

Surface Water Pollution and Its Relationship with Human Health

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Abstract: The Shatt Al-Kufa and Abbasiyeh are among the main sources that feed the Kufa district with water for human consumption, irrigation of crops, and other human uses. As a result of population expansion and agricultural and industrial activity, the available water sources are saturated with human, animal and industrial wastes. As this river passes through several rural villages, the river uses an unhealthy and incorrect use, as well as many animals present in the river, making it an important factor in the spread of disease. The scientific research aims to study the diseases that affect the population as a result of contamination of surface water in the pathogenic neighborhoods according to the age groups of January and July of the year (2019) to reach the results and recommendations.

Keywords: Infection, diseases, bacterial, parasites, viruses

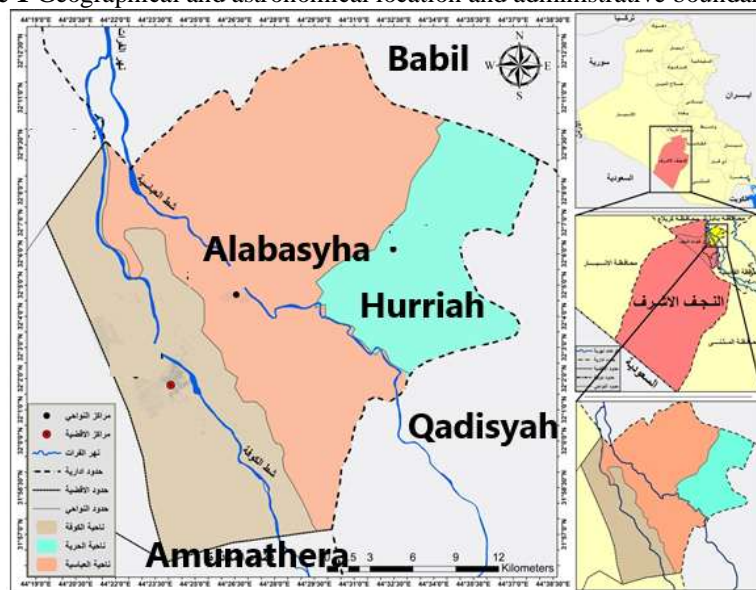
Introduction

The study of surface water in the Kufa district is one of the important studies that try to link water pollution and human infection with a number of diseases. It is a strong indication of the validity of the opinions that explained the reason behind the risks of using this water. It also represents a scientific study of decision makers to address such risks. In addition, scientific research in this field is of great importance because it attempts to establish the relationship between an important problem that threatens the lives of the population, which is the phenomenon of water pollution and the diseases it is exposed to. It is an important study for those with specialties, as it contributes to solving a problem that affects the different age groups of the population, especially in the study area, which is public health due to the presence of serious diseases that have disappeared but have recently returned. As contaminated surface water is a good food source for the growth and reproduction of living microorganisms, the most important of which are the intestinal pollutants that come from human and animal wastes, in addition to that wastewater is a means of transporting various diseases, especially parasitic ones, directly during the exposure of individuals to wastewater during the process of irrigation or Indirectly, by eating irrigated vegetables from that water or eating meat for animals that graze on irrigated pastures with contaminated water, as these pastures contain many pathogenic neighborhoods present in diseases that infect humans as a result of drinking A contaminated water.

Study Area

The Kufa district is located between the two circles of latitude (6 56 31-31 43 12 32) north and between longitudes (24-24 19 44-54 37 44) east, and is bounded to the north and northeast by the administrative borders of Babil Province. On the east and southeast sides, the administrative boundaries of the Qadisiyah Governorate, on the south, the Manathira district, and on the west the Najaf district, with an area of (437 km²) distributed in three administrative units, which are the center of the districts (129 km²), and a rate of (29.5%) in the city of Kufa and the Abbasiyeh area (223 Km²) with a percentage of (51%) and Al-Hurriya area with an area of (85 km²) at a rate of (19.5%), as shown in Figure (1).

