

*Full Length Research Paper*

# A study of the relationships between ecological factors, endemic diseases and the condition of villagers living in rural area in Baghdad city, Iraq

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Some factors that possibly affect tropical disease distribution was investigated in about 500 randomize human dwellings. The studied factors include wild animals, domestic animals, wild plants, cultivated plants, nature of soil, nature of water, positions of human dwellings, nature of building material and position of animal shelters. The diseases that studied were malaria, Kala-azar (visceral leishmaniasis), cholera, Bilharzias (urinary schistosomiasis), diarrhea, typhoid fever, hydatid cysts, dysentery, jaundice and tuberculosis (TB). The study was conducted in the ruler area near Baghdad city in Taji, Abou-Greeb, Rhadwaniya, Rasheed, Youssifiya, Latifiya, Mahmmodiya, Madaien and Nahrwann districts. It appears that the studied factors have direct and indirect effects on distribution of the diseases.

**Key words:** Position, human dwellings, animal shelters, Baghdad.

## INTRODUCTION

The top-geographical feature of Iraq is very different from the north to the south. The main fertile alluvial plain is the central region with elevation of about 30 to 360 m (above sea level). The northeast region is mountain, the west and southwest regions are deserts and the southern region is a marshy area (WHO, 2003).

Iraqi fauna is influenced by five geographical regions (Palearctic, Mediterranean, Central Asia, Eastern and Ethiopian) due to the geographical situation of this country. Therefore, the fauna and flora are very different from the north to the south of the country (Al-Barwari and Saeed, 2007). Vegetation of Iraq is also different from the north to the south; however, the central and south regions are well-known with date palm trees. Cultivated plants are mainly wheat, berry, corn and vegetables (Tengberg, 2011; Shabani et al., 2012).

Poultry farm have increased in the last decade. The estimation indicates that the number of cattle increased as well. Man activities are mainly limited to agriculture. Because of problems with sanctions from 1990, the number of rodents has highly increased (Cortes et al.,

2012).

Human dwellings are made from cement, mud and brick. Those for animals are mainly made of mud. Since many centuries ago, people in Iraq benefited from their environment because of the sun energy in winter and the wind direction in summer, thus the traditional direction of villages in Iraq is toward the southeast (Wisborg et al., 2008). In addition, the mud and plants branches were widely used in the construction of both human dwellings and animal shelters. Now, villagers choose their dwellings with regards to different factors such as exposure to sun, wind direction, roads, canals, trees and other factors (Salman and Mohammed, 2010).

Due to the problem of sanctions, high number of citizens are exposed to different illnesses and risks including the endemic diseases, especially in the rural area due to deficit in food, sanitation and the decries of infrastructures capability of Iraq (Hamid and Everett, 2007). Malaria for example reappears in different locali-ties in the north and in the southeast of Iraq due to the deficit of preliminary control programs as mosquito control in the marshy area which is

**Table 1.** Relationship between directions of dwellings and total diseases in study area.

Direction	House building		Total diseases	
	No.	Percentage	No.	Percentage
North	54	10.8	48	13.8
North-east	26	5.2	35	10
East	145	28.9	16	4.5
South-east	4	0.8	23	6.5
South	54	10.8	28	8
South-west	95	19	52	14.9
West	118	23.7	84	24
North-west	4	0.8	64	18.3
Total	500	100	350	100

The table shows the total percentage of the reported cases of illness in the dwelling in the north-west, south-west and north directions, respectively.

**Table 2.** Relationship between positions of animal shelters and total diseases in the study area.

Direction	Animal shelters		Total diseases	
	No.	Percentage	No.	Percentage
North	173	34.6	35	10
North-East	8	1.6	14	4
East	133	26.6	68	19.4
South-East	30	6	79	22.5
South	76	15.2	36	10.3
South-West	17	3.4	14	4
West	55	11	47	13.5
North-west	8	1.6	57	16.3
Total	500	100	350	100

The table shows the highest percentage of diseases in the positions of the south-east, east and north-west directions, respectively.

considered as the main endemic area with malaria.

Number of visceral leishmaniasis patients also increased, diarrhea and enteric malady was remarkably high due to the bad water quality (Zolnikov, 2013).

