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Addressing the Alarming Rise in Pediatric Cancer Prevalence in India: A Call to Action

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ABSTRACT

Background: Childhood cancer has become a pressing global concern, impacting over 200,000 children annually, and is projected to escalate to 21 million diagnoses by 2030. This article discusses the growing incidence of pediatric cancer in India, describes the unique obstacles it faces, and encompasses a strategy for solving this pressing problem.

Methods: We reviewed published scientific literature and available information on cancer control and prevention programs in India.

Results: According to the National Cancer Registry Programme, in India, childhood cancers (0–14 years) constitute 4.0% of all cancer cases. The surge in childhood cancer cases in India mirrors a global trend, emphasizing the necessity for a comprehensive understanding of contributing factors. Pediatric oncology in India faces challenges arising from limited rural healthcare access, resulting in delayed diagnosis and treatment. Socioeconomic factors hinder specialized pediatric cancer care, accentuating the need to bridge these gaps through targeted interventions, improved infrastructure, and policies. Additionally, there are limited population-level epidemiologic studies on environmental, lifestyle, and genetic risk factors and childhood cancers. Research on genetic and environmental determinants is crucial for developing effective treatments. Addressing this requires public education, enhanced medical and research training, community-based cancer screening, and integrated medical care initiatives. Advocacy and awareness campaigns play a vital role in tackling pediatric cancer challenges, supported by grassroots initiatives and collaboration between the government and nongovernmental organizations.

Conclusion: Despite recent efforts by the Ministry of Health, Government of India, childhood cancer lacks a specific policy in India. Urgent collective efforts are needed to address challenges, invest in research, enhance awareness, and advocate for policy changes. It is time for healthcare professionals, policymakers, researchers, and the public to collaborate and ensure no child in India is left behind in the fight against pediatric cancer, paving the way for a healthier future for the nation's youngest members.

1 | Perspective

The challenge of childhood cancer (ages 0–14 years) is evident in both developed and developing nations. A 2015 World Health Organization (WHO) estimate indicates that over 200,000 children aged 0–14 are diagnosed with cancer each year worldwide with projections estimating 21 million diagnoses by 2030 [1, 2]. The WHO's International Agency for Research on Cancer's 2022

GLOBOCAN data showed several countries in North America, Europe, and Asia with an age-standardized rate of 15.1–20.9 per 100,000 persons for both sexes for all childhood cancers (Figure 1) and leukemia had the highest age-standardized incidence and mortality rate worldwide (Figure 2).

In the United States of America, an estimated 9620 children (0–14 years of age) will be diagnosed with cancer in 2024 [3]. Australia reported 174 cases per million children each year during 2011–2015 [4]. While 80%–85% of pediatric cancer cases occur in the developing world, only 10% of these cases result in survival because treatment and supportive services are unavailable or unaffordable [5]. In this perspective, we examine the growing incidence of pediatric cancer in India, describe the unique obstacles it faces, and stress the importance of taking a coordinated and all-encompassing strategy to solve this pressing problem.

A recent National Cancer Registry Programme (NCRP) report summarized data from 28 population-based and 58 hospital-based cancer registries in India. The NCRP indicated that malignancies in children aged 0–14 constituted 4.0% of all diagnosed cancers from 2012 to 2016, with Delhi exhibiting the highest age-adjusted incidence rates of 203.1 per million in boys and 125.4 per million in girls [6, 7]. A possible explanation for the high rate of reported childhood cancers in Delhi could be referral bias to hospitals and cancer care centers in the region. Based on NCRP (2012–2016) data, Krishnan et al. estimated cancer incidence for 2022 and reported lymphoid leukemia as the leading cancer type, followed by central nervous system (CNS) cancer in children (0–14 years) [8].

The incidence of pediatric cancer, particularly leukemia and CNS tumors, is notably lower in India compared to high-income countries (HICs). For instance, while leukemia is the leading childhood cancer globally, India reports comparatively lower incidence rates compared to the United States, Australia, and the United Kingdom [2]. CNS tumors, which are often challenging to diagnose due to complex imaging requirements and technical skill levels, also show lower reported rates in India [9]. These disparities may stem from several contributing factors, including underreporting, underdiagnosis, or missed diagnosis due to limited diagnostic resources, environmental exposures, and socioeconomic barriers to healthcare access. This highlights the need for improved diagnostic infrastructure and data collection in India to ensure accurate assessment and targeted interventions [10–13].

