

Analysis and Comparison of highest cancers in Iraq

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ABSTRACT: Background: Cancer is considered the second cause of death after strokes in Iraq. This paper discusses cancer diseases in Iraq with special reference to the ten most common diseases and mortality, as well as cancer diseases and mortality of children and comparisons for both sexes. Material & Methods: Publications of Iraqi Cancer Board, Annual Report, Iraqi Cancer Registry, 2022 on the prevalence and mortality of common cancers in Iraq, analysis of the ten most common types of cancers in Iraq for both genders as well as for children of age (0 - 14). Results: The analysis of data on the prevalence and mortality of higher cancer diseases in Iraq indicated that male cancers were higher than female, leukemia, brain, and breast cancers are considered the highest cancer prevalence and mortality, as well as in children, the general trend of cancers is positive. Conclusion: there is an increase in the rates of cancers and limited rates, with the possibility of reducing the risks of these cancers through attention and developing plans to combat them and reduce their effects and early detection. In Iraq, the cause of the spread of cancer diseases, especially in the southern regions of Iraq, due to environmental pollution and the entry of toxins into drinking water, in addition to radiation resulting from the successive wars in Iraq.



Keywords: Cancer, WHO, Iraqi Cancer Board

1. INTRODUCTION

Cancer is a growing threat all over the world, as cancer cases have increased due to population growth and aging, in addition to other risk factors such as smoking and alcohol [1, 2]. Iraq has been exposed to a continuous war directly or indirectly during the past forty years, which posed a threat to the lives of the population with an increase in cancer cases and the consequences of the ongoing wars and conflicts that caused serious damage to the infrastructure of health services in Iraq and has made remarkable progress in its cooperation with the state agency for research on cancer and the World Health Organization to improve the comprehensive control of cancer diseases in Iraq in coordination with the Iraqi Cancer Board [3-6]. This paper sheds light on the highest prevalence of cancer diseases and mortality in Iraq and analyzes the published data on the Iraqi Cancer Council for the year (2022), making the necessary comparisons shown in the graphs.

2. METHODOLOGY

The data for Iraq, according to its sources, were arranged into five aggregates, the first is general data; the second is data on the prevalence of the top ten cancers, the third is data on pediatric cancers, the fourth is data on two of the most common cancers and mortality, namely breast cancer for women and bronchopulmonary cancer common between women and men, and the fifth is data on mortality [7-22].

3. RESULTS AND DISCUSSION

Table 1. and fig1. shows the prevalence of cancers in Iraq for the time series (2005-2022) for both sexes, as the series was escalating and the prevalence of cancers in female was higher than in male. To measure the secular trend of the time series using the statistical program (Minitab), it turned out that the trend is positive and the marginal tendency of the secular trend (1471) represents the annual increase in cancers in Iraq according to the following secular trend equation, Fig 2.

$$\hat{Y} = 9700 + 1471 t$$

Table 1. - Distribution male & female incidence cancers in Iraq (2005 – 2022)

<i>Year</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
2005	7505	7667	15172
2006	7377	7849	15226
2007	6656	7557	14214
2008	6589	7591	14180
2009	7201	8050	15251
2010	8544	9938	18482
2011	9352	10926	20278
2012	9268	11833	21101
2013	10568	12740	23308
2014	11411	14187	15598
2015	11205	14064	25269
2016	11194	14362	25556
2017	12502	16521	29023
2018	13612	17890	31502
2019	15447	20417	35864
2020	13841	17851	31692
2021	15064	20316	35380
2022	16287	22781	39068

