
# PEDIATRICS EMERGENCY UNIT LENGTH OF STAY AND IT'S ASSOCIATED FACTORS AT TASH AT TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDISABABA, ETHIOPIA

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# Pediatrics Emergency Unit Length of Stay and its Associated factors at Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia

**Primary Advisors**

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## List of acronyms

AOR- Adjusted odds ratio

CDC – Center for Disease Control and Prevention

COR- crude odds ratio

CI – confidence interval

EBT- Ethiopian Birr

ED- Emergency Department

DRERC- Department of Research and Ethics review committee

LMIC – Low- and Middle-Income Countries

MRN - Medical Record Number

PEDLOS- Pediatrics emergency department length of stay

TASH- Tikur Anbesa Specialized Hospital

PED-Pediatric Emergency Department

LOS- Length of stay

NHAMCS-National Hospital Ambulatory Medical Care Survey

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# Abstract

**Background:** The length of stay in pediatric emergency departments (PED) is a critical factor in providing timely and efficient care to children in need of immediate medical attention. Various factors, including operational, clinical, and social elements, influence the duration of stay in these departments. Research has shown that the introduction of dedicated pediatric emergency rooms can help reduce the average length of stay, despite an increase in patient volume (2). Additionally, family characteristics, such as primary language spoken at home, socioeconomic status, and insurance status, also play a role in determining the length of stay (7). Resource constraints in healthcare settings, such as limited availability of diagnostic tools and pediatric specialists, can further complicate these factors, potentially leading to longer wait times and lengths of stay (1).

**Objective:** This study aimed to examine the length of stay and the various factors influencing this duration in the Pediatrics Emergency Unit at Tikur Anbessa Specialized Hospital from September 11 to November 9, 2024.

**Methods:** Hospital-based cross-sectional study was employed from September 11 to November 9, 2024 G.C. at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. A total of 302 selected patients were studied. Data were collected by using a standard checklist through google sheet and analyzed using SPSS version 27 software package. Mean, and standard deviation were used to describe Continuous data; and frequency and percentage were used to describe categorical data. To identify factors associated with Pediatrics emergency department length of stay. Bivariable and Multivariable binary logistic regression analyses were done. Statistical significance was considered at level of significance of 5%, and adjusted odds ratio (AOR) with 95% confidence interval (CI) was used to present the estimates of the strength of the association.

**Result**: The prevalence of prolonged stays in the pediatric emergency department was found to be 84.4% (255); 95% CI: 79.8 - 88.3%. seeking care for Surgical reasons 0.16[0.06-0.43], who had no prior treatment 0.45[0.22-0.95], comatose mental status 0.09[0.01-0.64], illness duration longer than 24 hours 4.6[2.11-10.2],Investigation ordered 14[2.19-98.7], two/more investigation ordered 19.2[1.5-236.6], surgical intervention

preformed 0.14[0.02-0.81], observation as an intervention 0.11[0.02-0.48], Delays in diagnostic services 0.17[0.06-0.47], Staff shortages 0.034[0.005-0.23] and not dedicated staff 4.12[1.49-11.3] were significantly associated with Pediatrics emergency departments length of stay.

**Conclusion:** The study found that the prevalence of prolonged stays in the pediatric emergency department at Tikur Anbessa Specialized Hospital was high (84.4%). Several factors were significantly associated with length of stay, including clinical, operational, and resource-related elements. Patients with illness durations exceeding 24 hours, those requiring investigations, and those needing multiple investigations were more likely to experience prolonged stays, while surgical intervention and observation were associated with shorter stays. Additionally, the absence of prior treatment, comatose mental status, and delays in diagnostic services contributed to longer stays. Resource limitations, such as staff shortages and lack of dedicated staff, were also significant factors. Addressing these challenges through improved resource allocation, timely diagnostics, and staff management may help reduce prolonged stays and enhance pediatric emergency care efficiency.

**Key words:** Pediatrics emergency department length of stay, TASH, Pediatric Emergency Unit, factors

# 1.INTRODUCTION

## 1.1 Background of the study

The National Hospital Ambulatory Medical Care Survey (NHAMCS) defines an emergency department as a hospital facility that is staffed 24 hours a day, 7 days a week, and provides unscheduled outpatient services to patients whose condition requires immediate care (14).

Pediatrics emergency department length of stay (PEDLOS) according to the Ethiopian federal minister of health, the duration between Emergency Department (ED) arrival and ED discharge, hospitalization, or referral to another health facility should not exceed 24 hours (12).

The time spent in a pediatric emergency department (ED) between arrival and discharge, admission, or referral to another health facility is referred to as the length of stay (LOS) (8). The ED at the hospital is designed to assess and stabilize patients who require immediate medical attention. It must be accessible 24 h a day, and immediacy is crucial for the quality of ED care (9,10,11).

Waiting time: is a period that begins when a patient arrives at the ED and ends when the patient is triaged by health care providers and should not exceed 5 minutes (13).

The length of stay in pediatric emergency departments (PED) is influenced by several factors, including operational, clinical, and external social elements. Research has highlighted that variable such as the volume of lab tests, patient consultations, and radiology studies significantly impact the duration of stay in these departments (1).

Introduction of dedicated pediatric emergency rooms, have been shown to effectively reduce the average length of stay from 1.8 to 1.4 hours, despite an increase in patient volume. This aspect highlights the importance of targeted facilities in alleviating crowding in addition family characteristics, such as primary language spoken at home, socioeconomic status and insurance status also plays a role (1).

Across various healthcare settings, the length of stay in pediatric emergency departments is influenced by both clinical and systemic factors. These include the severity and

complexity of the child's medical condition, the need for diagnostic tests and consultations, admission status, and the efficiency of patient flow within the emergency department (1). Specific to settings like TASH, resource constraints, such as limited availability of diagnostic tools and pediatric specialists, can further complicate these factors, potentially leading to longer wait times and lengths of stay.

Evidence suggests that the implementation of dedicated pediatric emergency rooms or services can significantly reduce length of stay by streamlining care specifically tailored to pediatric patients (2). For TASH optimization of pediatric-focused emergency services could enhance the efficiency of care delivery, addressing both the demand for acute care and the unique needs of pediatric patients.

The efficiency of emergency care, including the length of stay in PEDs, can also reflect broader health system challenges and the effectiveness of health policies. Efforts to strengthen health system capacity, improve healthcare workforce training in pediatric emergency care, and implement evidence-based policies can collectively contribute to better outcomes and shorter lengths of stay at institutions like TASH.

Overall, these studies highlight a miscellaneous issue influenced by institutional capabilities, patient demographics, and specific health conditions, all demanding targeted interventions to improve efficiency and patient experience in pediatric emergency settings.

In summary, insights from global research emphasizes the complexity of factors impacting the length of stay in pediatric emergency operations. Our research will help us clearly understand the gap and areas of improvement.

## 1.2 Statement of problem

The crowded environment of Tikur Anbessa Specialized Hospital (TASH), the Pediatrics Emergency Unit serves as a critical first point of care for children presenting with acute illnesses and injuries. However, recent observations and preliminary data suggest there may be significant inefficiencies and challenges related to the Length of Stay (LOS) of pediatric patients within this department. The prolonged LOS not only contributes to patient and caregiver dissatisfaction but also potentially compromises the quality of care delivered by exacerbating overcrowding, increasing the risk of hospital-acquired

infections, and delaying timely access to treatment for critically ill patients. Furthermore, extended stays in the Emergency may lead to inefficient use of hospital resources, including manpower, beds, and medical supplies, thereby straining the hospital's capacity to deliver effective and timely pediatric care.

Despite the critical nature of these issues, there is a lack of comprehensive data analysis and research aimed at identifying the underlying causes contributing to the prolonged LOS at the Pediatrics Emergency Unit in TASH. Factors such as patient volume, triage efficacy, diagnostic procedures, treatment protocols, and inter-departmental transfer processes may all play significant roles. Understanding these factors is essential for devising targeted interventions aimed at minimizing LOS, improving patient flow, enhancing the quality of care, and optimizing resource utilization within the unit.

Therefore, this study aims to systematically examine the current state of LOS for pediatric patients at TASH's Pediatrics Emergency Unit, identify key factors contributing to prolonged stays, and propose evidence-based recommendations to address these challenges. By doing so, this research seeks to contribute to the improvement of pediatric emergency outpatient care at TASH, with the ultimate goal of enhancing patient outcomes and operational efficiency within this crucial healthcare setting.

