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Investigation of Toxic Substance in Basra Waters

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***Abstract*—** *There was a need to investigate the presence of toxic elements and compounds in drinking and desalination water for the population of the Basra city, especially after increasing cases of poisoning and diarrhea recently to more than 70,000 cases in the province of Basra according to the Human Rights Commission in the province .*

Six Samples (A, B, C, D, E, F) of drinking water and human uses of (RO) waters packaged in bottles produced by a private company (sample A), (RO) waters for direct sale (sample B) , waters desalination for the areas of Qibla, Jubaila and Brathaia (samples C,D,E) in addition to the waters of Shatt Al-Arab (sample F) for the purpose of conducting analysis and knowing the percentages of toxic elements and compounds in the compositions of these samples.

The results of the analysis of the samples under the study confirmed that the ratio of total soluble solids (TDS) of the samples (D, E , F) to the other samples (A, B, C)).

The results of the analysis also confirmed the high percentage of the lead element (Pb) of the two samples (E, F) from the other samples. The results showed an increase in sulphate (SO_4) for sample (E) than the other samples. The results showed an increase in the ratio of phosphate (PO_4) of sample (F) to the rest of the samples in comparison with the standards of the World Health Organization (WHO). These results indicate that pollution in the Shatt Al-Arab waters increased with toxic elements and compounds.

These results correspond to the statistics of the Directorate of Basra Heaith, where it showed the increase in the proportion of casualties among the population of the province of Basra to areas adjacent to the Shatt Al-Arab river, such as the city center , Abu-Khasseb and Al-Tanuma from the rest of the areas causing water pollution and the spread of E. coli causing diarrhea and intestinal colic with 50% of cases which was admitted to Basra hospitals.

***Keywords*— Toxic Substance, Basra Waters, RO, drinking and desalination water.**

I. INTRODUCTION

Water pollution is any physical or chemical change in water quality, directly or indirectly, adversely affects living organisms, or makes water unsuitable for the required uses. Water pollution has a major impact on the life of the individual, the family and the community. Water is a vital requirement for humans and other living things. Water may be a major cause of life if it is contaminated [1].

Water pollution is classified into: natural pollution, which means pollution that changes the natural characteristics of water, making it unpopular for human use, by changing its temperature or salinity, or increasing its suspended matter, both organic and inorganic. The increasing salinity of water is often due to increased evaporation of lake or river water, especially in dry areas without renewal, and this also leads to the acquisition of bad smell or change in color or taste[2].

The other type is the chemical pollution of water, which is one of the most important and the most serious problems facing modern man, and the water has a toxic effect on humans as a result of the presence of hazardous chemicals, such as lead compounds, mercury, cadmium, arsenic, and pesticides. Which can be divided into a decomposable species, and another type that can be accumulated and collected in living organisms living in water, posing a high risk to them, as well as on the reach of fish due to contamination.

Water pollution takes a variety of forms, and has different implications, and therefore multiple concepts of water pollution. It can be defined as damage or corruption to the quality of water, which causes a disturbance in its ecosystem, which reduces its ability to perform its natural role and makes it harmful when used, or loses much of its economic value, especially with regard to its fish resources and other aquatic organisms. Water pollution is also known as the desecration of rivers, oceans and lakes, as well as rainwater, wells and groundwater, rendering their waters untreated and unusable for humans, animals, plants and other aquatic organisms. [3]

A watercourse is contaminated when the composition or condition of its water changes directly or indirectly as a

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result of man's work, and thus its water becomes less suitable for use in its natural state. [4] Water pollution is also the change of natural qualities in water through the addition of strange substances that cause irritation, odor, color or taste. Microbes may be a source of pollution, making it a source of harassment or harm to legitimate uses of life [5]. Contaminated water contains substances that are foreign to its natural component, which may be solid soluble or stuck, dissolved organic or inorganic substances, or fine materials such as bacteria, algae or parasites, thereby altering its natural, chemical or biological properties, suitable for drinking or household consumption, nor is it suitable for use in agriculture or industry[6].

There was a need to investigate the presence of toxic elements and compounds in drinking and desalination water for the population of the Basra city, especially after increasing cases of poisoning and diarrhea recently to more than 20,000 cases in the province of Basra.

