# MEKELLE UNIVERSITY

# COLLEGE OF HEALTH SNCE

# SCHOOL OF NURSING

**OUTCOMES OF EMERGENCY ADMISSIONS AND ASSOCIATED FACTORS AMONG CHILDREN ADMITTED TO THE PEDIATRIC EMERGENCY UNIT OF PUBLIC HOSPITALS IN MEKELLE, ETHIOPIA, 2024.**

**BY: GIRMAY HALEFOM KIROS (BSc)**

**A THESIS SUBMITTED TO MEKELLE UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF NURSING, IN PARTIAL FULFILMENT OF FOR THE REQUIREMENTS MASTER OF PEDIATRICS AND CHILD HEALTH NURSING.**

**JULY, 2024**

**MEKELLE, ETHIOPIA**

MEKELLE UNIVERSITY
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Master's Thesis Submission Form

| | |
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This is to certify that the thesis titled "Outcomes of emergency admissions and associated factors among children admitted to the pediatric emergency unit of public hospitals in Mekelle, Ethiopia" is submitted in partial fulfillment of the requirements for the degree of Masters in "pediatric and child health nursing" to the Graduate Program of the College of health science of Mekelle University and has been carried out by Girmay Halefom Kiros ID No: CHS/PCHN009/13 under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence here by can submit the thesis to the Department.

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## LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AGE | Acute Gastro Enteritis |
| AOR | Adjusted Odd Ratio |
| ARDS | Acute Respiratory Distress syndrome |
| CHD | Congestive Heart Disease |
| CI | Confidence Interval |
| ARDS | Acute Respiratory Distress syndrome |
| DAMA | Discharged Against Medical Advice |
| EDHS | Ethiopia Demographic and Health Survey |
| EPH | Ethiopian Public Health Institute |
| ETB | Ethiopian Birr |
| FMOH | Federal Ministry of Health |
| IQR | Inter Quartile Range |
| LMA | Left against Medical Advice |
| LOS | Length of Stay |
| MDG | Millennium Development Goal |
| MV | Mechanical Ventilation |
| MOF | Multi Organ Failure |
| PED | Pediatric Emergency Department |
| PI | Principal Investigator |
| PICU | Pediatric Intensive Care Unit |
| PEM | Pediatric emergency medicine |
| SDG | Sustainable Development Goal |
| SAM | Severe Acute Malnutrition |
| SPSS | Statistical package for social science |
| TASH | Tikur Anbesa Specialized Hospital |
| TB | Tuberculosis Bacilli |
| URTI | Upper Respiratory Tract Infection, |
| WHA | World Health Assembly |
| WHO | World Health Organization |

## Abstract

**Background**: Globally, approximately 5.2 million children under five die each year, with a significant proportion of these deaths occurring in hospitals following emergency admissions, underscoring persistent inequities despite declining mortality rates. In Ethiopia, the under-5 mortality rate stands at 55 per 1,000 live births, with emergency admissions accounting for 39% of pediatric hospitalizations. Despite global efforts, gaps remain in understanding the outcomes and factors influencing pediatric emergency admissions, particularly in low-resource settings. This study aims to assess the outcomes and associated factors of emergency admissions among children in selected public hospitals.

**Objective**: The aim of the study was to assess the outcomes of emergency admissions and associated factors among children admitted to the pediatric emergency unit of public hospitals In Mekelle, Ethiopia, 2024.

**Methods**: A health facility-based retrospective cross-sectional study was conducted in randomly selected three public hospitals located in Mekelle, Ethiopia. The total sample size was 294, which was proportionally allocated across the hospitals based on their estimated monthly case admissions. Medical records from each hospital were selected using a simple random sampling method. A pretest was carried out on 5% of the sample size at Kuiha General Hospital. In the bivariate analysis, variables with a p-value < 0.2 were considered candidates for multivariable logistic regression analysis, with statistical significance set at a p-value of < 0.05.

**Result:** Out of 294 children admitted to the pediatric emergency department, 45.2% showed clinical improvement, 25.9% required ICU transfer, 18.7% were moved to general wards, and 6.8% died. Multivariable logistic regression revealed that previous hospital visit (AOR = 3.7, 95% CI: 1.17, 11.64), previous admission (AOR = 6.37, 95% CI: 2.09, 19.45), children with comorbidities (AOR = 6.71, 95% CI: 2.32, 19.37) and malnourished children (AOR = 4.8, 95% CI: 1.23, 18.8) had significantly higher odds of death.

**Conclusion and recommendation:** The mortality rate is high with previous hospital visit, previous admission, the presence of comorbidities and being malnourished were found to be strong predictors of poor outcomes, underscoring the need for early identification and targeted care for high-risk pediatric patients. Health facilities should enhance follow-up for previously hospitalized children and implement routine comorbidity screening.

**Key words**: Pediatric emergency unit, admission, Outcome, associated factors, Tigray, Ethiopia.

# 1. INTRODUCTION

## 1.1. Background

Pediatric emergency condition is a broad aspect of pathologies/disorders requiring proper emergency care as it is the only option of management to save life, avoid/minimize disability. They are a public health priority in the world and in Africa because of their considerable morbidity and mortality. Pediatric emergencies are nowadays one of the most sensitive areas of medicine and are the subject of questioning in many countries. At the time of hospital admission, children and adolescents may experience many of the same processes of care that have been the focus of hospital discharge quality improvement initiatives, including unstructured handoffs and poor communication between health care clinicians.

Also similar to hospital discharge, hospital admission may cause substantial stress for patients and their families. Although hospital discharge processes have been the focus of several quality improvement efforts over the last decade, analogous guidance to improve hospital admission processes is scant, particularly in the case of direct admission. Direct admissions may originate from primary care practices, specialty clinics, urgent care centers, and patients' homes. Among all pediatric hospitalizations, including scheduled admissions for surgeries, procedures, and chronic disease management, almost half originate as direct admissions (1).

In addition to that studying outcomes and associated factors among children admitted to pediatric emergency units in public hospitals is crucial for understanding the healthcare needs of the population and improving healthcare delivery. Understanding the outcomes of emergency admissions among children admitted to public hospital pediatric units is essential for optimizing care delivery, resource allocation, and public health policies (2).

