

Water Scarcity and the Novel Coronavirus:
A Review of the Compounded Combination of Two Wicked Crises
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Abstract

The COVID-19 pandemic is a worldwide crisis that is disproportionately affecting people experiencing a water crisis. One of the number one ways to reduce transmission of COVID-19 is thorough and frequent handwashing, but this is not plausible for people who live in water-poor regions. I hypothesize that in countries with water scarcity, there is compounded effect of COVID-19 and water unavailability which is exacerbating the negative health effects of both issues. I sought out literature that examined these issues through scientific databases, especially Google Scholar, to discover if my hypothesis reflected reality. The literature reviewed showed a link between water crises and COVID-19 transmission: the inability to conduct proper hygiene and sanitation in water-scarce areas was significant in several papers, and especially in regions like the Global South, lower-income countries, and for minority populations in Western countries. This is critical to know for reducing the spread of COVID-19 into the future and improving water availability and quality going forward.

Introduction

COVID-19 is a novel coronavirus that emerged in Wuhan, China, and quickly spread worldwide. In March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic (Gonzalez-Reiche *et al.*, 2020). This virus is easily spread through respiratory droplets between an infected person and people within six feet of them (CDC, 2020). The advice that agencies in every nation give to their citizens to prevent the transmission of COVID-19 is usually as follows: wash your hands, social distance, wear a mask (CDC, 2020). However, water is not readily available, uncontaminated, or safe for drinking for every person. Approximately

780 million people globally do not have access to an improved water source (Progress on Drinking Water and Sanitation: 2012 Update), making it difficult to conduct proper sanitation practices. The novel coronavirus traveled worldwide in the first months of 2020 and put a strain on many countries already impacted by a water crisis. The handwashing method of preventing COVID-19 transmission is implausible for people who live on less than a liter of water a day (Haddout *et al.* 2020). Both the water crisis and COVID-19 are wicked problems, meaning there is not enough knowledge and the solutions are multi-faceted (van der Voorn, 2020); further, there are many stakeholders who have different opinions on how to address these issues.

There are millions of people without access to safe and sufficient water, and the WHO states that 3 billion people worldwide don't have access to basic handwashing facilities in their homes (2019). Before COVID-19, populations without access to adequate water resources were suffering from diarrhoeal illnesses and respiratory diseases that are linked to clean water access and household hygiene. Water crises, from large amounts of water shutoffs to water scarcity, make reducing COVID-19 transmission difficult. This is in part due to the lack of water for proper hand washing. Proper and frequent handwashing with soap and water degrades and removes viral particles from hands, therefore, lowering transmission likelihood (Staddon *et al.*, 2020). This requires 8-10 liters per person per day and uncontaminated drying mechanisms, which is not a possibility for many people. As stated, Megacities (cities with a population of 10 million or more) in the Global South "tend to combine areas of higher-density, lower-quality housing with poor water service coverage," rendering them more vulnerable to disease transmission (Staddon *et al.*, 2020). It is also difficult to practice social distancing for many households in the Global South who must travel to different sources to fetch water, which also increases the vectors of viral infection.

Water-poor regions like The Middle East and North Africa (MENA) and sub-Saharan Africa are experiencing more severe effects from COVID-19 (Woertz, 2020). Water crises exacerbate economic issues in MENA by reducing agricultural production, negatively impacting industrial output, and limits the socio-economic development of countries (Haddout *et al.* 2020). COVID-19 will worsen these effects of the water crisis.

Beyond the Global South, there are many areas in Europe and North America where people lack adequate water resources. States in the United States with the highest populations of Black, Hispanic, and Native American populations experience the highest water shut-off rates (Deitz and Meehan, 2019). Essentially, minority populations and regions and countries historically disadvantaged because of Global North colonialism are at most risk of inadequate, water-related COVID-19 transmission.

This paper seeks to examine the literature on water scarcity and how it affects the spread of COVID-19 and how this is detrimentally affecting people worldwide. This review paper seeks to analyze existing research to compare different regions' experiences with water scarcity and COVID-19. By doing this, we can achieve a better and more holistic understanding of the future of these regions. Until there is a widely available and distributed vaccine, countries facing a water crisis will need to know how to mitigate both the effects of water scarcity and COVID-19 infection.

Methods

To find evidence for this review paper I utilized several databases to find peer-reviewed sources about water crises and how they exacerbate the effects of COVID-19 and increase transmission of the disease. Mainly, I used the University of Michigan Library as a broad

database for finding articles, as well as Google Scholar. Further, I looked specifically for articles in the scientific journals *Science* and *Nature*. I searched keywords such as “COVID-19 + water crises” or “water availability + disease transmission” among others. This allowed me to find at least ten papers to review, and some papers included additional sources that were relevant. This led me to conduct a “snowball search” in the references of some of the papers.

Discussion

Eight of the reviewed papers described how COVID-19 effects were more severe in countries experiencing water scarcity, therefore my hypothesis was supported. Three papers reviewed described how disease transmission and negative health consequences in general are exacerbated by water scarcity. Some papers were more focused on specific countries or regions in the world, while some talked about learning from this historical event in order to generate solutions to decrease water scarcity.

Water Scarcity and COVID-19 Transmission

Issues with water availability, accessibility, and quality directly affect human health and the transmission of disease (Young *et al.*, 2019). Several papers examined recognize this as the connection between water crises and COVID-19 transmission (Staddons *et al.*, 2020; Haddout *et al.*, 2020; van der Voorn *et al.*, 2020). Water scarcity also means that there may be available freshwater, but it could be contaminated with disease or pollution. Haddout *et al.* describes the vulnerability of water-scarce regions in Africa to water-borne illnesses, like cholera, and how this information applies to the COVID-19 pandemic. An older study of a previous coronavirus demonstrated that a lack of sufficient water decontamination procedures

meant exhibited coronavirus faces were able to survive in water for days or weeks (Casanova *et al.* 2009). Therefore, the literature is discussing how water scarcity increases transmission of disease, and how past studies apply to the current pandemic. Because COVID-19 is found in respiratory droplets that travel through the air and can also stick to surfaces, without proper decontamination measures for water the risk of transmission is going to be exacerbated by existing issues.