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Six Samples have been studied of drinking water and human uses of (RO) waters packaged in bottles produced by a private company, (RO) waters for direct sale , waters desalination for the areas of Qibla, Jubaila and Brathaia in addition to the waters of Shatt Al-Arab for the purpose of conducting analysis and knowing the percentages of toxic elements and compounds in the compositions of these samples. Figure (1) shows the ways of spreading pollutants in the Shatt Al-Arab waters and Fig. (2) shows one of the stations of drawing water from the Shatt Al-Arab river and pump it to the residential areas in Basra, where the amount of pollution from herbs, algae and plankton.

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Fig.1: Shows the ways of spreading pollutants in the waters of the Shatt Al-Arab because of pollution with sewage water, Water pollution with industrial waste. Waste spread, Oil contaminants and Agricultural waste.

Fig. 2: Shows one of the water pumping stations from the Shatt Al-Arab river and pumping it to the residential areas in Basra, where the amount of pollution from herbs, algae and plankton are observed.

II. RESEARCH PLAN

Six samples of water included (2) samples of drinking water (RO) , desalination waters were used (3) samples from different areas in Basra and sample (1) taken from Shatt Al-Arab water for the analysis of toxic elements and compounds in their structures. Table (1) shows the details of these samples under study. Figure (3) shows a photo of samples which is indicated in table (1).

Table.1: Coding of the samples and the areas taken from the samples under study

Samples	Details
A	(RO) bottle produced by the (Al-Malika) private com.
B	(RO) free water sale taken from Al Briha area
C	Water desalination of the Qibla area
D	Water desalination of the Jubaila area
E	Water desalination of the Al-Brathaia area

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F	Sample of Shatt Al-Arab water is taken near the Educational Hospital

Fig.3: A photo of the six samples (A, B, C, D, E, F) detailed in the mentioned areas in table (1).

III. TEST RESULTS

The analyses were carried out in the Central Laboratory of the Faculty of Agriculture and the Center of Marine Sciences at the University of Basra for the purpose of measuring the ratios of total dissolved solids (T.D.S), pH, , toxic elements and compounds and comparing them with World Health Organization (WHO) specifications [7]. The results are arranged in Tables (2, 3, 4) and the relationships were drawn in the figures (4,5,6,7) as shown below [8]:

Table.2: Total Dissolved Solids (TDS) and (pH) of the studied samples.

Samples	Units	T.D.S	Specification (WHO)	pH	Specification (WHO)
A	mg/l	39.63	**1000**	7.93	6.5 – 8.5
B	=	125	=	7.35	=
C	=	721	=	8.06	=
D	=	9740	=	7.48	=
E	=	16960	=	7.59	=
F	=	15936	=	7.56	=

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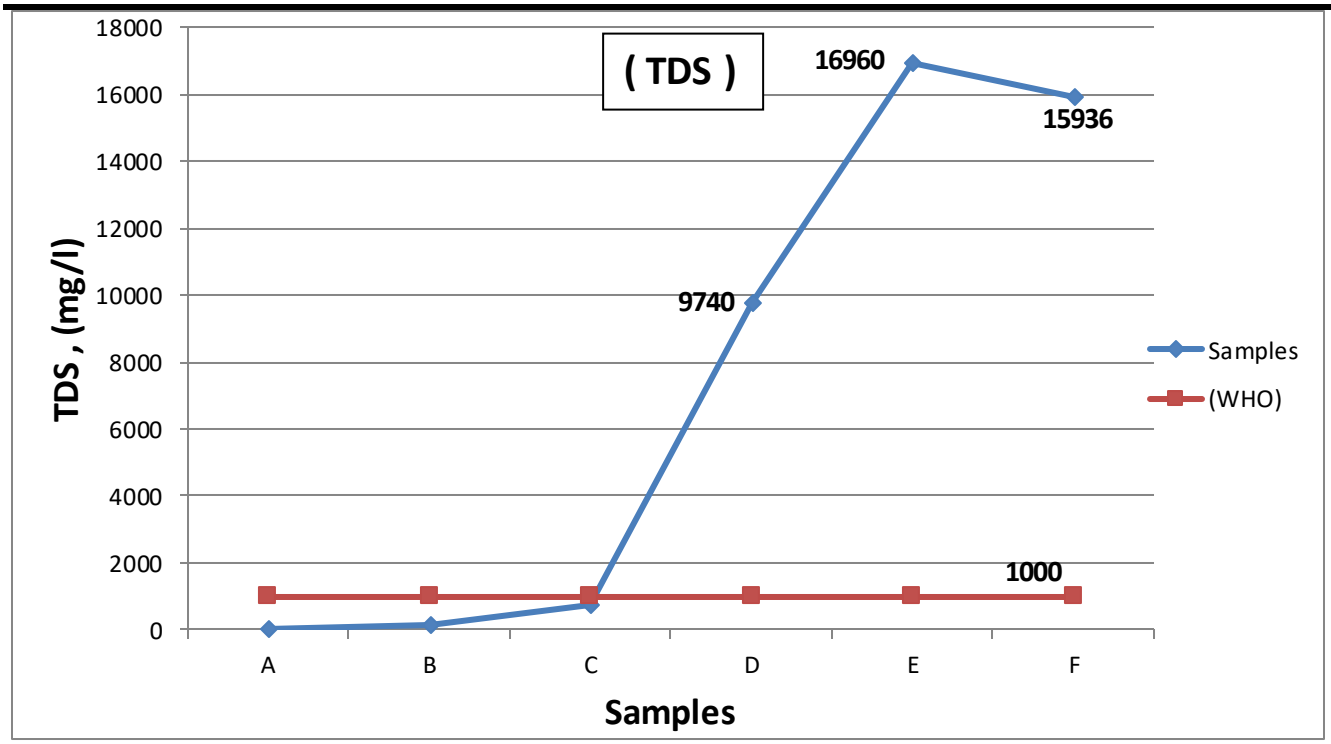

