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# Proportion of Death and Associated factors among patients admitted to Pediatric Intensive Care unit in Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia, 2022

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**Bahir Dar University**

**College of Medicine and Health Sciences**

**School of Medicine**

**Department of pediatrics and child health**

**Proportion of Death and Associated factors among patients admitted to Pediatric Intensive Care unit in Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia, 2022**

**By:**

**Haymanot Amare (MD)**

**A THESIS REPORT TO BE SUBMITTED TO DEPARTMENT OF PEDIATRICS AND CHILD HEALTH, COLLEGE OF MEDICINE AND HEALTH SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE SPECIALTY PROGRAM OF PEDIATRICS AND CHILD HEALTH**

**September, 2022**

**Bahir Dar, Ethiopia**

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Total Budget	44,385
Study period	June 1 to August 30 ,2022
Study Area	Tibebe Gion Specialized Hospital, Bahir Dar Ethiopia

## **Declaration**

This is to certify that the thesis report on Proportion of Death and Associated factors among patients admitted to Pediatric Intensive Care unit in Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia submitted in partial fulfillment of the requirements for the postgraduate of pediatrics and child health, in Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates.

Haymanot Amare

05/10/2022

Bahir Dar, Ethiopia

Name of the candidate

Date of submission

Place

**BAHIR DAR UNIVERSITY**

**COLLEGE OF MEDICINE AND HEALTH SCIENCES**

**DEPARTMENT OF PEDIATRICS AND CHILD HEALTH**

I herewith certify that I have supervised, read and evaluated this proposal titled Proportion of Death and Associated factors among patients admitted to Pediatric Intensive Care unit in Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia by Haymanot Amare prepared under my guidance. I recommend the dissertation be submitted for defense.

Approved by

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Date

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Signature

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First, I would like to thank Bahir Dar University, College of medicine and health science, and department of pediatrics and child health for giving me opportunity to prepare this thesis. Next, I would like to express my deepest gratitude to my advisors Dr. Mastewal Ambaw and Mr Taye Abuhay for their invaluable support and guidance for the preparation of this proposal. Lastly, I would like to say thank you for those health professionals who are working at Tibebe Gion specialized Hospital.

## **Abstract**

**Background:** Pediatric intensive care unit, usually abbreviated to PICU, is an area within a hospital which is specialized in the care of critically ill infants and children. It is typically directed by one or more pediatric intensivists or PICU consultants and staffed by doctors, nurses, and respiratory therapists who are specially trained and experienced in pediatric intensive care. There are limited data on pediatric Intensive Care in resource limited countries. Most studies done on patient characteristics and treatment outcome are obtained from developed countries that provide treatment with high level health care professionals and advanced equipment.

**Objective:** To assess Admission pattern, Treatment outcome and associated factors of patients admitted to pediatric Intensive Care unit, Tibebe Gion Specialized Hospital, Bahir Dar, Ethiopia, 2022

**Methods;** A retrospective cross sectional chart review of all patients from January 2020 to August /2022 who were admitted to Pediatric Intensive Care Unit and those who meet the inclusion criteria were used . All the necessary Data were collected from the patients' charts by using the pre-developed data collection format. The data were entered to epidata version 4.6 and then exported to SPSS 25 version software for analysis. Logistic regression analysis was used and those variables with p-value <0.05 at 95% CI were declared as statistically significant.

**Results:** In this study, the proportion of death among patients admitted to PICU was 17.8%. The odds of patients with length of stay less than or equal to one day admission at pediatric intensive care unit (AOR = 6.1; 95% CI (4.9-18), the odds of patients who were on mechanical ventilation (AOR=4.3; 95%CI (1.7-10)) and patients who had use vasopressor (AOR=6; 95%CI (2.9-18) were the factors significantly associated with the outcome of patients at PICU.

**Conclusion and Recommendation:** In this study the proportion of death among patients admitted to PICU was found to be high. The most common causes of admission were complicated meningitis with ICP, and respiratory problem (complicated pneumonia, TB, status asthmatics). The most common cause of death was multi organ failure Length of stay less than one days of admission, use of vasopressor and use of a mechanical ventilator were statistically significant predictors of mortality. It is recommended that The Ethiopian Federal Ministry of Health and the Regional Health Bureau should better to focus on infectious disease prevention and treatment.

We also recommend TGSH to organize PICU with Pediatric Intensivists and respiratory

therapists.

**Key words:** proportion of death, PICU, Tibebe Ghion, Ethiopia

## **Abbreviations**

BLSH	Black Lion Specialized hospital
ETAT	Emergency Triage Assessment and Treatment
MV	Mechanical Ventilator
NICU	Neonatal Intensive care Unit
PICU	Pediatric Intensive Care Unit
TGSH	Tibebe Ghion Specialized Hospital



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# 1. Introduction

## 1.1. Background

Pediatric intensive care unit, usually abbreviated as PICU, is an area within a hospital which is specialized in the care of critically ill infants and children. It is directed by one or more pediatric intensivists or consultants and staffed by doctors, nurses, and respiratory therapists who are specially trained and experienced in pediatric intensive care.(1)

Critically ill pediatric patients should be admitted to pediatric critical care beds. Those patients with severe or potentially life-threatening pulmonary or airway disease, life-threatening or unstable cardiovascular disease, unstable neurologic disease, life-threatening or unstable hematologic or oncologic conditions and other serious medical illness are candidates for admission. Postoperative patients requiring frequent monitoring and potentially requiring intensive intervention and trauma patients who need close follow up are also among candidates.(2)

