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# Epidemiological Profile of Pediatric Cancers at the Chantal Biya Foundation Mother and Child Center From 2016 to 2022

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## Abstract

The incidence of childhood cancer worldwide has risen by 30% in the last twenty years. Every year, 80% of cases originate in developing countries, and 60% of this die. To improve survival rates, epidemiological surveillance is essential. We conducted a study of the epidemiological profile of children with cancer at the Chantal Biya Foundation's Mother and Child Center. We carried out a retrospective descriptive study. We carried out a consecutive and exhaustive recruitment in the period from January 2016 to December 2022. We included patients with a confirmed diagnosis of cancer. We recruited 765 patients, including 336 girls and 429 boys, for a sex ratio of 1.35. Mean age was 7.64 ± 4.58 years (min 1.6 months - max 19 years). The most common age group was under 5 (41.31%). In 47.9% of cases, the interval between the appearance of the first symptoms and the first consultation in the haemato-oncology department was greater than 3 months. The most frequent clinical manifestation was adenopathy in 49.67% of cases. The most common malignancies were, in descending order, Burkitt's lymphoma (25.75%), ALL (13.46%) and nephroblastoma (10.5%). More than half the patients (65.5%) arrived at the pilot unit with advanced disease. Treatment was initiated in 645 (84.31%) patients. During treatment, 95.57% (539 patients) presented febrile neutropenia as the main complication, followed by severe anemia in 92.91% (524). In our study series, the drop-out rate was estimated at 31.11% (238), the death rate at 45.23% (346) and 23.66% (181) had survived. Knowledge of the epidemiological profile of pediatric cancers at the CME/FCB is a step forward in developing strategies to improve management with the aim of increasing survival rates.

keywords: Cancer, Pediatric, Epidemiology, Cameroon

## **1. Introduction**

Cancers are diseases of concern with high mortality rates in children. According to a study by the World Health Organization (WHO), the frequency of childhood cancers has increased by 30% in the past 20 years worldwide. Of the 400 000 cases of pediatric cancer diagnosed each year worldwide, around 80% of cases come from developing countries and 60% of them die [1,2].

In sub-Saharan Africa, there are about 20,000 children with cancer per year. In Cameroon, the expected number of incident cases annually is about 900 new cases, many children with cancers are never diagnosed, therefore have no chance of treatment and the prognosis is often poor [3-5].

Partnerships have been established with the Franco-African Pediatric Oncology Group (GFAOP) since 2000 to improve cancer management. As early as 2018, training on early diagnosis was carried out with the support of the Cameroon Pediatric Oncology Group (GCOP) accompanied by World Child Cancer (WCC), Clinton Health Access Initiative (CHAI) in order to improve the survival rate Despite these advances, the epidemiological surveillance of cancers, which is essential for priority decision-making in the fight against cancer, was no longer effective; hence the need to conduct a study on the epidemiological profile of pediatric cancers at CME/FCB [6].

# 2. Materials and Methodology

All patients admitted to the CME/FCB Hemato-Oncology Unit from 2016 to 2022 were selected. This service is the first referral center for pediatric cancer patients in Cameroon. Some laboratory tests are taken free of charge at the Center Pasteur du Cameroun (CPC). Moreover, since 2000, there has been a partnership between the GFAOP and the CME/ FCB facilitating the free acquisition of certain anti-cancer drugs for patients, and the archiving of data through the REDCAP software, thus making it possible to identify certain information. We did a descriptive retrospective study. We conducted a consecutive and exhaustive recruitment in the period from January 2016 to December 2022. We included patients with a confirmed cancer diagnosis. The different morphological types were coded according to the International Classification of Childhood Cancer (ICCC) used for the descriptive epidemiology of childhood cancers. The data were collected after the patient files were studied,

#### Journal of Epidemiology and Public Health

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through the questionnaire. The latter allowed us to collect socio-demographic, clinical, paraclinical and evolving data. These data were analyzed via the SPSS statistical software version 26.0. The results of our study have been presented in the form of tables and figures. Continuous variables were expressed as mean (standard deviation) or median (inter quartile range). The categorical variables were expressed as frequencies and percentages.

#### 3. Results

#### 3.1 Socio-Demographic Characteristics

During the study period, we identified 765 patients with

Region of residence	Frequency (n)	Percentages (%)		
Adamawa	5	0.65		
Center	377	49.28		
East	32	4.18		
Far North	12	1.57		
Coastline	120	15.69		
North	26	3.40		
North-West	21	2.75		
Other to specify	12	1.57		
South	42	5.49		
Southwest	18	2.35		
West	100	13.07		
Other (n=12)				
Equatorial Guinea	3	25.00		
Chad	9	75.00		

**Table 1: Distribution of Patients by Region of Residence** 

#### 3.2 Types of Cancer and Clinical Characteristics

There was a 17.09% increase in the annual incidence of pediatric cancers during our study period. Of these cancers, Burkitt lymphoma (25.75%) was the most causative

pathology followed by acute lymphoblastic leukemia (13.46%), nephroblastoma, lymphoblastic lymphoma and acute myeloid leukemia as shown in FIG. 1.





