

Title: Water Insecurity Compounds the Global Coronavirus Crisis

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Main Text:

In recent weeks, people all over the world have been settling into a ‘new normal’ of restricted mobility, online working, social distancing and enhanced hand hygiene. As part of the global fight against the spread of COVID-19 (the illness caused by SARS-CoV-2), we are repeatedly reminded by public health authorities that frequent and thorough hand-washing with soap and water is one of the best ways of limiting transmission. The rationale behind this is clear: washing regularly and thoroughly physically degrades and removes viral particles from hands and, therefore, lowers the likelihood of infection transmission. Many health agencies are recommending washing hands for a minimum of 20 seconds up to 8-10 times per day. If washed

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in running water, the average hand basin tap uses 2-3 litres per minute, which implies a total water requirement of 8-10 litres of clean water per person per day, as well as appropriate soap and drying facilities (i.e. not a reused and possibly contaminated towel or rag).

Achieving clean hands is not difficult in wealthier parts of the world that have long enjoyed water services so reliable that they have stopped thinking much about it. But if hand-washing is so important to the fight against COVID-19, what does this mean for the large numbers of people around the world who do not have access to a sufficient and secure supply of safe water to support this life-critical activity? According to UNICEF and WHO, as many as 1 in 3 of the world's population do not enjoy access to safe and reliable water services, and 3 billion people across the world do not have basic handwashing facilities (soap and water) in their home (1). Research published by the Household Water Insecurity Experiences (HWISE) Research Coordination Network shows that rates of household water insecurity vary greatly between and within developing nations with urban and rural areas often faring quite differently (2)ⁱ. Further, the HWISE research reveals that many households depend on multiple sources of water, including tap stands and kiosks as well as environmental sources such as streams or springs, further complicating not just hand-washing, but also the challenge of social distancing. Consequently, these populations bear a disproportionate share of resultant global health burdens from viral and bacterial pathogens, including COVID-19. Even before the current crisis we knew that three people die every minute from diarrheal illnesses (1.6 million per year) and six people die every minute from respiratory diseases (3 million per year), and that both types of mortality are linked to lack of access to clean water and household hygiene. Now the risk is even greater because of the emergence of new zoonotic viral diseases like SARS (2003), MERS (2012) and now COVID-19. For the strategy of viral suppression to work, we all need to be able to practice

hand hygiene and social distancing. If too many people cannot, then the spread of such diseases will neither be slowed in less wealthy parts of the world nor entirely suppressed in wealthier areas.

5 What are the current threats to safe hand-washing? Household water insecurity may exacerbate the COVID-19 pandemic and exact an even greater toll on people, especially in Africa, Asia and Latin America, simply because too many people do not have access to safe and secure water services, including water supply and sanitation, at home. Recent studies have shown that as many as a quarter of households in communities within the Global South may be unable to practice necessary hand hygiene. In some locations, the inability to wash hands during the last 10 30 days rises to 80% (2). Figure 1 shows reported inability to wash hands in a number of settings involved in the global HWISE survey and reveals both the widespread persistence and variability of this phenomenon. 23% of randomly selected households across 29 sites in low- and middle-income countries (LMICs) were unable to wash their hands in the prior month due specifically to problems with water. And there is considerable variability of experience: with more than 50% of 15 respondents in some study sites, in Pakistan, Uganda, Indonesia and Colombia for example, reporting such difficulties. Whilst relatively unheard of in some LMICs, it is commonplace in others, and even within individual sites there is considerable variability of experience. It is therefore crucial to know more about where personal and household water insecurity may be most present in the current moment or most likely in the future.

20 Megacities may be at particular risk of being unable to manage the COVID-19 pandemic due to sheer population density as well as a lack of reliable clean water and sanitation. Megacities in the Global South tend to combine areas of higher-density, lower-quality housing with poor water service coverage. For example, in São Paulo, Brazil, 30% of the 12 million

population live in dense informal settlements (‘favelas’) that do not have a secure water supply (3). Some favelas have been adopted by municipal utilities, in others the water supply hangs precariously on illicit connections to mains water systems. Lack of clear tenure over the plots they occupy is a common problem for residents of São Paulo and other informal settlements around the world. The city of Bangalore in India has grown so quickly over the last decade (becoming India’s “Silicon Valley”) that accessible water sources (principally the Cauvery River) have been largely exhausted, placing the entire city at risk. Groundwater too has been over-exploited causing land subsidence and desiccation such that what was once a city of lakes is now drying up. And in Jakarta, Indonesia, a combination of rapid urbanisation and water utility privatisation has meant that poorer households are often left to fend for themselves. Many simply have no clean water supply at all and are forced to use natural water sources which are heavily polluted with chemicals from industry and agriculture, and biological pollutants from poorly managed sewage. These patterns are repeated throughout the Global South, exacerbated by overcrowded, and often informal, housing conditions that make social distancing practically impossible.

