Using GIS for mapping the Cancer incidence, distribution in Babylon governorate middle of Iraq

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Abstract:
The purpose of this paper is to use geographic information systems (GIS) mapped the distribution of cancer cases in the Babylon governorate The Cases were examined with the data, including the patient's sex, age, address, The addresses of confirmed cancer cases recorded from 2009 to 2013. It was found Babylon governorate have shown that there are high rates of cancer in each of the town Mahaweel and Alkifil between 2009-2013.
Keywords: - geographic information system - risk factor

Introduction

Cancer is a major health problem in many countries. It has been estimated that there are approximately 24.6 million people living with cancer worldwide in 2002. In the same year, 10.9 million new cancer cases were reported, and the incidence is estimated to continue to increase by approximately 50% by the year 2020 [1]. Cancer has become a major public health problem in Iraq and continue the burden to grow while our population grows still without adopting a healthy life, which may help prevent many of the non-communicable diseases such as cancer patterns Date Iraqis Cancer was founded in 1976. And has been registered total 25 0.000 malignant states from 1995 to 1997, giving an average annual number of cases between 8000 and 9000 remained almost the same number of cases recorded in 1998 (9052) and 1999 (8939), but rose to 10,888 in 2000 because of cancer registration is incomplete, it is difficult that this increase is due to a rise in the rate of infection because it can be the result of improved registration [2].

Geographic information system and health:
Therefore, in order to incorporate spatial components into the existing tabular data maintained by the National Cancer Registry or other organizations, a global positioning system (GPS) can be used to record the geographic

location of patients based on their addresses [3]. This data can then be mapped using GIS software to visualize the distribution, evaluate the pattern of cases and identify possible clusters. Such an approach allows for the generation of maps that show the incidence in different areas and for the ability to communicate the information more effectively [4].

Study area

Babylon governorate location inside Iraq Coordinates: is situated between longitudes 44° 00' - 45° 00' E and latitudes 32° 00' - 33° 15' N. Hilla city is a central. It is the capital of Babylon province and is located near the ancient cities of Babylon, one the Hilla branch of the Euphrates river, 100 km south of Baghdad It is situated in a predominantly agricultural region which is extensively irrigated with water provided by the Hilla river [5]. The Babylon governorate with its total number of 16 twon   into four administrative districts, namely Hilla, Mussayab, Mahaweel and Hashmya. The population of the 1,078,446 people.[6]. see Figure (4)
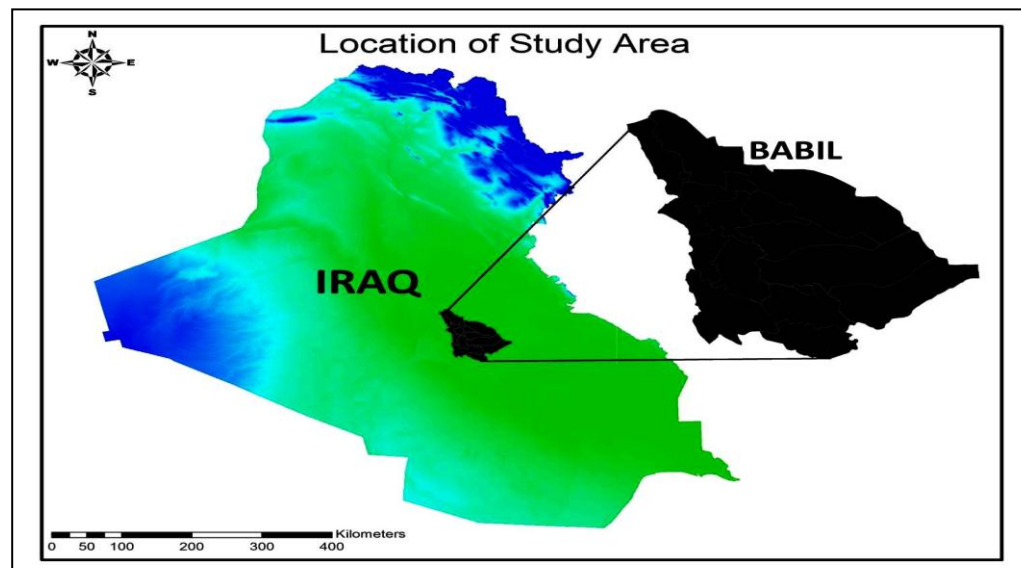

Figure (1) study area

Aim of Study

- Determining the geographical distribution of disease.
- Analysing spatial and temporal trends.
- Mapping of population at risk and stratify risk factors
- Monitoring disease and intervention over time.