The health and survival of children is a concern to every country throughout the globe. However, children under the age of five accounted for 70% of deaths and a total of 5.2 million deaths occurred among children under the age of 5 in 2019 worldwide. A total of 2.2 million Children and adolescents aged greater than 5 died, with 43% of deaths occurring during the adolescent period. Preventable diseases such as pneumonia, diarrheal diseases, and malaria are major causes of childhood morbidity and mortality globally. Pneumonia, diarrhea and malaria account for 41% of yearly deaths globally and 49% in Africa. According to 2019 Ethiopia Mini Demographic and

Health Survey (EDHS) the prevalence of under-five mortality rate in Ethiopia is 59 deaths per 1,000 live births. There was an increase in overall admission for children and young people between 2006/7- 2015/16 from 2.6 million admissions to 2.9 million admissions. Emergency admissions were the most common type of admissions which constituted about 39%.

There are number of reasons why children and their families may seek emergency care in a hospital. In many situations, it is the exact place to go, or it could be the mere option (3).

One of the primary goals of the World Health Assembly is to improve emergency services, particularly for children through the Millennium Development Goal (MDG) and Sustainable Development Goal (SDG). Emergency care especially for children is one of such services, which would improve their chances of survival. In reality, the number of children under the age of five who die every year from preventable causes has dropped from 12.5 million in 1990 to 5.2 million in 2019. A significant goal of the (SDGs) is to reduce child mortality to less than 2.5 percent in all countries by 2030. Between 2015 and 2030, the global birth rate is predicted to remain around 140 million per year. 121 nations have already achieved the SDGs' objective for under five mortality (4).

The aim of this study is to improve the quality of life of pediatrics by minimize the mortality and disability through standard of clinical emergency care. The determinant factors for the outcome of intervention may varies from health facility to health facility. In Ethiopia some studies were conducted to assess the pattern and outcome of admissions in children emergency units and all the studies have shown a predominance of respiratory diseases as the major causes of morbidities and mortality in children (5).

## 1.2. Statement of the problem

There is a notable gap in understanding the outcomes of emergency admissions among children in pediatric emergency units of public hospitals, as well as the factors contributing to these outcomes. Despite being frontline facilities for urgent pediatric care, disparities persist in clinical results, length of stay, readmission rates, and mortality among pediatric patients. This knowledge gap impedes efforts to optimize care delivery and improve outcomes for this vulnerable population. Factors such as limited access to preventive care, socio-economic barriers, and healthcare disparities contribute to differential outcomes among pediatric patients, exacerbating health inequities. Addressing this problem requires comprehensive data collection and analysis methodologies, as well as a thorough examination of the multifaceted factors contributing to differential outcomes in pediatric emergency care settings. By clarifying these complexities, researchers can provide valuable insights to inform policy interventions and clinical practice guidelines aimed at promoting health equity and ensuring optimal outcomes for all pediatric patients in public hospital settings (6).

In developed countries, injury is the leading cause of death and disability in children, with head injury being the most common type of injury and one of the most common reasons for presentation to the emergency department (ED). Children are evaluated annually in the EDs in the United States for blunt head trauma, with an increasing trend over time. The vast majority (> 95%) of these injuries, however, are mild in severity (7).

Several key issues underline the urgency of addressing this problem. Primary there is a lack of comprehensive data and analysis regarding the outcomes of emergency admissions among children in public hospital settings. Without a clear understanding of the prevailing trends and patterns, healthcare providers and policymakers struggle to implement targeted interventions and allocate resources effectively (8).

Pediatric emergency situations are often ignored around the world, particularly in developing countries. The number of children hospitalized for emergency reasons has climbed dramatically. There is no extensive research on the management outcome of pediatric emergency admissions and associated factors in industrialized countries, but developing countries have paid little attention to it. Furthermore The majority of hospitals lack designated emergency care units, healthcare staff trained to worry about critically ill children, adequate number of staff, rapid guidelines and

protocols, access to necessary medications, supplies, equipment, and institutional obstacles during the implementation of life-saving interventions (9).

Additionally, a thorough examination of the factors contributing to differential outcomes is imperative. Socio-economic factors, including access to preventive care and health insurance coverage, play a significant role in shaping pediatric health outcomes. Moreover, systemic issues such as healthcare discrepancies and resource allocation challenges must be addressed to ensure equitable access to high-quality emergency care for all children. By clarifying the complex interplay between clinical, socio-economic, and systemic factors, researchers can provide valuable insights to inform policy interventions and clinical practice guidelines. Efforts to improve outcomes of emergency admissions among children in public hospitals must be multifaceted, addressing both clinical care delivery and broader socio-economic determinants of health. Ultimately, addressing disparities in pediatric emergency care is crucial for promoting health equity and ensuring optimal outcomes for all pediatric patients (10).

## 1.3. Significance of the Study

This study on the determinants of emergency admissions outcomes and contributing factors in children in public hospital pediatric emergency services is of a critical need to strengthen healthcare systems and improve survival rates among children. Under-five mortality is mostly explained by pediatric emergencies, particularly in low-resource settings where delay in seeking care, limited resources, and systemic inefficiencies exacerbate poor outcomes. The findings will guide the development of uniform emergency care protocols, which will enable prompt and effective treatment of critically ill children. The study is an essential tool for healthcare professionals and public health planners, enabling them to make data-informed decisions to reduce avoidable deaths among children.

As a result of the scarcity of context-specific studies on pediatric emergency care in public hospitals, this study fills an essential knowledge gap and serves as the foundation for future studies and programmatic interventions. Enhanced pediatric emergency care, saves lives and avoids the long-term socioeconomic burden for families and health systems, complementing global efforts toward equitable and sustainable child health outcomes. The generated data will be crucial in improving clinical practice, and advancing research in pediatric emergency medicine.

# 2. LITERATURE REVIEW

## 2.1. Outcome of emergency admission

A retrospective, institution-based review conducted in the Pediatric Emergency Unit of the Federal Medical Centre in Nigeria reported a mortality rate of 11.6%, with 0.8% of patients discharged against medical advice and 1.2% absconding from admission (15). In a study carried out in Southwest Nigeria, 33% of patients were transferred to other wards, 7% died, and 5% left against medical advice (16). A five-year review study in Sokoto, Nigeria, found that 40.8% of patients were discharged, 43.3% were transferred, and 11.2% died (17). Similarly, a study at the University of Nigeria Teaching Hospital, Enugu, showed that 50.4% were discharged, 44.3% were transferred, 5.14% died, and 0.11% were discharged against medical advice, and 0.05% absconded (18).

