

TRENDS IN INPATIENT ADMISSIONS AND THE MAGNITUDE OF EARLY MORTALITY AMONG PEDIATRIC HEMATO-LYMPHOID CANCER PATIENTS AT TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, 2025 G.C.

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A RESEARCH PROPOSAL TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES; PEDIATRICS AND CHILD HEALTH DEPARTMENT IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE SPECIALTY CERTIFICATE PROGRAM IN PEDIATRICS AND CHILD HEALTH

SEP 30, 2025 GC

ADDIS ABABA, ETHIOPIA

APPROVAL SHEET

Addis Ababa University College of health sciences school of medicine department of pediatrics and child health

I, the undersigned Pediatrics and Child Health Resident declare that I have submitted my original proposal on the investigating the early mortality and causes of death in children with cancer at TASH, Addis Ababa, Ethiopia, Cross-Sectional study in partial fulfillment of the specialty program.

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Advisor Signature Date

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ACRONYMS AND ABBREVIATIONS

ALL…….....Acute lymphoblastic leukemia

AML …… Acute myeloid leukemia

ED ……Early death

HICs…… Higher in high-income countries

LICs…… Low income countries

LMICs……. Low- and middle-income countries

PHOU ……. Pediatric hemato-oncology unit

SPSS …… Statistical package for the social science

TASH…….. Tikur Anbessa specialized hospital

WHO…… World health organization

OPERATIONAL DEFENATION

- **Very early mortality**- death occurred within 3 days of admission
- **Early mortality**- death occurred within 42 days of admission

ABSTRACT

Background

Cancer is a major cause of childhood morbidity and mortality worldwide. Each year, nearly 273,000 children and adolescents under the age of 20 are diagnosed with cancer.

While the overall survival rate for children with cancer has reached 80% in many high income countries (HICs), in lower-middle-income countries (LMICs) and low-income countries (LICs), figures are significantly lower with rates falling below 30%.

Globally, leukemia is the most common childhood cancer, followed by brain tumors and lymphomas, though the distribution varies geographically.

Early mortality (EM), defined as death within the first 42 days of diagnosis or admission. Early mortality reflects limitations in timely diagnosis, supportive care, infection management, and treatment access.

Objective: *To asses Early Death (ED) at TASH, Pediatric Hematology and Oncology Unit And to analyze the types and causes of mortalities across different Cancer types*

Method: *A facility-based Cross-sectional study will be conducted on All children with newly diagnosed childhood cancer who admitted at the TASH PHOC unit. Data will be collected from charts. Data will be entered into Statistical Package for Social Sciences version 25 (SPSS) for subsequent descriptive and analytical statistics where applicable. Statistically significant association will be taken for p value of <0.05.*

Budget and Work plan*: The study will be conducted from 1 January, 2023 to 31 January, 2025.G.C with estimated total cost of 36,825 Birr, the cost will be sponsored by Addis Ababa University, College of health science.*

Keywords: *Childhood cancer; Pediatric hemato-lymphoid malignancies; Early mortality; Inpatient admissions; Leukemia; Lymphoma; Sepsis; Diagnostic delay; Tikur Anbessa Specialized Hospital (TASH); Ethiopia.*

1. INTRODUCTION

1.1. Background

Childhood cancer is a health challenge worldwide. Although it is rare it causes significant deaths in children especially in low and middle income countries.(1,2)

According to the World Health Organization (WHO) 400,000 new cases of childhood cancer happen every year in children under 19 years old. Most of these cases 80% occur in low- and middle-income countries.(1)

The types of childhood cancers vary by region. In high income countries, leukemia, brain tumors and lymphomas are common while in low income countries, Wilms tumor, Burkitt lymphoma and Kaposi sarcoma are more common. Leukemia is the common childhood cancer globally followed by brain tumors and lymphomas.(3,4)

Thanks to advances in early diagnosis, treatment and care more children in high income countries survive for five years or more after diagnosis with survival rates over 80%. However in low income countries survival rates are much lower below 30%.(2,4,5)

The WHO launched a global initiatives in 2018 to increase survival rates to at least 60% by 2030. (1,5)To achieve this we need to improve early diagnosis, care and early detection in sub-Saharan Africa.

Early mortality, defined as death within 42 days of diagnosis. Occurs due to delayed diagnosis, poor supportive care and limited access to treatment(5,6).

In high income countries settings early deaths make up less than 5% of pediatric cancer mortality. In contrast studies from low-income countries report death rates of 15–45%.(5,7,8)

The causes of death are complex and include patient-related factors, disease-related factors and system-related factors.(5,6,7)

Sub-Saharan Africa accounts for a quarter of childhood cancer deaths despite having less than 15% of global cases.(8,9,10)

In Ethiopia Tikur Anbessa Specialized Hospital (TASH) is the referral center for pediatric hemato-oncology. The hospital receives over 600–800 cases every year but resources are

limited. Studies show that survival rates are low with a death rate of 22% among children with acute leukemia.(11,12)

With a growing number of cases, limited resources and inadequate care children with cancer at TASH are at risk of early death.

The Ethiopian National Cancer Control Plan (2022–2030) has been introduced, but there is no comprehensive assessment of early deaths across all childhood cancers at TASH.(13)

Understanding the burden and causes of mortality is crucial for designing interventions to improve outcomes.

