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RESEARCH ARTICLE

Burden of Childhood Cancer in Nepal: An Analysis of GLOBOCAN Data 2022

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Abstract

Introduction: Childhood cancer poses a significant public health challenge in low-middle-income countries, such as Nepal. This study reports the burden of childhood cancer in Nepal. **Materials and Methods:** This study utilized the data from the latest GLOBOCAN 2022 database to present estimates of childhood cancer in Nepal. The data were described as incidence, prevalence, and mortality stratified by age, gender, and cancer type. The projected trend of childhood cancer was also analyzed until the year 2050. **Results:** In 2022, there were an estimated 936 childhood cancer cases in Nepal, including 330 new cases with an age-standardized rate (ASR) of 4.1 per 100,000 and 121 deaths with an ASR of 1.5 per 100,000. The most common cancers were leukemia, non-Hodgkin lymphoma, and brain and central nervous system. The projected trend in 2050 indicated a decrease in childhood cancer cases and mortality by 10.6% and 10.7%, respectively. **Conclusion:** This study highlighted the burden of childhood cancer in Nepal, aligning with global and Asian trends. Urgent action is required, emphasizing a comprehensive approach that includes raising awareness, early diagnosis, treatment, resource allocation, and policy integration to effectively alleviate the burden of childhood cancer.

Keywords: Child- neoplasms- leukemia- burden- Nepal

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Introduction

Cancer is a major global health burden, causing about 20 million new cases and 9.7 million deaths in 2022 [1]. The Global Cancer Observatory (GLOBOCAN) 2022 data shows that there are 22,008 new cancer cases and 14,704 deaths from cancer in Nepal [2]. Cancer accounted for 10% of the total mortality and 5.6% of the total disability-adjusted life years (DALYs) in Nepal [3].

Cancer is a leading cause of mortality among children. Cancer affects an estimated 400,000 children around the world every year [4]. Leukemias, brain cancers, lymphomas, and solid tumors such as neuroblastoma and Wilms tumors are among the most frequently occurring types of cancer in children [4,5]. Though childhood cancers are less common than other childhood diseases, their consequences result in financial burdens, increased likelihood of subsequent neoplasms, and chronic complications [6]. The advancements in clinical treatments and supportive care have substantially increased the cure rate of childhood cancer, leading to a 5-year survival rate of more than 80% in high-income countries (HICs) [4]. Nevertheless, challenges such as delays in seeking care, difficulty in accessing treatment, and financial hardships contribute to a significantly lower 5-year survival rate of less than 30% in low-middle-income countries (LMICs) [4]. Unfortunately, 80% of childhood cancer cases reside in LMICs, and projections indicated a potential 30%

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increase in this burden by the end of this decade [7]. Childhood cancers are linked to prenatal and congenital factors, with approximately 10% of these cancers having a germline mutation [5]. Air pollution, nutritional deficiencies, radiation, maternal obesity, maternal tobacco and alcohol consumption, and infectious diseases can also contribute to the burden of childhood cancer burden [5, 8].

The WHO Global Initiative for Childhood Cancer was established to address the considerable burden of childhood cancers, emphasizing the need for capacity-building interventions and the integration of childhood cancers into national policies [4]. Nepal has been designated as a focus country in the WHO Global Initiative for Childhood Cancer, alongside Myanmar and Sri Lanka in the WHO South-East Asia Region [9, 10].

There are limited studies in childhood cancer in Nepal and most of them are hospital-based studies. In the absence of a national childhood cancer registry, this study will provide baseline data regarding childhood cancer in Nepal, which will be useful for healthcare planning. Hence, this study aims to report the burden of childhood cancer in Nepal in terms of incidence, prevalence, and deaths, based on the latest data from GLOBOCAN 2022.

