This study may be helpful to have knowledge of the LOS of pediatric patients in the emergency department and the factors that influence it. The study may be more crucial for hospital and emergency health administrators, as well as other concerned bodies, in order to implement the necessary actions, such as training for emergency personnel, auditing the organization's resources and concentrating on the weak points, prioritizing, and making decisions based on the findings. The study also will be important for policymakers to evaluate the program in the emergency department as well as provide input during policy-making. Furthermore, the study's findings will include pertinent recommendations for additional information. Lastly, the findings of this study might be a baseline for other researchers and possibly be used by responsible stakeholders

2. Literature review

2.1. Length of stay in the emergency unit

Prolonged EDLOS is a universal problem with different prevalence. Studies conducted in Guangzhou China, in North Taiwan, in the United State, California and in Calabar Southern Nigeria were 31.3(3), 0.9%)(41),22% (42) 30% (43)and 16.4%(33) respectively, which were greater than 24 hours.

A study which was done in Southern Iran, the average LOS was 72 hours and the minimum and Maximum LOS were 1 and 27 days, respectively. From a total study of participants 25% of patients stayed for less than two days and 25% stayed for more than five days in a hospital(8). Another study done in Saudi Arabia the total length of stay from registration or tirage(whichever first) to disposition of the patient from ED was less than 2 hours (45.7%), between 2 and 4 hours (27.7%), 4 and 6 hours (13.1%), between 6 and 8 hours (5.9%), and more than 8 hours (7.6%)(6). The average LOS was nearly six hours(44) and 5.45±6.14 days (45) in south Florida and Qazvin respectively. Another cross- sectional study conducted in Nepal during COVID19 found that the median length of emergency stay was 1.75 hours, with a minimum stay of less than 1 hours and a maximum stay of 30 hours(19) and in Taiwan, the mean total LOS was 2.6±4.67 hours(41). A LOS of 0.5-2 hours was common (44.4%),and less than two hours accounted for 74.3% of the LOS and patients who waited greater than 24 hours for admission had the longest LOS(33.27± 7.26) hours(41). A study conducted in Egypt the LOS ranged from minutes to six hours with mean 0.48 minutes(22).

A prospective cross- sectional study was conducted at the University of Calabar teaching Hospital, Nigeria, the shortest and highest LOS was 0.5 and 456 hours respectively while, the median LOS was 48 (24-72) hours. About 16.4% (95% CI: 13.6% - 19.4%, n =103/633) of children had prolonged hospital stay(33).

A research which was done in Ethiopia, the percentage of responders who spent a prolonged LOS in the pediatric emergency room was (79.70%), while the remaining (20.30%) only stayed less than a 24-hour period(1). The study showed that the pediatric emergency room minimum LOS in the pediatric emergency was one hour, accounting for one percent of participants, the median LOS was 50.50 hours, and the maximum LOS was 384 hours the maximum length of stay was 384 hours, accounting for 2% percent of participants(1).

Another research conducted in southern Ethiopia, about 91.5% patients stayed in the EDs for greater than 24 hours(2).

2.2. Factors associated to length of stay

2.2.1. Socio-demographic factors

In a study conducted at a South Florida University, demographic factors such as sex and age were linked to length of stay. Females had a significantly longer LOS than males, despite the difference being only 16 minutes. Age was found to be positively related to LOS, with children older than 9 years old having the longest LOS and Children younger than 9 years old having the shortest LOS(46) and also in another cross-sectional study at Zagazig University Hospitals in Egypt, there was a statistically significant association between length of stay and age, but no statistically significant difference between LOS an sex(22).

Another study was conducted in the Children's Hospital of Hormozgan University of Medical Sciences in southern Iran, whose places of residence were those living in rural areas who had a longer LOS, but their health insurance coverage was not significantly associated with LOS (8).

However, a cross-sectional study was conducted at Qazvin medical sciences teaching hospitals, the mode of payment for medical expense had an effect on length of stay in such a way that patients who were covered by Relief Committee insurance (a charity committee that pays for poor people's medical fees) had the longest stay(8.833 days), and patients with have no health insurance had the shortest stay (2.769 days), so mode of payments influence the LOS(45).

2.2.2. presentation and Clinical characteristics

A retrospective observational study conducted in the Kantonsspital Winterthur secondary and tertiary care teaching hospital, prolonged EDLOS was independently linked to physicians referral (AOR=1.97: 95% CI: 1.47-2.62), triage level 5 (non-urgent tirage category) (OR= 0.18; 95% CI, 0.06–0.61), gastrointestinal infection (OR= 1.38, 95% CI: 1.08-1.76), infections of the upper (OR= 0.37; 95% CI: 0.27-0.49) and lower airways (OR= 0.54; 95% CI: 0.37- 0.76)(20). And another study conducted at the university of Calabar teaching Hospital, Nigeria stated children with sepsis / meningitis had the longest mean hospital stay (65.5±72.1 hours) followed by malaria (61.5±36.9 hours) and sickle cell anemia (59.0 ±35.9 hours), while surgical cases (30.9±26.4 hours) had the least hospital stay(33). Children who had previously received therapies, home or

herbal remedies, or had previously visited another health facility before presenting had 59%,74% and 61% decreased likelihood of staying over 72 hours than children who did not have. Furthermore, as compared to children with surgical problems, children with SCA, malaria, sepsis or respiratory infection had 11.2, 10.7, 10.2, and 7.6 respectively times the risks of having a lengthy stay in the emergency. SCA: OR:11.2, 95% CI:1.3-95.1, P- value = 0.03; malaria OR:10.7;95% CI:1.4-82.5; P-value = 0.02; sepsis OR: 10.5;95% CI: 1.3-82.7, P-value =0.03(33). Children that had prior treatment from alternative care facility had more stay in ED (216.0 ± 0.0 hours)(33).
A study conducted in Taiwan, found that patients complaining of gastrointestinal symptoms such as diarrhea and vomiting lead to a longer length of stay. Due to the likelihood of dehydration, patients with such symptoms might have taken IV fluids and needed observation in the emergency department(41).

According to research done in Ethiopia, at Wolaita Sodo prolonged length of stay, the urgent triage category was, the likelihood of a longer duration of stay at the PED was four times higher than those in the non-urgent triage category (AOR= 4.01; 95% CI: 1.60,10.05)(1).

2.2.3. Organizational and time related factors

Previous research linked increasing LOS to variables like radiology studies, laboratory testing, consultations, and the length of time patients must wait for an unavailability of inpatient beds(41).

A prospective cross-sectional study was carried out in Nigeria, and patients who were seen by a consultant had about three times the odds of having to stay longer than children who were seen by house officers, but there was no statistical significance at the 95% confidence interval (AOR= 2.57;95% CI: 0.90-7.31; P-value = 0.08). Children admitted by consultants had the highest mean length of stay (57.9± 50.8 hours) but the difference was not statistically significant (P-value= 0.8334). In addition, admission during the afternoon shift was nearly 1.6 times as likely to have a longer stay than admission during the morning shift. This relationship was not statistically significant (P-value = 0.06)(33).