1.2 Statement of the Problem

Childhood cancer is the leading cause of disease-related mortality worldwide. Even though the incidence is increasing, there is limited published literature on pediatric cancer outcomes in LMIC and in Ethiopia.

It is considered that early mortality rate must be less than 5% in acute lymphoblastic leukemia, although it is not standardized in solid tumors.

There is limited multi-disease data on early death in Ethiopian pediatric oncology. Most local studies are disease-specific, and there is minimal analysis of modifiable system-level factors.

1.3 Significance of the study

- ✓ To evaluate the Early Death (ED) at TASH, Pediatric Hematology and Oncology Unit.
- ✓ To analyze the magnitude and causes of early mortalities across hemato-lymphmoid Cancer
- ✓ To evaluate trend of admission at hematoma-oncology unit at TASH

2. LITERATURE REVIEW

Survival rates for childhood cancer have improved significantly over the five decades. This is due to advancements in imaging, chemotherapy and supportive care. However early death among children with cancer remains a concerning and understudied outcome.(2,4,5,16,20)

Early death reflects both tumor biology and health-system factors. Determinants of death include patient-related factors, disease-related factors and health-system factors.(5,6)

In Africa up to 80% of children present at advanced stages of cancer and shortages of antibiotics and blood transfusions worsen mortality. Understanding death and its causes is critical in low-income countries like Ethiopia.(5,6,7,11,12)

Studies use time windows to define early death, which affects incidence estimates and comparability across studies. Early mortality is an indicator of the quality of care reflecting delays, gaps in care and preventable complications. Early death rates serve as an indicator of supportive care quality.(5,6,7)

In countries treatment-related toxicity is common while in poor countries, preventable infections and malnutrition dominate. Large series from high- and middle-income settings identify leukemia and high-grade central nervous system tumors as leading cancer types associated with early death. Treatment-related emergencies, such as infection/sepsis, tumor lysis syndrome and hemorrhage frequently cause early mortality. (4,5,14,15)

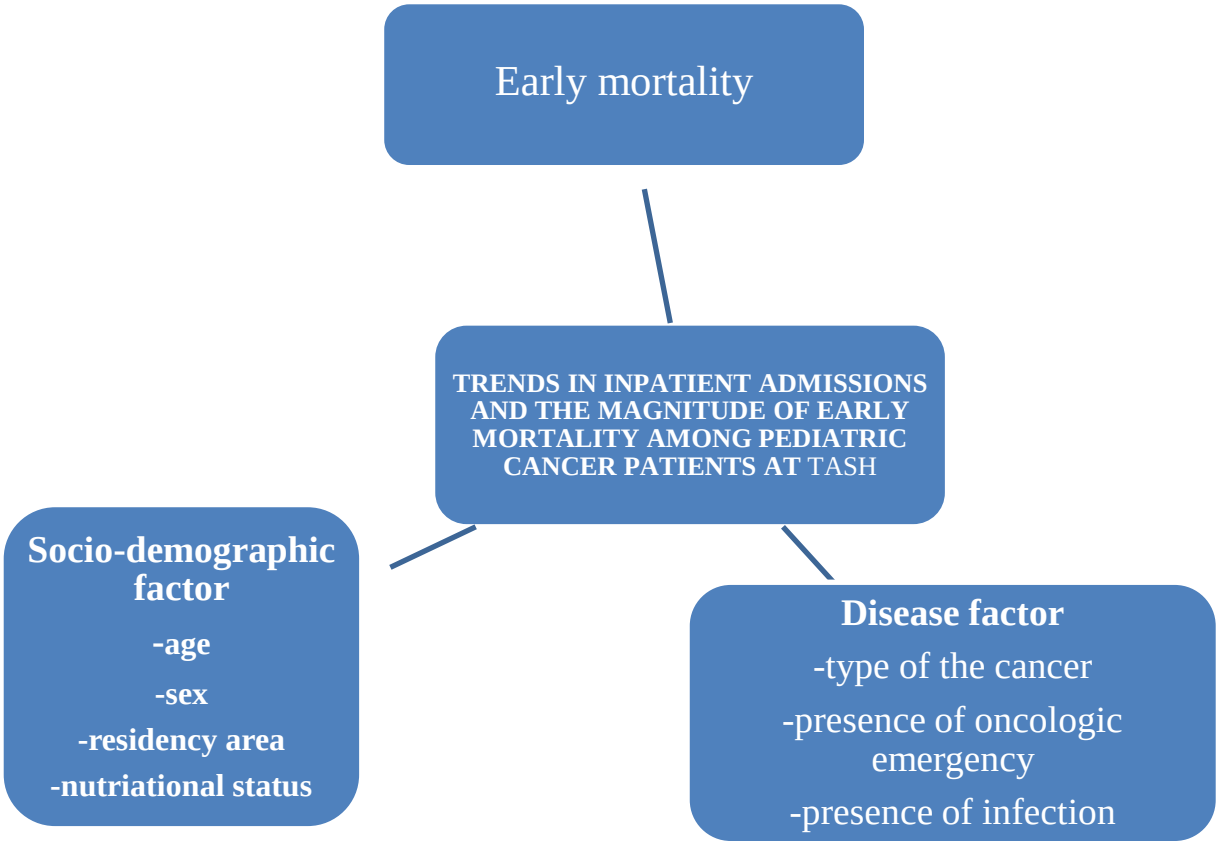
In resource-limited settings early death is amplified by delayed presentation, diagnostic delays and limited specialized pediatric oncology services. Recent reports from TASH document the establishment and growth of the Pediatric Oncology Unit and initial outcome patterns. These analyses highlight the need for definitions of early death and prospective data capture to identify preventable causes. Disease-specific studies at TASH report induction mortality and identify sepsis, induction failure and comorbid infections as leading causes of death. (7,8,9,11,12,15,18,19)

