



## AWARENESS OF IRAQI CONSUMERS TO FOODBORNE ILLNESS RISKS

Mahmud A. J. Alkhafaji

Assistant Professor, PhD, Market Research and Consumer Protection Center, University of Baghdad, Iraq, Corresponding author e: [mahmud@mracpc.uobaghdad.edu.iq](mailto:mahmud@mracpc.uobaghdad.edu.iq)

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### ABSTRACT

Many of Iraqi consumers suffered every year from foodborne illness including food poisoning, symptoms of their diseases varies from usual symptoms which ends after a few days to severe cases which require hospitalization, and sometimes lead to death. In this research we collected data from Iraqi directorates related with consumer's health to investigate the awareness of Iraqi population against foodborne illness. The questionnaire used as a tool research, based on information collected. Four most commune pathogens, which caused almost foodborne illness among Iraqi consumers have been investigated in the research. The collection data has been done by the questionnaire addressed to 500 consumers. The research focused to ask Iraqi consumer about their awareness of the pathogens causing foodborne illness and the way of infection. Results showed that Iraqi consumers were aware of foodborne illness risks causing by pathogens as following consequently: Typhoid Fever *Salmonella typhi* 48%, *Escherichia coli* E coli 44%, *Brucellosis Brucella ssp.* 38%, *Shigellosis Shigella ssp.* 30%, and *Amebiasis Entamoeba histolytica* 21%.

The results obtained by the research reflected a lack in awareness of Iraqi consumer against pathogens causing foodborne illness.

Keywords: Awareness of risks, Iraqi consumer, foodborne illness.

مدى إدراك المستهلك العراقي بمخاطر الامراض المنقولة عن طريق الغذاء

محمود عبد الله جاسم الخفاجي،

أستاذ مساعد دكتور، مركز بحوث السوق وحماية المستهلك، جامعة بغداد، العراق، البريد الإلكتروني: [mahmud@mracpc.uobaghdad.edu.iq](mailto:mahmud@mracpc.uobaghdad.edu.iq)

### الخلاصة

يعاني العديد من المستهلكين العراقيين سنويا من الأمراض المنقولة عن طريق الغذاء بما في ذلك التسمم الغذائي، وتختلف أعراض أمراضهم من الأعراض المعتادة التي تنتهي بعد بضعة أيام إلى الحالات الشديدة التي تتطلب دخول المستشفى، وتؤدي في بعض الأحيان إلى الوفاة. أجري في هذا البحث جمع بيانات من المؤسسات العراقية المعنية بصحة المستهلك لبيان مدى وعي السكان العراقيين تجاه الأمراض المنقولة عن طريق الغذاء. اعتمدت الاستبانة كأداة للبحث بناءً على المعلومات التي تم جمعها. وتم في هذا البحث دراسة أربعة مسببات مرضية شائعة الحدوث في المجتمع العراقي، وهي تسبب اغلب حالات الأمراض المنقولة بالغذاء تقريباً بين المستهلكين العراقيين. وقد تم استحصال بيانات عينة الدراسة المؤلفة من 500 شخص بواسطة الاستبانة الموجه إليهم. ركز البحث على سؤال محوري الى المستهلك العراقي عن مدى وعيه بمسببات الأمراض المنقولة عبر الغذاء وكيفية حدوثها من خلال ادراكه الشخصي. أظهرت النتائج أن المستهلكين العراقيين مدركين الأمراض المنقولة بالغذاء والتي تسببها الجراثيم الممرضة على النحو التالي: حمى التيفويد 48% *Salmonella typhi*، الاشركية القولونية 44% *E. Coli*، داء البروسيلة 38% *Brucella ssp.*، الشيجلا 30% *Shigella ssp.*، داء الأميبا 21% *Entamoeba histolytica*.  
تتفق النتائج التي تم الحصول عليها في البحث نقص في وعي المستهلك العراقي تجاه مسببات الأمراض التي تنتقل عن طريق الأغذية.