Climate of Iraq is so hot and dry in summer and cold and rainy in winter. The variation in temperature between day and night is about 20°C in summer (Barreto et al., 2011). Thus, the aim of this study was to determine any possible relationships between ecological factors, endemic diseases and the position of villagers dwelling in rural area near Baghdad.

**MATERIALS AND METHODS**

**The study area**

About 500 human dwelling were randomly selected from the following area around Baghdad:

1. Taji (about 20 km in north of Baghdad).
2. Abou Greeb (about 25 km north-west of Baghdad).
3. AL Rhadwaniya (about 20 km westward of Baghdad)
4. AL Youssifiya (about 20 km southward of Baghdad).
5. AL Latifiya (about 35 km south ward of Baghdad).
6. AL Mahmmodiya (about 25 km southward of Baghdad).
7. AL Rasheed (about 25 km southward of Baghdad).
8. AL Madaien (about 25 km south-east of Baghdad).
9. AL Nahrwann (about 29 km eastward of Bagdad)

A standard forms was completed for each dwelling. The form included:

- a. Cultivated and wild plants.
- b. Domestic and wild animals.
- c. Nature of soil.
- d. Source of water.
- e. Types of diseases in study area.
- f. Tower of houses at East or West.
- g. Positions of animal shelters to the houses.

**Statistic analysis**

Chi-square analysis was performed to limit the relationship between study parameters and prevalence of diseases. The software statistical program used in this study was SPSS version 11.

**RESULTS**

The examination of about 500 human dwelling was studied in order to find possible relationship between different ecological factors and the prevalence of endemic diseases in the study localities in Iraq.

The houses building toward to the east and west (28.9 and 23.7%, respectively) were more than toward the north and south (both 10.8%). The highest rate of houses was building toward the east (24%) while the lowest rate of these was building toward the south-east and north-west (both 0.8%). Generally, the main examinations of dwellings were as follows:

North, 10.8%; north-east, 5.2%; east, 28.9%; south-east, 0.8%; south, 10.8%; south-west, 19%; west, 23.7%; north-west, 0.8% (Table 1).

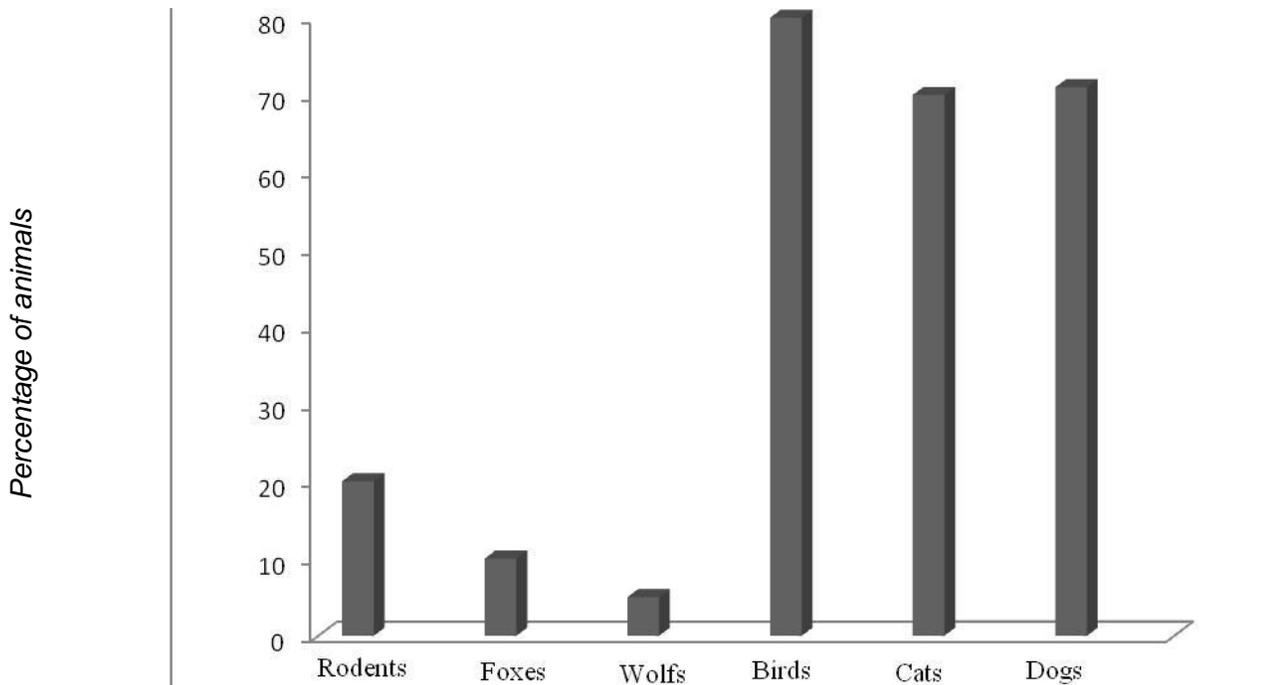
The villager’s dwellings in the study area are divided into three main categories as follows:

1. Cement made dwellings.
2. Brick made dwellings.
3. Mud made dwellings (Table 2).

Villagers live in the study area in grouped or separated dwellings. Now, these villages are rear while 85% of dwellings were built in respect to the directions of the highway and network of roads and irrigation canals. The study showed relationship between direction of house building and the diseases. The houses with building tower to the west recorded the highest rate of diseases (24%).

**Table 3.** Classification of dwellings in the study area.

Type	Number	Orientation	Open-land	Orchard	Vegetation
Cement	374	ALL	238	337	Cultivated and wild
Brick	81	ALL	137	93	Cultivated and wild
Mud	45	ALL	125	70	Cultivated and wild
Total	500	-	500	500	-

**Figure 1.** Common animals in study area.

The study proves that the place of animal shelters to the house was in correlation with the diseases. The highest rate of shelters was building with tower to the north which was 34.6%. The highest rate of diseases (22.5%) was recorded in the shelters with building tower to south-east. Generally, the main examinations of animal shelters were as follows:

North, 34.6%; north-east, 1.6%; east, 26.6%; south-east, 6%; south, 15.2%; south-west, 3.4%; west 11%; north-west, 1.6% (Table 3).

All the shelters of animals were mainly mud made. The ruler of the area near Baghdad have a big variety of animals as rodents, cats, dogs, foxes, wolves and birds which were the highest density in the study stations (Figure 1).

The total number of disease recorded in the study area was 350 cases. High number of children suffered from diarrhea (120 cases). Cases of visceral leishmaniasis (VL)

recorded in the study area were six cases. Only three cases of malaria were report. Typhoid fever (50 cases) and Brucellosis (7 cases) were common. The reported cases of Echinococcosis were few. No case of Schistosomiasis was reports (Figure 2).

The common diseases reported during the study were significantly different according to the value of Chi-square (541.88) under probability level ( $p > 0.05$ ).

The highest rate of the diseases was in Al-Mahmmodiya station (85 cases) while the station of Al-Taji had lowest rate of diseases (20 cases) (Figure 3). More than 90% of the study area soil was good type but more than 75% of the study area drinking water was the bad type. The rate of diseases was related to the nature of soil and source of drinking water (Figure 4).