According to a study carried out the Children's Hospital of Hormozgan University of Medical Sciences in southern Iran, patients who were admitted in the evening and night time, had consultations, had more laboratory orders, had imaging, and had intravenous medication or fluid

were associated with LOS, but patient status at discharge and disposition to the inpatient ward were not significantly associated (8). Another study which was carried out the Washington University night shift arrivals(OR,5.0;1.9-12.8) radiology studies other than radiographs(OR,18.0 ;95% CI: 7.5-43.1) and subspeciality consultations (OR,7.6;95%CI:3.2-18.3) were associated with LOS greater than 10 hours(27).

According to a study conducted in New Jersey, the effect of UA on LOS is minimal at best. Blood testing increases LOS by around twice as much in both crude and adjusted studies. Urinalysis, whether separately or combined, increases 35-45 minutes to the median quantile LOS. Tests of blood, either alone or when or when analyzed individually, add roughly 90 minutes at the midpoint of quantile. When urine and blood tests are combined, they appear to have an additive effect(47).

A study also conducted in Cohen Children's Medical Center, showed that obtaining neurodiagnostic studies significantly increases the length of stay in the ED. Head imaging was performed on 16% of patients, with 81% having CT and 19% having MRI. Having an MRI resulted in a 3.5 hour longer in the ED (P= 0.07);having a CT resulted in a 1.5 hour longer in the ED (p= 0.005) and EEGs were obtained in 20% of the visits(28). Another study done at East Carolina University found that lab tests and having advanced imaging studies had the largest effects, with these services each increase more than 50 minutes to the average the ED encounter(48) and also a study conducted in South Florida, hospitals with less than 25 beds had shorter length of stay than hospitals with more than 400 beds(46).

A cross sectional study done in Ethiopia, the pediatrics PLOS was caused by a variety of factors, such as date of arrival (4.25 times higher than those who presented on weekdays (AOR = 4.25; 95% CI: 1.63, 11.12)), time of arrival. Patients who arrived to the emergency at night were 3.19 times more likely to have a longer duration of stay (AOR= 3.19; 95% CI: 1.14-8.98) than those who arrived in the morning. The chances of staying a long period in PED were 2.83 times (AOR= 2.82;95%CI: 1.49-5.35) greater in those who had an imaging diagnostic examination than in those who did not have an imaging study. The length of stay was 71% (AOR= 0.29;95%CI: 0.87-0.98) less in a participant with a duration of pain from 13 to 24 hours compared to those who had less than 12-hour duration of pain and receiving all ordered medications. Participants who did not find all of their prescribed medications at the hospital had a 2.05 times(AOR= 2.05;95% CI:1.04-

4.03) higher risk of staying at the PED for a longer period of time than those who did(1). In another study which was conducted in southern Ethiopia, lack of inpatient beds, overcrowding, absence of different lab test profiles, and delay in radiological services accounted for 58.6%,70.1%,48.2% and 56.7% respectively(2).

2.3. Conceptual Framework

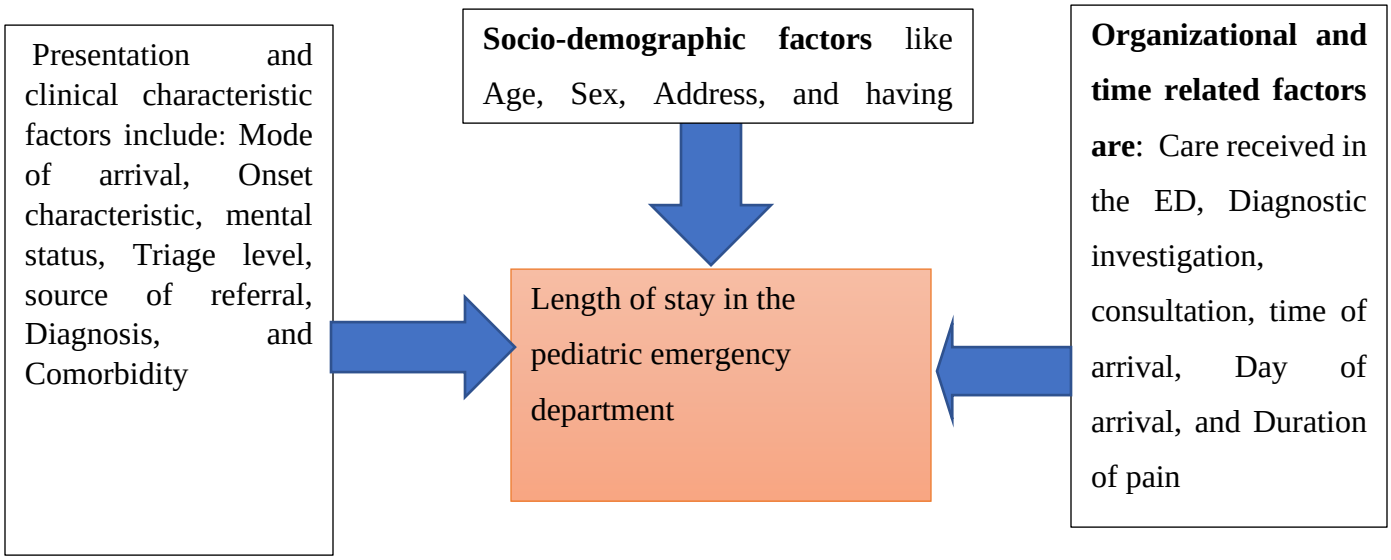

Figure1. Conceptual framework of LOS in the pediatric emergency unit(1)

3. Objectives

3.1 General objective

To assess the length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbesa Specialized Hospital.

3.2. Specific objectives

- To assess the length of stay for patients admitted to the pediatric emergency unit of Tikur Anbesa Specialized Hospital.
- To identify factors associated with a prolonged length of stay at Tikur Anbesa Specialized Hospital's pediatric emergency unit.

4. Methodology

4.1. Study area and Study period

The study was conducted at the pediatric emergency unit of Tikur Anbessa Specialized Hospital, which is located in Addis Ababa, the capital city of Ethiopia. The hospital offers tertiary care and is open for emergency services for 24 hours a day and seven days a week. The hospital is governed by Addis Ababa university (AAU) and is the largest and oldest hospital in Ethiopia. The hospital has over 700 beds (49). The pediatric emergency unit is found on the first floor of the hospital. It has 45 beds and admits, on average, around 15-20 patients per day and 450–600 patients per month. The study took place at the pediatric emergency unit of Tikur Anbessa Specialized hospital in Addis Ababa Ethiopia, from March 15 to April 15, 2023.

4.2. Study design

An institution-based, prospective cross -sectional study design was used to assess the length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized Hospital.

4.3. Source population

The source population for this study was all pediatric patients who were admitted to the pediatric emergency unit of Tikur Anbessa Specialized hospital during the study period.

4.4. Study Population

The study population for this study was all selected pediatric patients who were admitted to Tikur Anbessa specialized hospital's pediatric emergency unit within the study period.

4.5. Eligibility criteria

4.5.1. Inclusion criteria

All patients admitted to the pediatric emergency unit of Tikur Anbessa specialized hospital during data collection period.