Methodology:

In this study, a GIS-based decision support system is constituted to record residences of people diagnosed with cancer together with their geographical locations, to reveal the relationship of these cancer diseases to geographical locations, to keep these diseases under control, and to support taking necessary measures for the risks of disease. This data were acquired from the Tumor Treatment Center in Morgan Medical City in the Babylon governorate. Five years in a row were studied and analyzed (2009, 2010, 2011, 2012, and 2013). They are various formats that may used. Iraqi cancer registry uses standards provided by the International Agency for Research on Cancer (IARC). Which include: Patients' details: first name, father's name, family name, mother's name, sex, age/date of birth, nationality, address, address detail &occupation. Population data for each administrative Unit was collected from the Structural plan of the province of Babylon Report 2010 After matching the address related to each cancer case with the administrative unit data set, the location of cancer cases can be shown on the map that is produced. Cases were examined with the data, including the patient's sex, age, address, The addresses of confirmed cancer cases recorded

from 2009 to 2013 were provided in Microsoft EXCEL format as shown in table (fig 2). ArcGIS 9.2 was used to combine the data and achieve spatial analysis.
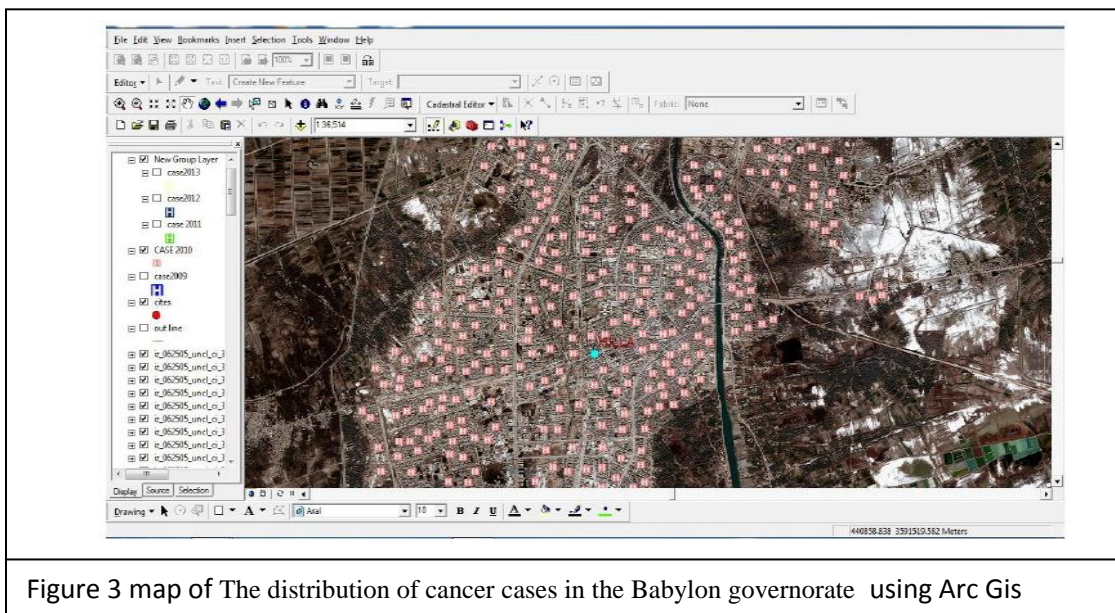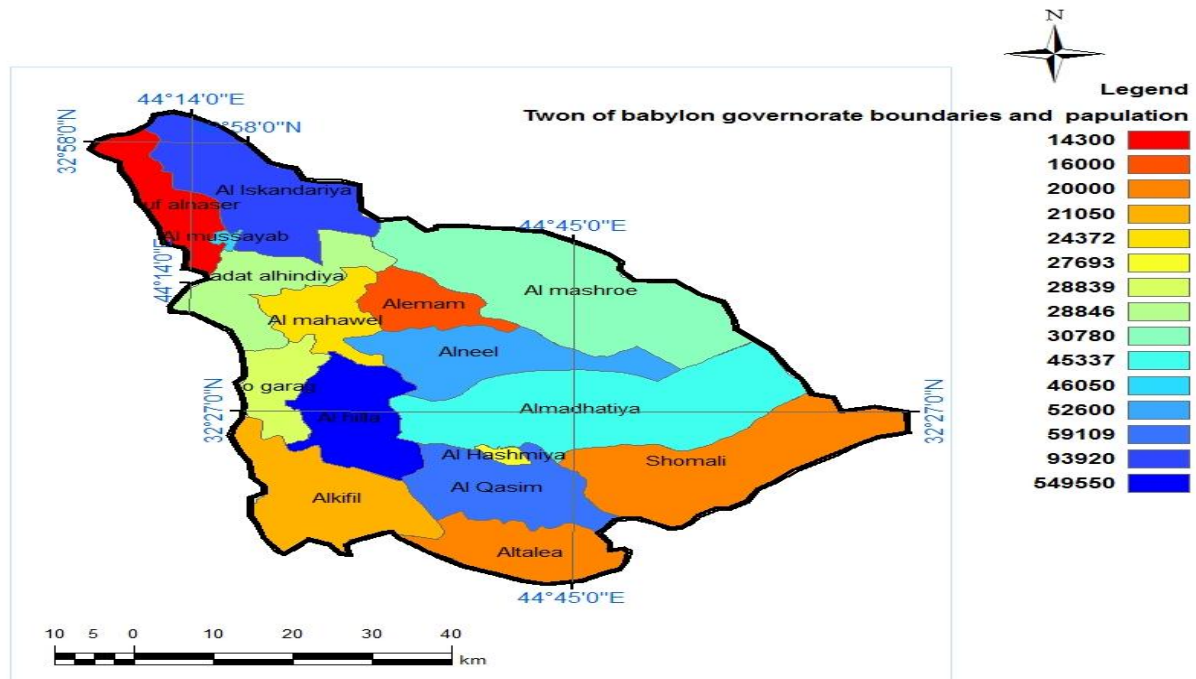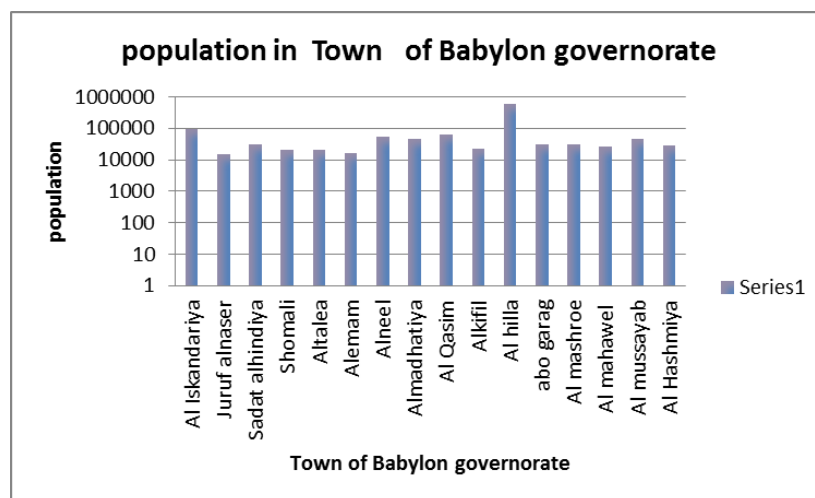

Figure 3 data excel for cases

Figure 3 map of The distribution of cancer cases in the Babylon governorate using Arc Gis

Figure(4) Town boundaries

Figure(5)   population in Town of Babylon governorate

Using of GIS

A GIS can be used to answer basic locational questions such as: What is located at a given point on the earth; or where is a specific feature located, For example, using a mouse-driven cursor, a specific point on a map can be queried to determine its land use, vegetation, soil type, elevation, and land ownership characteristics. In health use GIS to determine the case of disease and location of this case and show the statistical interpretation of the data in Babylon province.

