Original Article

The evolving burden of pediatric solid tumors: A global analysis from 1990 to 2021

Gang Xiao, Qidong Ye

Department of Pediatrics, The First Affiliated Hospital of Ningbo University, Ningbo, Zhejiang Province, China

Correspondence to: Qidong Ye, E-mail: samuel_ped@163.com

Abstract

Background: To evaluate the global incidence and mortality trends of seven major solid tumors (brain cancer, hepatoblastoma, kidney cancer, malignant bone tumors [MNBAC], neuroblastoma, retinoblastoma, and soft tissue sarcomas) in individuals aged 0–19 years from 1990 to 2021.

Methods: Using data from the Global Burden of Disease Study 2021, analyses were stratified by age, region, and sociodemographic index (SDI). Temporal trends were quantified via estimated annual percentage change (EAPC). A linear regression model evaluated the correlation between childhood meningitis mortality and SDI.

Results: In 2021, these tumors accounted for 96,913 new cases and 42,869 deaths worldwide. Brain cancer and MNBAC were the most common and fatal. Retinoblastoma showed the largest incidence increase, while neuroblastoma was the only tumor with rising mortality. Major regional disparities were observed, with East Asia having the highest brain cancer burden and sub-Saharan Africa experiencing the greatest retinoblastoma mortality. Incidence peaked in infants for hepatoblastoma, neuroblastoma, and soft tissue sarcomas, and in adolescents for bone tumors. Higher SDI correlated with higher neuroblastoma incidence, while lower-SDI regions had elevated mortality for multiple tumors.

Conclusion: Substantial global and regional disparities persist in the burden of pediatric solid tumors. Enhancing early detection in low-SDI regions and implementing targeted strategies for high-burden tumors such as brain cancer and MNBAC are essential to reducing mortality.

Keywords:
Global burden of disease, incidence, mortality, pediatric cancer, solid tumors

Introduction

Cancer is a major global health crisis, particularly for children and adolescents, who are highly vulnerable. Annually, around 400,000 children and adolescents are diagnosed with cancer worldwide, with solid tumors being particularly prevalent.[1,2] Despite remarkable advancements in cancer treatment, particularly in the realms of molecular genetics, immunotherapy, and precision medicine, the therapeutic landscape for malignant solid tumors in children and adolescents remains fraught with challenges.[3-5] The long-term survival prospects for certain high-risk tumor types remain bleak, with effective radical treatment options still elusive. Furthermore, the potential long-term adverse effects and complications associated with treatment can severely compromise patients' quality of life.[6] This

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treatment quandary manifests in notable disparities across diverse global regions. In resource-constrained countries, the scarcity of medical resources, delayed diagnosis, and irregular treatment practices contribute to a cure rate for malignant solid tumors that is less than 30%.[7] This global imbalance in medical resource allocation further intensifies the disease burden of malignant solid tumors in children and adolescents.[8] To devise more targeted and efficacious prevention and control strategies, a profound comprehension of the epidemiological characteristics and trends of prevalent malignant solid tumors on a global scale is imperative.

The Global Burden of Disease Study (GBD) 2021 report highlights the need to prioritize health threats across 204 countries.[9] Leveraging the latest data from GBD 2021, this study will undertake a comprehensive analysis of incidence and mortality rates for seven relatively prevalent malignant solid tumors in children and adolescents worldwide. Our findings will furnish policymakers with reliable data, thereby fostering the development of tailored prevention and control strategies to address this pressing global health concern.

Methods

Data source and definition

In this study, malignant solid tumors occurring in individuals aged 0–19 were defined as such in children and adolescents. This analysis specifically focuses on seven prevalent solid tumors in children and adolescents: Brain and central nervous system cancer (brain cancer), hepatoblastoma, kidney cancer, malignant neoplasm of bone and articular cartilage (MNBAC), neuroblastoma and other peripheral nervous cell tumors (neuroblastoma), retinoblastoma, and soft tissue and other extraosseous sarcomas (STES). Quantitative indicators such as incidence, deaths, and associated rates for these tumors across diverse regions and ages globally were sourced from the GBD database (available at https://vizhub.healthdata.org/gbd-results/). Relevant data from systematic reviews of the literature, household surveys, health service access, civil registration and vital statistics data, surveillance data, and other sources were collected and identified for use in the GBD estimation process. The definition, processing, correction, and modeling of the data have been described elsewhere.[10,11]

Based on the SDI classification, spanning low, low-middle, middle, middle-high, and high categories, these countries and regions were further categorized into five groups.[10] The world was segmented into 21 regions, taking into account epidemiological similarity and geographical proximity.[12] To delineate the age distribution of the disease burden, patients were stratified into seven distinct age groups: <1 year, 1–2 years, 2–4 years, 5–9 years, 10–14 years, and 15–19 years.

Statistical analyses

Death counts and rates per 100,000 population were used as indicators, with 95% uncertainty intervals (UI) for accuracy. UI were computed based on the 2.5th and 97.5th percentiles obtained from 1000 samples for each variable.[13] To unravel key characteristics of the cancer burden, further analysis was conducted to examine differences across diverse geographical locations, countries, age groups, and SDIs. Simultaneously, the estimated annual percentage change (EAPC) in rates was estimated to illustrate trends in the burden of solid tumors in children and adolescents over time. Specifically, the following linear regression model was utilized for calculation: $y = \alpha + \beta x + \varepsilon$, where y represents the natural logarithm of the age-standardized rate, x represents the year, and ε is the error term. The EAPC value was derived using the formula $100 \times (e^{\beta} - 1)$, with its 95% confidence interval (CI) determined within the regression analysis framework. An EAPC with both its value and the upper limit of its 95% CI being negative signifies a decreasing trend over time; an EAPC with both its value and the lower limit of its 95% CI being positive indicates an increasing trend; an EAPC close to zero or statistically insignificant denotes stability or minimal change in the indicator over time.[10,11] Linear regression models were employed to explore the association between the burden of solid tumors and the SDI across regions and countries.[14,15] Statistical analyses and data visualization were executed using R (v4.4.2), with significance set at $P < 0.05$.

Results

Global incidence and mortality

Our analysis revealed seven major types of solid tumors accounted for 96,913.4 cases and 42,868.6 deaths annually, with incidence and mortality rates of 3.8 per 100,000 and 1.6 per 100,000, respectively. Additionally, brain cancer, MNBAC, and kidney cancer had the highest incidence rates, while brain cancer, MNBAC, and STES were the primary causes of death [Table 1].

From 1990 to 2021, the incidence rates of brain cancer, hepatoblastoma, kidney cancer, and STES declined, while those of MNBAC, neuroblastoma, and retinoblastoma increased. Notably, hepatoblastoma exhibited the most significant decline in incidence, with an EAPC of –2.1 (95% CI –2.3 to –2.0). In contrast, retinoblastoma showed the most

Key Message

From 1990 to 2021, pediatric solid tumors caused significant global burden, with brain cancer and malignant bone tumors being the most incident and fatal types. Retinoblastoma incidence increased most, while neuroblastoma was the only tumor with rising mortality. Infants were most affected by hepatoblastoma and neuroblastoma, whereas adolescents faced higher risks from bone tumors and soft tissue sarcomas. These findings highlight the urgent need for early detection in resource-limited regions and targeted strategies for high-burden tumors.

pronounced increase in incidence, with an EAPC of 1.3 (95% CI 1.0 to 1.6). In terms of mortality, hepatoblastoma had the most significant decline, with an EAPC of –2.6 (95% CI –2.8 to –2.5). Conversely, neuroblastoma was the only solid tumor among the seven to show an increasing mortality trend [Figure 1 and Table 1].

Regional incidence and mortality

The global burden of solid tumors in children and adolescents varies significantly by region. Brain cancer is the primary cause of incidence and mortality in most regions, with East Asia reporting the highest number of cases at 10,667.4 (95% UI 8,179.5–14,267.2), accounting for 61.2% of global incidence. South and Central Asia have high death tolls and mortality rates, respectively [Table 1, Figure 2, and S1]. MNBAC ranks second in many regions, especially in sub-Saharan Africa [Figure S1]. Kidney cancer is most incident in Southern Latin America, while neuroblastoma is prevalent in High-income Asia Pacific. The Caribbean has the highest STES incidence, and Eastern sub-Saharan Africa has the highest retinoblastoma incidence and mortality [Table 1 and Figure 2].

From 1990 to 2021, incidence and mortality trends differed by region and tumor type. High-income Asia Pacific saw a rise in brain cancer, while East Asia noted increases in MNBAC and retinoblastoma. Central Asia had growth in neuroblastoma and STES. Southern Sub-Saharan Africa saw a significant increase in kidney cancer. Hepatoblastoma declined in most regions except Australasia. Most regions saw declines in MNBAC, kidney cancer, STES, hepatoblastoma, and retinoblastoma mortality, but Southern Sub-Saharan Africa had increases in brain cancer, STES, kidney cancer, and retinoblastoma mortality. Brain cancer and neuroblastoma mortality trends were relatively balanced across regions [Table 1].

National incidence and mortality

In 2021, India topped the list for neuroblastoma, hepatoblastoma, and MNBAC in terms of both incidence and mortality. China led in the incidence of brain cancer, kidney cancer, and retinoblastoma. Nigeria ranked first in the incidence and mortality of STES, as well as in the mortality of kidney cancer. Monaco and Tajikistan had the highest incidence and mortality rates of brain cancer, respectively. For kidney cancer, Argentina and Malawi recorded the highest incidence and mortality rates. Malta and Malawi had the highest incidence and mortality rates for neuroblastoma. Tokelau ranked first in both the incidence and mortality rates of MNBAC, as well as in the incidence rate of retinoblastoma. Mali and Haiti had the highest incidence and mortality rates for hepatoblastoma and STES, respectively [Table 1, Figure S2, and Figure 3].

From 1990 to 2021, Ecuador experienced the fastest increase in incidence rate brain cancer, and both Ecuador and Turkmenistan had the fastest increases in mortality. For MNBAC, Saint Vincent and the Grenadines saw the most significant increases in both incidence and mortality, with EAPCs of 3.8 (95% CI 2.4–5.2) and 3.5 (95% CI 2.2–4.8), respectively. Mongolia had the fastest growth in both incidence and mortality for kidney cancer, with EAPCs of 7.4 (95% CI 6.0–8.8) and 6.1 (95% CI 4.8–7.5), respectively. Guyana had the fastest increases in both incidence and mortality for neuroblastoma, with EAPCs of 8.3 (95% CI 5.7–11.0) and 7.8 (95% CI 5.3–10.3), respectively. Armenia experienced the most significant increases in both incidence and mortality for retinoblastoma, with EAPCs of 18.3 (95% CI 14.4–22.4) and 14.4 (95% CI 10.7–18.2), respectively. Belarus had the fastest growth in both incidence and mortality for hepatoblastoma, with EAPCs of 6.5 (95% CI 5.4–7.6) and 5.3 (95% CI 3.7–7.0), respectively. Finally, Georgia had the most rapid increases in both incidence and mortality for STES, with EAPCs of 12.6 (95% CI 11.1–14.2) and 12.4 (95% CI 10.9–14.0), respectively (Table 1). These findings highlight the diverse trends in solid tumor disease burden across different countries over the past few decades.

Burden of solid tumor by age

In 2021, an analysis of the age distribution characteristics revealed distinct patterns among seven types of solid tumors. Specifically, brain cancer incidence and mortality cases were predominantly observed in the 5–9 age group, with peak incidence

Table 1: Global and regional burden of malignant solid tumors in children and adolescents in 1990 and 2021, and the changing trend from 1990 to 2021

