

**MJ** MULTISCIA  
JOURNALS PUBLISHERS

# FRONTIERS IN CHEMICAL AND LIFE SCIENCES



**ISSN: ( 3065- 4238 )**

<https://multisciajournals.com/journals/index.php/fcls>  
editor.fcls@gmail.com

## Diseases Caused by Contaminated Water: Signs, Symptoms, Treatment Options, and Precautions

M.Fazal-ur-Rehman \*

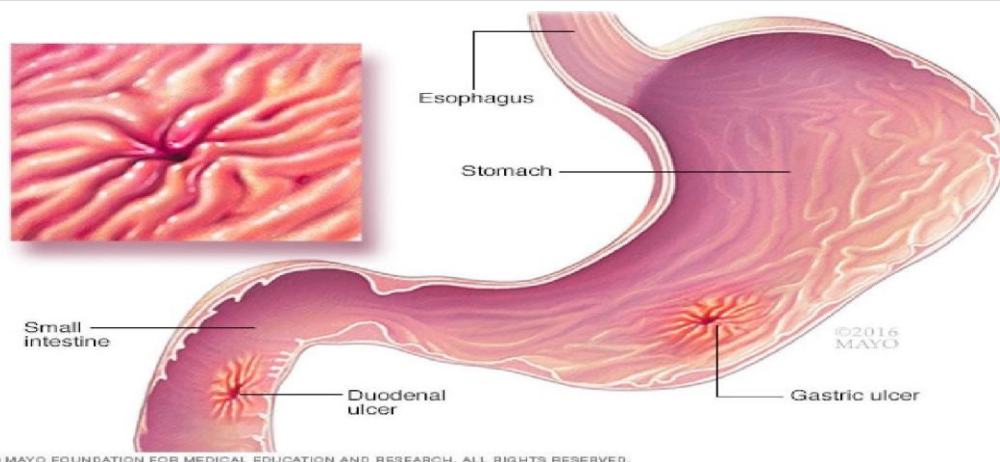
Department of Chemical and Life Sciences

*Received: 30-1-2025    Revised:08-03-2025    Accepted:17-03-2025    Published:28-03-2025*

### ABS TRACT

Everyone, but especially humans, can't drink dirty, filthy water. Several serious health problems, including death, may result from ignoring it in its early stages. Diseases transmitted by water include cholera, typhoid fever, dracunculiasis, ulcers, hepatitis, arsenicosis, and infections of the respiratory system. Damage to the endocrine systems, including the kidneys, is very dangerous to human health and life. One of the main causes of these diseases is the prevalence of harmful bacteria and germs in the water supply. Some diseases may be curable with the help of modern medicine. It is possible to prevent these diseases while receiving treatment in a number of ways. By doing so, lives might be spared from this water-borne disease. No one will ever have to worry about the risks of using or drinking polluted water again thanks to our water treatment efforts. This article summarizes the causes, risk factors, treatment choices, and ways to avoid certain conditions.

### GRAPHICAL ABSTRACT



#### Keywords:

Dirty Water  
Water Born Diseases Antibiotics Painkillers  
Bacteria

#### Introduction

A few million people in the United States and billions more across the world become sick from drinking dirty water each year, according to some estimates. Surface and groundwater contamination is what's known as water pollution, and it may lead to a host of illnesses. Serious health consequences may result from them. 1 Polluting our water streams may have long-term consequences by decreasing our planet's "drinkable" water sources, even if we can manage the water we drink to a certain degree. Furthermore, many of the newly developing pollutants are not even tested for, and the conventional water filtering systems are ineffective against them. Even though it moves more slowly than air pollution, water contamination may nevertheless cover a lot of ground. 2 Two major types of contaminants are known to routinely contaminate water. Chemicals: These can be either naturally occurring or man-made substances that have entered a body of water in sufficient quantities to pose a threat to human health. It's important to remember that, just like with air pollutants, the presence of chemicals in water isn't always easy to see or detect. In addition to the tens of thousands of chemicals used in industrial processes, pesticides, chlorinated solvents, petroleum compounds, mercury, PCBs, dioxins, and other persistent organic pollutants are common substances that pose a hazard when they enter water sources.

