

Malignant Neoplasms in Kosovo's Children and Adolescents, 2024: A Population-Based Study

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Abstract

Background: The global prevalence of malignant neoplasms has been steadily increasing for more than a half-century and has now reached pandemic proportions. Millions of people suffer from preventable malignancies. Data are vital for determining what actions are required and which populations should be addressed. This paper presents cases of malignant neoplasms among children and adolescents in Kosovo reported in the population-based registry at the Department of Health Statistics (DHS) at the NIPHK for the year 2024.

Methods and Results: For this retrospective analytic study, the main source of information was the DHS's annual reports on malignant diseases at the NIPHK for 2024. In 2024, in the population registry of malignant diseases at the DHS at the NIPHK, 56 new cases of malignant diseases in children (aged 0–14 years) and adolescents (aged 15–19 years) were reported. Of these, half were boys, and half were girls. Those aged 0–4 years were 19% and 33.9%, respectively; those aged 5–9 years and 10–14 years were 12% and 21.4%, respectively; and those aged 15–19 years were 13% and 23.2%, respectively. The incidence of neoplasms in 2024 in Kosovo among children and adolescents was 11.9 cases per 100,000. Of the 56 new cases with neoplasms, almost half (23/41.1%) were malignant neoplasms, stated or presumed to be primary, of lymphoid, hematopoietic, and related tissue (C81-C96); 8/14.3% were malignant neoplasms of eye, brain and other parts of the central nervous system (C69-C72); 6/10.7% were malignant neoplasms of the urinary tract (C64-C67); and 5/8.9% cases were malignant neoplasms of mesothelial and soft tissue (C45-C49) and of female genital organs (C51-C58), while the other groups were one or two cases each.

Conclusion: Our study provides strong evidence of the incidence of cancer among children and adolescents in Kosovo, highlighting the need to develop strategies and programs to reduce the burden of cancer in children and adolescents in Kosovo. (International Journal of Biomedicine. 2025;15(2):319-324.)

Keywords: neoplasm • cancer • children • adolescents • Kosovo

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Introduction

Malignant neoplasm, or cancer, is the leading cause of disease-related death and treatment-related morbidity in children, and this trend has been increasing worldwide in recent decades.¹ Each year, approximately 400,000 children and adolescents (aged 0–19) get cancer. Every day, almost 1,000 children throughout the world are diagnosed with cancer.² A study looking at the trends of cancer incidence in childhood and adolescence (aged 0–19 years) using data from 62 countries showed an increase in cancer incidence rates from the 1980s

and the period 2001–2010.³ Malignant neoplasms that affect children and adolescents are predominantly embryonic and generally affect blood system cells and supporting tissues.⁴ Childhood cancers most commonly include leukemias, brain tumors, and solid tumors, including neuroblastoma and Wilms tumor.³ Recent medical improvements have resulted in extremely high survival rates in high-income countries, with more than 80% of children diagnosed with cancer surviving. However, only approximately 20% of children with cancer will survive in several low- and middle-income countries (LMICs).² Avoidable childhood cancer mortality in LMICs

is caused by a lack of diagnosis, misdiagnosis, or delayed diagnosis, barriers to care, treatment abandonment, death from toxicity, and relapse. Only 29% of low-income countries report that cancer medicines are generally available to their populations, compared to 96% of high-income countries.⁵ Cancer remains one of the major causes of death among children and adolescents.^{3,6} The international temporal trends of cancer incidence rates in childhood and adolescence varied by region, cancer type, age group, and gender and had changed over time.⁷ The estimated 5-year survival rate in the European region in 2022 was 83.1%.⁸ After a long gap in reporting, the Kosovo population-based Cancer Registry was established in 2011 in the Department of Health Information System (DHIS) at the National Institute of Public Health of Kosovo (NIPHK).⁹ In 2012, the DHIS published the first annual report for malignant diseases in Kosovo.¹⁰

This paper presents cases of malignant neoplasms among children and adolescents in Kosovo reported in the population-based registry at the Department of Health Statistics (DHS) at the NIPHK for the year 2024.