Location	Diseases	1990			
		Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)
Global	Brain cancer	38816.6 (30302.6, 48085.6)	1.7 (1.3, 2.1)	25697.8 (19402.2, 32227.8)	1.1 (0.9, 1.4)
	Hepatoblastoma	7063.7 (5798.8, 8280.7)	0.3 (0.3, 0.4)	4828.3 (3938.6, 5670.5)	0.2 (0.2, 0.3)
	Kidney cancer	11077.5 (9103.0, 13051.4)	0.5 (0.4, 0.6)	4328.8 (3481.0, 5198.3)	0.2 (0.2, 0.2)
	MNBAC	14750.0 (12236.1, 17658.0)	0.7 (0.5, 0.8)	7319.9 (6060.5, 8894.9)	0.3 (0.3, 0.4)
	Neuroblastoma	4394.7 (3242.7, 5903.9)	0.5 (0.4, 0.6)	1711.8 (1431.9, 2037.1)	0.1 (0.1, 0.1)
	Retinoblastoma	4673.5 (3033.3, 5953.1)	0.2 (0.1, 0.3)	3179.8 (1819.0, 4172.8)	0.1 (0.1, 0.2)
	STES	13194.2 (10307.6, 17690.5)	0.6 (0.5, 0.8)	5959.5 (4754.7, 8150.2)	0.3 (0.2, 0.4)
Low-SDI	Brain cancer	2007.2 (1232.2, 3591.9)	0.7 (0.4, 1.3)	1699.4 (1037.3, 3102.7)	0.6 (0.4, 1.1)
	Hepatoblastoma	1431.5 (988.3, 1850.8)	0.5 (0.4, 0.7)	1012.4 (700.0, 1308.5)	0.4 (0.3, 0.5)
	Kidney cancer	1258.4 (749.8, 1731.6)	0.5 (0.3, 0.6)	772.7 (465.8, 1046.8)	0.3 (0.2, 0.4)
	MNBAC	1896.0 (1346.9, 2610.2)	0.7 (0.5, 0.9)	1190.6 (903.6, 1623.1)	0.4 (0.3, 0.6)
	Neuroblastoma	389.5 (216.1, 711.3)	0.1 (0.1, 0.2)	182.8 (122.3, 286.7)	0.1 (0.0, 0.1)
	Retinoblastoma	1141.8 (628.0, 1572.9)	0.4 (0.2, 0.6)	1139.7 (633.5, 1570.9)	0.4 (0.2, 0.6)
	STES	3428.4 (2359.9, 5411.0)	1.2 (0.8, 1.9)	1863.4 (1347.3, 2838.3)	0.7 (0.5, 1.0)
Low-middle SDI	Brain cancer	5667.1 (3947.4, 8376.8)	1.0 (0.7, 1.4)	4536.0 (3152.6, 6759.1)	0.8 (0.5, 1.1)
	Hepatoblastoma	1653.2 (1114.4, 2085.7)	0.3 (0.2, 0.4)	1167.0 (786.7, 1469.5)	0.2 (0.1, 0.2)
	Kidney cancer	1554.7 (1105.2, 1980.9)	0.3 (0.2, 0.3)	790.5 (559.1, 1021.6)	0.1 (0.1, 0.2)
	MNBAC	3532.4 (2480.7, 4479.6)	0.6 (0.4, 0.8)	2072.5 (1479.3, 2573.5)	0.4 (0.3, 0.4)
	Neuroblastoma	832.4 (521.2, 1298.7)	0.1 (0.1, 0.2)	379.6 (287.8, 506.6)	0.1 (0.0, 0.1)
	Retinoblastoma	1198.3 (658.7, 1689.9)	0.2 (0.1, 0.3)	1133.6 (613.2, 1582.6)	0.2 (0.1, 0.3)
	STES	3455.8 (2484.4, 4760.9)	0.6 (0.4, 0.8)	1732.3 (1305.4, 2328.1)	0.3 (0.2, 0.4)
Middle SDI	Brain cancer	14842.3 (10633.6, 18330.8)	1.9 (1.4, 2.4)	10577.9 (7579.9, 13031.9)	1.4 (1.0, 1.7)
	Hepatoblastoma	2649.0 (2302.6, 3055.9)	0.3 (0.3, 0.4)	1842.2 (1604.9, 2128.8)	0.2 (0.2, 0.3)
	Kidney cancer	3818.7 (3173.4, 4504.5)	0.5 (0.4, 0.6)	1546.2 (1317.9, 1804.8)	0.2 (0.2, 0.2)
	MNBAC	4199.8 (3424.2, 5278.8)	0.5 (0.4, 0.7)	2127.4 (1794.5, 2683.9)	0.3 (0.2, 0.4)
	Neuroblastoma	1118.7 (777.4, 1554.6)	0.1 (0.1, 0.2)	467.8 (381.6, 545.2)	0.1 (0.0, 0.1)
	Retinoblastoma	907.5 (520.1, 1337.6)	0.1 (0.1, 0.2)	651.6 (385.7, 861.4)	0.1 (0.1, 0.1)
	STES	3041.6 (2346.4, 3949.7)	0.4 (0.3, 0.5)	1314.6 (1000.3, 1690.5)	0.2 (0.1, 0.2)
High-middle SDI	Brain cancer	9797.7 (7820.2, 11552.7)	2.6 (2.1, 3.1)	6350.0 (5009.3, 7541.9)	1.7 (1.4, 2.0)
	Hepatoblastoma	996.9 (859.2, 1166.9)	0.3 (0.2, 0.3)	660.3 (567.9, 774.4)	0.2 (0.2, 0.2)
	Kidney cancer	3074.2 (2598.1, 3618.3)	0.8 (0.7, 1.0)	938.3 (798.6, 1112.1)	0.3 (0.2, 0.3)
	MNBAC	3027.5 (2748.9, 3498.6)	0.8 (0.7, 0.9)	1225.2 (1116.3, 1423.2)	0.3 (0.3, 0.4)
	Neuroblastoma	844.9 (639.9, 1090.9)	0.1 (0.1, 0.3)	306.7 (261.6, 357.5)	0.1 (0.1, 0.1)
	Retinoblastoma	605.5 (405.7, 899.1)	0.2 (0.1, 0.2)	213.6 (119.6, 326.9)	0.1 (0.0, 0.1)
	STES	1571.2 (1311.6, 1941.3)	0.4 (0.4, 0.5)	574.9 (493.3, 720.3)	0.2 (0.1, 0.2)
High-SDI	Brain cancer	6470.5 (6254.7, 6692.9)	2.6 (2.5, 2.7)	2513.2 (2401.7, 2610.6)	1.0 (1.0, 1.0)

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Table 1: Contd...

Location	Diseases	1990			
		Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)
	Hepatoblastoma	330.1 (312.2, 349.4)	0.1 (0.1, 0.1)	144.4 (133.1, 156.2)	0.1 (0.1, 0.1)
	Kidney cancer	1362.8 (1310.1, 1413.0)	0.5 (0.5, 0.6)	277.7 (267.9, 287.8)	0.1 (0.1, 0.1)
	MNBAC	2079.4 (1971.0, 2194.6)	0.8 (0.8, 0.9)	697.3 (663.1, 730.3)	0.3 (0.3, 0.3)
	Neuroblastoma	1205.3 (1015.7, 1416.4)	0.5 (0.4, 0.6)	373.4 (353.8, 391.7)	0.1 (0.1, 0.2)
	Retinoblastoma	818.0 (684.0, 961.6)	0.3 (0.3, 0.4)	40.0 (32.8, 47.4)	0.0 (0.0, 0.0)
	STES	1684.6 (1566.4, 1821.6)	0.7 (0.6, 0.7)	468.8 (450.4, 489.8)	0.2 (0.2, 0.2)
Andean Latin America	Brain cancer	310.3 (231.5, 470.5)	1.6 (1.2, 2.5)	240.0 (179.5, 352.9)	1.3 (0.9, 1.9)
	Hepatoblastoma	39.5 (28.4, 51.9)	0.2 (0.1, 0.3)	27.7 (20.0, 36.5)	0.1 (0.1, 0.2)
	Kidney cancer	103.1 (85.1, 122.8)	0.5 (0.4, 0.6)	54.2 (44.5, 63.4)	0.3 (0.2, 0.3)
	MNBAC	198.8 (148.8, 254.1)	1.0 (0.8, 1.3)	104.1 (81.4, 131.0)	0.5 (0.4, 0.7)
	Neuroblastoma	42.6 (26.2, 64.1)	0.5 (0.4, 0.6)	18.3 (13.0, 24.0)	0.1 (0.1, 0.1)
	Retinoblastoma	55.4 (30.8, 98.0)	0.3 (0.2, 0.5)	48.1 (28.4, 82.3)	0.3 (0.1, 0.4)
	STES	134.3 (87.6, 183.3)	0.7 (0.5, 1.0)	61.9 (42.2, 83.3)	0.3 (0.2, 0.4)
Australasia	Brain cancer	151.6 (138.2, 167.6)	2.4 (2.2, 2.7)	68.4 (64.3, 72.2)	1.1 (1.0, 1.2)
	Hepatoblastoma	6.2 (5.5, 6.9)	0.1 (0.1, 0.1)	2.1 (1.8, 2.3)	0.0 (0.0, 0.0)
	Kidney cancer	27.9 (24.7, 32.0)	0.4 (0.4, 0.5)	6.5 (6.0, 7.1)	0.1 (0.1, 0.1)
	MNBAC	65.6 (59.4, 72.0)	1.0 (0.9, 1.1)	21.6 (19.6, 23.7)	0.3 (0.3, 0.4)
	Neuroblastoma	29.9 (24.7, 36.7)	0.3 (0.2, 0.4)	8.4 (7.3, 9.6)	0.1 (0.1, 0.2)
	Retinoblastoma	8.2 (6.0, 10.4)	0.1 (0.1, 0.2)	0.2 (0.2, 0.3)	0.0 (0.0, 0.0)
	STES	42.8 (37.1, 49.7)	0.7 (0.6, 0.8)	11.2 (9.9, 12.7)	0.2 (0.2, 0.2)
Caribbean	Brain cancer	220.0 (172.9, 369.6)	1.5 (1.1, 2.4)	153.6 (115.5, 279.1)	1.0 (0.8, 1.8)
	Hepatoblastoma	11.5 (7.4, 16.7)	0.1 (0.0, 0.1)	8.0 (5.1, 11.7)	0.1 (0.0, 0.1)
	Kidney cancer	84.5 (60.7, 109.5)	0.6 (0.4, 0.7)	41.8 (28.5, 56.3)	0.3 (0.2, 0.4)
	MNBAC	116.9 (97.0, 150.9)	0.8 (0.6, 1.0)	56.3 (46.3, 73.2)	0.4 (0.3, 0.5)
	Neuroblastoma	37.9 (25.2, 58.4)	0.0 (0.0, 0.1)	15.1 (11.3, 21.2)	0.1 (0.1, 0.1)
	Retinoblastoma	13.8 (8.7, 20.8)	0.1 (0.1, 0.1)	5.5 (3.5, 7.9)	0.0 (0.0, 0.1)
	STES	157.1 (110.0, 219.5)	1.0 (0.7, 1.5)	77.4 (52.6, 110.1)	0.5 (0.3, 0.7)
Central Asia	Brain cancer	555.4 (465.5, 696.8)	1.8 (1.5, 2.2)	427.0 (360.9, 538.7)	1.4 (1.1, 1.7)
	Hepatoblastoma	114.7 (93.9, 143.7)	0.4 (0.3, 0.5)	79.1 (64.8, 99.4)	0.3 (0.2, 0.3)
	Kidney cancer	168.3 (137.5, 207.2)	0.5 (0.4, 0.7)	71.4 (58.5, 88.2)	0.2 (0.2, 0.3)
	MNBAC	182.4 (145.7, 225.5)	0.6 (0.5, 0.7)	80.4 (65.0, 96.4)	0.3 (0.2, 0.3)
	Neuroblastoma	13.5 (9.1, 20.3)	0.3 (0.2, 0.3)	5.7 (4.3, 7.5)	0.0 (0.0, 0.0)
	Retinoblastoma	31.4 (12.9, 66.3)	0.1 (0.0, 0.2)	16.0 (7.4, 30.0)	0.1 (0.0, 0.1)
	STES	69.4 (52.1, 96.6)	0.2 (0.2, 0.3)	27.9 (21.2, 38.1)	0.1 (0.1, 0.1)
Central Europe	Brain cancer	992.6 (924.7, 1085.8)	2.5 (2.4, 2.8)	672.8 (627.7, 730.0)	1.7 (1.6, 1.9)
	Hepatoblastoma	43.1 (37.2, 50.1)	0.1 (0.1, 0.1)	28.1 (24.2, 32.7)	0.1 (0.1, 0.1)
	Kidney cancer	172.3 (152.8, 189.5)	0.4 (0.4, 0.5)	60.5 (54.2, 65.6)	0.2 (0.1, 0.2)

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Table 1: Contd...

Location	Diseases	1990			
		Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)
	MNBAC	403.1 (358.3, 451.8)	1.0 (0.9, 1.2)	164.2 (148.2, 181.5)	0.4 (0.4, 0.5)
	Neuroblastoma	99.5 (74.6, 131.0)	0.2 (0.2, 0.3)	35.7 (30.2, 42.5)	0.1 (0.1, 0.1)
	Retinoblastoma	28.6 (14.7, 54.9)	0.1 (0.0, 0.1)	8.6 (4.3, 17.2)	0.0 (0.0, 0.0)
	STES	198.2 (172.8, 228.3)	0.5 (0.4, 0.6)	68.3 (60.8, 77.0)	0.2 (0.2, 0.2)
Central Latin America	Brain cancer	1012.6 (950.9, 1084.8)	1.2 (1.2, 1.3)	737.5 (695.5, 786.0)	0.9 (0.8, 1.0)
	Hepatoblastoma	175.0 (162.2, 191.1)	0.2 (0.2, 0.2)	122.1 (113.2, 133.0)	0.1 (0.1, 0.2)
	Kidney cancer	415.4 (387.0, 448.9)	0.5 (0.5, 0.5)	201.9 (188.2, 217.9)	0.2 (0.2, 0.3)
	MNBAC	483.8 (451.2, 523.1)	0.6 (0.5, 0.6)	235.0 (224.5, 247.2)	0.3 (0.3, 0.3)
	Neuroblastoma	189.2 (136.8, 252.9)	0.0 (0.0, 0.1)	77.8 (71.1, 85.8)	0.1 (0.1, 0.1)
	Retinoblastoma	138.7 (98.2, 189.6)	0.2 (0.1, 0.2)	92.7 (79.3, 109.1)	0.1 (0.1, 0.1)
	STES	415.1 (368.7, 471.7)	0.5 (0.4, 0.6)	176.3 (165.2, 189.0)	0.2 (0.2, 0.2)
Central sub-Saharan Africa	Brain cancer	99.3 (56.8, 195.4)	0.3 (0.2, 0.6)	85.4 (49.1, 167.9)	0.3 (0.2, 0.5)
	Hepatoblastoma	149.7 (80.5, 236.5)	0.5 (0.3, 0.8)	106.5 (57.6, 169.2)	0.3 (0.2, 0.5)
	Kidney cancer	51.5 (24.0, 85.6)	0.2 (0.1, 0.3)	32.4 (15.3, 54.2)	0.1 (0.0, 0.2)
	MNBAC	108.2 (69.2, 182.6)	0.3 (0.2, 0.6)	71.3 (45.6, 115.6)	0.2 (0.1, 0.4)
	Neuroblastoma	15.4 (6.0, 31.4)	0.1 (0.1, 0.2)	7.3 (3.1, 13.8)	0.0 (0.0, 0.0)
	Retinoblastoma	50.9 (23.1, 85.9)	0.2 (0.1, 0.3)	51.0 (23.1, 87.0)	0.2 (0.1, 0.3)
	STES	274.9 (158.4, 466.6)	0.9 (0.5, 1.5)	149.4 (86.9, 241.1)	0.5 (0.3, 0.8)
East Asia	Brain cancer	14486.3 (9824.6, 17746.4)	3.1 (2.1, 3.9)	10113.7 (6870.8, 12407.6)	2.2 (1.5, 2.7)
	Hepatoblastoma	2315.2 (1923.6, 2834.3)	0.5 (0.4, 0.6)	1600.8 (1334.5, 1955.0)	0.3 (0.3, 0.4)
	Kidney cancer	3544.3 (2927.8, 4329.2)	0.8 (0.6, 0.9)	1373.2 (1148.1, 1666.8)	0.3 (0.2, 0.4)
	MNBAC	1897.1 (1324.5, 3227.0)	0.4 (0.3, 0.7)	896.7 (624.4, 1562.7)	0.2 (0.1, 0.3)
	Neuroblastoma	522.0 (339.1, 791.4)	0.2 (0.2, 0.3)	206.8 (153.9, 273.9)	0.0 (0.0, 0.1)
	Retinoblastoma	564.9 (289.5, 927.4)	0.1 (0.1, 0.2)	319.9 (165.7, 493.6)	0.1 (0.0, 0.1)
	STES	1404.1 (1023.4, 1934.7)	0.3 (0.2, 0.4)	589.7 (429.7, 817.0)	0.1 (0.1, 0.2)
Eastern Europe	Brain cancer	1346.8 (1264.4, 1441.6)	2.0 (1.9, 2.1)	957.5 (910.4, 1007.2)	1.4 (1.4, 1.5)
	Hepatoblastoma	155.2 (145.0, 165.7)	0.2 (0.2, 0.2)	99.1 (93.0, 105.6)	0.1 (0.1, 0.2)
	Kidney cancer	600.1 (559.5, 649.7)	0.9 (0.8, 1.0)	157.8 (148.4, 169.3)	0.2 (0.2, 0.3)
	MNBAC	954.7 (888.3, 1024.8)	1.4 (1.3, 1.5)	347.2 (329.5, 367.1)	0.5 (0.5, 0.5)
	Neuroblastoma	151.4 (108.2, 209.4)	0.2 (0.1, 0.4)	55.2 (44.2, 71.5)	0.1 (0.1, 0.1)
	Retinoblastoma	106.8 (73.8, 155.7)	0.2 (0.1, 0.2)	24.4 (17.9, 32.6)	0.0 (0.0, 0.0)
	STES	286.6 (253.0, 324.2)	0.4 (0.4, 0.5)	96.1 (87.8, 104.6)	0.1 (0.1, 0.2)
Eastern sub-Saharan Africa	Brain cancer	963.1 (639.2, 1610.3)	0.9 (0.6, 1.5)	816.3 (543.3, 1389.4)	0.7 (0.5, 1.3)
	Hepatoblastoma	570.6 (389.6, 750.8)	0.5 (0.4, 0.7)	403.2 (275.3, 530.6)	0.4 (0.2, 0.5)
	Kidney cancer	699.8 (438.5, 978.6)	0.6 (0.4, 0.9)	435.2 (271.7, 606.0)	0.4 (0.2, 0.5)
	MNBAC	1019.0 (763.6, 1450.4)	0.9 (0.7, 1.3)	667.9 (507.9, 935.0)	0.6 (0.5, 0.8)
	Neuroblastoma	244.6 (136.9, 437.5)	0.2 (0.1, 0.3)	113.9 (78.6, 190.0)	0.1 (0.1, 0.2)