## 1.3 Significance of the study

The significance of a study investigating the length of stay (LOS) at the Pediatrics Emergency Outpatient Unit at Tikur Anbessa Specialized Hospital (TASH) is multifaceted, impacting various stakeholders across the spectrum of healthcare delivery. Here in lies the importance of this research:

1. Improvement in Patient Care and Outcomes: Understanding the factors that contribute to the LOS in the Pediatrics Emergency Unit is crucial for implementing strategies that can reduce waiting times and ensure that children receive immediate and effective medical care. Shorter LOS is often associated with improved patients' outcomes, reduced risk of hospital-acquired infections, and enhanced patient and family satisfaction (15,17).

2. Enhancement of Operational Efficiency: Analyzing and addressing the reasons for prolonged LOS can lead to more efficient use of hospital resources, including beds, medical

supplies, and human resources. By optimizing patient flow through the emergency department, the hospital can treat more patients without the need for additional resources, thereby increasing the department's capacity to provide care (2).

3. Policy and Planning Implications: The findings of this study can inform policy-making and planning processes at both the departmental and hospital management levels. Insights derived could lead to the redesign of processes, improvement in staffing levels and skills mix, and better allocation of resources to areas where they are most needed (6,16).

4. Reduction in Healthcare Costs: Shortening the LOS can significantly reduce healthcare costs. These savings arise from reduced resource utilization, including less need for medical tests and treatments, and decreased expenses related to inpatient care facilities. This is particularly important in settings with limited healthcare budgets (18).

5. Academic and Research Contributions:

This study will add valuable knowledge to the existing literature on healthcare management and pediatric emergency care. It will provide a model for similar studies in other settings and contribute to the body of evidence that can inform clinical guidelines (6).

# 2 LITERATURE REVIEW

## 2.1 Prevalence

The literature review on the LOS in Pediatric Emergency Outpatient Departments unveils numerous factors influencing the duration of pediatric patients' stays and their prevalence in such settings. Diverse studies mentioned below indicate a multiplicity of both internal and external determinants affecting the LOS, reflecting on their prevalence and the impacts on pediatric healthcare system.

A study by Barata et al ,a prospective, observational, multisite cohort study of a 24-hour consecutive sample of pediatric ED patients was conducted on 11/14/11 at 6 U.S. EDs: 3 children's hospitals, 3 general EDs of which 2 had separate pediatric areas, and 1 integrated adult and pediatric area ,total of 641 pediatric patients were screened, with a final sample size of 628 eligible patients (6 with unknown admission/discharge status; 6 transferred, 1 with disposition decision time before admission); 67 admitted and 561 discharged (1).

Subjects with at least one lab test had a significantly longer LOS as compared to those with no lab tests. Subjects with 1 - 2 lab tests (mean 227.93 minutes, standard error (SE): 29.00) and > 3 lab tests (mean 312.61 min, SE: 29.28) stayed, on average, 23 and 107 minutes longer than subjects with no lab tests (mean 205.14 min, SE: 28.48), respectively. Subjects with a patient consult (mean 268.94 min, SE: 29.10) stayed, on average, 41 minutes longer than subjects with no patient consult (mean 228.18 min, SE: 28.19). Subjects with a radiology study (mean 270.26 min, SE: 28.39) stayed, on average, 43 minutes longer than subjects with no radiology study (mean 226.86 min, SE: 28.40) (1).

So this study pinpointed that the number of laboratory tests, patient consults, and radiology studies significantly associates with extended LOS in pediatric emergency departments (1).

The Prospective, multicenter, observational, cohort study published on 2013 conducted in USA in all pediatric ED patients seen in 6 hospitals on 1 day. The 6 hospitals included were from all regions of the country and included different types of EDs including general hospitals where both adults and children are seen and pediatric EDs at children’s hospitals. There were 641 patients from 6 sites. Psychiatric patients median LOS 5 hours [P25=3.8, P75=10.3]) was significantly higher ($p<0.001$) than nonpsychiatric patients (median 2.7

[P25=2, P75=3.7]), that highlighting the need for specialized care protocols for this subgroup of pediatric patients (3).

The study conducted in South Korea, compared and analyzed the length of stay according to age, time distribution, injury/non-injury, in-patient/returning home to young patients under 15 years before the operating the pediatric emergency room between January and December 2010 and after the introduction between January and December 2011, respectively. Despite the increase of pediatric emergency room and in-hospital patients by 63% and 94% after the operation of the pediatric emergency room respectively, the length of stay of the emergency room reduced from 1.8 to 1.4 hours. However, due to the shortage of sick-beds the length of stay of in-hospital patients increased from 3.4 to 4.3 hours. While the hospitalization admission procedure time reduced considerably from 1.8 to 0.9 hours, the time of injured patients had no changes. The number of adult patients and in-hospital patients increased 18%, 8%, respectively, and the length of stay in the emergency room reduced from 2.7 to 2.5 hours (2).

In conclusion introduction of dedicated pediatric emergency rooms has been associated with reduced LOS despite an increase in patient volume, offering evidence that specialized facilities might enhance overall efficiency and patient capacity (2).

Study published on 2021 was conducted in South Africa aim of this research was to describe the areas of delay related to prolonged length of stay in the emergency department of an academic hospital (4).

A quantitative retrospective study was done. The Input-Throughput-Output model was used to identify the areas of patients' journey through the emergency department. The possible areas of delay where then described. Using systematic sampling, a total of 100 patient files managed in an emergency department of an academic hospital in South Africa were audited over a period of 3 months. Descriptive statistics and regression analysis was used to analyze data. The mean length of stay of patients in the emergency department was 73 h 49 min. The length of stay per phase was: input (3 h 17 min), throughput (16 h 25 min) and output (54 h 7 min). A strong significant relationship found between the length of stay and the time taken between disposition decision (throughput phase) disposition decision to admission or discharge of patients from the ED (output phase) ($p < 0.05$) (4).

In conclusion the output phase was identified as the longest area of delay in this study, with the time taken between disposition decision to admission or discharge of patients from the ED (patients waiting for inpatient beds) as the main significant area of delay (4).

This cross-sectional study was conducted on 399 patients at Hawassa University Comprehensive Specialized Hospital from February 15 to March 30/2018 to assess the length of stay (LOS) and its associated factors in emergency departments (EDs). The outcome indicates about 91.5% patients were stayed in the EDs for greater than 24 h in different reasons. Inadequacy of beds in inpatient wards, overcrowding, absence of different laboratory test profiles and delay in radiological services were showed a significant difference in LOS greater than 24 h when compared to LOS ≤ 24 h in EDs ($p < 0.05$ for all). In addition, admission beds [adjusted odds ratio: 8.7 (95% CI 3.2–23.2)]; overcrowding [adjusted odds ratio: 3.6 (95% CI 1.6–8.3)]; laboratory test profiles [adjusted odds ratio: 5.1 (95% CI 1.9–14.1)], and radiology services [adjusted odds ratio: 3.7 (95% CI 1.5–9.2)] were significantly and positively associated with LOS greater than 24 h in Eds (5).

The study conducted at Wolaita Sodo University Hospital; an institution-based cross-sectional study was conducted from March 15 to May 15, 2021. A total of 422 children visited the pediatric emergency department during the study period were selected using a systematic sampling technique. The proportion of prolonged pediatric emergency department length of stay was 79.70% (95% CI; 75.7, 83.6). Nighttime arrival [AOR = 3.19, 95% CI (1.14, 8.98)], weekend arrival [AOR = 4.25, 95% CI (1.49, 5.35)], not receiving ordered medication in the hospital [AOR = 2.05, 95% CI (1.04, 4.03)], orange triage category [AOR = 4.01, 95% CI (1.60, 10.05)], and duration of pain 13–24 h [AOR = 0.29, 95% CI (0.89,0.98)], were significantly associated with length of stay (6).

Based on the study mentioned above factors that were significantly associated with PEDLOS were night-time arrival, weekend arrival, not receiving ordered medication in the hospital, orange triage category and duration of pain 13–24 hours (6).

## 2.2 Associated factors

The associated factors influencing the length of stay (LOS) in Pediatric Emergency Outpatient Departments (EOPD) are miscellaneous and encompass a wide array of clinical, operational, and systemic variables.

**Clinical factors**

- Increased severity and complexity of the patient's condition, including psychiatric cases, often result in longer LOS (1).The number of laboratory tests, radiology studies, and need for specialist consultations can significantly increase the LOS (1).Patient Demographic characteristics such as age, pre-existing conditions, immigration status, and parental language proficiency may affect LOS. For example, non-English speaking families might experience longer stays due to communication barriers (7).

**Operational and systemic factors**

- Insufficient bed capacity and overcrowded facilities delay admissions and discharges, extending the LOS for pediatric patients (5). Delays in diagnostic services, radiology, and laboratory testing contribute significantly to prolonged length of stay.