Organisms (so long as they are generated by humans); nonetheless, it is important to remember that even in waterways that have not been impacted by humans, these organisms may be present naturally, and in such cases, the illnesses produced by them may not be considered pollution disorders. 4 Various types of viruses, bacteria, fungus, and intestinal worms are examples of pathogens, which may include a wide range of live creatures often found in animal excrement. The majority of the time, their existence in water goes undiscovered. Dangerous Algae: When agricultural runoff contains nitrates and phosphates, it may cause some species of algae, which are known as "red tides" or "brown tides," to overgrow and cause water contamination. Fish, birds, and, eventually, people might be impacted by their poisons as they move up the food chain. One of the major causes of fish mortality on a global scale is oxygen deprivation in dirty water. Water contamination can lead to a wide range of health problems. The most prevalent ones, like typhoid, giardiasis, amoebiasis, ascariasis, and hookworm, are infectious diseases caused by pathogens (typically microorganisms) derived from animal feces. These diseases are especially common in developing nations. Infectious diseases such as hepatitis, respiratory infections, gastroenteritis, diarrhea, encephalitis, nausea, vomiting, and abdominal cramps and pains are all brought on by drinking contaminated beach water. Chlorinated solvents are one of the substances that may harm the liver and potentially cause cancer by damaging DNA. A cascade of substances may induce kidney injury. Chemical exposure, especially to pesticides, is a common cause of neurological disorders and harm to the nervous system. Several chemicals, particularly endocrine disruptors, cause reproductive and endocrine harm, which includes problems with sexual development, infertility, impaired immunological function, inability to breed, and an uptick in some malignancies. Thyroid problems (perchlorate, a chemical that pollutes rivers like the Colorado, is a typical culprit). Every year, between 1.2 and 2.7 million individuals lose their lives due to malaria because of mosquitoes that reproduce in polluted water. Taking a dip in polluted beach water, for example, may cause a number of less severe side effects, such as rashes, earaches, and pink eyes, among others. We can be directly affected by water pollution when we drink or bathe in polluted streams (like city water), lakes, or beaches. We can be indirectly affected by it when we eat vegetables that have been irrigated with polluted water, fish that live in or eat animals that were grown in polluted water, or any number of other animals. 5 Because certain contaminants bio-accumulate in fish and other living things, the concentration in fish may be several orders of magnitude more than in water, making this a much more serious threat than being directly damaged by drinking water. Furthermore, houses in close proximity to the shore may be affected by the potent brown tide chemicals that may move through the air. 6 Contaminated water has the potential to transmit infectious illnesses. Paratyphoid fever, typhoid, cholera, dysentery, jaundice, amoebiasis, and malaria are among the water-borne illnesses. 7 Our health is also negatively impacted by chemicals in the water. Because they include carbonates and organophosphates, pesticides may cause cancer and harm the neurological system. Ingesting chlorides may harm the endocrine system and reproductive organs. Babies that consume formula are particularly vulnerable to nitrates. The "blue baby" condition results from a decrease in brain oxygen levels. As lead builds up in the body, it may wreak havoc on the neurological system. Liver damage, skin cancer, and vascular disorders are all caused by arsenic. 8 Too much fluoride might harm the spinal cord and turn your teeth yellow. Even at extremely small doses, petrochemical seven may induce cancer. 9



**Fig 1.** Cholera causing bacteria in dirty water.

## 1. Diseases Caused by Polluted Water

Water borne diseases including cholera, Dracunculiasis, Typhoid fever, Diarrhea, Ulcers, Hepatitis, Arsenicosis, Respiratory tract infection, Kidney Damage, and Endocrine Damage are very risky for lives of individuals and especially for humans, these can lead ultimately death.<sup>10</sup> These diseases are mainly due to drinking water problems because of presence of different harmful bacteria and germs which may cause these drugs. These diseases can be cured with proper medications and treatment courses. Along the treatment, there are different ways to prevent from these diseases.