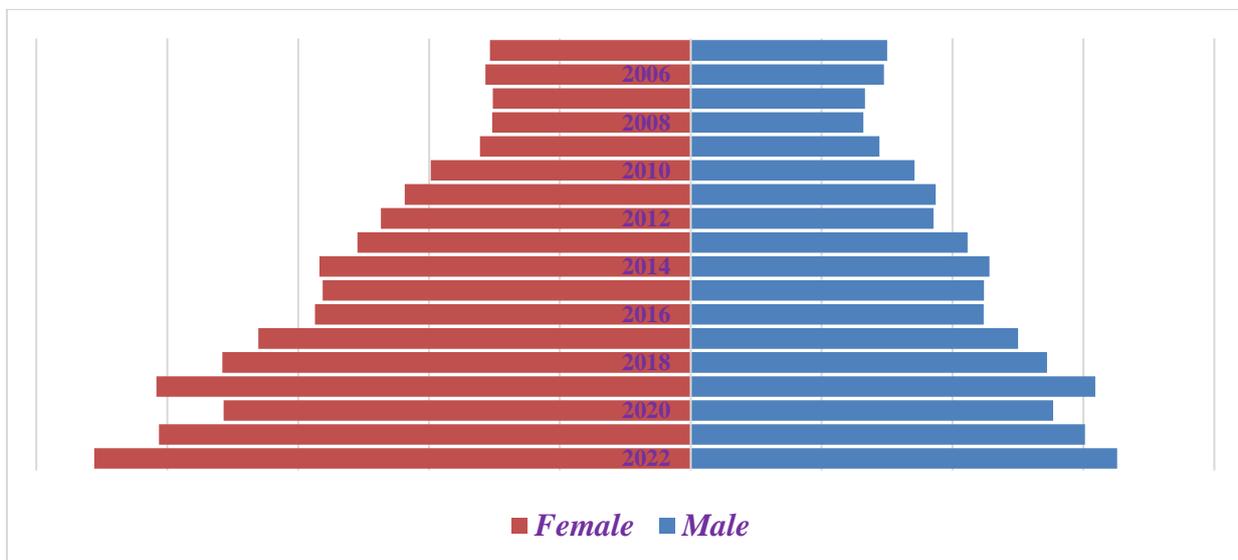


FIGURE 1. - Distribution male & female incidence cancers in Iraq (2005 – 2022)

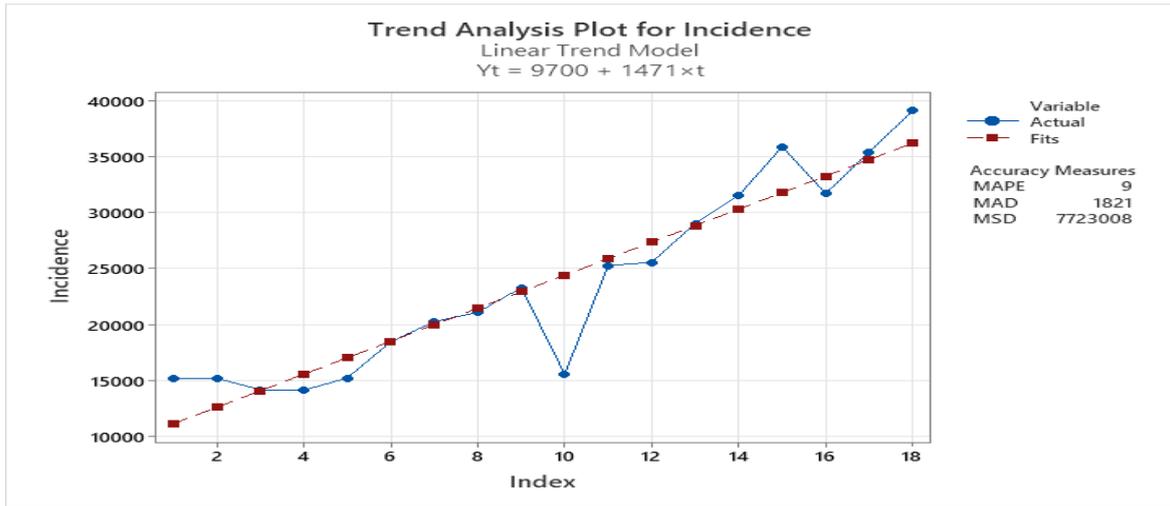


FIGURE 2. - Minitab statistical program outputs

Table 2. shows the prevalence of cancers in Iraq by age group and gender, in general, the prevalence of female cancers is higher than male, especially in the age groups of children (0 - 10), old age (70+) the prevalence of female was lower, fig 3.

Table 2. - Distribution of cancer cases by gender & age group

Age group	Male	Female	Total
0 -	716	515	1231
10 -	660	533	1193
20 -	728	1078	1806
30 -	1110	2487	3597
40 -	1682	4491	6173
50 -	3086	5357	8443
60 -	3734	4488	8222
70 -	3278	2745	6023
80+	1293	1087	2380
Total	16287	22781	39068

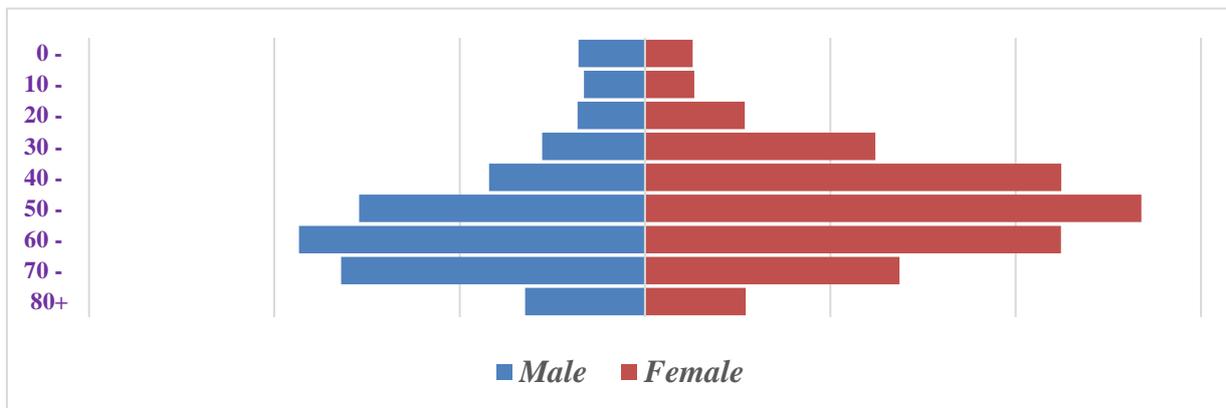


FIGURE 3. - Distribution of cancer cases by gender & age group

The most prevalent cancers in Iraq represent ten main types, breast cancer was the most prevalent (8299) cases, accounting for one fifth of the total (21.2%), followed by colorectal (2871) by (7.3%), and least of all (non – Hodgkin lymphoma) by (1361) and (3.5%), all ten types were more prevalent in male than female, except breast cancer, and thyroid due to the type of cancer [23, 24], table 3.