## 2.3 CONCEPTUAL FRAMEWORK & STUDY VARIABLES

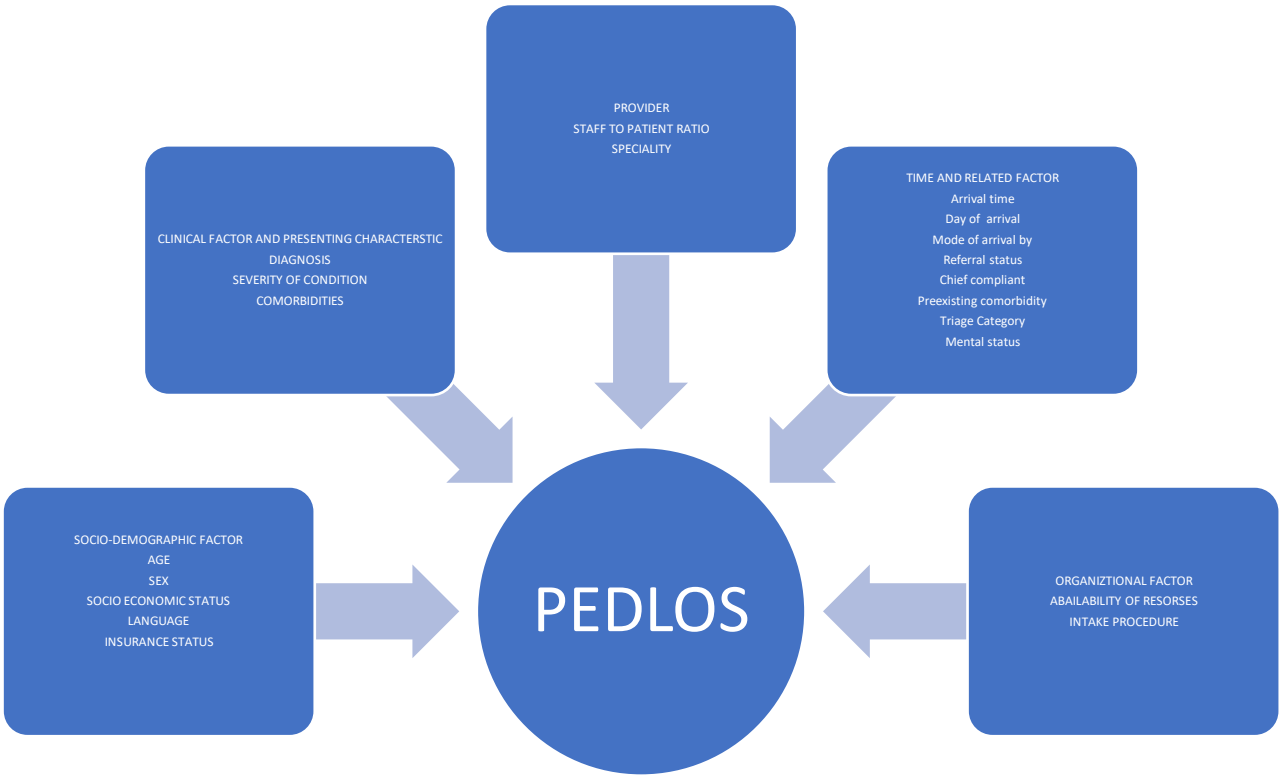


Figure 1. Conceptual framework of factors associated with Pediatrics emergency department length of stay

⟶ The solid line indicates the association between the outcome variable and explanatory variables.

# 3 OBJECTIVES

## 3.1 General objective

- To examine the overall duration of stay within the Pediatrics Emergency Unit at Tikur Anbessa Specialized Hospital and to investigate the various factors that influence this length of stay.

## 3.2 Specific objectives

- To Quantify the Average Length of Stay (LOS): Measure and report the average duration that pediatric patients spend in the emergency, from admission to discharge or transfer.
- To Identify Demographic Influences: Analyze how demographic factors such as age, sex, and socioeconomic status affect the length of stay in the PED.
- To Assess Medical and Clinical Factors: Determine how the type and severity of medical conditions, as well as the time of arrival and admission method (walk-in vs. ambulance), influence the PEU length of stay.
- To Evaluate Process and Operational Factors: Examine internal hospital factors including staffing levels, bed availability, and procedural efficiency to see how they impact the LOS.

# 4 METHODS AND MATERIALS

## 4.1 Study area and Study period

Tikur Anbesa specialized Hospital is the largest referral hospital in the country and main teaching hospital for both clinical and preclinical training of most disciplines.it is also an institution where specialized clinical services that are not available in other public or private institutions are rendered to the whole nation.

The study is going to be conducted at pediatric emergency unit of Tikur Anbesa Specialized Hospital, the pediatric emergency and critical care unit gives 24- hour service; has 42 beds;

and is staffed with one emergency and critical care trained consultant, residents, interns and nurses (20).

Average of more about 500 to 600 patients visit each month. where hematology, oncology, surgical, cardiac and infectious cases being the most commonly encountered. Among the infectious causes of admission pneumonia, meningitis, sepsis and gastroenteritis are frequently encountered (19).

The proposed study will provide a detailed assessment on factors associated with prolonged length of stay at TASH pediatric emergency unit. Which helps to obtain data that benefits both the institution and the nation, influencing policy decisions.

This study will be conducted from September 11 to November 11/2024

### 4.2 Study design

Hospital based prospective, observational cross-sectional study was carried out.

### 4.3 Population

#### 4.3.1 Source population

Pediatric patients who visit Tikur Anbesa specialized hospital pediatric emergency unit during the study period.

#### 4.3.2 Study population

Pediatric patients who visit Tikur Anbesa specialized hospital pediatric emergency unit during the study period.

### 4.4 Eligibility

#### 4.4.1 Inclusion criteria

- All patients presented to pediatric emergency department during the study period

#### 4.4.2 Exclusion criteria

- Dead body on arrival
- Children who die shortly after arrival
- Charts with incomplete data

## 4.5 Sample size determination and sampling technique

### 4.5.1 Sample size determination

The sample size was determined using a single population proportion formula, with a confidence level of 95%, a marginal error of 5%, and a proportion of 80%. This calculation was based on previously published data regarding the length of stay in pediatric emergency departments, specifically a study conducted at Wolaita University Hospital in Ethiopia, which estimated a prevalence of 0.8.[Reference].

Where: n = sample size P = proportion of pediatrics emergency department length of stay q = 1-p d = desired degree of precision (5%) Z= is the standard normal value at 95% confidence level

$$n = \frac{p(1-p)\left(Z_{\frac{\alpha}{2}}\right)^2}{d^2}$$

$n = \frac{(1.96)^2 \times 0.2\ (1-0.8)}{0.05^2} = 245$ → 245+10% non-respondent =302

The final sample size was determined 302.

### 4.5.2 Sampling technique and procedure

The study took place at the Tikur Anbesa Specialized Hospital Pediatric Emergency Unit. To effectively assess our patient population, we began by analyzing the total number of patients who attended the department over a one-month period. This review revealed that, on average, approximately 600 pediatric emergency patients are seen each month.

Based on this average, we anticipated that a total of 600 patients would be seen during the study month. To facilitate a systematic approach to our data collection, we calculated a sampling interval (K) of 600/302 = 2, yielding an interval of approximately 2.

To implement the systematic random sampling method, we selected every second patient to participate in interviews. The selection process commenced with a random choice of the

first patient, using a lottery method to ensure fairness. In the event that the selected second patient was not willing to participate, we continued our selection by approaching the next available patient to maintain the integrity of our study. This method helped us gather diverse insights from our outpatient population while ensuring that all participants' rights and willingness were respected.

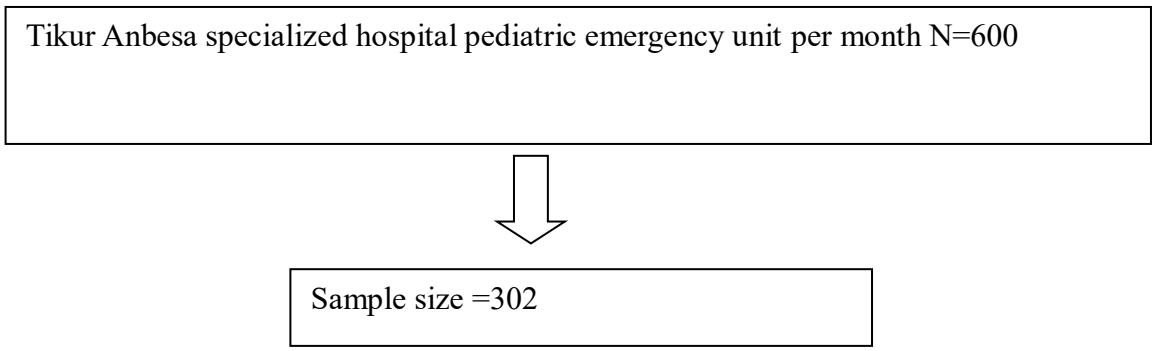


Figure 2. Schematic presentation of sampling procedures in Tikur Anbessa Specialized Hospital, September 11 to November 9, 2024, G.C

## 4.6 DATA COLLECTION TOOL AND PROCEDURE

The data was collected by the principal investigator. Structured questionary was used which comprise two sections.