Table.3: Values of elements (Ca, Cr, Co, Pb, Cd) of the samples under study[9].

	Units	Ca	Cr	Co	Pb	Cd
A	mg/l	60.12	0.0	0.0	0.0	0.0
B	=	92.18	0.0	0.001	0.0	0.0
C	=	96.19	0.0	0.005	0.0	0.0
D	=	120.24	0.0	0.004	0.0	0.0
E	=	140.28	0.0	0.013	0.8	0.0
F	=	140.28	0.0	0.015	0.8	0.0
(WHO)	=	200	0.05	0.0	0.05	0.005

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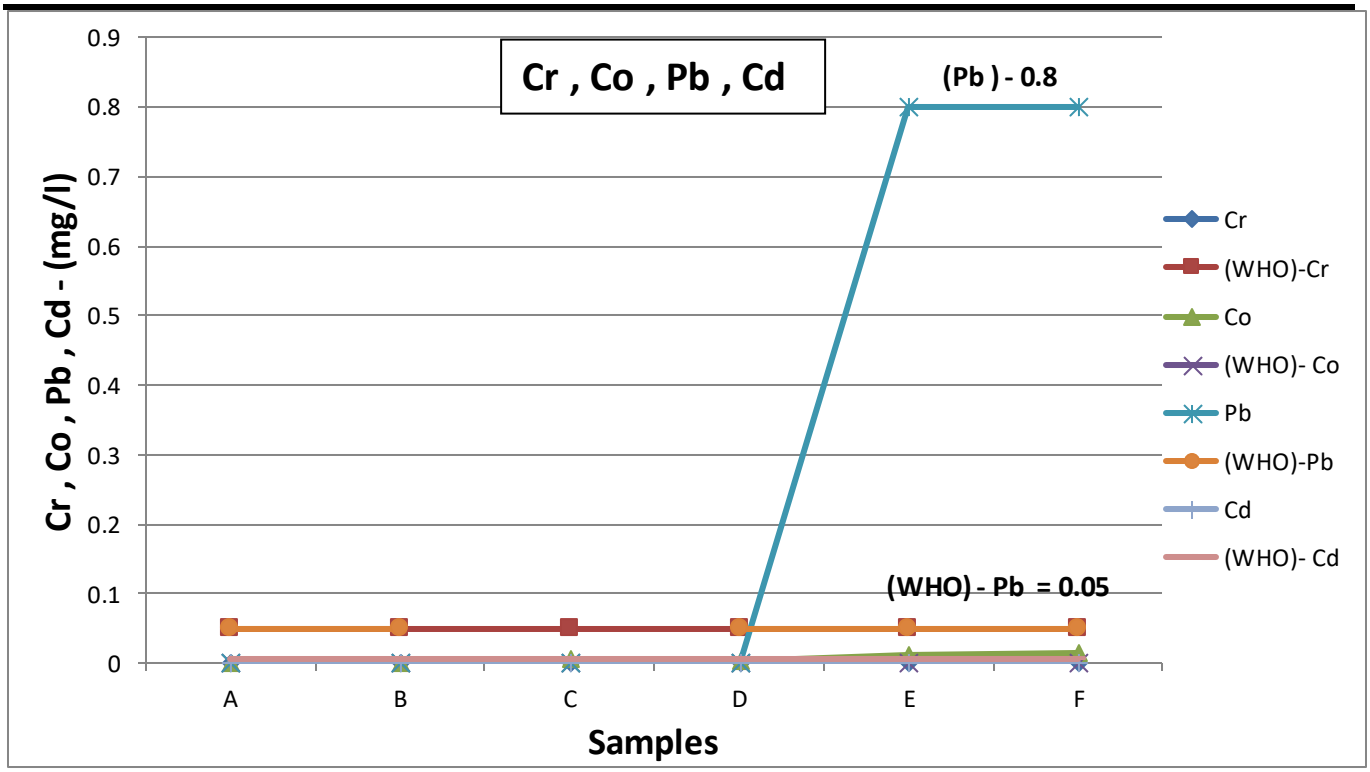