Table 3. - Incidence of top ten Iraqi cancers both sexes.

Types	Male	Female	Total	%
Brest	115	8184	8299	21.2
Colorectal	1506	1365	2871	7.3
Bronchus & Lung	1981	872	2853	7.3
Thyroid	478	1924	2402	6.1
Brain, CNS	1069	1047	2116	5.4
Leukemia	1052	772	1824	4.7
Bladder	1376	400	1776	4.5
Skin	774	641	1415	3.6
Prostate	1387	-	1387	3.6
Non – Hodgkin Lymphoma	748	618	1361	3.5

The top ten types of cancers for both male and female. For male, the highest number of bronchus & lung cancers (1981) and (12%), followed by colorectal (1506) cases and (9%), the lowest stomach cancer (599) cases and (3.7%). The highest cancers of female, as usual, is breast cancer (8184) with (36%), followed by thyroid (1424) cases (8%), and the lowest non – Hodgkin lymphoma by (613) and (2.7%), Fig 4,5.

Two types of cancers with the highest prevalence and mortality, one for male is bronchus & Lung cancer, the second is female breast cancer. bronchus & Lung cancer is closely related to smoking, male have more than female, there are two types, one benign that can be treated, and the second malignant, its symptoms are shortness of breath, cough, heat, difficulty swallowing. It is diagnosed through magnetic and X-ray imaging, magnetic resonance and endoscopy, the treatment of the malignant type is through tumor removal, radiation and chemotherapy [25], table 4.