Figure 1 Geographical and astronomical location and administrative boundaries [1]



Diseases are transmitted by contaminated drinking water by the organisms that cause the disease and include:

A- Viruses (Class A viral hepatitis, chickenpox, tonsillitis)

B- Bacteria (typhoid, acute diarrhea, blepharitis)

C- Parasites (amoebic dysentery, giardiasis, food poisoning). They can be illustrated in the following:

Hepatitis A type

Severe infectious disease that affects the liver, often occurs in the summer as a result of contamination of drinking water sources with faecal waste. The severity of the disease increases with age and the patient acquires permanent immunity from it. This disease is one of the diseases caused by viral diseases. The hepatitis A virus value reaches from 40 to 50 parts per million, which is resistant to acids and chemical disinfectants. It also resists heat to a temperature of 56 ° C. for 30 minutes. It is found in the feces of an infected person and enters the human being through contaminated food and drink or direct use of the patient's tools [2]. Infection can occur in all ages among people with a predisposition. Infection tends to be mild and asymptomatic in young children and the clinical manifestations of the disease increase with age. The infection with the hepatitis A virus is one of the most important causes of acute hepatitis and it appears in the form of an acute flu (fever and chills), and the patient is not known to have hepatitis. The infection is transmitted by drinking water contaminated with the virus that causes the disease, and the incubation period for this virus is (15-50) days, [3] and among its symptoms (feeling of tiredness and fatigue, high temperature, loss of appetite, abdominal pain, diarrhea or vomiting, and jaundice that It includes yellowing of urine, fecal color changes to light color, yellowing of the skin and conjunctiva in the eye, impaired liver function) and symptoms disappear after 4 weeks have passed and immunity to the virus occurs) [4].

The source of this virus in the environment is sewage and is spread by the way (faecal-oral) as it is released in very high concentrations in the excrement of some infected people a week before the emergence of jaundice and for days after. Especially if personal hygiene is very weak and sanitary procedures to sterilize water are not available or few, when a person is infected it produces symptoms (malaise, fever followed by several days after nausea, vomiting, and abdominal pain, then the color of the turns dark yellow and then appears jaundice, which may remain for a week Up to two weeks, accompanied by malaise for a period of two to three months, and the severity of the disease is related to age, so it is more severe in adult patients [2]. Table (1) shows that infection with Hepatitis A virus increases in Kufa more than Abbasiyah due to population density and high population. The disease affects all the population in different age groups, and the highest injuries occurred in the age group (5-14), at a rate of (52.4%), while the infection in the category (1-4) reached (32.8%). The reason for its rise is due to the poor physical structure in this age group. The category (15-45) recorded a rate of (14.8%), while no injuries were recorded for the two groups (less than a year and above 45).

Table (1) the number of HIV infections in Kufa (2019)

Hepatitis A	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	0	0	0	0	0
Class 1-4	4	7	3	6	32.8
Class 5-14	6	13	4	9	52.4
Class 15- 45	1	4	1	3	14.8
Above 45	0	0	0	0	0
Total	61				100

Chicken Pox

A disease that spreads during the winter and spring seasons and often affects children and sometimes affects adults who have never been exposed to infection, in the form of granules appear in the form of batches, which is inconsistent and asymmetric and crusts appear. Severe virus disease accompanied by fever and rash that spots for a few hours for a period of (3-4 days), leaving spots on the skin that disappear over time that are more on the covered parts of the body than on the exposed parts and may appear on the scalp, upper armpit, and mucous membranes of the mouth [5]. It begins with a rash in the form of red granules accompanied by high fever, coughing and pain in the body, especially if the granules are spread all over its parts [6]. The incubation is between (10-21 days), and it is considered an infectious disease, affects children under ten and affects a

small percentage of adults. The virus is affected by high temperatures, when at (50 ° C) the virus dies, and it resists drought and low temperatures to (0 ° C) for several years [7]. Table 2 shows that the incidence of chickenpox disease increases in Kufa more than Abbasid due to population density. The disease affects all residents of different age groups, and the highest number of injuries is in the age group (5-14), at a rate of (50.7%). The reason for its rise is attributed to the weak physical structure in this age group. Followed by the age group (1-4) with a percentage of (23.9%), then the age group (15-45) with a rate of (17.9%) and the last age group affected is (less than 1) with a rate of (7.5%).