The common causes of early death include sepsis, tumor lysis syndrome, rapid tumor progression and treatment complications. Studies in Africa show trends with early death rates ranging from 18% to 47%.(7,8,10,11,18,19)

There is limited data on early death in Ethiopian pediatric oncology and most local studies are disease-specific. This underscores the need for institutional-level data to guide quality improvement at TASH.(11,12,15)

In low-income countries inpatient admission remains the mode of care due to late presentation, limited diagnostic capacity and inadequate supportive care. Evidence, from low-income countries indicates that 60-80% of pediatric cancer care requires inpatient admission.(1,3)

3. CONCEPTUAL FRAMEWORK



4 OBJECTIVES

4.1 General

- To describe patterns of inpatient admissions among pediatric cancer patients at TASH admitted to the Pediatric Hematology and Oncology Unit from January 2023 to December 2025
- To assess the magnitude of early mortality among children with cancer at TASH admitted to the Pediatric Hematology and Oncology Unit from January 2023 to December 2025

4.2 Specific

- To determine the annual number and proportion of inpatient admissions among pediatric hemato-lymphoid cancer patients
- To assess the magnitude of early mortality among pediatric hemato-oncology inpatients during the study period.
- To evaluate the association between clinical characteristics and early mortality
- To examine trends in early mortality rates over the three year study period

5. METHODS AND MATERIAL

5.1 Study setting

The study will be conducted in Tikur Anbesa Specialized Hospital, hemato oncology unit, Addis Ababa, Ethiopia. Tikur Anbesa Specialized Hospital, established in 1974, is the largest tertiary hospital in the country. The hospital is administered by Addis Ababa University and is the largest and oldest teaching hospital. Black Lion hospital offers diagnosis and treatment for approximately 400,000 patients a year. Under the department of pediatrics and child health the hemato oncology unit provides care for the hematology and oncology patients from all over the country. The PHOC unit has 25 Beds. Currently there is 4 pediatric hemato oncologist and 4 hemato oncology fellows.

I selected Tikur Anbessa Specialized Hospital (TASH) for this research because of several factors. First, it is the largest tertiary hospital in the country and the main referral hospital for pediatric cancer patients. This ensured access to the specific patient population required for my study. Second, it facilitates easier data collection.

5.2 Study design and period

This study will be conducted using a hospital-based retrospective cross sectional study design from January 2023GC to December 2025GC

5.3 Source Population

All children who admitted to Tikur Anbessa Specialized Hospital, PHOC unit.

5.4 Study population

All children with newly diagnosed hemato-lymphoid cancer who admitted at the TASH PHOC unit.

5.5 Sample size and Sampling methods

The sample size is determined using single population proportion formula by considering early death 20% with from previous study conducted in Ethiopia, Uganda and Kenya.

Step 1- initial Sample size calculation formula: $n = \frac{(Z\ \alpha/2)^2\ P\ (1-P)}{d^2}$

Where:

- n is sample size,
- z is the probability of the error going to estimate(1.96),

- d is precision required (5%), and
- p is 20 %
- After adding contingency 10%(for incomplete data)
- n - corrected final sample size is 246

Step 2- Finite population correction

- Since the total population is less than 10,000,we used correctional formula

  n_0 -initial calculated sample size(without correction)-246

  N- total population size(in PHOU estimated number of cases to be see 150/year this means N-450 in 3 years)

- corrected sample size using finite population correction (FPC) formula

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Final Sample size = 175 participants

Step 3 - Expected mortality

- Mortality - 20%
- Expected death in minimum sampling- 175*0.2=35
- Expected death in study period(in 3 years) - 450*0.2=90

5.6 Inclusion and exclusion criteria

Inclusion criteria:

- All newly diagnosed childhood hemato-lymphoid Cancer pateints at TASH during the study period

Exclusion criteria:

Pediatric patients diagnosed with non-cancer conditions (Benign hematology)

Patients with cancer who were not treated during the study period

5.8 Data handling

The primary investigator will check for data cleanliness and completeness. The hard copies will be converted into soft copies, stored on hard drive and will be ready for analysis and back up copy will be stored on separate drive.

5.9 Study variables

Dependent variables- Early Death

Independent variables –sociodemographics data: age, sex, residence, diagnosis/type of cancer, symptoms, the interval between initial symptoms and the first visit to TASH, length of stay at emergency, the duration from admission to death,

5.10 Data Quality Assurance

Primary investigator will check collected data completeness and it will be coded. Then converted to soft copy and will be again cross checked with the hard copy for neatness, Completeness and its consistency before carrying out any statistical analysis.

5.11 Data analysis

After thorough cleaning and checking for its completeness data will be entered into Statistical Package for Social Sciences ver. 25 (SPSS) for subsequent descriptive analysis such as Mean frequencies and percentage as appropriate. Chi square test and multiple logistic Regression analysis will be used to analyze the association between variables where Applicable. Statistical significance will be taken for p values of <0.05 for all statistical tests.