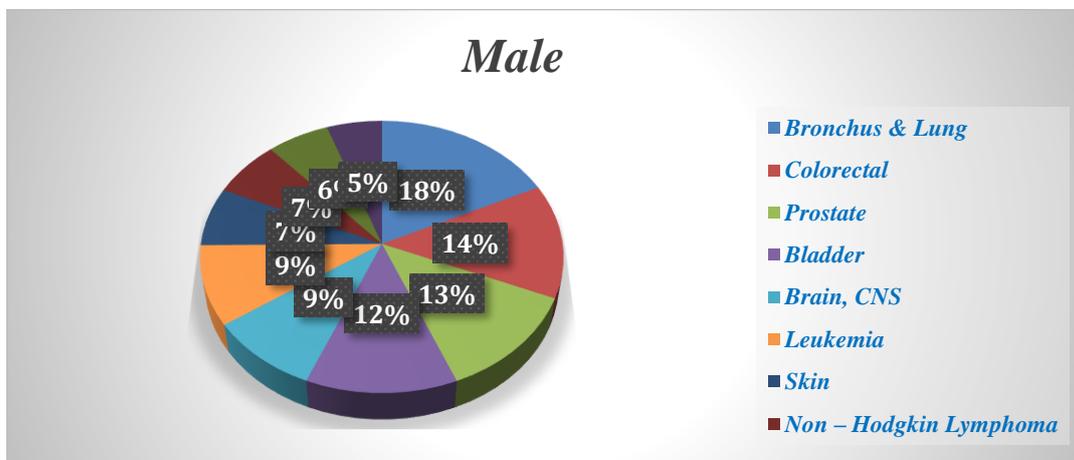


FIGURE 4. - Incidence of top ten Iraqi cancers in male

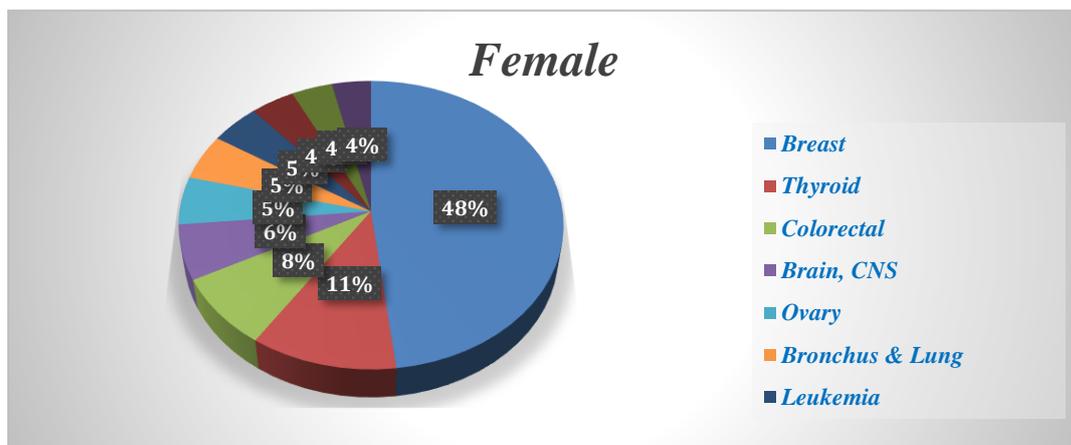


FIGURE 5. - Incidence of top ten Iraqi cancers in female

Table 4. - Morphological distribution of bronchus & lung cancer by gender

<i>Morphology</i>	<i>Male</i>	<i>%</i>	<i>Female</i>	<i>%</i>	<i>Total</i>	<i>%</i>
<i>Squamous cell carcinoma, NOS</i>	902	45.5	340	9	1242	0.44
<i>Adenocarcinoma, NOS</i>	731	36.9	381	43.7	1112	0.39
<i>Small cell carcinoma, NOS</i>	277	14	121	13.9	398	0.14
<i>Neuroendocrine carcinoma, NOS</i>	28	28	9	1	37	0.01
<i>Mesothelioma, malignant</i>	13	0.7	11	1.3	24	0.008
<i>Others</i>	30	1.5	10	1.1	40	0.014
Total	1981		892		2853	

The morphological distribution of female breast cancer, the most species is infiltrating duct carcinoma, NOS (1242) cases and almost half (45%), followed by adenocarcinoma, NOS (112) cases (39%), small cell carcinoma, NOS (14%), neuroendocrine carcinoma, NOS (1%), mesothelioma, malignant (0.8%), others (1.4%).

The ten highest types of childhood cancer for the age of (0 -14) years for both sexes, it seems obvious that the common types between them were the percentage of males higher than females, it is also noted that the highest common between them was for leukemia and brain, CNS cancers with a common percentage of approximately (30%), the lowest for males was an Unspecified Site (1.8), and the lowest for females Ovary (2.2), all ten types of cancers for both sexes represent (88%) and the remaining percentage (12%) represent the other types of pediatric cancers [26], fig 6, 7.

In Iraq, the highest mortality was for lung and bronchus cancer (16.6%), followed by breast cancer (11.8%), and non-Hodgkin's lymphoma (3.6%), these percentages account for (75%) of mortality and the remaining percentage (25%) represent mortality of other cancer cases. The highest mortality rate compared to prevalence cases was pancreatic cancer (90%), followed by lung and bronchial cancer (67%), the lowest is breast cancer (16%), Table 5, fig 8.

