Awareness and Understanding of Waterborne Diseases Among Healthcare providers in Al-Karkh District, Baghdad

Abstract

Aims: This study aimed to evaluate the awareness of healthcare providers in Al-Karkh District, Baghdad, regarding the prevention and management of waterborne diseases.

Methodology: Between January and March 2025, 550 randomly chosen healthcare professionals from six hospitals and 25 healthcare institutions participated in a descriptive cross-sectional survey. A standardized questionnaire for interviews that focused on water safety procedures was used to gather data. The significance level was established at $p < 0.05$, and statistical analysis was conducted using IBM SPSS version 29.

Result: Regarding the prevention of waterborne diseases, the survey discovered that 43.3% of participants had good practices, 44.4% had acceptable practices, and 12.4% had bad practices. Practice levels were found to be significantly correlated with factors like age, education, years of experience, profession, length of training, and attitude ratings ($p < 0.05$). Practice levels, however, were not substantially correlated with facility type or knowledge scores.

Conclusion: Although the majority of healthcare professionals showed that good procedures are acceptable, there are still training and awareness gaps. Enhancing waterborne illness prevention and control in Baghdad requires adopting focused training programs and enhancing provider education.

Keywords: Waterborne diseases, Waterborne diseases, public health, hygiene practices, Iraq, cross-sectional study

Introduction

Water-related infectious diseases are a major cause of mortality and morbidity worldwide, and climate change effects will exacerbate the challenges for the public health sector for both foodborne and water-borne diseases, human exposure to water-borne infections occurs by contact with contaminated drinking water, recreational water or food. Water-and food-borne diseases are linked to the ingestion of pathogens via contaminated water or food, while vector-borne diseases are linked to the infections transmitted by arthropods, such as mosquitoes. Climate change and climate variability will, therefore, affect the burden of climate-sensitive infectious diseases, particularly water-borne and food-borne diseases. [1].

Risks associated with deficiencies in water, sanitation and hygiene infectious diseases that are spread to humans through polluted water. They include cholera, shigella, typhoid, hepatitis A and E, and poliomyelitis. accounting for about 1.5 million deaths annually and accounting for an estimated 3.6% of the global burden of disease in terms of disability-adjusted life years (2). Poor water quality continues to pose a major threat to human health. Diarrheal disease alone amounts to an estimated 4.1% of the total Disability Adjusted Life Year (DALY) global burden of disease and is responsible for the deaths of 2 million people every year. It was estimated that 88% of that burden is attributable to unsafe water supply, sanitation, and hygiene and is mostly concentrated on children in developing countries(3)

According to estimates from the World Health Organization (2007), environmental modifications, such as initiatives to enhance sanitation and hygiene practices and expand access to clean drinking water, can prevent 94% of waterborne diarrheal infections (4). Moreover, a 2005 systematic review determined that diarrheal episodes are lowered by 25% through enhanced water supply, 32% through proper sanitation, 45% through hand washing, and by 39% via household water treatment and safe storage. Other interventions to decrease waterborne diseases are improvements in drinking water, hygiene practices, and sanitation facilities in less developed countries (5).

Water-borne disease can be acquired during water-related recreational activities such as swimming, boating or other water sports. Many epidemiological studies conducted at both marine and freshwater bathing beaches have shown that there is a significant increase in incidence of illness, including gastrointestinal, respiratory, ear and ocular and skin or wound infection among those who engage in water-based recreational activities(6).

Waterborne infections can still affect the most immunocompromised patients, even with proper monitoring and additional disinfection of the water distribution system. Comprehensive epidemiological data can be obtained through whole genome sequencing to assess such transmissions. For the most vulnerable patients, point-of-use filters could be used as a last resort. Along with technological solutions, patients and their families should notify any issues with water quality or hygiene, and healthcare staff should receive training on strict hand hygiene guidelines and how to prevent contaminating the water system (7).

Materials and Methodology

Objective of Study

This study aimed to evaluate the Awareness of healthcare providers in Al-Karkh District, Baghdad, regarding the prevention and management of waterborne diseases.