Children continue to face widespread regional and income disparities in their chances of survival. Sub-Saharan Africa continues to be the region with the highest under-five mortality rate in the World—76 deaths per 1,000 live births. In 2019, 1 in 13 children in sub-Saharan Africa died before reaching their fifth birthday—15 times higher than the risk for children born in high-income countries and 20 years behind the world average, which achieved a 1 in 13 rate by 1999. Disparities in child survival abound at the country level as well, where the risk of dying before age five for a child born in the highest mortality country is about 70 times higher than in the lowest mortality country, and all five countries with mortality rates above 100 deaths per 1,000 live births are in sub-Saharan Africa.(3)

Ending preventable child deaths worldwide will require targeted interventions to the age-specific causes of death among children. Despite strong advances in fighting childhood illnesses, infectious diseases, which disproportionately affect children in poorer settings, remain highly prevalent, particularly in sub-Saharan Africa. Globally, infectious diseases, including pneumonia, diarrhea and malaria, remain a leading cause of under-five deaths. Moreover, malnourished children, particularly those suffering from severe acute malnutrition, are at a higher risk of death from these common childhood illnesses. Access to life saving interventions and advanced pediatric intensive care is critical to ensuring steady mortality declines in low- and middle-income countries.(3-5)

## **1.2. Statement of the Problem**

In developed countries, advanced pediatric intensive care Unit has dramatically improved the prognosis for the critically ill children. Numerous conditions that were previously fatal are now treatable, and many children who previously would have sustained a permanent disability now recover completely. Evidences suggests that the sickest subgroups of critically ill children are less likely to die if treated in the pediatric intensive care unit (PICU) in a tertiary care hospital (6)

Currently, pediatric critical care in low middle-income countries (LMICs) remains in its infancy in most hospitals. The majority of hospitals lack designated intensive care units, healthcare staff trained to care for critically ill children, adequate numbers of staff, and rapid access to necessary medications, supplies and equipment. In addition, most LMICs lack pediatric critical care training programs for healthcare providers or certification procedures to accredit healthcare providers working in their pediatric intensive care units (PICU) and high dependency areas.(7)

In Ethiopia, there is a small number of established PICU .There is also limited resource to give care for the critically ill patient. Therefore the aim of this study is to assess the clinical outcome of patients admitted to the PICU. It will also show the burden of problem and will help in establishing and improving the quality of service given at PICU in our setting.

## **1.3. Significance of the study**

The aim of this study is to assess the admission pattern, treatment out come and associated factors of patients admitted to pediatric intensive care unit in TGSH. It is very important to know which patients need critical care, how the facility is organized and the outcome of treated patients in a tertiary care hospital. This will help to improve the quality of health care and reduce patient mortality rate.

The findings of this study will also serve as a back ground information for those hospitals who need to establish PICU and will be used as a base line for further study.

## 2. Literature Review

### 2.1. Admission pattern

In western countries, Respiratory illnesses (predominantly acute respiratory infections) and congenital anomalies were the most common reasons for admission in PICU hospitals. Epilepsy was the most common neurological disorder (3.4%) of PICU admissions, malignant brain tumors were the most common neoplasms (2.2%) and diabetes was the most common endocrine disorder (1.5%). Injury-related causes accounted for 8.6% of admissions overall, but was proportionally higher (29.0%) in general ICU admissions than for PICU admissions (7.1%)(8, 9)

A Study done in North Africa (Egypt) showed that the most frequent diagnosis at PICU admission was respiratory distress/failure (30.4%), followed by seizures (16.0%) and then altered level of consciousness (14.4%). The most common diagnosis at discharge was complicated gastroenteritis (16.8%) followed by pneumonia (15.2%) and then traumatic brain injury (12%). The majority of the patients had no co-morbidities (76.8%), meanwhile 23.2% of them had co-morbid conditions.(10)

In Eritrean study, Overall the most commonly affected systems were respiratory (50/190 patients 26.3%) followed by gastrointestinal (47/190 patients 24.7%) and neurological system (21/190 patients 11%). The vast majority of PICU admissions were due to medical problems (80.5%) and out of this infectious diseases accounted for 50% of the cases. Twenty-four (12.63%) of the cases were malnourished.(11)

There are studies in Ethiopia, which are done in Black lion Specialized Hospital, University of Gondar and Ayder Referral Hospital. In BLSH, among 317 patients admitted to PICU, the vast majority 71(22.4%) were due to respiratory problems, 62 (19.6%) neurology diseases, 56(17.7) Cardiac disease, 35(11%) Trauma and 32 (9.8%).Renal disease gastrointestinal disease is least admission diagnosis 10 (3.2%).(12)

The study done at University of Gondar showed that the three most common reasons for admission were neurologic 104 (31.1%), infectious 44 (13.3%) and renal 37 (11.2%) disorders. Among the neurologic disorders the commonest diseases were complicated acute bacterial meningitis (37.5%), Guillain-Barre syndrome (17.3%), followed by cerebral malaria and status epilepticus (15.4%). Most of the infectious causes were complicated meningitis (12.1%), and severe sepsis with shock (9.4%).(13)

