

## RESEARCH COMMUNICATION

# Cancer Incidence Rates in the Kurdistan Region/Iraq from 2007-2009

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### Abstract

Cancer is a disease of gradual increase in incidence overall the world. Kurdistan Region in Iraq has been exposed to several carcinogenic hazards. There are few reports about the increased risk of cancer in different cities in Iraq. These reports did not cover Kurdistan region. The aim of this paper was to study cancer incidence and to identify possible risks of cancer in this region. Cancer registries from 9 hospitals in three cities of Kurdistan were used as a source of data. Information on these cases was subjected to careful verification regarding repetition, place of residence and other possible errors. Overall registered cases in 2007, 2008 and 2009 were 1444, 2081, 2356 respectively. 49% of registered cases were males and 51% were female. The Age Standardized Rate of cancer was 89.83/100 000 among male and 83.93/100 000 among female. The results showed major variation in incidence rates of different types of cancer in the three governorates of Kurdistan. Furthermore, there was evidence of increased risks of cancer in Kurdistan Region in Iraq. Hematological malignancies were the most common cancer among male (21.13% of all cancer in males) and second most common in female (18.8% of all cancer in female), only exceeded by breast cancer. To reach sound conclusions about extent and determinants of cancer in Kurdistan, enormous multi-spectrum efforts are now needed.

**Keywords:** Cancer incidence - Kurdistan/Iraq - risk factors

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### Introduction

Cancer incidence is increasing all over the world (Curado et al., 2007). Despite new advances in cancer research, the etiology of many types of cancer is still unknown. Although there is no National Cancer Registry in whole Iraq including Kurdistan Region but still every Governorate registers new cancer cases depending on their limited local resources. Some independent report from different cities of Iraq had showed increase incidence of different types of cancer; Adil H. Al-Humadi showed increase in risk of colon cancer in Iraq from 25% to 50% during 30 year period (1965-1994) (Al-Humadi, 2009).

Omran S Habib et al, demonstrate overall increase in incidence cancer rate as compared to previously reported figures in Basrah. Additionally, this report showed high cancer incidence rate specially among female compared to neighboring country ASR of 123.4 and ASR of 114.3 for both male and female respectively (Omran S Habib et al., 2007).

Kurdistan Region as a part of Iraq country has been exposed to many environmental and epidemiological

changes that predispose to increase risk of cancer in this region. On one hand, there is shift toward the western-style of living and dietary habits, on the other hand the effects of chemical hazard of the Iraqi/Iranian War for 8 years (from 1980-1988) and use of Chemical weapons against Kurdish people from the Central Government for example Chemical Bombardment of Halabja City in Kurdistan on 1988 (Salih, 1995).

In Kurdistan, North of Iraq, no research has been undertaken to identify the incidence rate of cancer and to highlight the increase risk of malignancy in this region. Aim of this study is to have a 1st report about cancer incidence in Kurdistan Region and to identify increase risk of cancer in this region.

### Materials and Methods

Kurdistan Region is located in the north-west of Iraq at latitude of 36° 11' N and a longitude 44° 00' E. Kurdistan region is divided into three governorates Duhok, Erbil and Sulaimaniyah. The people living in Kurdistan Province are Kurds as well as Arabs, Assyrians, Chaldeans, Turkmen,

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and Armenians. The Region has a young and growing population, with 36% aged 0-14 years, and only 4% aged over 63. The median age in Kurdistan is just over 20, meaning more than 50% are less than 20 (UNDP, 2005).

Results reported here are based on all cases of cancer, which were diagnosed by histopathology, laboratory investigation including hematology and biochemical study and/or radiology. Data about cancer patients were collected from 3 teaching hospitals, 4 general hospitals and 2 specialized hospital for cancer patient management. Most of the hospitals have surgery units, but there are only 4 specialized centers for chemotherapy in Kurdistan. Before 2009 there was no radiotherapy in Kurdistan Region but now there 2 specialized centers for radiotherapy treatment in this area. Recorded data were summarized in a data sheet excel program and coded using ICD-O 3 (Fritz A and Sobin LH, 2000). Duplicate cases with the same name, age, sex and place of residence were deleted by manual and computerized linkage. Also recorded cases from other cities of Iraq were deleted.