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Table 1: Contd...

Location	Diseases	1990			
		Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)
	Retinoblastoma	971.6 (563.9, 1356.9)	0.9 (0.5, 1.2)	942.5 (554.0, 1327.7)	0.8 (0.5, 1.2)
	STES	1888.6 (1265.8, 3012.6)	1.7 (1.1, 2.7)	1033.2 (718.9, 1612.4)	0.9 (0.6, 1.5)
High-income Asia Pacific	Brain cancer	1041.1 (898.0, 1174.5)	2.1 (1.8, 2.3)	369.7 (303.7, 412.9)	0.7 (0.6, 0.8)
	Hepatoblastoma	100.1 (83.6, 118.9)	0.2 (0.2, 0.2)	47.1 (36.3, 59.1)	0.1 (0.1, 0.1)
	Kidney cancer	124.0 (111.4, 136.4)	0.2 (0.2, 0.3)	34.7 (31.9, 37.9)	0.1 (0.1, 0.1)
	MNBAC	485.3 (428.4, 549.1)	1.0 (0.9, 1.1)	168.0 (141.6, 195.5)	0.3 (0.3, 0.4)
	Neuroblastoma	255.4 (209.8, 304.6)	0.6 (0.5, 0.7)	81.2 (73.2, 92.3)	0.2 (0.1, 0.2)
	Retinoblastoma	138.4 (107.3, 176.1)	0.3 (0.2, 0.4)	8.4 (6.0, 11.6)	0.0 (0.0, 0.0)
	STES	321.4 (280.6, 377.8)	0.6 (0.6, 0.8)	91.9 (79.5, 109.7)	0.2 (0.2, 0.2)
High-income North America	Brain cancer	2601.5 (2509.1, 2692.6)	3.2 (3.1, 3.3)	799.0 (788.4, 809.6)	1.0 (1.0, 1.0)
	Hepatoblastoma	110.0 (107.1, 113.0)	0.1 (0.1, 0.1)	37.6 (36.7, 38.5)	0.0 (0.0, 0.0)
	Kidney cancer	607.7 (587.9, 628.1)	0.7 (0.7, 0.8)	84.5 (82.9, 86.0)	0.1 (0.1, 0.1)
	MNBAC	634.9 (605.1, 662.3)	0.8 (0.7, 0.8)	191.4 (187.0, 196.2)	0.2 (0.2, 0.2)
	Neuroblastoma	488.4 (411.1, 577.2)	0.2 (0.2, 0.3)	147.4 (136.3, 157.4)	0.2 (0.2, 0.2)
	Retinoblastoma	445.2 (370.1, 529.0)	0.5 (0.5, 0.6)	14.0 (12.5, 15.5)	0.0 (0.0, 0.0)
	STES	703.0 (654.0, 757.3)	0.9 (0.8, 0.9)	184.3 (180.6, 188.3)	0.2 (0.2, 0.2)
North Africa and Middle East	Brain cancer	3557.4 (2455.6, 5235.1)	2.0 (1.4, 3.0)	2285.1 (1589.2, 3426.1)	1.3 (0.9, 1.9)
	Hepatoblastoma	494.5 (363.2, 626.8)	0.3 (0.2, 0.4)	345.1 (254.0, 439.8)	0.2 (0.1, 0.2)
	Kidney cancer	1215.4 (759.1, 1699.9)	0.7 (0.4, 1.0)	309.5 (208.5, 416.8)	0.2 (0.1, 0.2)
	MNBAC	1235.6 (786.7, 1551.9)	0.7 (0.4, 0.9)	616.6 (405.6, 761.7)	0.3 (0.2, 0.4)
	Neuroblastoma	250.9 (154.0, 402.8)	0.0 (0.0, 0.0)	101.4 (71.7, 145.0)	0.1 (0.0, 0.1)
	Retinoblastoma	114.4 (67.2, 180.1)	0.1 (0.0, 0.1)	77.8 (47.3, 122.7)	0.0 (0.0, 0.1)
	STES	1141.7 (834.7, 1682.4)	0.6 (0.5, 1.0)	492.2 (367.4, 729.3)	0.3 (0.2, 0.4)
Oceania	Brain cancer	11.2 (5.6, 17.1)	0.3 (0.2, 0.5)	8.6 (4.3, 13.4)	0.3 (0.1, 0.4)
	Hepatoblastoma	2.9 (1.8, 4.9)	0.1 (0.1, 0.1)	2.1 (1.3, 3.6)	0.1 (0.0, 0.1)
	Kidney cancer	3.5 (2.4, 5.5)	0.1 (0.1, 0.2)	1.4 (1.0, 2.2)	0.0 (0.0, 0.1)
	MNBAC	9.0 (4.3, 16.6)	0.3 (0.1, 0.5)	5.8 (2.7, 10.9)	0.2 (0.1, 0.3)
	Neuroblastoma	0.4 (0.2, 0.8)	0.1 (0.1, 0.2)	0.2 (0.1, 0.4)	0.0 (0.0, 0.0)
	Retinoblastoma	1.4 (0.5, 3.9)	0.0 (0.0, 0.1)	1.3 (0.4, 3.7)	0.0 (0.0, 0.1)
	STES	3.0 (1.8, 4.9)	0.1 (0.1, 0.1)	1.4 (0.8, 2.3)	0.0 (0.0, 0.1)
South Asia	Brain cancer	4726.4 (2887.9, 7266.5)	0.9 (0.5, 1.3)	3910.3 (2418.3, 5982.5)	0.7 (0.4, 1.1)
	Hepatoblastoma	1177.7 (706.7, 1587.7)	0.2 (0.1, 0.3)	833.9 (496.5, 1122.2)	0.2 (0.1, 0.2)
	Kidney cancer	816.7 (504.1, 1116.0)	0.2 (0.1, 0.2)	484.1 (296.5, 664.8)	0.1 (0.1, 0.1)
	MNBAC	3212.0 (2108.3, 4123.6)	0.6 (0.4, 0.8)	1959.6 (1325.8, 2452.2)	0.4 (0.2, 0.5)
	Neuroblastoma	767.5 (442.2, 1216.3)	0.1 (0.1, 0.2)	358.1 (242.6, 494.0)	0.1 (0.0, 0.1)
	Retinoblastoma	954.0 (453.0, 1416.6)	0.2 (0.1, 0.3)	935.5 (441.3, 1395.8)	0.2 (0.1, 0.3)
	STES	3114.9 (2024.1, 4114.6)	0.6 (0.4, 0.8)	1580.7 (1058.2, 2030.3)	0.3 (0.2, 0.4)

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Table 1: Contd...

Location	Diseases	1990			
		Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)
Southeast Asia	Brain cancer	1939.0 (1247.4, 2746.3)	0.9 (0.6, 1.2)	1433.6 (899.2, 2070.0)	0.7 (0.4, 0.9)
	Hepatoblastoma	649.4 (434.9, 832.7)	0.3 (0.2, 0.4)	452.6 (303.4, 581.4)	0.2 (0.1, 0.3)
	Kidney cancer	719.5 (436.0, 1000.1)	0.3 (0.2, 0.5)	272.6 (163.4, 386.4)	0.1 (0.1, 0.2)
	MNBAC	1094.3 (669.2, 1379.9)	0.5 (0.3, 0.6)	599.7 (371.8, 749.0)	0.3 (0.2, 0.3)
	Neuroblastoma	242.6 (150.7, 369.9)	0.3 (0.2, 0.3)	103.1 (74.2, 141.5)	0.0 (0.0, 0.1)
	Retinoblastoma	217.9 (92.0, 393.3)	0.1 (0.0, 0.2)	154.8 (67.3, 257.1)	0.1 (0.0, 0.1)
	STES	849.6 (612.9, 1242.5)	0.4 (0.3, 0.6)	392.4 (286.8, 563.0)	0.2 (0.1, 0.3)
Southern Latin America	Brain cancer	227.7 (201.2, 261.2)	1.2 (1.0, 1.3)	144.5 (131.9, 159.0)	0.7 (0.7, 0.8)
	Hepatoblastoma	3.5 (3.0, 4.0)	0.0 (0.0, 0.0)	2.3 (2.0, 2.7)	0.0 (0.0, 0.0)
	Kidney cancer	186.7 (162.7, 216.6)	1.0 (0.8, 1.1)	32.8 (29.6, 36.2)	0.2 (0.2, 0.2)
	MNBAC	213.8 (183.4, 247.4)	1.1 (0.9, 1.3)	92.3 (78.2, 106.8)	0.5 (0.4, 0.6)
	Neuroblastoma	48.5 (34.6, 66.9)	0.1 (0.1, 0.2)	17.8 (14.1, 23.3)	0.1 (0.1, 0.1)
	Retinoblastoma	40.9 (21.7, 71.6)	0.2 (0.1, 0.4)	7.7 (5.1, 12.1)	0.0 (0.0, 0.1)
	STES	93.1 (76.2, 114.7)	0.5 (0.4, 0.6)	34.5 (28.5, 41.7)	0.2 (0.1, 0.2)
Southern Sub-Saharan Africa	Brain cancer	135.2 (104.4, 181.5)	0.5 (0.4, 0.7)	101.8 (78.7, 136.1)	0.4 (0.3, 0.5)
	Hepatoblastoma	33.0 (21.3, 45.0)	0.1 (0.1, 0.2)	23.1 (14.9, 32.0)	0.1 (0.1, 0.1)
	Kidney cancer	72.5 (50.2, 94.6)	0.3 (0.2, 0.4)	35.8 (25.2, 46.4)	0.1 (0.1, 0.2)
	MNBAC	103.5 (73.5, 131.5)	0.4 (0.3, 0.5)	55.4 (40.6, 68.1)	0.2 (0.2, 0.3)
	Neuroblastoma	28.7 (18.3, 42.4)	0.4 (0.3, 0.5)	12.0 (9.0, 16.1)	0.0 (0.0, 0.1)
	Retinoblastoma	24.8 (12.2, 41.4)	0.1 (0.0, 0.2)	19.9 (10.5, 30.2)	0.1 (0.0, 0.1)
	STES	102.8 (71.8, 136.5)	0.4 (0.3, 0.5)	45.3 (32.7, 60.2)	0.2 (0.1, 0.2)
Tropical Latin America	Brain cancer	1230.0 (1082.5, 1395.0)	1.8 (1.6, 2.0)	892.1 (786.5, 1004.9)	1.3 (1.1, 1.5)
	Hepatoblastoma	78.1 (67.5, 92.0)	0.1 (0.1, 0.1)	54.3 (47.0, 64.2)	0.1 (0.1, 0.1)
	Kidney cancer	332.0 (296.3, 365.6)	0.5 (0.4, 0.5)	160.6 (143.4, 177.0)	0.2 (0.2, 0.3)
	MNBAC	503.8 (455.8, 555.3)	0.7 (0.7, 0.8)	249.0 (228.7, 267.7)	0.4 (0.3, 0.4)
	Neuroblastoma	244.4 (173.3, 332.3)	0.6 (0.5, 0.6)	100.9 (86.6, 114.9)	0.1 (0.1, 0.2)
	Retinoblastoma	88.9 (61.5, 125.1)	0.1 (0.1, 0.2)	63.5 (49.5, 80.3)	0.1 (0.1, 0.1)
	STES	271.3 (236.4, 314.9)	0.4 (0.3, 0.5)	115.0 (102.8, 127.1)	0.2 (0.1, 0.2)
Western Europe	Brain cancer	2774.6 (2667.3, 2888.6)	2.8 (2.7, 2.9)	1122.6 (1100.3, 1144.0)	1.1 (1.1, 1.2)
	Hepatoblastoma	105.7 (100.8, 110.8)	0.1 (0.1, 0.1)	40.9 (39.0, 42.9)	0.0 (0.0, 0.0)
	Kidney cancer	554.8 (523.3, 590.2)	0.6 (0.5, 0.6)	117.2 (112.6, 121.2)	0.1 (0.1, 0.1)
	MNBAC	1080.8 (1025.2, 1136.0)	1.1 (1.0, 1.2)	345.0 (333.9, 357.3)	0.4 (0.3, 0.4)
	Neuroblastoma	547.6 (461.8, 638.2)	0.2 (0.0, 0.3)	167.6 (160.1, 176.3)	0.2 (0.2, 0.2)
	Retinoblastoma	291.0 (238.0, 351.0)	0.3 (0.2, 0.4)	11.5 (10.2, 13.0)	0.0 (0.0, 0.0)
	STES	680.2 (625.5, 736.3)	0.7 (0.6, 0.7)	184.5 (175.0, 194.2)	0.2 (0.2, 0.2)
Western sub-Saharan Africa	Brain cancer	434.6 (281.6, 631.5)	0.4 (0.3, 0.6)	358.4 (234.6, 526.3)	0.3 (0.2, 0.5)
	Hepatoblastoma	728.2 (528.2, 958.7)	0.7 (0.5, 0.9)	512.6 (372.7, 672.8)	0.5 (0.3, 0.6)

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Table 1: Contd...

