

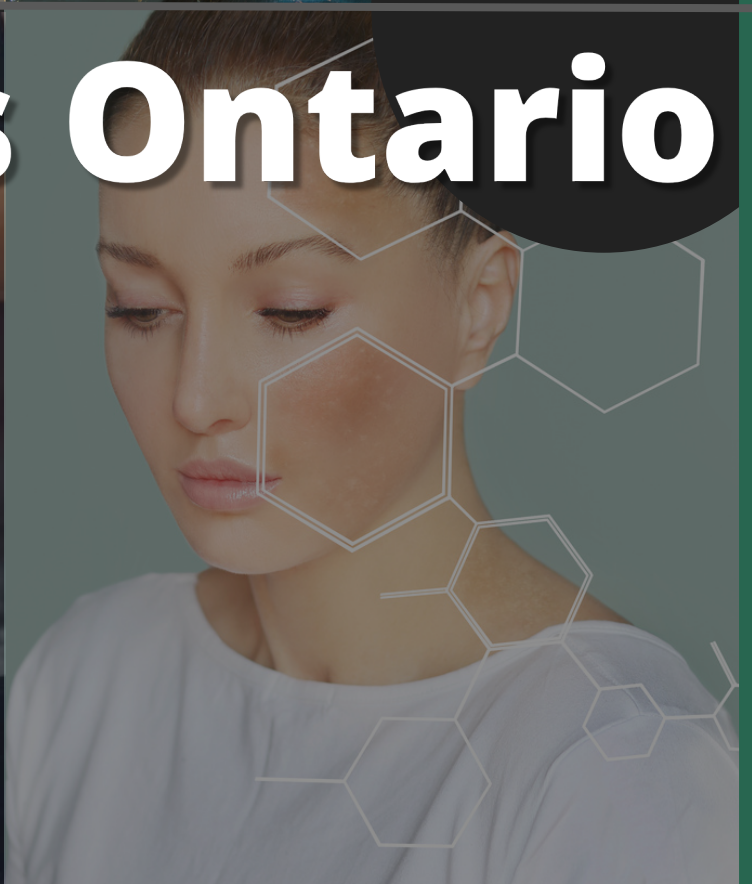


March 2023

Human Nature



Projects Newsletter



Ontario

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(Small Intestine Disorders, 2017)



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WATER POLLUTION AND GASTROINTESTINAL DISEASES



INTRODUCTION

Canada has taken its world-class water treatment system for granted as the rest of the world faces the devastating effects of contaminated drinking supplies. Not only do other nations lack sufficient freshwater, but people are at risk of contracting numerous deadly illnesses each year. Sewage from municipal areas and agricultural runoff are of particular concern, as they are rife with biological pathogens, including *E. coli* and *C. jejuni*, among others.

Wastewater treatment reduces levels of microbes and bacteria found in sewage, but cannot completely remove them. (Nathanson, 2010) In developing nations, the impact of unsafe water supplies is particularly damaging, resulting in over 480,000 deaths annually, gastrointestinal diseases being a leading cause. (WHO, 2022) A few of the most prominent illnesses include cholera, dysentery and typhoid fever.

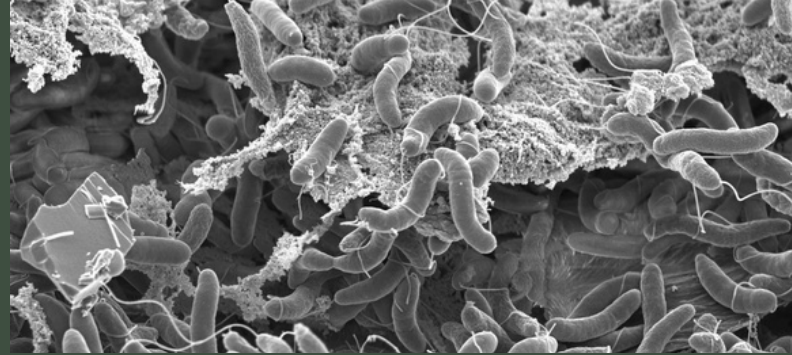


Figure 1. *Vibrio cholerae* bacteria forming biofilm (KNOTT & BLOKESCH, n.d.)

CHOLERA

Although municipal sewage systems place tight restrictions on permitted levels of contaminants in water, citizens are still at risk of coming in contact with various hazardous microorganisms. Cholera, an infection caused by *Vibrio cholerae* in contaminated water sources, can be fatal if left untreated. It is characterized by watery diarrhea, vomiting, and dehydration.

Most developed countries have the issue under control, countries within Asia and Africa struggle to provide safe drinking water, resulting in 1.3 to 4 million cases per year, and up to 100,000 deaths. (Cholera – *Vibrio Cholerae* Infection | Cholera | CDC, 2022) Poverty and poor sanitation services also contribute to the high death toll.