6. ETHICAL CONSIDERATION

Ethical clearance to conduct this study will be obtained from the Pediatrics and Child Health Department's Research and Publications Committee of the School of Medicine, College of Health Sciences, Addis Ababa University. Confidentiality will be fully maintained during Data Collection and further analysis and dissemination of results.

7. DISSEMINATION OF FINDING

The finding of the study will be presented on the research defense day and a formal report will be submitted to the Department of Pediatrics and Child Health with both soft and hard copy. For the publication purpose, the abstract of this thesis will be submitted to national or international Peer reviewed publishers.

8. RESULT

8.1 Socio-demographic characteristics

A total of 454 patients participated, the majority of age group 5-10 years (38.6%).Most patients were male (67.2%).regarding place of residence, most patients were from outside Addis Ababa 367(81.6%), whereas 83 (18.4%) were residents of Addis Ababa.

From outside of Addis Ababa, most patients were from Oromia region (47.6%) followed by SNNPR(19.5%) and Amhara region(18.8%).

Table 1: Table 1: Socio-demographic characteristic of patients

Characteristics	Respondent	frequency	percent
Age	< 1 year	6	1.3
	1-5 years	138	30.4
	5-10 years	175	38.6
	>10 years	135	29.7
Sex	Female	149	32.8
	Male	305	67.2
place of residences	Addis Ababa	85	18.7
	Outside of Addis Ababa	369	81.3

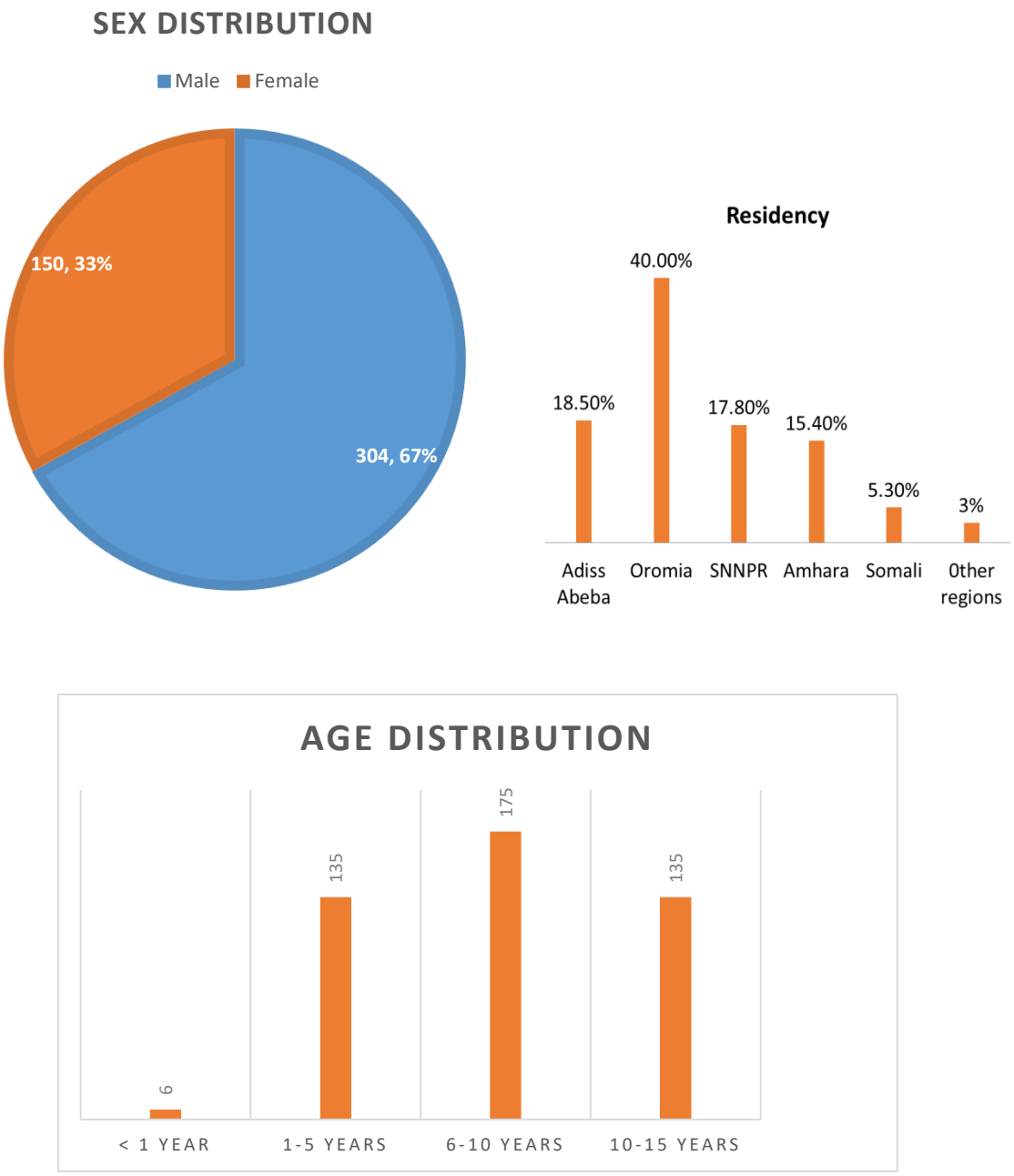
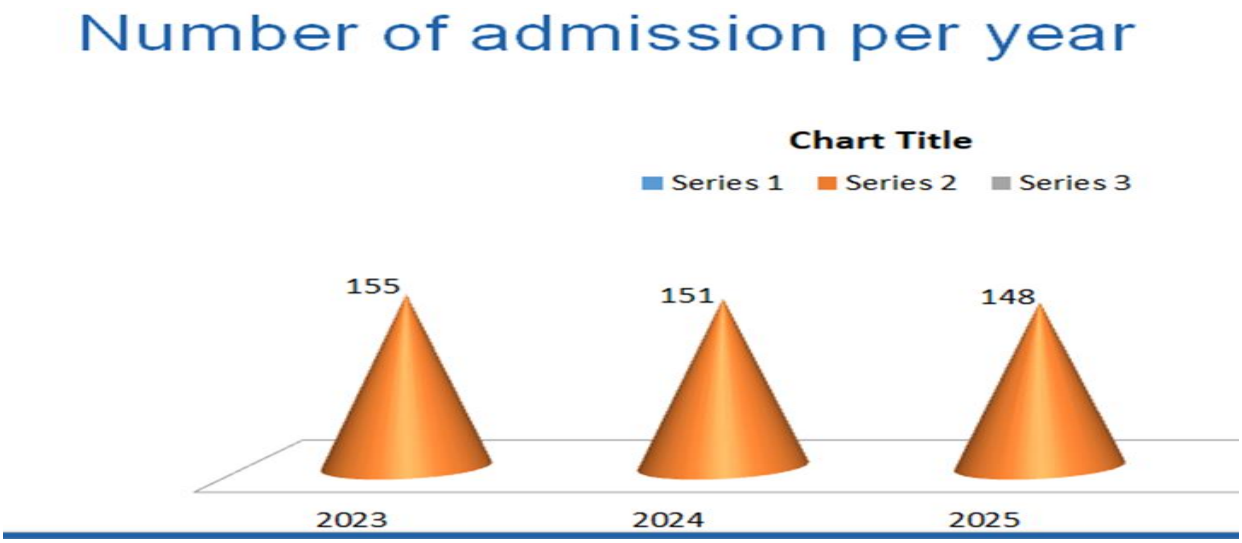