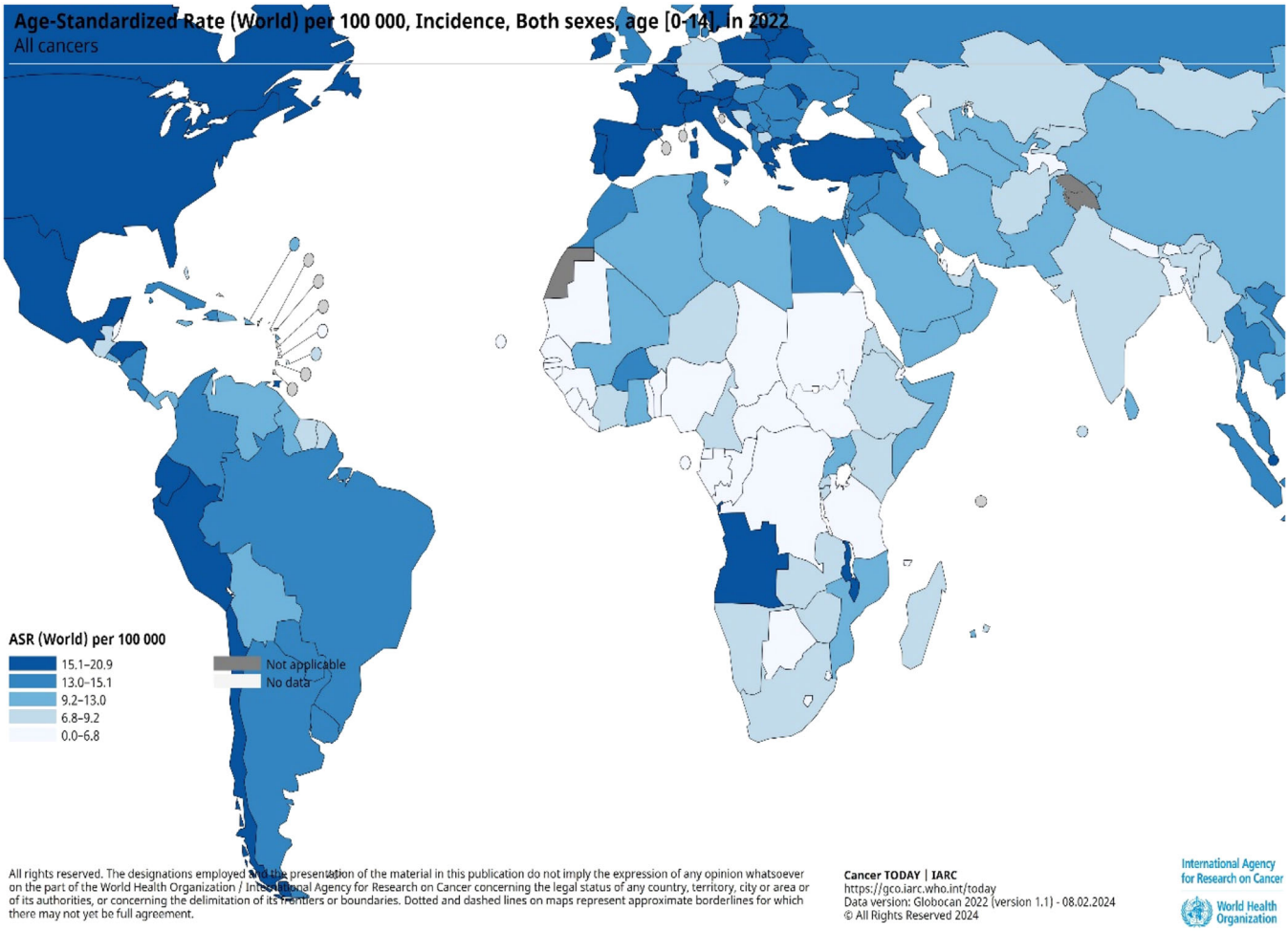

FIGURE 1 | Estimated age-standardized incidence rate per 100,000 persons, all cancers, both sexes, ages 0–14 years in 2022. *Source:* GLOBOCAN 2022 Map Production: https://gco.iarc.fr/today/en/dataviz/maps-heatmap?mode=population&age_end=2 World Health Organization, International Agency for Research on Cancer.