Furthermore, the peaks in the ages of occurrence of these cancers in our environment were respectively from 6 to 10 years for LB, from 1 to 5 years and from 11 to 15 years for LA,

and from 1 to 5 years for so-called embryonic tumors, namely nephroblastoma, neuroblastoma and retinoblastoma. The table below shows the types of cancer by age group.

Type of cancer	Age ranges				Total	
	<1yr	[1-5] yrs	[6-10]yrs	[11-15]yrs	>15yrs	
Burkitt Lymphoma		46	96	48	7	197
ALL	5	35	28	33	2	103

Volume - 3 Issue - 2

Page 2 of 5

a confirmed cancer diagnosis, including 336 girls and 429 boys with a sex ratio of 1.35. The mean age was  $7.64 \pm 4.58$ years (min1.6 months - max 19 years). The age group most represented was children under 5 years of age (41.31%). Nearly half of our patients, 384 (50.20%), were in primary school. Secondary education was the most prevalent among parents and mothers in 69.93% (535). Nearly half of the patients, or 49.28%, resided in the central region, 15.69% in the coastal region and % came from foreign countries (Chad, Equatorial Guinea). (See Table I)

Nephroblastoma	2	60	13	4		79
LL		13	28	28	4	73
AML	1	24	15	20	3	63
Neuroblastoma	6	30	16	7		59
Rhabdomyosarcoma	1	25	17	5	2	50
Retinoblastoma	5	36				41
Osteosarcoma			8	12	2	22
Hodgkin lymphoma			7	8		15
Other	1	1	4	6	1	13
Hepatoblastoma	3	4	3	1		11
Germ cells Tumour	1	5		5		11
CML		2		3	1	6
Cerebral tumour		2	3	1		6
Kaposi Sarcoma		1	2	1	1	5
Burkitt like leukemia		3	1			4
Ewing sarcoma		2	1	1		4
Langerhans Histocytosis		2	1			3
Total	25	291	243	183	23	765

# Table 2: Distribution of Pediatric Cancer Types by Age Group in the Study Population

The time from symptom onset to first consultation in the haematooncology department was greater than 3 months in 47.97% of patients. The most common clinical manifestations

were, in descending order, lymphadenopathy, abdominal distention, and masses. The advanced stages were the rule in the majority of cases, i.e. 65.5%.



Figure 2: Breakdown of Pediatric Cancers by Stage

## **3.3 Scalable Features**

During our study period, treatment was initiated in 645 (84.31%) patients. During the latter period, 95.57% (539 patients) experienced febrile neutropenia as the main

complication, followed by severe anemia in 92.91% (524). We recorded a drop-out rate of 31.11% (238), a death rate of 45.23% (346) and 23.66% (181) live

Variables	Frequency	Percentage		
State of the child at last follow up (n=765)				
Death	346	45,23		
Abandon	238	31,11		
Alive	181	23,66		
State of those alive (n=181)				
Complete Remission	141	77,90		
Treatment ongoing	19	10,49		
Relapse	9	4,97		
Another cancers	3	1,66		
Tumour progression	3	1,66		

#### **Table 3: Patient Distribution by Outcome**

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## Journal of Epidemiology and Public Health

#### 4. Discussion

The limitations of our study were that the data archiving system was failing over a number of years. The retrospective nature of our study was limited to only those parameters identified in the department's records and patient records, some of which were incomplete. In addition, another weakness was found in the patients who died or had given up before a diagnosis was made, constituting a large number.

## 4.1 Socio-Demographic Characteristics

In our study, children under 5 years of age were the most affected age group (41.31%). This result is similar to that found in several studies. At the Liège University Hospital, about 40% of pediatric cancers occur in children under 5 years of age and 11% in children under 1 year of age. In the 2004-2015 Cameroon study by Afungchwuil et al, the most affected age group was between 5 and 9 years. We see from these differences that our age groups over time are approaching the literature, which may be explained by improved cancer diagnoses [7,8].

The level of education of mothers was most marked by secondary education (69.93%) followed by university education (17.78%), in contrast to the study published in 2019 by Pondy et al. in the same department, which had returned to primary education (70.6%) as the majority level of education of mothers. According to UNESCO in Cameroon, the overall literacy rate among people over 15 in 2017 was 80%. The relationship between literacy and health has been the focus of much research, most of which has concluded that the use of health services increases with the level of education of parents [9,10].