4.5.1. Exclusion criteria

Attendants who were refused to give their consent.

4.6. Sample size and sampling procedure

4.6.1. Sample size determination

A single population proportion formula was used to determine sample size.

Proportion of prolonged length of stay (p = 79.7) was taken from the previous study done in Wolaita Sodo University Teaching and Referral Hospital(1) and a 95% confidence interval with a margin of error of 5% was considered.

$$n = \frac{\left(\frac{Z\alpha}{2}\right)^2 P(1-P)}{d^2} \qquad n = \frac{(1.96)^2 0.797(1-0.797)}{0.05^2} = 249$$

n= sample size

z@/2= critical value for normal distribution at 95% confidence interval

d = margin of error

p=proportion

Based on the above formula and after adding a 10 % non-response rate, the final total sample size was 274 and data was collected from 274 pediatric patients admitted to the pediatric emergency unit.

4.6.2. Sampling procedure and Technique

Systematic random sampling technique was used to select the actual study participants in Tikur Anbessa specialized hospital admitted to the pediatric emergency unit. The average number of pediatric emergency unit admissions at TASH within the three months prior to the study was between 450 and 600, which was identified from the client registration. On the basis of this, the

expected number of patients admitted during the study period (one month) was around 525. Then the sampling interval (K) was calculated by dividing the expected number of patients during the study period (N) with the determined sample size(n) of respondents (525/274 = 1.9). Finally, by using a systematic random sampling technique, one of every two admitted children were selected until the required sample was reached.

4.7. Measurement variables

4.7.1 Dependent variable

Length of stay in the emergency unit

4.7.2 Independent variables

Independent variables were factors categorized under three groups. Specifically,

- Socio- demographic factors like age, sex, address and having health insurance
- Presentation and clinical characteristic factors include: mode of arrival, source of referral, onset characteristic, mental status, triage level, diagnosis and Comorbidity.
- Organizational and time factors are: care received in the ED, diagnostic investigation Consultation, time of arrival, Day of arrival, and Duration of pain

4.8. Operational Definitions

Length of stay: - "Length of stay in the emergency department (ED) begins when the patient enters the unit and does not end until the patient is discharged home, admitted to the hospital bed, or transferred to another institution" (3).

Prolonged length of stay: patients stayed at the ED over 24 hours for different reasons (15).

Not prolonged length of stay: Patients stayed at the ED less than or equal to 24 hours(15)

Pediatric Emergency patients: pediatric patients between 7 days and 12 years old presented to the emergency room.

4.9. Data Collection Tools and Procedure

The required data was collected from parents or guardians by using face to face interviews through semi-structured questionnaires and chart review which were adopted from the previous studies(1, 2, 8, 21, 22) . The questionnaire contains 22 items organized into three major parts.

Part 1: Socio-demographic factors like age, sex, address and having health insurance.

Part 2: presentation and clinical characteristics, include: mode of arrival, source of referral, onset characteristic, mental status, triage level, diagnosis and comorbidity.

Part 3: Organizational and time related factors are: care received in the ED, diagnostic investigation, consultation, time of arrival, day of arrival, and duration of pain

Data was collected by three trained data collectors, all BSc-qualified nurses, and one supervisor from the patient's following presentation, admission, and at the time of discharge from the ED through attendant interviews and medical record reviews. The data collection procedure was illustrated as follows: First eligible patients were identified by data collectors in the emergency room while resident staff triage patients on arrival. Hence, at arrival, time and other presentation characteristics were recorded at the triage area. Following that extra information such as socio-demographic variables and other organizational-related elements were acquired through interviews and chart review at various treatment points, as well as after the patient was stabilized. Then, information such as diagnostic investigations and overall treatment were obtained from medical records, whereas the total length of stay at the department and final disposition were obtained at the moment the patient was discharged from the ED.

4.10. Data quality control.

Supervisor and data collectors were trained for one day to ensure the quality of the data. The supervisor and data collectors discussed how to approach participants and perform measurements. The principal investigator was on-site to supervise the data collection process and ensure the completeness and consistency of the completed questionnaire on a daily basis. Furthermore, throughout the data entry and cleaning processes, the consistency and completeness of all data was checked.

4.11. Data Analysis and Interpretation

After checking for completeness, the data was coded and entered into Epi Data version 4.6 software and exported to SPSS version 27 for further data analysis. Then standard residuals were analyzed to check for the presence of outliers and multicollinearity by using the variance inflation factor, and variables with a variance inflation factor greater than ten were removed. Binary logistic

regression was applied to assess the association between the dependent variable independent variables. Then variables with a p value less than 0.25 were fitted to multiple logistic regression. Finally, a variable with a p-value less than 0.5 was considered as a factor associated with LOS. The findings of the study were interpreted in the form of appropriate figures, tables, graphs, and charts

4.12. Ethical clearance

Ethical clearance was obtained from the department of emergency medicine at Addis Ababa University, and additionally the proposal was reviewed by the pediatric department research ethics committee and approval was obtained. Only codes were assigned to each checklist, and no names were put on the list. Consent was obtained from participants and those who did not volunteer to participate could be allowed to stop at any time during the interview. All the collected data was kept confidential, and no one except the members of the research team had access to it. All paper and computer records of the study were kept in a secured place under lock, and the same and /or other personal information would not be disclosed in any report.

4.13. Result Dissemination

Results of the study will be submitted and presented to the department of emergency medicine. It will be disseminated to Addis Ababa University's College of Health Science, Tikur Anbessa's specialized hospital, and the AAU College of Health Sciences Library.

Finally, every effort will be made to publish the findings in national and international journals so that the next generation of researchers can access them.

5. Result

5.1. Socio-demographic profile of the participants

A total of 268 patients participated in the study from the total sampled population with a response rate of 97.81%. The median age of the study participants were 3 years with a minimum of 10 days and a maximum of 12 years old. Majority of the respondents' age group were 1-3 years old (30.6%). Majority of the participants were male 157(58.6%). More than half, 147(54.9) of the study participants' residences were in the rural area. One hundred thirty-two (49.3%) of the study participants were paying patients (Table1).

Table 1. Socio-demographic profile of pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia, 2023(N=268)

Variables	Category	Frequency (n=268)	Percentage
Age	<= 1year	68	25.4
	1-3year	82	30.6
	3-6 year	72	26.9
	6-12year	46	17.2
Sex	Male	157	58.6
	Female	111	41.4
Residency	Rural	147	54.9
	Urban	121	45.1
Mode of payment for health service	Health insurance	125	46.6
	Self	132	49.3
	free/exempted	11	4.1

5.2. Presentation and clinical characteristics of the participants

From the total participants,143 (53.4%) of the participants' mode of arrival were by taxi. Most of the participants, 164(61.2%) triage category, were urgent. Half of the patients 135(50.4%) were referred from governmental health institution. Fever and respiratory system problems were the most common complaints for the emergency visiting, which accounts, 132 and 126 respectively.

Almost two-third of the participants 162 (60.4%) were given first aid before arrival, among them more than 93.2% of the participants were from a health facility. Most of the participants, 210(78.4%) had a medical diagnosis (Table 2).