Location	Diseases	1990			
		Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)
	Kidney cancer	577.5 (427.0, 733.9)	0.5 (0.4, 0.7)	360.7 (261.5, 469.3)	0.3 (0.2, 0.4)
	MNBAC	747.3 (534.5, 975.5)	0.7 (0.5, 0.9)	392.3 (290.8, 500.5)	0.4 (0.3, 0.5)
	Neuroblastoma	174.4 (49.2, 326.7)	0.5 (0.4, 0.6)	77.6 (21.9, 121.9)	0.1 (0.0, 0.1)
	Retinoblastoma	386.5 (184.0, 556.9)	0.4 (0.2, 0.5)	376.5 (179.4, 544.0)	0.4 (0.2, 0.5)
	STES	1042.2 (687.7, 1756.6)	1.0 (0.6, 1.6)	545.9 (365.1, 910.8)	0.5 (0.3, 0.8)

Location	2021				1990–2021	
	Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)	EAPC of incidence, % (95% CI)	EAPC of death, % (95% CI)
Global	40534.5 (33345.9, 49609.0)	1.5 (1.3, 1.9)	19922.5 (16061.8, 24531.8)	0.8 (0.6, 0.9)	−0.3 (−0.4,−0.2)	−1.3 (−1.4,−1.2)
	4048.4 (3252.5, 5000.5)	0.2 (0.1, 0.2)	2416.2 (1922.5, 3019.0)	0.1 (0.1, 0.1)	−2.1 (−2.3,−2.0)	−2.6 (−2.8,−2.5)
	10448.2 (8384.5, 12579.7)	0.4 (0.3, 0.5)	3243.2 (2427.1, 4090.5)	0.1 (0.1, 0.2)	−0.3 (−0.4,−0.1)	−1.0 (−1.2,−0.9)
	19679.4 (16489.8, 23501.0)	0.7 (0.6, 0.9)	8573.6 (7257.2, 10618.1)	0.3 (0.3, 0.4)	0.5 (0.5, 0.6)	0.0 (−0.1, 0.1)
	5793.0 (3923.5, 7837.5)	0.2 (0.1, 0.3)	2094.7 (1546.6, 2658.7)	0.1 (0.1, 0.1)	0.7 (0.5, 0.8)	0.4 (0.3, 0.6)
	6275.0 (3855.0, 8381.8)	0.2 (0.1, 0.3)	2762.0 (1666.3, 3760.8)	0.1 (0.1, 0.1)	1.3 (1.0, 1.6)	−0.5 (−0.7,−0.3)
	10134.8 (7986.0, 14109.5)	0.4 (0.3, 0.5)	3856.4 (3008.9, 5526.1)	0.1 (0.1, 0.2)	−1.3 (−1.3,−1.2)	−1.8 (−1.9,−1.7)
Low-SDI	4394.9 (3044.9, 5632.4)	0.8 (0.5, 1.0)	3402.5 (2355.0, 4428.4)	0.6 (0.4, 0.8)	0.3 (0.2, 0.4)	0.0 (−0.1, 0.1)
	1416.6 (996.2, 1916.9)	0.2 (0.2, 0.3)	987.4 (696.1, 1339.1)	0.2 (0.1, 0.2)	−2.3 (−2.4,−2.2)	−2.4 (−2.5,−2.3)
	2532.7 (1551.1, 3549.2)	0.4 (0.3, 0.6)	1256.2 (781.5, 1775.2)	0.2 (0.1, 0.3)	0.3 (0.1, 0.4)	−0.5 (−0.6,−0.3)
	4372.9 (3341.1, 6000.2)	0.7 (0.6, 1.0)	2356.8 (1833.8, 3267.8)	0.4 (0.3, 0.6)	0.3 (0.1, 0.4)	−0.3 (−0.4,−0.3)
	1022.3 (465.2, 1793.7)	0.2 (0.1, 0.3)	444.8 (241.6, 713.0)	0.1 (0.0, 0.1)	1.0 (0.6, 1.5)	0.8 (0.4, 1.1)
	1677.1 (979.2, 2522.1)	0.3 (0.2, 0.4)	1457.4 (878.6, 2100.7)	0.2 (0.2, 0.4)	−0.9 (−1.0,−0.8)	−1.3 (−1.4,−1.1)
	3623.4 (2515.0, 5538.4)	0.6 (0.4, 0.9)	1673.8 (1199.3, 2606.1)	0.3 (0.2, 0.4)	−2.1 (−2.2,−2.1)	−2.7 (−2.8,−2.6)
Low-middle SDI	8316.2 (6534.5, 10364.0)	1.1 (0.9, 1.4)	5575.8 (4417.4, 6967.6)	0.7 (0.6, 0.9)	0.6 (0.5, 0.6)	0.0 (−0.1, 0.1)
	1102.0 (886.3, 1345.3)	0.1 (0.1, 0.2)	752.3 (603.5, 919.6)	0.1 (0.1, 0.1)	−1.8 (−1.9,−1.7)	−1.9 (−2.0,−1.8)
	2111.2 (1612.8, 2650.0)	0.3 (0.2, 0.3)	829.8 (616.9, 1040.9)	0.1 (0.1, 0.1)	0.6 (0.5, 0.8)	−0.2 (−0.4,−0.1)
	5902.3 (4784.5, 7376.1)	0.8 (0.6, 1.0)	2920.4 (2374.8, 3661.8)	0.4 (0.3, 0.5)	0.9 (0.9, 1.0)	0.3 (0.3, 0.4)
	1611.1 (980.7, 2416.1)	0.2 (0.1, 0.3)	642.1 (457.3, 852.8)	0.1 (0.1, 0.1)	1.7 (1.5, 2.0)	1.2 (1.0, 1.5)
	1530.6 (881.2, 2240.6)	0.2 (0.1, 0.3)	922.9 (553.0, 1276.8)	0.1 (0.1, 0.2)	0.4 (0.1, 0.6)	−1.1 (−1.2,−0.9)
	2552.6 (1831.3, 3883.5)	0.3 (0.2, 0.5)	1054.0 (764.5, 1593.7)	0.1 (0.1, 0.2)	−1.7 (−1.7,−1.6)	−2.3 (−2.4,−2.2)
Middle SDI	13806.3 (10921.7, 17058.3)	1.8 (1.5, 2.3)	6484.9 (5143.0, 7884.6)	0.9 (0.7, 1.1)	−0.2 (−0.3,−0.0)	−1.6 (−1.7,−1.4)
	823.5 (655.8, 1044.0)	0.1 (0.1, 0.1)	458.9 (369.3, 569.1)	0.1 (0.0, 0.1)	−3.7 (−4.0,−3.3)	−4.4 (−4.8,−4.1)
	2774.7 (2290.6, 3304.8)	0.4 (0.3, 0.4)	729.5 (600.4, 864.9)	0.1 (0.1, 0.1)	−0.4 (−0.6,−0.2)	−1.9 (−2.1,−1.7)
	5521.3 (4312.1, 6390.5)	0.7 (0.6, 0.9)	2171.1 (1732.9, 2521.6)	0.3 (0.2, 0.3)	1.2 (1.0, 1.4)	0.3 (0.1, 0.6)
	1502.9 (1035.4, 2002.1)	0.2 (0.1, 0.3)	525.3 (397.4, 656.0)	0.1 (0.1, 0.1)	1.4 (1.1, 1.6)	0.8 (0.6, 1.0)
	1481.4 (848.1, 2089.8)	0.2 (0.1, 0.3)	308.7 (175.0, 416.6)	0.0 (0.0, 0.1)	2.8 (2.4, 3.1)	−1.8 (−2.0,−1.6)
	1684.7 (1354.4, 2217.7)	0.2 (0.2, 0.3)	571.3 (461.2, 746.9)	0.1 (0.1, 0.1)	−1.7 (−1.8,−1.5)	−2.4 (−2.6,−2.3)

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Table 1: Contd...

Location	2021				1990–2021	
	Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)	EAPC of incidence, % (95% CI)	EAPC of death, % (95% CI)
High-middle SDI	7848.4 (6323.1, 9922.9)	2.6 (2.1, 3.3)	2820.8 (2336.6, 3512.8)	0.9 (0.8, 1.2)	0.0 (−0.1, 0.2)	−2.1 (−2.2,−1.9)
	359.6 (290.0, 448.1)	0.1 (0.1, 0.1)	131.3 (108.8, 158.6)	0.0 (0.0, 0.1)	−2.5 (−2.9,−2.1)	−4.8 (−5.2,−4.5)
	1793.2 (1547.9, 2070.3)	0.6 (0.5, 0.7)	278.2 (242.4, 314.3)	0.1 (0.1, 0.1)	−0.5 (−0.7,−0.2)	−2.9 (−3.0,−2.7)
	2183.8 (1684.3, 2547.4)	0.7 (0.6, 0.8)	662.3 (510.6, 766.4)	0.2 (0.2, 0.3)	−0.4 (−0.6,−0.2)	−1.5 (−1.8,−1.2)
	780.8 (580.6, 984.8)	0.3 (0.2, 0.3)	237.8 (185.8, 284.8)	0.1 (0.1, 0.1)	1.0 (0.7, 1.3)	0.3 (0.1, 0.6)
	934.7 (487.8, 1387.5)	0.3 (0.2, 0.5)	59.3 (29.8, 85.6)	0.0 (0.0, 0.0)	4.0 (3.3, 4.6)	−2.4 (−2.7,−2.1)
	836.8 (719.0, 987.3)	0.3 (0.2, 0.3)	224.7 (193.5, 262.7)	0.1 (0.1, 0.1)	−1.4 (−1.6,−1.3)	−2.5 (−2.6,−2.4)
High-SDI	6139.9 (5783.5, 6526.6)	2.6 (2.5, 2.8)	1622.6 (1531.1, 1724.4)	0.7 (0.7, 0.7)	0.3 (0.2, 0.4)	−1.1 (−1.1,−1.0)
	345.0 (314.7, 374.0)	0.1 (0.1, 0.2)	85.2 (78.1, 91.6)	0.0 (0.0, 0.0)	0.7 (0.4, 0.9)	−1.2 (−1.3,−1.2)
	1228.6 (1145.1, 1318.7)	0.5 (0.5, 0.6)	146.9 (136.9, 155.8)	0.1 (0.1, 0.1)	0.2 (−0.0, 0.3)	−1.6 (−1.7,−1.5)
	1686.6 (1567.1, 1808.7)	0.7 (0.7, 0.8)	457.4 (430.6, 484.1)	0.2 (0.2, 0.2)	−0.6 (−0.7,−0.4)	−1.3 (−1.4,−1.1)
	871.6 (726.8, 1020.6)	0.4 (0.3, 0.4)	243.1 (215.2, 270.2)	0.1 (0.1, 0.1)	−0.8 (−1.0,−0.6)	−1.1 (−1.3,−0.9)
	648.7 (488.8, 828.9)	0.3 (0.2, 0.4)	12.4 (9.9, 15.0)	0.0 (0.0, 0.0)	0.4 (0.0, 0.8)	−2.7 (−3.2,−2.1)
	1427.0 (1274.1, 1565.6)	0.6 (0.5, 0.7)	328.5 (302.4, 349.3)	0.1 (0.1, 0.2)	−0.4 (−0.6,−0.1)	−1.0 (−1.2,−0.7)
Andean Latin America	499.0 (383.4, 667.4)	2.1 (1.6, 2.8)	288.1 (215.6, 371.7)	1.2 (0.9, 1.6)	1.1 (0.8, 1.3)	0.1 (−0.2, 0.4)
	15.5 (10.4, 22.4)	0.1 (0.0, 0.1)	9.9 (6.9, 14.4)	0.0 (0.0, 0.1)	−3.7 (−4.1,−3.4)	−4.1 (−4.4,−3.8)
	99.1 (76.0, 127.9)	0.4 (0.3, 0.5)	30.9 (23.9, 39.6)	0.1 (0.1, 0.2)	−0.5 (−0.8,−0.3)	−2.3 (−2.5,−2.1)
	202.2 (150.8, 266.3)	0.9 (0.6, 1.1)	79.3 (59.5, 103.9)	0.3 (0.3, 0.4)	−0.5 (−0.6,−0.4)	−1.4 (−1.5,−1.3)
	41.8 (27.5, 58.4)	0.2 (0.1, 0.2)	15.4 (11.0, 20.4)	0.1 (0.0, 0.1)	−0.3 (−0.6,−0.1)	−0.9 (−1.0,−0.7)
	111.8 (62.1, 187.6)	0.5 (0.3, 0.8)	26.1 (16.1, 42.6)	0.1 (0.1, 0.2)	2.4 (2.1, 2.7)	−2.3 (−2.5,−2.0)
	70.0 (50.4, 96.0)	0.3 (0.2, 0.4)	23.8 (17.5, 32.9)	0.1 (0.1, 0.1)	−2.3 (−2.6,−1.9)	−3.3 (−3.6,−3.0)
Australasia	158.1 (134.4, 185.7)	2.1 (1.8, 2.5)	52.1 (47.0, 58.1)	0.7 (0.6, 0.8)	−0.3 (−0.4,−0.2)	−1.4 (−1.5,−1.3)
	13.3 (10.4, 16.6)	0.2 (0.1, 0.2)	3.1 (2.5, 3.8)	0.0 (0.0, 0.1)	2.1 (1.8, 2.4)	1.0 (0.8, 1.3)
	28.9 (23.3, 35.4)	0.4 (0.3, 0.5)	3.6 (3.1, 4.3)	0.0 (0.0, 0.1)	0.1 (−0.5, 0.7)	−2.0 (−2.4,−1.6)
	51.9 (44.0, 61.0)	0.7 (0.6, 0.8)	13.5 (11.4, 15.9)	0.2 (0.2, 0.2)	−1.4 (−1.9,−0.9)	−2.1 (−2.6,−1.6)
	30.3 (21.8, 41.1)	0.4 (0.3, 0.5)	8.3 (6.2, 10.9)	0.1 (0.1, 0.1)	−0.5 (−0.8,−0.2)	−0.6 (−0.8,−0.3)
	2.9 (1.5, 5.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.0)	−1.4 (−3.2, 0.4)	−4.5 (−6.2,−2.8)
	52.6 (40.6, 66.8)	0.7 (0.5, 0.9)	11.4 (8.8, 14.5)	0.2 (0.1, 0.2)	−0.5 (−1.3, 0.4)	−1.1 (−1.9,−0.2)
Caribbean	240.0 (186.1, 340.9)	1.6 (1.2, 2.2)	161.4 (119.0, 245.1)	1.1 (0.8, 1.6)	0.5 (0.4, 0.6)	0.4 (0.3, 0.4)
	7.1 (4.7, 11.0)	0.0 (0.0, 0.1)	4.8 (3.1, 7.5)	0.0 (0.0, 0.0)	−1.5 (−1.8,−1.2)	−1.6 (−1.9,−1.3)
	74.9 (55.5, 105.6)	0.5 (0.4, 0.7)	31.1 (21.3, 47.4)	0.2 (0.1, 0.3)	−0.2 (−0.3,−0.0)	−0.7 (−0.9,−0.5)
	107.5 (81.2, 145.5)	0.7 (0.5, 1.0)	47.6 (35.6, 65.3)	0.3 (0.2, 0.4)	−0.0 (−0.2, 0.1)	−0.1 (−0.2, 0.0)
	56.3 (36.3, 83.8)	0.4 (0.2, 0.5)	21.8 (15.3, 31.1)	0.1 (0.1, 0.2)	1.3 (0.8, 1.8)	1.2 (0.8, 1.6)
	4.4 (2.4, 7.4)	0.0 (0.0, 0.0)	1.8 (0.9, 3.3)	0.0 (0.0, 0.0)	−2.4 (−3.4,−1.3)	−2.5 (−3.2,−1.8)
	141.5 (90.7, 210.7)	0.9 (0.6, 1.4)	63.6 (38.8, 94.7)	0.4 (0.3, 0.6)	−0.1 (−0.3, 0.0)	−0.4 (−0.6,−0.2)
Central Asia	822.0 (688.2, 978.4)	2.4 (2.0, 2.8)	559.4 (469.1, 668.3)	1.6 (1.4, 1.9)	1.3 (1.2, 1.5)	0.9 (0.7, 1.0)