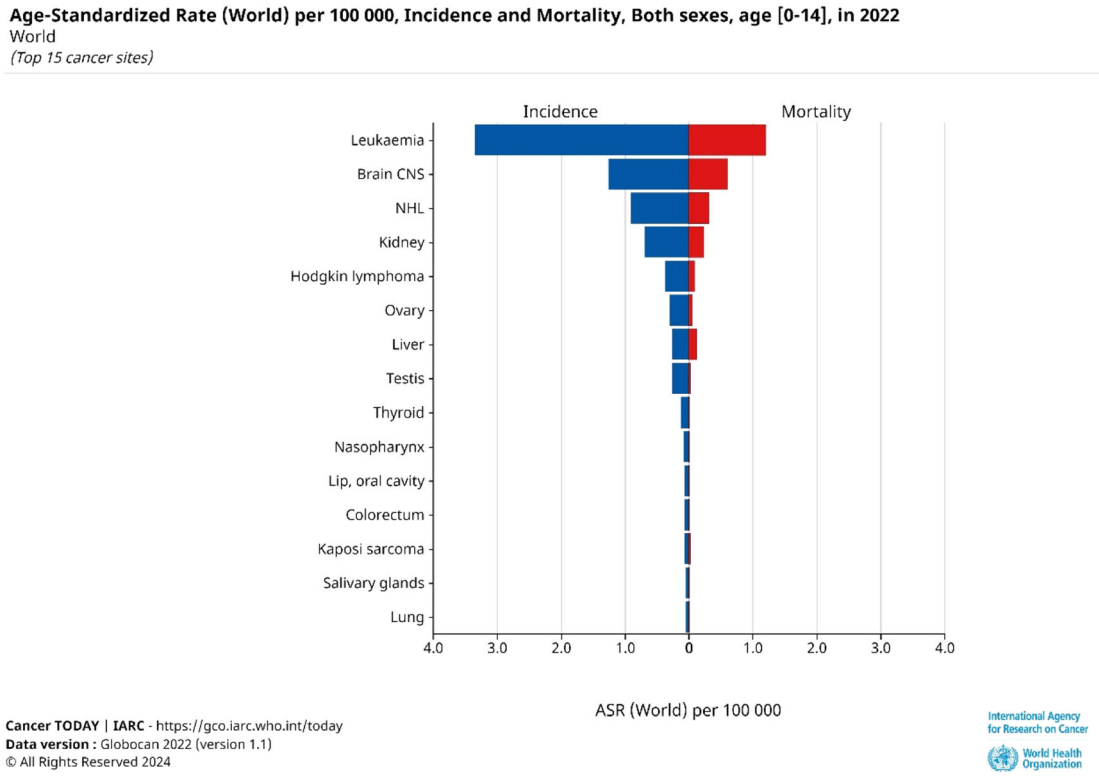

FIGURE 2 | Age-standardized incidence and mortality rates per 100,000 persons, all cancers, both sexes, ages 0−14 years in 2022. *Source:* GLOBOCAN 2022 Map Production: https://gco.iarc.fr/today/en/dataviz/bars-compare-populations?populations=900&mode=cancer&types=0_1&sort_by=value1&age_end=2 World Health Organization, International Agency for Research on Cancer.