 Result and discussion :

We will study results in the form of a score.

A:There were (916) cases of cancer in both genders accounting for 84.93% of all newly diagnosed cancer cases per 100,000 population in 2009 of them (496) cases were among females and (449) cases among males. The highest incidence rate population. was found in the age (56) years figure(6a,7a).

B:There were (1003) cases of cancer in both genders accounting for 93.% of all newly diagnosed cancer cases per 100,000 population in 2010. Of them (511) cases were among females and (492) cases among males. The highest incidence rate population. was found in the age (57) years figure(6b,7b).

C:There were (1098) cases of cancer in both genders accounting for 101.% of all newly diagnosed cancer cases per 100,000 population in 2011. Of them (556) cases were among females and (542) cases among males. The highest incidence rate population. was found in the age (61) years figure(6c,7c).

D:There were (1078) cases of cancer in both genders accounting for 100.7.% of all newly diagnosed cancer cases per 100,000 population in 2012. Of them (566) cases were among females and (521) cases among males. The highest incidence rate population. was found in the age (62) years figure(6d,7d).

E:There were (672) cases of cancer in both genders accounting for 62.3.% of all newly diagnosed cancer cases per 100,000 population in 2013. Of them (293) cases were among females and (379) cases among males. The highest incidence rate population was found in the age (59) years figure(6e,7e).

Statistical Analysis:

  Incidence means the frequency with which a disease appears in a particular population or area. A cancer incidence rate is the number of new cancers of a specific site/type occurring in a specified population over a year, usually expressed as the number of cancers per 100,000 people at risk. The incidence rate for each administrative unit was calculated with Equation below:

Incidence rate = (New Cancer Cases / Population) × 100,000
According to the WHO, the number of cancer cases is estimated to be between a minimum 150.