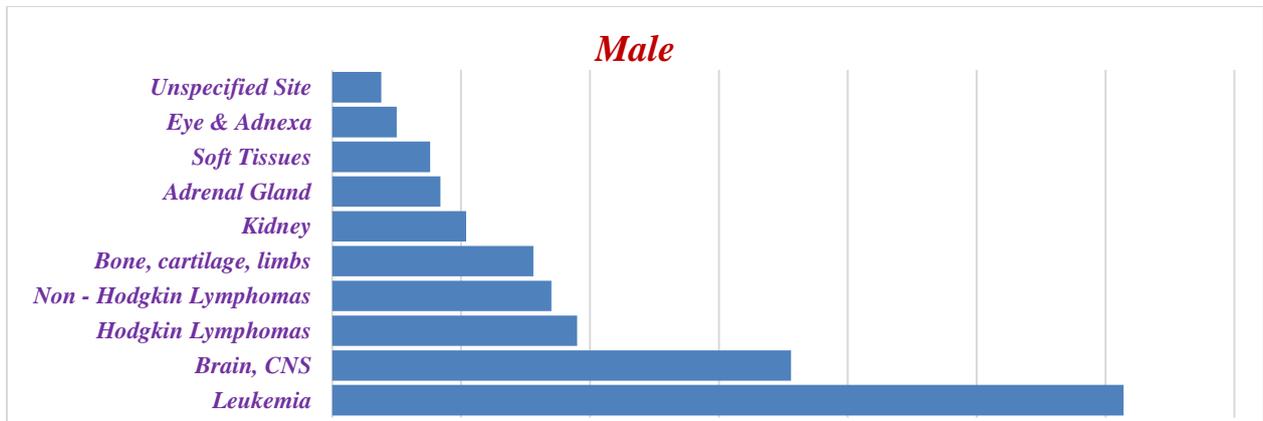


FIGURE 6. - Incidence of top ten children cancer aged (0 – 14) in male

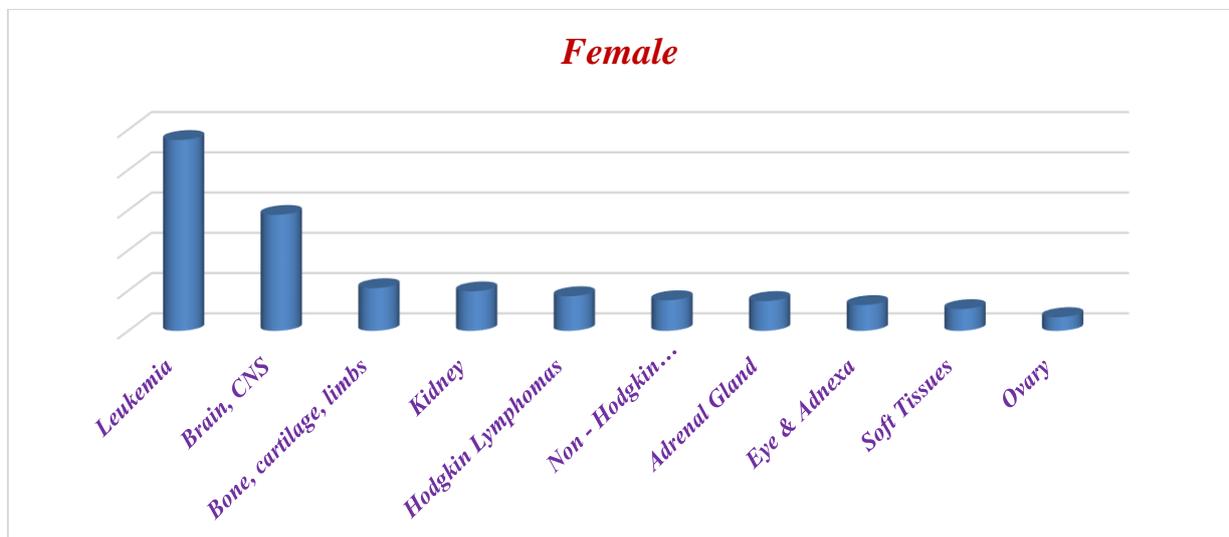


FIGURE 7. - Incidence of top ten children cancer aged (0 – 14) in female

Table 5. - Number of top ten Iraqi mortality cancer 2022

<i>Cancer Type</i>	<i>No.</i>	<i>%</i>	<i>Percentage of mortality among incidence</i>
<i>Bronchus & Lung</i>	1901	16.6	0.67
<i>Breast</i>	1349	11.8	0.16
<i>Brain, CNS</i>	951	8.3	0.45
<i>Leukemia</i>	808	7.1	0.44
<i>Colorectal</i>	802	7	0.28
<i>Pancreas</i>	686	6	0.90
<i>Liver</i>	590	5.2	0.73
<i>Stomach</i>	549	4.8	0.43
<i>Bladder</i>	518	4.5	0.29
<i>Non-Hodgkin Lymphoma</i>	410	3.6	0.30
<i>Total ten</i>	8564	0.75	0.33
<i>Total other sites</i>	2857	0.25	
<i>Total</i>	11421		

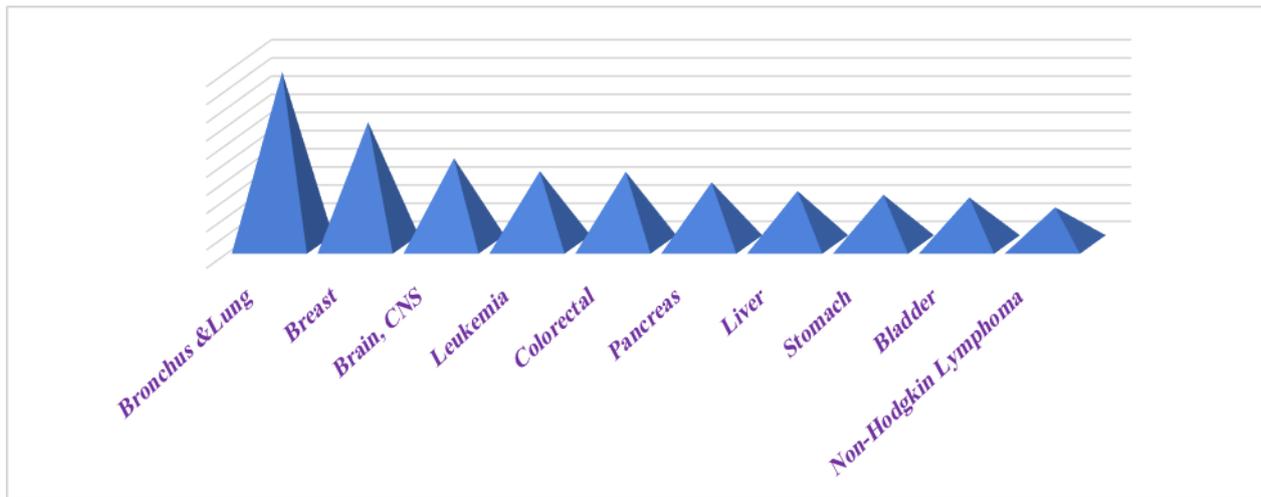


FIGURE 8. - Number of top ten Iraqi mortality cancer 2022

The highest percentage mortality for male was bronchus & lung (22.6%), followed by Brain, CNS (8.7%), the lowest was Non - Hodgkin Lymphomas (4.1%), the percentage of all top ten male mortality was (81.9%). For female the highest as usual was female breast (23.6), followed by the common cancer bronchus & lung (10.5%), the lowest was ovary (3.8), the percentage of all top ten female mortality was (77.6%), figures 9, 10.