At Dilla University Referral Hospital in Ethiopia, 51% of children improved, 40.9% were transferred to wards, 7.6% died, 0.4% left against medical advice, and 0.1% were referred to external facilities (19). In a five-year retrospective case review at Tikur Anbessa Specialized Hospital, the mortality rate in the pediatric emergency department was 4.1 % (20). Similarly, a retrospective cross-sectional study among pediatric patients admitted to the pediatric ICU revealed that 50.69% improved, 43.8% died, 3.6% left against medical advice, and 1.94% were referred to other hospitals (21).

### 2.1.2 Factors associated with treatment outcome

In a cross-sectional study done in Dilla University Referral Hospital, Ethiopia, children presented with diarrhea, severe respiratory distress, coma, comorbidity and delay to seek healthcare were significantly associated factors with emergency unit mortality, whereas pneumonia and severe acute malnutrition were significantly associated factors with intrahospital unit/ward transfer (4).

A multivariate analysis done in Tikur Anbessa hospital revealed that shortness of breath, late onset of signs and symptoms, fever, and diarrhea had significant association with early mortality (5).

### 2.1.3 Socio-demographic characteristics

In a cross-sectional study done in Dilla University Referral Hospital, Ethiopia, children presented with diarrhea, severe respiratory distress, coma, comorbidity and delay to seek healthcare were significantly associated factors with emergency unit mortality, whereas pneumonia and severe acute malnutrition were significantly associated factors with intra hospital unit/ward transfer (19).

A multivariate analysis done in Tikur Anbessa hospital revealed that shortness of breath, late onset of signs and symptoms, fever, and diarrhea had significant association with early mortality (20).

### 2.1.4 Clinical characteristics

A study conducted at Debre Markos Specialized Hospital revealed that the clinical presentation at admission was 31.1% of a worse condition; 83.4% were vomiting, 29.1% were seizures, and 86.7% presented with a complaint of fever. Regarding physical findings, 42.9% were in respiratory distress, and 12.8 were unconscious. Of patients who had a fever, 64.8 % were febrile with a body temperature greater than 38 °c (22).

### 2.1.5 Clinical management and length of stay in the pediatric emergency Unit

A study conducted in Tikur Ambesa Specialized Hospital revealed that 39.3% of patients were presented to PED as self-referral, 25.4% were referred from public hospitals, and 13.9% were referred to hospitals from private health facilities. 56.8% had a previous hospital visit, and 41.9% also had a previous hospital admission. Vital signs were deranged during emergency presentation in 56.4% of the cases. Respiratory rate derangement was seen in 46% of children, and 30% of children also had deranged oxygen saturation. 20% of children were also had a known comorbid illness, among these, 38.3% had CHD comorbidity. 8.9% of children were malnourished (21).

### 2.1.6 Causes of Emergency Admission

A study conducted in Nigeria revealed that the common cause of admission and common indications for Emergency room visits were all infectious diseases, and they included malaria (18.3%), sepsis (11.9%), and Gastroenteritis. Upper respiratory tract infections: 8.8%, Bronchopneumonia 7.9%, and Meningitis 6.8%, in descending order of frequency. These diseases were also the predominant diagnosis in children < 6 years of age. On-infectious indications for Emergency room visits were trauma (5.9%), acute asthma (5.2%), and Sickle cell disease (4.1%).

Among neonates, the most common disease seen in emergency room consults was, Sepsis 19.5% followed equally by Asphyxia and prematurity (18.4%) (23).

### 2.1.7 Conceptual framework

This conceptual framework is developed based on the literature reviews; the detail of the framework is displayed in the figure below. The arrow in the diagram shows the relationship between the variables. As depicted in the diagram, at admission diagnosis, intervention given can directly influence the outcomes of emergency admissions and clinical characteristics have direct influence to the admission outcome, and the socio-demographic characteristics directly and indirect influence.