الكلمات المفتاحية: إدراك المخاطر، المستهلك العراقي، الأمراض المنقولة عن طريق الغذاء.



## INTRODUCTION

Foodborne illness or commonly known as food poisoning according to the World Health Organization (WHO) is at least two cases of illness after consuming the same food (WHO, 2020). Food poisoning can be caused by different ways. Only foodborne illness caused by microorganisms and their toxins (poisons) is covered by this research. Food poisoning can also be caused by chemical substances and pure poisons, for example mushroom poisoning. According to statistics compiled by the Directorate of Public Health of the Iraqi Ministry of Health, there are approximately hundreds outbreaks and approximately thousands cases of food poisoning annually (Statistics IMOH, 2019). Only a fraction of all food poisoning is reported. The vast majority of sufferers cure their stomach ailment at home without reporting it further. This makes it difficult to calculate the total number of cases of food poisoning in Iraq (Alkhafaji M., 2020). The assessment is that around thousands Iraqi are affected per year. Internationally, this is a low estimate.

Foodborne infection can be divided into two different groups: infection and poisoning. The infection requires that food contains microorganisms or parasites that penetrate the intestinal wall from the gastrointestinal tract and cause inflammation (for example, Salmonella, Escherichia Coli, Shigella, Brucella, and Entamoeba histolytica). Poisoning requires that food is contaminated primarily by bacteria that form bacterial toxins during their growth, for example *Staphylococcus aureus*, *Clostridium perfringens* and *Bacillus cereus*. *Clostridium botulinum* is also a toxin-forming bacterium but causes completely different symptoms than the others. Some polluting microorganisms can also, via their own enzymes, convert, for example, proteins in the food into toxic products (Thomas Bintsis, 2017).

That the infectious agent is present in the food right from the start and is given the opportunity to grow. So, for example, *Clostridium. perfringens*, whose spores are naturally found in soil and on vegetables, can survive long-boiling cooking, and if there is a lack of cooling, grow in large quantities. The toxin can then be formed in the intestine when the bacteria reverts to spore form (Alkhafaji M., 2016). That non-spore-forming bacteria survive, and possibly grow, if the cooking temperature was too low and the food was then stored incorrectly, for example Salmonella in egg dishes, Campylobacter in chicken, various different bacteria in spices (Alkhafaji M., 2019). That the food has been irrigated, treated or rinsed in contaminated water (*Shigella ssp*, *Salmonella ssp*, and *E. coli* in different types of lettuce, hepatitis A in raspberries). That naturally occurring substances in the food via the influence of polluting microorganisms have been converted into "poisons", for example into histamine in fish (RR Attaran & F Probst, 2002).

Symptoms and incubation period depend on the type of infection. In general, toxin poisoning has a short incubation period (a few hours to a day), while in the case of infections it is usually somewhat longer and for some infectious agents up to weeks. Symptoms usually include diarrhea, vomiting, abdominal pain and sometimes fever (S.J. Chai, W.Gu & others, 2019).

## MATERIALS & METHODS

### Data collection & questionnaire

According to data collected in this research from the Iraqi Ministry of Health, we noted that the more common problems caused foodborne illness in Iraq, came from five pathogens: *Escherichia coli*, *Shigella ssp.*, *Entamoeba histolytica*, *Salmonella typhi* and *Brucella ssp.* (MoH, 2020) The infection by indicated pathogens varies from one person to another, from symptoms that disappear after days by receiving appropriate treatment to the death in some cases (C.T. Lin, *et al.*, 2005). The number of annual cases studied in the research, their symptoms and source are represented the average for registered cases for three years between 2019-2021 as it shown in (Table 1).