Design of Study

The current investigation was a cross-sectional descriptive study that evaluated the health provider's knowledge regarding water borne diseases in 6 hospitals and 25healthcare center located in Al-karkh side of Baghdad city. The study was performed from January 2025 till March 2025.

Sample Size

The sample study included 550 medical staff and health care workers who were selected at randomly among health providers who work in the hospitals and health care centers in Al-Karkh district in Baghdad city. Required data were collected onto the health provider's knowledge about waterborne diseases. All eligible patients filled out the consent form and completed the research tool in a written format. The sample size was calculated using the following formula:

$$n = \frac{Z^2_{1-\alpha/2}\,\sigma^2}{d^2}$$

Where n is the sample size, α is the first type, Z is the table-based normal distribution index that is considered at 5% type-one error ($P<0.05$), σ represents the small variable variance, and d shows the accuracy of quantitative variable estimation. In this study, a first type error, z, σ, and d equal to 0.05, 96.3, 7.38, and 0.99, respectively.

Study Instruments

The questionnaire was aimed at collecting data on "Definition of waterborne diseases, their modes of transmission, symptoms, affected age groups, and examples of such diseases.". It consisted of 45 questions. structure of the questionnaire: The questionnaire consisted of four parts:

Part I: Respondent Demographics:

This component included 7 elements addressing age, gender, educational level, professional level, years of experience, health institution, and involvement in training courses or workshops linked to waterborne diseases [8].

Part II: Knowledge Module

Consist of 45 questions included in this section tested the participants' understanding of general information, symptoms, consequences, mechanisms of transmission, and prevention strategies related to waterborne infections [9].

Part III: Attitudes Module:

Consist of 13 questions measuring medical and paramedical staff attitudes regarding waterborne diseases include attitudes toward maintaining safe water and clean water containers and, they were taken from these studies [10].

Part IV: Practices Module:

There were 15 questions in this section that evaluated the medical and paramedical staff's practices regarding waterborne diseases. These questions provided information on how to keep the water source, water collecting containers, and storage containers clean. This means that water is preserved from the source to the final consumer while being shielded from contamination [11].

A reliability of 0.93 was found when the questionnaire's reliability was examined using Cronbach's alpha.

Statistical analysis

The collected data were coded, input, displayed, and analyzed by a computer using IBM SPSS-29 (IBM Statistical Packages for Social Sciences, version 29, Chicago, IL, USA) is a statistical software program that is available for databases. Frequency, percentage, mean, standard deviation, and range (minimum-maximum values) were the basic statistics used to display the data.

The significance of the contrast of different means (quantitative data) were tested utilizing Students-t-test for calculating the variation between two independent means or Paired-t-t-test for the variation between the two observations (or two dependent means), or ANOVA test for variations between more than a pair of separate means. The Pearson Chi-square test was used to determine whether the differences in percentages (qualitative data) were significant (χ^2-test) with application of Yate's correction or Fisher Exact test whenever applicable. The P value was deemed statistically significant if it was equal to or less than (8-10)

Results

Table (1): Socio-Demographics characteristics of the study sample

Demographic Characteristics		No.	%
Age (years)	20-29	222	40.4
	30-39	194	35.3
	40-49	85	15.5
	50-59	49	8.9
	Mean±SD (Range)	34.0±9.2 (22-59)	
Sex	Male	149	27.1%
	Female	401	72.9%

Education Level	Institute/Diploma	163	29.6
	Bachelor's degree	354	64.4
	Master/PhD degree	33	6.0
Experience	1-4years	232	42.2
	5---9	120	21.8
	10---14	79	14.4
	15---19	43	7.8
	=>20years	76	13.8
	Mean±SD (Range)	9.0±8.5 (1-35)	
Profession	Medical	462	84.0
	Paramedical	88	16.0
Facility Type	Hospital	360	65.5
	PHCC	190	34.5
Training status	Yes	194	35.3
	No	356	64.7
Number of courses (n=194)	1	77	39.7
	2	47	24.2
	3	21	10.8
	4	17	8.8
	5	27	13.9
	6	4	4.9
Duration of the last course (days) (n=194)	3 days	42	21.6
	5 (1 week)	104	53.6
	14 (2 weeks)	13	6.7
	21 (3 weeks)	18	9.3
	30 (1month/More)	17	8.8
Total		550	100%

The study showed sample's demographic variables are shown in Table (1), where the study was performed on 550 healthcare providers with the mean ± SD of their ages being 34.0 ± 9.2 years, ranging from 22 to 59 years. The age group 20–29 years had the highest percentage (40.4%), while the age group 50–59 years had the lowest percentage (8.9%). Females represented the majority of the sample (72.9%) in contrast to men (27.1%).