## 2. Cholera

Cholera disease is mainly caused due to water pollution. In polluted, dirty and hard water, different bacteria are contaminated

(Fig.1), which cause different diseases like cholera.<sup>8</sup> Its symptoms include the stomach ulcer, severe

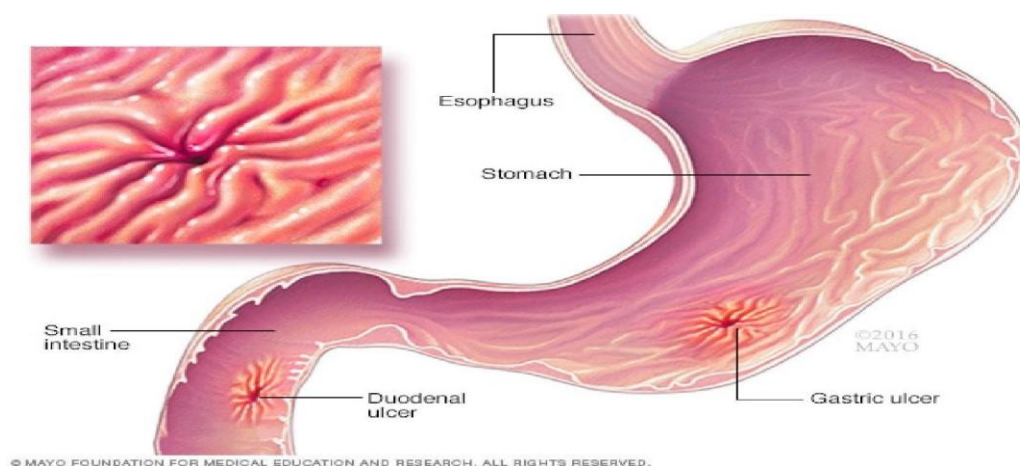
### 3. Dracunculiasis

**Fig 2.** Guinea-worm

dehydration, rapid diarrhea and sometimes, it ends with death. Main causes of the cholera are the bacteria available in polluted water, hard water ingestion containing cholera causing germs. Swimming in dirty unsafe water can cause cholera. Deficiency in stomach acid can cause to increase the risks for cholera disease. Besides it, O-blood group (including +O, -O), raw shellfish, and bad sanitation of sewage system also lead to cholera. To treat the cholera, a proper careful vaccination is needed to be done along with strict antibiotics and hospitalization. To prevent from cholera, either treated boiled or bottled water should be used. Fruits and vegetables should be washed before use; avoid to use the unpasteurized milk products and uncooked shellfish.



Dracunculiasis guinea-worm crippling parasitic disease caused by *Dracunculus medinensis* (Fig. 2). It is transmitted exclusively when people drink stagnant water contaminated with parasite-infected water fleas.<sup>11</sup> Dracunculiasis is rarely fatal, but infected people become non-functional for weeks. It affects people in rural, deprived and isolated communities who depend mainly on open surface water sources such as ponds for drinking water. Its common symptoms include the high fever, pain, swelling, vomiting, diarrhea, itching in skin, stinging, tingling skin and worms are visible in welts on the skin. Ingestion of dirty water, swimming in polluted water and existence in that area where infection lead to increase the risks for Dracunculiasis. To treat the Dracunculiasis, proper topical antibiotics should be used carefully. Ibuprofen is a magic drug that can reduce the inflammation and pain from body.<sup>11</sup> Prevention is possible however and it is through preventive strategies that the disease is on the verge of eradication. Prevention strategies include: heightening surveillance to detect every case within 24 hours of worm emergence, preventing transmission from each worm by treatment, cleaning and bandaging regularly the affected skin- area until the worm is completely expelled from the body, preventing drinking water contamination by advising the patient to avoid wading into water, ensuring wider access to improved drinking-water supplies to prevent infection, filtering water from open water bodies before drinking, implementing vector control by using the larvicidetemephos, and promoting health education and behavior change.