**Table (1):** Average of annual causes of foodborne illness and causing pathogens.

Pathogen	No. Annual Cases	Food Source (average)	Symptoms
<i>Escherichia coli</i>	14035	Food contaminated with <i>E.Coli</i>	Diarrhea, fever, vomiting, severe stomach cramps
<i>Shigella ssp.</i>	78865	Food contaminated with shigella	Diarrhea, fever, vomiting
<i>Entamoeba histolytica</i>	23951	Fruits and vegetables	Diarrhea, abdominal pain
<i>Salmonella typhi</i>	14211	Food contaminated with <i>Salmonella</i>	Headache, fatigue, persistent fever
<i>Brucella ssp.</i>	1488	Dairy products contaminated with <i>Brucella</i>	Fever, headache, chills

The data used in the research has been taken from the archives of the Iraqi Ministry of Health-Food Research Institute. The data were included all ages of habitants that they live in different provinces of Iraq who infected by foodborne illness during the period 2019-2021. A questionnaire created for the purpose of the research, and discussed by experts specialized in foodborne illness from Iraqi Universities and others from directorates related with public health before submitting to a random sample consisted of 500 adults. The questionnaire addressed personally or sending by social media to the participants. The survey based on questionnaire adopted a descriptive statistics analysis results.

The questionnaire includes several questions addressed to the consumer about his knowledge of: the reasons caused problems in food, consumer awareness to have safe food, consumer awareness to use good manufacturing practices in food handling and consumption (Herrera R. & Alkhafaji M., 2021). Study sample were 55% male and 45% female, 57% live in Alrusafa district and 43% live in Alkarj district. The questionnaire submitted to the study sample between April 2022 to August 2022. The final total questionnaires received after removing invalid questionnaires were 486, delivered between 245 male respondents and 241 females (Table 2).

**Table (2):** Study sample characteristics

Demographic info.	Frequency	Percentage (%)
<b>Gender</b>		
Male	245	50.4
Female	241	49.6
<b>Age</b>		
18-34 years	165	33.9

35–54 years	231	47.5
55–64 years	90	18.5
<b>Education Level</b>		
Without Education	5	5.3
Essential education	55	58.5
Higher education	34	36.1
<b>Income</b>		
300.000-600.000 ID	196	40.3
600.000-1000.000 ID	213	43.8
More than 1000.000 ID	77	15.8

### Statistical analysis

A descriptive statistics analysis used to analyze obtained results (i.e., percentage), the statistical analysis ensured that different pathogens analyzed in this study is related with food safety perceptions, awareness of food and substances that probably make hazards to food safety, consumer behaviors and experience related to food safety, and demographic data.

### Food safety perceptions

Consumers who are interested in avoiding foodborne diseases are more aware of the causes of these diseases than others, and they always try to pay attention to food safety requirements and constantly search for information that helps them to avoid contracting diseases caused by food, directly or indirectly (Alkhafaji, M., 2020). Therefore, the questionnaire was built on the extent of awareness consumers perceive food safety depending on four variables. First: The extent to which the study sample knows the pathogens represented by five pathogens that are the most causative of foodborne diseases in Iraqi society. Second: Where is the possibility of danger entering food, which threatens food safety and leads to disease? Third: The role played by food safety practices in reducing the incidence of foodborne diseases. Fourth: Consumer's Knowledge of the cause of his illness. The results were as shown in Table 3.

**Table (3):** Variables & study sample answers

Variables	Question	Yes	No
<b>Pathogens</b>			
E. Coli	Do you heard about <i>E. Coli</i> as a problem in food	212 (44%)	274
Shigella ssp.	Do you heard about <i>Shigella</i> as a food problem	146 (30%)	340
Entamoeba histolytica	Do you heard about <i>Entamoeba histolytica</i> as a food problem	104 (21%)	382
Salmonella typhi	Do you heard about <i>Salmonella typhi</i> as a food problem	231(48%)	255
Brucella ssp.	Do you heard about <i>Brucella</i> as a food problem	187 (38%)	299
<b>Risk probability</b>			
Home food	Do you think that food problems caused at home	65 (14%)	421
Microorganisms	Do you think that food contamination is caused by microorganisms	249 (52%)	237
Wrong practices	Do you think that foodborne illness is caused from wrong practices	177 (37%)	309
<b>Food safety practices</b>			
Wash hands	Do you know that not wash hands before preparing food will expose food safety to a potential risk.	196 (40%)	290
Other personal	Do you think that not followed personal hygiene practices will expose food safety to a potential risk?	222 (46%)	264
<b>Sickness</b>			
Foodborne illness	Do you think that you fell sick onetime because you eating unsafe food or contaminated by pathogens	178 (37%)	308