Materials and Methods

For this retrospective analytic study, the main source of information was the DHS’s annual reports on malignant diseases at the NIPHK for 2024. For vital statistics (number of children and adolescents), we use the Kosovo Agency of Statistics (KAS) publication.²

Statistical analysis was performed using the statistical software package SPSS version 22.0 (SPSS Inc, Armonk, NY: IBM Corp). Baseline characteristics were summarized as frequencies and percentages. Inter-group comparisons were performed using Student’s t-test. The probability value of $P<0.05$ was considered statistically significant.

Results

In 2024, in the population registry of malignant diseases at the DHS at the NIPHK, 56 new cases of malignant diseases in children (aged 0–14 years) and adolescents (aged 15–19 years) were reported. Of these, half were boys, and half were girls. Those aged 0–4 years were 19% and 33.9%, respectively; those aged 5–9 years and 10–14 years were 12% and 21.4%, respectively; and those aged 15–19 years were 13% and 23.2%, respectively. Boys were aged 0–19 years, with a median of 6 years, while girls were 1–19 years, with a median of 9.5 years, with no significant difference in mean age by gender ($P=0.247$) (Table 1).

The incidence of neoplasms in 2024 in Kosovo among children and adolescents was 11.9 cases per 100,000. The incidence in individuals of 0–4 years was 17.6/100,000; 5–9 years, 10.2/100,000; 10–14 years, 9.8/100,000 inhabitants, and 15–19 years, 10.6/100,000 (Table 2).

Of the 56 new cases with neoplasms, almost half (23/41.1%) were malignant neoplasms, stated or presumed to be primary, of lymphoid, hematopoietic, and related tissue (C81-C96); 8/14.3% were malignant neoplasms of eye, brain and other parts of the central nervous system (C69-C72);

6/10.7% were malignant neoplasms of the urinary tract (C64-C67); and 5/8.9% cases were malignant neoplasms of mesothelial and soft tissue (C45-C49) and of female genital organs (C51-C58), while the other groups were one or two cases each (Tables 3-6).

Table 1.
Frequency distribution of tumors in children and adolescents in Kosovo in 2014 by gender and age group.

Age group, year	M		F		Total	
	N	%	N	%	N	%
0-4	11	39.3	8	28.6	19	33.9
5-9	6	21.4	6	21.4	12	21.4
10-14	6	21.4	6	21.4	12	21.4
15-19	5	17.9	8	28.6	13	23.2
Total	28	100.0	28	100.0	56	100.0
Mean ± SD	7.8 ± 6.1		9.6 ± 5.6		8.7 ± 5.8	
Median	6.0		9.5		7.5	
Rank	0 - 19		1-19		0 - 19	
Unpaired t-test	t=1.17, P=0.247					

Table 2.
Incidence of neoplasms in children and adolescents in 2024.

Age group, yr	Inhabitants, 2024 years	New cases	Incidence/100000
0-4	107710	19	17.6
5-9	117272	12	10.2
10-14	123022	12	9.8
0-14	348004	43	12.4
15-19	122613	13	10.6
0-19	470617	56	11.9

Table 3.
Frequency distribution of tumors in children and adolescents in Kosovo in 2014 by group of diagnosis and gender (ICD-10 codes)

ICD 10		M		F		Total	
		n	%	n	%	n	%
C00-C14	Malignant neoplasms of lip, oral cavity and pharynx	1	3.6	-	-	1	1.8
C30-C39	Malignant neoplasms of respiratory and intrathoracic organs	-	-	1	3.6	1	1.8
C40-C41	Malignant neoplasms of bone and articular cartilage	1	3.6	-	-	1	1.8
C43-C44	Melanoma and other malignant neoplasms of skin	1	3.6	-	-	1	1.8
C45-C49	Malignant neoplasms of mesothelial and soft tissue	3	10.7	2	7.1	5	8.9
C51-C58	Malignant neoplasms of female genital organs	-	-	5	17.9	5	8.9

Table 3 (continued).

Frequency distribution of tumors in children and adolescents in Kosovo in 2014 by group of diagnosis and gender (ICD-10 codes).