In Ayder referral hospital, the vast majority of patients admitted to PICU were due to medical problems (85.2%) and non-infectious disease (266/400 patients, 66.5%). Most were admitted due to meningitis (44/400 . 11%), post-operative (43/400 , 10.8%).(14)

## **2.2. Treatment Outcome and associated factors**

There is dramatic Improvement of pediatric intensive care recently with substantial reduction of mortality rate in the developed world. In the USA, mortality rates have fallen from more than 10% in the 1980s to approximately 1.4% in 2014. But this trend was not evident for lower income countries. Systematic analysis which included one hundred eleven studies from developing and developed countries showed that mortality during admission ranged from 1.3 to 50%.The lowest mortality was documented in Finland and the highest record was reported in Rwanda (15)

A study done in Nepal showed Out of 230 admitted children, 29 (12.6%) died, 19 (8.2%) left against medical advice and 5 (2%) were referred to other centers. Forty-one (17.8%) children received mechanical ventilation, among which 23 (56%) improved, 14 (34.1%) died and 4 (9.7%) children were taken away by caretakers against medical advice.(16)

A two-year analysis Admission pattern and outcome in a pediatric intensive care unit of a tertiary care pediatric hospital in Bangladesh showed that out of 119 patients, 81 cases (68.1%) were improved and transferred to the ward or discharged to home. Six cases (5.0%) were transferred to other specialized center for cardiac and neurosurgical management, 6 cases (5.0%) left the hospital against medical advice(LAMA), and 25 (21.0%) died.(17)

A study done in Egypt comparing the outcomes of pediatric patients admitted to PICU with Different Resources, Japan and Egypt showed that the mortality rate was higher in resource limited setup.(18)

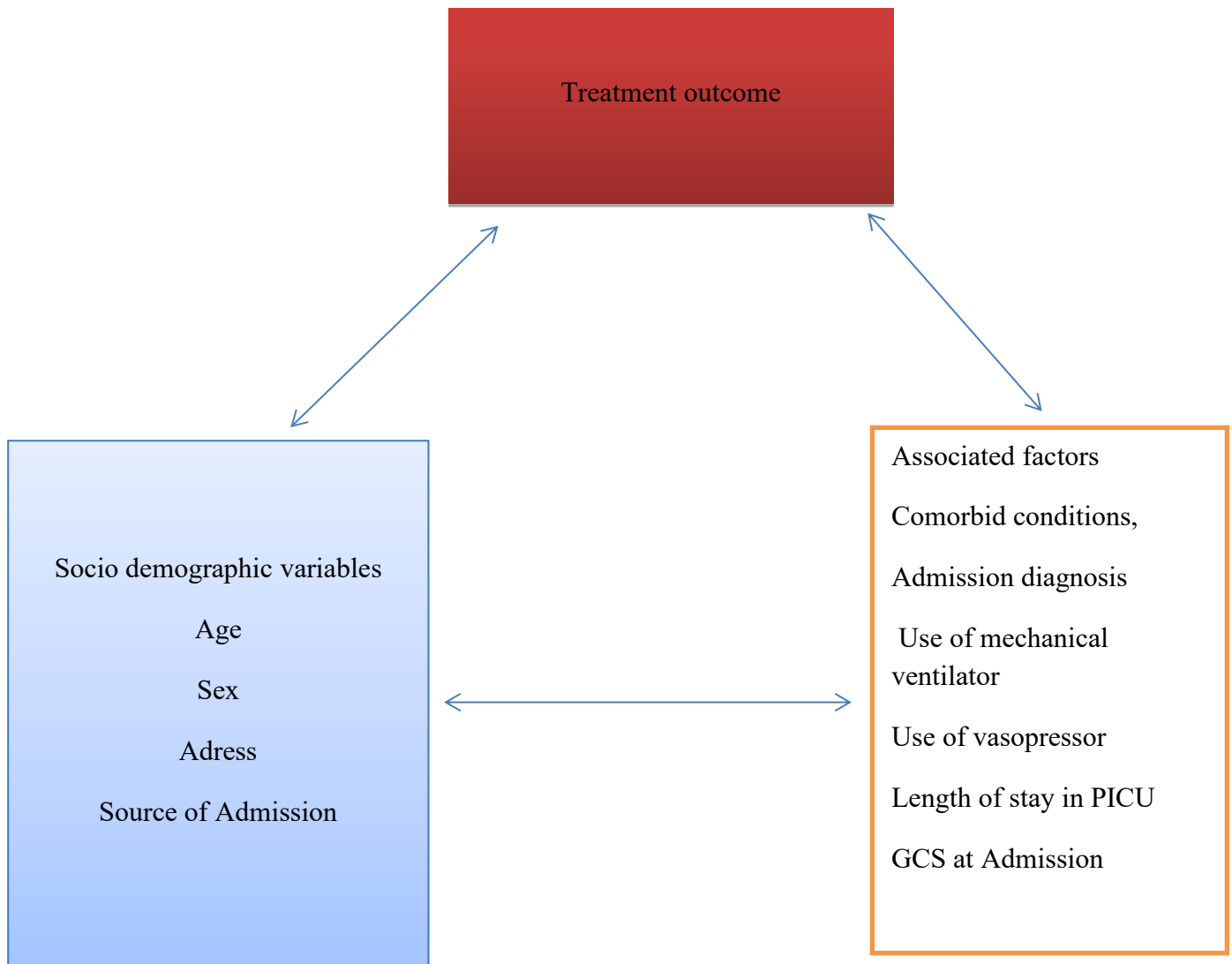
According to the study done In Ethiopia, at Black lion, 180(56%) patients were a candidate for mechanical ventilation and 93(29.3 %) of them were died. Study participants with comorbid illness account 36 (11.4%). Mortality was higher in those patients without comorbid illness, 86.4%. The percentage of patients discharged from PICU is 24.2% of respiratory disease followed by 21.6% neurology disease. The main cause of death is cardiovascular disease (25.6%) and respiratory disease (20.0%).(12)