The highest percentage of participants held a bachelor's degree (64.4%), followed by those with an Institute/Diploma (29.6%), while the lowest percentage had a Master's/PhD degree (6.0%). Most respondents had 1–4 years of experience (42.2%), and the mean work experience was 9.0 ± 8.5 years, ranging from 1 to 35 years. The majority of healthcare providers were medical professionals (84.0%), while paramedical staff accounted for (16.0%). Most participants worked in hospitals (65.5%), compared to primary healthcare centers (PHCCs) (34.5%).

This study also showed that the majority of participants (64.7%) had not received any training on waterborne diseases, while only (35.3%) had undergone training. Among those trained, the most common course duration was 5 days (53.6%), followed by 3 days (21.6%).

Table (2): Awareness of Healthcare Providers for Waterborne Diseases – General Concepts

I=Knowledge of HC provider about water borne diseases management	Yes		No		DNK	
	No.	%	No.	%	No.	%
1.Waterborne diseases are illnesses caused by pathogens in contaminated water	516	93.8	22	4.0	12	2.2
2.Outbreaks of waterborne diseases result in significant mortality in vulnerable communities	508	92.4	26	4.7	16	2.9
3.Waterborne disease primarily transmitted through drinking tap water	411	74.7	107	19.5	32	5.8
4.Waterborne diseases affect both humans and animals	476	86.5	49	8.9	25	4.5
5.Poor water quality a direct indicator of the potential for waterborne diseases	487	88.5	51	9.3	12	2.2
6.Poor sanitation and hygiene are major causes of waterborne diseases	497	90.4	43	7.8	10	1.8

Healthcare providers' responses regarding general knowledge of waterborne diseases are showed in **Table (2)**, indicating the vast majority (93.8%) were aware that waterborne diseases are illnesses caused by pathogens in contaminated water, while nearly all (92.4%) recognized that outbreaks result in significant mortality in vulnerable communities.

About three-quarters of providers (74.7%) correctly identified drinking tap water as a primary transmission route for waterborne diseases. Most respondents (86.5%) knew these diseases affect both humans and animals. The overwhelming majority recognized poor water quality as a direct indicated (88.5%), and nearly all (90.4%) identified poor sanitation and hygiene as major causes of waterborne diseases.

Table (3): Awareness of Healthcare Providers for Waterborne Disease Transmission Routes

I=Knowledge of HC provider about water borne diseases management	Yes		No		DNK	
	No.	%	No.	%	No.	%
7.Agricultural runoff contributes to water contamination and the spread of diseases	353	64.2	128	23.3	69	12.5
8.Improper disposal of industrial waste is a known cause of waterborne diseases	455	82.7	71	12.9	24	4.4
9.Heavy rains and flooding often lead to an increase in waterborne diseases	403	73.3	97	17.6	50	9.1

10.Contamination by human or animal feces is a primary source of waterborne diseases	451	82.0	68	12.4	31	5.6

Healthcare providers' responses regarding transmission routes of waterborne diseases are showed in Table (3), demonstrating that most providers (82.0%) correctly identified contamination by human or animal feces as a primary source of waterborne diseases. Similarly, a strong majority (82.7%) recognized improper disposal of industrial waste as a known cause.

The table reveals that nearly three-quarters of providers (73.3%) understood that heavy rains and flooding often lead to increased waterborne diseases. However, knowledge was notably lower (64.2%) regarding agricultural runoff's contribution to water contamination, with a substantial proportion (23.3%) denying this connection and 12.5% being uncertain.