In recent years, India has witnessed a substantial increase in pediatric cancer cases, making it a significant public health concern. A secondary analysis of population-based cancer registries in India from 2006 through 2014 showed that age-adjusted incidence rate per million for childhood cancers increased, and substantially in boys (from 156.6 to 235.3 per million) [14]. Variation in cancer incidence by sex could be from potential gender bias in the pursuit of medical treatment for cancer and illness in general due to discrimination against girl child in many rural areas. Improved cancer detection, reporting, and screening programs may explain the growing incidence of pediatric cancers [9–13, 15]. However, the burden of pediatric cancer is beyond its incidence.

Studies have reported coexistence of multiple disease conditions such as treatment-related effects (other cancers, cardiac and pulmonary conditions, renal failure, etc.) in pediatric cancer survivors, affecting the quality of life [16–19]. Additionally, there are psychological and socioeconomic challenges associated with long-term care of pediatric cancer patients and survivors indicating caregiver burden [20, 21]. Once uncommon, pediatric cancer is becoming a major issue in India and worldwide as a result of a rise in the disease's frequency and survivorship among children and adolescents. While infectious diseases and malnutrition historically dominated health challenges in developing economies like India, the growing burden of pediatric cancer demands focused attention. There is a need for a better comprehension of the contributing factors specific to the Indian setting.

A complex interplay of factors, including environmental pollution, genetic predisposition, and lifestyle changes, has collectively contributed to the alarming rise in cases, presenting intricate challenges for the Indian healthcare system [22–29]. The landscape of pediatric oncology in India is marked by unique challenges and disparities. Restricted access to healthcare facilities, especially in rural regions, intensifies delays in diagnosis and the commencement of therapy. Socioeconomic factors significantly influence families' ability to afford and access specialized pediatric cancer care [9, 30–33]. Addressing these gaps requires targeted interventions, expanded healthcare infrastructure, and policies aimed at reducing disparities in pediatric cancer outcomes across diverse socioeconomic strata.

The survival gap in pediatric cancer between HICs and low- and middle-income countries (LMICs) remains a crucial concern, with survival rates significantly lower in LMICs. In HIC, the majority of children with cancer achieve remission and survive long-term due to early diagnosis, advanced treatments, and comprehensive support systems. In contrast, in LMICs like India, limited access to diagnostic facilities and advanced treatment options contributes to lower survival rates. Addressing this disparity requires a strong commitment to equitable healthcare, including the provision of free treatment access for underprivileged and economically disadvantaged populations. By ensuring that financial barriers do not impede access to life-saving treatments, India can work toward narrowing the survival gap and improving outcomes for children affected by cancer. Free or subsidized treatment initiatives, supported by government and nongovernmental organizations, are essential

to creating a healthcare system where every child, regardless of socioeconomic status, has a fair chance of survival and recovery [34–37].

India's diverse environmental landscape, coupled with rapid urbanization and industrialization, significantly contributes to increased exposure to potential carcinogens. Environmental factors, such as air and water pollution, along with lifestyle changes, are increasingly linked to the rise in pediatric cancer cases [33]. A comprehensive study of specific environmental determinants within India is essential for devising effective preventive methods and policy interventions to mitigate the impact of these environmental factors on human health.

Early detection of pediatric cancer remains a formidable challenge in India. Limited awareness among parents and healthcare professionals, combined with often subtle symptoms, leads to delayed diagnoses [9, 38, 39]. Addressing this challenge requires a multi-pronged strategy encompassing improved awareness through public education campaigns, enhanced medical training programs, and the implementation of community-based screening initiatives. Such initiatives are pivotal to improving the prognosis for affected children and reducing the burden on families and the healthcare system.

While substantial strides have been made globally in the treatment of pediatric cancer, ensuring equitable access to these advancements in India is imperative. Research initiatives focused on understanding the genetic and environmental determinants of pediatric cancer in the Indian population is essential. Collaborative efforts involving the government, healthcare institutions, and international organizations can facilitate the development of targeted medicines customized to the distinct genetic profiles of Indian pediatric cancer patients, ensuring more effective and accessible treatments. The WHO's Global Initiative on Childhood Cancer (GICC) is a great example of a coordinated response for childhood cancer care, prevention, and research. The Indian Pediatric Oncology Group (InPOG) and the Paediatric Hematology Oncology Chapter of the Indian Academy of Paediatrics are key stakeholders in this global initiative. InPOG is also focusing on workforce capacity development by training clinicians and other healthcare professionals to improve their proficiency in research for robust multicenter clinical trials and conducting childhood cancer surveillance [40, 41].