ICD 10		M		F		Total	
		n	%	n	%	n	%
C60-C63	Malignant neoplasms of male genital organs	1	3.6	-	-	1	1.8
C64-C67	Malignant neoplasms of urinary tract	3	10.7	3	10.7	6	10.7
C69-C72	Malignant neoplasms of eye, brain and other parts of central nervous system	3	10.7	5	17.9	8	14.3
C73-C75	Malignant neoplasms of thyroid and other endocrine glands	1	3.6	1	3.6	2	3.6
C76-C80	Malignant neoplasms of ill-defined, secondary and unspecified sites	1	3.6	-	-	1	1.8
C81-C96	Malignant neoplasms, stated or presumed to be primary, of lymphoid, hematopoietic and related tissue	12	42.9	11	39.3	23	41.1
D10-D36	Benign neoplasms	1	3.6	-	-	1	1.8
Total		28	100.0	28	100.0	56	100.0

Table 4.

Frequency distribution of tumors in children and adolescents in Kosovo in 2014 by group of diagnosis and age (ICD-10 codes).

ICD 10		Age-group (year)			
		0-4	5-9	10-14	15-19
C00-C14	Malignant neoplasms of lip, oral cavity and pharynx	-	-	1	-
C30-C39	Malignant neoplasms of respiratory and intrathoracic organs	-	1	-	-
C40-C41	Malignant neoplasms of bone and articular cartilage	-	1	-	-
C43-C44	Melanoma and other malignant neoplasms of skin	-	-	-	1
C45-C49	Malignant neoplasms of mesothelial and soft tissue	1	1	2	1
C51-C58	Malignant neoplasms of female genital organs	-	2	1	2
C60-C63	Malignant neoplasms of male genital organs	-	-	-	1
C64-C67	Malignant neoplasms of urinary tract	4	-	-	2
C69-C72	Malignant neoplasms of eye, brain and other parts of central nervous system	3	2	1	2
C73-C75	Malignant neoplasms of thyroid and other endocrine glands	1	1	-	-
C76-C80	Malignant neoplasms of ill-defined, secondary and unspecified sites	1	-	-	-
C81-C96	Malignant neoplasms, stated or presumed to be primary, of lymphoid, hematopoietic and related tissue	9	4	6	4
D10-D36	Benign neoplasms			1	
Total		19	12	12	13

Table 5.

Frequency distribution of tumors in children and adolescents in Kosovo in 2014 by diagnosis and gender (ICD-10 codes with specific subtypes).

ICD-10 codes		M		F		Total	
		n	%	n	%	n	%
C11.9	Malignant neoplasm of nasopharynx	1	3.6	-	-	1	1.8
C38.3	Malignant neoplasm of mediastinum, part unspecified	-	-	1	3.6	1	1.8
C41.9	Malignant neoplasm of bone and articular cartilage of other and unspecified sites	1	3.6	-	-	1	1.8
C43	Malignant melanoma of skin	1	3.6	-	-	1	1.8
C49.9	Malignant neoplasm of other connective and soft tissue, unspecified	3	10.7	2	7.1	5	8.9
C56	Malignant neoplasm of ovary	-	-	5	17.9	5	8.9
C62	Malignant neoplasm of testis	1	3.6	-	-	1	1.8
C64	Malignant neoplasm of kidney, except renal pelvis	2	7.1	2	7.1	4	7.1
C67	Malignant neoplasm of bladder	1	3.6	1	3.6	2	3.6
C71	Malignant neoplasm of brain	3	10.7	5	17.9	8	14.3
C73	Malignant neoplasm of thyroid gland	-	-	1	3.6	1	1.8
C74	Malignant neoplasm of adrenal gland	1	3.6	-	-	1	1.8
C80	Malignant neoplasm, without specification of site	1	3.6	-	-	1	1.8
C81.9	Hodgkin lymphoma	2	7.1	-	-	2	3.6
C83.7	Burkitt lymphoma	1	3.6	-	-	1	1.8
C91	Lymphoid leukemia	6	21.4	9	32.1	15	26.8
C92	Acute myeloblastic leukemia	3	10.7	1	3.6	4	7.1
C96.1	Other and unspecified malignant neoplasms of lymphoid, hematopoietic and related tissue	-	-	1	3.6	1	1.8
D16	Benign neoplasm of bone and articular cartilage	1	3.6	-	-	1	1.8
Total		28	100.0	28	100.0	56	100.0

Table 6.