and maximum 300 for a population of 100,000 in developing countries therefore, administrative units with a cancer incidence rate of more than 300 are considered to have a high cancer density level. The towns Mahaweel and Alkifil two of the towns with higher cancer incidence rates is rank in the first and second place in 2009,2010,2011,2012 and 2013 so the two towns that higher cancer density level according [6] see figure(8).
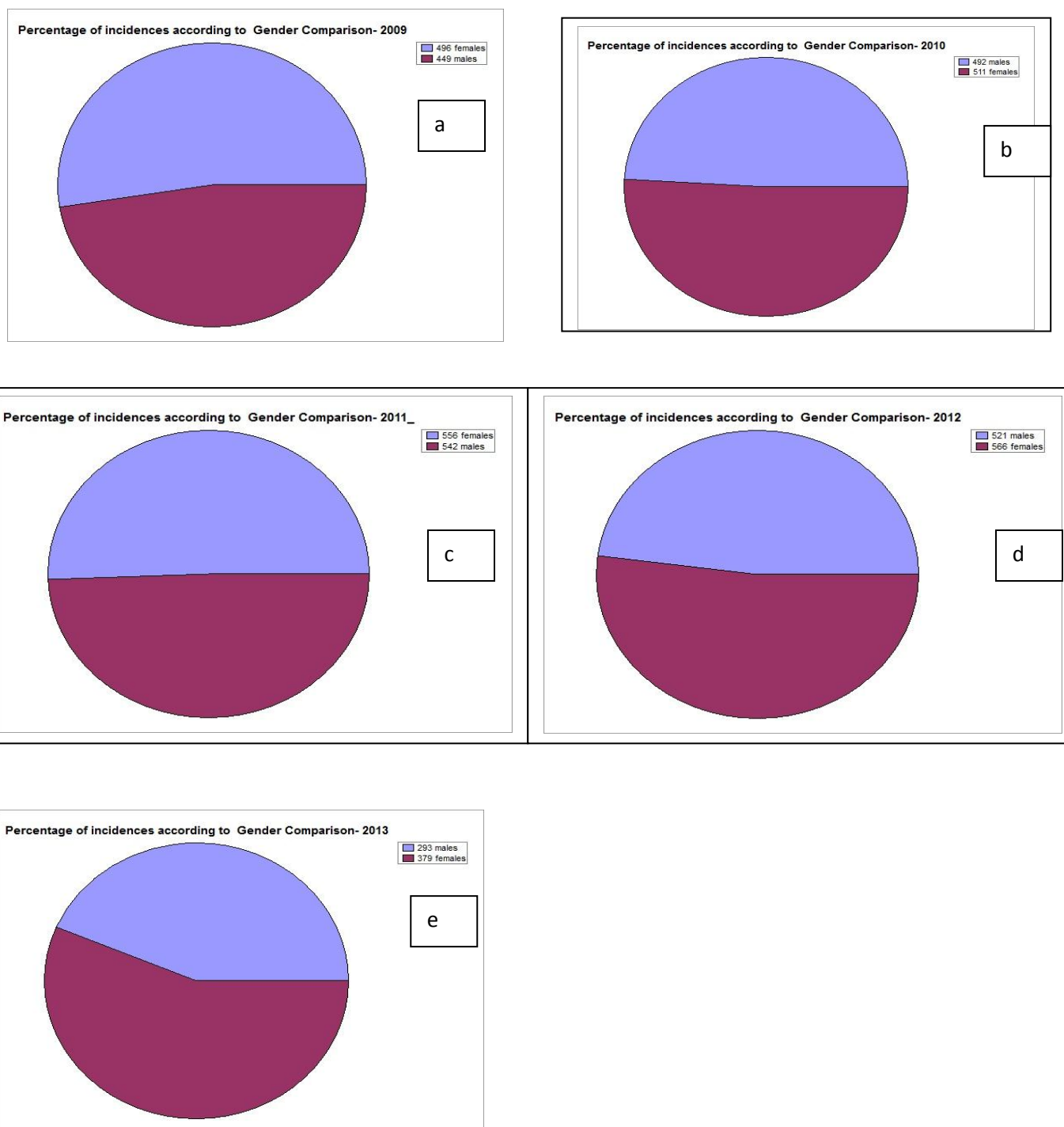
Figure (6) male and female cancer incidence rate in the town of Babylon governorate between 2009 and 2013
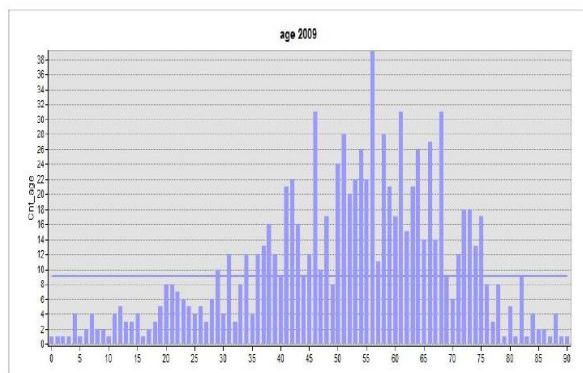
a

Figure 10 Relationship between cancer counts and ages census in Babylon cities, 2009
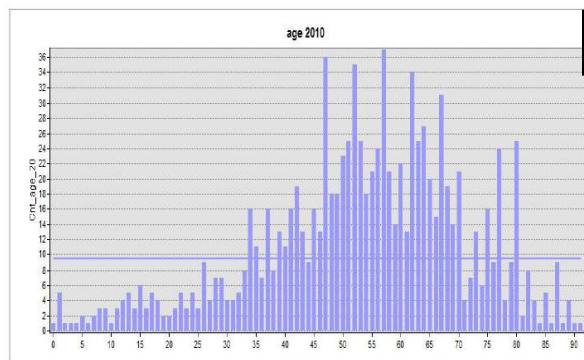
b