WATER POLLUTION AND GASTROINTESTINAL DISEASES



DYSENTERY

Dysentery is another gastrointestinal disease caused by fecal contamination. It commonly results in diarrhea containing blood or mucus, as a result of inflammation in the intestines. It can be caused by bacteria, such as the bacilli of the genus *Shigella*, or amoebas. In severe cases, death can result from dehydration or toxins released by bacteria. Amebic dysentery is particularly troublesome due to its chronic nature, which makes it difficult to treat. Recurrences are common, and the stress placed on the large intestines can cause ulcers, while the liver may experience infections. (The Editors of Encyclopaedia Britannica, 2023)

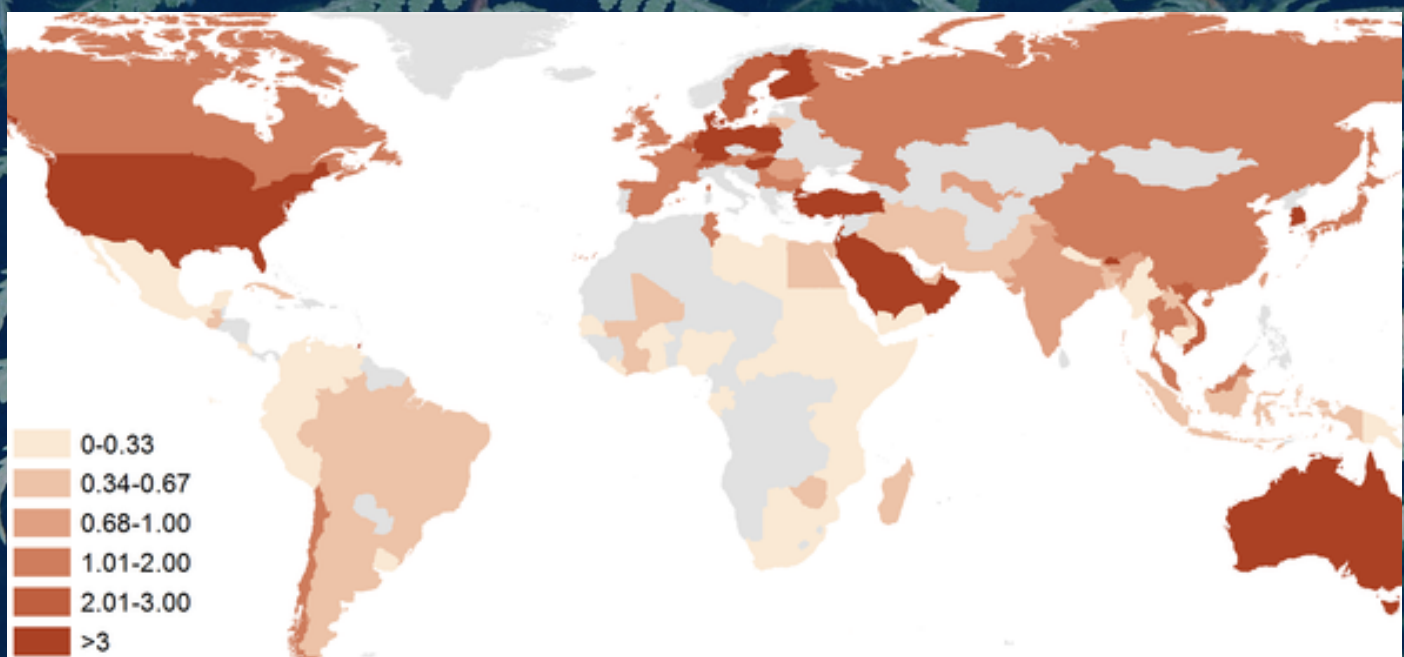


Figure 2. Concentrations of *Shigella* around the world (Antimicrobial Resistance and Presence of Resistance-conferring Genes in *S. Sonnei* and *S. Flexneri.*, 2015)

WATER POLLUTION AND GASTROINTESTINAL DISEASES



TYPHOID FEVER

Salmonella, which is typically contracted through untreated food and water, can cause typhoid fever. Aside from obvious symptoms such as fever, one may experience stomach pain and diarrhea. The Salmonella enterica serotype typhi bacteria are capable of causing cell death in the small intestine and bowels, which not only results in intestinal bleeding, but also allows other materials to escape from the digestive tract and into the body. (Typhoid Fever – Symptoms and Causes, 2023) Complications include vomiting, abdominal pain and sepsis, which are infections throughout the body.

CONCLUSION

Although water treatment falls outside an average citizen's capabilities, there are actions that can be taken to keep oneself and the community safe. Those with septic tanks should perform regular maintenance to avoid any risk of bacterial infections. Avoid flushing materials that aren't meant to be flushed, and use appropriate waste disposal systems instead. Personal protective measures such as boiling water or using a filtration system can also reduce the risk of contracting potentially fatal illnesses. By reducing pollution and ensuring that water treatment systems run smoothly, individuals can enjoy safer drinking water.



Executive of the Month



Congrats

Hello! I'm Abtin and I am a student at Glebe Collegiate Institute. I joined HNP because I felt I needed to do more for the environment as we are in an extremely dangerous spot with climate change. I feel like with HNP, I can make a difference. During my free time, I like to watch films, study history, and read poems.