Figure 1: Age, sex and residency distribution patterns.

8.2 Patterns of admission

The majority of admissions occurred in recent years. Nearly one third of the patient where admitted in 2023(32.8%), followed by 2024(31.9%) and 2025 (30.6%).

Overall, the findings demonstrate a nearly similar admission trends from 2023 to 2025.



8.3 Clinical presentation at admission

The majority of patients Frist point care was health centers (43.3%) and most of the study participants were referred from government hospitals (96%). The most of patients (85.7%) presented to hospital below 60 days of symptom onset. Most patients (90.3%) received a definitive diagnosis within 1–14 days of arrival.

Leukaemia accounted for the majority of cases (67.2%),while lymphoma accounted (32.8%) of the cases. Among leukaemia and lymphoma subtypes, Acute Lymphoblastic Leukaemia (ALL) was the most common diagnosis (49.3%), followed by Non-Hodgkin Lymphoma (NHL) (32.8%).

In terms of nutritional status based on anthropometry measurement, the majority of participants had normal nutritional status (72.2%).

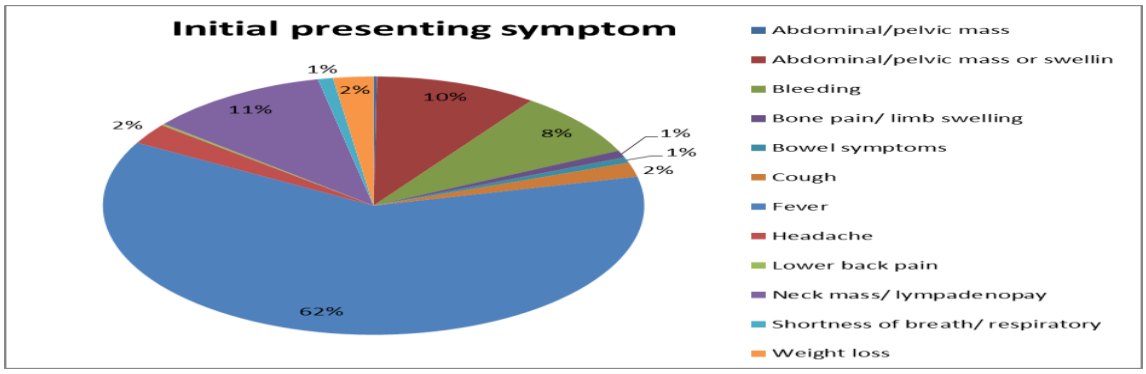


Figure 2: initial symptoms pediatric hemato-lymphoid cancer patients

Table 2: Clinical presentation at admission characteristic of patients

Characteristics	Respondent	Frequency	Percent
First point care	Health canter	198	43.6%
	Primary Hospital	185	40.7%
	General Hospital	41	9.0%
	Private clinic/Hospital	30	6.6%
Referred from	Government Hospitals	436	96.0%
	NGO/ Mission Hospital	2	0.4%
	Private facility	16	3.6%
Type of cancer	Leukaemia	305	67.2%
	Lymphoma	149	32.8%
Duration of symptoms before arrival to TASH(days/weeks)	Below 60 days	389	85.7%
	61-120 days	47	10.4%
	121-180 days	17	3.7%
	3	1	0.2%
Definitive diagnostic delay(days)	0-14days	410	90.3%
	15-30 days	40	8.8%
	Above 31 days	4	0.9%
Leukaemia/Lymphoma	ALL	224	49.3%
	AML	51	11.2%
	APML	24	5.3%
	Infantile leukaemia	6	1.3%
	NHL	149	32.8%
Nutritional status	Normal	327	72.0%
	Moderate Acute Malnutrition(MAM)	73	16.1%
	Severe Acute Malnutrition(SAM)	54	11.9%
Presence of oncologic emergency at admission	No	189	41.6%
	Yes	265	58.4%