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Table 1: Contd...

Location	2021				1990–2021	
	Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)	EAPC of incidence, % (95% CI)	EAPC of death, % (95% CI)
	42.4 (31.0, 56.8)	0.1 (0.1, 0.2)	28.0 (20.5, 37.3)	0.1 (0.1, 0.1)	−3.0 (−3.5,−2.6)	−3.2 (−3.7,−2.8)
	154.4 (125.8, 186.7)	0.4 (0.4, 0.5)	53.8 (43.6, 65.3)	0.2 (0.1, 0.2)	0.1 (−0.3, 0.5)	−0.6 (−0.9,−0.4)
	218.0 (178.8, 264.5)	0.6 (0.5, 0.8)	83.6 (69.4, 99.3)	0.2 (0.2, 0.3)	0.5 (0.3, 0.8)	0.0 (−0.2, 0.3)
	22.5 (14.4, 32.7)	0.1 (0.0, 0.1)	8.4 (6.1, 11.7)	0.0 (0.0, 0.0)	2.8 (2.2, 3.4)	2.3 (1.8, 2.8)
	54.7 (28.0, 97.1)	0.2 (0.1, 0.3)	14.4 (7.8, 25.5)	0.0 (0.0, 0.1)	2.9 (2.1, 3.6)	−0.1 (−0.5, 0.3)
	84.4 (64.6, 107.3)	0.2 (0.2, 0.3)	28.9 (22.3, 36.5)	0.1 (0.1, 0.1)	1.0 (0.5, 1.5)	0.4 (−0.1, 0.8)
Central Europe	459.4 (404.5, 510.8)	2.0 (1.7, 2.2)	212.2 (188.9, 237.5)	0.9 (0.8, 1.0)	−0.5 (−0.8,−0.3)	−1.8 (−2.0,−1.6)
	8.9 (7.2, 11.0)	0.0 (0.0, 0.0)	3.5 (2.8, 4.3)	0.0 (0.0, 0.0)	−3.0 (−3.6,−2.5)	−4.9 (−5.3,−4.4)
	85.8 (75.5, 96.6)	0.4 (0.3, 0.4)	17.8 (15.8, 19.9)	0.1 (0.1, 0.1)	0.0 (−0.3, 0.3)	−1.8 (−2.0,−1.6)
	105.2 (93.5, 119.0)	0.4 (0.4, 0.5)	34.2 (30.5, 38.5)	0.1 (0.1, 0.2)	−2.7 (−3.1,−2.4)	−3.6 (−3.9,−3.2)
	50.0 (38.3, 63.3)	0.2 (0.2, 0.3)	15.5 (12.7, 19.0)	0.1 (0.1, 0.1)	−0.4 (−1.0, 0.1)	−0.9 (−1.4,−0.4)
	17.6 (11.3, 27.2)	0.1 (0.0, 0.1)	1.2 (0.8, 1.9)	0.0 (0.0, 0.0)	0.2 (−0.5, 1.0)	−4.7 (−5.3,−4.1)
	117.6 (101.3, 138.0)	0.5 (0.4, 0.6)	30.8 (26.7, 35.4)	0.1 (0.1, 0.2)	0.2 (0.0, 0.5)	−0.7 (−0.9,−0.4)
Central Latin America	1056.7 (900.1, 1252.0)	1.2 (1.1, 1.5)	617.8 (528.8, 726.2)	0.7 (0.6, 0.9)	0.3 (0.0, 0.6)	−0.4 (−0.6,−0.2)
	86.2 (66.4, 112.9)	0.1 (0.1, 0.1)	55.0 (42.5, 71.1)	0.1 (0.0, 0.1)	−2.0 (−2.2,−1.8)	−2.3 (−2.4,−2.1)
	318.5 (260.1, 387.5)	0.4 (0.3, 0.5)	98.9 (81.4, 120.7)	0.1 (0.1, 0.1)	−0.3 (−0.5,−0.1)	−1.7 (−1.9,−1.5)
	699.9 (616.0, 787.8)	0.8 (0.7, 0.9)	289.6 (256.8, 323.8)	0.3 (0.3, 0.4)	1.7 (1.4, 2.0)	1.2 (0.8, 1.5)
	175.1 (124.2, 241.5)	0.2 (0.1, 0.3)	63.1 (49.5, 80.6)	0.1 (0.1, 0.1)	−0.2 (−0.9, 0.4)	−0.6 (−1.2, 0.0)
	161.0 (104.7, 242.1)	0.2 (0.1, 0.3)	37.8 (25.9, 53.8)	0.0 (0.0, 0.1)	1.1 (0.4, 1.7)	−2.5 (−2.9,−2.1)
	377.8 (323.0, 440.4)	0.4 (0.4, 0.5)	126.1 (109.3, 146.5)	0.1 (0.1, 0.2)	−0.3 (−0.5,−0.1)	−1.0 (−1.2,−0.9)
Central sub-Saharan Africa	228.8 (155.4, 315.1)	0.3 (0.2, 0.4)	185.9 (126.7, 256.3)	0.3 (0.2, 0.3)	0.2 (0.0, 0.4)	0.1 (−0.1, 0.2)
	96.5 (43.1, 177.1)	0.1 (0.1, 0.2)	67.9 (30.5, 128.1)	0.1 (0.0, 0.2)	−4.1 (−4.3,−3.8)	−4.1 (−4.3,−3.8)
	85.1 (56.3, 124.1)	0.1 (0.1, 0.2)	43.1 (28.5, 62.1)	0.1 (0.0, 0.1)	−0.7 (−0.9,−0.5)	−1.4 (−1.6,−1.2)
	238.8 (134.6, 389.7)	0.3 (0.2, 0.5)	140.3 (78.6, 231.4)	0.2 (0.1, 0.3)	−0.2 (−0.4,−0.0)	−0.6 (−0.7,−0.5)
	27.5 (16.1, 43.4)	0.0 (0.0, 0.1)	12.3 (8.5, 17.6)	0.0 (0.0, 0.0)	−0.6 (−1.0,−0.2)	−0.7 (−1.0,−0.3)
	71.6 (26.3, 146.7)	0.1 (0.0, 0.2)	65.9 (25.9, 126.1)	0.1 (0.0, 0.2)	−1.2 (−1.4,−0.9)	−1.4 (−1.7,−1.1)
	291.7 (185.4, 461.3)	0.4 (0.3, 0.6)	136.3 (86.9, 210.3)	0.2 (0.1, 0.3)	−2.3 (−2.5,−2.1)	−2.8 (−3.0,−2.5)
East Asia	10667.4 (8179.5, 14267.2)	3.1 (2.4, 4.1)	3711.7 (2803.3, 4960.4)	1.1 (0.8, 1.4)	−0.0 (−0.3, 0.2)	−2.5 (−2.8,−2.3)
	565.8 (401.6, 801.9)	0.2 (0.1, 0.2)	221.6 (160.3, 309.4)	0.1 (0.0, 0.1)	−3.6 (−4.2,−3.1)	−5.6 (−6.1,−5.2)
	1829.8 (1409.5, 2275.5)	0.5 (0.4, 0.7)	332.2 (250.5, 410.4)	0.1 (0.1, 0.1)	−0.6 (−0.9,−0.3)	−3.3 (−3.5,−3.1)
	2341.2 (1607.8, 2989.6)	0.7 (0.5, 0.9)	662.9 (455.9, 829.1)	0.2 (0.1, 0.2)	2.0 (1.4, 2.6)	0.3 (−0.4, 1.0)
	597.0 (408.2, 793.1)	0.2 (0.1, 0.2)	180.8 (130.5, 231.6)	0.1 (0.0, 0.1)	2.2 (1.7, 2.7)	1.2 (0.7, 1.7)
	1124.9 (444.1, 1762.9)	0.3 (0.1, 0.5)	74.0 (31.6, 110.6)	0.0 (0.0, 0.0)	5.9 (5.0, 6.8)	−2.1 (−2.7,−1.6)
	311.0 (227.0, 474.4)	0.1 (0.1, 0.1)	84.4 (61.9, 126.2)	0.0 (0.0, 0.0)	−4.2 (−4.4,−4.0)	−5.7 (−5.9,−5.4)
Eastern Europe	802.5 (752.9, 849.2)	1.7 (1.6, 1.8)	439.8 (417.1, 462.3)	1.0 (0.9, 1.0)	−0.3 (−0.6,−0.1)	−1.4 (−1.5,−1.2)
	57.7 (52.1, 63.1)	0.1 (0.1, 0.1)	25.9 (23.6, 28.3)	0.1 (0.1, 0.1)	−1.1 (−1.9,−0.4)	−2.6 (−3.1,−2.0)

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Table 1: Contd...

