

Study The Spread of Cancerous Diseases Throughout Iraq Using Geographic Information Systems (GIS)

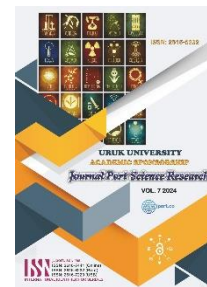
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Abstract GIS science is considered one of the modern sciences that intertwine with various disciplines and scientific branches in order to solve or present a specific problem. Understanding the wider picture of public health has been greatly aided by the development of Medical GIS. In this paper, the spatial analysis of GIS was used to prepare maps for the distribution of the number of cancer cases in some central and southern governorates of Iraq for several years. It was clearly noted that most of the injuries are in southern Iraq. In this paper was used the Arc-GIS software V. 10.3 and data collected by the ministry of health department of statistics were used.



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Keywords: GIS science, spatial analysis, cancer cases, Iraq governorates.

1. INTRODUCTION

To describe it simply, cancer is a deadly disease caused by unchecked cell growth. The ensuing proliferating cells can infiltrate neighboring tissues either directly by migrating to them or indirectly by traveling through the bloodstream. [1]. There are about 200 different kinds of cancer, each of which is named after the organ, tissue, or cell from whence it first manifested. [2]. The prevalence or incidence rate of cancer changes over time and among populations depending on the diversity and concentration of risk factors. WHO said that in 2012 there were around 14 million new instances of cancer identified, resulting in 8.2 million deaths, with developed regions accounting for 55 percent of these fatalities [3], as of 2012, 13.7 million Americans were estimated to have survived cancer after receiving treatment.[4]

There were more cases of cancer in the Arab countries than there were people in those countries in 2013, with 14.9 million new diagnoses and 8.2 million fatalities [5]. These countries have a combined population that spread out across roughly 14 million km² of land

2. TOP TEN TYPES OF CANCER IN IRAQ

Cancer is a major public health problem worldwide [7]. In 2007 cancer were the third leading cause of deaths in Iraq and the 7th leading cause of morbidity [8]. The cancer incidence rate in Iraq is largely unknown. In order to build control

programs for the common cancers that may be susceptible to prevention, early identification, and cure, we need full knowledge about cancer forms in Iraq which are 1-breast cancer , 2-colorectal, 3-brunchus & lung, 4-leukemia, 5-brain & other , 6-non-hodgkin lymphoma, 7-urinary bladder, 8-stomach, 9-thyroid 10-skin. exceeding 330 million as estimated at 2008 [8].

3. INTERPOLATION METHODS

Interpolation techniques are used to predict values of an interested variable at locations outside the sampling frame based on values measured at a subset of points within the study area [9].

We can classify these techniques as either deterministic or geostatistical Deterministic interpolation methods resolve mathematical functions that can be used to determine values at unidentified locations based on the similarity degree (e.g., IDW) or the of smoothing degree (e.g., RBF) between those locations and neighboring points. Mathematical and statistical functions based on spatial autocorrelation between points are used to make predictions about the values of unnamed places and to provide probabilistic estimates of the quality of the interpolation [10].

4. INVERSE DISTANCE WEIGHTED (IDW)

This procedure is categorized as a local deterministic interpolation method that guarantees precision [10]. According to IDW, the value at the ensample location is an average of the values at the sampled locations in a

predetermined neighborhood surrounding the ensample place. [12]. To put it another way, IDW assumes that the anticipated value will be affected more by points located closer to the prediction sites than by points located further away: [13].

Table1. Iraq's population and cancer cases data in 2012

State	Population	Cancer cases	Density percentage %
al-basrah	2601790	1638	6.295665676
al-muthana	735905	343	4.660927701
al-qadisyah	1162485	686	5.901151413
dhi-qar	1883160	735	3.903014083
maysan	997410	519	5.203477005

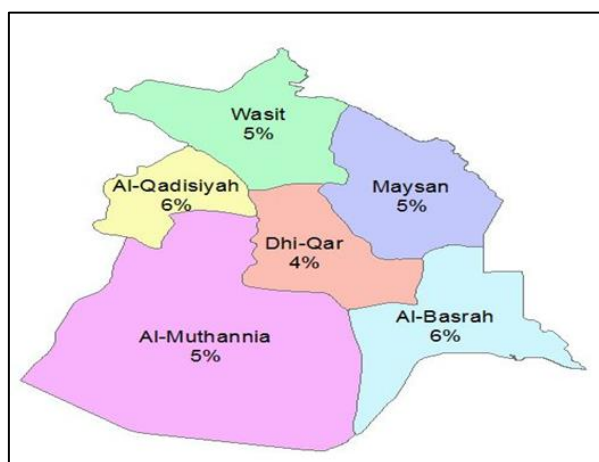


Figure1. Iraq population and cancer cases in 2012

Table2. Iraq's population and cancer cases data in 2013

State	Population	Cancer cases	Density percentage %
al-basrah	2672425	1610	6.024490865
al-muthana	753024	437	5.803267891
al-qadisyah	1191106	722	6.061593175
dhi-qar	1930835	1193	6.178673993
Maysan	1023690	590	5.763463549
Wasit	1271706	767	6.031268233



Figure2. Iraq population and cancer cases in 2013

Table 3. cases data of Iraq's population and cancer in 2014

State	Population	Cancer cases	Density percentage %
al-basrah	2744758	1965	7.159101094
al-muthana	770476	468	6.074167138
al-qadisyah	1220333	766	6.276975219
dhi-qar	1979561	1294	6.536802857
Maysan	1050580	623	5.930057682
Wasit	1303137	827	6.346224534