Fig.5: Ratios of the elements (Cr, Co, Pb, Cd) of the samples under study

Table.4: Values of Sulphate (SO4) , Phosphate (PO4) and Total Nitrogen (TN) of the samples under studied.

Samples	Units	SO_4	PO_4	Total Nitrogen
A	mg/l	12.3	ND	0.07
B	=	2.63	ND	0.014
C	=	101	0.11	0.07
D	=	328	0.22	ND
E	=	750	0.09	ND
F	=	342	0.35	0.014
(WHO)	=	400	0.0	0.0

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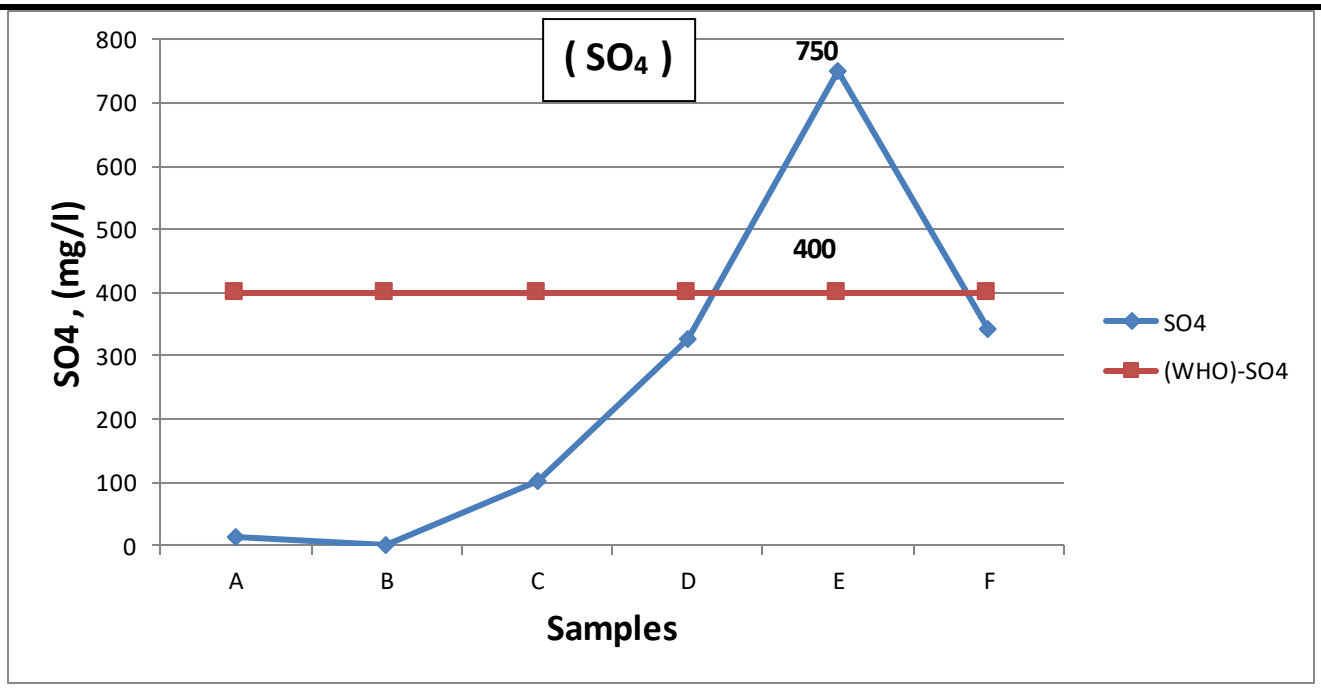

Fig.6: Ratios of Sulphate (SO4) of the samples under study.