Frequency distribution of tumors in children and adolescents in Kosovo in 2014 by group of diagnosis and age (ICD-10 codes with specific subtypes).

ICD-10		Age-group (year)			
		0-4	5-9	10-14	15-19
C11.9	Malignant neoplasm of nasopharynx	-	-	1	-
C38.3	Malignant neoplasm of mediastinum, part unspecified	-	1	-	-
C41.9	Malignant neoplasm of bone and articular cartilage of other and unspecified sites	-	1	-	-

Table 6 (continued).
Frequency distribution of tumors in children and adolescents in Kosovo in 2014 by group of diagnosis and age (ICD-10 codes with specific subtypes).

ICD-10		Age-group (year)			
		0-4	5-9	10-14	15-19
C43	Malignant melanoma of skin	-	-	-	1
C49.9	Malignant neoplasm of other connective and soft tissue, unspecified	1	1	2	1
C56	Malignant neoplasm of ovary	-	2	1	2
C62	Malignant neoplasm of testis	-	-	-	1
C64	Malignant neoplasm of kidney, except renal pelvis	4	-	-	-
C67	Malignant neoplasm of bladder	-	-	-	2
C71	Malignant neoplasm of brain	3	2	1	2
C73	Malignant neoplasm of thyroid gland	-	1	-	-
C74	Malignant neoplasm of adrenal gland	1	-	-	-
C80	Malignant neoplasm, without specification of site	1	-	-	-
C81.9	Hodgkin lymphoma	-	1	1	-
C83.7	Burkitt lymphoma	1	-	-	-
C91	Lymphoid leukemia	6	3	3	3
C92	Acute myeloblastic leukemia	1	-	2	1
C96.1	Other and unspecified malignant neoplasms of lymphoid, hematopoietic and related tissue	1	-	-	-
D16	Benign neoplasm of bone and articular cartilage	-	-	1	-
Total		19	12	12	13

Discussion

Cancer in childhood and adolescence is a serious public health issue. While childhood and adolescent cancer is relatively rare compared to cancer in adults, it remains a significant concern due to its profound impact on the lives of young patients and their families.¹⁰ In LMICs, cancers in childhood and adolescence are often fatal due to the lack of early diagnosis and treatment. This occurs due to the lack of population screening programs or lifestyle-related, risk-reduction strategies that are more effective in obtaining favorable results. Childhood cancer, therefore, is often fatal when appropriate diagnosis and treatment are not carried out. Childhood cancer usually progresses quickly. Thus, improving childhood cancer outcomes requires well-functioning health systems.¹¹ Childhood cancer encompasses a broad range of malignancies that can arise in various organs and tissues, which differ from the cancers found in adults.¹⁰ Among the most abundant pediatric primary tumors occurring under age 15 are acute lymphoblastic leukemia (30%), tumors of the brain and central nervous system (23%), neuroblastoma (7.2%), soft tissue sarcoma (6.1%), Wilms tumor (5.6%), non-Hodgkin lymphoma (5.0%), Hodgkin lymphoma (4.9%), acute myeloid