## DISCUSSION

The traditional Iraqi village in the rural area has building

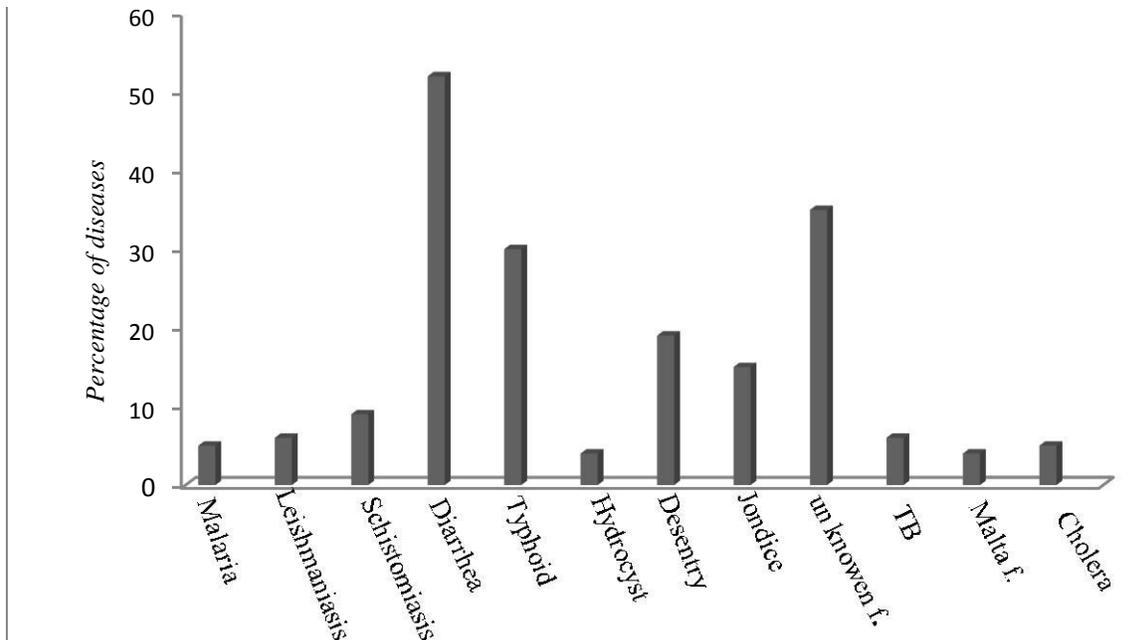


Figure 2. Common diseases in the study area.

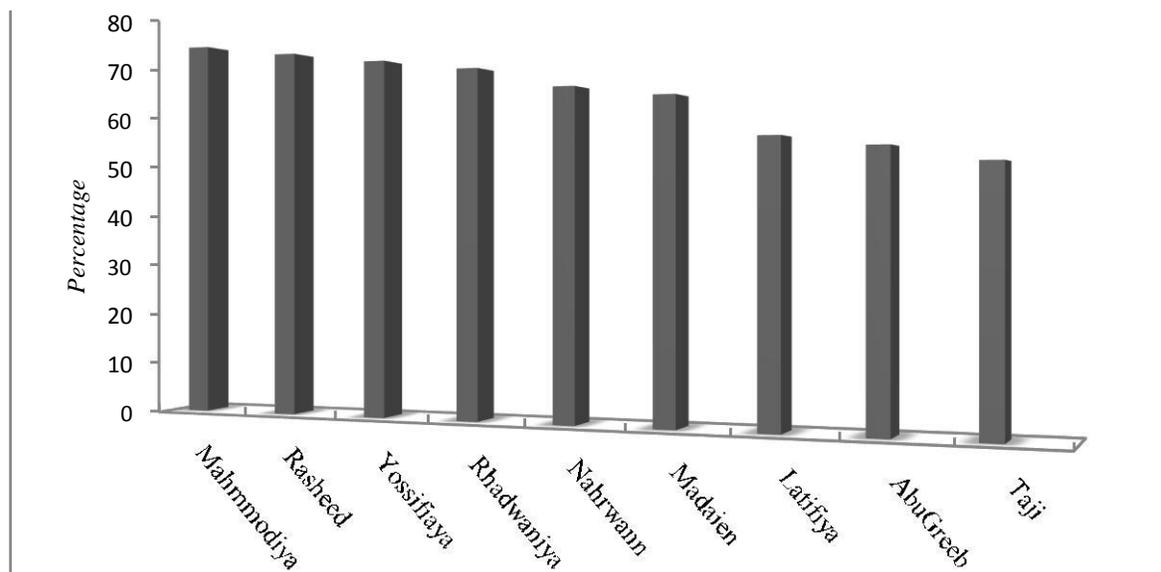
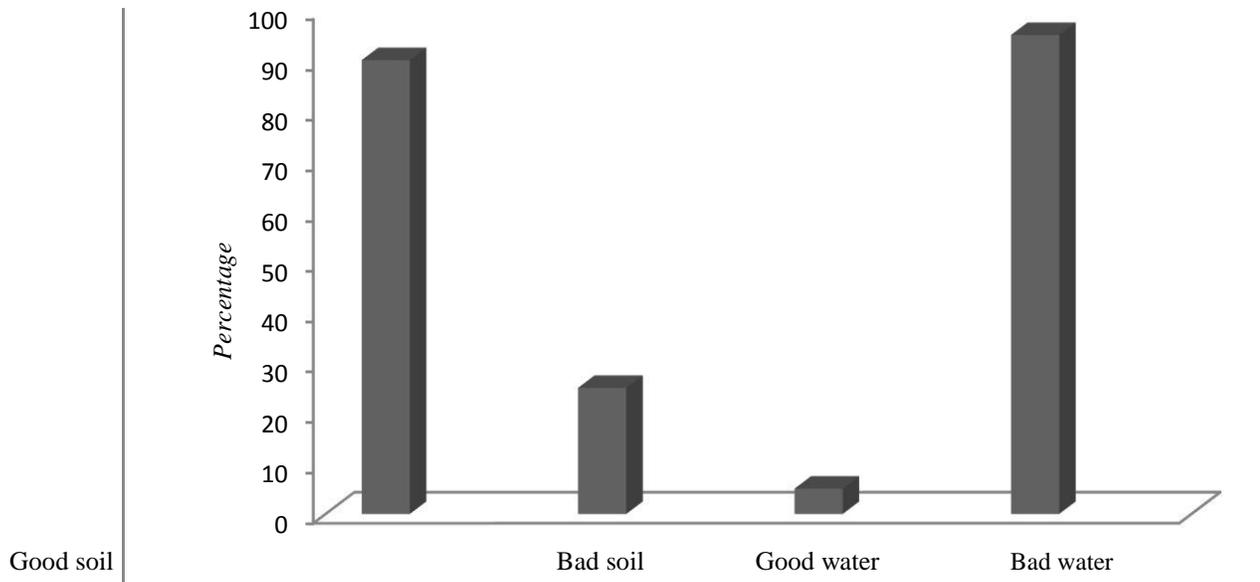