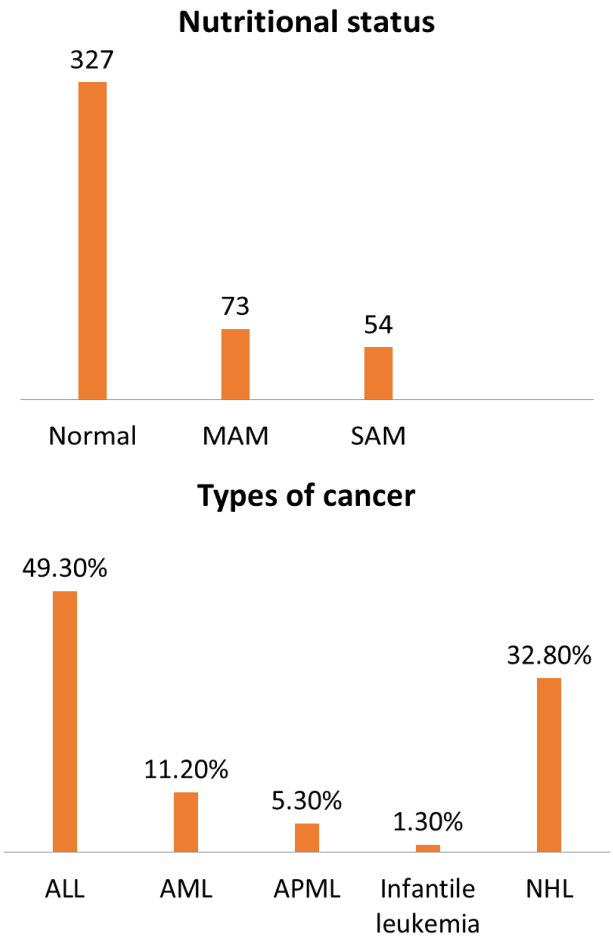


Figure 3: Nutritional status and types of cancer pediatric hemato-lymphoid cancer patients

8.4 Trends of inpatient admission

More than half of patients (54.8%) stay at emergency 1-10 days. most of patient (94.5%) stayed below 20 days. The mean length of stay at emergency was 10.4, while the median was 9.1.

The majority of patient (90.9%) not required ICU admission, only 9.1% patients required ICU admission. Cancer-directed treatment was started for all patients.

100% patients were treated by chemotherapy. Most of patient (87%) started treatment within 1-5 days.

Table 3: Trends of inpatient admission characteristic

Characteristics	Respondent	Frequency	Percent
Length of stay in emergency/CW (in days)	0-10 days	249	54.8%
	11-20 days	174	38.3%
	Above 21	31	6.8%
Length of stay at	Below 60 days	429	94.5%

ward	61-120 days	19	4.2%
	121-180 days	6	1.3%
ICU admission required	No	409	90.9%
	Yes	41	9.1%
Any cancer-directed treatment started?	No	0	0%
	Yes	454	100%
Types of treatment initiated	Chemotherapy	437	96.3%
	Chemotherapy and Surgery	2	0.2%
	steroid only	9	2.0%
Time from admission to treatment initiation(days)	0-5 days	395	87.0%
	6-10 days	37	8.1%
	11-15 days	14	3.1%
	Above 16 days	2	0.4%

8.5. Early mortality and cause of death

Among 454 patients, 3.7% were died 72 hrs. By 7 days 7.4% died. By the end of 42 days of follow-up, 21.4% patients had died.

The leading immediate cause of death was sepsis/septic shock 11.9%, followed by haemorrhage (4.4%) and respiratory failure (3.7%). Tumor lysis syndrome was reported in one patient 0.2%.

Infection was the leading intermediate cause of death,(14.8%) cases. Other causes included severe malnutrition (3.1%), metabolic complications (1.8%), disease progression (1.5%), and treatment-related toxicity (0.9%).

In 1.3% of cases, the intermediate cause was not documented.