Table 2. Presentation and clinical characteristics of the pediatric patients admitted in the pediatric emergency unit of Tikur Anbessa specialized hospital Addis Ababa Ethiopia 2023(N=268)

Variables	Category		Frequency	Percentage
Mode of arrival	By private car		31	11.6
	By taxi		143	53.4
	By ambulance		65	24.3
	By public transport		29	10.8
Tirage category	Emergent		80	29.9
	Urgent		164	61.1
	Non-urgent		24	9.0
	Self-referral		121	45.1
Source of referral	Governmental health institution		135	50.4
	Private		12	4.5
Chief Complaint	Fever	Yes	132	49.3
		No	136	50.7
	Respiratory system problem	Yes	126	47.0
		No	142	53.0
	Cardiovascular system problem	Yes	46	17.2
		No	221	82.5
	Gastrointestinal system problem	Yes	106	39.6
		No	162	60.4
	Neurological system problem	Yes	21	7.8
		No	247	92.2

	Renal system problem	Yes	15	5.6
		No	253	94.4
	Musculoskeletal system problem	Yes	29	10.8
		No	239	89.2
	Hematological system problem	Yes	43	16.0
		No	225	84.0
	Trauma	Yes	10	3.7
		No	258	96.3
Was the patient get first aid	Yes		162	60.4
	No		106	39.6
If yes where they got it (n= 162)	From health facility		151	93.2
	From home remedy		6	3.7
	Both		5	3.1
Frequency of presentation to ED	For the first time		119	44.4
	Previously presented		149	55.6
Having comorbidity	Yes		129	48.1
	No		139	51.9
Characteristic of the illness of the patient	Acute illness		141	52.6
	Chronic illness with acute illness		127	47.4
Mental status of the patient on arrival	Alert		240	89.6
	Confused		22	8.2
	Comatose		6	2.2
Type of diagnosis	Medical		210	78.4
	Surgical		48	17.9
	Trauma		10	3.7

5.3. Time and organizational related factors of the participants

Of the total participants, more than half of them 143(53.4%) were arrived to emergency unit in the morning time, and most participants 208(77.6%) were come to emergency unit on working days and 114 (42.5%) of the participants total duration of illness were between 13-24 hours. All of the participants had laboratory investigations and 223(83.2%) had imaging studies. Almost all participants 264(98.5%) had medication in the emergency room and all of them were ordered to take medication in the emergency room. More than two-third 185(69%) of the participants had consultation in the emergency unit (Table3).

Table 3: Time and organizational related factors of the pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized hospital Addis Ababa Ethiopia 2023(N=268)

Variables	Category	Frequency	Percentage
Time of arrival	morning 8:00Am - 1:59PM	143	53.4
	Evening 2:00PM - 7:59PM	92	34.3
	Night 8:00PM-7:59AM	33	12.3
Day of arrival	Working day	208	77.6
	Weekend day	46	17.2
	Holyday	14	5.2
Duration of pain/illness	<=12 hours	41	15.3
	13-24 hours	114	42.5
	25-48 hours	45	16.8
	49-72 hours	25	9.3
	>72 hours	43	16.0
Did the patient have laboratory request order	Yes	268	100.0
	No	0	0
	<=3	69	25.7

Number of investigations	>3	199	74.3
Having imaging study	Yes	223	83.2
	No	45	16.8
Number of imaging studies(n=223)	1	115	51.6
	>1	108	48.4
Did the patient have medication in ED	Yes	264	98.5
	No	4	1.5
If yes, did they get the ordered medication in ED(n=264)	Yes	264	100.0
	No	0	0
Having consultation in ED	Yes	185	69.0
	No	83	31.0

5.4. Length of stay of the participants

One hundred eighty (67.2%) of the participants stayed more than 24 hours in the pediatric emergency unit while the rest, 88(32.8%) had a length of stay ≤ 24 hours. The minimum length of stay in the pediatric emergency unit of Tikur Anbessa Specialized Hospital was 3 hours which accounts for 1.1% of the participants, the median length of was 72 hours, the mean length of stay was 96 hours and the maximum emergency unit length of stay was 672 hours which accounts 0.7% of the respondents (Figure 1).

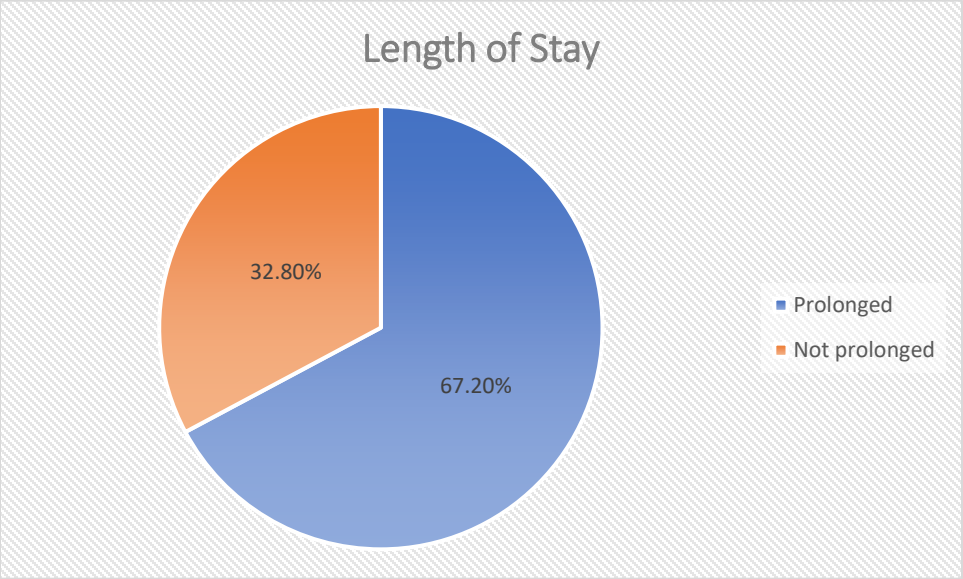

Figure 1. Length of stay for pediatric patients admitted in the pediatric emergency unit of Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia, 2023(N=268)

The most common reason for staying more than 24 hours in the emergency unit was absence of inpatient bed 159(88.3%) (Figure 2).