Abtin Zaker

Co-Director

Human Resources Team



WATER POLLUTION AND SKIN DISEASES



INTRODUCTION

While water pollution can contribute to several health problems, one usually associates water contamination with digestive and respiratory issues. Water pollution can also affect the skin, from simple problems like irritating our skin to significant problems like skin cancer. In the following article, learn about three common health problems linked to water pollution/contamination and how to prevent them.



Figure 2: A rash caused by excessive chlorine.

(Fletcher, 2018)

CHLORINE

In recreational pools, workers will add chlorine to the water. Chlorine is used as a disinfectant to protect humans from harmful bacteria. Although it can keep others safe from significant infections, it is proven to be a toxic chemical and can cause severe skin agitation. (Sublime Life, 2020) When toxic chemicals interact with the natural oils in our skin barrier, dryness, itchiness, and irritated skin are guaranteed side effects. When chlorine mixes with other pollutants in water bodies, it turns acidic. (Sublime Life, 2020) As pollutants and chlorine absorb within the skin, it will disrupt the desired pH balance of the skin, tearing off its protective layer. Overexposure to chlorine can also lead to severe burns, as a high chlorine concentration can lead to blisters and wounds. (Hirsch, 2019) Continuous exposure to chlorinated water can result in premature aging and overall damage to the longevity and health of the skin.

WATER POLLUTION AND SKIN DISEASES



SWIMMER'S ITCH

A more severe skin infection from water pollution is “Swimmer’s Itch.” Within large bodies of water, animals such as ducks, geese, muskrats, and raccoons carry adult parasites in their infected bloodstreams. Their bloodstreams can be infected by their food once chemical waste is dumped into habitats and rivers. Once these animals defecate, these microscopic parasites can interact and grow once exposed to water. Although humans are not suitable hosts for these parasites, larvae burrow themselves into a swimmer’s skin and can cause an allergic reaction/rash. (Quebec, 2022) Symptoms of swimmer’s itch include swollen red spots and itching, lasting between 1-2 weeks. (CDC, 2020).

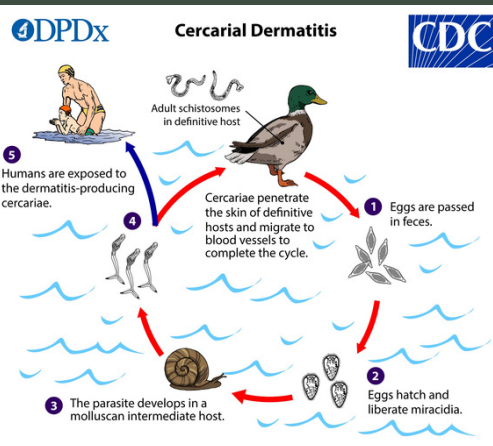


Figure 3: A graph explaining the cycle of Swimmer's itch.

(Cercarial dermatitis, 2019)

ARSENIC POISONING

More than rashes and parasites, arsenic poisoning risks our skin health. Arsenic integrates itself into water supplies from natural deposits in the earth or from industrial and agricultural pollution. According to the World Health Organization, however, “the greatest threat to public health from arsenic originates from contaminated groundwater.” (WHO, 2022) In third-world countries such as Argentina, Bangladesh, Cambodia and India, arsenic concentration is much more prevalent within bodies of water due to mining and chemical waste dumping into bathing waters. Long-term exposure to arsenic can cause skin cancer, discoloration and thickening of the skin. (WHO, 2022) Exposure to arsenic can also branch off into other cancers, such as bladder and lung cancer.

WATER POLLUTION AND SKIN DISEASES



PREVENTION

Although these three health issues concern effects on humans, there are methods of prevention that can be considered. For chlorine, when going into swimming pools, take a thorough shower and apply moisturizer after you are done to retain moisture and firmness. For swimmers' itch, use corticosteroid cream and apply cool compresses to the affected areas. One can prevent arsenic concentration levels by adding lime to the water or precipitation. For treatment, WHO recommends substituting high-arsenic sources, such as groundwater, with low-arsenic, microbiologically safe sources, such as rainwater and treated surface water. (WHO, 2022) It is also helpful to install either centralized or domestic arsenic removal systems that ensure the complete removal and disposal of arsenic.

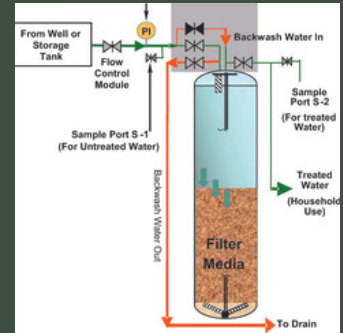


Figure 5: An arsenic filtration system.

(Arsenic in your drinking water may damage, 2011)

CONCLUSION

Pollutants, contaminants, and chemicals are in all water sources. Even chemicals like chlorine, which are meant to protect humans from harmful bacteria, can destroy the skin barrier. In extreme cases with arsenic, some people are automatically prone to poisoning and lethal illnesses, especially where clean water is scarce. What is important is that we find ways to prevent these contaminants from permanently affecting the health of others.



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