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Research Article

Age-Specific and Age-Standardized Incidence Trends of Iraq's Top Five Childhood Cancers (2002–2021)

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ABSTRACT

Background

The incidence of childhood cancer has consistently increased over several decades, but there is limited recent data available. This lack of information inhibits our ability to accurately assess figures and investigate the potential effects that environmental or lifestyle changes may have on pediatric neoplasm susceptibility. As a result, further research in this area is essential for understanding the causes underlying these trends and their impact more thoroughly.

Objectives

To encourage exploration aimed at gaining a deeper comprehension of the factors behind heightened occurrences of cancer in children. It would be achieved by providing pertinent data relating to such cases among minors, with potential methods for prevention and control.

Methodology

We have utilized a descriptive approach in our analysis methodology, which involves gathering subject data covering all child malignancy diagnoses before the age of 15 within an Iraqi population from 2002 until the present. This has been accomplished by utilizing published cancer registry records. We will use these acquired sources to compute age-specific incidences (ASIR), cumulative rate frequencies per hundred thousand subjects' classification (100k CRs), and calculate combined gender-standardized average-age statistics corresponding to averages on the five most common forms regarding cancers among minors between respective stipulated periods of years ranging from 2002-2021.

Results

From 2002 to 2021, the study involved a population of 681,013,099 in Iraq, including 276,811,275 children aged from zero to fourteen years old accounting for about forty-point sixty-five percent of the total populace. Throughout this period there have been instances where twenty-seven thousand five hundred fifty-one cases of cancer afflicting kids under fifteen years(old) were reported- specifically; boys had twice as many recorded cases than girls with up to fifteen thousand seven thirty-seven versus eleven thousand eight hundred and fourteen respectively

Conclusions

Prioritizing these efforts may bring us closer to improving survival rates and raising the quality of life for children battling this severe disease within Iraq's borders. Childhood cancer in Iraq is a significant health issue. The most prevalent types include leukemia, lymphoma, brain tumors, Wilms tumor, and retinoblastoma. Despite advances in healthcare infrastructure and treatment options available, limited access to specialized care, socioeconomic disparities, and environmental factors remain problems that need addressing as they affect diagnosis rates and outcomes.

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1. INTRODUCTION

Incidence records for childhood cancer in low- and middle-income countries are lacking, with even existing data often disregarding such cases due to their minimal representation among all cancers [1-4] The publication of the International Incidence of Childhood Cancer Volume [1] (IICC-1) in 1988 [2], followed by IICC-2 in 1998 [3], represents the last internationally comparable account on youth cancer incidence patterns as stated by Eva Steliarova-Foucher et al.[1]. Childhood cancer is a major contributor to the burden of disease for children worldwide, with a prevalence higher than previously thought and an increasing incidence over time. Although treatment has greatly improved in high-income countries, low- and middle-income countries still suffer from poor survival rates at approximately 20%. To address this disparity, WHO partnered with St Jude Children's Research Hospital to launch the Global Initiative for Childhood Cancer in 2018. This initiative aims to improve childhood cancer survival rates globally by achieving an average of 60% by 2030.[1][3][5-[6]

The Eastern Mediterranean region, which encompasses 22 countries, shows tremendous diversity in income level and economic status. These nations are also confronted with varying health challenges and divergent stages of healthcare system development. As per the World Health Organization's rating based on population health outcomes, quality of healthcare system delivery, and degree of health expenditure - the strength levels differ significantly across these countries. The EMR classifies its member states into three ranks: Level 1 comprises high-income locations such as Bahrain, Kuwait Oman Qatar Saudi Arabia, and UAE; Levels-2 consists of economies like Egypt Iran Iraq Jordan Lebanon Libya Morocco Syria Tunisia West Bank Gaza Strip (Palestine); while Countries featuring a lower spectrum comprise Afghanistan Djibouti Ethiopia Pakistan Somalia Sudan Yemen.