Overall, from admitted patients to PICU of Gondar University hospital, 30.9% of the patients died. Among those who died, 67 (65.7%) were males.(13)

The mortality rate of PICU in Ayder was 8.5%, with the most common cause of death being infectious causes mostly affecting respiratory and CNS. The statistically significant predictors of mortality in this study were: the presence of comorbid illness, need for MV, and need for inotropes, low GCS level, infectious disease and duration of ICU stay. The need for ventilation and inotropes indicates that these patients were in an advanced stage of a disease.



## Conceptual frame work



**Figure 1: conceptual framework on treatment outcome of patients admitted at Tibebe Ghion specialized hospital PICU 2022 (n=202);constructed from various literatures .**

### **3. Objectives of the study**

#### **3.1. General objective**

To assess the proportion of death and associated factors among patients admitted to PICU of TGSH, Bahir Dar Ethiopia from January 2020 to May 2022.

#### **3.2. Specific Objectives**

- ✓ To determine the proportion of death and associated factors among patients admitted to PICU.
- ✓ To identify the factors those are associated with the proportion of death among patients admitted to PICU.

## **4. Methods**

### **4.1. Study design**

A retrospective cross sectional study was applied.

### **4.2. Study area and period**

The study was conducted at Tibebe Ghion Specialized Hospital, BahirDar Ethiopia starting from June 1 to August 30, 2022.

Bahir Dar is situated on the southern shore of Lake Tana, the source of the Blue Nile (locally called Abay). The city is one of the ten most beautiful cities in Africa and one of the twelve UNESCO Learning Cities Awardee of 2015 .It is located approximately 578 km (360 miles) northwest of Addis Ababa, and an elevation of 1,840 meters (6,036 foot) above sea level. Tibebe Ghion specialized hospital is a newly established Tertiary care Teaching hospital in Bahir Dar City founded in January, 2019.It is located about 10km south from the city center and about 7 km from the new bus station ('Addisu Meneharia') on the high way to Addis Ababa and about 23 km from the Blue Nile Falls (locally called 'Tis Esat' (Smoke of Fire). It has more than 450 bed capacity and serves for more than 94,000 patients per year.

The pediatric and child health unit has about 112 beds divided into Emergency Triage Assessment and treatment (ETAT), Critical and stable Wards, Neonatal Intensive care unit (NICU) and Pediatric Intensive care Unit (PICU).

The pediatric Intensive care Unit is established in January 2020, with 2 beds, 1 functional mechanical ventilator, it gives service by Anesthesiologists, pediatricians, pediatric residents and pediatric nurses.

### **4.3. Populations**

#### **4.3.1. Source population**

All pediatrics patients admitted to PICU in Tibebe Ghion Specialized Hospital.

#### **4.3.2. Study population**

All pediatrics patients in the age range of 28 days to 14 years admitted to pediatrics ICU in Tibebe Ghion Specialized Hospital from January 2020 to August 2022.s

### **4.4. Inclusion and exclusion criteria**

#### **4.4.1. Inclusion criteria**

- Patients admitted to PICU with complete data.
- Age between 29 days and 14 years

#### **4.4.2. Exclusion criteria**

- Incomplete Charts
- Death on arrival at PICU

### **4.5. Measurement of Variables**

#### **4.5.1. Dependent variable**

- Proportion of death among patients admitted to PICU.

#### **4.5.2. Independent variables**

Age, sex, average length of stay in PICU, use of mechanical ventilator, length of stay on mechanical ventilator

### **4.6. Sample size determination and Sampling procedures**

All patients who were admitted at PICU from January 2020 to January 2022 and met the Inclusion criteria included in this study.

### **4.7. Data collection procedure**

A pre-developed data collection format was used to collect data from the patients chart. The data was collected by trained health professionals (trained nurses who work in PICU & pediatric residents). Training was given how to collect the data.

### **4.8. Data processing and analysis**

The collected data was checked by the principal investigator and any incomplete document cleaned, checked before data entry. Then this data was entered to Epi Data version 4.6 and analyzed by using SPSS software version 25. The descriptive analysis was done by simple frequencies and proportions, and the results presented by tables, bar graphs, and pie charts. Binary logistic regression was used to Estimate the crude odds ratio of all independent variables with p-value of <0.25. And Multiple logistic regressions was also used to estimate the adjusted odds ratio of outcome to Control confounders and predict the final predictor at 95% confidence interval and 0.05 level of Significance.

## **4.9. Ethical Considerations**

Ethical clearance was obtained from Bahir Dar University Ethics Review Committee. A support letter was sent to Tibebe Ghion Specialized Hospital. Names were not used in data collecting questionnaire. The data was taken from the medical charts. Confidentiality was maintained by keeping the data collection forms locked in a secure cabinet and the electronic data filled was kept securely in a password protected computer. Data obtained in the course of study was only handled by the research team.

