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# Pattern of childhood cancers presenting to the paediatric cancer unit of a tertiary hospital in Kumasi, Ghana

## Abstract

**Introduction:** Childhood cancers are increasing in incidence worldwide with geographic differences having an impact on the types of cancers seen. The main aim of this study was to assess the trends in yearly proportions and number of cases seen, to determine age and gender proportions of the types of cancers and types of childhood cancers diagnosed at the cancer unit from 2012 through 2014. The purpose of this study is to set the baseline framework for future research to improve knowledge, clinical care and advocacy programmes for the newly established paediatric cancer unit in KATH in Kumasi, Ghana.

**Methods:** A retrospective study was conducted to review secondary data from the paediatric cancer registry of all patients aged 0-15 years diagnosed with cancer by fine needle aspiration cytology and tissue biopsy at the paediatric cancer unit from 2012-2014. Demographic, anthropometric and clinical data stored in excel was exported to Stata and analysed. Simple descriptive statistics was used and presented in tables.

**Results:** The study showed an increasing trend in the number of cancer cases from 2012-2014 in the unit from 27.2% to 43.0%. The 5-9 age groups had the highest prevalence of cancers; 142 (46.0%) with Burkitt's lymphoma 80 (25.9%) dominating. The Hodgkin's lymphomas were predominant in the 10-15 year group. The leukaemias and the embryonal cancers particularly Wilm's tumour were prevalent in the 0-4 year group of the 309 cases, the Male: Female ratio was 1.5:1. Burkitt's lymphoma (126, 40.8%) accounted for the majority of the cancers followed by Acute Lymphoblastic Leukaemia (31, 10%), Wilm's Tumour (28, 9.1%), other Non-Hodgkin's Lymphoma (28, 9.1%), and retinoblastoma (22, 7.1%).

**Conclusion and Recommendations:** There is an observable trend in the progressive increment in the number of cancer cases presenting to the unit over the three years period. The prevalence of cancers is highest in the 5-9 year group with more males being affected. The lymphomas were the commonest cancers diagnosed with Burkitt's lymphoma being the highest. The leukaemias are second to the lymphomas. Based on these findings, further studies need to be conducted into the specific clinical patterns particularly, the lymphomas and leukaemias for better case management and advocacy programs.

**Keywords:** pattern, lymphoma, leukaemia, paediatric cancer unit, Ghana

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**Abbreviations:** CHRPE, committee on human research publications and ethics; KATH, Komfo Anokye teaching hospital; KNUST, Kwame Nkrumah University of science and technology

## Introduction

Cancers form one of the major causes of death in children aged 15years or less. They differ markedly from adult cancers in their nature, distribution and prognosis. Worldwide, childhood cancer burden is increasing[1] and over 80% of children who develop cancers each year live in low and middle income countries.[2] Whiles the outcome for cancers in the developed countries is good, the opposite is the case for patients in low and middle income countries. Early diagnosis of cancer is a fundamental goal because it allows an opportunity for timely treatment while disease burden is in its earliest stages.[3] Consequently, prognosis may improve and a cure can be attained with minimal side or late effects.[3] Geographic differences in childhood cancer incidence rates suggest a genetic and environmental influence on disease susceptibility.[2] Socioeconomic status, malnutrition, exposure to viral infections and malaria are thought to play important roles in cancer pathology and clinical characteristics.[4]

The patterns of childhood cancers in the United States of America and Europe are very similar, with leukaemia and central nervous system tumours accounting for over one-half of the new cases. In contrast, lymphoma is the most common prevailing cancer of this age group in Africa.[5] Although many studies have been published on this in some African countries,[6–8] reports on the patterns and incidence of childhood cancer in Ghana are very few.[4,9] There is paucity of data regarding childhood cancers in Ghana and no such publication exists on the cancer cases seen and treated at the Komfo Anokye Teaching Hospital (KATH) in Ghana. It is for this reason that this study was conducted with these objectives in mind, to assess thetrends in yearly proportions of cancer cases being captured, to determine age and gender proportions of the types of cancers and types of childhood cancers diagnosed at the cancer unit from 2012 through 2014. The purpose of this study was to set the baseline framework for future research to improve knowledge, clinical care and advocacy programmes for the newly established paediatric cancer unit in KATH.

## Materials and methods

### Study site

This study was conducted at the Paediatric Oncology Unit of KATH. KATH is a tertiary health institution accredited for training

medical students and residents. It is located at Bantama which is near the central business centre of Kumasi. Kumasi is the regional capital of the Ashanti Region of Ghana and the second largest city in Ghana. The city has a population of 1,889,934 by 2009 according to the Ghana Statistical Service in 2010. KATH is a 1200 bed capacity hospital and operates as a referral centre for the whole northern sector of Ghana. The catchment area stretches beyond Ashanti region to the Western, Brong-Ahafo, Eastern, Central and the 3 Northern regions. The Paediatric Cancer Unit is one of the two paediatric cancer treatment centres in the country. It is located in the Child Health Directorate at KATH. Children with cancer up to 15years are seen here.