Regions most at risk to COVID-19 due to water crises

Several papers talk about certain regions or countries disproportionately affected by COVID-19 due to water crises. In a study by Young *et al.* (2019) a Household Food Insecurity Access Scale survey was used to measure water availability in low- and middle-income countries (LMICs). Nearly one-quarter of households sampled in the survey were unable to wash their hands in the previous month because of water problems. Another study found that many LMICs are unable to practice hand hygiene because of a lack of basic access to drinking water and basic sanitation services (Zar *et al.*, 2020). Brauer *et al.* (2020) also notes limited handwashing facilities with soap and water in low-income countries according to. Brauer *et al.* highlight that rural populations have disproportionately worse access to handwashing facilities. Urban slums and other similar settlements also experience a lack of access. Haddout *et al.* (2020) discuss how African slums are affected by water availability and scarcity and in some cases live on less than a liter of water a day. Additionally, refugee settlements experience similar water challenges to slums and rural areas. A review of refugee settlements, COVID-19, and water challenges details how refugees are facing disadvantages in water availability, water accessibility, and water quality (Rafa *et al.*, 2020). Similar to rural areas and slums, Rafa *et al.*

recognized there were large distances between water sources and dwellings and water points shared by large sums of people. Therefore, the literature compares impoverished communities such as slums, rural communities, and refugee settlements and how they are facing the compounded effects of COVID-19 and water scarcity similarly.

The literature also acknowledges certain geographical regions that are more affected by water scarcity and COVID-19. In the *Journal of Infection*, a letter by two researchers describes how people in sub-Saharan Africa (SSA) have unequal access to safe water, and that poorly developed water and sanitation systems are said to be a major contributor to the Ebola outbreak (Anim and Ofori-Asenso, 2020). They emphasized how the recommended handwashing time of 20 seconds to reduce transmission of COVID-19 is a luxury many people in SSA do not have. This is similar to Staddout *et al.* (2020), which points out that megacities like Bangalore in India have had such rapid population growth that water sources that were once accessible have been exhausted. Jakarta, Indonesia also went through swift urbanization, and water privatization led to lower-income households using natural water sources permeated with pollutants. Young *et al.* (2019) bolsters this point through the HWISE survey, which showed that many households in the Global South rely on several water sources, increasing the vectors of viral infection. An important detail in this study too is that women and girls are more vulnerable to viral infection because they are the providers of domestic water. However, the Global South is not the only region experiencing these disadvantages.

Further, Staddout *et al.* (2020) report that people in Europe and North America experience water insecurity in a different way: lack of piped water due to water shutoffs. The United States has temporarily responded to the negative COVID-19 effects of water shutoffs by mandating halts, but shutoffs may continue if debts remain unpaid. The groups most affected by

water shutoffs are Black, Hispanic, and Native American populations (Deitz and Meehan, 2019), who also experience “plumping poverty,” where they lack piped water access and sewerage. Staddout *et al.* also mention how nomadic Europeans like Roma and First Nations in Canada are more likely to experience complications in hygiene due to water unavailability. Across the literature, there is a connection between minority communities, impoverished communities, and areas in the Global South experiencing the worst ramifications of COVID-19 and water scarcity.

Potential solutions for water scarcity and COVID-19

When examining the literature, some papers included strategies for mitigating the issue of water scarcity and COVID-19. There were concerns about the compounded consequences of these two issues and their indirect effects on vulnerable populations, especially those in LMICs. Going into the future, access to safe water, sanitation, and hygiene must focus on long-term in poor communities, especially urban areas (Anim and Ofori-Asenso, 2020). If handwashing isn't available, Brauer *et al.* (2020) propose utilizing alcohol-containing hand rub solutions, but overall is a less desirable option compared to handwashing because of sustainable production and distribution, the low implications for low-income populations, and the flammability. Essentially, these papers propose that the spread of disease via water can be reduced with an increase in water accessibility and safety, and maybe less so through chemical means.

Limitations

COVID-19 is still novel and enough time has not elaborated to fully explore the consequences of the virus and water scarcity together. Conclusions are being drawn from

previous research and being applied to the current situation at hand, and it may take years to see the comprehensive outcome of this particular complication of COVID-19.

Another limitation is lack of studies of a variety of countries or regions. I was able to find a sufficient amount of papers to review for this paper, but they either covered a very broad region (i.e. the Global South) or a very specific region (i.e. specific communities in the United States). To garner a more holistic understanding of water scarcity and COVID-19 there needs to be further research in other water scarce areas.

Conclusion

The literature on COVID-19 and water scarcity has shown how certain populations are being disproportionately affected by these issues, and how water is connected to the spread of COVID-19. Several papers also discussed how we can work to solve these linked issues: overall, broad and sweeping change needs to be implemented to ensure that people have access to water, perhaps through programs run by the United Nations. This supports my hypothesis, and overall supports something intrinsic to us: water is life. But, when that water is contaminated, not in excess, and inaccessible, it can become the cause of death. We must continue to understand how water scarcity and COVID-19 are linked in order to target water-poor regions to slow the pandemic's spread, but also to prevent future disasters such as the current pandemic. Future research must focus on mitigating water scarcity in water-poor regions, more specific water-poor regions, and disease mitigation. Equitable distribution of water resources is vital to reduce disease transmission in general, and to promote and secure the livelihood of millions, if not billions, globally.

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