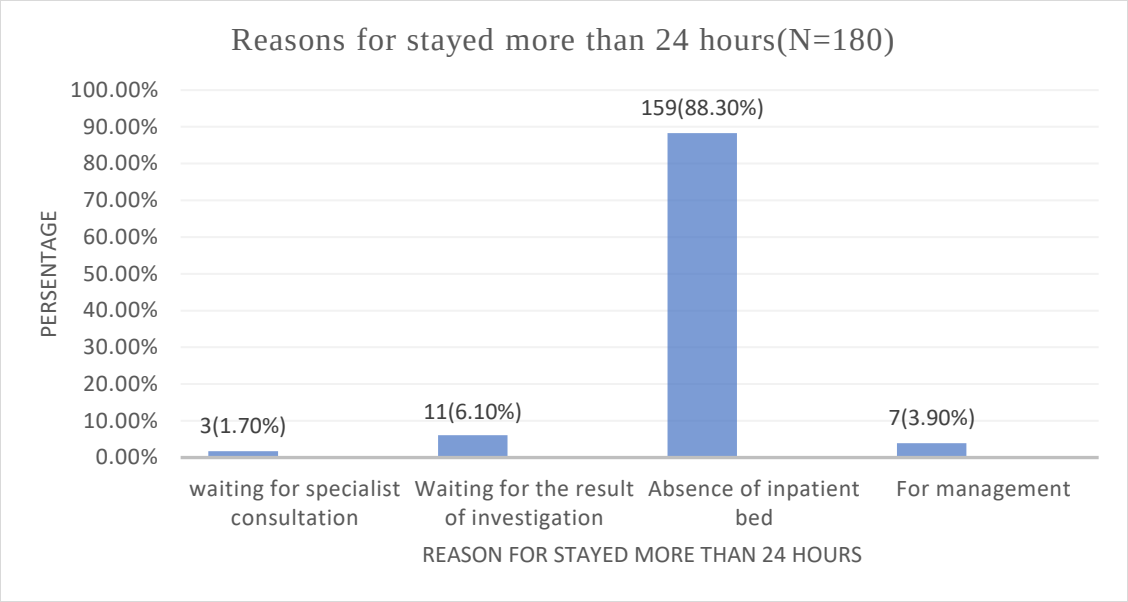

Figure 2. Reasons for stayed more than 24 hours for pediatric patients admitted in the pediatric emergency unit of Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2023(N=180)

5.5. Factors associated with length of stay

Bivariable and multivariable logistic regression analysis were tested to check variables associated with length of stay. In bivariable analysis shows that; age, residency, mode of payment, mode of arrival, triage category, chief complaint of fever, renal system problem, hematological problem, trauma, frequency of presentation, type of diagnosis, day of arrival, time of arrival, duration of pain/illness, number of investigations and having imaging study were significantly associated with the length of stay at p- value <0.25 and eligible for multivariable analysis

In multivariable analysis; residency, tirage category, type of diagnosis, number of investigations and having imaging study were variables which significantly associated with the prolonged length of stay at a p- value of < 0.05.

Those living in the rural area were 2.040 times (AOR= 2.040, 95%CI:1.034,4.025) more prolonged when compared to whose places of residence were those living in the urban area.

The likelihood of experiencing a prolonged length of stay in the pediatric emergency room among those under the urgent tirage category was 3.247 times (AOR=3.247, 95%CI:1.083, 9.742) higher than those with non-urgent category tirage category.

About 86.1% of surgical patients were less likely to be prolonged compared to medical patients (AOR = 0.139, 95% CI:0.051- 0.377).

The odds of experiencing a prolonged length of stay at the PED among those having more than three laboratory investigations were 2.381 times (AOR=2.381;95%CI:1.038,5.462) higher than those less than or equal to three investigations.

Furthermore, individuals who had imaging studies had a 4.230 times higher chance of having a prolonged length of stay at the pediatric emergency unit (AOR = 4.230; 95% CI: 1.638,10.929) than those who did not have imaging studies (Table 4).

Table 4: Summary of factors associated with length of stay among pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia 2023(N=268)

Variables	Category	Length of stay		COR (95% CI)	P- value	AOR (95% CI)	P-value
		Not Prolonged N (%)	**Prolonged N (%)**				
Residency	Rural	39(14.6%)	108(40.3%)	1.885(1.125-3.156)	**0.016***	2.040(1.034-4.025)	**0.040****
	Urban	49 (18.3%)	72(26.9%)	1		1	
Tirage category	Emergent	24(9.0%)	56(20.9%)	2.333(0.919-5.927)	**0.075***	2.848(0.815-9.951)	0.101
	Urgent	52(19.4%)	112(41.8%)	2.154(0.907-5.116)	**0.082***	3.247(1.083-9.742)	**0.036****
	Non urgent	12(4.5%)	12(4.5%)	1		1	
Type of diagnosis	Medical	51(19.0%)	159(59.3%)	1		1	
	Surgical	30(11.2%)	18 (6.7%)	0.192(0.099-0.374)	**<0.001***	0.139(0.051-0.377)	**<0.001****

	Trauma	7(2.6%)	3(1.1%)	0.137(0.034-0.551)	**0.005***	0.000(0.000)	0.999
Number of investigations	<=3	43(16.0%)	26(9.7%)	1		1	
	>3	45(16.8%)	154(57.5%)	5.660 (3.139-10.204)	**<0.001***	2.381(1.038-5.462)	**0.041****
Having imaging study	Yes	61(22.8%)	162(60.5%)	3.984(2.048-7.747)	**<0.001***	4.230(1.638-10.929)	**0.003****
	No	(10.1%%)	18(6.7%)27	1		1	

Key: - 1=Reference category

*= Significant at P < 0.25

** = Significant at P < 0.05

6. Discussion

One way to measure how well a hospital uses its resources is to look at how long patients stay there (LOS). LOS affects how much money the hospital spends on each patient and how many patients it can treat (6). If patients can leave the hospital emergency room sooner, without compromising their health, it is better for everyone. It saves money and makes more beds available for other patients(8).

This study showed that about 67.2% with a 95% C.I (61.8-72.9) of patients were stayed more than 24 hours in the emergency unit. This finding is higher compared with other previously study's findings like, in Guangzhou China, North Taiwan, United State, California and Calabar Southern Nigeria were 31.3% (3), 0.9% (41),22% (42),30% (43)and 16.4% (33) respectively. The possible reason for those discrepancies might be due to the difference in health care system level, using advanced medical equipment and different countries using different criteria for saying prolonged length of stay. Study done in Nigeria the cut point of prolonged length of stay is greater or equal to 72 hours (33), in Taiwan and California use greater or equal 8 hours (41, 43), Australia, USA and Saudi Arabia use greater than 4 hours (6, 12, 42) but this study used greater than 24 hour based on Ethiopian Hospital Service Guideline of 2016 (15). In contrary this finding is almost similar compared to a study conducted in southern Iran(8). But this study is lower compared to other previously studied at Wolaita Sodo University teaching and referral hospital, prolonged length of stay was (79.70%)(1) and Southern part of Ethiopia,(91.5%)(2).This difference might be due to their sample size, 408 and 399, respectively(1, 2).

This study also revealed that a large number of patients stayed greater than 24 hours in the pediatric emergency unit due to lack of inpatient beds (88.3%). This study is supported by other similar studies conducted in South Florida, Saudi Arabia, Taiwan and Southern Ethiopia(2, 6, 41, 46). Because a patient was expected to wait until another one is discharged if there wasn't an available inpatient bed.

Of the three sets of variables computed to explain the LOS, socio-demographic factor (Residency), clinical presentation and characteristics (type of diagnosis, and triage category) and organizational factors (number of investigations and having imaging studies were found to affect length of stay

in the emergency unit. The findings suggested that, whose residency was the rural area, those with medical cases, patients under urgent triage category, those who had more lab investigation and having imaging were more likely to stay in emergency unit. Moreover, absence of an inpatient bed was a crucial factor that prolonged the length of stay in the emergency room.