Figure 14 Relationship between cancer counts and ages census in Babylon cities, 2010
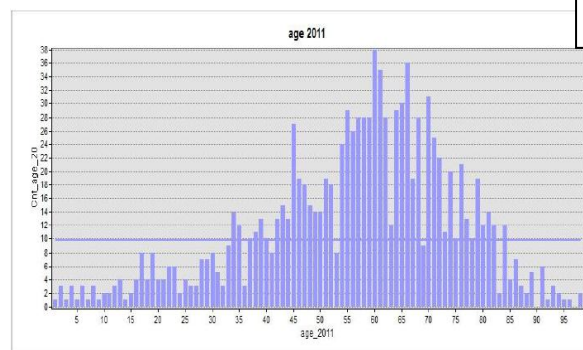
c

Figure 18 Relationship between cancer counts and ages census in Babylon cities, 2011
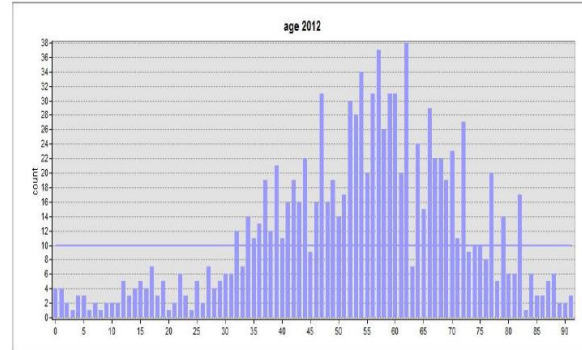
d