Table 2: Number of cases of chickenpox in Kufa, according to the age groups of the year (2019) [8]

Chicken Pox	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	3	1	1	0	7.5
Class 1-4	10	3	2	1	23.9
Class 5-14	20	5	6	3	50.7
Class 15- 45	8	2	2	0	17.9
Above 45	0	0	0	0	0
Total	67				100

Tonsillitis

It was known for the first time as a medical concept at the end of the nineteenth century and is one of the common diseases in different countries in the world is one of the common respiratory diseases that affect both children and adults [9] It is the interaction of lymphoid tissue in the tonsils with inflammatory factors such as bacteria and viruses and as a result of this interaction It results in a rise in temperature, tonsil enlargement, congestion and poor functioning of the organ, [10]. It is clear from Table 3 that the incidence of tonsillitis in Kufa is more than Abbasiyah, as it is a region where most of the various commercial activities that attract residents have come together motivated by job opportunities or education. The disease affects all the population in different age groups, and the highest injuries occurred in the age group (15-45) by (30.3%), the category (5-14) by (20.6%), the category (1-4) by (19.7%), while the two categories (less than 1) over 45 (11.1 and 18.3%) were recorded, respectively.

Table 3 Number of cases of tonsillitis in Kufa by age groups for 2019 [11]

Tonsillitis	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	1122	453	138	72	11.1
Class 1-4	1740	724	543	155	19.7
Class 5-14	1825	836	501	158	20.6
Class 15- 45	2062	1026	929	865	30.3
Above 45	1464	662	437	387	18.3
Total	16099				100

Typhoid

An acute infectious disease that affects the small intestine and is caused by a bacillus bacterium called Salmonella, which enters its bodies through ingestion or inhalation and is represented (bacillus causing typhoid) as well as the types of this sex that cause various injuries to the gastrointestinal tract as well as (negative bacilli of the gram color) that cause bacterial dysentery that is Less common than typhoid. Infection occurs by eating contaminated food or drinks and by cooling contaminated water or drinks [12] It is divided into three clinical types affecting humans, which are infection of the gastro-intestinal tract and intestinal fever. Table 4 shows that the incidence of typhoid disease increases in Kufa more than Abbasiyha due to population density. The disease affects all the population in different age groups, and the highest injuries occurred in the age group (15-45), at a rate of (47.7%). The reason is attributed to the fact that they are the youth category, which has a dependency ratio and the nature of different work activities. They are more vulnerable to external causes of disease, followed by the age group (5-14) by (37%) and the age group (1-4) by (15.3%).

Table 4 Number of typhoid infections in Kufa district by age groups for the year (2019) [11]

Typhoid	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	0	0	0	0	0
Class 1-4	2	5	0	3	15.3
Class 5-14	4	10	3	7	37
Class 15- 45	8	17	1	5	47.7
Above 45	0	0	0	0	0
Total	65				100

Shigella (Acute Diarrhea)

Infectious disease that affects the small intestine and sometimes the large intestine in humans and the cause of infection with Bacillus bacteria from the Shigella group. It is a widespread disease and is found anywhere in the world and abundant in summer. It is transmitted by the way (stool-oral) causing bacterial dysentery or shigellosis in humans. The symptoms of the disease appear suddenly and violently, beginning with abdominal cramps followed by severe watery diarrhea accompanied by fever, malaise and inflammation in the large intestine. The patient may release small amounts of mucous bloody stool. Shigella can be found in surface water and contaminated drinking water, which is a big problem and in general, drinking water does not contain shigella unless it is untreated. Shigella can live for up to weeks, but if the water is sterile and clean, bacteria cannot survive. More than 14 days [13]. Table 5 shows that the incidence of Shigella disease in Kufa is more than Abbasiha, due to population density and high population numbers.

The disease affects the entire population of different age groups, and the highest injuries in the age group (15-45) have reached (47.2%). The reason is that they are the young group on which the dependency ratio falls on the nature of different work activities. They are vulnerable to infection with external pathogens, followed by the age group (5 - 14) by (24.4%), then the age group (1-4) at (18.1%). As for the two categories (less than 1 and above 45), their percentages were absolutely the lowest (3.9 and 6.4%), respectively, for each of them.

Table 5 Number of Shigella Diseases in the Kufa District by Age Groups for the year (2019) [11]

Acute diarrhea)	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	5	13	4	11	3.9
Class 1-4	33	48	34	37	18.1
Class 5-14	45	61	42	58	24.4
Class 15- 45	91	116	88	103	47.2
Above 45	10	19	11	14	6.4
Total	843				100

Inflammation of the Eyelid

It is an infectious disease of the eyelids that is caused by staph bacteria. Among the most prominent symptoms are itching and burning sensation with redness and swelling of the eyelid rings and falling cilia with abnormal sensitivity, as well as the appearance of the cilia base and the cilia may become attached to each other, as a result of sticky secretions and their edges twist inward and outward, and this may affect the conjunctiva of the eye [14]. Table 6 shows that infection with eyelid inflammation affects all the population in different age groups, and the highest injuries were in the age group (15-45) at (32.9%), followed by the age group (5-14) at (26.9%), then the age group (Over 45) by (21.6%) and the two categories (less than 1) and (1-4) with (7.7 and 10.9%), respectively.