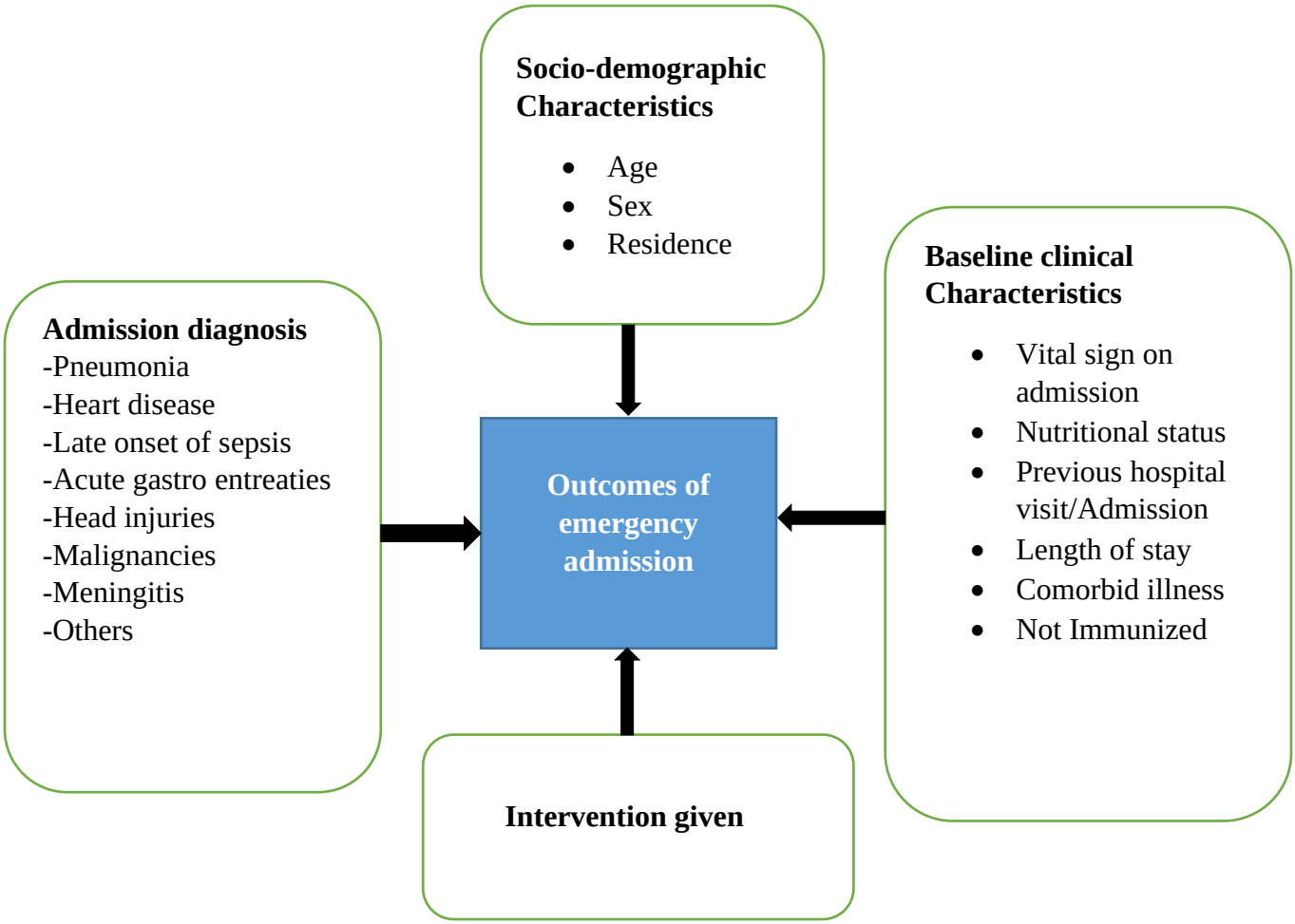


Figure 1: Conceptual frame work used for variables predicting the relationship of patient out come and associated factors among pediatric emergency unit patients admitted at public hospitals Mekelle, Tigray, Ethiopia adapted from different literatures (1, 15, 21, 24, 25).

# 3 OBJECTIVES

## 3.1 General objective

- To assess the outcomes of emergency admissions and associated factors among children admitted to the pediatric emergency unit of public hospitals, Mekelle, Ethiopia, May 23, 2024 to Jun 25, 2024.

## 3.2 Specific Objective

- To assess of outcomes of emergency admissions among children admitted in a pediatric emergency unit of public hospitals, Mekelle, Ethiopia, May 23, 2024 to Jun 25, 2024.
- To identify factors associated with the outcomes of emergency admissions among children admitted in public hospitals, Mekelle, Ethiopia, May 23, 2024 to Jun 25, 2024.

# 4 METHODS AND MATERIALS

## 4.1 Study Area and Period

The study was conducted in Mekelle city, capital of the Tigray Regional State, in the northern part of Ethiopia, approximately 789 kilometers away from Addis Ababa. Mekelle has seven sub-administrative zones and five public hospitals and nine public health centers. Five of the hospitals offer basic pediatric emergency admission and care services. The study was conducted from May 23, 2024, to June 25, 2024.

## 4.2 Study design

An institution based retrospective cross-sectional study design was employed.

## 4.3 Source population

All children who were admitted in pediatric emergency unit in Mekelle public hospitals.

## 4.4 Study population

All 0 to 15 years old children who were admitted to pediatric emergency unit in public hospitals in Mekelle during the study period.**4.5. Inclusion and Exclusion criteria**

### 4.5.1 Inclusion criteria

All 0 to 15 years patients admitted to the pediatric emergency units of the selected public hospitals during the study period were included in the study.

### 4.5.2 Exclusion Criteria

Children who died on arrival or within two hours of admission, those referred to other health facilities, and those with incomplete chart information were excluded from the study.

## 4.6. Sample size determination

The sample size for the first objective was determined using a single population proportion formula, considering the proportion of pediatrics with severe pneumonia to be 22.4% (p=0.224),

as reported in a previous study done in public hospitals in Addis Ababa, Ethiopia (1). The confidence interval was set at 95% ($Z_{\alpha/2} = 1.96$), and the margin of error was 5%. The sample size was determined using a single population proportion formula:

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

$$n = \frac{(1.96)^2 0.224(1-0.224)}{(0.05)^2} = \underline{\mathbf{267}}$$

Adding 10% as a non-respondent, considering lost or incomplete sheets, giving a total sample size **n = 294**.

The sample size for the second objective is summarized as follow:

Table 1: Sample size calculation for associated factors by using OpenEpi, open source calculator.

| Factors | CI | Power | AOR | Ratio | Sample size including 10% non-response rate |
|---|---|---|---|---|---|
| Fluid treatment | 95 | 0.8 | 0.14 | 53 | 136 |
| Known comorbidity | 95 | 0.8 | 4.65 | 31 | 79 |
| length of stay less than 24 hours | 95 | 0.8 | 4.2 | 36 | 90 |

Since the sample size for the first objective is larger than the second objective, 294 samples was selected.

## 4.7. Sampling procedure

The study population was selected from patient charts of three randomly chosen public hospitals in Mekelle that have pediatric emergency units, using a simple random sampling method. First, the total number of children admitted over the past two years was obtained from each hospital. The overall sample size was then proportionally allocated to each hospital based on their respective

admission numbers. Finally, the study units were selected through a systematic random sampling technique, using the institutional admission lists as the sampling frame.