This study showed that those whose places of residence were those living in rural areas were significantly associated with prolonged length of stay in the pediatric emergency unit. This was supported by the findings of previous research done at the Children's Hospital of Hormozgan University of Medical sciences southern Iran(8). This could be because Tikur Anbessa Specialized Hospital is the country's largest public referral hospital and patients come from all over the region. Similarly, the outcomes of this study revealed that urgent tirage category was significantly associated with prolonged length of stay. This finding is also confirmed by a study in Ethiopia, Taiwan, and Switzerland(1, 20, 41). This might be indicated due to the severity of triage acuity level that shows the complexity of the disease and increased LOS in the emergency department. When the acuity level of the disease is increased, patients need a lot of interventions, and it needs more time. Additionally, the nature of the disease in the pediatrics by itself is challenged to manage easily for health professionals, and the higher the acuity level the more challenged to decide and physicians required more time to decide the appropriate place for the patient's admission to inpatient ward, transferred to other hospitals or discharged to home. As a result, they may require additional experts (senior consultations), lab tests and imaging examinations. Generally, such factors may contribute to prolonged LOS by increased time to waiting for the senior consultations and getting and collecting all ordered investigations.

The type of diagnosis was significantly associated with prolonged length of stay. This result revealed that patients with surgical cases were less likely to stay in the emergency department than those with medical and Trauma. This study was similar to those conducted in Switzerland, Nigeria and Taiwan (20, 33, 41). This could be connected to the study with the high prevalence of hemato-oncological cases. Because they required more investigations and a senior decision to admit them. TASH is the only hospital that treats pediatric hematologic and oncologic patients. They were easily critical and visited frequently to the Emergency unit. Another possibility could be that surgical patients who need emergency attention went to the OR as soon as possible.

This study showed that having more than three laboratory investigations was significantly associated with a longer emergency duration of stay than having fewer than or equal to three

investigations. The same is true in the findings of studies conducted in East Carolina University, Taiwan, New Jersey (41, 47, 48). Since, laboratory and imaging tests are key in aiding diagnosis, monitoring treatment progress, and confirming cure. Due to this physician orders different type of laboratory investigations in the emergency unit for confirming diagnosis and to know the prognosis of the disease. All of them might have contributed to increasing the duration of time in the emergency and might have extended the length of stay.

Moreover, this study also showed that having an imaging study was substantially associated with a longer pediatric emergency length of stay, which is comparable with a study conducted in southern Ethiopia, Iran, Cohen Children's Medical Centre, California and East Carolina University(1, 8, 28, 43, 48). The likely explanation could be that imaging studies were required for accuracy and confirmation of the patient’s diagnosis, which is crucial for the physician's decision whether the patient is referred to another hospital, discharged, or admitted. Most imaging studies take more time than other investigations, which may result in increased length of stay.

7. Strength and limitation of the study

7.1. Strength of the study

- The study had a high response rate of 97.81% and employed face-to-face interviews to collect data and allow for questionnaire clarifications.
- The results will serve as a benchmark for future researchers because there haven't been many studies in Ethiopia.

7.2. Limitation of study

- Due to time limitations, the research was carried out at a single hospital. Therefore, it is challenging to generalize the study's findings to the national level of pediatric emergency department length of stay in Ethiopia.
- Cross-sectional study design by itself is difficult to determine whether or not an association is caused by another factor.

8. Conclusion and Recommendations

8.1 Conclusion

- The findings of this study shows that a large number of pediatric patients stayed greater than 24 hours in emergency room.
- Residency, tirage category, type of diagnosis, number of investigations and having imaging studies were significant factors that were associated with length of stay.

8.2. Recommendations

- For the hospital management board and concerned bodies to discuss and solve the critical reason for prolonged length of stay, such as a lack of beds, disposition from ED by increasing inpatient beds capacity according to hospital demand.
- Emergency professionals should provide special attention to patients with medical diagnoses and have more laboratory tests and imaging studies in order to decrease the length of stay.
- The Minister of Health and policymakers have more close supervision over emergency service management.
- Researchers are recommended to conduct further research by using a prospective study design.

9. Reference

1. Tezera N, Negasi K, Tefera A, Getachew M. Length of stay in the emergency department and its associated factors among pediatrics patients attending at Wolaita Sodo University Teaching and Referral Hospital, Southern, Ethiopia, 20212021.
2. Alemu GHm, Negari KG, Rodamo KM, Hirigo AT. Factors associated with the length of stay in emergency departments in Southern-Ethiopia. BMC research notes. 2019;12:1-5.
3. Xie J, Lin Y, Kissoon N. Factors associated with prolonged stay in a pediatric emergency observation unit of an urban tertiary children's hospital in China. Pediatr Emerg Care. 2013;29(2):183-90.
4. Forster AJ, Stiell I, Wells G, Lee AJ, Van Walraven C. The effect of hospital occupancy on emergency department length of stay and patient disposition. Academic Emergency Medicine. 2003;10(2):127-33.
5. Chaou C-H, Chiu T-F, Yen AM-F, Ng C-J, Chen H-H. Analyzing factors affecting emergency department length of stay—using a competing risk-accelerated failure time model. Medicine. 2016;95(14).
6. Al Nhdi N, Al Asmari H, Al Thobaity A. Investigating Indicators of Waiting Time and Length of Stay in Emergency Departments. Open Access Emergency Medicine. 2021;Volume 13:311-8.
7. Miller R. Nurse-Driven Protocols in the Pediatric Emergency Department: A Systematic Review: Walden University; 2020.
8. Baniasadi T, Kahnouji K, Davaridolatabadi N, Hosseini Teshnizi S. Factors affecting length of stay in Children Hospital in Southern Iran. BMC health services research. 2019;19(1):1-6.
9. Rose L, Scales DC, Atzema C, Burns KE, Gray S, Doing C, et al. Emergency department length of stay for critical care admissions. A population-based study. Annals of the American Thoracic Society. 2016;13(8):1324-32.
10. Horwitz LI, Green J, Bradley EH. US emergency department performance on wait time and length of visit. Annals of emergency medicine. 2010;55(2):133-41.

11. of the American CIC. American Society for Metabolic and Bariatric Surgery position statement on emergency care of patients with complications related to bariatric surgery. Surgery for Obesity and Related Diseases. 2010;6(2):115-7.
12. Geelhoed GC, Klerk NH. Emergency department overcrowding, mortality and the 4-hour rule in Western Australia. Medical Journal of Australia. 2012;196(2):122-6.
13. Jones P, Schimanski K. The four hour target to reduce emergency department 'waiting time': A systematic review of clinical outcomes. Emergency Medicine Australasia. 2010;22(5):391-8.
14. Otto R, Blaschke S, Schirrmeister W, Drynda S, Walcher F, Greiner F. Length of stay as quality indicator in emergency departments: analysis of determinants in the German Emergency Department Data Registry (AKTIN registry). Internal and Emergency Medicine. 2022;17(4):1199-209.
15. ETHIOPIA FDRO, HEALTH MO. ETHIOPIAN HOSPITAL SERVICES