**Fig 3.** Gastric Ulcer.

### 4. Typhoid

Typhoid fever is a type of enteric fever along with paratyphoid fever.<sup>12</sup> The cause is the bacterium *Salmonella Typhi*, also known as *Salmonella enterica* serotype Typhi, growing in the intestines and blood. Typhoid is spread by eating or drinking food or water contaminated with the feces of an infected person.<sup>1</sup>

Other symptoms for typhoid are headache, stomach pain, loss of appetite, weakness, weight loss, constipation, and sometimes, internal bleeding through vomiting. Bacteria that can be found in polluted water, cause the typhoid fever in humans. Food that has been contaminated by either drinking contaminated water or being grown with contaminated water also a cause of typhoid fever. Antibiotic treatment and hospitalization are the most common types of treatment for typhoid. Ibuprofen for inflammation and pain may also be administered.<sup>9,13</sup>

Following preventive measures can be applied to be saved from typhoid fever which are; Wash your hands frequently and don't touch your eyes with dirty hands, don't drink water from taps or make ice from this water in countries where typhoid is present, don't eat raw or room temperature food in these countries, don't eat unwashed food.

## 5. Diarrhea

Diarrhea is an increase in the frequency of bowel movements or a decrease in the form of stool (greater looseness of stool). Although changes in frequency of bowel movements and looseness of stools can vary independently of each other, changes often occur in both.<sup>9</sup> With diarrhea, stools usually are looser whether or not the frequency of bowel movements is increased. This looseness of stool--which can vary all the way from slightly soft to watery--is caused by increased water in the stool. During normal digestion, food is kept liquid by the secretion of large amounts of water by the stomach, upper small intestine, pancreas, and gallbladder. Food that is not digested reaches the lower small intestine and colon in liquid form. The lower small intestine and particularly the colon absorb the water, turning the undigested food into a more-or- less solid stool with form. Increased amounts of water in stool can occur if the stomach and/or small intestine secrete too much fluid<sup>10</sup>, the distal small intestine and colon do not absorb enough water, or the undigested, liquid food passes too quickly through the small intestine and colon for enough water to be removed. The main cause for Diarrhea is drinking water which is polluted with bacteria and chemicals. Without filtration and treatment, use of drinking water and foods without wash may increase the risks for diarrhea. Treatment of diarrhea usually involves the rest and plenty of liquids. Hospitalization may be required for severe dehydration. Eating simple foods until the stomach settles is a priority with diarrhea. To prevent from diarrhea, always boil water or use bottled water if you aren't sure of the quality, use a filter at home if you have well water or questionable city water, and wash food with clean water.