Table (٤): Awareness of Healthcare Providers for Specific Waterborne Diseases (Bacterial)

I=Knowledge of HC provider about water borne diseases management	Yes		No		DNK	
	No.	%	No.	%	No.	%
17.Cholera is classified as a bacterial waterborne disease	461	83.8	64	11.6	25	4.5
18.Cholera is caused by the bacterium Vibrio cholerae, which is often present in contaminated water	438	79.6	65	11.8	47	8.5
19.Cholera outbreaks can lead to severe dehydration and death within hours if untreated	456	82.9	55	10.0	39	7.1
20.Typhoid and dysentery are considered bacterial waterborne diseases	422	76.7	78	14.2	50	9.1
21.Salmonella bacteria can contaminate drinking water, leading to salmonellosis	445	80.9	64	11.6	41	7.5
22.Salmonellosis is often associated with symptoms like fever, diarrhea, and vomiting after consuming contaminated water or food	457	83.1	56	10.2	37	6.7
23.E. coli infection primarily associated with drinking contaminated water or undercooked food	430	78.2	56	10.2	64	11.6
24.Certain strains of E. coli can cause hemolytic uremic syndrome (HUS), leading to kidney failure	402	73.1	60	10.9	88	16.0

Healthcare providers' responses regarding bacterial waterborne diseases are showed in Table (٤), where the majority (83.8%) correctly identified cholera as a bacterial waterborne disease, while nearly as many (82.9%) recognized its potential to cause rapid dehydration and death if untreated.

Table (٥): Awareness of Healthcare Providers for Specific Waterborne Diseases (Parasitic & Viral)

I=Knowledge of HC provider about water borne diseases management	Yes		No		DNK	
	No.	%	No.	%	No.	%
25.Giardia lamblia a parasite classified as classified as water borne diseases	407	74.0	65	11.8	78	14.2
26.Giardiasis can lead to prolonged diarrhea, weight loss, and malnutrition if untreated	454	82.5	42	7.6	54	9.8
27.Dysentery commonly caused by Shigella bacteria or Entamoeba histolytica parasite through contaminated water	428	77.8	50	9.1	72	13.1
28.Dysentery can result in bloody diarrhea and severe abdominal pain	460	83.6	49	8.9	41	7.5
29.Parasitic infections such as schistosomiasis result from contaminated water	461	83.8	59	10.7	30	5.5
30.Hepatitis A, known as a viral waterborne disease	422	76.7	86	15.6	42	7.6
31.Hepatitis A spreads through contaminated water and poor hygiene practices	434	78.9	70	12.7	46	8.4
32.Hepatitis A cause viral diseases with symptoms such as jaundice, fatigue, and abdominal pain	472	85.8	46	8.4	32	5.8

Healthcare providers' responses regarding parasitic and viral waterborne diseases are showed in Table (٥), where the majority (83.8%) correctly identified schistosomiasis as resulting from contaminated water, while nearly as many (85.8%) recognized hepatitis A symptoms including jaundice and abdominal pain. Most providers (78.9%) knew hepatitis A spreads through contaminated water and poor hygiene, and (76.7%) correctly classified it as a viral disease. For parasitic infections, (82.5%) understood giardiasis consequences, though fewer (74.0%) knew Giardia lamblia is waterborne. Regarding dysentery, (83.6%) recognized its symptoms, while (77.8%) knew its causes (Shigella or Entamoeba histolytica), with (13.1%) answering "Do Not Know" to this question.

Table (٦): Awareness of Healthcare Providers for Symptoms and Complications

I=Knowledge of HC provider about water borne diseases management	Yes		No		DNK	
	No.	%	No.	%	No.	%
33.Waterborne diseases commonly present with symptoms such as diarrhea and vomiting	474	86.2	52	9.5	24	4.4
34.Waterborne diseases contribute to malnutrition in children	478	86.9	42	7.6	30	5.5

35.Waterborne diseases cause fever and abdominal pain	468	85.1	55	10.0	27	4.9
36.Untreated waterborne diseases can lead to severe dehydration	479	87.1	48	8.7	23	4.2
37.Prolonged exposure to contaminated water linked to chronic gastrointestinal issues	465	84.5	37	6.7	48	8.7
38.Certain waterborne diseases lead to kidney or liver failure if left untreated	452	82.2	47	8.5	51	9.3
39.That some waterborne diseases can cause long-term neurological damage	422	76.7	67	12.2	61	11.1
40.Skin rash and eye infections are potential symptoms of waterborne diseases caused by parasites	444	80.7	54	9.8	52	9.5