leukemia (4.6%), retinoblastoma (2.8%), and osteosarcoma (2.3%).¹² In the European Union, in 2022, there were an estimated 13,800 new cases (6,241 girls and 7,559 boys) in 0 to 19-year-olds. In the same year, among 0 to 19-year-olds, 90 patients (33 girls and 57 boys) in Albania, 318 patients (145 girls and 173 boys) in Austria, 149 patients (75 girls and 74 boys) in Croatia, 58 patients (20 girls and 38 boys) in Bosnia and Herzegovina, 35 patients (13 girls and 22 boys) in North Macedonia, 75 patients (29 girls and 46 boys) in Slovenia, 282 patients (130 girls and 152 boys) in Switzerland, 1,565 patients (678 girls and 887 boys) in Germany, 4,817 patients (2,232 girls and 2,585 boys) in Turkey and 2,489 patients (1,207 girls and 1,282 boys) in France were diagnosed with cancer.¹³ As can be seen from the data presented above, the number of cases with neoplasms was higher in boys compared to girls, while our data for 2024 shows the same number in both sexes, 28 cases. Since there are more boys than girls in this age group,⁹ the incidence of neoplasms in girls 0-19 years old is 12.4/100,000, while in boys, it is 11.4/100,000. The incidence of primary cancer in children aged 0–14 years is 140.6 per million person-years, and in those aged 0–19 years, 155.8 per million person-years, representing about 1% of all cancers diagnosed annually worldwide, with a gradual increase in recent decades.^{3,14-16}

In 2022, the cancer incidence across Europe was 15/100,000 and 26/100,00 in those aged 0–14 and 15–24 years, respectively.¹⁷ In Albania, in 2019, the incidence of cancer in individuals of 0-4 years was 27.7/100,000 (F: 33.9/100,000 vs. M: 21.8/100,000); of 5-9 years, 12.2/100,000 (F: 6.2 /100,000 vs. M: 18.0/100,000); 10–14 years, 15.2/100,000 (F: 19.3 /100,000 vs. M: 11.4 /100,000); and 15–19 years, 19.8/100,000 (F: 17.1 /100,000 vs. M: 22.4 /100,000). In the age group of 0–19 years, it was 18.7/100 000 (F: 19.1 /100 000 vs. M: 18.4 /100 000). Of 151 cases, 63 were female, and 88 were male.¹⁸

The incidence of neoplasms in 2024 in Kosovo among children and adolescents was 11.9 cases per 100,000 persons aged 0–19, which is lower than in Albania in 2019. In Kosovo, the incidence in children 0–4 years was 17.6/100,000; in those 5–9 years it was 10.2/100,000; in those 10–14 years it was 9.8/100,000 inhabitants and in those 15–19 years it was 10.6/100,000 inhabitants.

Tumors of the central nervous system are the most common solid neoplasm and the leading cause of cancer-related death in children,¹⁹⁻²¹ accounting for 20% of all juvenile malignancies and ranking second only to leukemia in frequency.^{22,23}

The same situation is in Kosovo: Of the 56 new cases with neoplasms, almost half (23/41.1%) were malignant neoplasms, stated or presumed to be primary, of lymphoid, hematopoietic, and related tissue (C81-C96); 8/14.3% were malignant neoplasms of eye, brain and other parts of the central nervous system (C69-C72); 6/10.7% were malignant neoplasms of the urinary tract (C64-C67); and 5/8.9% cases were malignant neoplasms of mesothelial and soft tissue (C45-C49) and of female genital organs (C51-C58), while the other groups were one or two cases each.

In the European region, the 5-year survival rate in 2022 was estimated at 83,1%, and differs little between European

countries that have data about survival of 5 years, like Austria at 85.3%, Croatia at 80%, Slovenia at 84.4%, Switzerland at 83.7%, and Germany at 82.6%. In Kosovo, causes of death are reported to the KAS, and the two databases are separate, so we are currently unable to calculate the survival rate. The data on causes of death show in the last four years (the latest data is 2021) show these results: In 2020 and 2021, 12 cases of deaths from neoplasms were reported each year in the age group 0–19 years; in 2019, Kosovo reported nine cases in that age group; and in 2018, six cases.²⁴⁻²⁶

Conclusions

Our study offers solid proof of the incidence of malignant neoplasms among Kosovo children and adolescents. We need to work on strategies and programs to reduce the disease burden of childhood and adolescent cancer in Kosovo. One of the limitations of this study was the inability to analyze the 5-year survival rates of adolescents and children with malignant neoplasms in Kosovo.

Competing Interests

The authors declare that they have no competing interests.

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