### **4.9.1 Operational Definition**

Pediatric intensive care unit- an area within a hospital which is specialized in the care of critically ill infants and children

Pediatric patients-refers to in the age range of 29 days to 14 yrs.

Proportion of death-percentage of death among patients admitted to PICU

Discharge; a patient admitted to PICU that has improved, left against medical advice or referred.

Death –cessation of all biological activities of the patient.

Death on arrival-a patient died in the hospital within 1 hour of stay.

Incomplete chart; a medical record the does not contain full information which is important for this study.

Multi organ failure; a patient who developed more than 3 organ dysfunction or failure.

## 5. Results

### 5.1. Socio demographic characteristics of patients admitted in PICU

In this study a total of 208 patients were admitted and 202 included making the response rate 97%. Among this 202 patients 129 (63.9%) of them were male. Most of the study subjects were in the age range of less than 1 year 56 (27.7%). The mean age of admission was  $2.94 \pm$ SD of 1.49 years. The mean PICU length of stay was  $7.30 \pm 7.8$  days. Majority 190 (94.1%) of the patients staying for 1–20 days of admission.

**Table 1: Patient characteristics children admitted to Tibebe Ghion Specialized Hospital pediatric intensive care unit BahirDar, Ethiopia**

Variables		Frequency (n)	Percent (%)
Age	<1 year	56	27.7
	1 - 2 year	22	10.9
	2 - 5year	44	21.8
	5-11 year	38	18.8
	>11years	42	20.8
Sex	Male	129	63.9
	Female	73	36.1
Resident	Rural	129	63.9
	Urban	73	36.1
Length of Stay	$\leq 1$ day	8	4
	2 to 7	134	66.3
	8 to 14	37	18.3
	>14	23	11.4

### 5.2. Admission pattern of children

Majority of the pediatric patients 115(56.9%) were admitted from ETAT, 59(29.2%) were transferred from paediatric ward. Most of the patients admitted to PICU 52(25.7%) were due to neurologic disease, ICP, Coma, GBS and 36 (17.8%) of them were due to Respiratory disease. While tetanus, and hepatic failure, hepatic encephalopathy 3(1.5%) were the least admission diagnosis of children at PICU. as shown in Table 2.

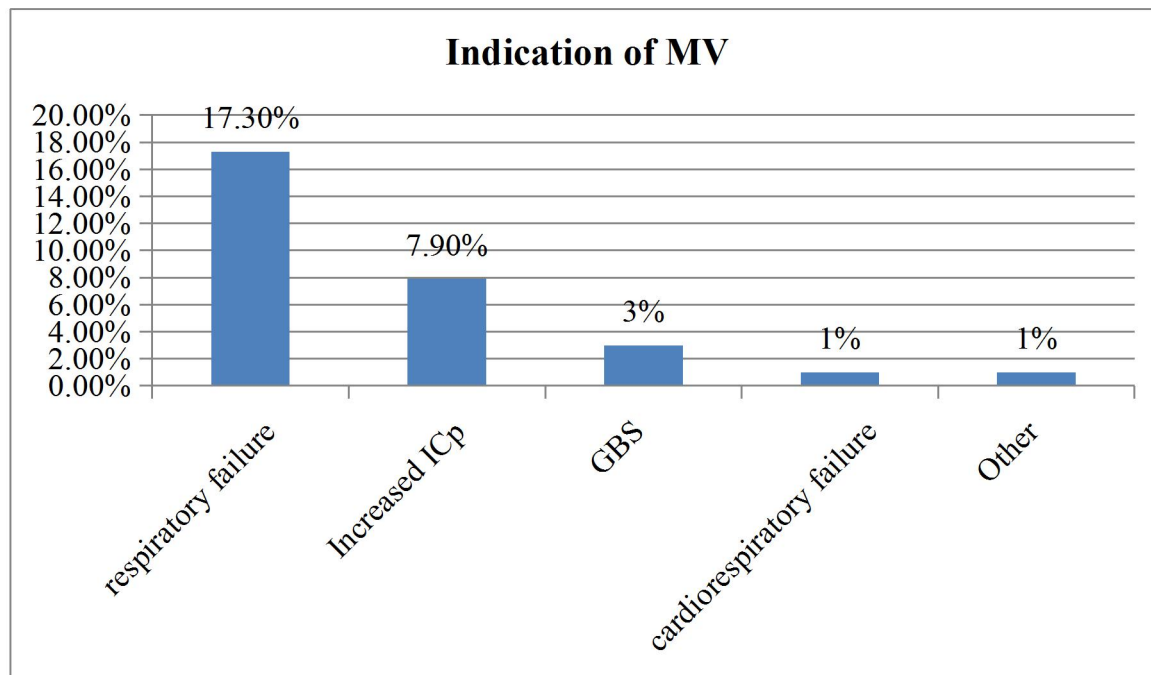
**Table 2: admission pattern of patients admitted at PICU in Tibebe Ghion Specialized hospital BahirDar Ethiopia, 2022 (n=202)**

<b>Variables</b>		<b>Frequency (n)</b>	<b>Percent (%)</b>
<b>Admitted from</b>	Pediatric ward	59	29.2
	NICU	5	2.5
	ETAT	115	56.9
	Surgical	23	11.4
<b>Reason for Admission</b>	neurologic ICP, Coma, GBS	52	25.7
	Respiratory disease	36	17.8
	Cardiac failure	25	12.4
	Traumatic Brain injury	14	6.9
	Shock, septic, hypovolemic,	13	6.4
	Upper air way obstruction	11	5.4
	DKA	10	5
	Other *	36	
<b>Comorbidity</b>	yes	97	48
	No	105	52
<b>Vasopressor</b>	Yes	41	20.3
	No	161	79.7

**Other\***Thoraco-abdominal injury, tetanus, hepatic failure, hepatic encephalopathy, burn with sepsis, airway obstruction, renal (AGN,AKI, Nephritic)

### Indication of Mechanical Ventilation

As shown in figure 2 below 35(17.3%) of children with respiratory failure were used mechanical ventilation and 16 (7.9%) of them were on mechanical ventilation due to increased Cranial Pressure.