## 6. Ulcers

Peptic ulcers are open sores that develop on the inside lining of your stomach and the upper portion of your small intestine. The most common symptom of a peptic ulcer is stomach pain. Peptic ulcers include: **Gastric ulcers** that occur on the inside of the stomach (**Fig. 3**), **Duodenal ulcers** that occur on the inside of the upper portion of your small intestine (duodenum).<sup>14</sup> The most common causes of peptic ulcers are infection with the bacterium *Helicobacter pylori* (*H. pylori*) and long-term use of aspirin and certain other painkillers, such as ibuprofen (Advil, Motrin, others) and naproxen sodium (Aleve, Anaprox, others). Stress and spicy foods do not cause peptic ulcers. However, they can make your symptoms worse. Fullness in the stomach, even after eating very little, Frequent bloating and gas, burning pain described as being in the "pit" of the stomach and Frequent heartburn and nausea are the common symptoms of stomach ulcer. Any type of irritation to the lining of the stomach or intestines, Chemical pollutants in water, which can damage the lining of the stomach severely and Bacteria that may be present in water are the causes of ulcer.<sup>5</sup> Frequently drinking alcohol and smoking, eating spicy foods often, being high-stress much of the time, combining any of these factors with consuming polluted water are the factors that can increase the risks for ulcer. If caused by bacteria, antibiotics are used to cure the ulcer. Medication also can be used that reduces the production of acid in the stomach. Antacids on a regular basis can also be used to treat the ulcer. Medication that protects the stomach's lining is used to cure the ulcer. Taking aspirin, as well as certain over-the-counter and prescription pain medications called nonsteroidal anti-inflammatory drugs (NSAIDs) can irritate or inflame the lining of your stomach and small intestine. These medications include ibuprofen (Advil, Motrin IB, others) and naproxen sodium (Aleve, Anaprox, others), but not acetaminophen (Tylenol). Peptic ulcers are more common in older adults who take these pain medications frequently or in people who take these medications for osteoarthritis. Certain other medications along with NSAIDs, such as steroids, anticoagulants, low-dose aspirin, selective serotonin reuptake inhibitors (SSRIs), alendronate (Fosamax) and risedronate (Actonel), can greatly increase the chance of developing ulcers.<sup>2,15</sup> To prevent from Ulcer, avoid contaminated water to reduce the risk of irritating the stomach or introducing some bacteria. Do not use alcohol or tobacco regularly and eat mild foods.

## 7. Hepatitis

Hepatitis is inflammation of the liver tissue. Some people have no symptoms whereas others develop yellow discoloration of the skin and whites of the eyes, poor appetite, vomiting, tiredness, abdominal pain, or diarrhea. Hepatitis may be temporary (acute) or long term (chronic) depending on whether it lasts for less than or more than six months. Acute hepatitis can sometimes resolve on its own, progress to chronic hepatitis, or rarely result in acute liver failure. Over time the chronic form may progress to scarring of the liver, liver failure, or liver cancer. The most common cause worldwide is viruses.<sup>15</sup>



**Fig 4.** Symptom of Arsenicosis

Other causes include heavy alcohol use, certain medications, toxins, other infections, autoimmune diseases, and non-alcoholic steatohepatitis (NASH). There are five main types of viral hepatitis: type A, B, C, D, and E. Hepatitis A and E are mainly spread by contaminated food and water. The introduction of fecal matter into the body causes the hepatitis. A virus spread from fecal matter to the human liver also leads to hepatitis. Abuse of alcohol or tobacco significantly over time, other drug use and exposure to unsanitary conditions increase the risks for hepatitis. Rigid antibiotic treatment over time, and antiviral medication administered for a long period of time are necessary for treatment of hepatitis. Vaccination against hepatitis from a young age should be done to prevent from this disease. Avoiding unsanitary conditions, boiling or filtering water before use and avoiding swimming in natural, untreated bodies of fresh water may also prevent from this disease.

## 8. Arsenicosis

Arsenicosis is a chronic illness resulting from drinking water with high levels of arsenic over a long period of time (such as from 5 to 20 years). It is also known as arsenic poisoning.<sup>16</sup> The WHO recommends a limit of 0.01 mg/l of arsenic in drinking water. It results in various health effects including skin problems, skin cancer, cancers of the bladder, kidney and lung, and diseases of the blood vessels of the legs and feet, and possibly also diabetes, high blood pressure and reproductive disorders.