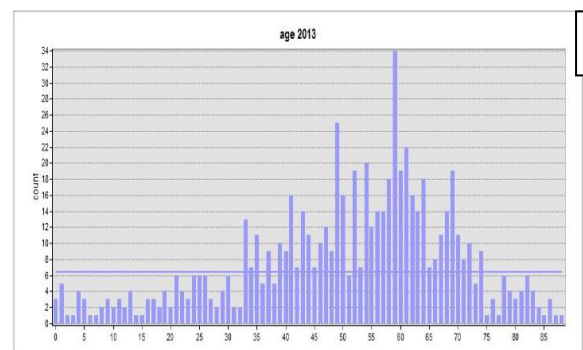Figure 22 Relationship between cancer counts and ages census in Babylon cities, 2012
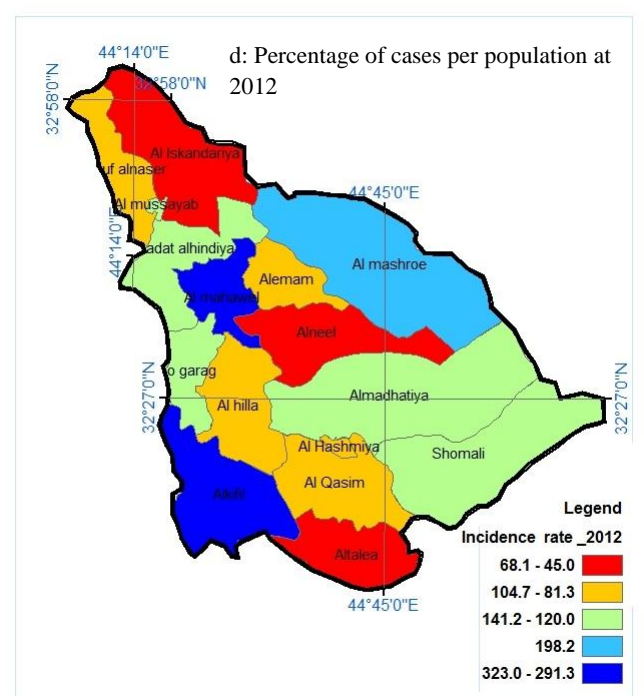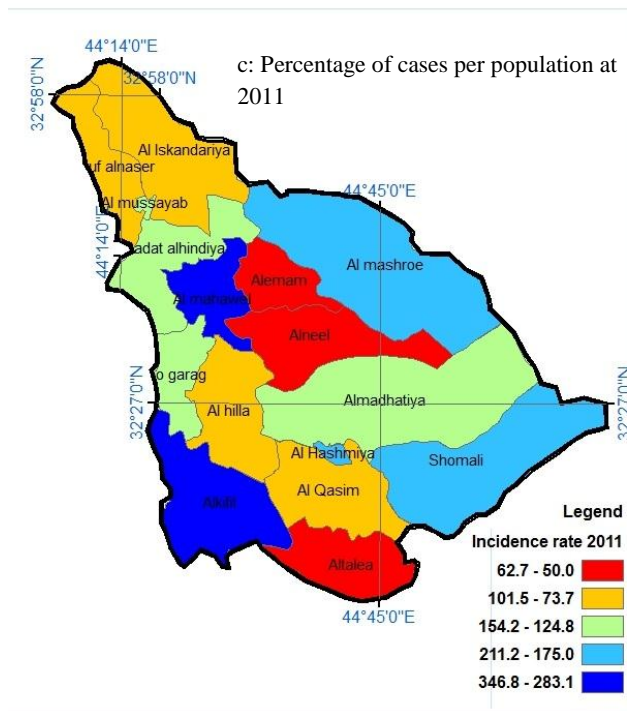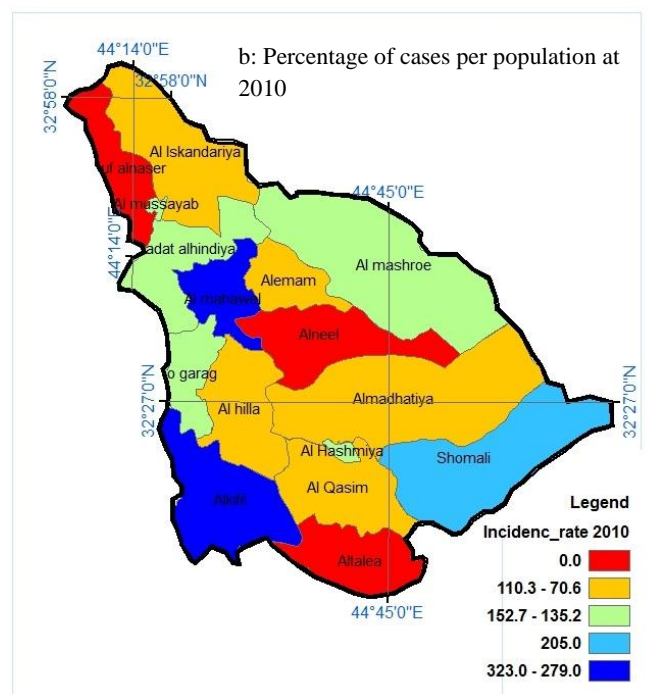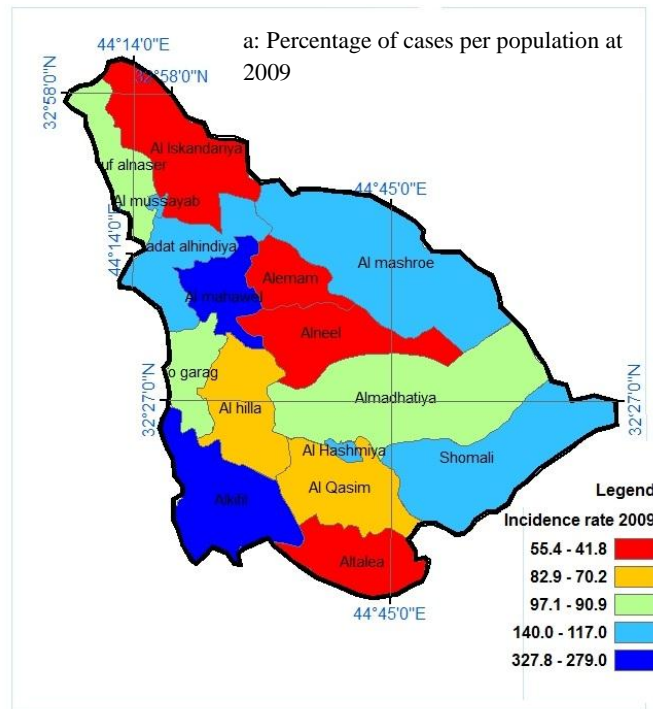
e