**Other\*\* cardiac failure, air way obstruction**

### Proportion of death and associated factors among patients admitted to PICU.

In this study out of the total children admitted at pediatric intensive care unit 36(17.8%) of them were died and while 166 (82.2%) of them were discharged. Among the admitted children 62(30.7%) of them needed mechanical ventilation but, the remaining 140(69.3%) of them were not needed mechanical ventilation. From the admitted children 7(3.5%) of them had complication. Seizure 3(1.5%) and paraparesis were 2(1%) were the most common types of complication. (Table 2)

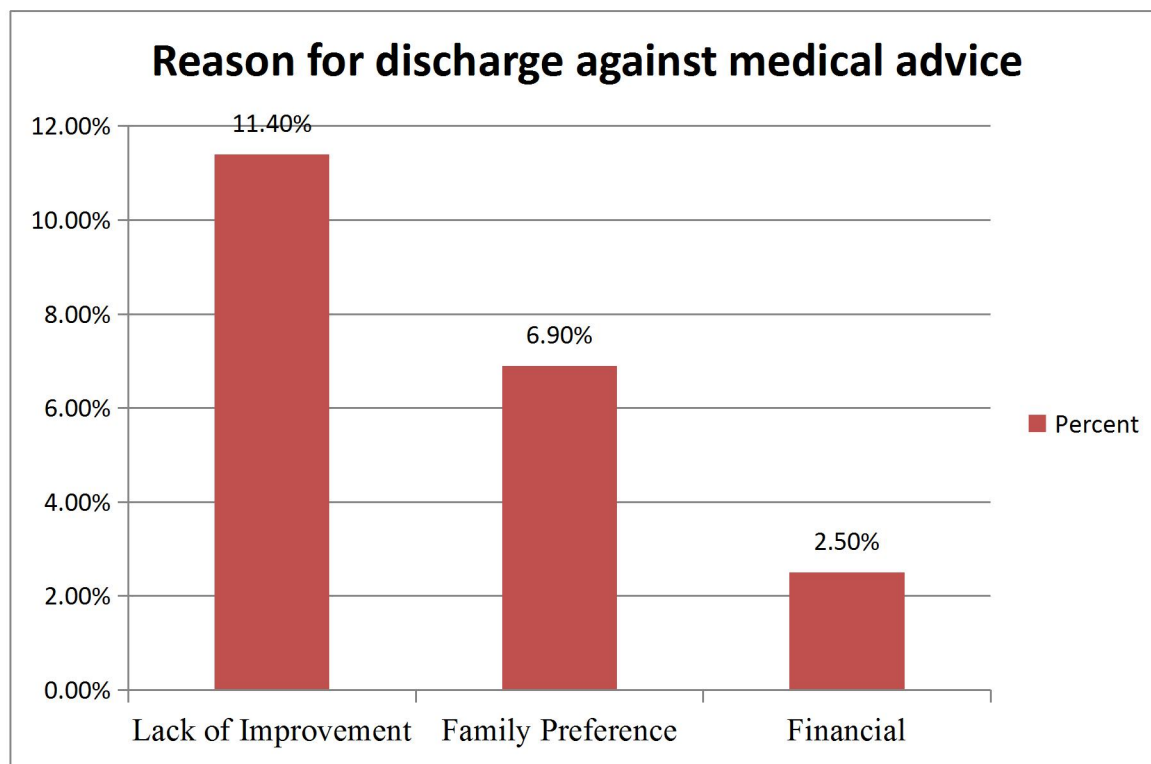


**Table 2: the proportion of death and associated factors among patients admitted to PICU in Tibebe Ghion Specialized hospital BahirDar Ethiopia, 2022 (n=202)**

<b>Variable</b>		<b>Frequency (n)</b>	<b>Percent (%)</b>
<b>Clinical outcome</b>	Discharged	166	82.2
	Death	36	17.8
<b>Need of MV</b>	Yes	62	30.7
	No	140	69.3
<b>Complication</b>	Yes	7	3.5
	No	195	96.5
<b>Type of complication</b>	Hemiparesis	1	0.5
	Seizure	3	1.5
	Quadri, Para Paresis	2	1.0
	Hydrocephalus	1	0.5
<b>Reason for Referral</b>	For better treatment	5	2.5
	Family Preference	2	1