Materials and Methods

This study utilized the estimates of childhood cancer from the GLOBOCAN database created by the International Agency for Research on Cancer (IARC). The resources and methods used in compiling the GLOBOCAN estimates for 2022 are described online at the Global Cancer Observatory (GCO) website (https://gco.iarc.who.int/en) [11]. The GLOBOCAN allows tabulation and graphic visualization of the GLOBOCAN database for 185 countries and 36 cancers, as well as all the cancers combined by age and sex. We analyzed the incidence, 5- year prevalence, and mortality data for childhood cancers in Nepal and, compared them with Southeast Asia, Asia and the world. GLOBOCAN estimates cancer burden from national rates, if available otherwise it uses the rates from those of neighbouring countries or registries from same area. Nepal also lack data and hence GLOBOCAN utilizes the data from India to estimate Nepal's cancer burden [11]. Children were defined as 0 to 14 years old. Projections to 2050 were derived from CANCER TOMORROW, applying stable age-specific incidence/mortality rates to UN World Population Prospects 2024 medium-variant estimates for Nepal's pediatric population (0-14 years), yielding a modeled 10.6% reduction in cases (330 to 295) and 10.7% in deaths (121 to 109). Uncertainty arises from demographic assumptions; sensitivity analyses assuming high-variant growth indicate only a 5.2% decline [12]. The data were presented in numbers and age-standardized rates (ASR) based on the 1966 Segi-Doll World standard population. This is the world standard population used to calculate the GLOBOCAN data.

This study used GLOBOCAN database, that are freely available from GCO web portal for data extraction at https://gco.iarc.who.int/en (accessed October 2025). Hence, ethical approval for this study was not required. This study adheres to STROBE guidelines for reporting observational epidemiological data [13].

Results

GLOBOCAN estimated 202,124 new cases of childhood cancer (ASR= 10.3 per 100,000) globally with 114,667 in males and 87,457 in females in the year 2022. There were 77,176 deaths, with 44,492 in males and 32,684 in females, resulting in an overall mortality ASR of 3.9 per 100,000. In Asia, the estimated incidence rate was 9.7 per 100,000 and the mortality rate was 3.9 per 100,000. In Southeast Asia, the estimated incidence rate was 8.1 per 100,000 and the mortality rate was 3.6 per 100,000. In 2022, Nepal recorded 330 new childhood cancer cases (ASR 4.1/100,000), 936 five-year prevalent cases (ASR 11.3/100,000), and 121 deaths (ASR 1.5/100,000), substantially lower than global (ASR 10.3) and Asian (9.7) incidence rates (Table 1).

Leukemia was the most common childhood cancer, both in incidence (46.4% of total) and mortality rates

Table 1. Incidence, Prevalence, and Mortality of Childhood Cancers Globally, in Asia and Nepal in 2022.

Location	Sex	Incidence		5-year Prevalence		Mortality	
		n	ASR per 100,000	n	ASR per 100,000	n	ASR per 100,000
Global	Both	202124	10.3	676133	34.1	77176	3.9
	Male	114667	11.4	389107	38.1	44492	4.4
	Female	87457	9.2	287026	29.9	32684	3.4
Asia	Both	101 718	9.7	337408	31.6	40562	3.9
	Male	58839	10.8	197170	35.4	24049	4.4
	Female	42879	8.5	140238	27.4	16513	3.3
South-East Asia	Both	40976	8.1	127681	24.8	18136	3.6
	Male	24521	9.3	77104	28.8	10947	4.1
	Female	16455	6.7	50577	20.5	7189	2.9
Nepal	Both	330	4.1	936	11.3	121	1.5
	Male	205	5	593	14.1	81	2
	Female	125	3.1	343	8.4	40	1

Table 2. Incidence and Mortality of Childhood Cancer in Nepal by Cancer Type and Sex, 2022.

Cancer type	Both sex						Male				Female			
	Incidence			Mortality			Incidence		Mortality		Incidence		Mortality	
	n	ASR	%	n	ASR	%	n	ASR	n	ASR	n	ASR	n	ASR
All cancers	330	4.1	100	121	1.5	100	205	5	81	2	125	3.1	40	1
Leukaemia	153	1.9	46.4	62	0.78	51.2	92	2.3	39	0.95	61	1.5	23	0.6
Non-Hodgkin lymphoma	22	0.28	6.7	11	0.14	9.1	22	0.54	11	0.27	0	0	0	0
Brain, central nervous system	20	0.24	6.1	7	0.09	5.8	16	0.37	5	0.12	4	0.11	2	0.06
Hodgkin lymphoma	10	0.11	3	3	0.04	2.5	4	0.09	3	0.07	6	0.12	0	0
Kidney	9	0.13	2.7	4	0.06	3.3	8	0.22	4	0.11	1	0.03	0	0
Thyroid	5	0.05	1.5	3	0.03	2.5	3	0.06	2	0.04	2	0.04	1	0.02
Colorectum	4	0.04	1.2	0	0	0	3	0.06	0	0	1	0.02	0	0
Liver and intrahepatic bile ducts	2	0.03	0.6	0	0	0	1	0.03	0	0	1	0.03	0	0
Trachea, bronchus and lung	2	0.02	0.6	0	0	0	2	0.04	0	0	0	0	0	0
Melanoma of skin	1	0.01	0.3	0	0	0	1	0.02	0	0	0	0	0	0
Ovary	1	0.02	0.3	0	0	0	0	0	0	0	1	0.02	0	0