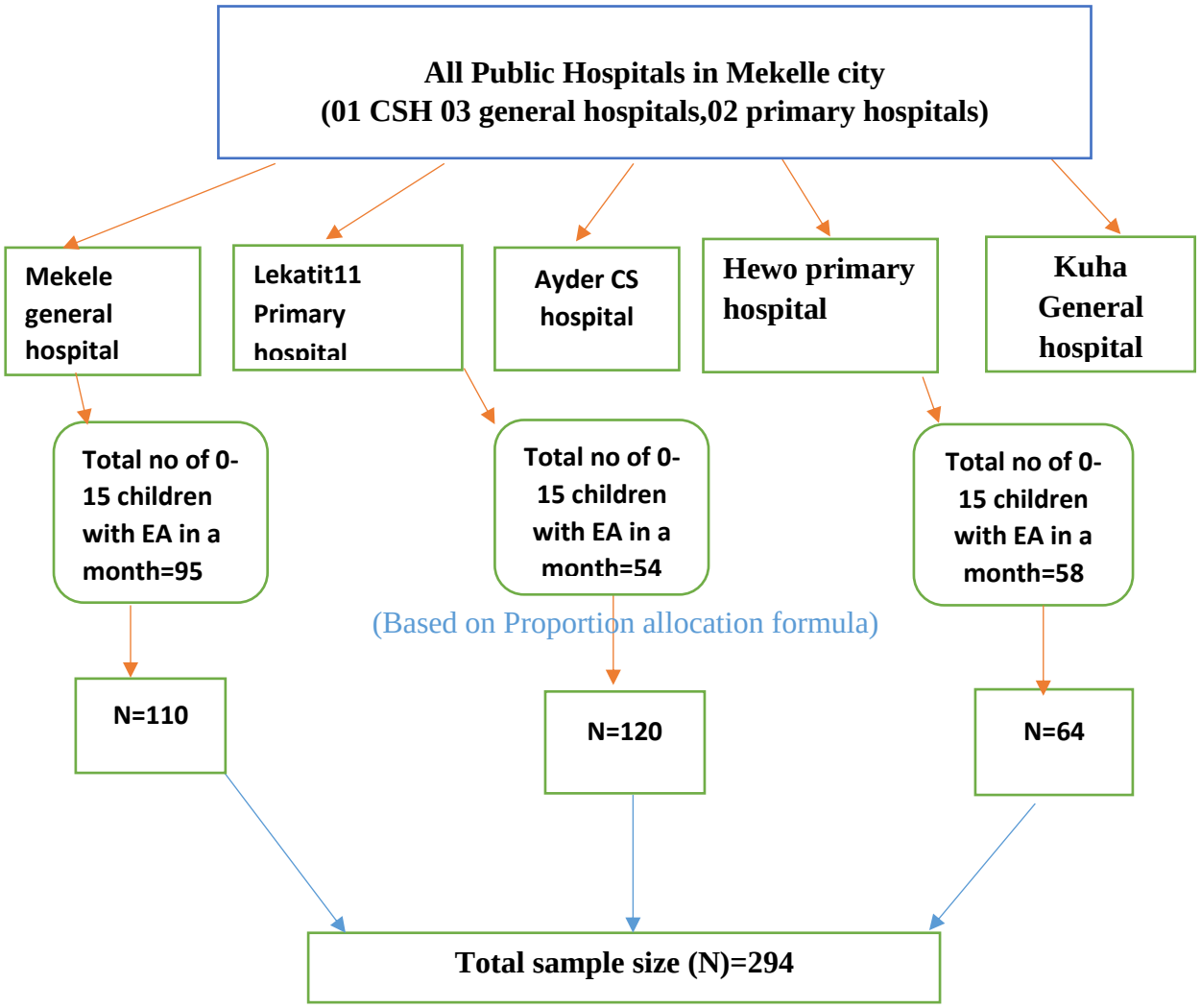


**Figure 2: - Sampling procedure**

## 4.8. Methods of Data Collection

A structured data collection tool was developed in English after some literature review related to emergency admission outcomes. The standard checklist had four parts: socio-demographic information, admission diagnosis,and emergency admission outcomes. Baseline clinical characteristics, nutritional status, comorbidities, hospital length of stay, interventions and management, and admission outcome status were the data that were collected. Additionally, the data abstraction format was piloted on 5% of the sample size at Kuiha General Hospital.

## 4.9. Data collection procedure

Data collection was carried out by three trained nurses working in the Pediatric Emergency Department (PED), using standardized data extraction form from history sheets, medical logbooks, and individual follow-up charts. Two supervisors were assigned to oversee and coordinate the entire data collection process. A two-day training was provided for both the supervisors and data collectors. In addition, a separate orientation session was held for the supervisors on how to effectively supervise the data collectors and ensure the completeness of the data abstraction forms. The supervisors were responsible for monitoring the data collection process, checking the completeness and accuracy of the abstraction forms, and addressing any issues or errors encountered.

## 4.10. Study variables

### 4.10.1. Dependent variables:

- Outcome of emergency admission (Death, Yes/No, Discharge, Improved/Not improved).

### 4.10.2. Independent variables

- Socio demographic Characteristics of children (age, sex and address), diagnosis at admission, nutritional status, vital sign on admission, intervention given, previous hospital visit, previous hospital admission, length of stay, comorbid illness.

## 4.11. Operational definitions

- **Pediatric emergency admissio**n: an admission where the physician admits the child to PED due to a sudden and unexpected change in child.
- **Clinical outcome**: reveals that patient survived or died at the time of discharge.
- **Pediatric patient Survived**: Patients who survived during pediatric emergency unit stay, including patients who were improved, transferred to the pediatric ward or discharged.
- **Pediatric patient non-survived**: Patients who were not alive at the time of discharge.
- **Discharge**: the procedure of releasing patients at the completion of their visit.
- **0(zero)**: it indicates for age of child at birth

## 4.12. Data quality Control

To ensure data quality, a pre-test was conducted on 5% of the total sample size at Kuiha Geneal Hospital, three weeks prior to the actual data collection period. The purpose of the pre-test was to assess the consistency and relevance of the data extraction form with the study objectives. Any errors or inconsistencies identified during the pre-test were corrected and the tool was modified accordingly. Based on the findings, appropriate feedback and adjustments were made. Additionally, data collectors and supervisors received two days of training on the data collection checklist and procedures to ensure uniformity and accuracy during data collection.

## 4.13. Methods of Data Analysis

Data entry and cleaning were performed using SPSS version 27. The results were presented using narratives, tables, and graphs. Bivariate logistic regression analysis was conducted to examine the association between each independent variable and the dependent variable. Variables that showed a significant association in the bivariate analysis were entered into a multivariable logistic regression model for further analysis. The strength of association between the dependent and independent variables was expressed using odds ratios (OR) with 95% confidence intervals (CI).

## 4.14. Ethical Considerations

Ethical clearance was obtained from the Institutional Review Board (IRB) of Mekelle University, College of Health Sciences. Support letters were secured from the Department of Nursing, and an

official letter of permission was requested from the Tigray Regional Health Bureau, as well as the respective Zonal and Woreda health offices. To ensure privacy and confidentiality, the data extraction form was anonymized, personal computers were secured with strong passwords, and data collectors were trained on maintaining data confidentiality.

### 4.15. Dissemination of findings

The results of the study was presented to the School of Nursing, College of Health Sciences at Mekelle University, as part of the partial fulfillment for the requirements of the MSc in Pediatrics and Child Health Nursing. The findings are also submitted to the Mekelle University College of Health Sciences, the Tigray Regional Health Bureau, and the Mekelle City Health Office. Additionally, efforts will be made to publish the study findings and disseminate them through various scientific journals and publications.

## 5. Results

### 5.1. Socio-demographic characteristics of children

This study included 294 children admitted to the pediatric emergency department with a 100% coverage. The demographic characteristics of the respondents showed that 202(68.8%) were below 59 months, followed by 58 (19.7%) between 60 to 120 months, and 34 (11.6%) between 120 to 180 months. The median age of the children was 40 months, with interquartile range (IQR) 23 to 67 months. Gender distribution, 133 (45.2%) were male and 161 (54.8%) were female. In terms of place of residence, 242(82.3%) of them were from urban areas (**Table 2**).