Health condition	Do you have a good health condition	289 (59%)	197
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### Awareness of potentially risks food and substances

Through the results obtained from the study sample, it was found that consumers who are aware of the potential risks of eating food contaminated with pathogens have more knowledge than others about the microorganisms that cause these diseases, and therefore they are aware of the importance of food safety and make sure that all the food they want to eat is safe. It does not cause them any health damage. This comes from the culture acquired by those consumers by researching and investigating the causes of some common foodborne diseases, whether through visual and audio media, or by searching themselves for pathogens to prevent infection with them.

Consumers were also asked if they had heard of some common pathogens such as *E.coli*, *Shigella ssp*, *Salmonella typhi*, *Brucella ssp*. and *Entamoeba histolytica*, their answer showed in Table 3.

### Other explanatory variables

Proper personal practices for food handling, and followed good manufacturing practices (GMP) are playing an important role in increasing consumer awareness of foodborne pathogens, and making them more careful when preparing food. For this purpose, the study sample was questioned with a very important and essential question, whether they know that not wash hands before preparing food will expose food safety to a potential risk (Allison E., *et al.* 2008) This question addressed to consumers to ensure the safety of the food they prepare and avoid contamination of food with pathogenic germs that are likely to be carried by hands and cause food contamination, unless they are removed by hand washing with water and soap. Consumer were also asked if they follow and know other hygiene practices when preparing food, their answers were as shown in Table 3.

## RESULTS & DISCUSSION

Iraqi consumers participated in the research said they had heard of Tyhid Fever *Salmonella typhi* (48%), *Escherichia coli E. coli* (44%), *Brucellosis Brucella ssp.* 38%, *Shigellosis Shigella ssp.* 30%, and *Amebiasis Entamoeba histolytica* 21% as a threat to the food safety, and a serious risk should be take into account when consuming food (Table 3), therefore they will be careful to consume only safe food. About risk possibility to occur foodborne illness among Iraqi consumer, a few percentages 14% thought that food prepared in home caused disease to the consumer because of contaminated food with pathogens at home due not following Good Hygiene Practices (FAB, 2020), 52% of them thought pathogens in consumed food causing symptoms of sickness by food due to not following Good Manufacturing Practices (GMP) by food handlers, and 37% thought other wrong personal practices of food handlers were the reason of infection by foodborne illness.

More advanced, food safety practices are also considered as another reason for infection by foodborne illness among Iraqi people. We asked study sample in this issue, the results showed that 40% of study sample thought that not wash hands before preparing food will expose food safety to a potential risk, 46% of them thought that not followed another

personal hygiene practices will also expose food safety to a potential risk. Some of consumers (37%) of study sample, thought that they getting sick from unsafe food or contaminated by pathogens prepared out home, although that (59%) of them have a good health condition enable them to be more resistance to be sick.

Less than half of consumers of the study sample (44%) heard about *E. coli*, so they more aware to take all procedures to keep them safe from this pathogen causing symptoms of foodborne illness. Having heard of the pathogen *E. coli* is more likely among those who think it is very common or somewhat common for people in Iraq to become sick because of the way food is handled or prepared in their homes, who perceive higher likelihood of getting sick from unsafe food handling practices (C.T.J. Line *et al.*, 2005). *Salmonella typhi* is another serious pathogen causing Typhoid Fever to consumers if they not have enough aware, so we asked Iraqi consumers if they heard about that, less than half (48%) had also answered that they heard about *Salmonella typhi* as a threat to food safety in Iraqi community. Results showed that (38%) of Iraqi consumers heard about *Brucella ssp.* that causing Brucellosis among Iraqi people every year according to the data of the Iraqi Ministry of Health (Statistics IMOH, 2019) (see Table 1).