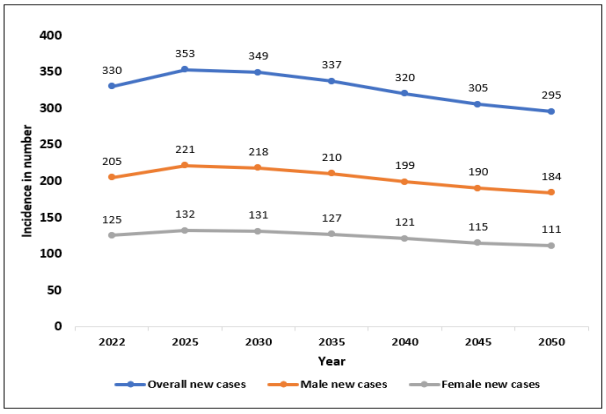

Figure 1. Projected New Cases for Childhood Cancer in Nepal, 2022 to 2050, by Sex.

(51.2% of total). Non-Hodgkin lymphoma was second overall and in males, while in females, Hodgkin's lymphoma was second. The third most common cancer was brain and central nervous system cancer in both sexes (Table 2).

According to GLOBOCAN projections, both childhood cancer cases and deaths are projected to decrease by 10.6% and 10.7%, respectively, from 2022 to 2050. For males, cases and deaths are anticipated to decrease by 10.2% and 9.9%, respectively and for females, there is an expected decrease of 11.2% in cases and 10.0% in deaths during the same period, showing a positive trend in childhood cancer (Figure 1 and Figure 2).

Discussion

This study based on the GLOBOCAN database showed the age-standardized incidence, prevalence, and mortality rates of childhood cancer globally, in Asia and Nepal, and also estimated projections of the future incidence of childhood cancer in Nepal till 2050. We found that the incidence and mortality rates of childhood cancer cases in Asia were 9.7 and 3.9 per 100,000 respectively, which in Nepal were 4.1 and 1.5 per 100,000 respectively. This shows that childhood cancer mortality is of significant concern for Nepal, too. In LMICs, five-year survival remains <30% due to systemic barriers, compared to >80% in high-income settings [5].

We found almost similar patterns of incidence, prevalence, and mortality of childhood cancer globally and in Asia. This showed that the problem is of growing concern. Male predominance (ASR 5.0 vs. 3.1/100,000) aligns with global patterns [14], driven by genetic/hormonal factors and higher male birthweight/infection susceptibility [15, 16]; Nepal's PBCR data show age-specific reversals in older girls [17].

Leukemia was the most common type of childhood cancer in our study followed by non-Hodgkin's lymphoma, in terms of incidence as well as mortality rates. Leukemia has been the most common cancer globally though it shows a declining trend [18]. The International Agency for Research on Cancer (IARC) and other studies also highlighted leukemia as the most common type of cancer and the most common cause of cancer mortality in children [14, 19, 20]. Lymphoma was the second most common type in a study in India similar to our study [19]. The incidence of these cancers was found higher among males compared to females. Similar to this, another study observed a higher incidence of cancer like non-Hodgkin's lymphoma, Hodgkin's disease, etc. among male children

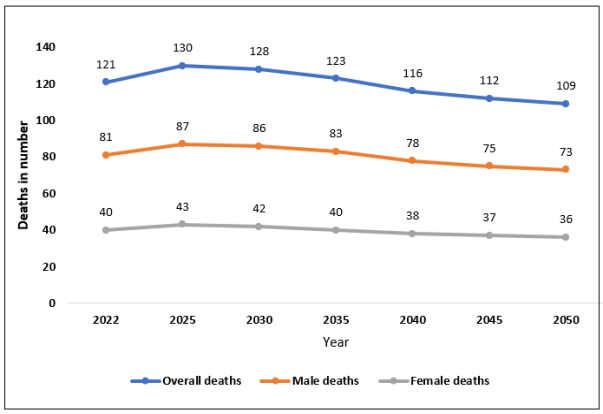

Figure 2. Projected Deaths for Childhood Cancer in Nepal, 2022 to 2050, by Sex.