There are 18 governorates in Iraq, each containing one Cancer Control Section and Cancer Registry Unit within the Directorates of Health, except for Baghdad where there are three.[4][6-9]

The Cancer Registry Section in every specialized oncologist governmental hospital, center, and laboratory comprises an oncologist doctor with a statistician and administrative staff. Their primary responsibility is to gather mandatory cancer patient information through CanReg 4Form. They are responsible for completing the registration of compulsory cancer patient information using paper forms called CanReg 4Form. The Planning and Resources Enhancement Office/Health Statistical Section/Ministry of Health, as well as the equivalent section in all Heath Directorates, collect mortality data.4.The essential information required for the registration of a cancer patient lies within the report documenting their diagnosis. This data must be provided not through the CanReg 4Form but using a distinctive form issued by private hospitals, centers, and laboratories responsible for furnishing such details.[4][6][10-13]

2. METHODOLOGY

For our analysis methodology, we have chosen a descriptive approach that involves gathering subject data on all childhood malignancies diagnosed in an Iraqi population before the age of 15 from 2002 to the present. We obtained this information by using published cancer registry records as sources. These gathered resources will be utilized when calculating various statistics such as age-specific incidence rates (ASIR), cumulative frequency per hundred thousand subjects' ranks (100k CRs), and average-age demographics combined for both genders - specifically focusing on the top five most commonly occurring cancers amongst minors during specified time frames between 2002-2021.

3. THE ANALYSIS of STATISTICS

Age-specific incidence rates (ASIR) were computed for four age groups spanning five years each, namely 0-4, 5-9, and 10-14. The calculation involved dividing the number of cases by the total person-years across respective gender categories - calculated as a ratio per every 100,000 person-years. To calculate the age-standardized rates for individuals aged 0-14 years, we divided them into two groups based on their ages: those between 0 and 14, and those over 15. Next, we determined the WSRs by computing a weighted average of the incidence rates within each age group. Due to the varying age structures in underlying populations, the crude rate cannot be relied on solely. Hence, two standardized measures - namely, the age-standardized and cumulative rates - are presented as they allow for cancer risk comparisons between different registries without being affected by age differences; just like previous volumes have done so.

4. STANDARDIZED INCIDENCE RATE CALCULATION

The standardized incidence rate based on age serves as a summary measure that enables the comparison of health outcomes across varied populations with dissimilar age distributions. To achieve this, a standard age distribution is utilized to evaluate hypothetical rates summarizing how overall rates would compare if all populations shared the same age composition. The rate of incidence has been standardized. Population obtains a single age-adjusted summary rate. This standardized rate is useful for comparing incidence rates across different populations with varying age distributions. The age-standardized rate was obtained by categorizing individuals into two sub-age groups: 0-14 years and 15 years and above. Consequently, the age-standardized rate represents the weighted mean of the rates specific to each age group.

(Ai represents the rate specific to a certain age subgroup (i), while Ni denotes its corresponding population. The notation (i) pertains to that sub-age group i.)

5. RATES of DISEASE STANDARIZED

Direct standardization is a handy technique for comparing health outcomes across populations with varying age distributions. It involves using a standardized age distribution to calculate theoretical summary rates of the overall disease rates as if these populations had identical age structures. This method applies when one has data on the specific-age prevalence of diseases in all compared societies. The cumulative rate will be calculated. The cumulative rate is obtained by adding the age-specific rates for every year of a person's life, from birth to death. This calculation involves 5-year intervals; therefore, multiplying the sum of age-specific rates calculated over these intervals by five yields the cumulative rate. The accumulated rate is equal to 5 times the daily percentage change.

6. RESULTS

Between 2002 and 2021, the study analyzed a population of Iraqis numbering at 681,013,099. Among them were children aged from newborns up to 14 years old who accounted for about 40.65% or approximately 276,811,275 individuals in total. In this duration afore mentioned above within Iraqi's child age group (>0 - <15), there had been a recorded number of cancer cases amounting to around twenty-seven thousand five hundred fifty-one (27,551) between young boys accounting for fifteen thousand seven hundred thirty-seven (15,737) instances while young girls counted eleven thousand eight hundred fourteen(11,814). A detailed breakdown can be found in Table I below details: The population includes all age groups, ranging from 0-4 to those over 100 years of age. The Population Pyramids spanning 1950 to 2100 across the globe.