### Reason for Discharge against medical advice

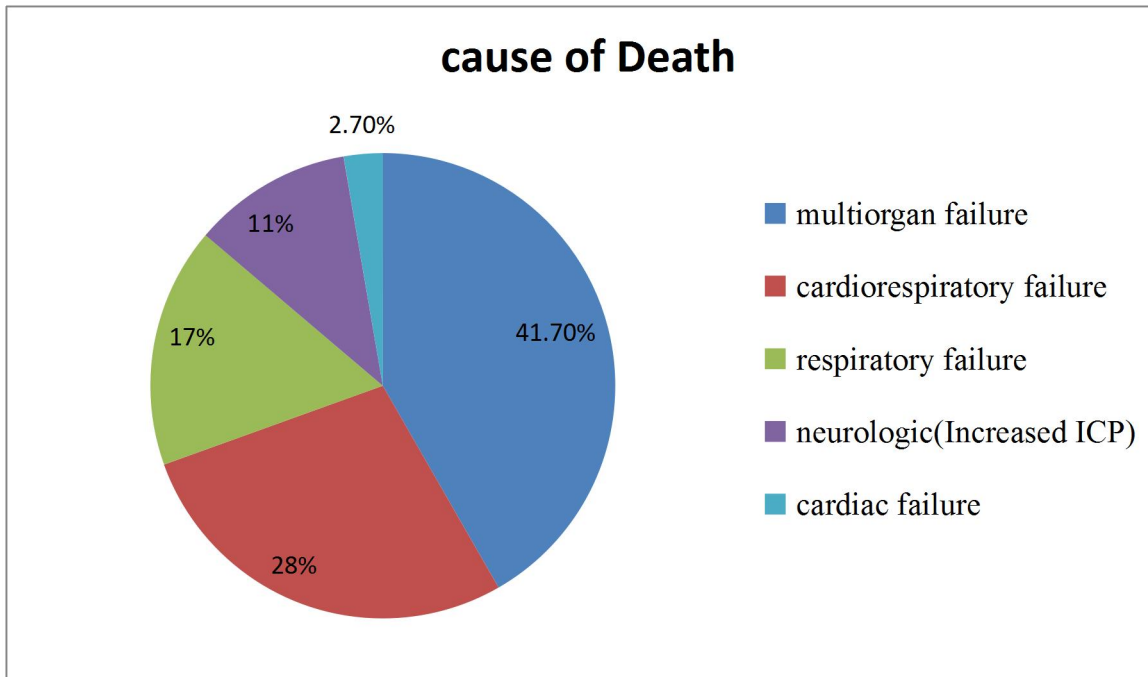
In this study out of the discharge against patients (11.4%) of them were due to lack of improvement on the children, 6.9% were due to family preference and 2.5% were due to financial constraint.



**Figure 2: shows reason for discharge against medical advice among children admitted at PICU in Tibebe Ghion Specialized hospital BahirDar Ethiopia, 2022 (n=202)**

### Cause of death and associated factors among patients admitted to PICU

In this study from the total death, 41.4% died due to Multi organ failure and the remaining patients died due to cardiorespiratory failure 28% and respiratory failure 17%, respectively.



**Figure 3: shows cause of death among children admitted at PICU in Tibebe Ghion Specialized hospital BahirDar Ethiopia, 2022 (n=202)**

## **Factors associated with the proportion of death among patients admitted to PICU**

On Binary logistic analysis age; sex; length of stay at PICU; use of mechanical ventilator, comorbidity; vasopressor use during admission were variables which are candidate for multivariable Binary logistic regression analysis.

On Multi-variable logistic regression analysis length of stay at hospital, use of vasopressor and use of mechanical ventilation were found to have significant association with mortality of patients. The odds of patients with length of stay less than or equal to one day were more than six times higher odds of proportion for death than those with length of stay more than one days admission at pediatric intensive care unit (AOR = 6.1 (4.9-18); 95% CI (P=0.002). the odds of patients who were on mechanical ventilation have more than four times higher odds of death than their counterparts (AOR=4.3; 95%CI (1.7-10) p=0.002\*). Similarly patients who had use vasopressor were more than 6 times more likely to be died than their counterparts (AOR=6; 95%CI (2.9-18) P=0.001). (Table 4).

**Table 4: factors associated with proportion of Death among children admitted at PICU in Tibebe Ghion Specialized hospital BahirDar Ethiopia, 2022 (n=202)**

Variable	Category	Outcome		COR (95%CI)	AOR (95%CI)	P-Value
		Death	Discharged			
Age (yr.)	<1 year	10	46	2.8 (0.72,10)	2.7(0.53-14)	0.229
	1 - 2 year	5	17	3.8 (0.81, 17)	2.3(0.35-15)	0.374
	2 - 5year	10	34	3.8 (0.97, 15)	3.7(0.70-20)	0.121
	5-11 year	8	30	3.4 (0.84, 14)	2.6(0.49-14)	0.255
	>11years	3	39	1	1	
Sex	Male	19	110	1	1	
	Female	17	56	1.7(0.84-3.64)	2.2(0.83-5.8)	0.111
Length of Stay (days)	<1 day	7	1	4 (4, 12)	6.1(4.9-18)	<b>0.002*</b>
	2 to 7	24	110	1.4 (0.40, 5.2)	1.8(0.45-7.3)	0.390
	8 to 14	2	35	0.38(0.05,2.4)	0.43(0.06-3.1)	0.403
	>14 day	3	20	1	1	
Mechanical Ventilation	Yes	20	43	3.6 (1.7, 7.7)	4.3(1.7-10)	<b>0.002*</b>
	No	16	123	1	1	
Comorbidity	Yes	89	17	1.3 (0.91, 3.9)	1.4(0.55-3.6)	0.469
	No	77	19	1		
Vasopressor used	Yes	20	21	8.6 (3.8, 19)	6.2(2.9-18)	<b>0.001*</b>
	No	16	145	1	1	