Table 6 the number of cases of blepharitis in Kufa district for the year 2019[11]

Inflammation of the Eyelid	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	15	8	0	3	7.7
Class 1-4	22	12	1	2	10.9
Class 5-14	27	42	7	15	26.9
Class 15- 45	21	63	17	10	32.9

Above 45	29	32	4	8	21.6
Total	338				100

Entamoeba Histolytica (Amoebiasis)

One of the causes of this disease is intestinal parasites, which are diseases of hot and warm areas that are transmitted from one person to another by being in contaminated food and drink from human waste and from the causes of contamination of drinking water sources, contaminated sewage water, epidemics of amoebiasis may occur in cities with a network Water by stools, because the regular chlorination that takes place in the treatment of water plants does not eliminate cysts. As for the symptoms of the disease, they start the infection without symptoms first, showing a slight vague intestinal disorders due to many different reasons. Table 7 shows that the incidence of amoebic dysentery affects all the population in different age groups, and the highest injuries occurred in the age group (15-45) at a rate of (40.3%). They practice it, followed by the age group (5-14) at (22.7%), the category (1-4) at (17.2%), the category (over 45) at (14.3%) and the category (less than 1) at (5.5%).

Table 7 The number of cases of amoebic dysentery in Kufa, according to the age groups of the year (2019) [11]

Amoebiasis	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	3	5	1	4	5.5
Class 1-4	10	21	4	6	17.2
Class 5-14	14	21	9	10	22.7
Class 15- 45	30	29	12	25	40.3
Above 45	8	20	1	5	14.3
Total	238				100

Giardiasis

One of the diseases caused by parasites, and the causes of this disease are the primary animals (Giardia) trophozoite, which is the active phase that is able to stay in the water for up to two months and is transmitted from person to person through drink and contaminated food [15] It is a parasite of the intestinal tract, a single cell, widespread and affects humans throughout the world due to the infection of the Giardia parasite for the use of non-sterilized water and direct drinking water using a tap and may come from the source of the tanks' water as the survival of this water in the tanks provides an appropriate environment of stagnation and darkness And an oxygen deficiency is transmitted to humans when using this water [16].

Table 8 shows that giardiasis affects all the population with different age groups and the highest injuries occurred in the age group (15-45) and by (26.5%). The rise is due to the nature of the external activities that they engage in from work and education that make them vulnerable to infection with external pathogens, Then the age group (1-4) followed by (24.5%) and the age group (5-14) with (21.4%) and the lowest percentages were for the two groups (less than 1 and above 45) with rates (12.5 and 15.1%), respectively.

Table 8 Number of cases of Giardia disease in Kufa district by age group for the year 2019 [11]

Giardiasis	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	2	5	9	16	12.5
Class 1-4	12	21	11	19	24.5
Class 5-14	6	10	14	25	21.4
Class 15- 45	14	26	10	18	26.5
Above 45	5	9	10	15	15.1
Total	257				100

Food poisoning

Food poisoning is caused by a type of microorganism, or one of the substances that cause food poisoning, such as contamination of food or drink with germs, or with toxins of germs or with toxic chemical substances, and this disease is

spread in poor and underdeveloped societies and it appears especially in hot countries, especially in the summer. This is due to the nature of the very hot climate, which has a significant impact on food contamination, as the hot weather exacerbates cases of poisoning [17] Especially with poor hygiene care and food poisoning, there are several types in terms of the cause of its occurrence, either the cause is bacterial, viral, parasitic, or chemical contamination, or may It is vegetable or animal toxins. Table 9 shows that food poisoning affects the population of different age groups, and the highest injuries occurred in the age group (15-45) and by the rate of (50%) who represent the youth category and the reason is that they are more vulnerable to infection with external pathogens and their desire to eat outside the home And the nature of the different work activities that they engage in, followed by the age group (5-14) with a percentage (31.3) and the age group (over 45) with a rate of (18.7%) while the two categories (less than 1) and (1-4) did not get away from the pathogens external.

Table 9 The number of cases of food poisoning in Kufa district, according to the age groups of 2019.