Looking at the distribution by region of residence of the patients at the beginning of the symptoms of the disease, it appears that most of them were in the Center, with a percentage of 49.28%, against those of the Far North 1.57%, Adamaoua 0.65%. This situation is explained by the proximity of the center's populations to the Mother and Child Center. Needless to say, difficulties in access to specialized services for people in remote areas, especially those from the far north of the country, as well as language barriers may explain their low representation.

#### 4.2 Clinical Characteristics

We registered 765 patients during our study period, with an annual average of 109 cases. This rate is low and does not reflect what is actually expected in Cameroon, namely 900 cases per year. It corroborates WHO statistics that estimate that 30% of children with cancer are not diagnosed. In 2022, about 1,000 children in Canada develop cancer each year. This difference in figures can be explained by the problem of archiving data, the lack of health coverage and difficulties in accessing the care service. By looking at the number of new diagnoses, we have objected to an increase in cases with an estimated rate of increase of 17.09% in the number of cases per year. At least 20,000 new cases of cancer occur in children aged 0-15 every year in sub-Saharan pediatric oncology units, members of GFAOP. This number is expected to increase by 2030 due to population growth. This increase in the number of cases in our context is probably due to the various training courses focused on the knowledge of the early signs of cancers and the increased awareness in the territory since 2021. In our study, 367 patients, or 47.97%, entered the haematooncology department 3 months after the onset of their symptoms. These delays depend on the type of malignancy, age, and providers. In our study series, the consultation period for hematological malignancies was between 2 and 3 months, while for solid tumors it was more than 3 months. In industrialized countries, the consultation period varies from 2-3 weeks for leukemia, NHL, renal tumors, from 6 to 8 weeks for MH, rhabdomyosarcoma, retinoblastoma, and from 2 to 4 months for bone tumors and brain tumors [3-11].

The main clinical manifestations of our patients were in order of frequency: lymphadenopathy 49.67% (380 cases), abdominal distension 41.18% (315 cases), any site mass 40.92% (313), pallor 39.48% (302), fever 38.56% (295 cases). These signs and symptoms are similar to those found in the literature in both developed and sub-Saharan Africa. It should be noted that fever and pallor are common symptoms in pediatric consultations and are managed in the different health centers. In our study, the first six cancers most represented in descending order were Burkitt lymphoma 25.75% (197 cases), ALL 13.46% (103 cases), Nephroblastoma 10.33% (79 cases), LL 9.54% (73 cases), AML 8.24% (63 cases) and Neuroblastoma 7.21% (59 cases), respectively. The reason for the high prevalence of PLB is thought to be a combination of two factors: early Epstein-Barr virus (EBV) infection and P. falciparum malaria in an endemic area. It should be noted that the epidemiology of cancer types has evolved over time, and we have noted the appearance of LLs that merge with LB, suggesting a better understanding of tumors [12-15].

Moreover, LBs were more frequent between the ages of 6 and 10. This age group is similar to that reported by Zacharie S et al in Cameroon. Our cases of leukemia had two peaks of occurrence: before the age of 5 years, and after 10 years. These peaks of incidence are consistent with those mentioned in the literature and in studies such as Doumbia in 2016 in Morocco So-called embryonic tumors (retinoblastoma, nephroblastoma, hepatoblastoma) were more frequent before 5 years. The age range for osteosarcomas and HD observed in our study was that of adolescence. Our study found that the age distribution of cancers is consistent with literature data on these conditions Literature data reveal that the difficulty of diagnosing childhood cancer late is common in many African countries. This could be due to misdiagnosis, non-specificity of symptoms of these conditions and the late arrival of patients in hospitals. Thus, in our study, 501 patients or 65.5% reached an advanced stage of the disease. In the same ward in 2019, a study found that the majority of patients had reached stages III and IV of the disease It is clearly established that the chemo induced complications are hematological, infectious as found in our study, justifying the importance of supportive care [7-22].

## Journal of Epidemiology and Public Health

#### 4.3 Scalable Features

Childhood cancer remains a heavy burden for developing countries with a survival rate of no more than 30% as stated in the WHO report. This is consistent with studies in sub-Saharan Africa. Thus, in our study population, the death rate was estimated at 45.23%, the dropout rate at 31.11%, compared with 23.66% of patients who had completed their treatment. It should also be noted that in Africa, despite the fact that the issue of cancer remains taboo, there are difficulties related to access to care [23].

# **5.** Conclusion

Knowledge of epidemiology has enabled us to establish the profile of pediatric cancers in our environment. It shows that childhood cancers affect children of all ages, especially those under five. There is male predominance; consultation times exceed 3 months, with arrivals at mostly high stages. Burkitt's LB remains the leader, drop-out and death rates are high, and thus represent a major public health problem.

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## **Competing Interests**

The authors declare no competing interest.

## Declarations

All authors have read and approved the final manuscript.

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