- *Section 1*- socio-demographic characteristics
- *Section 2* – Clinical related characteristics
- Section 3 – Time and related organizational factors
- Section 4 – Departmental challenges and inefficiencies
- Section 5 – Discharge Information

google form was used to collect the data along with the Gmail server to store the collected data.

## 4.7 Data Quality control and management

To ensure the quality of the data, the questionnaire was pretested with 5% of the total sample size to check the consistency of the questionnaire. The questionnaire was modified based on pretested results. After the data collection, the tool was reviewed and checked for completeness every day by the principal investigators.

## 4.8. Variables

### 4.8.1 Outcome variable

- Pediatrics emergency department length of stay.

### 4.8.2 Explanatory variables

- Socio Demographic data: - Age, sex, Socio Economic status, Language, Insurance status
- Clinical factors
- Severity of condition
- Comorbidities
- Organizational factors

## 4.9. Operational Definition

- A Pediatrics emergency department length of stay (PEDLOS): According to the Ethiopian federal minister of health, the duration between ED arrival and ED discharge, hospitalization, or referral to another health facility should not exceed 24 hours.
- Pediatrics; age under 15 years

## 4.10. Data processing and Analysis

After data collection by Google form, each completed form was checked for completeness and exported to SPSS version 27 for analysis. Mean, and standard deviation were used to describe Continuous data; and frequency and percentage were used to describe categorical data. To identify factors associated with Pediatrics emergency department length of stay, first, Bivariable analysis was done. Then variables with a P-value < 0.25 in a Bivariable analysis were selected as candidate variables to be entered together into a multivariable analysis. Lastly, variables with a p-value $\leq 0.05$ in multivariable analysis were employed as statistically significant and AOR with 95% CI were identified to measure the strength of

the associations. The result is presented by using text, tables and graphs, and finally interpreted into valuable information.

## 4.11. Ethical consideration

Ethical clearance was obtained from the Department of Research and Ethical Review Committee (DRERC). Then an official letter of support and ethical clearance was submitted to Emergency department. Confidentiality was maintained at all levels of the study, besides only the MRN number of study participants were used without mentioning the name and the collected information was kept in a secured place. All the information obtained from the patents chart was held with confidentiality and used only for the intended purpose, besides only the MRN number of the patent chat were used without mentioning the name and the collected information was kept in a secured place.

## 4.12. Dissemination and utilization of results

The finding of this research will be submitted to Addis Ababa university health science and medical college,departement of pediatrics and child health and will be presented during the final defense for partial fulfillment of speciality. The finding of the study will also be shared to TASH administration, and other concerned bodies. Subsequently an attempt will be made to present the findings on different review meetings, seminars, and workshops Furthermore, the manuscript will be published on peer reviewed journals.

# 5. RESULT

### 5.1 Socio-demographic data

The study included children and adolescents aged less than or equal to 18 years who visited the pediatric emergency unit, Tikur Anbessa Hospital between September 30 and November 29/2024. The participants' mean age ± SD was 4.66 ± 3.58 years.

Male accounts (53.6%) with male to female ration 1.16:1. Over two-thirds 126(41.7%) were in the age group of 1 to 5 years.

Most of the participants (89.7%) resided in urban areas. (51.5%) of the participants lived more than 25 km away from the hospital, while 32.8% lived within 8-25 km, and 26.8% were closer than 7 km.

Caregivers 94.7% having attended formal education; among these, primary (35.0%), secondary (32.5%), and above-secondary education (32.5%) were evenly distributed. The occupation profile of caretakers showed that self-employment was predominant (52.0%), while governmental (26.5%) and private sector employees (15.2%).

The socioeconomic assessment indicated that 77.5% of households earned more than 2000 birr monthly, 21.9% reported lower incomes. Notably, health insurance coverage was reported by only 48.0% of participants.

Table 1 Sociodemographic characteristics of study populations TASH from September 29 to November 30 /2017

| **Sociodemographic Variables** | | **Frequency** | **Percent** |
|---|---|---|---|
| **Age in years** | <1 year | 68 | 22.5 |
| | 1-5 year | 126 | 41.7 |
| | 6-12 year | 102 | 33.8 |
| | >12 year | 6 | 2.0 |
| **Sex** | Male | 162 | 53.6 |
| | Female | 140 | 46.4 |
| **Residence** | Rural | 31 | 10.3 |
| | Urban | 271 | 89.7 |
| **Residence from the hospital** | less than7 km | 81 | 26.8 |
| | 8-25km | 99 | 32.8 |
| | more than 25 km | 65 | 21.5 |
| | Other | 57 | 18.9 |
| **Number of Languages caretaker speaks** | One language | 123 | 40.7 |
| | Two languages | 157 | 52.0 |
| | Three or more languages | 22 | 7.3 |
| **Educational level of the caretaker** | No formal education | 16 | 5.3 |
| | Primary education | 100 | 35.0 |
| | Secondary education | 93 | 32.5 |
| | Above secondary education (college, university) | 93 | 32.5 |
| | Total | 302 | 100.0 |
| **Occupation of the caretaker** | Governmental employee | 80 | 26.5 |
| | Private sector employee | 46 | 15.2 |

| | | | |
|---|---|---|---|
| | Self-employed | 157 | 52.0 |
| | Other | 19 | 6.3 |
| **Monthly income of the Household** | less than1500 birr | 2 | 0.7 |
| | 1500-2000 birr | 66 | 21.9 |
| | more than 2000 birr | 234 | 77.5 |
| **Health insurance** | Yes | 145 | 48.0 |
| | No | 157 | 52.0 |
| **Total** | | **302** | **100.0** |

## 5.2 Pediatrics Emergency Unit Length of Stay

The prevalence of prolonged stays in the pediatric emergency department was found to be 84.4% (255); 95% CI: 79.8 - 88.3%. The average length of stay in the pediatric emergency department was 3.72 ± 3.46 days, with a range of 0 to 24 days.

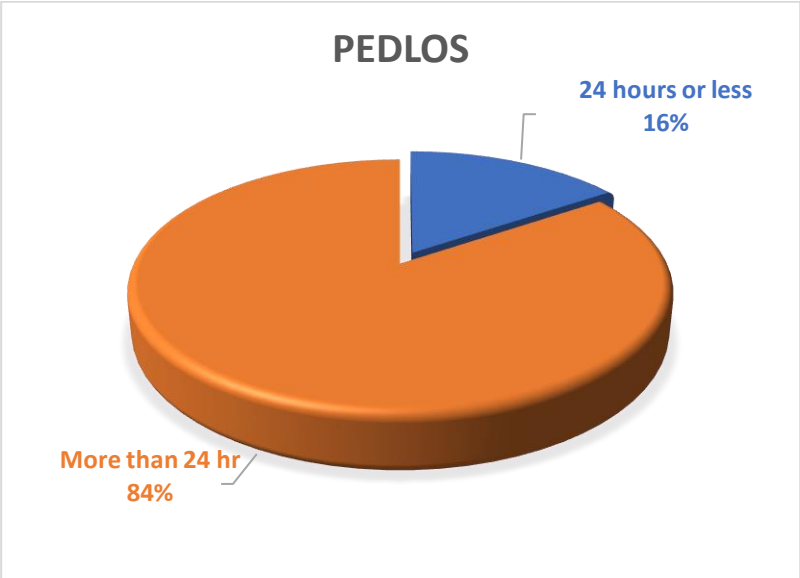


Fig 2 prevalence of prolonged stay at TASH from September 29 to November 30/2017

## 5.3 Factors

### 5.3.1. Medical and clinical characteristics

A significant majority of patients (67.5%) arrived at the emergency unit by taxi. Nearly two-thirds (61.6%) of patients were referred from other healthcare facilities. The most common reasons for seeking medical care included, hemato-oncological concerns (19.9%), gastrointestinal problems (14.2%), and respiratory issues (16.9).

More than half of the patients (53.0%) had received some form of treatment prior to arriving at the emergency unit.

Upon arrival, a significant majority of patients (88.1%) were alert. Additionally, 74.2% were categorized under the orange triage category. The data also revealed that 70.2% of patients had no preexisting medical conditions.