Food poisoning	Kufa		Abbasiyah		%
	July	January	July	January	
Class less than 1	0	0	0	0	0
Class 1-4	0	0	0	0	0
Class 5-14	1	2	1	1	31.3
Class 15- 45	2	3	1	2	50
Above 45	1	1	0	1	18.7
Total	16				100

Conclusions

- 1- The total number of injuries recorded (17.984 injuries) for the year 2019 varied spatially and temporally.
- 2- (8) of them were concentrated in the Kufa sector, as they are characterized by a high population density, in addition to being a commercial and administrative center that helped increase the demand for the population, which increases the chance of contracting the disease more broadly and quickly, except for the disease Giardia disease, which focuses in Abbasiyah because there are rural settlements that use water In an incorrect and unhealthy way, as well as their activities of raising animals, getting them into the water near homes and using them directly, and this indicates that there is a serious biological contamination that led to the further spread of this disease.
- 3- We find that most of the infections are confined to the age group (15-45) due to work and eating activities outside the home except for patients with chickenpox and viral hepatitis, type A was restricted to the age group (5-14).
- 4- Injuries varied temporally, as we note that most diseases are concentrated in the hot season of the year (typhoid, class A viral hepatitis, amoebic dysentery, shigella, giardiasis, eyelid inflammation, food poisoning) because parasites, viruses, and vectors that transmit these diseases are active in High temperatures, and others that cannot resist high temperatures, so they appear in the cold season of the year (such as chickenpox and tonsillitis).

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References

1. Ministry of Water Resources. National Center for Water Management, Division of Geographic Information Systems and Remote Sensing, 2016
2. Khalaf Hussein Al-Dulaimi, Geography of Health. Dar Safaa for Publishing and Distribution, 1st Edition, Amman, 2009, p. 567.
3. Miqdad Noaman Hamza. The effect of climatic characteristics on the incidence of seasonal diseases in the province of Najaf, Master's thesis, College of Arts, University of Kufa, 2018, p. 115.
4. Mohamed Abdel Nasser Al-Zarqa. Water pollution in the North and Central governorates and its impact on human health, 2010, p. 74.

5. Abdel-Hussein Bayram. Infectious Diseases: A scientific study of the spread of diseases through infection and ways to prevent them, Al-Hayat Library, Beirut, 1967, p. 58.
6. Mohsen Abdul-Saheb Al-Mudhafar. Medical Geography, Spatial Content, Methodology and Analysis, 1st edition, Dar Shomoua Al-Thaqafa Printing House, Benghazi, 2002, p. 309.
7. Ibrahim Benson. Combating Communicable Diseases in Persons, All American Public Health 1985, WHO in Alexandria, translation of the Eastern Mediterranean Regional Office, Cairo, 1987, p. 301.
8. Department of Health Najaf Al-Ashraf, Department of Public Health, Division of Communicable Diseases, Epidemiological Monitoring Unit, 2019.
9. Saad Sawadi Hammoud, Hana Abdul Latif Yassin. Diagnosis of Bacterial Isolated Patients from Tonsillitis Patients in Ramadi and Knowing their Sensitivity to Some Antibiotics, Al-Anbar Journal for Pure Sciences, Volume 7, Issue 1, 2013, p. 45.
10. Amal Ghazi Mahdi. Isolation and Diagnosis of Aerobic Bacteria causing Tonsillitis from Diwaniya City Patients, Al-Qadisiyah Journal of Pure Sciences, Volume 22, Number, 4, 2017, p. 321.
11. Najaf Health Department. Public Health Department. Division of Communicable Diseases, 2019.
12. Fathi Muhammed Moselhi. Health and Medical Geography, Al-Majed Publishing House, Cairo, 2008, p. 2.
13. Hareth Jabbar Fahd and Adil Mishaan Rabei. Water Pollution, Arab Society Library for Publishing, 1st Floor, 2011, pp. 132-134.
14. Abdel Moneim Mostafa, Eye Diseases and Orthoptics. Arab Foundation for Studies and Publishing, 1st edition, Beirut, 1990, p. 25.
15. Mohamed Abdel Nasser Al-Zarqa. Water Pollution in the North and Central Governorates and Their Impact on Human Health, 2010, p. 76.
16. Ali Hussein Makki Al-Kubaisi. Contamination of water tanks by the lamblia giardia in the investigation of the holy governorate of Karbala / Iraq, Karbala University scientific journal, volume 12, No. 2, 2014, p. 82.
17. Khalaf Soufi Al-Dulaimi. Food Poisoning, University of Baghdad, College of Agriculture, 1986, pp. 12-14.