Figure 3. Percentage of diseases in each station of the study area.

in respect to many traditional considerations including the direction of the wind. The main wind direction in Iraq is usually northwest, thus a very high number of villagers consider this effect in the construction of their dwellings. Many villagers were building their dwellings for a religious reason, in this case, the direction of dwellings was toward the saint place of Muslims AL-QAABA. Others choose the dwellings in the orchards of date palms or near the orchard. The relationship between house

building and diseases is due to the sterling of sun on the house built toward the east, the sunrays make kill some of the germs and insect larvae.

The animal shelters were a few meters from the human dwellings; this is due probably to the security. The animal's shelters play a very important role as good places for feeding and breeding for insects such as sand flies and flies (Bray and Hamilton, 2013). Dick of irrigation canals, date palms trees and farms are very suitable places



**Figure 4.** Sources of water and nature of soil in the study area.

places for rodents (Tavares and da Fonseca, 2013; Daniel, 2012). There is an association between socio-economic factors and dwelling without regarding the climate or something that affect the incidence of the reported cases.

The constructions of dwellings were changed. Thus, the cement replaced mud which may affect the ecological aspect of vector diseases. Style and fusion of dwellings were change during the last two decades as the use of new mode of design without considering the environment and the daily exigency of villagers and their domestic animals. The position of animal shelters was a determinant factor because the construction of mud consists of a suitable place for both feeding and resting for the sandflies which is the vector of visceral leishmaniasis.

It seems that the effect of microclimate was not on the considerations of villagers to build their dwellings as the very dense of date palms trees, vegetable farms and irrigation canals which are a determinant factors in the prevalence of diseases. Some dwellings had been constructed in respect to the wind direction. No significant mean was noted for the distance from dwelling and drainage canals except rodent burrows which are suspected as the intermediate host of both cutaneous and visceral leishmaniasis disease in Iraq.

The study area is a suitable place for the breeding and feeding of rodents and according to villagers, their number was highly increased in the last decade. Use of manure as a source of energy is a common habit in the study area (Tauseef et al., 2013). The sanction was a very important factor in the degradation of ecological factors, which directly affect the prevalence of many endemic diseases leading to the degradation of both

sanitation services and environmental conditions (Al-Hilfi et al., 2013). It seems clearly that this kind of study is very important to find alternative for more healthy dwellings.

### Recommendation

An epidemiological study needs a high number of samples before definitive conclusion and we hope to achieve that in the future. The study may be oriented toward this vital problem and we suggest that the cooperation between different official authorities, universities and international organization as WHO and UNICEF can be of help to investigate this big problem in Iraq in order to reduce the high number of reported cases of the main endemic disease in the rural area in the country.

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