In many settlements in LMICs, insufficient numbers of water supply points leads to queuing for water and therefore creates an additional challenge to the mainstay of preventing infectious disease spread, social distancing. The HWISE global survey revealed that water insecurity goes beyond mere insufficiency of water – many households in the Global South must typically rely on a variety of water sources, including network water, vended water and groundwater, thus multiplying vectors of viral infection related to inability to social distance (2). The necessity of travelling to fetch water from these different sources limits the capacity of household members to practice social distancing or self-isolation, and therefore incurs safety

risks not imposed on those with more stable, singular and uniform supply arrangements. Safety risks include close contact during exchange of cash and containers with vendors, contact with other people while travelling to or queueing at shared sources, and limited ability to afford and/or carry sufficient water home for household use. Heightened anxiety about infectious disease spread in areas already crowded and affected by water insecurity is also likely to lead to discrimination and abuse of vulnerable people. People from different ethnic or faith communities, of different caste, those affected by HIV/AIDS or with disabilities often face discrimination or abuse at water sources (4). For example, access to water supply points by minority Batwa in Uganda, DRC and Rwanda or by minority Christians in Pakistani communities was already precarious even before COVID-19. Such communities can be prevented from accessing shared water supplies or forced to access more distant and unsafe sources because of fears that they will ‘contaminate’ the water or spread disease, as in the 2009 case of Asia Bibi in Pakistan. Furthermore, as the primary providers of domestic water labour throughout the Global South, women and girls will be more vulnerable to risks of viral infection and inter-communal conflict. The current pandemic may therefore exacerbate existing inequalities and vulnerabilities within and between communities, with the greatest impact on those already at high risk of COVID-19 infection.

Problems of water insecurity are not restricted to the Global South but extend into higher-income countries as well. In 2015, an estimated 57 million people in Europe and North America lacked piped water at home. During March 2020, 90 US cities and states halted water shutoffs – which usually happen due to unpaid domestic water bills – as a temporary response to the COVID-19 pandemic. The highest shut-off rates are concentrated in southern states, including Louisiana, Arkansas, Florida and Oklahoma, with the largest Black, Hispanic and Native

American populations. ‘Plumbing poverty’ – the lack of piped water access and sewerage – affects 471,000 households in the United States, with the majority (73%) located in metropolitan areas and nearly half (47%) in the 50 largest metros, including the nation’s largest and most affluent cities such as San Francisco, New York, and Los Angeles (5). Native American, Black and Hispanic households are much worse affected than the national average. In Europe, Roma and other traveller communities have found themselves both unable to follow government guidelines around social distancing and hand hygiene, and harassed by police for their failure to do so. In Canada, First Nations’ homes are ninety times more likely to be without running water than other Canadians (6). Clearly, the lack of piped water complicates basic hygiene tasks such as hand-washing and sanitary food preparation.

Other often overlooked populations include prisoners, the homeless, refugees, undocumented migrants and displaced people. In 2019, almost 568,000 people experienced homelessness in the United States, with more than one-third (37.2%) residing in unsheltered locations (7). There are an estimated 65 million displaced people around the world, many living in overcrowded refugee camps. Danny Sriskandarajah, chief executive of Oxfam GB, said: “For many of the world’s most vulnerable, basic preventive measures like staying at home or washing hands more frequently, are simply impossible. For those in overcrowded camps living in a space smaller than the average British bathroom, social distancing is not an option. Women are usually hardest hit during emergencies as they carry out most of the care work and so are especially vulnerable to exposure to the virus” (8). Only 13% of countries have a dedicated budget for collecting gender statistics and there is no standardized or universal methodology for gendered analysis of data on water and sanitation. To highlight discrepancies between women and men, it is critical to assess household water insecurity (i.e., HWISE) together with gendered analysis

tools such as the Empowerment in WASH Index (EWI). Ensuring that women are specifically included in analysis and actions is critical to successfully managing this crisis.