Shigellosis is another common foodborne illness among Iraqi consumers causing hard pain in abdomen, fever and diarrhea, (30%) of study sample heard about this disease and its cause (Aysha Aslam, Chika N. Okafor, 2022). Finally, we asked consumers about their aware against Amebiasis as a serious disease among Iraqi consumers, their answer was that only (21%) of study sample know this disease and its cause.

Awareness of foodborne illness caused by a pathogen, is also associated with people demographic characteristics. Consumers with at least some college education are more likely to have heard of any one of the five pathogens studied, Female consumers are more aware of *Salmonella typhi* or *E. coli* than males. Awareness of *Salmonella typhi*, *Brucella ssp.*, or *E. coli* is higher among those who their annual income from house- holds above 12 million Iraqi Dinar, Consumers age 30 to 49 have higher awareness of *Shigella ssp.* or., *Entamoeba histolytica* than older consumers (50 and above).

## CONCLUSION

As expected, awareness of pathogens, is in general higher among those who perceive homes, rather than other places, are where food safety problems are less likely to occur. It is very or some- what common for people in the Iraq to become sick because of how food is handled or prepared out of their homes. Microorganism contamination is a very serious food safety problem, or also higher vulnerability to unsafe practices. In addition, pathogen awareness is positively related to awareness of potentially-risky foods and substances. Therefore, the results obtained refers to pay more attention to food safety information, and are also more motivated to learn about food safety, and consumers should be more likely to be aware of the pathogens.

## REFERENCES



1. Alkhafaji M. (2020). A Program for Developing Locally Food Supervision to Support Sanitary Monitoring Work. *Indian Journal of Forensic Medicine & Toxicology* 14 (4):1438-1442.
2. Alkhafaji M. (2020). Extent of Iraqi consumer interested in choosing of food products bearing quality and safety certificate. *Plant Archives*, 20(2), 2012-2015.
3. Alkhafaji M. (2016). Implementing of Good Manufacturing Practices Program (GMP) in Baghdad's Restaurants and Cafeterias. *International Journal of Novel Research in Life Sciences* 3 (3): 18-23.
4. Alkhafaji M. (2019). Quality Systems. Possibility of implementing in some local food establishments. *Iraqi Journal of Market Research and Consumer Protection* 11 (2), 132-138
5. Allison E., Rebecca M., Vanessa P., Elaine L. (2008). Effect of hand hygiene on infectious disease risk in the community setting: a meta-analysis. *American Journal of Public Health*, 98(8):1372-1381.
6. Aysha Aslam, Chika Okafor (2022). *Shigella*. Stat Pearls Publishing LLC: 10-14.
7. C. Lin, K. Jensen, S. Yen (2005). Awareness of foodborne pathogens among US consumers. *Food Quality and Preference*, 16: 401-412.
8. Food Administration Board (2020). Food business control. FAB, Sweden: 25-29.
9. Herrera R., Alkhafaji M. (2021) A study of implementation food safety management system ISO 22000 in local food products company. *NATURAL VOLATILES & ESSENTIAL OILS Journal| NVEO*, 8(4): 13511-13527
10. Iraqi Ministry of Health. (2019). *Statistics of foodborne illness*. MoH, Iraq.
11. S.J. Chai, W.Gu & others. (2019). Incubation periods of enteric illnesses in foodborne outbreaks, United States, 1998–2013. *Epidemiology and Infection*, 147, e285:1–7.
12. Thomas Bintsis (2017). Foodborne pathogens. *AIMS Microbiology* (3): 529-563.
13. RR Attaran, F Probst (2002). Histamine fish poisoning: a common but frequently misdiagnosed condition. *Emerg. Med. Journal*, 19:474-475.
14. World Health Organization (2022). *Estimating the burden of foodborne diseases*. WHO, Geneva-Switzerland.