Childhood cancer was the underlying cause of death, ALL(47.4%) was leading underlying cause of death followed by NHL(42.3%)

Table 4: Early mortality and cause death Characteristic

Characteristics	Respondent		Frequency	Percent
At 72 hours	Alive		429	94.5%
	Died		17	3.7%
	Left against medical advise		8	1.8%
At 7 days	Alive		401	88.3%
	Died		17	3.7%
	Left against medical advise		11	2.4%
At 42 days	Alive		198	44.0%
	Transferred to ICU		6	1.3%
	Died		63	14.0%
	Disappeared		1	0.2%
	Left against medical advise		16	3.5%
	Transferred to HOC		121	26.9%
After days 42	Died		3	0.7%
	Discharged		173	38.1%
	Still in Admitted		17	3.7%
Immediate cause of death	Sepsis/septic shocks		56	57.7%
	Haemorrhage		23	23.7.6%
	Respiratory failure		17	17.5%
	Tumor lysis syndrome		1	1.1%
Intermediate cause of death	Infection		61	62.9%
	Severe malnutrition		14	14.4%
	Disease progression		5	5.2%
	Metabolic complications		8	8.2%
	Not documented		2	2.1%
	Treatment related complications		2	2.1%
	Comorbid conditions		3	3.1%
	delayed diagnosis		2	2.1%
Underlying cause of death	Childhood cancer	ALL	45	46.4%
		AML	7	7.2%
		APML	2	2.1%

		Infantile leukemia	2	2.1%
		NHL	41	42.2%

8.6 Factor associated with early mortality of pediatric hemato-lymphoid cancer

In bi-variate logistic regression, Age, place of residences, Definitive diagnostic delay(days), Type of cancer, Nutritional status, Length of stay in emergency unit (in days) and ICU admission required associated with early mortality.

In multivariable logistic regression patients with a diagnostic delay 15–30 days had 3 times (AOR = 3.08; 95% CI: 1.45–5.50) more likely die when compared to those diagnosed with in 1–14 days. Children with severe acute malnutrition 2 times (AOR =2.2; 95% CI: 0.8-3.54) more likely experienced death when compared to children with normal nutritional status. Additionally, Patient who required ICU care had 3 times (AOR = 3.4; 95% CI: 1.6–7.2) higher odds of death when compared with patient not required ICU care.

ICU admission was a strong predictor of death. Children who required ICU care had 3.4 times higher odds of mortality (AOR = 3.4; 95% CI: 1.6–7.2).

Table 5: Factors associated with early mortality of pediatric hemato-lymphoid cancer patients

Characteristics	Category	Outcome		COR(95%CI)	AOR(95%CI)	P-value
		Alive	Dead			
Age	0-4 years	103	39	1	1	
	5-9 years	139	36	0.69(0.4-1.7)	0.54(0.3-1.3)	
	10-14 years	113	22	0.5(0.29-0.94)*	0.3(0.19-0.76)	
place of residences	Addis Ababa	68	17	1		
	Outside of Addis Ababa	289	80	1.17(0.6-1.97)	0.97(0.4-1.68)	
Definitive diagnostic delay(days)	0-14days	334	76	1	1	
	15-30 days	21	19	3.29(1.83-5.9)**	3.08(1.45-5.5)*	0.05
	Above 31 days	2	2	1.7(0.9-2.8)	1.4(0.7-2.03)	

Type of cancer	Leukaemia	247	56	1		
	Lymphoma	110	41	1.64(1.037-2.6)*	1.3(0.7-2.3)	
Nutritional status	Normal	289	36			
	Moderate Acute Malnutrition (MAM)	44	30	1.68(1.05-2.7)	1.05(0.6-2.5)	
	Severe Acute Malnutrition (SAM)	24	31	2.89(0.934-3.84)*	2.2(0.8-3.54)*	0.03
Length of stay in emergency/CW (in days)	0-10 days	194	55	1	1	
	11-20 days	142	32	1.4(0.57-2.9)	1.02(0.5-2.6)	
	Above 21 days	21	10	1.68(0.74-3.7)*	1.2(0.59-2.4)	
ICU admission required	No	336	75	1	1	
	Yes	21	22	4.69(2.45-8.97)**	3.4(1.6-7.2)**	0.01

9. DISCUSSION

This study showed very early mortality (death within 3 days of admission) among paediatric hemato-lymphoid cancer patients was 3.7%, early mortality is 21.4%.

The leading immediate cause of death was sepsis/septic shock (11.9%), followed by haemorrhage and respiratory failure, while infection was the predominant intermediate cause. This results is consistent with reports from low-resource settings in sub-Saharan Africa (7,8,10,11), where early mortality in paediatric leukaemia and lymphoma ranges from 10–25%.This could be due to infection treatment delay, malnutrition and limited supportive care. In contrast, study done in high-income countries report much lower early mortality (<5% in children with acute lymphoblastic leukaemia).this differences due to timely diagnosis and advanced supportive care (3,4).

Additionally ,this study showed that diagnostic delay of 15–30 days was associated with a three times more likely risk of death (AOR = 3.08; 95% CI: 1.45–5.50) .this results in line study done in Kenya, this could due to late presentation and limited supportive care. While in high-income countries such as the United States, five-year survival exceeds 85–90%, and early death is below 5%.(2,4,20), These comparisons highlight the critical impact of timely diagnosis and treatment access on survival.

Children with severe acute malnutrition in this study had approximately two times higher odds of death compared to children with normal nutritional status (AOR = 2.2; 95% CI: 0.8–3.54); however, the association was not statistically significant.

This finding is consistent with study done LMIC, Nigeria and Ethiopia. (5,11,12) This is could be due nutritional deficits among children with cancer in LMIC and other resource-limited settings.

In contrasts with patterns seen in high-income countries, where baseline childhood malnutrition rates among cancer patients tend to be lower (often under 20%) and nutritional support is more routinely integrated into care, contributing to better treatment tolerance and survival outcomes (4,12).