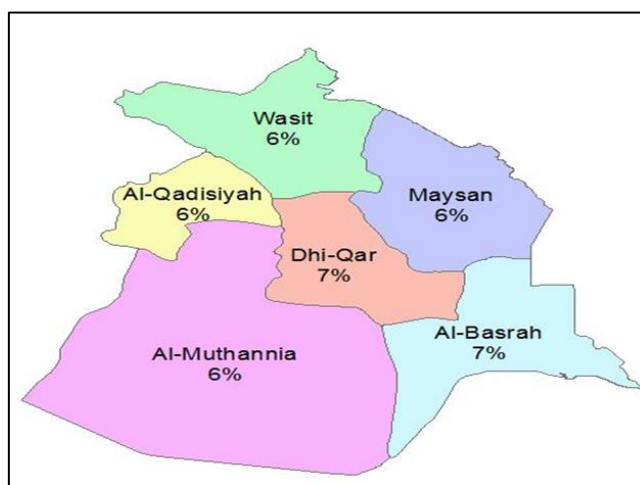


Figure3. Iraq population and cancer cases in 2014

Table (4): Iraq population and cancer cases data in 2015

State	Population	Cancer cases	Density percentage %
al-basrah	2,818,804	1,969	6.985232035
al-muthana	788,262	379	4.808046056
al-qadisyah	1,250,166	721	5.767234111
dhi-qar	2,029,345	1,216	5.992081189
maysan	1,078,086	605	5.611797204
wasit	1,335,230	784	5.871647581

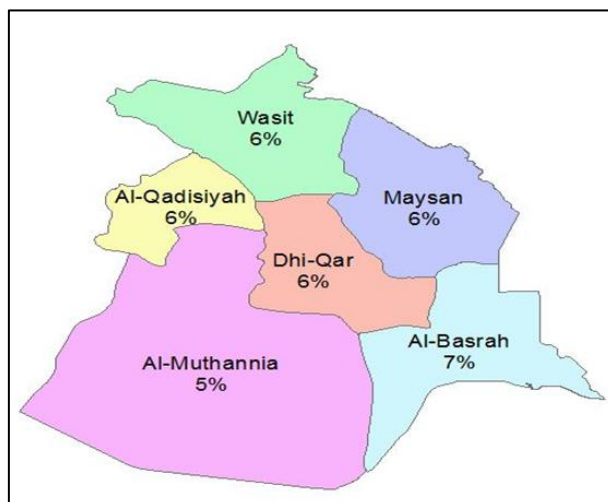


Figure4. Iraq population and cancer cases in 2015

Table 5. Iraq's population and cancer cases data in 2016

State	Population	Cancer cases	Density percentage %
al-basrah	2,894,591	2132	7.365461994
al-muthana	806,368	462	5.729394024
al-qadisyah	1,280,622	933	7.285522192
dhi-qar	2,080,188	1414	6.797462537
Maysan	1,106,212	662	5.984386356
Wasit	1,367,993	852	6.228102044

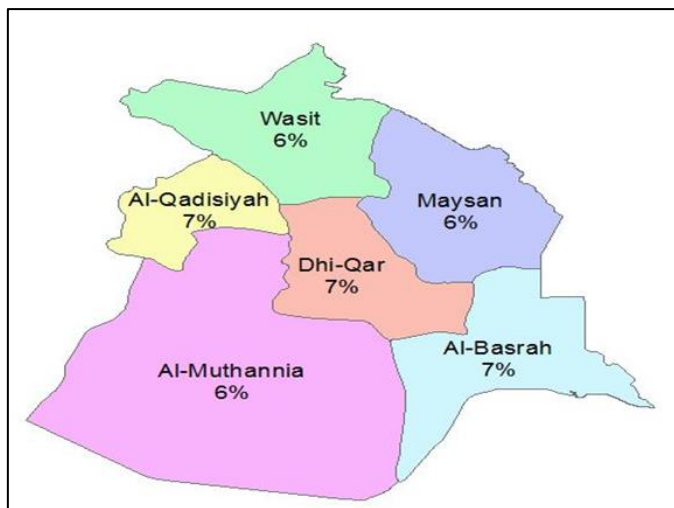


Figure5. Iraq population and cancer cases data in 2016

5. DISCUSSION

In this research, the distribution and prevalence of cancerous diseases were studied in the southern regions of Iraq, which are (Wasit, Qadisiyah, Basra, Muthanna, Maysan and Dhi Qar) for several years 2012. In Figure (1) it was noted that the two governorates (Basra and Qadisiyah) have the largest percentage of the disease. And in figure (2) for the year 2013, it was shown that all the above governorates have equal rates of infection. And in figure (3) for the year 2014, it was shown that the governorates of (Basra and Dhi Qar) had the largest percentage of diseases. And in figure (4) for the year 2015, it was shown that the province of basra is The highest percentage of diseases. Figure (5) for the year 2016 shows that (Basra, Dhi Qar, Al-Qadisiyah) have the largest percentage. We note that the province of Basra is the province most affected by cancerous diseases.

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6. CONCLUSION

In the research, the distribution of the population to the number of injuries was taken for several years. It was noted that the higher the population, the higher the incidence of diseases, and this is due to several factors, including:

1. Remnants of war. Some areas were military bases. As well as some provinces were bombed with depleted uranium, which has a negative impact on health.
2. *Lack of health awareness and the absence of health control, and it was found that most of the infections were with leukemia because it is one of the diseases transmitted by contaminated tools. Therefore, the solutions start first from good health control and increasing health awareness.

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