## Discussion

This study found that the proportion of death was 17.8% which is comparable with the previously reported mortality rate 2.1 to 41% (10, 11, 17-20). Developing countries have the highest mortality rates (10, 18) due to lack of resources and transportation access. The result of the current mortality rate was relatively higher when compared to recent studies in Nepal (19), and Ethiopia Addis Ababa (9) which were 12.6%, and 8.5 %, respectively. This is due to a lack of resources, which makes the current result higher similar to other resource-limited countries. Additionally, the PICU in the current study in which critically ill children are being referred from different parts of the town. There is no full access transportation for critically ill patients, due to this critically ill patients were come lately which leads to poor patient outcomes. The lack of trained Pediatric intensivist also could be a reason for the high PICU mortality rate in our setting as reported by a previous systematic review study which showed low-intensity (no intensivist or elective intensivist consultation) ICU was reported to have a higher ICU mortality rate as compared to the high-intensity (mandatory intensivist consultation or closed ICU) groups (21).

On the other hand the result of the current study was lower than study done in other sub-Saharan countries (40–42%), Gondar (30.9%), Black lion Specialized Hospital (21.1%). This might be due to difference in study area and study setting.

Length of stay less than one day at hospital, use of vasopressor and need of mechanical ventilation were the factor as significantly associated with the outcome of patients at PICU.

The odds of mortality were 6.1 times higher in patients who stayed less than one day than who stayed more than two weeks. In a similar study done in University of Gondar, Among all deaths, 51% occurred within 24 hours of stay .This could be due to patients who come with complication and serious illness might be died early before stabilization and further work up.

The odds of mortality were 4.3 fold higher in patients who was in a mechanical ventilator than not being in a mechanical ventilator. This could be explained by advanced illness of patients and the scarcity of a trained pediatrics intensivist. This finding is similar to studies done in Nepal and Addis Ababa (9, 20).

The odds of developing mortality were 6.2 times higher in a patient who was on vasopressor during admission .this finding is also similar with a study done in black Lion which showed the odds of mortality was 10 times higher than those who didn't use vasopressor. This might be because of the absence of organ support or multi organ failure due to severe sepsis, and management for post-cardiac arrest care in the transferring units or in the case of our setting.

## **Conclusion**

In this study the proportion of death was found to be high (17.8%). The most common causes of admission were complicated meningitis with ICp, and respiratory problem (complicated pneumonia, TB, status asthmatics). The most common cause of death is multi organ failure. Length of stay less than one days of admission, use of vasopressor and use of a mechanical ventilator were statistically significant predictors of mortality.

This higher death proportion needs immediate intervention. Studies have shown that well equipping and trained staffed PICU with intensivists and admitting the patient and follow up improve patient outcomes.

## **Recommendation**

We recommend The Ethiopian Federal Ministry of Health and the Regional Health Bureau to focus on infectious disease prevention and treatment.

We also recommend TGSB to work further on expansion of PICU and organize it with Pediatric Intensivists and respiratory therapists.

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Annex I; data collection format

Part I Socio demographic patient data

Date.....

Patient ID number.....

Study number.....

1. Age .....

2. Sex .....

3. Address of the patient .....

II. PATTERN FOR DISEASE

1. Admitted to PICU from

A. pediatric wards B. NICU C. pediatric Emergency

2. Reasons for admission to PICU

1. .... 2.....

3.....

3. Admission diagnosis.....

III. Associated Factors

4. Co-morbidity

1. Yes 2.No

4.1 If yes .Which comorbid illness

1. Cardiac 2.renal 3.respiratory 4.neurologic 5.other (specify)

5. Date of admission in PICU ----//----//--- (DD/MM/YY)

6. Date of transfer ----//---//--- (DD/MM/YY)

7. Length of stay in PICU\_\_\_\_\_

8. Did the patient need mechanical ventilator (MV)?

1. Yes 2.No

8.1 If yes, was the put on MV?

8.2 If yes, Length of stay on mechanical ventilator \_\_\_\_\_

8.3. If no, why MV was not used?

1. Lack of MV 2.innapropriatly functioning MV 3.other reason (specify)

Part III .OUTCOME

1. Patient outcome

A. Discharged from PICU

B. Referred to another health facility

C. Left without medical advice

D. Death

1.2. If referred, what is reason for referral.....

1.3. If left against medical advice, what is the reason for against medical advice

1.4. If the outcome if death

1. Immediate cause of death

2. underlying illness

## Annex II Request Form for Ethical Clearance

Date.....

To BDU/CMHS Ethics Committee

Subject: To get ethical clearance for my research

I am Dr.Haymanot Amare, 2nd year pediatrics and child health resident in Bahir dar University College of Medicine and Health sciences. I kindly request your office to have ethical clearance to conduct a research on Admission pattern, treatment outcome and associated factors of patients admitted to pediatric Intensive Care unit, Tibebe Gion Specialized Hospital for the partial fulfillment of specialty program in pediatrics and child health. Data will be extracted using a prepared questionnaire; confidentiality of records will be kept.

With regards

Dr.Haymanot Amare (year II pediatrics and Child Health Resident)