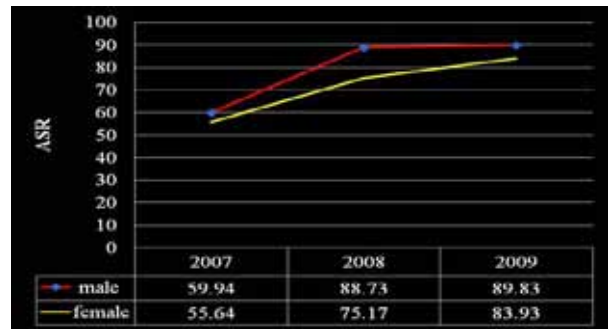
All these hospital are now cooperating with each other to start a national cancer registry in Kurdistan Province to improve cancer registration. Although results presented in this paper represent majority of cancer cases but still we believe that some cancer cases are diagnosed and treated outside Kurdistan Region. The total number of cases registered with all sources in 2007, 2008 and 2009 were 1444, 2081 and 2356 respectively.

Information related to population of Kurdistan Region was based on data available from Office for statistical analysis of Kurdistan region. Direct adjustment method was used for computing Age-standardized rate (ASR). World population has been used as standard one.

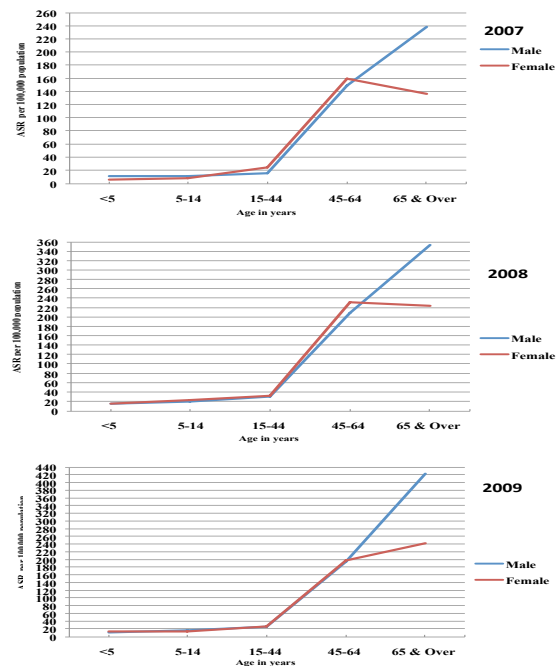
**Results**

Table 1 shows the distribution of new cancer cases reported in Kurdistan Region from 2007-2009 and classified according to the gender and the type of tumor. After deleting repeated cases and cases from outside Kurdistan, 2356 cancer cases had been registered in 2009. The ASR of cancers were 89.83 and 83.93 per 100 000 among male and female, respectively (Figure 1). The crude sex ratio of cancer (male to female) was 0.98; 51% of cases were female. The most common cancers amongst females were Breast 33.47% of all cancer in females (ICD-O C50), hematological malignancy 18.8% (ICD-O C42), Lymphomas 8.72% (ICD-OC77), colorectal 5.62% (ICD-O C18-C21) and skin cancer 4.61% (ICD-O C44). The most reported cancers in men were hematological malignancy 21.13% (ICD-O C42), lung 13.4% (ICD-O C33-C34), Lymphomas 12.46% (ICD-OC77), colorectal 7.3% (ICD-O C18-C21) and bladder 6.01% (ICD-O C67) (Table 1). Tobacco-related cancers of oral cavity, pharynx, larynx, esophagus, lung, urinary bladder and kidney, constituted 26.02% of the total male cancers, while in females they accounted for only 7.3% of the cases.

Figure 1 plot the ASR of all cancers for men and women from 2007-2009. The maximum ASR was seen in Duhok 96.1 per 100 000 for all registered cases compared to 64.8 per 100 000 in Sulaimaniyah (Table 3).



**Figure 1. Age Standardized Incidence Rate of Cancer Per 100,000 Populations in Female and Male in 2007-2009.**



**Figure 2. Age Standardized Incidence Rate of Cancer per 100,000 Populations in Female and Male in 2007,2008 and 2009.**

Figure 2 shows age and sex specific annual incidence rate of all cancers reported in Kurdistan for different age groups in male and female for year 2007, 2008 and 2009. The ASR of all cancer in male and female of Kurdistan were compared with those of neighboring country of 2008 in Table 4. The ASR of Kurdistan of male and female were similar to those of Saudi Arabia and Syria and were lower than those of Jordan and Turkey.

**Discussion**

There is a lack of research on cancer incidence in Iraq and especially in Kurdistan region. This is the first report about cancer incidence in Kurdistan Region/North of Iraq. Although this study does not provide the staging of tumors, it does give a clue about increase incidence of cancer in this region.