Table 2 Clinical characteristics of the study population in TASH from September 29 to October 30/2017

| **Clinical characteristics** | | **Frequency** | **Percent** |
|---|---|---|---|
| **Mode of arrival** | Taxi | 204 | 67.5 |
| | Ambulance | 28 | 9.3 |
| | Public transport (bus, minibus) | 64 | 21.2 |
| | Personal Car | 6 | 2.0 |
| **Mode of referral,** | Came without referral | 29 | 9.6 |
| | Self-referral | 87 | 28.8 |
| | Referred from health care facility | 186 | 61.6 |
| **Reason for seeking medical care** | Respiratory system related issue | 51 | 16.9 |
| | Cardiovascular system related issue | 38 | 12.6 |
| | Gastrointestinal system related issue | 43 | 14.2 |
| | CNS related issues | 38 | 12.6 |
| | Trauma | 13 | 4.3 |
| | Hematoncology | 60 | 19.9 |
| | Renal | 15 | 5.0 |
| | Endocrine related issues | 5 | 1.7 |
| | other | 39 | 12.9 |
| **History of treatment before arrival** | *Yes | 160 | 53.0 |
| | No | 142 | 47.0 |
| ***Place of treatment before arrival** | Health facility | 113 | 70.6 |
| | Home remedy | 46 | 28.8 |
| | Traditional healer | 1 | 0.6 |
| | **Total** | **160** | **100.0** |
| **preexisting medical condition** | Yes | 90 | 29.8 |
| | No | 212 | 70.2 |
| **Triage category** | Red | 57 | 18.9 |
| | Orange | 224 | 74.2 |
| | Green | 21 | 7.0 |
| | Alert (fully conscious and responsive) | 266 | 88.1 |

| | | | |
|---|---|---|---|
| **Pt status during arrival** | Confused (disoriented, impaired understanding) | 29 | 9.6 |
| | Comatose (unresponsive, no reaction to stimuli) | 7 | 2.3 |
| **Total** | | **302** | **100.0** |

### 5.3.2 Process and Operational characteristics

Process

A significant number of patients (44.0%) arrived in the afternoon, with 77.2% visiting on workdays, and the majority (88.4%) were triaged within five minutes. Imaging studies were conducted for 58.9% of patients, with 34.3% completing them within four hours, though CT scans were available only 16% of the time. Medication administration was the most common intervention (59.3%), while observation accounted for 32.8%, yet 70.2% of patients did not receive all prescribed medications. Regarding patient disposition, 46.0% were admitted to inpatient wards, 39.4% were discharged, 4.0% died, and 1.0% were referred to another hospital.

Table 3 presentation time process and operational characteristics

| | | **Frequency** | **Percent** |
|---|---|---|---|
| **Time of arrival** | Morning (6:00AM – 12:00 PM) | 117 | 38.7 |
| | Afternoon (12;01PM – 6:00PM) | 133 | 44.0 |
| | Night (6:01PM – 5:59AM) | 52 | 17.2 |
| **Day of arrival** | Workday (Monday – Friday) | 233 | 77.2 |
| | Weekend (Saturday – Sunday) | 69 | 22.8 |
| **Waiting time before being triaged** | Less than 5 minutes | 267 | 88.4 |
| | More than 5 minutes | 35 | 11.6 |
| **Length of Time Experiencing Illness Before Visiting the Emergency Department** | less than 12 hours | 54 | 17.9 |
| | 13-24 hours | 70 | 23.2 |
| | 25-48 hours | 73 | 24.2 |
| | 49-72 hours | 51 | 16.9 |
| | more than 73 hours | 54 | 17.9 |

| | | | |
|---|---|---|---|
| **Medical investigations ordered** | Yes | 297 | 98.3 |
| | No | 5 | 1.7 |
| **The number of investigations were performed** | One investigation | 1 | 0.3 |
| | Two investigations | 187 | 61.9 |
| | Three or more investigations | 109 | 36.1 |
| | **Total** | **297** | **100** |
| **Laboratory test conducted** | Yes | 297 | 98.3 |
| | No | 5 | 1.7 |
| **The time it took to collect the lab test.** | less than 4 hour | 271 | 91.2 |
| | 4 to 12 hours | 26 | 8.8 |
| | **Total** | **297** | **100.0** |
| **Availability of the lab test in the hospital** | Yes | 209 | 70.4 |
| | No | 88 | 29.6 |
| | **Total** | **297** | **100.0** |
| **Reason for unavailability of the lab test** | Machine dysfunction | 18 | 20.5 |
| | Not available in the hospital | 70 | 79.5 |
| | **Total** | **88** | **100.0** |
| **Imaging studies performed** | Yes | 175 | 58.9 |
| | No | 122 | 41.1 |
| | **Total** | **297** | **100.0** |

Departmental challenges

A significant challenge identified in this study is the lack of inpatient beds, with 98.0% of respondents reporting insufficient availability, and 44.7% citing it as a primary factor affecting patient care and length of stay. Patient severity was noted as a challenge by 36.4% of respondents, while delays in diagnostic services were reported by 14.9%, with 72.2% rating the speed of diagnostics as slow or very slow. Staffing shortages were also a major issue, with 90.1% indicating insufficient staff to meet patient care demands. Communication was rated as good by 46.7% of respondents, while 31.1% considered it fair. Additionally, 71.5% of staff were perceived as somewhat dedicated, with only 22.8% seen as very dedicated.

Table 4 Departmental challenges

| | | Frequency | Percent |
|---|---|---|---|
| **Main challenges affecting the length of stay** | Patient severity | 110 | 36.4 |
| | Lack of in-patient bed | 135 | 44.7 |
| | Delays in diagnostic services | 45 | 14.9 |
| | Staff shortages | 9 | 3.0 |
| | Communication barriers | 3 | 1.0 |
| **Dedication of staffs in reducing LOS** | Very dedicated | 69 | 22.8 |
| | Somewhat dedicated | 216 | 71.5 |
| | Not dedicated | 17 | 5.6 |
| **Sufficiency of staffs** | Yes | 30 | 9.9 |
| | No | 272 | 90.1 |
| **Patients and staff communication rate** | Excellent | 43 | 14.2 |
| | Good | 141 | 46.7 |
| | Fair | 94 | 31.1 |
| | Poor | 24 | 7.9 |
| **Enough beds are available at EOPD** | Yes | 6 | 2.0 |
| | No | 296 | 98.0 |
| **Sufficiency of Radiology and Laboratory Services** | Yes | 4 | 1.3 |
| | No | 298 | 98.7 |
| **Diagnostic Service Speed Rating** | Very fast | 1 | 0.3 |
| | Fast | 49 | 16.2 |
| | Slow | 218 | 72.2 |
| | Very slow | 34 | 11.3 |
| **Total** | | **302** | **100.0** |

### 5.3.3 Factors affecting Pediatrics Emergency unit length of stay

Variables in Sociodemographic, Clinical characteristics and Process and operational characteristics were analyzed first by bivariable analysis. Based on the p-value (< 0.25) of the bivariable analysis, fourteen variables were identified as candidate variables for the multivariable these are: Mode of arrival, Reason for seeking medical care, History of treatment before arrival, Receives prior treatment, Triage category, Patient status during arrival ,Time of arrival, Waiting time before being triaged, Length of Time Experiencing Illness Before Visiting the Emergency Department, Medical investigations ordered, The number of investigations were performed, The time it took to collect the lab test, Imaging ordered availability, Interventions performed, Main challenges affecting the length of stay, Dedication of staffs in reducing LOS, Sufficiency of staffs, Patients and staff communication rate, Sufficiency of Radiology and Laboratory Services, and Speed of

Diagnostic Services. The results of the multivariable analysis revealed that Reason for seeking medical care, Prior treatment, Patient status during arrival, Duration of the illness, medical investigation ordered, number of investigations performed, Intervention performed, Main challenges affecting length of stay, and Dedication of staffs were significantly associated with Pediatrics emergency departments length of stay.