Figure 26 Relationship between cancer counts and ages census in Babylon cities, 2013

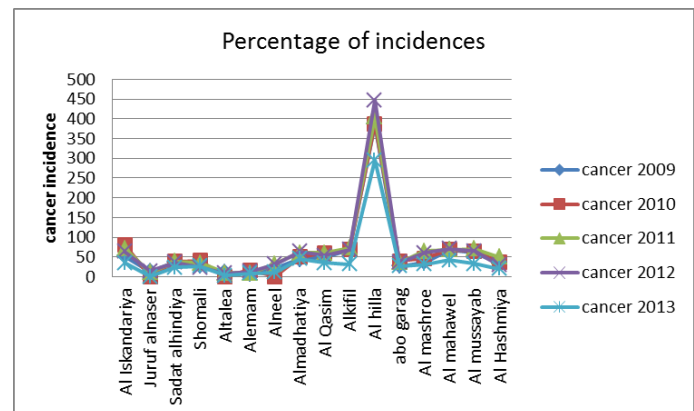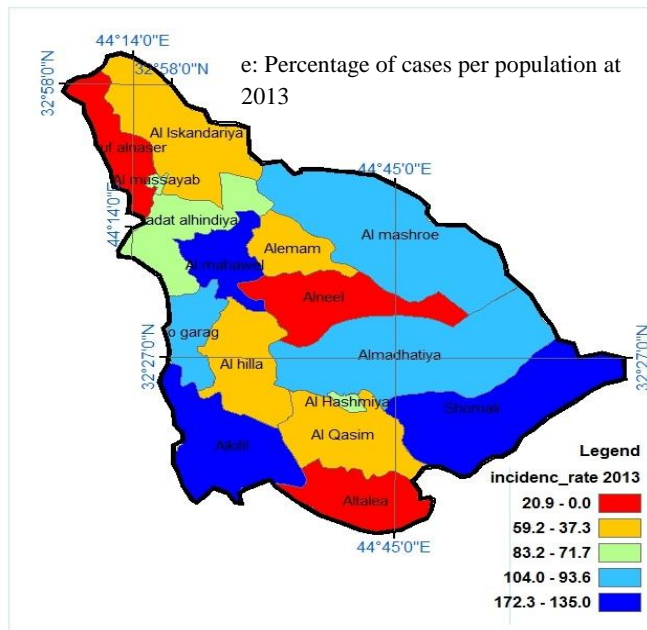Figure (7) Relationship between cancer counts and ages in Babylon governorate between 2009 and 2013.

a: Percentage of cases per population at 2009

b: Percentage of cases per population at 2010

c: Percentage of cases per population at 2011

d: Percentage of cases per population at 2012

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Figure (8) Pattern of cancer incidence rate cases in Babylon governorate town

Figure (9) Cancer incident rate of Babylon governorate town

Conclusion

Data contained in this research provides for those interested in this area and those in charge of the health sector with information on the epidemiology of cancer in the province of Babylon , and distributed through the sites and give the count sex groups and age is also working to help researchers and cancer experts , and decision makers in determining the status of plans to combat cancer , and priorities , and strategies, programs and national early detection of cancer and would also be useful when planning for the diagnosis and treatment services . The objectives of this research shed light on the possibility of the use of GIS in public health applications. This study showed that although the incidence of cancer in comparison to the population is within normal but depth statistical study and the number of injuries to all towns in Babylon governorate have shown that there are high rates of cancer in each of the town Mahaweel and Alkifil between 2009-2013.

Acknowledgements

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