Regarding information on the age and sex distribution of Iraq's population in 1950, the data has been visualized through a pyramid-shaped diagram, with bars representing different age groups grouped by gender. In addition to the data obtained regarding the population of Iraq from 1950 to 2023.

The staff at the World Bank has made calculations based on the United Nations Population Division's World Population Prospects 1960-2022: 2022 Revision, which includes total population and age/sex demographics. [8]

The ASIR for the 0-4, 5-9, and 10-14 age groups is calculated by dividing the number of cases in each sex category by the corresponding number of person-years and expressing it as a rate per 100,000 person-years.

The ASIR is significantly greater in boys than girls for all age groups. Specifically, for ages 0-4, 5-9, and 10-14 years, the age-specific rates among boys were recorded at 11.84%, 11.02%, and 10.28% respectively (see Table II). In contrast, their female counterparts had corresponding values of only, i.e., girls aged between zero to four years have a rate of about 9%, while those who are five years old have an average estimation equal to 8%. For ten-fourteen-year-olds, females also registered mild variation with their percentages hitting around the eight percent mark on recording day.

Childhood cancer frequently does not receive adequate attention due to its relatively low prevalence among all types of cancers. In this study, we examine data about the five most prevalent forms of childhood cancer amongst both males and females: Leukemia (9027 cases), Brain Cancer (4618 cases), non-Hodgkin lymphoma (3298 cases), Hodgkin's Lymphoma (1773 cases) and Kidney Cancer(1574 Cases). The analysis focuses on age-specific rates or ASIR.

Table I. Population and the number of cases by age group and gender in Iraq during 2002-2021.

	Population of children 0-14 years				The population of Iraqis 15+ years			
	boys	girls	Total	Cases (No.)	Male	Female	Total	Cases (No.)
2002	5786270	5531349	11317619	1092	7284376	7653336	14937712	12893
2003	5941892	5678705	11620597	924	7538029	7910187	15448216	10324
2004	6090199	5818759	11908958	1201	7782556	8167424	15949980	13319
2005	6243103	5963275	12206378	1094	8044842	8447456	16492298	14078
2006	6251706	5970082	12221788	1109	8132734	8551075	16683809	14117
2007	6159653	5880852	12040505	1096	8093815	8526555	16620370	13117
2008	6237237	5953556	12190793	936	8288978	8738600	17027578	13244
2009	6422855	6128795	12551650	1015	8639504	9097876	17737380	14236
2010	6592038	6287881	12879919	1312	8963652	9421292	18384944	17170
2011	6799462	6483215	13282677	1465	9319851	9775522	19095373	18813
2012	7087360	6754966	13842326	1384	9783537	10238570	20022107	19717

2013	7395881	7046123	14442004	1445	10292790	10746996	21039786	21863
2014	7623279	7259948	14883227	1549	10708378	11154875	21863253	24049
2015	7786647	7412912	15199559	1556	11063616	11494628	22558244	23713
2016	7923274	7540763	15464037	1511	11405511	11828384	23233895	24045
2017	8044899	7654957	15699856	1660	11749888	12171403	23921291	27363
2018	8165090	7768239	15933329	1715	12124174	12533186	24657360	29787
2019	8277712	7874545	16152257	1945	12510987	12900265	25411252	33919
2020	8394006	7984361	16378367	1740	12903565	13275040	26178605	29952
2021	8505620	8089782	16595402	1802	13291784	13646397	26938181	34013
	0	0	0				0	
Total	**141728183**	**135083065**	**276811248**	**27551**	**197922567**	**404201634**	**602124201**	**409732**