TRANSFORMATION GUIDELINES. ethiopia2016. 440 p.
16. Simkhada P, Acharya S, Lama R, Dahal S, Lohola N, Thapa A. Emergency Stay Duration of Patients in Emergency Department of A Tertiary Care Hospital in Nepal: A Descriptive Cross-sectional Study. JNMA J Nepal Med Assoc. 2020;58(222):84-7.
17. Vaghasiya MR, Murphy M, O'Flynn D, Shetty A. The emergency department prediction of disposition (EPOD) study. Australasian Emergency Nursing Journal. 2014;17(4):161-6.
18. Rotter T, Kinsman L, James E, Machotta A, Gothe H, Willis J, et al. Clinical pathways: effects on professional practice, patient outcomes, length of stay and hospital costs. Cochrane Database Syst Rev. 2010(3):Cd006632.
19. Singh S, Koirala B, Thami R, Thapa A, Thapa B, Kayastha A, et al. Length of Stay in the Emergency Department during COVID-19 Pandemic in a Tertiary Care Hospital: A Descriptive Cross-sectional Study. JNMA J Nepal Med Assoc. 2021;59(237):490-3.
20. Hofer KD, Saurenmann RK. Parameters affecting length of stay in a pediatric emergency department: a retrospective observational study. European Journal of Pediatrics. 2017;176(5):591-8.
21. Gurazada SG, Gao S, Burstein F, Buntine P. Predicting Patient Length of Stay in Australian Emergency Departments Using Data Mining. Sensors. 2022;22(13):4968.

22. Nassar MMAA, Hassan BA, El-Saadany HF. Factors Affecting Length of Stay in Pediatric Emergency Department in Zagazig University Hospital. The Egyptian Journal of Hospital Medicine. 2020;81(4):1872-7.

23. Harel-Sterling M, Diallo M, Santhirakumaran S, Maxim T, Tessaro M. Emergency department resource use in pediatric pneumonia: point-of-care lung ultrasonography versus chest radiography. Journal of Ultrasound in Medicine. 2019;38(2):407-14.

24. Chiu I-M, Lin Y-R, Syue Y-J, Kung C-T, Wu K-H, Li C-J. The influence of crowding on clinical practice in the emergency department. The American journal of emergency medicine. 2018;36(1):56-60.

25. Li J, Caviness AC, Patel B. Effect of a Triage Team on Length of Stay in a Pediatric Emergency Department. Pediatric Emergency Care. 2011;27(8):687-92.

26. Li Y, Lu Q, Du H, Zhang J, Zhang L. The impact of triage Nurse-ordered diagnostic studies on pediatric emergency department length of stay. The Indian Journal of Pediatrics. 2018;85(10):849-54.

27. Nelson KA, Boslaugh SE, Hodge DI. Risk Factors for Extremely Long Length-of-Stay Among Pediatric Emergency Patients. Pediatric Emergency Care. 2009;25(12):835-40.

28. El-Hallal M, Shah Y, Nath M, Eksambe P, Theroux L, Amlicke M, et al. Length of stay linked to neurodiagnostic workup for seizures presenting to the pediatric emergency department. Epilepsy & Behavior. 2021;115:107639.

29. Strada A, Bolognesi N, Manzoli L, Valpiani G, Morotti C, Bravi F, et al. Diagnostic anticipation to reduce emergency department length of stay: a retrospective cohort study in Ferrara University hospital, Italy. BMC Health Services Research. 2020;20(1).

30. Brick C, Lowes J, Lovstrom L, Kokotilo A, Villa-Roel C, Lee P, et al. The impact of consultation on length of stay in tertiary care emergency departments. Emergency Medicine Journal. 2014;31(2):134-8.

31. Morley C, Unwin M, Peterson GM, Stankovich J, Kinsman L. Emergency department crowding: A systematic review of causes, consequences and solutions. PLOS ONE. 2018;13(8):e0203316.

32. Di Somma S, Paladino L, Vaughan L, Lalle I, Magrini L, Magnanti M. Overcrowding in emergency department: an international issue. Internal and emergency medicine. 2015;10(2):171-5.

33. Enyuma CO, Anah MU, Pousson A, Olorunfemi G, Ibisomi L, Abang BE, et al. Patterns of paediatric emergency admissions and predictors of prolonged hospital stay at the children emergency room, University of Calabar Teaching Hospital, Calabar, Nigeria. Afr Health Sci. 2019;19(2):1910-23.

34. Lateef A, Lee SH, Fisher DA, Goh W-P, Han HF, Segara UC, et al. Impact of inpatient Care in Emergency Department on outcomes: a quasi-experimental cohort study. BMC health services research. 2017;17(1):1-8.

35. Chiu IM, Lin YR, Syue YJ, Kung CT, Wu KH, Li CJ. The influence of crowding on clinical practice in the emergency department. Am J Emerg Med. 2018;36(1):56-60.

36. Jofiro G, Jemal K, Beza L, Bacha Heye T. Prevalence and associated factors of pediatric emergency mortality at Tikur Anbessa specialized tertiary hospital: a 5 year retrospective case review study. BMC Pediatrics. 2018;18(1).

37. Prather J, Alexander B, Halstrom J, Sutherland C, Patel A, McGwin G, et al. Factors affecting emergency department visits, readmissions, and reoperations within 30 days of ankle fracture surgery- an institutional retrospective study. Injury. 2020;51(11):2698-702.

38. Wiler JL, Handel DA, Ginde AA, Aronsky D, Genes NG, Hackman JL, et al. Predictors of patient length of stay in 9 emergency departments. The American journal of emergency medicine. 2012;30(9):1860-4.

39. McKelvie B, McNally JD, Chan J, Momoli F, Ramsay C, Lobos A-T. Increased mortality and length of stay associated with medical emergency team review in hospitalized pediatric patients: a retrospective cohort study. Pediatric critical care medicine. 2017;18(6):571-9.

40. Obermeyer Z, Abujaber S, Makar M, Stoll S, Kayden SR, Wallis LA, et al. Emergency care in 59 low- and middle-income countries: a systematic review. Bull World Health Organ. 2015;93(8):577-86g.

41. Li S-T, Chiu N-C, Kung W-C, Chen J-C. Factors Affecting Length of Stay in the Pediatric Emergency Department. Pediatrics & Neonatology. 2013;54(3):179-87.

42. Case SD, Case BG, Olfson M, Linakis JG, Laska EM. Length of stay of pediatric mental health emergency department visits in the United States. Journal of the American Academy of Child & Adolescent Psychiatry. 2011;50(11):1110-9.

43. Bekmezian A, Chung PJ, Cabana MD, Maselli JH, Hilton JF, Hersh AL. Factors Associated With Prolonged Emergency Department Length of Stay for Admitted Children. Pediatric Emergency Care. 2011;27(2):110-5.

44. Smith JL, De Nadai AS, Petrila J, Storch EA. Factors associated with length of stay in emergency departments for pediatric patients with psychiatric problems. Pediatric emergency care. 2019;35(10):716.

45. Khosravizadeh O, Vatankhah S, Bastani P, Kalhor R, Alirezaei S, Doosty F. Factors affecting length of stay in teaching hospitals of a middle-income country. Electronic physician. 2016;8(10):3042-7.