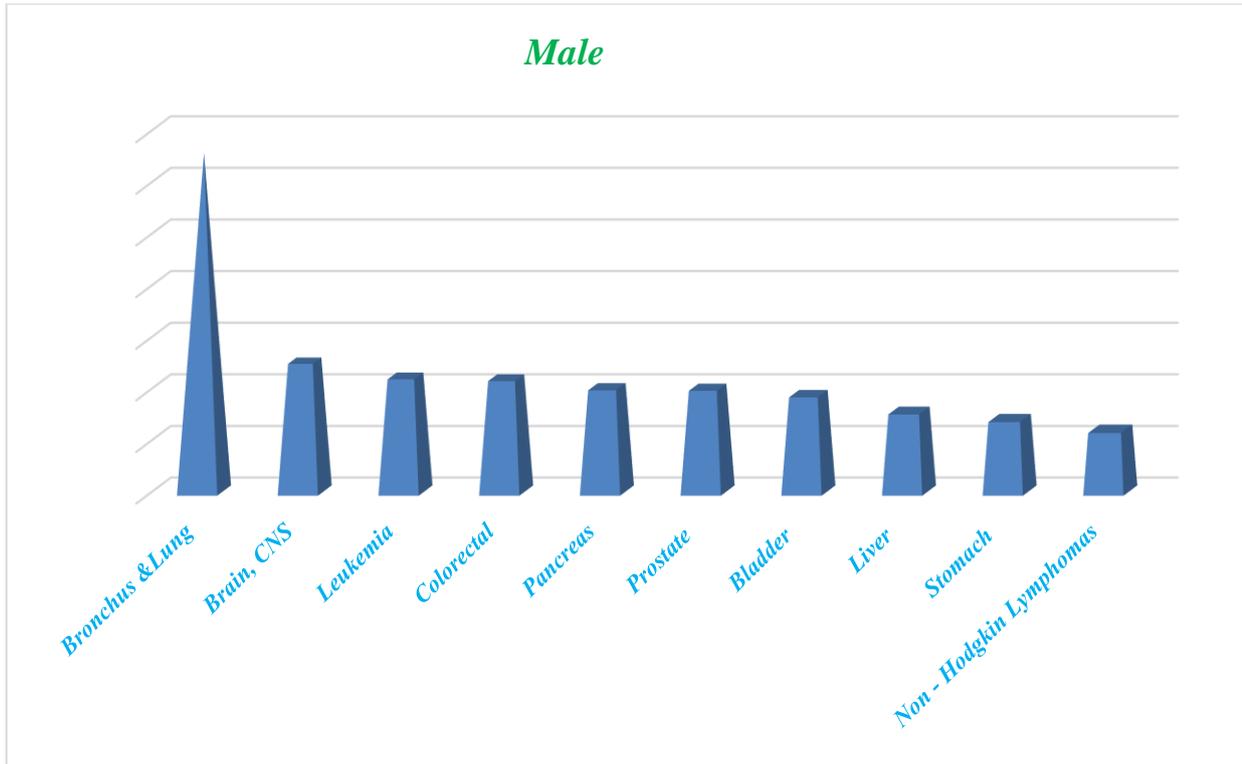


FIGURE 9. - Top ten mortality cancers in male

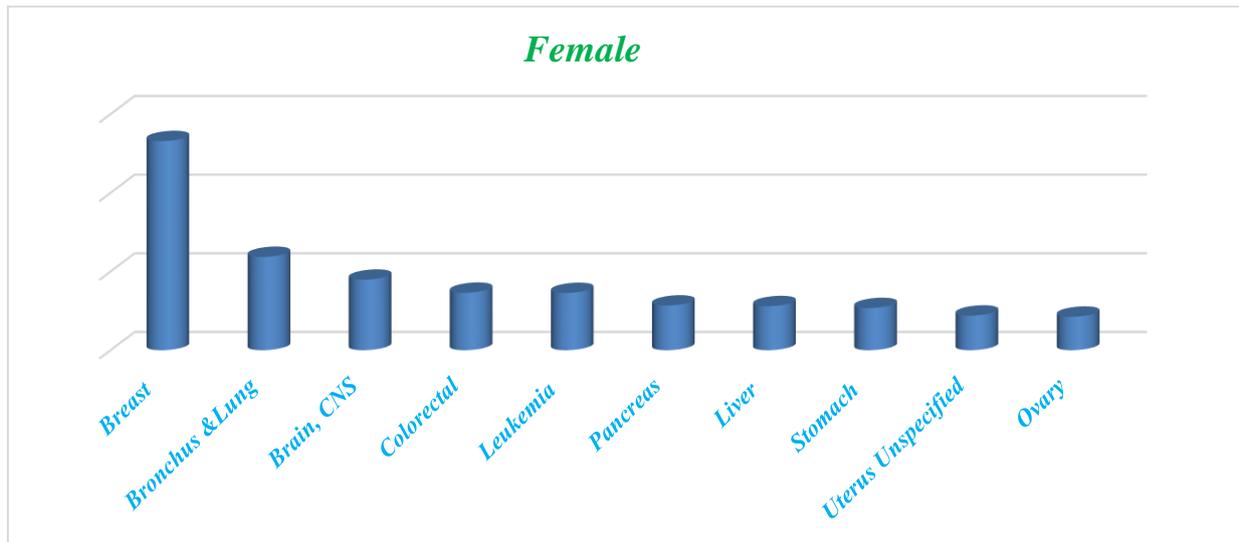


FIGURE 10. - Top ten mortality cancers in female

The highest children mortality was leukemia (40%), followed by brain, CNS (24.4%), the lowest was colorectal (1.5%), all ranked (95.3%), the highest percentage of mortality among incidence for male was bone, cartilage, limbs (61%), then brain (38%). For female mortality the highest was also leukemia and brain by (36.3 & 27.5 %), the highest percentage of mortality among incidence for male was brain (39%), then Non - Hodgkin Lymphomas (32%), fig 11, 12.