Healthcare providers' responses regarding symptoms and complications of waterborne diseases are showed in Table (٦). The majority of providers (87.1%) recognized that untreated waterborne diseases can lead to severe dehydration, while nearly as many (86.9%) knew these diseases contribute to malnutrition in children. Most respondents (86.2%) identified diarrhea and vomiting as common symptoms, and (85.1%) acknowledged that fever and abdominal pain are typical manifestations. A significant proportion (84.5%) understood the link between prolonged exposure to contaminated water and chronic gastrointestinal issues. Providers demonstrated good awareness of serious complications, with (82.2%) correctly stating that certain waterborne diseases can cause kidney or liver failure if untreated. Skin rash and eye infections as potential parasitic symptoms were recognized by (80.7%) of respondents. Knowledge was slightly lower regarding neurological effects, with (76.7%) agreeing that some waterborne diseases can cause long-term neurological damage, while (11.1%) answered "Do Not Know" to this question - the highest level of uncertainty in this section. The remaining responses for all items showed relatively low proportions of incorrect answers or uncertainty, indicating generally strong awareness of waterborne disease symptoms and complications among healthcare providers.

Table (7): Association Between Healthcare Providers' Characteristics and Their Knowledge of Waterborne Diseases

		Awareness Score						P value
		Poor (n=0)		Acceptable (n=70)		Good (n=480)		
		No.	%	No.	%	No.	%	
Age (years)	20-29	-	-	36	51.4	186	38.8	0.054
	30-39	-	-	25	35.7	169	35.2	
	40-49	-	-	4	5.7	81	16.9	
	50-59	-	-	5	7.1	44	9.2	
Gender	Male	-	-	19	27.1	130	27.1	0.992
	Female	-	-	51	72.9	350	72.9	

The years of practical work	1-4years	-	-	39	55.7	193	40.2	0.088
	5---9	-	-	15	21.4	105	21.9	
	10---14	-	-	8	11.4	71	14.8	
	15---19	-	-	2	2.9	41	8.5	
	=>20years	-	-	6	8.6	70	14.6	
Educational Qualification	Institute/Diploma	-	-	21	30.0	142	29.6	0.074
	Bachelor's degree	-	-	49	70.0	305	63.5	
	Mast/PhD degree	-	-	-	-	33	6.9	
Profession	Medical	-	-	59	84.3	403	84.0	0.944
	Paramedical	-	-	11	15.7	77	16.0	
Facility type	Hospital	-	-	49	70.0	311	64.8	0.392
	PHCC	-	-	21	30.0	169	35.2	
Training status	Yes	-	-	18	25.7	176	36.7	0.073
	No	-	-	52	74.3	304	63.3	
Number of courses (n=194)	1	-	-	7	38.9	70	39.8	0.867
	2	-	-	6	33.3	41	23.3	
	3	-	-	2	11.1	19	10.8	
	4	-	-	1	5.6	16	9.1	
	5+	-	-	2	11.1	30	17.0	
Duration of the last course (days) (n=194)	3days	-	-	2	11.1	40	22.7	0.833
	5 (1 week)	-	-	11	61.1	93	52.8	
	14 (2 weeks)	-	-	1	5.6	12	6.8	
	21 (3 weeks)	-	-	2	11.1	16	9.1	
	30 (1month+)	-	-	2	11.1	15	8.5	
Attitude Score	Poor	-	-	1	1.4	5	1.0	0.033*
	Acceptable	-	-	22	31.4	72	15.0	
	Good	-	-	47	67.1	403	84.0	
Practice Score	Poor	-	-	10	14.3	58	12.1	0.267
	Acceptable	-	-	36	51.4	208	43.3	
	Good	-	-	24	34.3	214	44.6	
*Significant difference between percentages using Pearson Chi-square test (χ^2-test) at 0.05 level.								