Patients presenting with surgical conditions had 84% lower odds of experiencing a prolonged stay in the pediatric emergency department compared to those presenting with medical conditions (AOR = 0.16; 95% CI: 0.06 – 0.43). Additionally, patients who had prior treatment were 55% less likely to experience a prolonged stay compared to those without prior treatment (AOR = 0.45; 95% CI: 0.22 – 0.95). Furthermore, comatose patients had a 91% lower chance of a prolonged length of stay compared to alert patients (AOR = 0.09; 95% CI: 0.01 – 0.64). These findings highlight the significant impact that medical condition, prior treatment, and alertness have on the likelihood of extended stays in the pediatric emergency department. Table 5

Table 5 factors affecting prolonged Emergency department length of stays

| | | PEDLOS | | Bivariate analysis (COR) | Multivariate analysis (AOR) | P value |
|---|---|---|---|---|---|---|
| | | More than 24 hr. | 24 hr. or less | | | |
| **Mode of arrival** | Taxi | 174(85.3%) | 30(14.7%) | 1 | 1 | |
| | Ambulance | 17(60.7%) | 11(39.3%) | 0.26[0.11-0.62] | 0.43[0.16-1.17] | 0.09 |
| | Public transport (bus, minibus) Other | 64(91.4%) | 6(8.6%) | 2.03[0.75- 5.48] | 1.54[0.57-4.15] | 0.38 |
| **Reason for seeking medical care** | Surgical | 48(94.1%) | 3(5.9%) | 1 | 1 | |
| | Medical | 32(84.2%) | 6(15.8%) | **0.16[0.06-0.43]** | **0.16[0.06-0.43]** | **0.0003** |
| **Prior treatment** | Yes | 140(87.5%) | 20(12.5%) | 1 | 1 | |
| | No | 115(81%) | 27(19%) | **0.68[0.32-1.14]** | **0.45[0.22-0.95]** | **0.036** |
| **Triage category** | Red | 38(66.7%) | 19(33.3%) | 1 | 1 | |
| | Orange/ Green | 217(88.6%) | 28(11.4%) | 0.25[0.13-0.50] | 0.5[0.17-1.51] | 0.22 |
| **Pt status during arrival** | Alert (fully conscious and responsive) | 234(88%) | 32(12%) | 1 | 1 | |
| | Confused (disoriented, impaired understanding) | 19(65.5%) | 10(34.5%) | 0.26[0.11-0.60] | 0.4[0.13-1.65] | 0.24 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Comatose (unresponsive, no reaction to stimuli) | 2(28.6%) | 5(71.4%) | **0.05[0.01-0.29]** | **0.09[0.01-0.64]** | **0.016** |

The odds of a prolonged length of stay in the pediatric department were 4.6 times greater for patients with an illness duration longer than 24 hours compared to those with an illness duration of 24 hours or less (AOR = 4.6; 95% CI: 2.1 – 10.2). Additionally, the likelihood of a prolonged stay was 14 times higher for patients for whom investigations were ordered compared to those for whom investigations were not ordered (AOR = 14; 95% CI: 2.19 – 98.7). Moreover, the odds of a prolonged stay were 19 times greater for patients who had two or more investigations ordered, compared to those who had only one investigation (AOR = 19.2; 95% CI: 1.5 – **236.6)**

Patients who receive surgical intervention in the pediatric emergency department have an 86% lower chance of experiencing a prolonged stay compared to those treated with medication alone (AOR = 0.14; 95% CI: 0.02 – 0.81)Whereas Patients who receive observation as an intervention in the pediatric emergency department have an 89% lower likelihood of experiencing a prolonged stay compared to those treated with medication (AOR = 0.11; 95% CI: 0.02 – 0.48). Table 6

Table 6 affecting prolonged Emergency department length of stays

| | | PEDLOS | | Bivariate analysis (COR) | Multivariate analysis (AOR) | P value |
|---|---|---|---|---|---|---|
| | | > 24 hours | ≤24 hours | | | |
| **Time of arrival** | Morning | 97 (82.9%) | 20 (17.1%) | 1 | 1 | |
| | Afternoon | 117 (88.0%) | 16 (12.0%) | 1.50[0.74-3.06] | 1.6[0.72-1.98] | 0.24 |
| | Night | 41 (78.8%) | 11 (21.2%) | 0.76[0.33-1.74] | 0.7[0.30-1.98] | 0.59 |
| **Waiting time before being triaged** | ≤5 minutes | 223 (83.5%) | 44 (16.5%) | 1 | 1 | |
| | > 5 minutes | 32 (91.4%) | 3 (8.6%) | 0.47[0.13-1.62] | 1.7[0.40-7.50] | 0.45 |
| **Duration of the illness** | ≤24 hours | 90 (72.6%) | 34 (27.4%) | 1 | 1 | |
| | >24 hours | 165 (92.7%) | 13 (7.3%) | **4.7[2.4-9.5]** | **4.6[2.11-10.2]** | **0.0001** |
| **Medical investigations ordered** | Yes | 253 (85.8%) | 42 (14.2%) | **15.0[2.82-80.1]** | **14[2.19-98.7]** | **0.006** |
| | No | 2 (28.6%) | 5 (71.4%) | 1 | 1 | |
| **number of investigations** | One | 1 (33.3%) | 2 (66.7%) | 1 | 1 | |
| | Two or more | 254 (84.9%) | 45 (15.1%) | **11.2[1.0-127]** | **19.2[1.5-236.6]** | 0.021 |
| **The time it took to lab test.** | ≤4 hours | 227 (85.0%) | 40 (15.0%) | 1 | 1 | |
| | 4 to 12 hours | 26 (92.9%) | 2 (7.1%) | 2.29[0.52-10.0] | 0.51[0.05-4.83] | 0.55 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Interventions performed** | medication | 169 (90.9%) | 17 (9.1%) | 1 | 1 | |
| | Surgical | 11 (64.7%) | 6 (35.3%) | **0.18[0.06-0.56]** | **0.14[0.02-0.81]** | **0.028** |
| | Observation | 75 (75.8%) | 24 (24.2%) | **0.31[0.16-0.61]** | **0.11[0.02-0.48]** | **0.003** |

The odds of a prolonged length of stay in the emergency department were 83% lower in cases with delays in diagnostic services compared to patients with higher severity (AOR = 0.17; 95% CI: 0.06 – 0.47). On the other hand, the odds of a prolonged length of stay were 4.12 times higher for patients treated by dedicated staff compared to those treated by non-dedicated staff (AOR = 4.12; 95% CI: 1.49 – 11.3). Table 7.

Table 7 factors affecting prolonged Emergency department length of stays

| | | **PEDLOS** | | **Bivariate analysis (COR)** | **Multivariate analysis (AOR)** | **P value** |
|---|---|---|---|---|---|---|
| | | > 24 hours | ≤24 hours | | | |
| **Main challenges affecting the length of stay** | Patient severity | 91 (82.7%) | 19 (17.3%) | 1 | 1 | |
| | Lack of resources | 129 (96.3%) | 5 (3.7%) | 5.38[1.94-14.95] | 2.5[0.82-7.67] | 0.10 |
| | Delays in diagnostic services | 28 (62.2%) | 17 (37.8%) | **0.34[0.15-0.75]** | **0.17[0.06-0.47]** | 0.001 |
| | Staff shortages | 4 (44.4%) | 5 (55.6%) | **0.16[0.04-0.68]** | **0.034[0.005-0.23]** | 0.001 |
| | Communication barriers | 3 (75.0%) | 1 (25.0%) | 0.62[0.06-6.35] | 0.065[0.004-1.13] | 0.06 |
| **Dedication of staffs in reducing LOS** | Very dedicated | 44 (63.8%) | 25 (36.2%) | 1 | 1 | |
| | Not dedicated | 211 (90.6%) | 47 (9.4%) | **5.44[2.82-10.52]** | **4.12[1.49-11.3]** | **0.006** |
| **Sufficiency of staffs** | Yes | 21 (70.0%) | 9 (30.0%) | 1 | 1 | |
| | No | 234 (86.0%) | 38 (14.0%) | 2.63[1.12-6.19] | 1.10[0.37-3.28] | 0.86 |
| **Patients and staff communication rate** | Excellent | 27 (62.8%) | 16 (37.2%) | 1 | 1 | |
| | Good | 121 (85.8%) | 20 (14.2%) | 3.58[1.64-7.81] | 1.10[0.37-3.26] | 0.86 |
| | Fair | 85 (90.4%) | 9 (9.6%) | 5.59[2.22-14.10] | 2.34[0.54-10.06] | 0.25 |
| | Poor | 22 (91.7%) | 2 (8.3%) | 6.51[1.35-31.46] | 5.59[0.50-61.51] | 0.16 |
| **Sufficiency of Radiology and Laboratory Services** | Yes | 1 (33.3%) | 2 (66.7%) | 1 | 1 | |
| | No | 254 (84.9%) | 45 (15.1%) | 11.28[1-127.11] | 3.87[0.21-71.3] | 0.36 |
| | Fast/Very Fast | 38 (76.0%) | 12 (24.0%) | 1 | 1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Speed of Diagnostic Services** | Slow/Very Slow | 217 (86.1%) | 35 (13.9%) | 1.95[0.93-4.10] | 1.66[0.62-4.43] | 0.30 |

## 6. Discussion

Length of Stay (LOS) in emergency departments (EDs) is one of the key markers of operational efficiency, being a reflection of both the effectiveness of healthcare as well as care quality. On the other hand, prolonged LOS has been linked to increasing illness severity, mortality, and dissatisfaction among patients, as well as resource consumption. LOS therefore is an important contributor to care planning and overall ED management [6].