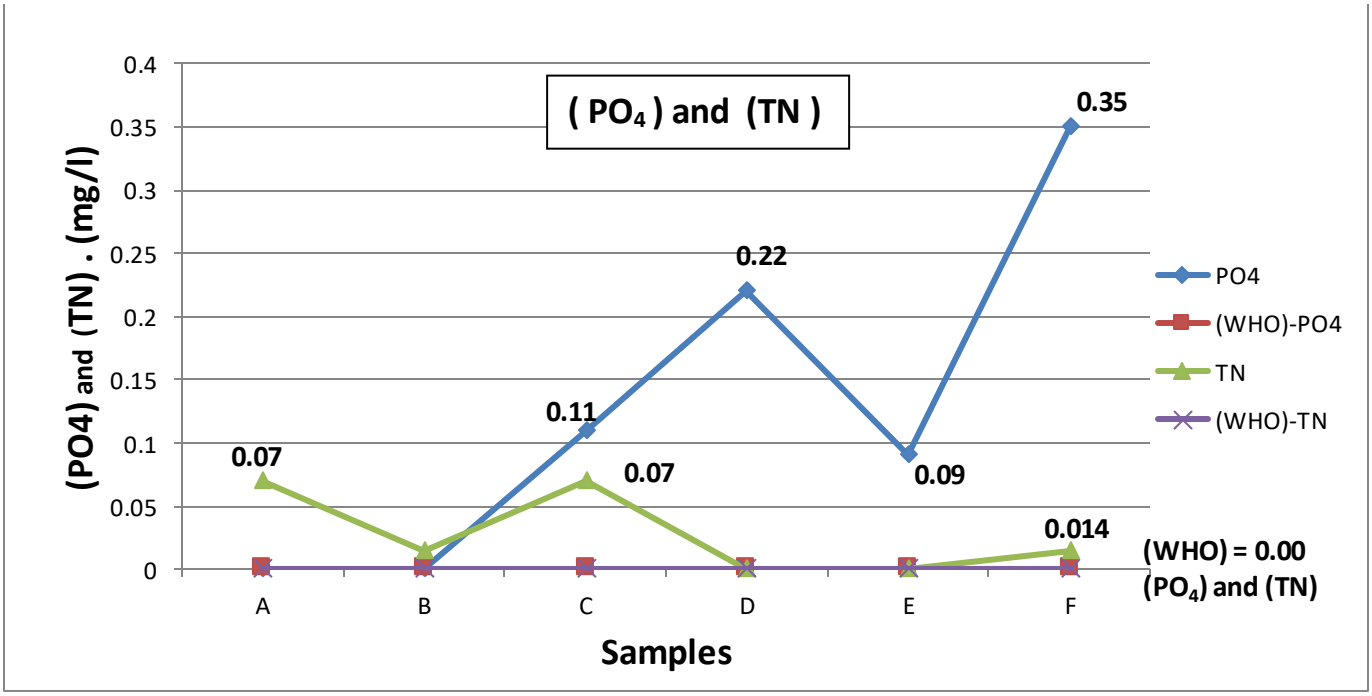

Fig.7: Ratios of Phosphate (PO4) and Total Nitrogen (TN) of the samples under study.

IV. CONCLUSIONS

The results of the analysis of the samples under the study confirmed that the ratio of total soluble solids (TDS) of the samples (D, E , F) to the other samples (A, B, C)).

The results of the analysis also confirmed the high percentage of the lead element (Pb) of the two samples (E, F) from the other samples. The results showed an increase in sulphate (SO_4) for sample (E) than the other samples. The results showed an increase in the ratio of phosphate (PO_4) of sample (F) to the rest of the samples in comparison with the standards of the World Health Organization (WHO). These results indicate that pollution in the Shatt Al-Arab waters increased with toxic elements and compounds.