FIGURE 11. - Mortality of top ten children cancer aged (0 – 14) in male

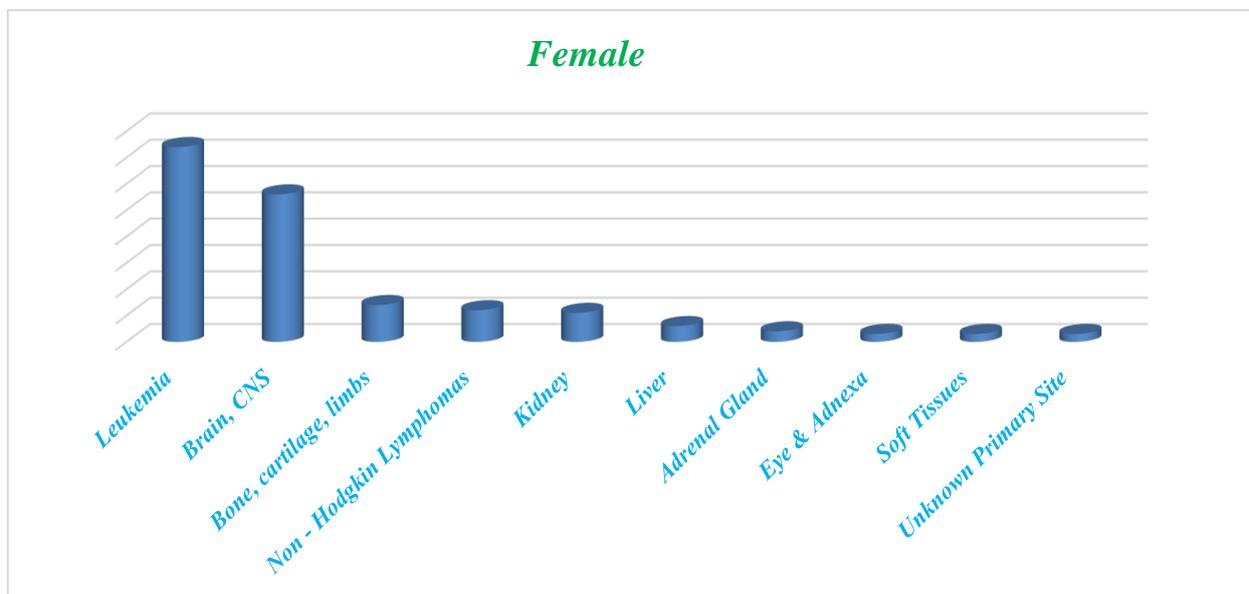


FIGURE 12. - Mortality of top ten children cancer aged (0 – 14) in female

Table 6. shows that the incidence of cancer in the governorates for women was higher than for men, as for deaths, they fluctuated from one governorate to another, the highest prevalence was in the capital Baghdad, followed by Sulaymaniyah, Basra, Ninawa, Erbil, and least of all in Muthanna governorate. The highest death rate was in ThiQar governorate, Diyala, Muthanna, Wasit, and Maysan, which are the southern governorates except Diyala, considered the east of the country, the lowest death rate was in Erbil governorate (0.2%), fig13

Table 6. - Governate incidence & mortality cancers by genders 2022

Governate	Male		Female		Total		Mortality percentage
	Incidence	Mortality	Incidence	Mortality	Incidence	Mortality	
Baghdad	3600	1533	5723	1583	9323	3114	0.33
Basrah	1377	544	1822	485	3199	1029	0.32
Nineveh	1179	519	1450	470	2629	989	0.37
ThiQar	694	355	868	385	1562	740	0.47
Diyala	669	351	953	352	1622	703	0.43
Najaf	888	360	1130	336	2018	696	0.34
Babil	762	321	1089	331	1851	652	0.35
Karbala	648	262	862	274	1510	536	0.35
Wasit	536	278	806	245	1342	523	0.38

<i>Misan</i>	421	217	567	195	988	412	0.41
<i>Salah Aldin</i>	485	206	776	190	1261	396	0.31
<i>Qadisiya</i>	537	199	753	177	1290	376	0.29
<i>Sulaymaniyah</i>	1324	205	1585	137	2909	342	0.11
<i>Muthana</i>	337	149	379	159	716	308	0.43
<i>Duhok</i>	545	137	677	95	1222	232	0.18
<i>Kirkuk</i>	432	89	701	106	1133	195	0.17
<i>Anbar</i>	502	65	847	92	1349	157	0.11
<i>Erbil</i>	1098	2	1367	3	2465	5	0.002
<i>Unknown</i>	253	5	426	11	679	26	0.03
Total	16287	5795	22781	5626	39068	11421	

The highest prevalence of cancer diseases according to the governorates of Iraq was breast cancer, followed by colorectal, lung, and the least is stomach cancer. Baghdad governorate had the highest number of cancer diseases, followed by Basra, Nineveh, Erbil, Sulaymaniyah, and Najaf, the lowest is Al-Muthana governorate, table 7.