The proportion of prolonged stays was 84.4% (255) with 95% confidence interval 79.8% to 88.3%. The mean LOS was 3.72 ± 3.46 days for pediatric patients (range: 0 to 24 days). The majority of pediatric patients (84.4%) remained in the ED longer than 24 hours. More than 80% of patients (84.4%) remained in the ED for >24 hours. This overwhelming share of extended stays presents a worldwide issue requiring advancements to patient flow and the efficacious use of care [21].

Several interrelated factors contribute to the remarkably high rate of protracted hospital stays at TASH (84.4%), compared to those found elsewhere in the world. Tight confines in individual hospitals, including limited inpatient bed capacity, crowding, workforce shortages, and operational inefficiencies, contribute to patient care and transfer delays. The issue is made worse by shortcomings in the healthcare infrastructure, such as a lack of resources, subpar diagnostic facilities, and ineffective referral networks.

Comparisons are made more difficult by the fact that different nations have different definitions of prolonged LOS. A protracted visit, for instance, is 72 hours or more in Nigeria, 8 hours or more in Taiwan and California, and more than 4 hours in Australia, the USA, and Saudi Arabia [22, 23, 24]. In accordance with the Ethiopian Hospital Service Guidelines (2016) [29], this study used a criterion of more than 24 hours, enabling comparisons with research from Kenya, Tanzania, and Uganda [25,26,27].

Prior treatment and patient alertness also influence ED stay duration, as reflected in international studies. Research from Canada and Australia shows that patients who received treatment prior to arriving at the ED often require less evaluation and stabilization, reducing their LOS [28,29]. These results are consistent with the 55% decreased likelihood of longer stays among pre-treated individuals in this trial. Because they required prompt intensive care, comatose patients at TASH were 91% less likely to have extended hospitalizations.

Additionally, the study discovered that ED LOS was highly impacted by the length of sickness, the necessity of diagnostic tests, and the quantity of investigations ordered. The likelihood of a protracted stay was 4.6 times higher for those whose illness lasted longer than 24 hours. Diagnostic tests are important; patients who need tests have a 14-fold higher chance of having a longer hospital stay. This result is in line with studies conducted in wealthy nations like Australia, where ED congestion is exacerbated by delays in diagnostic outcomes [30]. This pattern aligns with findings from similar studies conducted at East Carolina University, Taiwan, and New Jersey [31,32,33].

Significantly shorter ED visits were linked to surgical intervention and observation. The likelihood of an extended hospital stay was 86% lower for those who had surgery. Faster transfers were probably the outcome of TASH's urgent surgical situations and priority access to the operating room. The effectiveness of short-term monitoring in decision-making was demonstrated by the 89% reduction in lengthy stays that observation, as an intervention, produced.

The TASH research population showed a variety of arrival methods, with taxis accounting for the bulk of patients (67.5%), followed by public transportation (21.2%) and ambulances (9.3%). Patient outcomes and the distribution of resources in the emergency department are impacted by these disparities in access to emergency services. While 28.8% of patients self-referred, a sizable percentage (61.6%) were suggested by medical establishments. The importance of primary care and referral networks in pediatric crises is shown by the fact that a sizable percentage (61.6%) of patients were referred from medical facilities, whereas 28.8% self-referred. The ED needs to be ready to handle typical health concerns, as the most common causes for seeking medical attention were hematology-oncology concerns (19.9%), followed by respiratory issues (16.9%) and

gastrointestinal problems (14.2%).

88.1% of patients were awake when they arrived, whereas a lower proportion of patients required urgent, critical care because they appeared disoriented (9.6%) or comatose (2.3%). Peak patient arrivals happened on weekdays (77.2%) and in the afternoon (44.0%), indicating that daily routines and school schedules had an impact on pediatric health issues. 88.4% of patients were triaged in less than five minutes, indicating that waiting times prior to triage were brief.

Nearly all patients (98.3%) underwent medical investigations, with laboratory tests being the most common. The availability of diagnostic services had a significant impact on length of stay (LOS), with 29.6% of patients reporting delays in obtaining lab results. Staffing levels were identified as a critical factor, with 90.1% of respondents noting insufficient staffing to meet demand.

In conclusion, improved staffing strategies, resource allocation, and streamlined diagnostic processes are essential for enhancing operational efficiency and patient care in the ED. To improve patient outcomes and operational efficiency in pediatric emergency rooms, these concerns must be addressed through strategic planning, increased staffing, and the adoption of streamlined workflows.

## 7. Limitations of the study

First, it was done only at Tikur Anbessa Specialized Hospital (TASH), a tertiary referral facility, which could limit the transferability of results to other hospitals with different patients, healthcare systems, and available resources. Because it was a large referral center, the site may have had a higher likelihood of critically ill patients, which could have overstated the rate of prolonged hospitalizations in contrast to a smaller medical facility.

In addition, variability in triage protocols, admission criteria, and discharge procedures in hospitals in different locations also renders direct comparisons difficult.

## 8.Conclusion

The study on length of stay (LOS) in relation of pediatric emergency department (ED) in Tikur Anbessa Specialized Hospital (TASH) noted high numbers of prolonged LOS with 84.3% of patients remaining in the ED longer than 24 hours elongated. Prolonged LOS came as a result of hospital specific barriers, systemic healthcare limitations, clinical components, and the socioeconomic status of patients, including lack of inpatient bed availability, congested patient volumes, time-to-explorer diagnostic studies, the distribution of patients handing off to principles of quality and safety and slow transport out of the ED. Prior treatment, length of illness, and number of diagnostic studies ordered were factors leading to prolonged LOS, with pre-treated patients having shorter LOS, and un-previously treated patients, who needed several investigations, longer LOS. Also, surgical cases and observation had shorter LOS likely due to hands of total patient care with the burden of the approach placed of time critical according to the case. Staff shortages and slow results of lab studies also contributed to prolonged LOS and suggests thought of resource allocation, triage/ workflow of the emergency care delivery process, diagnostic management still needs to be priority. In summary, the identified challenges of planning, more staffing and using advanced triage development systems with AI components, to improve the flow of patients and improve congestion. In conjunction, it will also improve the efficiency and quality of emergency care of TASH.

## 9. Recommendation

To reduce the high prevalence of prolonged stays in the pediatric emergency department (ED) at Tikur Anbessa Specialized Hospital (TASH), several key interventions should be implemented. Expanding inpatient bed capacity and optimizing bed turnover through improved discharge planning can help alleviate ED congestion. Enhancing staffing levels by recruiting additional healthcare professionals, including physicians, nurses, and support staff, will improve patient management and care delivery. Additionally, streamlining diagnostic processes by reducing delays in laboratory and imaging services through optimized workflows, rapid diagnostic technologies, and 24/7 service availability can significantly decrease the length of stay (LOS

Strengthening referral systems between primary healthcare facilities and the ED through standardized guidelines will prevent unnecessary visits and ensure critically ill patients receive timely care. Expanding pre-hospital treatment by improving ambulance services and encouraging early medical intervention at lower-level healthcare facilities can help stabilize patients before arrival, reducing the severity of cases and LOS. Additionally, enhancing staff training, retention, and working conditions can boost efficiency and improve patient outcomes. Public awareness campaigns on early healthcare-seeking behavior will further reduce delays in seeking medical attention, preventing complications that lead to extended ED stays. By implementing these strategic measures, TASH can enhance patient flow, reduce congestion, and improve the overall efficiency and quality of pediatric emergency care.