Location	2021				1990–2021	
	Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)	EAPC of incidence, % (95% CI)	EAPC of death, % (95% CI)
	200.7 (184.3, 220.2)	0.4 (0.4, 0.5)	37.4 (34.6, 40.5)	0.1 (0.1, 0.1)	−1.2 (−1.7,−0.6)	−2.5 (−2.9,−2.1)
	278.7 (254.0, 302.2)	0.6 (0.6, 0.7)	92.5 (83.3, 100.6)	0.2 (0.2, 0.2)	−3.6 (−4.0,−3.3)	−4.1 (−4.6,−3.6)
	73.4 (53.4, 96.1)	0.2 (0.1, 0.2)	23.9 (18.7, 28.8)	0.1 (0.0, 0.1)	−0.9 (−1.1,−0.6)	−1.4 (−1.6,−1.2)
	51.9 (38.3, 71.8)	0.1 (0.1, 0.2)	4.8 (3.5, 6.4)	0.0 (0.0, 0.0)	−0.3 (−0.8, 0.2)	−3.8 (−4.1,−3.5)
	178.8 (153.0, 204.6)	0.4 (0.3, 0.4)	50.0 (43.2, 55.7)	0.1 (0.1, 0.1)	−1.0 (−1.6,−0.5)	−1.7 (−2.3,−1.1)
Eastern sub-Saharan Africa	2123.4 (1482.7, 2930.0)	0.9 (0.7, 1.3)	1678.3 (1180.6, 2343.2)	0.7 (0.5, 1.0)	0.5 (0.3, 0.7)	0.3 (0.2, 0.4)
	509.8 (296.9, 887.7)	0.2 (0.1, 0.4)	356.1 (208.9, 622.7)	0.2 (0.1, 0.3)	−2.5 (−2.7,−2.4)	−2.6 (−2.7,−2.5)
	1136.0 (604.3, 1694.1)	0.5 (0.3, 0.7)	552.8 (294.8, 830.2)	0.2 (0.1, 0.4)	−0.3 (−0.5,−0.1)	−1.1 (−1.3,−0.9)
	2282.7 (1546.7, 3664.2)	1.0 (0.7, 1.6)	1282.4 (878.0, 2055.5)	0.6 (0.4, 0.9)	0.2 (0.1, 0.3)	−0.4 (−0.5,−0.3)
	565.8 (247.3, 1006.5)	0.2 (0.1, 0.4)	244.0 (121.5, 403.3)	0.1 (0.1, 0.2)	0.8 (0.4, 1.1)	0.6 (0.3, 0.9)
	1265.0 (786.9, 1975.0)	0.6 (0.3, 0.9)	1058.1 (700.0, 1629.2)	0.5 (0.3, 0.7)	−1.0 (−1.2,−0.8)	−1.4 (−1.6,−1.1)
	1889.5 (1212.4, 2999.3)	0.8 (0.5, 1.3)	861.8 (571.5, 1428.2)	0.4 (0.3, 0.6)	−2.3 (−2.4,−2.2)	−2.9 (−3.0,−2.8)
High-income Asia Pacific	941.5 (793.6, 1070.1)	3.1 (2.6, 3.5)	190.1 (164.5, 207.6)	0.6 (0.5, 0.7)	1.6 (1.2, 2.0)	−0.6 (−0.9,−0.2)
	37.6 (33.1, 44.5)	0.1 (0.1, 0.1)	8.5 (7.6, 9.9)	0.0 (0.0, 0.0)	−1.8 (−2.6,−1.0)	−4.3 (−4.8,−3.8)
	88.9 (77.7, 101.9)	0.3 (0.3, 0.3)	12.1 (11.1, 13.1)	0.0 (0.0, 0.0)	0.6 (0.3, 0.9)	−1.9 (−2.0,−1.7)
	199.4 (178.7, 221.3)	0.6 (0.6, 0.7)	51.2 (46.4, 56.6)	0.2 (0.2, 0.2)	−1.5 (−1.7,−1.3)	−2.5 (−2.7,−2.2)
	150.1 (125.8, 173.5)	0.5 (0.4, 0.6)	41.7 (37.1, 46.7)	0.1 (0.1, 0.2)	−0.6 (−1.0,−0.2)	−1.0 (−1.3,−0.7)
	106.8 (74.0, 146.8)	0.3 (0.2, 0.5)	1.6 (1.2, 2.2)	0.0 (0.0, 0.0)	1.6 (0.7, 2.5)	−3.0 (−3.7,−2.3)
	157.9 (137.1, 177.9)	0.5 (0.4, 0.6)	34.7 (30.9, 38.2)	0.1 (0.1, 0.1)	−1.1 (−1.4,−0.8)	−1.9 (−2.3,−1.6)
High-income North America	2619.1 (2435.5, 2813.2)	2.9 (2.7, 3.1)	649.3 (612.8, 690.8)	0.7 (0.7, 0.8)	−0.1 (−0.2, 0.0)	−0.7 (−0.8,−0.6)
	179.2 (159.5, 200.1)	0.2 (0.2, 0.2)	44.7 (40.2, 49.7)	0.0 (0.0, 0.1)	1.7 (1.4, 1.9)	0.7 (0.5, 0.8)
	523.6 (486.7, 560.5)	0.6 (0.5, 0.6)	53.7 (50.7, 57.3)	0.1 (0.1, 0.1)	−0.6 (−0.8,−0.5)	−1.6 (−1.7,−1.5)
	765.1 (704.5, 818.5)	0.9 (0.8, 0.9)	211.6 (197.2, 225.5)	0.2 (0.2, 0.3)	0.2 (0.0, 0.3)	−0.1 (−0.3,−0.0)
	354.0 (292.3, 417.2)	0.4 (0.3, 0.5)	99.3 (86.4, 112.8)	0.1 (0.1, 0.1)	−1.1 (−1.3,−0.9)	−1.3 (−1.5,−1.2)
	233.5 (159.4, 336.0)	0.3 (0.2, 0.4)	4.3 (3.3, 5.7)	0.0 (0.0, 0.0)	−1.6 (−2.1,−1.1)	−3.3 (−4.0,−2.7)
	657.5 (590.8, 719.1)	0.7 (0.7, 0.8)	155.2 (143.5, 165.5)	0.2 (0.2, 0.2)	−0.4 (−0.5,−0.2)	−0.7 (−0.9,−0.5)
North Africa and Middle East	5965.5 (4265.8, 7546.2)	2.5 (1.8, 3.2)	2623.7 (1878.7, 3267.0)	1.1 (0.8, 1.4)	1.0 (0.8, 1.1)	−0.3 (−0.4,−0.2)
	329.2 (258.3, 418.2)	0.1 (0.1, 0.2)	207.8 (163.1, 264.6)	0.1 (0.1, 0.1)	−1.5 (−1.7,−1.2)	−1.8 (−2.0,−1.6)
	1230.6 (972.2, 1531.2)	0.5 (0.4, 0.6)	213.6 (173.3, 262.0)	0.1 (0.1, 0.1)	−0.2 (−0.4, 0.1)	−1.5 (−1.7,−1.3)
	1802.0 (1461.1, 2258.5)	0.8 (0.6, 1.0)	708.2 (569.3, 890.6)	0.3 (0.2, 0.4)	0.3 (0.2, 0.4)	−0.5 (−0.6,−0.4)
	365.5 (252.6, 511.6)	0.2 (0.1, 0.2)	119.3 (87.5, 158.5)	0.1 (0.0, 0.1)	0.9 (0.6, 1.2)	0.2 (−0.1, 0.4)
	230.5 (145.6, 358.8)	0.1 (0.1, 0.2)	43.6 (26.7, 70.0)	0.0 (0.0, 0.0)	2.0 (1.7, 2.3)	−2.3 (−2.6,−1.9)
	596.9 (436.3, 911.6)	0.3 (0.2, 0.4)	207.6 (152.4, 308.8)	0.1 (0.1, 0.1)	−2.7 (−2.9,−2.5)	−3.4 (−3.6,−3.2)
Oceania	24.6 (13.3, 37.0)	0.4 (0.2, 0.6)	18.8 (10.3, 28.1)	0.3 (0.2, 0.4)	0.4 (0.4, 0.5)	0.5 (0.4, 0.5)
	4.0 (2.3, 7.1)	0.1 (0.0, 0.1)	2.8 (1.6, 4.9)	0.0 (0.0, 0.1)	−1.2 (−1.5,−0.9)	−1.2 (−1.5,−1.0)
	8.1 (5.3, 12.8)	0.1 (0.1, 0.2)	3.2 (2.1, 5.0)	0.0 (0.0, 0.1)	0.5 (0.3, 0.7)	0.5 (0.3, 0.8)

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Table 1: Contd...

Location	2021				1990–2021	
	Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)	EAPC of incidence, % (95% CI)	EAPC of death, % (95% CI)
	20.7 (7.5, 40.5)	0.3 (0.1, 0.6)	12.6 (4.3, 25.7)	0.2 (0.1, 0.4)	0.5 (0.3, 0.8)	0.4 (0.2, 0.6)
	0.7 (0.4, 1.3)	0.0 (0.0, 0.0)	0.4 (0.2, 0.6)	0.0 (0.0, 0.0)	−1.2 (−1.7,−0.7)	−1.2 (−1.7,−0.8)
	3.5 (1.0, 10.2)	0.1 (0.0, 0.2)	2.9 (0.8, 9.5)	0.0 (0.0, 0.1)	0.8 (0.5, 1.0)	0.5 (0.1, 0.8)
	4.8 (2.8, 8.4)	0.1 (0.0, 0.1)	2.1 (1.2, 3.7)	0.0 (0.0, 0.1)	−0.6 (−0.8,−0.5)	−0.7 (−0.9,−0.6)
South Asia	6144.9 (4858.3, 7983.4)	0.9 (0.7, 1.2)	4377.3 (3437.4, 5653.5)	0.6 (0.5, 0.8)	0.1 (−0.0, 0.3)	−0.4 (−0.5,−0.3)
	815.5 (632.7, 1044.5)	0.1 (0.1, 0.2)	559.5 (436.1, 716.6)	0.1 (0.1, 0.1)	−1.7 (−1.8,−1.6)	−1.8 (−1.9,−1.7)
	1043.8 (733.8, 1396.0)	0.2 (0.1, 0.2)	452.3 (311.9, 608.8)	0.1 (0.0, 0.1)	0.3 (0.2, 0.4)	−0.7 (−0.8,−0.6)
	5197.2 (4149.7, 6529.2)	0.8 (0.6, 1.0)	2669.2 (2139.3, 3339.9)	0.4 (0.3, 0.5)	0.9 (0.8, 0.9)	0.2 (0.1, 0.3)
	1496.1 (907.4, 2299.9)	0.2 (0.1, 0.3)	598.9 (412.9, 833.5)	0.1 (0.1, 0.1)	1.8 (1.4, 2.2)	1.2 (0.9, 1.6)
	1247.8 (670.9, 1931.4)	0.2 (0.1, 0.3)	674.3 (378.2, 1002.6)	0.1 (0.1, 0.1)	0.3 (−0.1, 0.8)	−1.7 (−1.9,−1.5)
	1968.1 (1374.8, 3040.8)	0.3 (0.2, 0.4)	815.6 (586.2, 1234.2)	0.1 (0.1, 0.2)	−2.2 (−2.3,−2.1)	−2.9 (−3.0,−2.8)
Southeast Asia	2303.5 (1673.1, 2819.1)	1.0 (0.7, 1.2)	1451.1 (1042.4, 1795.8)	0.6 (0.5, 0.8)	0.4 (0.4, 0.4)	−0.1 (−0.1,−0.0)
	252.4 (185.7, 346.6)	0.1 (0.1, 0.2)	163.8 (121.8, 226.1)	0.1 (0.1, 0.1)	−3.0 (−3.2,−2.8)	−3.2 (−3.4,−3.1)
	738.8 (593.9, 902.1)	0.3 (0.3, 0.4)	231.9 (186.2, 284.9)	0.1 (0.1, 0.1)	0.1 (−0.0, 0.1)	−0.5 (−0.6,−0.4)
	1497.0 (1004.2, 1896.7)	0.7 (0.4, 0.8)	707.5 (477.1, 890.7)	0.3 (0.2, 0.4)	1.0 (0.9, 1.1)	0.5 (0.4, 0.6)
	345.6 (244.3, 469.3)	0.2 (0.1, 0.2)	126.3 (98.4, 159.2)	0.1 (0.0, 0.1)	0.9 (0.8, 1.1)	0.5 (0.4, 0.6)
	311.3 (171.8, 494.2)	0.1 (0.1, 0.2)	95.6 (42.5, 145.4)	0.0 (0.0, 0.1)	1.2 (1.0, 1.3)	−1.5 (−1.6,−1.4)
	514.2 (385.5, 784.6)	0.2 (0.2, 0.3)	194.8 (146.5, 290.8)	0.1 (0.1, 0.1)	−1.8 (−1.9,−1.8)	−2.5 (−2.6,−2.4)
Southern Latin America	293.7 (252.0, 345.8)	1.5 (1.3, 1.8)	143.9 (128.4, 159.8)	0.7 (0.7, 0.8)	1.4 (1.0, 1.8)	0.5 (0.2, 0.9)
	3.9 (3.2, 4.6)	0.0 (0.0, 0.0)	2.1 (1.8, 2.6)	0.0 (0.0, 0.0)	1.2 (0.9, 1.5)	0.4 (0.1, 0.7)
	222.4 (181.1, 269.9)	1.1 (0.9, 1.4)	22.6 (19.3, 26.1)	0.1 (0.1, 0.1)	0.9 (0.6, 1.1)	−0.8 (−1.0,−0.6)
	159.5 (139.2, 183.0)	0.8 (0.7, 0.9)	57.1 (49.3, 66.7)	0.3 (0.3, 0.3)	−0.8 (−1.0,−0.6)	−1.3 (−1.5,−1.1)
	62.6 (44.3, 87.3)	0.3 (0.2, 0.4)	20.3 (15.0, 27.3)	0.1 (0.1, 0.1)	1.3 (0.9, 1.8)	0.8 (0.4, 1.3)
	26.0 (15.3, 39.3)	0.1 (0.1, 0.2)	1.6 (1.0, 2.3)	0.0 (0.0, 0.0)	−1.0 (−1.7,−0.2)	−4.5 (−5.1,−3.8)
	94.9 (73.0, 121.5)	0.5 (0.4, 0.6)	28.6 (22.7, 36.3)	0.1 (0.1, 0.2)	0.4 (0.1, 0.6)	−0.3 (−0.5,−0.1)
Southern Sub-Saharan Africa	227.4 (166.5, 289.5)	0.7 (0.5, 0.9)	169.1 (123.8, 216.7)	0.5 (0.4, 0.7)	1.3 (1.1, 1.5)	1.2 (1.1, 1.4)
	39.7 (27.8, 53.4)	0.1 (0.1, 0.2)	27.8 (19.7, 37.3)	0.1 (0.1, 0.1)	0.1 (−0.2, 0.3)	0.1 (−0.2, 0.3)
	105.5 (84.4, 127.2)	0.3 (0.3, 0.4)	43.6 (35.0, 53.8)	0.1 (0.1, 0.2)	1.3 (0.8, 1.8)	0.7 (0.3, 1.1)
	132.5 (99.4, 187.6)	0.4 (0.3, 0.6)	68.0 (51.0, 98.2)	0.2 (0.2, 0.3)	−0.0 (−0.3, 0.3)	−0.1 (−0.5, 0.3)
	44.6 (28.4, 66.2)	0.1 (0.1, 0.2)	18.0 (13.5, 24.0)	0.1 (0.0, 0.1)	1.3 (0.8, 1.8)	1.1 (0.8, 1.5)
	51.6 (20.2, 91.6)	0.2 (0.1, 0.3)	30.5 (12.5, 55.6)	0.1 (0.0, 0.2)	3.0 (2.2, 3.7)	1.9 (1.4, 2.5)
	140.9 (96.8, 191.4)	0.5 (0.3, 0.6)	58.9 (41.3, 79.8)	0.2 (0.1, 0.3)	1.0 (0.6, 1.3)	0.8 (0.5, 1.1)
Tropical Latin America	1195.3 (1011.1, 1373.8)	1.8 (1.5, 2.1)	717.8 (610.7, 823.5)	1.1 (0.9, 1.2)	0.7 (0.3, 1.1)	0.1 (−0.3, 0.5)
	39.9 (30.9, 48.9)	0.1 (0.0, 0.1)	25.7 (19.8, 31.4)	0.0 (0.0, 0.0)	−1.5 (−1.8,−1.2)	−1.7 (−2.0,−1.4)
	263.7 (220.4, 307.2)	0.4 (0.3, 0.5)	83.5 (69.6, 98.6)	0.1 (0.1, 0.1)	0.2 (−0.2, 0.5)	−1.2 (−1.5,−0.8)

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Table 1: Contd...