**Table 2**: Sociodemographic Characteristics of children admitted to the pediatric emergency unit of public hospitals in Mekelle, Ethiopia, 2024 (n=294).

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Age | 1-59 months | 202 | 68.7 |
| | 5-9 Years | 58 | 19.7 |
| | 10-15 Years | 34 | 11.6 |
| Sex | Male | 133 | 45.2 |
| | Female | 161 | 54.8 |
| Residence | Rural | 52 | 17.7 |
| | Urban | 242 | 82.3 |

## 5.2. Clinical Characteristics of the children

Of the total of 294 children who presented to the emergency department, 225 (76.5%) were presented on themselves, 26 (8.8%) were referred from governmental hospitals, 17 (5.8%) from governmental health centers, and 26 (8.8%) were referred from private health facilities. One hundred forty four (49%) were new admissions, while 81 (21.1%) of them were previously hospitalized. Additionally, 213 (78.9%) of the admitted children were previously admitted to the hospital (**Table 3**).

**Table 3**: Clinical characteristics of children admitted to the pediatric emergency unit of public hospitals in Mekelle, Ethiopia, 2024 (n=294).

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Referral Source | Self | 225 | 76.5 |
| | Public Hospitals | 26 | 8.8 |
| | Public Health centers | 17 | 5.8 |
| | Private Health Facilities | 26 | 8.8 |
| Previous Hospital Visit | Yes | 150 | 51 |
| | No | 144 | 49 |
| | Yes | 81 | 21.1 |

| | | | |
|---|---|---|---|
| Previous Hospital Admission | No | 213 | 78.9 |
| | Yes | 62 | 78.9 |
| Comorbidity | No | 232 | 21.1 |

### 5.3. Major causes of admission

Acute gastroenteritis was the predominant diagnosis, accounting for 111 cases (37.8% of admissions), followed by pneumonia with 90 cases (30.6%). The remaining cases comprised heart disease 12(4.1%), head injuries 12(4.1%), meningitis 10(3.4%), and various other conditions 59(20.1%).

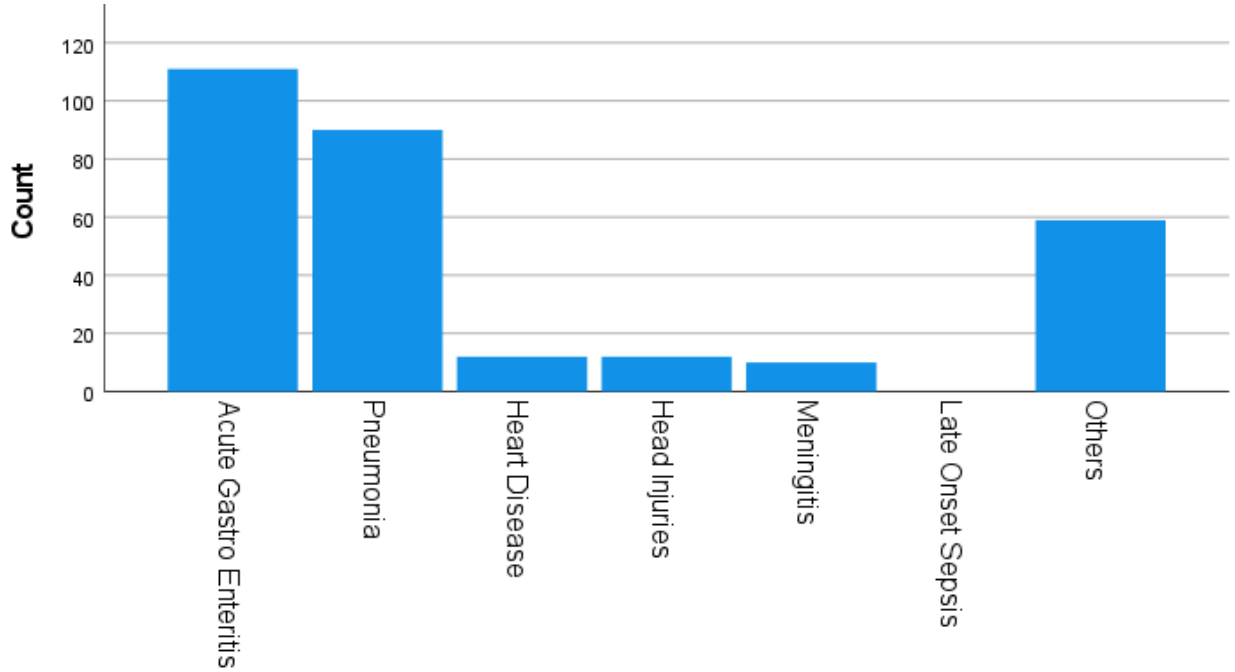


*Figure 2: Causes of pediatric admission in pediatric emergency unit of public hospitals in Mekelle, Ethiopia, 2024 (n=294)*

### 5.4. Treatment Outcomes

Treatment outcome analysis revealed that nearly half of the patients 133(45.2%) showed clinical improvement, 76(25.9%) required transfer to ICU, and 55(18.7%) were transferred to general

wards. twenty(6.8%) cases were experienced death with 7(2.4%) referrals and discharges against advice 3(1%).