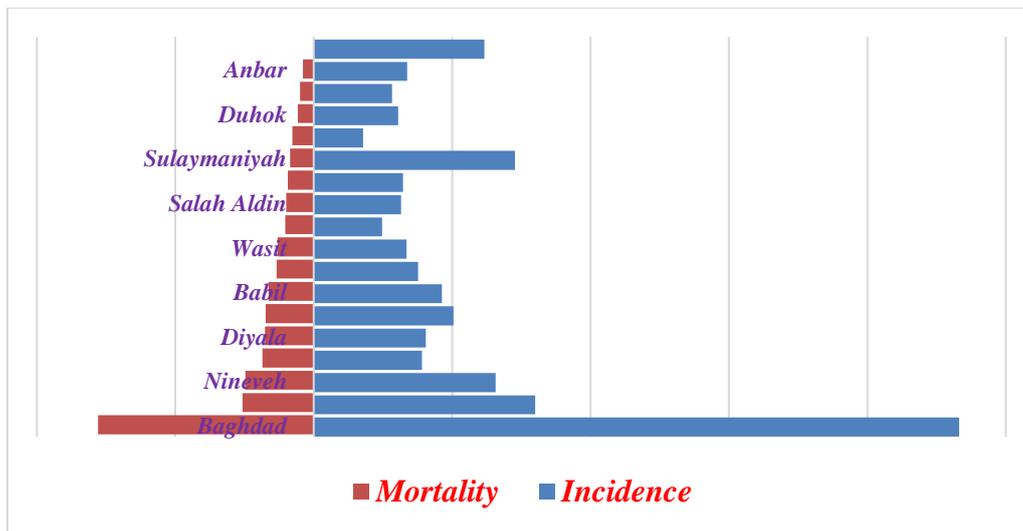


FIGURE 13. - Governate incidence & mortality cancers by genders 2022

Table 7. - highest top ten cancers in Iraqi governate

	Breast	Lun g	leukemia	Thyroid	Brain	Colorectal	Bladder	Pancreas	Non - Hodgkin	Stomach	Total
<i>Baghdad</i>	2251	577	323	597	570	755	397	266	279	-	6158
<i>Basrah</i>	668	165	173	116	157	234	156	-	139	-	2015
<i>Nineveh</i>	538	212	146	136	151	208	123	-	84	51	1649
<i>ThiQar</i>	268	169	97	74	111	85	103	66	56	-	1029
<i>Diyala</i>	323	128	69	98	103	136	-	58	50	76	1041
<i>Najaf</i>	380	154	140	132	115	108	108	84	74	-	1369
<i>Babil</i>	346	189	96	125	105	83	75	74	91	-	1184
<i>Karbala</i>	300	125	65	82	88	128	108	57	58	-	1011
<i>Wasit</i>	275	92	61	119	73	76	108	45	50	-	899
<i>Misan</i>	185	80	71	64	45	64	62	30	-	39	640
<i>Salah Aldin</i>	289	103	63	118	71	89	39	43	-	41	856
<i>Qadisiya</i>	231	124	74	83	70	83	87	39	74	36	901
<i>Sulaymaniyah</i>	525	208	121	117	167	242	121	113	113	106	1380
<i>Muthana</i>	101	88	48	37	42	31	38	-	28	-	413
<i>Duhok</i>	269	104	67	59	36	96	-	40	44	35	750
<i>Kirkuk</i>	232	77	40	41	114	45	44	55	-	40	789
<i>Anbar</i>	298	44	-	142	65	120	54	38	93	32	886
<i>Erbil</i>	570	191	176	117	-	180	-	122	69	72	1447

CONCLUSION

Lung cancers, leukemia, breast, brain are the most common types of cancer in Iraq and the most dangerous to human health, data analysis indicated that male were more susceptible to cancer than female for types common diseases as well as children. In governate the highest cancer was female breast, colorectal, lung, the lowest was stomach cancer, the highest governate cases were Baghdad, Basra, Nineveh, Arbil, Sulaymaniyah, and Najaf. Despite the difficult security, political and health conditions, the level of injuries and deaths has been limited and can be addressed by increasing the

attention of the state and increasing the number of Specialized Health Centers for cancer cases and early detection through continuous awareness, screening campaigns and health prevention measures.

Authors' Contribution Statement

AN and A SM did the conception, design, acquisition of data. W SA, A N and NMS conducted analysis. All authors took part in interpretation, drafting the A SM, revision and proofreading.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest

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