Table (7) presented the associations between demographic factors and **Awareness** levels are No providers scored in the poor knowledge category, with 70 (12.7%) showing acceptable knowledge and 480 (87.3%) demonstrating good knowledge. A statistically significant association emerged between attitude and knowledge scores (p=0.033), where 84.0% of providers with good attitudes also had good knowledge compared to 67.1% with acceptable knowledge.

Age showed a marginal association (p=0.054), with younger providers (20-29 years) comprising 51.4% of the acceptable knowledge group versus 38.8% of the good knowledge group. Training status approached significance (p=0.073), as trained providers represented 36.7% of the good knowledge category compared to 25.7% of the acceptable group. Educational qualification showed that no Master's/PhD holders fell into the acceptable knowledge category, though this difference wasn't statistically significant (p=0.074).

Other demographic and professional characteristics - including gender, years of experience, profession type, facility type, and practice scores - showed no significant relationships with knowledge levels (all p>0.05). Among trained providers, neither the number of courses taken nor their duration significantly affected knowledge scores. The findings suggest that while positive attitudes strongly correlate with better knowledge, most demographic factors don't significantly influence knowledge levels in this sample.

Discussion

Part I: Socio- Demographics Data

In the current study, the majority of participants were female. This finding is consistent with the results of confirmed that the majority of their participants were female. The average age in the current study was 34 ± 9.2 years, and the majority of the sample had 1–4 years of work experience. These findings dissent with(11) ,who found that majority of their participants were aged 30–40 years .However, it also dissent with (12), where most of the sample had 15–35 years of experience and only very few of them had 3–5 years.

In the present study, most participants held a bachelor's degree. This finding contrasts who reported that half of their sample were institute graduates, and only few of them held bachelor's degrees. It is also discord with (13) , where the majority half of the sample held diplomas, and only a few of them had higher academic qualifications(14), also mentioned a small number of institute graduates, which partially supports the lower representation of technical-level education.

A key finding in the current survey was that more than half of participants had not received any prior training related to waterborne diseases. This significantly contrasts with (15), who reported that 80% of healthcare workers in their study had received either formal or informal training on topics such as hand hygiene, water treatment, storage, and related diseases.

In the present study healthcare providers' responses regarding general knowledge of waterborne diseases indicate that vast majority of the sample had a good awareness that waterborne diseases are illnesses caused by water contaminated by pathogens, transmission routes of waterborne diseases are demonstrating that most providers correctly identified contamination by human or animal feces as a primary source of waterborne diseases. Similarly, a strong majority recognized improper disposal of industrial waste as a known cause, this finding resonate with (16 17) in north of Iraq and India which show that the respondent had a good knowledge about waterborne diseases and their causes.

The current study show that about three-quarters of respondents correctly identified drinking tap water as a primary transmission route for waterborne diseases, this validate previous work of (17)indicted that these diseases can spread from drinking tap water due to improper maintenance to the pipeline system that transports it. Nearly most of providers in the present study identified poor sanitation and hygiene as major causes of waterborne diseases.[18) correspond with this finding. In the current study providers demonstrated robust knowledge of high-risk populations, including children under five ,infants and elderly which is critical .for targeted interventions in vulnerable groups this similar to (19). which show that water had negative health impacts such as neurological disorders, gastrointestinal problems, pregnancy problems and reproductive problems which ultimately comprises the infants health, pregnant women, elderly persons and those who are already ill and taking medicine [20, 21). These studies demonstrated that poor water environment was connected to with higher maternal mortality which agreement with finding of ongoing study. The finding of our study at hand reveals that nearly three-quarters of providers understand that heavy rain and flooding often lead to increased waterborne diseases. However, knowledge was notably lower regarding agricultural runoff's contribution to water contamination (22). This line with finding in this study which clear that there are linkages between waterborne disease and climate chang. In the current survey the providers show high awareness about sanitation and hygiene as causative factors ,water quality as risk indicator and fecal contamination as primary source (18).