[15].

The projections of childhood cancer showed decreasing trends of childhood cancer cases and deaths in the next twenty-eight years similar to the current global and regional trends [14]. The anticipated reductions in cancer cases and deaths among males were by 10.2% and 9.9% respectively, and for females were 11.2% and 10% respectively. The reductions in childhood cancer mortality are seen in different LMICs according to the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) from 1990 to 2019, suggesting socioeconomic improvements leading to improvement in healthcare [18]. However, the overall incident and prevalent cases in South Asian countries showed increasing trends. In India, the incidence rates of pediatric cancer show an increasing trend, whereas its proportion shows a decreasing trend [21]. Nepal's modeled decline diverges from South Asia's empirical rises [19, 21], likely reflecting GLOBOCAN's rate-stability assumption; real-world surveillance may reveal 1-2% annual increases if air pollution/nutritional risks escalate [18].

Prevention of childhood cancers is less effective than adult cancers [5]. Screening tests have been reported to be less useful for childhood cancers. Most of the childhood cancers are detected in the late stage in Nepal. Therefore, a crucial focus for Nepal should be on early detection and intervention to increase the cure rates and, ultimately the survival rates. This can be achieved by providing recent advancements in diagnosis and treatment for children, training health professionals, establishing defined referral systems and strengthening the insurance system to alleviate financial burdens. There is also a need to increase public awareness, encourage early care-seeking behaviors, and eliminate associated stigma related to childhood cancer. The scarcity of pediatric oncologists (only 10 in number as of 2018), lack of specialized centers, and expensive treatments pose significant barriers to accessing health care in Nepal [22]. However, the Nepalese government has prioritized control of childhood cancer in its plans recently and has invited suggestions from the experts of the International Atomic Energy Agency and its partners on increasing access to cancer care and reducing annual cancer-related deaths [10]. Additionally, Nepal is a designated focus country in the WHO Global Initiative for Childhood Cancer, which will help emphasize the need for capacity-building interventions and integrating childhood cancers into national policies [4, 9]. Recent advances including launch of the Nepal Childhood Cancer Alliance (NCCA) partnering World Child Cancer and local NGOs for equitable access on February 2025 [23] and free government treatment since November 2024 [24], align with CureAll but require registry establishment to track progress toward 60% survival by 2030 [4]. Furthermore, pending DECAN-child results help identify the challenges of childhood cancer care in Nepal [25].

The limitations of this study are related to the data sources employed in GLOBOCAN 2022. Nepal lacks a comprehensive national population-based cancer registry. The existing population-based cancer registry is limited to only nine districts and, data collection in hospital-based cancer registry is confined to 12 hospitals [26]. Hence, GLOBOCAN utilizes the data from neighbouring country,i.e India to estimate the burden of cancer in Nepal. GLOBOCAN's India-derived estimates may understate Nepal's burden by 20-30%, given rural diagnostic disparities. It is crucial to address this gap by reinforcing cancer registries in Nepal along with the establishment of childhood cancer registry, as this would facilitate the comprehensive assessment of the national burden of childhood cancer. Nepal Pediatric Society has also emphasized on initiating a separate national childhood cancer registry in its position paper on childhood cancer in Nepal [27]. Strengthening these registries is imperative to inform policymakers with essential information, enabling them to formulate effective strategies for the control and management of childhood cancers.

In conclusion, this study presents a comprehensive picture of the distribution of childhood cancer burden in Nepal. Though the trend in future projections is in decreasing order, the current scenario in Nepal, marked by a lack of expertise and dedicated centers, underscores the ongoing need for concerted efforts to reduce the burden of childhood cancer. Strategies should be directed toward prioritizing childhood cancer within the national policy framework. This will help to enhance early detection, ensure equitable access to healthcare resources, allocate resources, improve intervention strategies, and deliver comprehensive care for children with cancer. Such targeted efforts are imperative to mitigate the burden of childhood cancer and contribute to improved outcomes and overall well-being for affected individuals.

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Declaration on generative AI and AI-assisted technologies in the writing process:

None

Clinical trial registration

Not applicable

Conflicts of interest/Competing interests

The authors declare that they have no conflicts of interest.

Authors' contributions

Gambhir Shrestha contributed to the conception, design, and final drafting of the manuscript. Gambhir Shrestha and Sujata Shakya contributed to data extraction and analysis. All authors contributed to the primary drafting of the manuscript. All authors approved the final version for submission.

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