Location	2021				1990–2021	
	Incidence cases, *n* (95% UI)	Incidence rate, *n* (95% UI)	Death cases, *n* (95%UI)	Death rate, *n* (95%UI)	EAPC of incidence, % (95% CI)	EAPC of death, % (95% CI)
	512.7 (452.2, 576.5)	0.8 (0.7, 0.9)	215.9 (194.5, 239.5)	0.3 (0.3, 0.4)	0.6 (0.4, 0.9)	0.1 (−0.1, 0.4)
	255.5 (181.1, 338.6)	0.4 (0.3, 0.5)	92.7 (71.9, 113.3)	0.1 (0.1, 0.2)	0.7 (0.2, 1.2)	0.3 (−0.2, 0.7)
	74.3 (48.7, 105.3)	0.1 (0.1, 0.2)	19.6 (13.1, 26.9)	0.0 (0.0, 0.0)	0.2 (−0.2, 0.6)	−2.9 (−3.3,−2.5)
	290.4 (242.1, 340.9)	0.4 (0.4, 0.5)	99.0 (83.5, 114.9)	0.1 (0.1, 0.2)	0.7 (0.4, 1.0)	0.0 (−0.3, 0.3)
Western Europe	2498.8 (2331.0, 2672.8)	2.7 (2.5, 2.9)	694.4 (656.6, 736.0)	0.8 (0.7, 0.8)	−0.0 (−0.1, 0.1)	−1.3 (−1.3,−1.2)
	120.1 (104.7, 136.5)	0.1 (0.1, 0.1)	26.9 (23.8, 30.3)	0.0 (0.0, 0.0)	0.9 (0.7, 1.2)	−0.7 (−0.9,−0.5)
	518.0 (465.2, 575.0)	0.6 (0.5, 0.6)	60.8 (55.4, 66.3)	0.1 (0.1, 0.1)	0.2 (−0.0, 0.4)	−1.7 (−1.9,−1.6)
	760.6 (691.6, 828.2)	0.8 (0.8, 0.9)	192.5 (178.1, 206.8)	0.2 (0.2, 0.2)	−1.1 (−1.3,−0.9)	−1.9 (−2.2,−1.7)
	410.7 (324.9, 509.6)	0.4 (0.4, 0.6)	112.6 (95.4, 132.7)	0.1 (0.1, 0.1)	−0.7 (−0.9,−0.4)	−1.0 (−1.2,−0.8)
	363.7 (263.7, 461.8)	0.4 (0.3, 0.5)	5.0 (3.9, 6.4)	0.0 (0.0, 0.0)	1.3 (0.7, 1.9)	−2.3 (−3.3,−1.4)
	662.0 (574.0, 751.8)	0.7 (0.6, 0.8)	145.0 (128.9, 160.2)	0.2 (0.1, 0.2)	−0.2 (−0.5, 0.1)	−0.9 (−1.3,−0.6)
Western sub-Saharan Africa	1262.8 (613.2, 1680.1)	2.1 (1.6, 2.8)	980.3 (482.9, 1303.7)	0.4 (0.2, 0.5)	0.8 (0.6, 1.0)	0.6 (0.5, 0.8)
	823.6 (590.2, 1092.9)	0.3 (0.2, 0.4)	570.6 (412.6, 754.3)	0.2 (0.2, 0.3)	−2.5 (−2.6,−2.3)	−2.5 (−2.7,−2.3)
	1691.9 (1056.7, 2362.5)	0.6 (0.4, 0.9)	864.2 (544.5, 1186.7)	0.3 (0.2, 0.4)	1.1 (0.9, 1.3)	0.4 (0.2, 0.5)
	2106.5 (1505.9, 2742.0)	0.8 (0.6, 1.0)	953.9 (687.0, 1253.1)	0.4 (0.3, 0.5)	0.5 (0.4, 0.7)	−0.0 (−0.1, 0.1)
	668.0 (173.6, 1235.1)	0.2 (0.1, 0.5)	271.7 (69.2, 474.1)	0.1 (0.0, 0.2)	1.8 (1.4, 2.2)	1.5 (1.1, 1.9)
	760.2 (290.7, 1259.8)	0.3 (0.1, 0.5)	599.0 (251.7, 949.3)	0.2 (0.1, 0.4)	−0.5 (−0.7,−0.3)	−1.2 (−1.3,−1.0)
	1532.6 (981.5, 2491.4)	0.6 (0.4, 0.9)	697.6 (446.1, 1118.2)	0.3 (0.2, 0.4)	−1.3 (−1.5,−1.2)	−1.8 (−2.0,−1.6)

EAPC, estimated annual percentage change; SDI, sociodemographic index; UI, uncertain interval; CI, confidence interval; Brain cancer, Brain and central nervous system cancer; MNBAC, Malignant neoplasm of bone and articular cartilage; Neuroblastoma, Neuroblastoma and other peripheral nervous cell tumor; STES, Soft tissue and other extraosseous sarcomas. Rate, per 100 000 people

in the 1–2 age group and peak mortality in infants under 1 year old. Hepatoblastoma cases and related mortality were primarily concentrated in infants under 1 year old, whereas retinoblastoma primarily impacted children in the 2–4 age bracket. Kidney cancer and neuroblastoma primarily struck individuals aged 2–4, with the highest incidence noted in the 1–2 age group and peak mortality in infants under 1 year old. MNBAC exclusively manifested in children older than 1 year, with incidence and mortality cases, as well

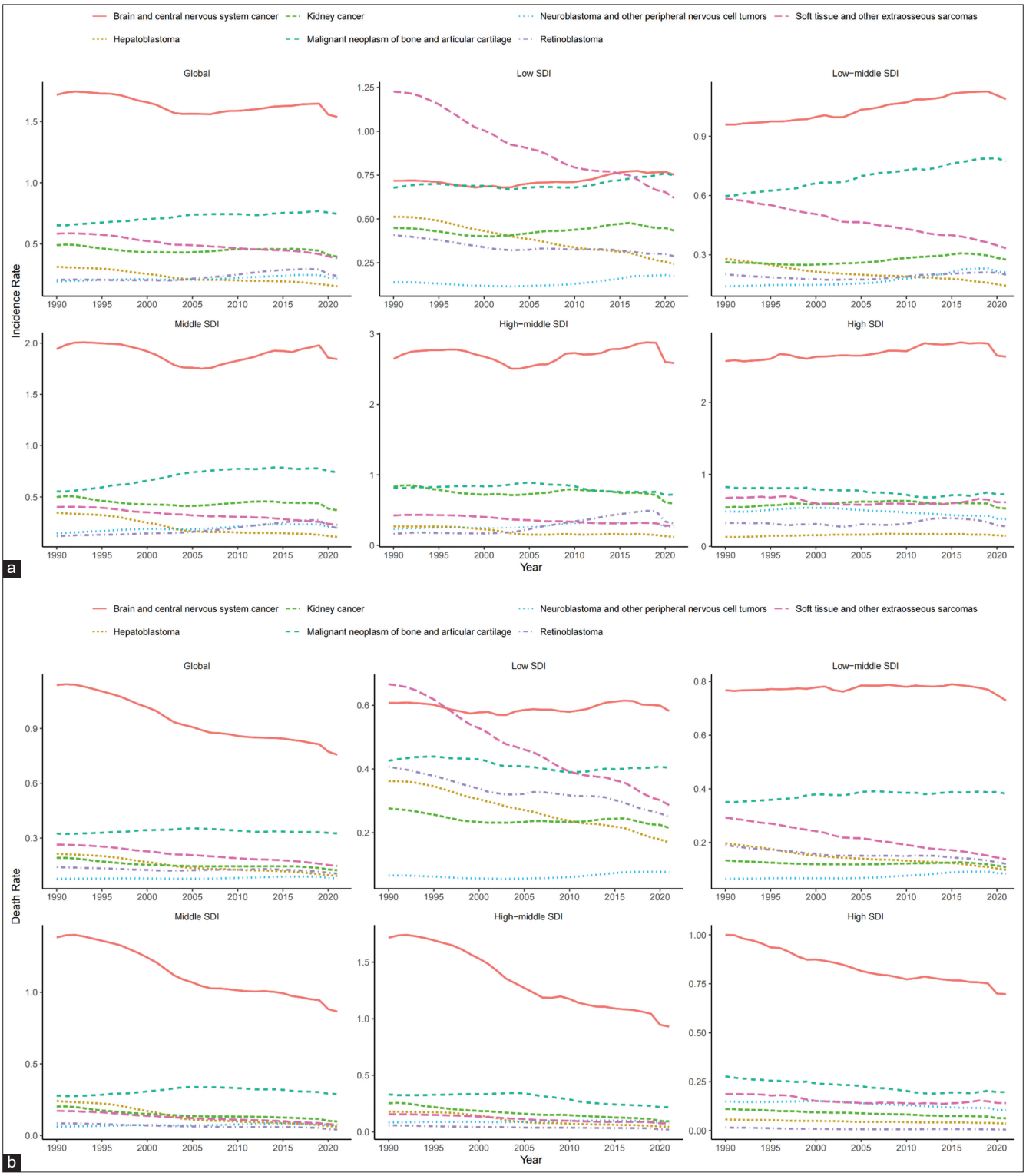

Figure 1: Epidemiologic trends of burden in global and five sociodemographic index regions of solid tumors from 1990 to 2021. (a) Incidence rate and (b) death rate

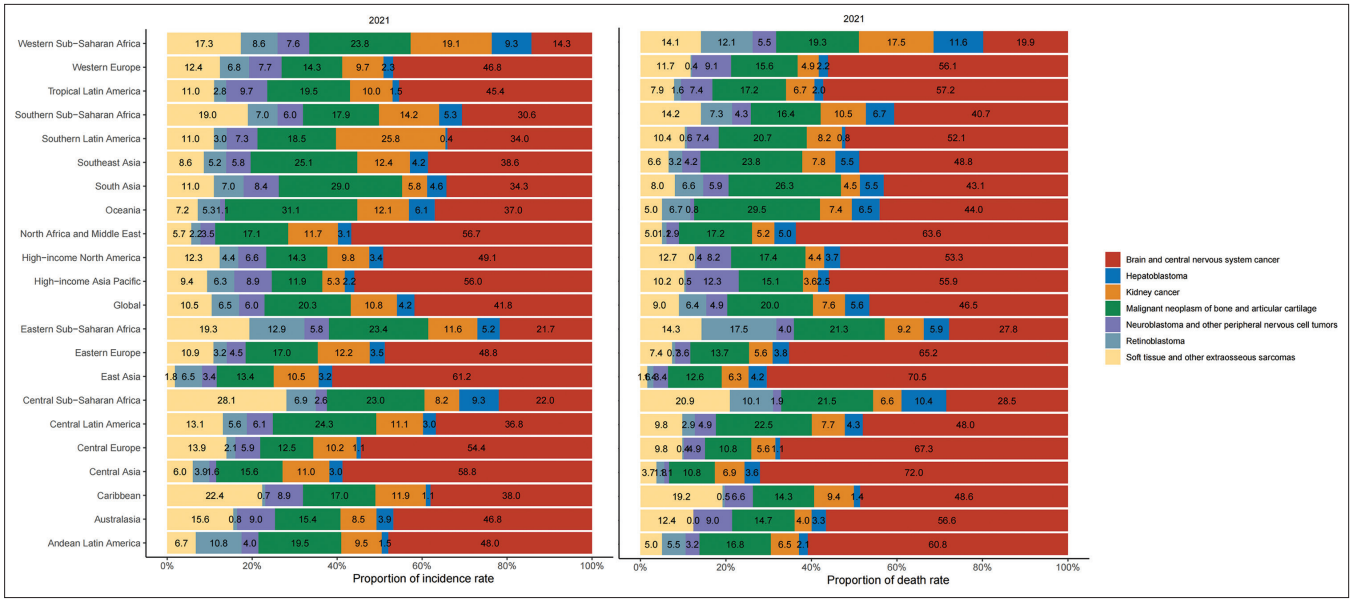

Figure 2: Regional incidence and death proportion of solid tumors burden in 2021

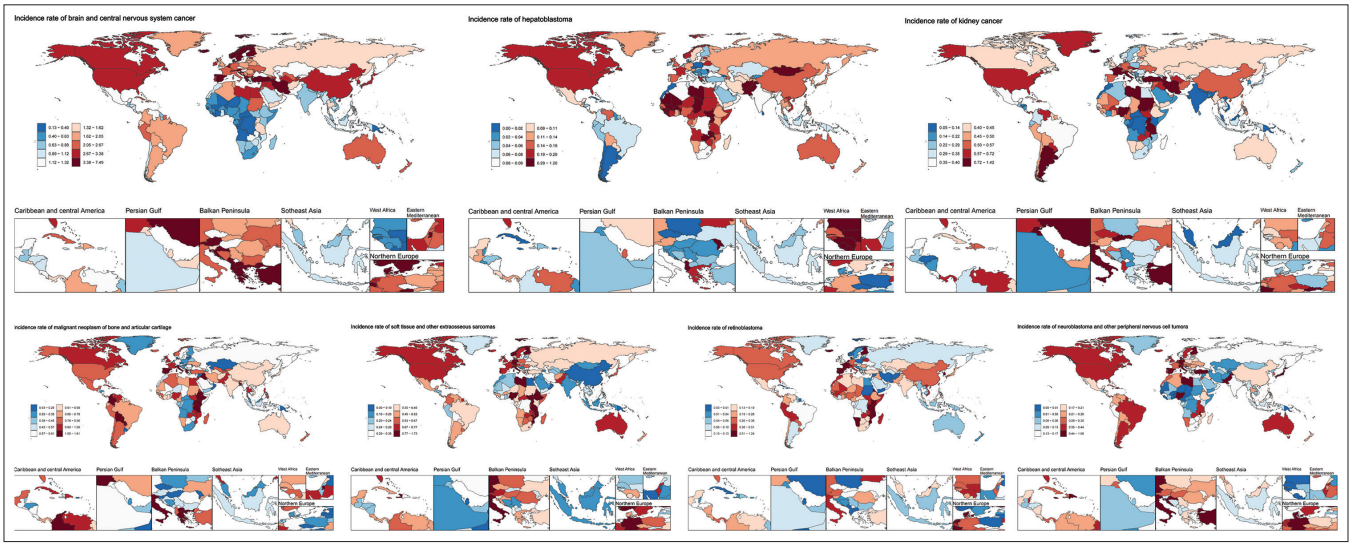

Figure 3: Incidence burden of solid tumors in 204 countries and territories in 2021

as corresponding rates, peaking in the 15–19 age group and increasing progressively with age. Notably, although the majority of STES cases and related deaths were concentrated in the 15–19 age group, infants under 1 year old had the highest incidence and mortality rates for this tumor type [Figure 4].