Table II. Cancer Age-Specific Incidence Rate (ASIR) per 100,000 Population in children by age group and gender–Iraq, 2002-2021

year	Age group >0 - <5				Age group 5-<10				Age group 10-14			
	boy cases	ASIR	Girls' cases	ASIR	boy cases	ASIR	Girls' cases	ASIR	boys' cases	ASIR	Girls' cases	ASIR
2002	246	11.27	166	7.99	211	10.87	131	7.05	217	13.06	121	7.58
2003	208	9.34	135	6.38	181	9.102	119	6.25	152	8.80	129	7.77
2004	237	10.45	189	8.77	263	12.93	158	8.12	203	11.35	151	8.79
2005	226	9.77	172	7.83	206	9.888	165	8.28	192	10.39	133	7.49
2006	247	10.70	174	7.94	230	11.02	149	7.47	175	9.43	134	7.51
2007	235	10.35	168	7.79	215	10.46	153	7.80	205	11.18	120	6.81
2008	194	8.43	151	6.91	199	9.59	130	6.57	158	8.49	104	5.82
2009	228	9.60	187	8.29	211	9.90	117	5.76	146	7.61	126	6.84
2010	306	12.50	239	10.28	271	12.45	157	7.57	177	9.00	162	8.58
2011	307	12.06	263	10.88	286	12.83	214	10.07	218	10.78	177	9.12
2012	310	11.56	269	10.57	255	11.03	178	8.09	206	9.83	166	8.26
2013	335	11.88	288	10.76	252	10.48	178	7.78	211	9.71	181	8.70
2014	373	12.78	293	10.57	269	10.86	200	8.48	232	10.41	182	8.54
2015	393	13.22	266	9.42	259	10.18	214	8.84	224	9.87	200	9.23
2016	369	12.36	273	9.62	272	10.35	194	7.76	233	10.09	170	7.71
2017	412	13.88	319	11.31	290	10.65	205	7.92	239	10.15	195	8.68
2018	359	12.19	320	11.44	336	11.94	241	9.00	251	10.43	208	9.07
2019	424	14.51	353	12.72	352	12.16	275	9.99	293	11.90	248	10.57
2020	362	12.43	306	11.06	343	11.62	259	9.23	292	11.53	178	7.38
2021	417	14.29	313	11.29	336	11.32	213	7.54	288	11.00	235	9.42
Total	**6188**	**11.84**	**4844**	**9.75**	**5237**	**11.02**	**3650**	**8.06**	**4312**	**10.28**	**3320**	**8.27**

Table III. Age-specific incidence rates (ASIR) and age-standardized rate (ASRs)/100,000 population of the top five sites of cancer in children aged 0–14

Year	Population of age group > 0 - < 15	sex	Leukemia			Brain			Non -non-Hodgkin lymphoma			Hodgkin lymphoma			kidney		
			No of cases	ASIR	ASRs	No of cases	ASIR	ASRs	No of cases	ASIR	ASRs	No of cases	ASIR	ASRs	No of cases	ASIR	ASRs
2002	5786270	boys	232	4.01	3.69	98	1.69	3.03	100	1.73	3.93	47	0.81	1.47	34	0.59	1.32
	5531349	girls	99	1.79	2.28	68	1.23	2.31	84	1.52	2.39	16	0.29	1.06	20	0.36	0.77
2003	5941892	boys	176	2.96	3.58	95	1.60	3.41	105	1.77	3.06	38	0.64	1.28	20	0.34	0.90
	5678705	girls	115	2.03	2.51	73	1.29	2.79	47	0.83	1.95	10	0.18	0.88	24	0.42	0.59
2004	6090199	boy	235	3.86	5.74	132	2.17	4.65	125	2.05	3.89	33	0.54	1.28	32	0.53	1.09