The symptoms of arsenic poisoning can be acute, or severe and immediate, or chronic, where damage to health is experienced over a longer period. This will often depend on the method of exposure. A person who has swallowed arsenic may show signs and symptoms within 30 minutes. These may include the drowsiness, headaches, confusion and severe diarrhea. If arsenic has been inhaled, or a less concentrated amount has been ingested, symptoms may take longer to develop. As the arsenic poisoning progresses, the patient may start experiencing convulsions, and their fingernail pigmentation may change. Signs and symptoms associated with more severe cases of arsenic poisoning are; a metallic taste in the mouth and garlicky breath, excess saliva, problems swallowing, blood in the urine, cramping muscles, hair loss, stomach cramps, convulsions, excessive sweating, vomiting and diarrhea. Arsenic poisoning typically affects the skin, liver, lungs, and kidneys. In the final stage, symptoms include seizures and shock. This could lead to a coma or death. Complications linked to long-term arsenic consumption include: cancer, liver disease, diabetes, nervous system complications, such as loss of sensation in the limbs and hearing problems and digestive difficulties.<sup>17</sup>

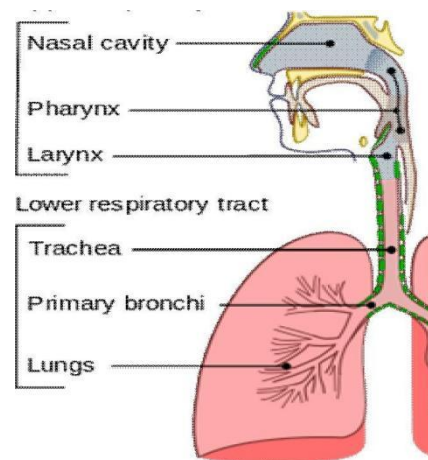
Groundwater possesses trace amounts of arsenic. On occasion, these levels may exceed the amount a human can safely ingest. The main cause of arsenic poisoning is the consumption of a toxic amount of arsenic. Arsenic, consumed in large amounts, can kill a person rapidly. Consumed in smaller amounts over a long period, it can cause serious illness or a prolonged death. The main cause of arsenic poisoning worldwide is the drinking of groundwater that contains high levels of the toxin. The water becomes contaminated underground by rocks that release the arsenic.

The treatment depends on the type and stage of the arsenic poisoning. Some methods remove arsenic from the human body before it causes any damage. Others repair or minimize the damage that has already occurred. Treatment methods include: removing clothes that could be contaminated with arsenic, thoroughly washing and rinsing affected skin, blood transfusions<sup>18</sup>, taking heart medication in cases where the heart starts failing, using mineral supplements that lower the risk of potentially fatal heart rhythm problems and observing kidney function. Bowel irrigation is another option. A special solution is passed through the gastrointestinal tract, flushing out the contents. The irrigation removes traces of arsenic and prevents it from being absorbed into the gut.

## 9. Respiratory tract infection

Respiratory tract infection (RTI) refers to any of a number of infectious diseases involving the respiratory tract (**Fig. 5**). An

infection of this type is normally further classified as an upper respiratory tract infection (URI or URTI) or a lower respiratory tract infection (LRI or LRTI).<sup>6</sup> Lower respiratory infections, such as pneumonia, tend to be far more serious conditions than upper respiratory infections, such as the common cold. Symptoms includes the coughing or sneezing, Stuffy head, Headache and earache, rattling in the chest and difficulty breathing Bacteria that may be ingested through contaminated water, exposure to viruses in water that has been polluted with fecal matter and exposure to chemicals in polluted water lead to cause this disease.<sup>15</sup> A weak immune system due to disease or medication, frequent respiratory infections in the past and living in unsanitary conditions are the factors which may increase the risks for this disease. Antibiotic or antiviral medication should be used to treat the Respiratory Infection.<sup>19</sup> Plenty of rest and liquids, hospitalization in some situations, and medication to break up mucus in some situations may also lead to reduce this disease.



**Fig 5.** Respiratory Tract.

## 10. Kidney Damage

Reduced urine levels, shortness of breath, fatigue, confusion, pain in the sides and convulsions are symptoms of kidney damage. Kidney damage infection caused by drinking water polluted with bacteria and allergic reactions to chemicals in water may also lead to kidney damage.<sup>16-17</sup> Weakened immune system, previous kidney infection, and certain medications without recommendations of a specialist may cause to increase the risks for kidney damage.<sup>20</sup> For infection, treatment with aggressive antibiotics or antiviral medication may work. Painkillers to reduce pain and inflammation are also used. Dialysis may be required when kidney function is limited. A kidney transplant may also be required in extreme situations. To prevent, do not drink water from groundwater that may have been contaminated with chemical runoff, and from natural sources without filtration.