Furthermore, Patients who required ICU care in this study had 3 times higher odds of death than those who did not require ICU admission (AOR = 3.4; 95% CI: 1.6–7.2), reflecting the severity of critical illness in paediatric oncology. This finding consistent with studies done Uganda, Pakistan and other resource limited setting.(8,19) this could be due to late

presentation, infection burden, and limited supportive care . In contrast, studies done in high income countries report low pediatric ICU mortality rate. This differences is due to earlier diagnosis, better supportive care, advanced monitoring systems, availability of trained critical care specialists, and improved infection control practices.(4,20)

10. CONCLUSION

In this study, Very early mortality (death within 3 days of admission) among pediatric hemato-lymphoid patients was 3.7% and the overall early death (death within 42 days of admission) is 21.4%.

Sepsis and septic shock is the leading immediate cause of death. Delay diagnosis, nutritional status and patient who required ICU admission significantly associated with early mortality. Diagnostic delay of 15–30 days was associated with a three times more likely risk of death. Similarly, Patients who required ICU care in this study had 3 times higher odds of death than those who did not require ICU admission Children with severe acute malnutrition in this study had approximately two times higher odds of death.

Targeted interventions focusing critical need for timely diagnosis, prompt treatment, nutritional support, and strengthened critical care to improve survival.

11. STRENGTH AND LIMITATION OF THE STUDY

- ✓ Strength of the study
  - Large institutional case load
  - Three-year study period
  - Compressive clinical variables
  - First recent institutional analysis on early death
  - Potential to inform clinical practice
- ✓ Limitation of the study
  - Since it is a cross sectional study, Cause and effect relation of variables cannot be eestablished
  - The study is limited to single canter tertiary governmental hospital
  - Unmeasured confounders

12. RECOMMENDATION

- Early diagnosis: Strengthen community awareness and referral systems to reduce diagnostic delays among children with suspected hemato-lymphoid malignancies.
- Timely treatment: Ensure prompt initiation of cancer-directed therapy to improve survival, particularly within the first few days of hospital admission.
- Nutritional support: Integrate routine nutritional assessment and intervention for children with cancer to reduce mortality associated with severe acute malnutrition.
- Critical care capacity: Expand and improve pediatric ICU facilities, staffing, and training to manage critically ill children and reduce ICU-related mortality.
- Infection control: Implement robust infection prevention, early recognition, and treatment protocols to decrease deaths from sepsis and septic shock.
- National strategy: Strengthen Ethiopia's pediatric oncology programs and policies, including registry systems, access to chemotherapy, and supportive care infrastructure.
- Research and monitoring: Encourage on-going epidemiological studies and monitoring to track pediatric cancer incidence, outcomes, and barriers to care for evidence-based interventions.

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14. ANNEX

14.1. Annex 1

Information and consent form.

Dear Participant,

My name is Dr. Bereket Genta and I am a pediatric and child health final year resident at TASH. I am currently doing my research on Early mortality and causes of death in children with cancer at TASH. The purpose of this study is to assess and investigate the cause of Early mortality and it's magnitude in children with cancer at TASH. The data collected will only be used for the purpose of this study. Confidentiality will be strictly protected and none of your responses will affect you in any way. Your participation will significantly help increase the body of knowledge in this area and is vital for the success of this study but is purely voluntary. You may decline to participate in the study at any point if you choose to do so. I would like to thank you in advance for your participation. If you have any questions or need to contact the researcher, please use the following contact information.

Respectfully,

Dr. Bereket Genta

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E-mail; bereketgenta0@gmail.com

Consent form

I declare that the purpose, procedure as well as, the risks and benefits of the study have been explained to me and that I understand. I hereby agree to take part in the study.

14.2. Annex 2

Data collecting Questionnaire

Trends in inpatient admissions and the magnitude of early mortality among pediatric cancer patients at tikur anbessa specialized hospital

Socio-Demographic and Clinical Information (Medical Record Abstraction Form)

Patient Information

• Medical record number: _____

• Age at admission: _____

• Sex: ☐ Male ☐ Female

• Residence: ☐ Addis Ababa ☐ Outside Addis Ababa (specify region) _____

Clinical Data

• Date of first symptom onset: _____

- What were the first symptoms?
  ☐ Fever
  ☐ Abdominal swelling
  ☐ Headache
  ☐ Fatigue/weakness
  ☐ Other (specify) _____

• How long after symptoms began did they seek care? _____ days

• Where did you first seek care?

☐ Local health post
☐ Health center
☐ Private clinic
☐ Hospital (other than TASH)
☐ Directly at TASH

• Date of first visit to TASH: _____

• Date of confirmed diagnosis: _____

• Type of cancer: ☐ Leukemia ☐ Lymphoma ☐ Solid tumor (specify) _____

• Stage at diagnosis: _____

• Nutritional status at admission: ☐ Normal ☐ Moderate malnutrition ☐ Severe malnutrition

• Presence of oncologic emergency: ☐ Yes ☐ No (If yes, specify) _____

Hospital Course

• Date of admission: _____

• Length of stay at emergency: _____

• Duration from admission to death (if applicable): _____

• Treatment initiated: ☐ Yes ☐ No

Outcome

• Patient status: ☐ Alive ☐ Died

• If died: cause of death (based on records):

☐ Disease progression

☐ Infection/septicemia

☐ Respiratory failure

☐ Tumor lysis syndrome

☐ Other (specify) _____