		s															
	5818759	girls	185	3.18	4.26	101	1.74	3.62	56	0.96	2.67	9	0.15	0.59	25	0.43	0.66
2005	6243103	boys	207	3.32	3.74	78	1.25	3.53	115	1.84	3.67	38	0.61	1.38	38	0.61	1.38
	5963275	girls	148	2.48	2.98	98	1.64	3.02	46	0.77	2.18	16	0.27	0.91	16	0.27	0.85
2006	6251706	boys	234	3.74	4.62	82	1.31	3.00	99	1.58	3.68	34	0.54	1.38	20	0.32	1.13
	5970082	girls	172	2.88	3.52	47	0.79	2.49	59	0.99	2.50	13	0.22	0.99	30	0.50	0.90
2007	6159653	boys	234	3.80	4.75	74	1.20	2.82	101	1.64	3.28	40	0.65	1.71	30	0.49	1.20
	5880852	girls	172	2.92	1.93	72	1.22	2.25	41	0.70	2.17	19	0.32	1.19	21	0.36	0.85
2008	6237237	boys	186	2.98	3.82	82	1.31	2.79	82	1.31	2.99	25	0.40	1.07	27	0.43	1.14
	5953556	girls	119	2.00	2.76	58	0.97	2.55	58	0.97	1.92	20	0.34	1.03	29	0.49	0.84
2009	6422855	boys	167	2.60	3.36	111	1.73	3.53	79	1.23	3.04	36	0.56	1.41	42	0.65	1.37
	6128795	girls	142	2.32	2.64	69	1.13	2.83	37	0.60	1.83	22	0.36	0.84	35	0.57	0.82
2010	6592038	boys	251	3.81	4.60	126	1.91	3.81	113	1.71	3.48	67	1.02	2.00	40	0.61	1.44
	6287881	girls	255	4.06	3.74	92	1.46	3.05	48	0.76	2.62	21	0.33	1.42	33	0.52	1.02
2011	6799462	boys	280	4.12	5.20	118	1.74	4.14	122	1.79	3.96	66	0.97	1.63	38	0.56	1.59
	6483215	girls	205	3.16	3.92	136	2.10	3.97	82	1.26	3.01	35	0.54	1.33	33	0.51	1.09
2012	7087360	boys	270	3.81	5.02	122	1.72	3.36	111	1.57	4.12	40	0.56	1.61	46	0.65	1.55
	6754966	girls	211	3.12	4.02	91	1.35	3.44	64	0.95	3.18	36	0.53	1.05	42	0.62	1.15
2013	7395881	boys	241	3.26	4.71	88	1.19	2.28	164	2.22	4.60	74	1.00	2.14	49	0.66	1.75
	7046123	girls	230	3.26	4.06	76	1.08	1.82	86	1.22	3.56	48	0.68	1.90	36	0.51	1.12
2014	7623279	boys	290	3.80	5.11	138	1.81	4.07	132	1.73	4.27	58	0.76	1.63	43	0.56	1.76
	7259948	girls	241	3.32	4.26	130	1.79	4.00	71	0.98	3.36	21	0.29	1.17	30	0.41	1.09
2015	7786647	boys	270	3.47	4.93	133	1.71	4.08	104	1.34	3.12	91	1.17	1.95	49	0.63	1.94
	7412912	girls	183	2.47	3.46	130	1.75	4.09	43	0.58	2.71	58	0.78	1.64	52	0.70	1.34
2016	7923274	boys	273	3.45	4.96	158	1.99	3.19	108	1.36	3.40	68	0.86	1.53	40	0.50	1.74
	7540763	girls	194	2.57	3.61	129	1.71	2.62	53	0.70	2.78	28	0.37	1.30	56	0.74	1.12
2017	8044899	boys	302	3.75	5.86	158	1.96	3.38	115	1.43	3.92	80	0.99	2.07	52	0.65	2.08
	7654957	girls	256	3.34	5.30	120	1.57	2.86	47	0.61	3.45	42	0.55	1.80	51	0.67	1.31
2018	8165090	boys	303	3.71	5.23	164	2.01	3.73	91	1.11	3.35	73	0.89	1.99	48	0.59	1.93
	7768239	girls	247	3.18	4.13	131	1.69	3.23	46	0.59	2.90	59	0.76	1.79	39	0.50	1.64
2019	8277712	boys	325	3.93	5.22	193	2.33	4.26	107	1.29	3.89	90	1.09	1.77	74	0.89	2.92
	7874545	girls	262	3.33	4.29	209	2.65	4.12	48	0.61	3.22	42	0.53	1.37	56	0.71	1.79
2020	8394006	boys	310	3.69	4.41	183	2.18	4.04	105	1.25	3.61	82	0.98	1.52	57	0.68	2.56
	7984361	girls	237	2.97	3.54	150	1.88	3.42	50	0.63	2.44	35	0.44	1.29	56	0.70	1.50
2021	8505620	boys	330	3.88	4.46	177	2.08	4.07	124	1.34	3.67	98	1.15	1.84	55	0.65	2.69
	8089782	girls	238	2.94	3.49	128	1.58	3.36	40	0.49	2.92	45	0.56	1.50	56	0.69	1.64
Total	**276811248**		**9027**	**3.261**		**4618**	**1.668**		**3298**	**1.191**		**1773**	**0.641**		**1574**	**0.57**	