ASRs in the Middle East range from below 70 to 180/10<sup>5</sup> among male and from below 70 to 150/10<sup>5</sup> among females (WHO, 2008f). The ASRs reported in Kurdistan were close to what was reported in Syria in 2008 as ASRs in this country were 76.2/10<sup>5</sup> and 68.9/10<sup>5</sup> in males and females, respectively (WHO, 2008e). However, the most

**Table 1. Crude incidence rate per 100 000 population in Kurdistan according to primary site in 2007–2009**

Site	CD-O	2007						2008						2009					
		Male	%	CR	Female	%	CR	Male	%	CR	Female	%	CR	Male	%	CR	Female	%	CR
All sites	C00-80	710	100	34.9	734	100	36.3	1068	100	50.9	1013	100	48.6	1164	100	53.9	1192	100	55.5
Head and neck		9	1.26	0.44	5	0.68	0.24	14	1.31	0.67	8	0.79	0.38	11	0.94	0.5	9	0.75	0.5
Oral	C00-06	2	0.28	0.09				4	0.37	0.19	3	0.29	0.14	9	0.77	0.42	2	0.17	0.09
Pharynx	C09-13	4	0.56	0.19				7	0.65	0.33	2	0.2	0.09	2	0.17	0.09	3	0.25	0.14
Esophagus	C15	12	1.69	0.58	5	0.68	0.24	18	1.68	0.86	20	1.97	0.96	22	1.89	1.02	10	0.84	0.47
Stomach	C16	30	4.22	1.47	18	2.45	0.88	63	5.9	3	40	3.95	1.92	62	5.33	2.87	35	2.94	1.63
Colorectum	C18-21	33	4.6	1.62	43	5.86	2.12	95	8.89	4.53	73	7.21	3.5	85	7.3	3.93	67	5.62	3.12
Liver	C22	5	0.7	1.22				24	2.25	1.14	13	1.28	0.62	13	1.12	0.6	8	0.67	0.37
Gallbladder	C23-24	5	0.7	1.22	4	0.54	0.19	17	1.59	0.81	12	1.18	0.57	6	0.51	0.28	13	1.09	0.6
Pancreas	C25	17	2.39	0.83	7	0.95	0.34	14	1.31	0.67	12	1.18	0.57	17	1.46	0.79	13	1.09	0.6
Larynx	C32	10	1.4	0.49	6	0.82	0.29	25	2.34	1.19	9	0.89	0.43	30	2.58	1.4	5	0.42	0.23
Lung	C33-34	126	17.74	6.18	21	2.86	1.03	174	16.29	8.29	37	3.65	1.77	156	13.4	7.22	35	2.94	1.63
Bones etc	C40	15	2.11	0.73	4	0.54	0.24	20	1.87	0.95	20	1.97	0.96	13	1.12	0.6	7	0.59	0.33
Blood	C42	100	14.08	4.91	97	13.21	4.79	155	14.51	7.39	112	11.06	5.37	246	21.13	11.4	224	18.8	10.4
Skin	C44	52	7.32	2.55	24	3.27	1.18	48	4.49	2.28	37	3.65	1.77	51	4.38	2.36	55	4.61	2.56
Connective	C49	10	1.4	0.49	8	1.1	0.39	27	2.53	1.28	16	1.58	0.76	24	2.06	1.11	12	1.01	0.56
Breast	C50	10	1.4	0.49	308	41.96	15.21	12	1.12	0.57	325	32.08	15.6	13	1.12	0.6	399	33.5	18.6
Vulva	C51				2	0.27	0.09				1	0.1	0.04				2	0.17	0.09
Cervix uteri	C53				6	0.82	0.29				8	0.79	0.38				13	1.09	0.6
Corpus uteri	C54				24	3.27	1.18				34	3.36	1.63				44	3.69	2.05
Ovary	C56				38	5.18	1.87				36	3.55	1.7				44	3.69	2.05
Penis	C60	1	0.14	0.04				1	0.09	0.04									
Prostate	C61	62	8.73	3.04				62	5.8	2.91				56	4.81	2.59			
Testis	C62	20	2.81	0.98				13	1.21	0.62				31	2.66	1.43			
Kidney	C64-65	13	1.83	0.63	9	1.22	0.44	36	3.37	1.71	14	1.38	0.67	14	1.2	0.65	14	1.17	0.65
Bladder	C67	46	6.47	2.25	13	1.77	0.64	59	5.52	2.81	13	1.28	0.62	70	6.01	3.24	18	1.51	0.84
Brain	C70-72	31	4.36	1.52	21	2.86	1.03	35	3.28	1.66	26	2.57	1.24	42	3.61	1.94	15	1.26	0.7
Thyroid	C73	2	0.28	0.28	8	1.1	0.39	12	1.12	0.57	12	1.18	0.57	5	0.43	0.23	12	1.01	0.56
Endocrine	C74-75	2	0.28	0.28				3	0.28	0.14	3	0.29	0.14	3	0.26	0.14	3	0.25	0.14
Lymph node	C77	93	13.09	4.56	58	7.9	2.86	114	10.67	5.43	87	8.59	4.17	145	12.46	6.71	104	8.72	4.85
Unknown	C80	24	3.38	1.17	16	2.18	0.79	40	3.74	1.9	46	4.54	2.2	37	3.18	1.71	36	3.02	1.68