Advocacy and awareness campaigns hold particular significance in the Indian context to tackle the multifaceted challenges posed by pediatric cancer. Grassroots initiatives, supported by both government and nongovernmental organizations, serve a crucial function in distributing precise information and dispelling misconceptions, and encouraging early intervention. The Government of India has adopted the WHO GICC CURE-ALL framework for the development of the National Childhood Cancer Comprehensive Management Policy for timely identification and availability of affordable integrated and palliative treatment across healthcare facilities in India. Through Indian Childhood Cancer Initiative, multidisciplinary stakeholders work to strengthen the childhood cancer program in India [42]. Engaging communities and empowering parents with knowledge about pediatric cancer can significantly impact the overall landscape of early detection and treatment, fostering a sense of urgency and resilience within affected families. Non-profit organizations such as the Indian Cancer Society (https://www.indiancancersociety.org/) and the National Society for Change for Childhood Cancer in India (CanKids https://www.cankidsindia.org/) work with stakeholders and affected families to promote education and awareness on cancer care and prevention and connect them to available resources.

The escalating burden of pediatric cancer in India demands urgent attention and a holistic, collaborative approach. By unraveling the complexities unique to the Indian context and through concerted efforts in research, awareness, and advocacy, we can strive to mitigate the impact of pediatric cancer on the nation's children. The time is ripe for collective action from healthcare professionals, policymakers, researchers, and the public to ensure that no child in India is left behind in the fight against pediatric cancer. Only through collective endeavors can we forge a more promising and healthier future for the youngest constituents of our society. The Ministry of Health and Family Welfare, Government of India, is striving to achieve cancer control via the implementation of the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD). However, the government does not possess a specific program component or policy to address childhood cancer. Data concerning the status, availability, and quality of pediatric oncology services in India is limited. The majority of research have been performed in certain geographic areas and fail to provide a comprehensive representation of the nation. Developing a program component or policy for pediatric cancers requires an analysis of childhood cancer services [43].

2 | Conclusion

The escalating prevalence of pediatric cancer in India demands urgent attention and a comprehensive, collaborative approach. By addressing the unique challenges faced by the Indian healthcare system, investing in research, enhancing awareness, and advocating for policy changes, we can work toward improving outcomes for children facing this life-altering diagnosis. The time is ripe for concerted efforts from healthcare professionals, policymakers, researchers, and the public to ensure that no child in India is left behind in the fight against pediatric cancer.

Author Contributions

Sohilkhan Riyazkhan Pathan: data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing–original draft, writing–review and editing, conceptualization. **Vishal Vinayak Bhende:** conceptualization, investigation, funding acquisition, writing–original draft, methodology, validation, visualization, writing–review and editing, project administration, formal analysis, software, data curation, supervision, resources. **Kruti Bharat Sharma:** data curation, formal analysis, investigation, project administration, resources, software, visualization. **Raghunandan Gorantlu Chowdappa:** data curation, investigation, formal analysis, project administration, resources, software, visualization. **Vishal Ajit Patel:**

data curation, formal analysis, investigation, project administration, software, visualization. **Dinesh Maknya Gangoda:** data curation, formal analysis, investigation, project administration, resources, software, visualization. **Tanishq Shashikant Sharma:** project administration, resources, software, visualization, data curation, formal analysis, investigation.

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The authors have nothing to report.

Consent

Waived off by the Institutional Ethics Committee (IEC-2) at H.M. Patel Centre for Medical Care and Education, Anand, Gujarat, as it is an editorial.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in Authorea at https://www.authorea.com/users/454413/articles/706324-addressing-the-alarming-rise-in-paediatric-cancer-prevalence-in-india-a-call-to-action, reference number 706324.

Transparency Statement

The lead author, Vishal Vinayak Bhende, affirms that this manuscript is an honest, accurate, and transparent account of the study being reported, that no important aspects of the study have been omitted and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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