Table IV. The cumulative rate/100,000 population for children aged (> 0-14 years) by gender during 2002-2021; in Iraq.

year	population of age group 0-14 year			number of cases and Cumulative rate/100,000 (CR) **for boys**		number of cases and Cumulative rate/100,000 (CR) **for girls**		number of cases and Cumulative rate/100,000 (CR) **for both gender**	
	Boys No.	Girls No.	Sum	cases No.	CR	cases No.	CR	cases No.	CR
2002	5786270	5531349	11317619	674	175.98	418	113.12	1092	145.24
2003	5941892	5678705	11620597	541	136.23	383	102.03	924	119.53
2004	6090199	5818759	11908958	703	173.66	498	128.39	1201	151.53
2005	6243103	5963275	12206378	624	150.27	470	118.04	1094	134.52
2006	6251706	5970082	12221788	652	155.74	457	114.61	1109	135.65
2007	6159653	5880852	12040505	655	159.95	441	111.99	1096	136.51
2008	6237237	5953556	12190793	551	132.56	385	96.46	936	114.92
2009	6422855	6128795	12551650	585	135.59	430	104.46	1015	120.39
2010	6592038	6287881	12879919	754	169.74	558	132.13	1312	151.39
2011	6799462	6483215	13282677	811	178.29	654	150.35	1465	164.65
2012	7087360	6754966	13842326	771	162.14	613	134.60	1384	148.70
2013	7395881	7046123	14442004	798	160.38	647	136.18	1445	148.58
2014	7623279	7259948	14883227	874	170.27	675	137.98	1549	154.52
2015	7786647	7412912	15199559	876	166.35	680	137.42	1556	152.25
2016	7923274	7540763	15464037	874	163.99	637	125.48	1511	145.21
2017	8044899	7654957	15699856	941	173.42	719	139.56	1660	156.91
2018	8165090	7768239	15933329	946	172.81	769	147.55	1715	160.49
2019	8277712	7874545	16152257	1069	192.88	876	166.39	1945	179.97
2020	8394006	7984361	16378367	997	177.96	743	138.36	1740	158.65
2021	8505620	8089782	16595402	1041	183.03	761	141.28	1802	162.68

Table V. The age-specific incidence rate (ASIR/100000), Age-standardized rate (ASRs), and Cumulative rate/100000 population of cancer for children, in Iraq during 2002-2021