Part II: Knowledge and awareness of healthcare providers regarding the prevention and management of waterborne diseases

The study in Tanzania was conflicted with finding of the present study which include less than half of participants had adequate knowledge regarding household sanitation and hygiene, while half of them had inadequate knowledge(23). This study is partially explained that poor quality of water in the in-house storage vessels, reflecting considerable in-house contamination of drinking water. Risk factors for diarrhea were inadequate for water connection and water storage facility. The association between water quality and diarrhea varied by the level of water availability and the presence or absence of a toilet. This aligns with the concept of the current study. Our finding of healthcare providers' responses regarding bacterial waterborne diseases are where the majority correctly identified cholera as a bacterial waterborne disease, while nearly as many recognized its potential to cause rapid dehydration and death if untreated and most providers knew cholera is caused by Vibrio cholerae in contaminated water (24).

in Yemen its result was consistent with a recent study, which showed that the participants had good knowledge about the infectious agent, vulnerable age group, main treatment and disagreement in knowledge about modes of transmission, severity classification and complications. Current findings show that awareness of the providers ware slightly lower for typhoid and dysentery being bacterial diseases. Regarding salmonellosis, most understood its link to contaminated water, and a high percentage of the group recognized its symptoms (25).

this study demonstrated consistency with current study in terms of providers show strong awareness of transmission routes, gaps exist in understanding severity, treatment challenges, and symptoms of typhoid fever (26, 27). these studies contradiction with the finding of the present study that participants were having less awareness about typhoid, this may be due to improper training in waterborne diseases.

The present finding of healthcare providers' responses regarding parasitic and viral waterborne diseases are shown in where the majority correctly identified schistosomiasis as resulting from contaminated water this similar to the finding of(28). Many respondents understood the role of contact with contaminated water in transmission. While nearly as many recognized hepatitis A symptoms including jaundice and abdominal pain, most providers knew hepatitis A spread through contaminated water and poor hygiene and correctly classified it as a viral disease. (29) this study supported the recent study that participant had highly knowledge on mood of transmission, signs and symptoms and moderate knowledge on vaccination (30).

Match with outcome of our study about vaccination of hepatitis A. Adequate number of providers knew Giardia lamblia is waterborne this line with(31) which participant had good knowledge while, (32) conflict with our finding which had bad awareness may be due to improper education for the participant about waterborne diseases. Regarding dysentery, high percentage of providers recognized its symptoms, knew its causes (Shigella or Entamoeba histolytica), this disagree with (33) who stated that there was an inadequate perception of the physician about amoebiasis.(34) agree with our finding. The contrast between the present study and their study may be due to that in their study, the questions include more details about amebiasis and giardiasis. In the current study the majority of providers recognized that untreated waterborne diseases can lead to severe dehydration, while nearly as many knew these diseases contribute to malnutrition in children. Most respondents identified diarrhea and vomiting as common symptoms and acknowledged that fever and abdominal pain are typical manifestations. A significant proportion understand the link between prolonged exposure to contaminated water and chronic gastrointestinal issues. Providers demonstrated good awareness of serious complications (31).

This study dispute with our finding which show low knowledge about waterborne commonest cause of diarrhea in children under five years and agree with it about providers had good knowledge about diarrheal diseases can cause malabsorption and waterborne diseases cause severe diarrhea(26), partially discord with our finding show that participant had moderate knowledge about meaning of dehydration (35), this study ware incompatibility with the current finding shown that participant had low knowledge about symptoms of diarrhea they need more education this may they had low experience. The overall Healthcare providers' knowledge scores in dealing with waterborne diseases. The results show that providers demonstrated good knowledge. (16, 18) agreement with current study due to poor training.(36) disagree with the present study that participant had good knowledge. In the current study younger providers comprising half of the acceptable knowledge group versus few of them had a good knowledge group. As trained providers represented, few of them had a good knowledge category compared to less than a quarter of the acceptable group (37-40).

These studies resonate with our study which found that there were considerable differences in the health provider's knowledge and practices about waterborne infections depending on their age and related training attended. It is also revealed that there is a significant relationship between the respondent's level of awareness and practices regarding waterborne diseases and their practices in the prevention of waterborne diseases in terms of their age and related training attended [41].

Conclusion

The survey found that the majority of medical professionals in Al-Karkh, Baghdad, are well-versed in waterborne illnesses, particularly in terms of prevention and symptoms. But there are still gaps in our knowledge of certain diseases and environmental variables. Apart from a positive correlation with attitude, the majority of demographic characteristics did not exhibit any meaningful association with knowledge.