### Study type

The study involved a retrospective review of secondary data from the cancer registry of all patients from birth to 15 years, who were diagnosed with cancer between 1st January, 2012 and 31st December, 2014.

### Study procedure

The cancer registry at the Paediatric Cancer Unit is in excel format. The registry has been in existence since 2008. Every patient who has a confirmed diagnosis of a cancer is entered on the excel database at the unit. Diagnosis for the various malignancies was confirmed using fine needle aspiration cytology or tissue biopsies for solid tumours. Bone marrow aspiration morphology was done for the diagnosis of haematological malignancies. Data entered in the registry includes demographic elements such as the name, age, gender, and address. Anthropometric data includes weight, height or length as well as laboratory, type of confirmed cancer, stage of cancer were entered daily, cleaned, stored and backed up. Data extracted from the cancer registry for this study included the demographic characteristics (age and gender) and the type of cancers which were classified based on the international classification of childhood cancer.

### Statistical analysis

The data stored in excel format in the cancer registry was exported to Stata and analysed. Simple descriptive statistics using, frequency distribution, percentages, means and standard deviation were used to describe the various variables and presented in tables.

### Ethical considerations

Ethical approval was obtained from the Committee on Human Research Publication Ethics - KATH/KNUST.

## Results

### Trends in yearly proportions of cancer cases

A total of 309 patient data was extracted from the cancer registry to determine the proportion and trend of the number of cases being captured annually from 2012-2014. The yearly distribution is captured in Table 1 as follows.

### Types of cancers by age distribution

Table 2 shows the types of cancer by age distribution from 0-15years. The lymphomas; 166 were the commonest cancers seen across the age groups. The Leukaemias; 21, Wilm's tumour; 20, Soft tissue sarcomas; 11, Rhabdomyosarcoma; 9 and Neuroblastoma; 9 were documented more among the 0-4 year group while, the lymphomas; 96, Central Nervous System Cancers; 3, and Osteosarcomas; 2 were commoner in the 5-9year group. Hepatoblastoma, though appears rare in the cancer registry among a few others, was seen with equal proportions in both 0-4 and 5-9years age groups. The 10-15 year groups recorded mainly Lymphomas; 42, but less of the other cancers.

**Table 1** Trends in yearly proportions of cancer cases

| Year | No. of cases | Yearly proportions (%) |
|---|---|---|
| 2012 | 84 | 27.2 |
| 2013 | 92 | 29.8 |
| 2014 | 133 | 43 |
| Total | 309 | 100 |

**Table 2** Types of cancers by age distribution

| Type of cancers | No. cases | Age groups (years) | | |
|---|---|---|---|---|
| | | 0 to 4 | 5 to 9 | 10 to 15 |
| **Lymphoma** | | | | |
| Burkitt's Lymphoma | 126 | 21 | 80 | 25 |
| Non-Hodgkin's Lymphoma(NHL) | 28 | 7 | 13 | 8 |
| Hodgkin's Lymphoma | 12 | 0 | 3 | 9 |
| **Leukaemia** | | | | |
| Acute Lymphoblastic Leukaemia (ALL) | 31 | 14 | 13 | 4 |
| Acute Myeloid Leukaemia (AML) | 14 | 7 | 6 | 1 |
| Wilms Tumours | 28 | 20 | 7 | 1 |
| Retinoblastoma | 22 | 18 | 4 | 0 |
| **Soft Tissue Sarcomas** | | | | |
| Rhabdomyosarcoma | 17 | 9 | 4 | 4 |
| Other soft tissue sarcoma | 4 | 2 | 1 | 1 |
| Neuroblastoma | 14 | 9 | 3 | 2 |
| CNS Tumour | 3 | 0 | 3 | 0 |
| Osteosarcoma | 3 | 1 | 2 | 0 |
| Hepatoblastoma | 2 | 1 | 1 | 0 |
| Nasopharyngeal Carcinoma | 1 | 0 | 1 | 0 |
| Germ cell Tumours | 1 | 1 | 0 | 0 |
| Others | 3 | 2 | 1 | 0 |
| **Total** | **309** | **112** | **142** | **55** |

### Types of cancers by gender distribution

There were a total of 187 (60.5%, 95%CI: 54.8-66.0) Males and 122 (39.5%, 95%CI: 34.0-45.2) Females, with a Male to Female ratio of 1.5:1. Most of the cancers are commoner in the males than the females by the proportions shown in the Table 3.