## 11. Endocrine Damage

Diabetes, excessive hunger, excessive thirst, weight loss or gain, frequent need to urinate, swollen feet or hands and Joint aches are symptoms of endocrine damage.<sup>20</sup> Lesions caused by exposure to certain chemicals, hormone imbalance caused by chemical exposure, and Infection from bacteria may cause the endocrine damage. Existing diabetes, exposure to chemicals and hormones in polluted water and too much or too little iodine may lead to increase the risks for endocrine damage. Depending on the type of endocrine disorder, treatment may vary significantly. Medication is available to treat many endocrine disorders. Hormone replacement may work in some cases. To prevent from endocrine damage, eating healthy food and a balanced diet and frequent blood were test to check for possible problems.

## 12. Conclusion

There are a number of dangerous water-borne illnesses that may affect people and other animals, including cholera, dracunculiasis, typhoid fever, diarrhea, ulcers, hepatitis, arsenicosis, respiratory tract infections, kidney damage, and endocrine disorders. The presence of many dangerous bacteria and germs in drinking water is a major contributor to these disorders. In addition to harming humans, these viral microorganisms wreak havoc on their local ecosystem. When these conditions are treated with the right medications, they may eventually go away. There are several methods to avoid these disorders while undergoing therapy. To safeguard human lives from this water-borne sickness, it is necessary to treat these infections early on and implement prevention measures. By treating the water, we can ensure that no one ever has to deal with the dangers of drinking or using unclean water.

## References

1. E. Bertuzzo and L. Mari, *Epidemiology of Water-Related Diseases, Hydrology, and Water Resources*. Elsevier, 2017.
2. S.W. Lindsay, *Bull. World Health Organ.* 2017, 95, 607-3. M. Ameer, *Article in World News: Natural Science*, 2017, 9, 7.
4. in Jammu and Kashmir, S.A. Baba (2017), 5:1133. 5. Li, T., *International Journal of Hygiene and Environmental Health*, 2017, 220, six11.
- Mortal Weekly Report 2017, 66, 1216 (K.M. Benedict, 2017). 7. In 2018: CRC Press, G.F. Craun published *Waterborne Diseases in the US*. *Trends in Microbiology*, 8(2017), 25–6 (C. Baker-Austin). Gargano, J. (2017). *Journal of Water Health*, 15, 438.
- J. *Water Res. Protect.* 2017, 9, 139, K. Heinrich, M. Bach, and L. Breuer. *Management*, 2017, p. 500, D.R. Hopkins. *PloS one*, 2018, 13, e0193348, S.D. Bennett, et al. Thirteen. *Clinical endocrinology of companion animals*, C.B. Chastain and V.K. Ganjam, There are 568 pages in the book (Lea & Gebiger, 1986). Chapter 14: *Equine Diseases and Disorders* by D.C. Knottenbelt and R.R. Pascoe, Wolfe Pub Co., 1994, 1-432. 15. *Public Health Reports* by M. Pirsahab, 2017, 10, 1524. *J. Natur Res Sci.* 2013, 30, 64, by M.A.C.S. Jayasumana.
17. Introduction by S.K. Saxena: *A Look at Neglected Tropical Waterborne Infectious Diseases and Their Potential Solutions* 3–12 in *nTech*, 2018. 132, 83 (R. Turner, 2018). *Journal of the New England Water Works Association*. *SMU Medical Journal*, 2017, 4, 8, by O.A. Mokuolu, D. Adu, and A.S. Aremu. "Environmental Toxicology and Pharmacology" by E.R. Kabir, M.S. Rahman, and I. Rahman, 2015, 40–41.