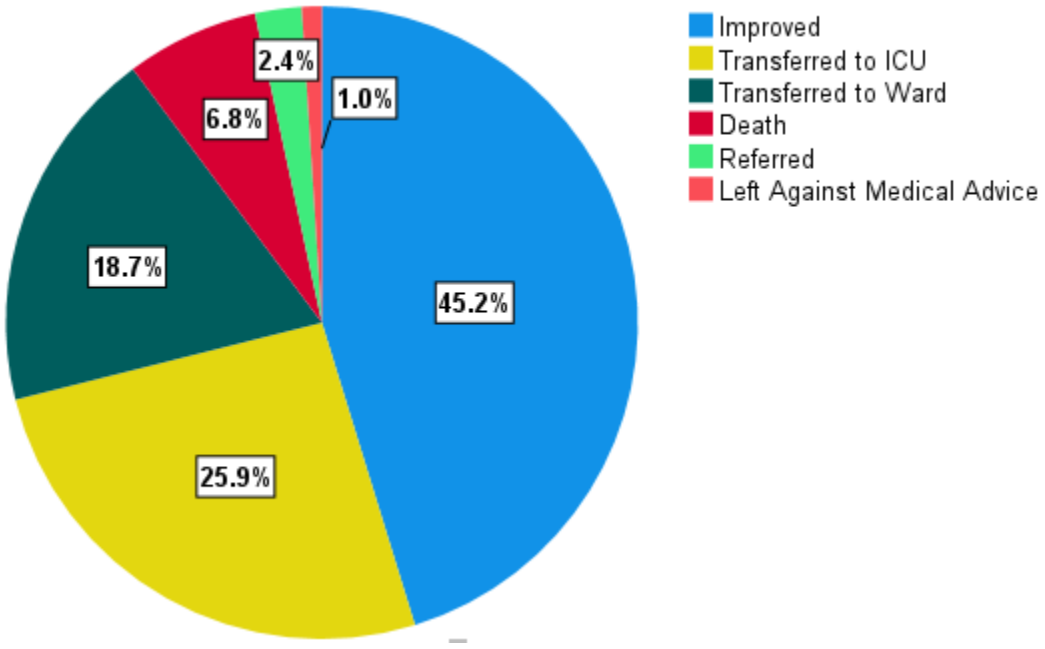


**Figure 3**: Treatment Outcomes of children admitted to the pediatric emergency unit of public hospitals in Mekelle, Ethiopia, 2024 (n=294)

## 5.5. Factors associated with treatment outcomes

Bivariate logistic regression was conducted to identify variables associated with treatment outcome among children who presented to the emergency department. Variables that were significant at $p < 0.2$ in the bivariate analysis were entered as candidate variables in the

multivariable logistic regression analysis. The following variables met the inclusion criteria: previous hospital visit (COR = 3.09, 95% CI: 1.09-8.73), previous hospital admission (COR = 7.21, 95% CI: 2.67-19.5), presence of comorbidity (COR = 8.5, 95% CI: 3.2-22.4), and nutritional status (COR = 4.01, 95% CI: 1.33-12.13).

These variables were then entered into a multivariable logistic regression model to adjust for confounding variables and determine independent predictors of treatment outcome. On multivariable logistic analysis, previous hospital visit, previous admission, presence of comorbidity and nutritional status were significantly associated with treatment outcome.

Children with a history of a previous hospital visit were found to possess a significantly greater likelihood of mortality compared to children who never visited a hospital visit in the past. Specifically, the odds of mortality in pediatrics with prior hospitalization were 3.7 times higher (AOR= 3.7, 95% CI: 1.17, 11.64). Similarly, history of prior hospitalization was significantly associated with death. The odds of mortality in previously admitted children were 6.37 times higher than children with no history of admission (AOR = 6.37, 95% CI: 2.09, 19.45). Comorbidity was also a significant predictor of increased mortality. The odds of mortality in children with one or more comorbidities were 6.71 times higher than children with no comorbidities (AOR = 6.71, 95% CI: 2.32, 19.37). Nutritional status was also a significant predictor of death. Malnourished children were nearly five times at risk of death compared to well-nourished children (AOR = 4.8, 95% CI: 1.23, 18.8) (**Table 4**).

**Table 4**: Bivariate and Multivariable analysis of outcomes of emergency admissions and associated factors among children admitted to the pediatric emergency unit of public hospitals in Mekelle, Ethiopia, 2024 (n=294)

| Variables | Categories | Outcome | | COR (95% CI) | AOR (95% CI) | Sig. |
|---|---|---|---|---|---|---|
| | | Died (%) | Survived (%) | | | |
| Previous Hospital Visit | Yes | 15(10) | 135(90) | 3.09(1.09-8.73) | 3.7(1.17-11.64) | 0.02* |
| | No | 5(3.5) | 139(96.5) | 1 | | |
| Previous Hospital Admission | Yes | 14(17.3) | 67(82.7) | 7.21(2.67-19.5) | 6.37(2.09-19.45) | 0.001*** |
| | No | 6(2.8) | 207(97.2) | 1 | | |
| Comorbidity | Yes | 13(21) | 49(79) | 8.5(3.2-22.4) | 6.71(2.32-19.37) | 0.001*** |
| | No | 7(3) | 225(97) | 1 | | |
| Nutritional Status | Malnourished | 5(19.2) | 21(80.8) | 4.01(1.33-12.13) | 4.8(1.23-18.8) | 0.02* |
| | Well Nourished | 15(5.6) | 253(94.4) | 1 | | |

**1** = indicates reference group ******* Statistically significant at P < 0.001 ***** Statistically significant at P < 0.05

This logistic regression model explains 33.7% of the variance in the dependent variable according to Nagelkerke $R^2$. The Hosmer-Lemeshow test yielded a p-value of 0.883 ($p > 0.05$), indicating insufficient evidence to reject the null hypothesis that the model's predicted values match the observed values. This result suggests good model fit, as the logistic regression predictions demonstrate adequate alignment with the actual outcome data.

## 6. Discussion

The aim of this study was to assess the treatment outcome and associated among children who were admitted to the pediatric emergency ward of public hospitals in Mekelle, Ethiopia.

In the present study, nearly half of the patients, 45.2%, demonstrated clinical improvement, 25.9% required transfer to the ICU, and 18.7% were transferred to general wards. The mortality rate was 6.8%, with 2.4% of patients referred to other hospitals and 1% discharged against medical advice. The proportion of clinical improvement observed in the current study is comparable to findings from Dilla University Referral Hospital with mortality rate of 7.6% (4) and 7% the University of Nigeria Teaching Hospital. The similar findings could be attributed to the same resource constraints, case-mix patterns, and patterns of health-seeking behaviors in the infant population of the particular setting.

The mortality rate lies between the rates reported in Ethiopia and Nigeria, but lower than those reported at the Federal Medical Centre in Nigeria (5) and Sokoto (2). This may be attributed to variations in disease severity, healthcare infrastructure, and emergency care practice between the nations. The mortality rate in the current study is, nonetheless, higher than the 4.1% observed in Tikur Anbessa Specialized Hospital (13). This disparity can be attributed to the fact that Tikur Anbessa is a referral national hospital with improved facilities and specialist personnel, which may conceivably have a positive influence on emergency outcomes. Furthermore, the discharge against medical advice rate observed in this study aligns with the low rates reported in earlier studies, ranging from 0.05%(3) to 5% (1).