### Types of childhood cancers diagnosed

Lymphomas were the commonest childhood malignancies seen with Burkitt's lymphoma being the commonest among them (Table 4). Burkitt's lymphoma accounted for 126 (40.8%) whiles Hodgkin's Lymphoma accounted for 12(3.9%) of the cases seen. Acute Lymphoblastic Leukaemias were the second commonest malignancies; 31(10.0%) Embryonal tumours such as Wilm's tumour and retinoblastoma were the 3rd and 4th commonest tumour with

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28 (9.1%) and 22 (7.1%) respectively. The least common cancers seen were hepatoblastoma, nasopharyngeal carcinoma and germ cell tumours in the proportions of; 0.6%, 0.3% and 0.3% respectively.

**Table 3** Types of cancers by gender distribution

| Type of cancer | Sex (n) | |
|---|---|---|
| | Male | Female |
| **Lymphoma** | | |
| Burkitt's Lymphoma | 84 | 42 |
| Non-Hodgkin's Lymphoma(NHL) | 15 | 13 |
| Hodgkin's Lymphoma | 8 | 4 |
| **Leukaemia** | | |
| Acute Lymphoblastic Leukaemia(ALL) | 17 | 14 |
| Acute Myeloid Leukaemia(AML) | 8 | 6 |
| Wilm's Tumour | 19 | 9 |
| Retinoblastoma | 13 | 9 |
| **Soft Tissue Sarcomas** | | |
| Rhabdomyosarcoma | 9 | 8 |
| Other soft tissue sarcoma | 1 | 3 |
| Neuroblastoma | 8 | 6 |
| CNS Tumour | 2 | 1 |
| Osteosarcoma | 1 | 2 |
| Hepatoblastoma | 1 | 1 |
| Nasopharyngeal Carcinoma | 0 | 1 |
| Germ Cell Tumours | 0 | 1 |
| Others | 1 | 2 |
| **Total** | **187** | **122** |

**Table 4** Yearly distribution of types of childhood cancers diagnosed

| Diagnosis | 2012 | 2013 | 2014 | Total (N) | Percentage (%) |
|---|---|---|---|---|---|
| **Lymphoma** | | | | | |
| Burkitt's Lymphoma | 42 | 41 | 43 | 126 | 40.8 |
| Non-Hodgkin's Lymphoma(NHL) | 7 | 6 | 15 | 28 | 9.1 |
| Hodgkin's Lymphoma | 2 | 3 | 7 | 12 | 3.9 |
| **Leukaemia** | | | | | |
| Acute Lymphoblastic Leukaemia (ALL) | 6 | 10 | 15 | 31 | 10 |
| Acute Myeloid Leukaemia(AML) | 3 | 4 | 7 | 14 | 4.5 |
| Wilm's Tumour | 12 | 8 | 8 | 28 | 9.1 |
| Retinoblastoma | 2 | 7 | 13 | 22 | 7.1 |
| **Soft Tissue Sarcomas** | | | | | |
| Rhabdomyosarcoma | 4 | 5 | 8 | 17 | 5.5 |
| Other soft tissue sarcoma | 0 | 1 | 3 | 4 | 1.3 |
| Neuroblastoma | 5 | 4 | 5 | 14 | 4.5 |
| CNS Tumour | 0 | 0 | 3 | 3 | 1 |
| Osteosarcoma | 0 | 0 | 3 | 3 | 1 |
| Hepatoblastoma | 1 | 1 | 0 | 2 | 0.6 |

Table continued...

| Diagnosis | 2012 | 2013 | 2014 | Total (N) | Percentage (%) |
|---|---|---|---|---|---|
| Nasopharyngeal Carcinoma | 0 | 0 | 1 | 1 | 0.3 |
| Germ cell Tumours | 0 | 1 | 0 | 1 | 0.3 |
| Others | 0 | 1 | 2 | 3 | 1 |

## Discussion

### Trends in yearly proportions of cancer cases

The emerging threat of cancers in developing countries especially in the paediatric age group has received little attention. There is pre-occupation with infectious diseases such as malaria, tuberculosis and HIV which contributes to about 25% of the deaths in children under the age of one year. With successes in immunizations coverage, there will be a reduction in infectious diseases with attendant increases in prevalence of non-communicable diseases like cancers. For the three years under review, a total of 309 new cases of cancers were diagnosed in the unit and this could even be the tip of the iceberg. As shown in Table 1, the trend reveals an increment in the number of cases yearly from 27.2% to 29.8% then to 43.0%. It can be estimated from Table 1, that the average number of new cases seen per year over the three years under study, was approximately 103, which may not be too different from the 124 cases per year reported at Korle-Bu Teaching Hospital in Accra, the largest teaching hospital in Ghana.[4]