CR, Crude rate per 100,000; Blood, Haematology system; Brain, Brain and CNS

**Table 2. Annual Incidence Rates Per 100,000 population of cancers in three Government of Kurdistan in 2007-2009**

Government	2007				2008				2009			
	Population	Registered	IR	ASR	Population	Registered	IR	ASR	Population	Registered	IR	ASR
Duhok	947014	399	42.13	82	975424	571	58.54	115.8	1004687	502	50.0	96.1
Erbil	1481636	535	36.11	58.1	1526085	661	43.31	72	1571868	966	61.5	94.4
Sulaimaniyah	1628022	510	31.33	37.6	1676863	849	50.63	63.7	1727168	888	51.4	64.8

common malignancy in males was different in these two countries. While hematological malignancy represented the most common cancer amongst Kurdish males, lung cancers represented the most common cancers in males in Syria. The ASRs for cancer between 2006 and 2008 in Islamic Republic of Iran were 110.43-126.1/10<sup>5</sup> and 98.23 - 87.5/10<sup>5</sup> in males and females, respectively (WHO, 2008d, Mousavi et al., 2009). Amongst males, stomach and skin cancers were reported as the most common cancers, while breast cancer represented the most common cancer in females followed by skin and stomach cancers.

Kurdistan has the highest rate of hematological malignancy among countries of Asia including Iraq (WHO, 2008a). In Kurdistan, hematological malignancies are the most frequent cancer in males (21.13% of all cancer in males) and followed breast cancer in female population (18.8% of all cancer in female). In middle and south of Iraq, hematological malignancy come as 4th and 3rd common cancer in male and female with

a percentage of 10.6% and 5.11% respectively (Omran S Habib et al., 2007, WHO, 2008c). In Jordan, such malignancies represented the fifth common cancer among male and female with a percentage of 2.4% in male 5.3% in Female (Malkawi, 2010). Which factors contribute to high incidence rate of hematological malignancy in our population needs further epidemiological studies and is an important area of research for future studies. Breast cancer is the most common cancer in females with increasing crude incidence rate by 3.5 per 100,000 populations from 2007-2009 (table 1). Breast cancer incidence rate was higher among Iraqi female living in Kurdistan than that of Jordanian and Israeli Arab and was similar to Egyptians (Freedman LS, 2006). In this report we find a low incidence rate of cervical cancer (0.6/10<sup>5</sup>). This cancer is associated with sexual and reproductive factors and oncogenes subtypes of human papillomavirus; this is a pattern observed in Muslim countries (Mousavi et al., 2009, WHO, 2008b). We observed a low proportion of

**Table 3. Age- Standardized Incidence Rates of Cancer in Kurdistan and Neighbouring Countries in 2008**

Country	Males	Females
Kurdistan	88.73	75.17
Iraq	116.2	100.1
Syria	76.2	68.9
Jordan	124.4	122
Saudi Arabia	87.7	92.2
Turkey	182.3	112.8
Iran	126.1	87.5
Kuwait	101.9	148.5

cancer of unknown primary origin in our data this may be due to the widely available diagnostic facilities in Kurdistan or sensitivity on the part of clinician to establish an accurate diagnosis.

Variation in incidence rate in three cities of Kurdistan has been observed. Such a variation could be due to the difference of exposure to risk factor from lifestyle, difference in types of food, exposure to chemical weapons at war time and accuracy of registration at registration center in three Governorates.

The authors are aware of the limitations of the data used in this paper. Acknowledging such limitations does not nullify the data used. The use of these cases to measure some epidemiological parameters are valid and does not distract from reality. If errors exist, they are toward under-estimation of the cancer incidence rate in this region. We are expecting the incidence to be higher because many patients have financial means to seek private care outside Kurdistan and never registered. The proportion of non-registered cases is unknown and is thought to be 15-20%. This is an area that needs further research and investigation.

In conclusion, the present paper provided evidences for the increase in cancer rates in Kurdistan region in Iraq. Development, establishment and implement of National Cancer Registration program should be the first priority for health policy makers; or else, now and future risk of increase cancer incidence rate, and the health system could not response the demands regarding diagnosis, treatment and palliation. The high increase of incidence rate of breast cancer from 2007-2009 should stimulate us to highly recommend a national screening program to ensure early detection of breast cancer patients. Finally, hematological malignancy represented the most common cancer amongst Kurdish males and further studies are needed to clearly identify the risk factors of high hematological malignancy in Kurdistan.

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