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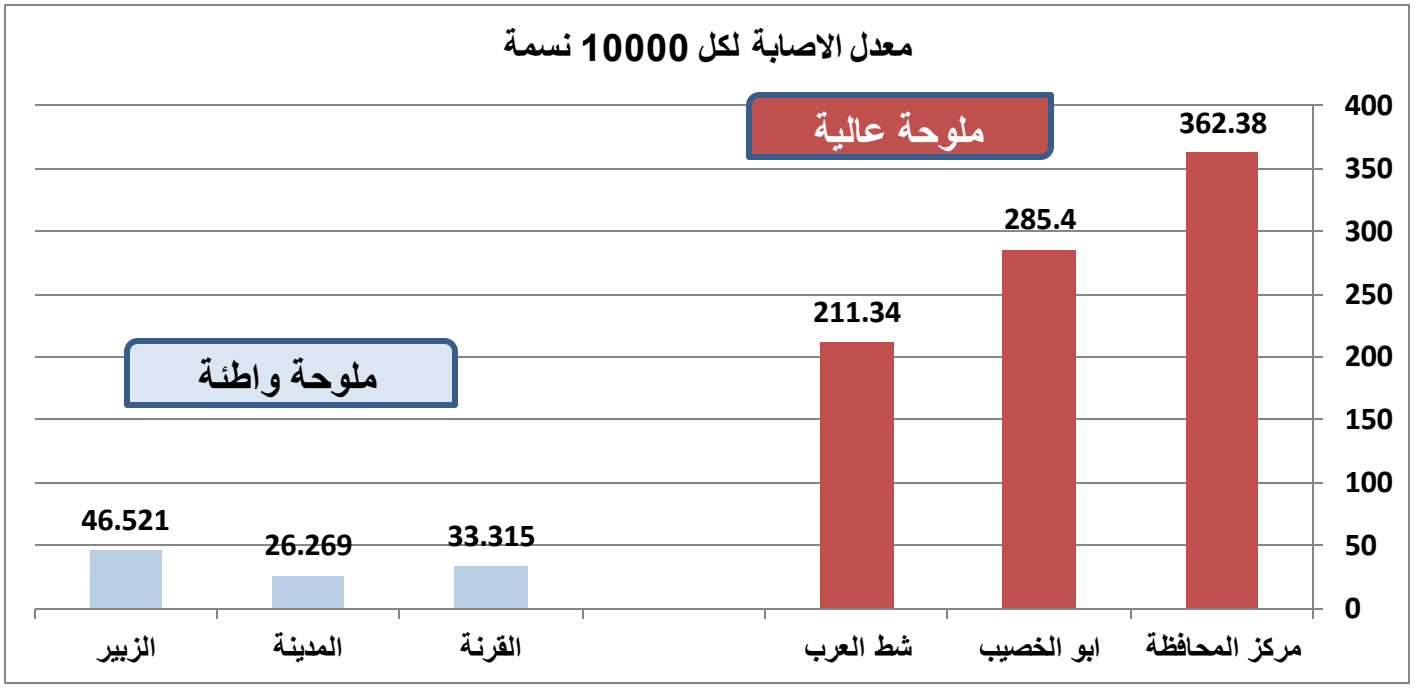
Samples	(WHO) TDS	TDS	(WHO) Pb	Pb	(WHO) SO_4	SO_4	(WHO) PO_4	PO_4
D	1000	9740	0.05	--	400	--	0.0	--
E	=	16960	=	0.8	=	750	=	--
F	=	15936	=	0.8	=	-	=	0.35

These results correspond to the statistics by the Directorate of Basra Governorate Heath, where it showed the increase in the proportion of casualties among the population of the province of Basra to areas adjacent to the Shatt Al-Arab river, such as the city center , Abu- Khasseb and Al-Tanuma from the rest of the areas causing water pollution and the spread of E. coli causing diarrhea and intestinal colic with 50% of cases which was admitted to Basra hospitals.



The rate of injuries that have admitted the Basra Governorate hospitals , where the statistics of the number of injuries in the city center , Abu Al-Khasseb and Al-Tanuma of the areas adjacent to the Shatt Al-Arab river and exposure to bacteria E-Coli causing poisoning and diarrhea with 50% of the total injuries [10].

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