### Types of cancers by age distribution

Age is a palpable demographic indicator in the causation and the types of cancers. This study looked at children from 0-15 years with some exciting revelations. More specifically, the lymphomas were more dominant in the 5-9 year group. The peak age for patients presenting with Burkitt's lymphoma was similar to other studies.[8,10]

Even more revealing is the finding that far more different cancers like the leukaemias, Wilm's tumour, soft tissue sarcomas, Rhabdomyosarcoma, and Neuroblastomas were all commoner in the 0-4 year group. In terms of prevalence of diagnosed cancers, the 5-9 year age group were at a higher risk but the 0-4 year group were at a higher risk for embryonal cancers and leukaemias. In our study most patients with acute lymphoblastic leukaemia were in the 0-4 year age group, similar to literature from the industrialized countries.[11] Patients with Hodgkin's Lymphoma seen in our study were mostly in the group of 10-15 years. This is comparable in the literature where adolescents are commonly affected.[12]

### Types of cancers by gender distribution

The study showed a male preponderance over the females with a male to female ratio of 1.5:1(Table 3). This result is comparable with other studies found in other developing countries.[5,10,13] In the study by Segbefia et al at Korle-Bu Teaching Hospital, there was a male preponderance with a male to female ratio of 1.3:1. In resource poor countries, gender disparity in the diagnosis of paediatric cancers may be exaggerated mainly because of our cultural practices and economic factors. Males are normally given more medical attention than females.[14] The ratio of childhood cancer in boys as compared to girls increases with decrease in gross domestic product and with increasing infant mortality.[15]

### Types of childhood cancers diagnosed

Burkitt's lymphoma was the most prevalent tumour seen in this study as shown in Table 4. This is in agreement with other studies in

developing countries which showed that Burkitt's lymphoma was the commonest cancer in the paediatric age group.[8,10,16] The high incidence of Burkitt's lymphoma in Equatorial Africa is related to endemic malaria and Epstein Barr virus infections.[14] Older studies such as that by Welbeck et al.[9] have shown a higher frequency of around 67% for Burkitt's Lymphoma, while newer studies in the same hospital; Korle-Bu Teaching Hospital have lower results with 30.7%.[4] The prevalence found in KATH; 40.8% compares more favourably with the more recent Korle-Bu study. At this point we can only question whether the prevalence is indeed reducing? Could improve malaria control in Ghana with better diagnostic facilities be the reason for the perceived reduction? In patients with Burkitt's lymphoma that were seen, there was a shift from the mainly jaw masses classically seen in the tropics to those with both Jaw and abdominal masses. Acute Lymphoblastic Leukaemias were the second most common cancer seen in our study. With improved clinical and laboratory diagnosis of the leukaemias, there is a chance that the incidence might even go higher. Clinicians need to have a high index of suspicion and be aware of the early warning signs for leukaemias to diagnose it as it often mimics other common childhood illnesses like sickle cell disease and malaria.[4] The commonest embryonal tumours seen were Wilm's Tumour and Retinoblastoma, the third and fourth most commonly seen cancers in our study. Comparing our data with what is seen in Accra, Retinoblastoma was more common than Wilm's tumour. Central Nervous System tumours and neuroblastomas which are common in the industrialized countries were relatively uncommon here with 3 (1.0%) and 14 (4.5%) respectively. Under-diagnosis might be a reason for our relatively low numbers as the cost and availability of investigative imaging, often a pre-requisite for diagnosis, is too expensive for families to bear. Nasopharyngeal carcinoma which is seen in older children was seen in 1 (0.3%) patient with metastatic disease at presentation.

## Conclusion and recommendation

There is an observable trend in the progressive increment in the number of cancer cases presenting to the unit over the three years period. Except for the lymphomas, CNS cancers and osteosarcomas which were commoner in the 5-9 years age group, most of the other childhood cancers; leukaemias, Wilm's tumour, soft tissue sarcomas and neuroblatomas were predominant in the 0-4 year age group. For a few rare cancers, majority of the common cancers affected more males than females in the paediatric population studied. The Male: Female ratio of all the cases was 1.5:1. The lymphomas were the commonest cancers diagnosed with Burkitt's lymphoma being the highest among the 5-9 years group. The acute lymphoblastic leukaemias were next to the lymphomas in KATH. Based on these findings, further studies need to be conducted into the specific clinical patterns of the individual cancers particularly the lymphomas and leukaemias for better case management and advocacy.

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## Conflicts of interest

The authors declare there is no conflict of interests.

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