Year	Age (0-14) years			ASRs /100000	Cumulative rate (CR) / 100000
	Population	Cases (No.)	ASIR /100000		
2002	11317622	1092	9.65	53.27	145.24
2003	11620597	924	7.95	41.55	119.53
2004	11908960	1201	10.08	51.59	151.53
2005	12206380	1094	8.96	52.87	134.52
2006	12221789	1109	9.07	52.67	135.65
2007	12040506	1096	9.10	49.59	136.51
2008	12190795	936	7.68	48.53	114.92
2009	12551652	1015	8.09	50.35	120.39
2010	12879921	1312	10.19	59.11	151.39
2011	13282678	1465	11.03	62.63	164.65
2012	13842328	1384	10.00	62.31	148.70
2013	14442006	1445	10.01	65.69	148.58
2014	14883228	1549	10.41	69.66	154.52
2015	15199560	1556	10.24	66.92	152.25
2016	15464038	1511	9.77	66.04	145.21
2017	15699858	1660	10.57	73.25	156.91
2018	15933330	1715	10.76	77.61	160.49
2019	16152258	1945	12.04	86.29	179.97
2020	16378369	1740	10.62	74.47	158.65
2021	16595403	1802	10.86	82.27	162.68

7. DISCUSSION and CONCLUTION

1. The top five most common cancer types in children aged 0–14 years in Iraq from 2002–2021, for both genders, were leukemia, brain tumors, non-Hodgkin lymphoma, Hodgkin lymphoma, and kidney tumors.

2. The total number of childhood cancer cases (ages 0-14 years) reported in Iraq from 2002 to 2021 amounted to 27,551 cases.

3. The age-specific incidence rates (ASIR) for boys, girls, and both genders across the study period were 11.10, 8.75, and 9.95 per 100,000 population, respectively.

4. The age-specific incidence rates (ASIR) and age-standardized rates (ASRs) for the top five childhood cancers, ages 0-14 years, in Iraq from 2002 to 2021, are as follows: leukemia (ASIR: 9.027, ASR: 3.261), brain tumors (ASIR: 4.618, ASR: 1.668), non-Hodgkin lymphoma (ASIR: 3.298, ASR: 1.191), Hodgkin lymphoma (ASIR: 1.773, ASR: 0.641), and kidney tumors (ASIR: 1.574, ASR: 0.570).

Childhood cancer remains a significant public health concern in Iraq, with leukemia, brain tumors, lymphomas, and kidney tumors representing the most common diagnoses among children. Despite the country's advancements in healthcare infrastructure and the availability of treatment options, challenges persist in terms of access to specialized care, socioeconomic disparities, and environmental risk factors, all of which continue to impact diagnosis, treatment, and survival outcomes. The relatively high age-specific incidence rates of childhood cancer in Iraq highlight the need for greater attention to early detection, diagnosis, and comprehensive treatment protocols.[14-16]

One critical aspect of improving survival rates lies in overcoming barriers to healthcare access, particularly in rural and underserved areas. Efforts to enhance infrastructure, train healthcare professionals, and establish specialized pediatric oncology centers could significantly improve care quality and outcomes. Additionally, socioeconomic factors—such as poverty and limited education—play a substantial role in delays in seeking medical care, thus exacerbating the burden of disease.

Furthermore, environmental factors, including exposure to toxins, pollutants, and potentially harmful chemicals, require further investigation to understand their role in the increasing incidence of childhood cancers in Iraq. Strengthening research initiatives focused on these environmental determinants is vital to implementing preventative strategies and policies.[17-19]

To achieve these goals, a collaborative effort between healthcare providers, policymakers, and the community is essential. Comprehensive early detection programs should be prioritized, focusing on raising awareness among parents and caregivers about the early signs and symptoms of childhood cancers. Additionally, research programs aimed at understanding the etiology of childhood cancers in the Iraqi context should be expanded to inform evidence-based practices and public health strategies.

In conclusion, improving survival rates and quality of life for children battling cancer in Iraq requires a multi-faceted approach that includes enhancing early detection, improving access to specialized care, addressing socioeconomic and environmental risk factors, and increasing investment in pediatric cancer research. By prioritizing these efforts, Iraq can move closer to ensuring better health outcomes for its youngest population and providing them with the opportunity for a healthier, brighter future.[6][20-22]

Conflicts Of Interest

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