46. Smith JL, De Nadai AS, Petrila J, Storch EA. Factors Associated With Length of Stay in Emergency Departments for Pediatric Patients With Psychiatric Problems. Pediatr Emerg Care. 2019;35(10):716-21.

47. Neyman G, Dalsey W. A Quantification of the impact of awaiting results of a urinalysis upon emergency department length of stay. The Journal of Emergency Medicine. 2021;60(2):158-64.

48. Kocher KE, Meurer WJ, Desmond JS, Nallamothu BK. Effect of testing and treatment on emergency department length of stay using a national database. Acad Emerg Med. 2012;19(5):525-34.

49. http://www.aau.edu.et/chs/tikur-anbessa-specialized-hospital/background-of-tikur-anbessa-hospital/. [

10. ANNEES

Annex 1: Information Sheet

Title of the Research Project: - Length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia 2023

Name of investigator: Telayneh Addis (BSC)
Name of the Organization: Addis Ababa University College of Health Sciences, Department of Emergency Medicine
Name of sponsor: Addis Ababa University
Introduction: This information sheet was prepared by the administration and pediatric emergency coordination office of Tikur Anbessa Specialized Hospital. The aim of the form is to make the above-mentioned office clear about the purpose of research, data collection procedures, and permission to conduct the research.
Purpose of the Research Project: To assess the length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbessa Specialized Hospital.
Procedure: In order to achieve the above objective, the study obtained the necessary information from the child's parent/ guardian and their chart.
Risk: Since the study was conducted by taking appropriate information from attendant and medical charts, it did not inflict any harm on the attendants as well as the patients. The name or any other identifying information was not recorded on the questionnaire, and all information was kept strictly confidential and in a safe place. The information retrieved was only to be used for study purposes.
Benefits: The person or whose document is included in this research received no direct benefit from the research. But it could have an indirect benefit for other clients because the health care planner got information about the length of stay and its associated factors, which will ensure proper care and treatment. Overall, the research will be of great direct benefit to health care planners and managers.
Confidentiality: To ensure confidentiality, the data was collected without the names of the participants, and the information collected from this research project was kept confidential and

stored in a file cabinet. In addition, it was not revealed to anyone except the investigator, and it was kept in a key-locked system with a computer password.

Person to contact: This research project was reviewed and approved by the institutional committee of Addis Ababa University, the College of Health Sciences, and the Department of Emergency Medicine. If you have any questions, you can contact any of the following individuals: (Investigators and Advisors) and ask at any time what you want.

1. Telayneh Addis, Addis Ababa University College of Health Sciences, Department of Emergency Medicine (BSC)

Principal investigator: cell phone +251935854770,

E-mail: telaynehaddis749@gmai.com

2. Wagari Tuli, Department of Emergency Medicine (lecture, MSC in EMCCN), Addis Ababa University College of Health Science

Main Advisor: Cell phone: +251929016068

E-mail: wagarit@gmail.com

3. Dr Muluwork Tefera, Addis Ababa University College of Health Sciences, Department of pediatrics and child health (MD, Pediatrician, Emergency Medicine and Critical Care Specialist, Associate professor)

Co-adviser: cell phone +251911405609

E-mail: muluworktef@yahoo.com

Annex 2: Information consent sheet

Addis Ababa University, College of Health Science, School of Medicine, Department of Emergency Medicine

Consent Form

This questionnaire is prepared to assess length of stay and its associated factors among pediatric patients admitted in the Emergency Department of Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia.

Consent form and introduction

My name is _____. I am working on research on the length of stay and its associated factors among pediatric patients admitted in the Emergency unit of Tikur Anbessa specialized hospital. We are interviewing parents/guardians to assess the length of stay and its associated factors. Your name will not be written in this form and the information you give will be kept confidential. If you don't want to answer all of or some of the questions, you do have the right to do so. However, your willingness to answer all of the questions would be appreciated. Would you participate in responding to the questions in this questionnaire?

Yes □□ No □□

Name of interviewer: ---------- signature ----------

Name of the supervisor ---------- signature--------- ---

Date of checking ----------

Remark: 1. Complete 2. Incomplete

Annex 3: English version questioners

Table 3: A Questioners to assess the length of stay and its associated factors among pediatric patients admitted to the pediatric emergency unit of Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia 2023

Part One: socio-demographic data of the child and the parent or guardian			
S.№	Questions	Response	Remark
101	Id number	----------	
102	Age of the child	Year -----month------day--	
103	Sex of the child	1. Male 2. female	
104	Residency	1. Rural 2. Urban	
105	Mode of payment for health service	1. Self 2. Health insurance 3. free/exempted	
Part Two: Clinical related characteristics of patients admitting in the ED			
201	What was the mode of arrival patients used to come to the hospital?	1. By private car 2. By taxi 3. By ambulance 4. By public transport	
203	What was the tirage category?	1. Emergent 2. Urgent 3. Non urgent	

204	What was the source of referral?	1. Self-referral 2. Governmental health institution 3. Private	
205	What was/ were patient's Chief compliant /s?	1.---------- 2.---------- 3.---------- 4.---------- 5--------- others list	
206	Did the patient get first aid?	1. Yes 2. No	
206.1	If yes for question 206 where they got it?	1. From health facility 2. From home remedy 3. Both	
207	Frequency of presentation to ED	1. For the first time 2. previously presented	
208	Did he/she have Preexisting comorbidity?	1. Yes 2. No	
209	What was the characteristic of the illness of the patient?	1. Acute illness 2. Chronic illness with acute illness	

210	What was Mental status of the patient on arrival?	1. Alert 2. Comatose 3. Confuse	
211	What was the most responsible diagnosis of patient?	----------	
Part Three: Time and organizational related factors of patient			
301	Time of arrival	1. morning 8:00Am -1:59PM 2. Evening 2:00PM – 7:59PM 3. Night 8:00PM-7:59AM	
302	Day of arrival	1. Work day 2. Weekend day 3. Holyday	
303	How long the duration of pain/ illness?	------ Day----- hours----	
304	Did the patient have a laboratory request order?	1. Yes 2. No	
304.1	If your answer is yes for question no. 303,	1. Complete blood count	

	which lab is ordered? (Select more than one answer is possible)	2. Serum electrolyte 3. Organ function test 4. Stool examination 5. Urine analysis 6. Blood culture 7. Urine culture 8. CRP 9. Others (specify	
305	Did the patient have imaging studies?	1. Yes 2. No	
305.1	If yes question number 304 what type of imaging did have? (More than one answer is possible)	1. X-ray 2. Ultrasound 3. CT-scan 4. MRI 5. Echocardiography 6. Electroencephalogram	
306	Did the patient have medication in ED?	1. Yes 2. No	
306.1	If yes for question 305, did they get the ordered medication in ED?	1. Yes 2. No	
307	Did the patient have consultation in ED?	1. yes 2. no	
308	For how long did patient stayed in ED?	----------	
309	If stayed for more than 24 hours, what was the reason?	1. waiting for specialist consultation	

		2. Waiting for the result of investigation 3. Absence of inpatient bed 4. For management 5. Others (Specify	