Considering factors related to mortality, among the predictors developed in this study were previous hospital visit, previous admission, comorbidity, and malnutrition. Children with comorbidities were nearly eight times more likely to die. This finding is consistent with the literature highlighting that underlying conditions such as congenital abnormalities, HIV, or chronic respiratory disease can complicate the clinical course and reduce the chances of recovery (11,12).

Furthermore, a history of previous hospital admission was also found to be a significant predictor of poor outcomes. These results are consistent with a study conducted at Tikur Anbessa Specialized Hospital, where children with known comorbidities were found to be more likely to have poor outcomes (13). This may be an expression of underlying chronic illness or chronic acute episodes that may not have been under good control. Previous hospitalization is generally accepted

as a marker of vulnerability and may signify absence of follow-up services or underlying socio-economic problems.

The relatively higher odds of poor outcomes associated with comorbidities and previous hospital admissions in the current study may reflect variations in patient severity, referral patterns, or healthcare access. It is possible that children with repeated hospital visits and chronic illnesses represent a more clinically vulnerable population, requiring more intensive management.

Moreover, the current study found that malnourished children had 4.9 times higher odds of death, consistent with previous reports. For instance, malnutrition was detected in 8.9% of emergency admissions to Tikur Anbessa (13), and studies in Dilla University associated severe acute malnutrition with higher transfer and mortality rates (4). This argues that malnourished children are more susceptible and at risk of developing complications of acute illness.

In contrast to other studies, there was no correlation between outcome of treatment and socio-demographic factors in this research. Delays in seeking care and clinical conditions like coma and respiratory distress were however revealed by the Dilla University study to be major causes of mortality. The lack of correlation here may be due to a relatively homogeneous population or efficient triage and treatment procedures that made demographic variation have an equal effect.

# 7. Strength and Limitations of the study

## 7.1. Strength of the study

The study employs a standardized sampling approach, with proportional allocation across hospitals and systematic random sampling, which likely improves the representativeness of the results.

## 7.2. Limitation of the study

Its retrospective design relies on medical records, which may be incomplete or inaccurate, potentially omitting key variables such as immunization status or care timelines. The focus on a single urban region limits the generalizability of the findings to rural areas or other parts of Ethiopia with different healthcare infrastructures.

## 8. Conclusion

This study assessed treatment outcome and its determinants among children who were admitted to the pediatric emergency wards of public hospitals in Mekelle, Ethiopia. The mortality rate observed in this study was relatively high compared to some previous studies in Ethiopia and other countries, indicating an urgent need for targeted interventions in pediatric emergency care. The study identified previous hospital visit, prior admission, presence of comorbid conditions, and poor nutritional status as significant predictors of mortality among children admitted to pediatric emergency units.

## 9. Recommendation

**For Health facilities and practitioners:**

- Strengthen follow-up care for children with previous hospital admissions to reduce the risk of complications and readmission.
- Implement routine screening for comorbid conditions during emergency admission to ensure timely and appropriate management.
- Routine nutritional screening and immediate therapeutic interventions should be integrated into pediatric emergency care protocols.

**For Future Research:**

- Further studies should explore the impact of time to presentation, and immunization status on treatment outcomes.
- Qualitative studies may provide deeper insight into barriers to accessing early care.

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# 11.Annex

## 1.1. Data Etraction Form

This data abstraction format is prepared for outcome associated factors pediatric emergency admission among children's **zero up to fifteen** who are admitted in emergency unit, in selected public hospitals of mekelle city, Tigray region, 2024.The target study populations were first identified from registration books in the wards and operation theatre. Then the patients' medical records were retrieved and data was collected using a prepared standard and structured checklist from the chart.

1. Data collector name _____

2. Date of data collection _____

3. Data abstraction format identification number /_____/_____/

| **Part I** | Socio-demographic Characteristics | | |
|---|---|---|---|
| **Code** | **Question** | **Response** | **Skip to.ques.** |
| | Age of the child in months | _____month/s | |
| | Sex of the child | □ Male<br>□ Female | |
| | Residence | □ Urban<br>□ Rural | |
| **Part II** | Baseline clinical Characteristics | | |
| | Source of referral | □ Self | |
| | | □ From Public health center | |
| | | □ From Private health facility | |
| | | □ From Public hospital | |
| | Record V/s on day of admission | | |

| | | | |
|---|---|---|---|
| | | BP | □ YES<br>□ NO |
| | | PR | □ YES<br>□ NO |
| | | RR | □ YES<br>□ NO |
| | | Temperature | □ YES<br>□ NO |
| | | Spo2 | □ YES<br>□ NO |
| | Previous hospital visit | □ YES<br>□ NO | |
| | Previous hospital admission | □ YES<br>□ NO | |
| | Known comorbid illness | □ CHD | |
| | | □ DM | |
| | | □ Malignancy | |
| | | □ HIV | |
| | | □ Others | |
| | Nutritional status | □ Well-nourished | |
| | | □ Malnourished | |
| | Length of stay | □ <24hrs | |
| | | □ >24hrs | |
| **Part III** | Diagnosis on Admission | | |
| | | | |

| | | | |
|---|---|---|---|
| | | ☐ Late onset of sepsis | |
| | | ☐ Acute gastro entreaties | |
| | | ☐ Head injuries | |
| | | ☐ Malignancies | |
| | | ☐ Meningitis | |
| | | ☐ Head injury | |
| | | ☐ Heart disease | |
| | | ☐ Pneumonia | |
| | | ☐ Others | |
| | Did the child Triaged | ☐ YES<br>☐ NO | |
| **Part IV** | Interventions | | |
| | | ☐ Senior physicians | |
| | | ☐ Residents | |
| | | ☐ Nurses | |
| | | ☐ Other clinical staff | |
| | Treatments and supplements | | |
| | Did the child receive IV antibiotic/s? | ☐ YES<br>☐ NO | |
| | Does the child take PO antibiotic/s? | ☐ YES<br>☐ NO | |
| | | ☐ YES<br>☐ NO | |
| **Part V** | **Outcomes of emergency admissions** | | |
| | | ☐ Discharge improved | |
| | | ☐ Transfer to Pediatric/other ward | |
| | | ☐ Transfer to ICU or Referred | |

| | | | |
|---|---|---|---|
| | | ☐ Discharge Against medical Advice | |
| | | ☐ Death | |

Checked by supervisor; Name_____, Signature_____