# 10. REFERENCE

1. I.A. Barata S.E. Mace M. Wu L. Rosen K. Bailey A. Stephens A.M. Dietrich G. Sharieff L. Benjamin C.S. Amato

(https://doi.org/10.1016/j.annemergmed.2013.07.126)

2. An Experience of Operating the Pediatric Emergency Room Jaewoo Kim Department of Emergency Medicine, Soonchunhyang University Cheonan Hospital, Soonchunhyang University College of Medicine, Cheonan, Korea

(https://jsms.sch.ac.kr/journal/view.php?doi=10.15746/sms.12.008)

3. A Prospective, Multicenter Study of Factors Affecting the Emergency Department Length of Stay of Pediatric Patients: Does the Diagnosis, Especially Psychiatric Diagnosis, Matter? S.E. Mace A. Stephens C. Amato L. Benjamin A. Dietrich G. Sharieff

(https://www.annemergmed.com/article/S0196-0644(13)01154 2/fulltext#:~:text=A%20Prospective%2C%20Multicenter,G.%20Sharieff)

4. Areas of delay related to prolonged length of stay in an emergency department of an academic hospital in South Africa Kapari Mashao 1, Tanya Heyns 1, Zelda White

(https://pubmed.ncbi.nlm.nih.gov/33747758/#:~:text=Afr%20J%20Emerg,2021%20Mar %2010)

5. Factors associated with the length of stay in emergency departments in Southern-Ethiopia Getahun H/meskel Alemu, Keneni Gutema Negari, Kaleb Mayisso Rodamo & Agete Tadewos Hirigo

(Getahun H/meskel Alemu et al., 2019)

6. Length of stay in the emergency department and its associated factors among pediatric patients attending Wolaita Sodo University Teaching and Referral Hospital, Southern, Ethiopia Kiberealeme Bisete Negasi, Almaz Tefera Gonete, Migbaru Getachew, Nega Tezera Assimamaw, Bewuketu Terefe

(https://bmcemergmed.biomedcentral.com/articles/10.1186/s12873-022-00740-3#auth-Kiberealeme_Bisete-Negasi-Aff1)

7. Language and Length of Stay in the Pediatric Emergency Department R.D. Goldman P. Amin A. Macpherson

(https://dx.doi.org/10.1016/J.ANNEMERGMED.2005.06.401)

8. Bashkin O, Caspi S, Haligoa R, Mizrahi S, Stalnikowicz R. Organizational factors affecting length of stay in the emergency department: initial observational study. Isr J health policy Res. 2015;4(1):38.

( https://link.springer.com/doi/10.1186/s13584-015-0035-6)

9. Riney LC, Brokamp C, Beck AF, Pomerantz WJ, Schwartz HP, Florin TA. Emergency medical services utilization is associated with community deprivation in children. Prehospital Emerg Care. 2019;23(2):225–32

(https://doi.org/10.1080%2F10903127.2018.1501124)

10. Kusumawati HI, Magarey J, Rasmussen P. Analysis of factors influencing length of stay in the Emergency Department in public hospital. Yogyakarta Indonesia Australasian emergency care. 2019;22(3):174–9

(https://doi.org/10.1016%2Fj.auec.2019.06.001)

11. Hosseininejad SM, Aminiahidashti H, Pashaei SM, Goli Khatir I, Montazer SH, Bozorgi F, Mahmoudi F. Determinants of Prolonged Length of Stay in the Emergency Department; a Cross-sectional Study. Emerg (Tehran). 2017;5(1):e53. Epub 2017 Jan 18.

(https://pubmed.ncbi.nlm.nih.gov/28286860/#:~:text=2017%3B5(1)%3Ae53,2017%20Jan%2018

12. Ababa A. Federal democratic republic of Ethiopia ministry of health. Ethiopia: Postnatal Care; 2003.

13. Wu T-Y, Liu F-Y, Cui C-Y, Qi X-B, Su B. A genetic adaptive pattern-low hemoglobin concentration in the Himalayan highlanders. Zhongguo ying yong sheng li xue za zhi = Zhongguo yingyong shenglixue zazhi = Chinese. J Appl Physiol. 2013;29(6):481–93.

(https://bmcemergmed.biomedcentral.com/articles/casredirect/1:CAS:528:DC%2BC2MXht1KksbbM)

14.National Hospital Ambulatory Medical Care Survey

(https://www.cdc.gov/nchs/ahcd/index.htm)

15.Which Factors Predict Hospital Length-of-Stay for Children Admitted to the Neonatal Intensive Care Unit and Pediatric Ward? A Hospital-Based Prospective Study Biniyam Sahiledengle, MPH1, Yohannes Tekalegn, MPH1, Demisu Zenbaba, MPH1, Demelash Woldeyohannes, MPH2, and Zinash Teferu, MPH1

(https://doi.org/10.1177/11786302211009894)

16. Evaluation of an emergency department lean process improvement program to reduce length of stay Marian J Vermeulen 1, Therese A Stukel 2, Astrid Guttmann 3, Brian H Rowe 4, Merrick Zwarenstein 5, Brian Golden 6, Amit Nigam 7, Geoff Anderson 8, Robert S Bell 9, Michael J Schull 10; ED Investigator Team

https://doi.org/10.1016/j.annemergmed.2014.06.007

17. Milfi Al-Onazi, Ahmed Al Hajri, Angela Caswell, Maria Leizl Hugo Villanueva, Zuhair Mohammed, Vania Esteves, Faith Vabasa, Khaled Al-Surimi Correspondence to Milfi Al-Onazi

(onazim@ngha.med.sa)

18.Factors Affecting Length of Stay in Pediatric Emergency Department in a Teaching Hospital in Saudi Arabia Abdullah A Yousef 1 2, Mohammed H Al Qahtani 1 2, Abdullah K Al-Mutairi 1 2, Faisal O AlQurashi 1 2, Reem S AlOmar 3, Nouf A AlShamlan 3, Malak A Al Shammari 3, Hannen A Yousef

(https://doi.org/10.5455/medarh.2023.77.268-275)

19. Analysis of admissions to the pediatric emergency ward of Tikur Anbessa Hospital in Addis Ababa, Ethiopia Dagnew Muluneh1, Damte Shimelis2, Daniel Benti3

https://www.ajol.info/index.php/ejhd/article/view/10031/2283

20. Bacha T, Shiferaw Y, Abebaw E. Outcome of diabetic ketoacidosis among pediatric patients managed with modified DKA protocol at Tikur Anbessa specialized hospital and Yekatit 12 hospital, Addis Ababa, Ethiopia. Endocrinol Diab Metab. 2022;5:e363. Doi:

https://doi.org/10.1002/edm2.363)

21, Nega T, Bewkwtu T, Kibralem B, Migbaru G, Almaz T

Length_of_stay_in_the_emergency_department_and_its_associated_factors_among_pediatric_patients_attending_Wolaita_Sodo_University_Teaching_and_Referral_Hospital_Southern_Ethiopia

https://www.researchgate.net/publication/366217002

22. Al Nhdi N, Al Asmari H, Al Thobaity A. Investigating Indicators of Waiting Time and Length of Stay in Emergency Departments. Open Access Emerg Med. 2021;13:311–8. https://doi.org/10.2147/oaem.s316366.

23. Geelhoed GC, Klerk NH. Emergency department overcrowding, mortality and the 4-hour rule in Western Australia. Med J Aust. 2012;196(2):122–6. https://doi.org/10.5694/mja11.11159.

24. Case SD, Case BG, Olfson M, Linakis JG, Laska EM. Length of Stay of Pediatric Mental Health Emergency Department Visits in the United States. J Am Acad Child Adolesc Psychiatry. 2011;50(11):1110–9. https://doi.org/10.1016/j.jaac.2011.08.011.

25. Shisundi PY. Factors influencing patient waiting time in emergency department of Khunyangu Sub-County hospital, Kenya. 2023.

26. Zimmerman, A., L.K. Barcenas, M. Pesambili, F. Sakita, S. Mallya, J.R.N. Vissoci, . . . C.A. Staton. Injury characteristics and their association with clinical complications among emergency care patients in Tanzania. Afr J Emerg Med. 2022;12(4):378–386.

27. Pickering AE, Dreifuss HM, Ndyamwijuka C, Nichter M, Dreifuss BA, Investigators GECC. Getting to the Emergency Department in time: Interviews with patients and their caregivers on the challenges to emergency care utilization in rural Uganda. PLoS ONE. 2022;17(8):e027233

28. Effect of a Multi-Diagnosis Observation Unit on Emergency Department Length of Stay and Inpatient Admission Rate at Two Canadian Hospitals

Amy H Y Cheng [1], Neil G Barclay [1], Riyad B Abu-Laban [1]

29. ETHIOPIA, F.D.R.O. and M.O. HEALTH, ETHIOPIAN HOSPITAL SERVICES TRANSFORMATION GUIDELINES. Emergency admissions processes. Vol. 1. 2016, Ethiopia. 440.

30.The_Effect_of_Laboratory_Testing_on_Emergency_Department_Length_of_Stay_A_Multihospital_Longitudinal_Study_Applying_a_Cross-classified_Random-effect_Modeling_Approach Ling Li, PhD, Andrew Georgiou, PhD, Elia Vecellio, MSc, Alex Eigenstetter, George Toouli, MPH,Roger Wilson, MBChB, FRCPA, and Johanna I. Westbrook, PhD

https://www.researchgate.net/publication/265865454_

31. i S-T, Chiu N-C, Kung W-C, Chen J-C. Factors Affecting Length of Stay in the Pediatric Emergency Department. Pediatr Neonatol. 2013;54(3):179–87. https://doi.org/10.1016/j.pedneo.2012.11.01

32. 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. https://doi.org/10.1111/j.1553-2712.2012.01353.x.

33. Neyman G, Dalsey W. A Quantification of the impact of awaiting results of a urinalysis upon emergency department length of stay. J Emerg Med. 2021;60(2):158–64.