Burden of solid tumor by SDI

Among the five SDI regions, brain cancer had the highest incidence and mortality rates for solid tumors, followed by MNBAC. Specifically, in 2021, the high-SDI region had the highest incidence rate of brain cancer, and it also had a relatively high incidence rate of neuroblastoma. In contrast, the low-SDI region had the highest incidence rates of hepatoblastoma and STES. The High-middle SDI region had the highest incidence rates of kidney cancer and retinoblastoma. The low-middle SDI region had the highest incidence rate of MNBAC. In terms of mortality, several types of tumors in the low-SDI region had high mortality rates, including MNBAC, kidney cancer, hepatoblastoma, retinoblastoma, and STES. Notably, the High-middle SDI region had the highest mortality rate for brain cancer, and the high-SDI region had a high mortality rate for neuroblastoma [Table 1].

From 1990 to 2021, the incidence rates of brain cancer and kidney cancer remained relatively stable across all SDI regions. However, the incidence of MNBAC gradually increased in regions with lower-SDI, and neuroblastoma incidence increased in

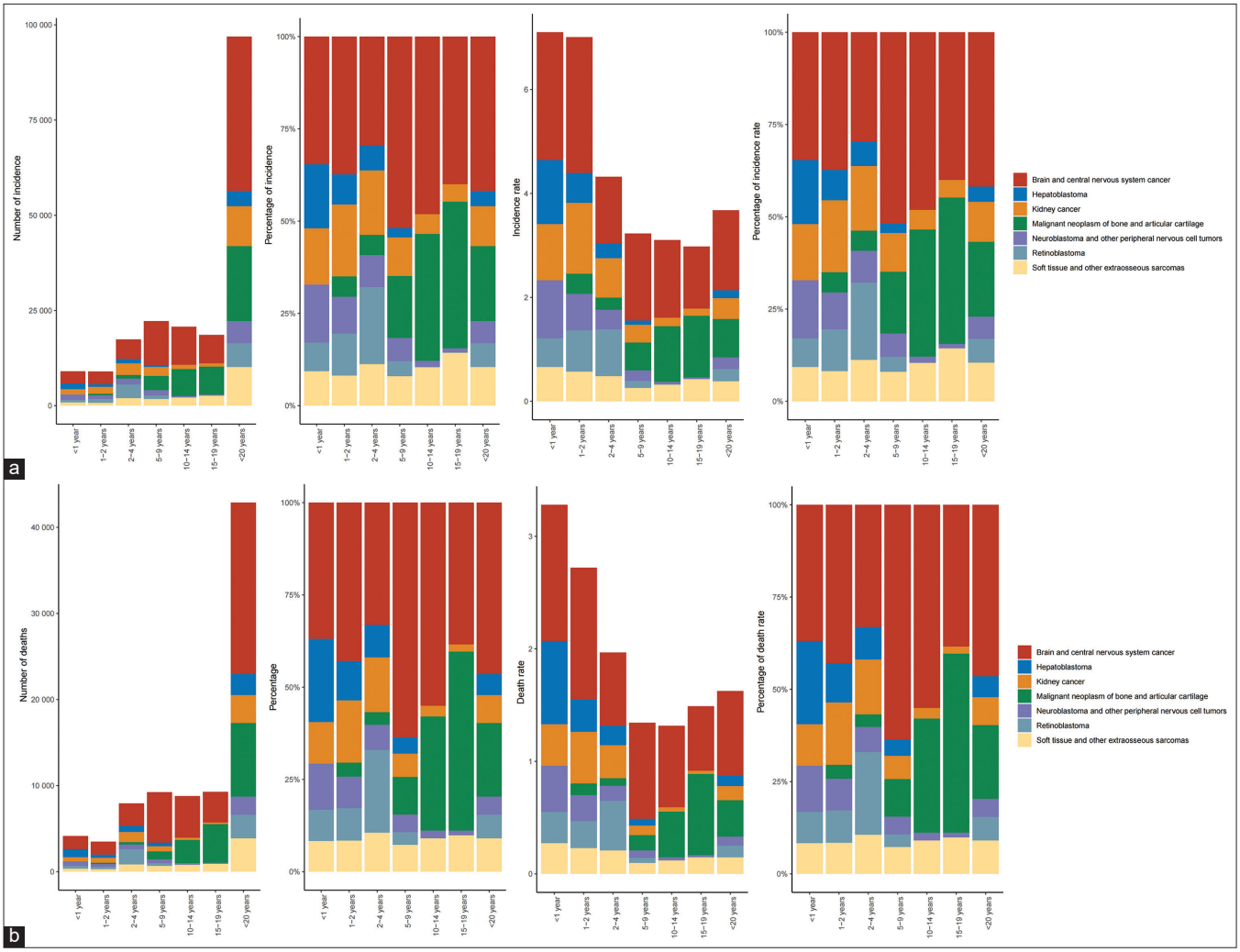

Figure 4: Age proportion of solid tumors burden in 2021. (a) Incidence rate and (b) death rate

all regions except high-SDI. Retinoblastoma showed an increasing trend in all regions except low-SDI, while hepatoblastoma and STES declined in most SDI regions. In terms of mortality, neuroblastoma mortality increased in all regions except high-SDI, and MNBAC mortality slightly increased in Low-middle and Middle SDI regions. The mortality burden of the other tumors declined in different SDI regions [Table 1 and Figure 1].

The relationships between the incidence and mortality rates of different types of cancer and SDI vary. As SDI increases, the incidence rates of brain cancer and neuroblastoma gradually increase, while the mortality rates of hepatoblastoma and retinoblastoma gradually decrease. The mortality rate of neuroblastoma increases with SDI. However, the correlations between the incidence and mortality rates of the other tumors and SDI are relatively weak or insignificant [Figures S3 and S4]. At the national level, there was no significant correlation between the incidence and mortality rates of kidney cancer and SDI. The associations between the burden of the other tumors and SDI were similar to those at the regional level, indicating that the trends observed at the regional level are largely consistent with those at the national level [Figures S5 and S6].

Discussion

Solid tumors seriously threaten children and adolescents' health, challenging global health policies and systems. Their impact requires urgent action. This study outlines incidence and mortality of seven major solid tumors affecting this age group worldwide, showing trends and disparities. In 2021, these tumors caused nearly 40% of new cancer cases and deaths in 0–19 year-olds globally. Brain cancer and MNBAC are prominent. Since 1990, MNBAC, neuroblastoma, and retinoblastoma incidence has risen, with neuroblastoma mortality also increasing,

needing constant monitoring, research, and targeted prevention.

Over the past few decades, remarkable advancements in multi-modal therapy and supportive care have substantially enhanced the prognosis of numerous types of malignant solid tumors among children and adolescents, as demonstrated by our study results.[16] However, substantial regional disparities persist. Brain cancer, which stands as the most prevalent solid tumor and the primary cause of cancer-related deaths in this age group, is particularly prominent in Asian regions, notably East and Central Asia. This disparity is largely attributed to variations in demographic factors, including race, parental age, and environmental exposures such as ionizing radiation and air pollution.[17,18] Research indicates that an older maternal age correlates with an accumulation of chromosomal and gene-level mutations in germ cells, thereby elevating the risk of brain cancer in offspring. Folate plays a pivotal role in nucleotide synthesis and repair; maternal folate supplementation during pregnancy aids in reducing the likelihood of chromosomal breaks and improper proto-oncogene activation, thereby offering protection against pediatric brain tumors.[19,20] Hence, enhancing basic maternal healthcare is imperative for mitigating the risk of brain tumors in these regions. The disease burden, particularly the mortality burden, associated with various tumors such as MNBAC, STS, and retinoblastoma in sub-Saharan Africa, is markedly higher compared to other regions. This disparity is primarily driven by economic limitations, restricted access to healthcare facilities and professional medical care, the intricacy of treatment protocols, and the absence of effective early screening and diagnostic mechanisms. Consequently, pediatric tumors in this region frequently manifest as advanced and locally metastatic diseases, often without receiving any effective treatment. Furthermore, the presence of multiple comorbidities, including malaria, tuberculosis, malnutrition, and treatment-related toxicities, further exacerbates the decline in pediatric tumor survival rates in the region.[21,22] In response, there is a pressing need to augment medical assistance to sub-Saharan Africa, bolster its pediatric tumor diagnosis and treatment capabilities, and intensify the training of medical personnel. Neuroblastoma, a malignant tumor arising from primitive neural crest cells within the sympathetic nervous system, exhibits an escalating global incidence and mortality trend. The incidence is notably high in relatively developed regions, such as High-income Asia Pacific, potentially due to advancements in early detection technology, enhanced screening initiatives, and heightened clinical awareness.[23] Conversely, the incidence of renal cancer is significantly elevated in Southern Latin America, which starkly contrasts with the pervasive high levels of arsenic in drinking water sources in this area. Studies have shown that prolonged arsenic exposure is linked to alterations in gene expression related to arsenic methylation, potentially increasing the risk of developing various tumors, including renal cancer.[24] While further in-depth research is required to elucidate the precise connection between arsenic contamination and renal cancer, the existing evidence will aid relevant countries in promoting public health awareness and intervention programs, as well as formulating urgently needed environmental policies for the region. Despite notable improvements in the survival rate of hepatoblastoma across most global regions, it has exhibited a notable surge in Australia. The reasons underlying this increase remain unclear, but potential contributing factors may include a significant rise in metastatic hepatoblastoma cases, advancements in diagnostic techniques, and changes in reporting practices.[25,26]

It is noteworthy that despite the fact that 80% of cancer patients reside in low- and middle-income countries, the incidence and mortality trends of various cancer types exhibit distinct patterns across different SDI regions, intricately intertwined with the SDI. Specifically, brain cancer holds the top position in both incidence and mortality across the five SDI regions, underscoring its significant contribution to the global cancer burden, particularly in regions with a higher SDI. This revelation underscores the formidable challenges still faced in the prevention and control of brain cancer, even in areas with relatively abundant medical resources.[27] Furthermore, MNBAC demonstrates a high incidence across multiple SDI regions, particularly in those with a low-middle SDI, with mortality rates escalating in some areas. This may be attributed to the low rates of early diagnosis and limited treatment resources stemming from adverse socio-economic conditions.[28] Conversely, in regions with a higher SDI, despite the heightened incidence of kidney cancer, retinoblastoma, and hepatoblastoma, the mortality rates of these tumors have not risen concurrently, thanks to superior medical services, screening mechanisms, and heightened diagnostic awareness. This underscores the pivotal role of effective medical interventions in mitigating mortality. From a temporal trend perspective, while the mortality burden of most tumor types has decreased in various SDI regions, this positive shift has not been evenly distributed across all regions and tumor types. This suggests

that global cancer prevention and control strategies must become more nuanced and comprehensive. In devising future prevention and control strategies, it is imperative to bolster support for cancer prevention, early diagnosis, and treatment in low-SDI regions, while simultaneously addressing the emerging challenges in the prevention and control of specific tumor types in high-SDI regions, thereby fostering balanced progress in the global cancer prevention and control endeavor.

Moreover, there are disparities in the incidence of malignant solid tumors among different age groups of children and adolescents. Infants are more susceptible to brain cancer, neuroblastoma, kidney cancer, hepatoblastoma, and retinoblastoma, potentially due to their underdeveloped immune systems and high cell division rates.[29,30] Conversely, adolescents aged 15–19 are more affected by MNBAC and STES, possibly linked to their growth stage, active tissues, and increased life pressures.[31] Adolescents may overlook bodily abnormalities and hesitate to discuss health concerns, leading to delayed diagnosis and reduced survival rates.[32] To address these disparities, precise and personalized prevention and screening strategies tailored to different age groups and tumor types are crucial for early detection.

Pediatric solid tumors are challenging due to their rapid growth, aggressiveness, and tendency to spread, making prevention difficult. However, they often respond well to treatment and are cost-effective. To address this, early diagnostic capabilities and access to high-quality healthcare must be improved. This ensures timely referrals to pediatric oncology centers for accurate evaluations, diagnoses, and staging, enabling effective treatment and supportive care.[22] As global research progresses, new targets and drugs offer better prospects for pediatric patients.[33] For example, neuroblastoma treatment is shifting to more precise immunotherapy and targeted therapy, significantly improving survival rates and quality of life.[23]

This study, based on GBD 2021 estimates, offers insights into malignant solid tumors in children and adolescents globally but has limitations. Data are mainly from existing studies and stats, which may be incomplete or vary in quality. Regional comparisons may be biased due to different data collection methods. The study focuses on seven major tumors and excludes others, like extracranial germ cell tumors, and lacks detailed tumor classification, hindering understanding of specific tumor pathogenesis. For rare or specific tumors, it provides limited information. Proposed interventions rely on existing research and may be affected by factors like medical resources, patient economics, and social support. Implementation must consider local feasibility and require continuous monitoring.

Conclusion

This study offers an exhaustive examination of the incidence and mortality rates associated with seven primary malignant solid tumors affecting children and adolescents worldwide. It profoundly underscores the dire challenges posed by these tumors to adolescents' health and brings to light the stark disparities in their geographical distribution and across different socio-economic development levels. Notably, brain cancer and MNBAC predominate the global incidence and mortality scenario, posing a formidable risk to the survival prospects of the affected youth. We urge policymakers to prioritize this, develop tailored prevention and screening initiatives, and improve pediatric cancer survival rates and prognosis.

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Ethical statement

For GBD studies, the Institutional Review Board of the University of Washington reviewed and approved a waiver of informed consent (https://www.healthdata.org/research-analysis/gbd).

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Conflicts of interest

All authors have completed the ICMJE uniform disclosure form. The authors have no conflicts of interest to declare.

Data availability statement

The data on the burden of disease are available from the Institute for Health Metrics and Evaluation at https://www.healthdata.org/.

ORCID iDs

Gang Xiao: https://orcid.org/0009-0007-0114-3256
Qidong Ye: https://orcid.org/0009-0000-4920-3544

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