The steady decline in provision of public sanitation around the world, even in wealthy countries, makes adequate hygiene an even more intractable problem. In such settings, and in other low- or middle-income regions, already stressed and understaffed health services are ill-prepared and likely to be unable to mobilise sufficient resources to cope with the pandemic. Prior to the pandemic, one in four health care facilities in the world lacked basic water services and one in five had no sanitation services, while 42% had no hand hygiene facilities at points of care (9). This indicates that health care facilities in the Global South may not only be unable to cope with an influx of acutely ill patients with COVID-19, but that they may become a site of disease spread with even higher rates of infection and subsequent deaths among health care professionals and other patients attending the facility. Universal health coverage, which includes access to health care services with safe water, sanitation and hygiene (WASH) facilities, must be key in the management of future pandemics. Similarly, water security must be established to ensure that safe WASH facilities are maintained for other essential premises and services, to support crucial supply chains, and on premises away from the home when they are in use, for example in schools, shopping malls and markets, prior to and after ‘lockdown’.

Humanity has entered a new chapter in our existence; never before have we had the combination of political, administrative and scientific resources necessary to attempt to deal with a global pandemic in real time, as we have now. Will we also recognise that universal access to clean water is not only a vital tool in this global endeavor, but also consistent with commitments under the UN Sustainable Development Goals? A recent World Bank study estimates that meeting SDG 6 could cost \$US116 billion per year through to 2030, which is a large number in

absolute terms, but it is only a fraction of the amount wealthy countries have already pledged to invest in their own recoveries from the COVID-19 pandemic (10). These costs unbundle into the separate costs of providing safe water (\$37.6 billion pa), safe sanitation (\$19.5 billion pa), safe faecal waste management (\$49 billion pa) and hygiene facilities and education (\$2 billion pa).

5 Will the current pandemic change the collective view of universal access to safe and clean water from something that would be nice to have to something that it is imperative to achieve?

Recognising that the COVID-19 pandemic is also a water crisis is central to addressing it.

References:

- 10 1. United Nations Children’s Fund (UNICEF) and World Health Organization (WHO), “Progress on household drinking water, sanitation and hygiene 2000-2017. Special focus on inequalities” (United Nations Children’s Fund (UNICEF) and World Health Organization, New York; 2019).
- 15 2. S.L. Young, G.O. Boateng, Z. Jamaluddine on behalf of the HWISE Research Coordination Network, et al., The Household Water InSecurity Experiences (HWISE) Scale: development and validation of a household water insecurity measure for low-income and middle-income countries, *BMJ Global Health*. **4**:e001750 (2019).
- 20 3. E. Hylton, K. J. Charles, Informal mechanisms to regularize informal settlements: Water services in São Paulo's favelas. *Habitat International*, **80**, 41-48. doi:10.1016/j.habitatint.2018.07.010 (2018).
4. WWAP (UNESCO World Water Assessment Programme), “The United Nations World Water Development Report 2019: Leaving No One Behind” (UNESCO, 2019; <https://unesdoc.unesco.org/ark:/48223/pf0000367306>)
- 25 5. S. Deitz, K. Meehan, Plumbing Poverty: Mapping Hot Spots of Racial and Geographic Inequality in U.S. Household Water Insecurity. *Annals of the American Association of Geographers*, **109**:4, 1092-1109, DOI: 10.1080/24694452.2018.1530587 (2019).
6. D. R. Boyd, No Taps, No Toilets: First Nations and the Constitutional Right to Water in Canada. *McGill Law Journal*, **57**(1), 81. doi:10.7202/1006419ar (2011).
- 30 7. C. Demyers, C. Warpinski, A. Wutich, Urban Water Insecurity: A Case Study of Homelessness in Phoenix, Arizona. *Environmental Justice*, **10**(3), 72-80. doi.org/10.1089/env.2016.0043 (2017).
- 35 8. Oxfam GB, “Fears for spread of coronavirus in refugee camps as up to 250 people share one tap – Oxfam”, https://oxfamapps.org/media/press_release/fears-for-spread-of-coronavirus-in-refugee-camps-as-up-to-250-people-share-one-tap-oxfam/ (Published 6 April 2020)

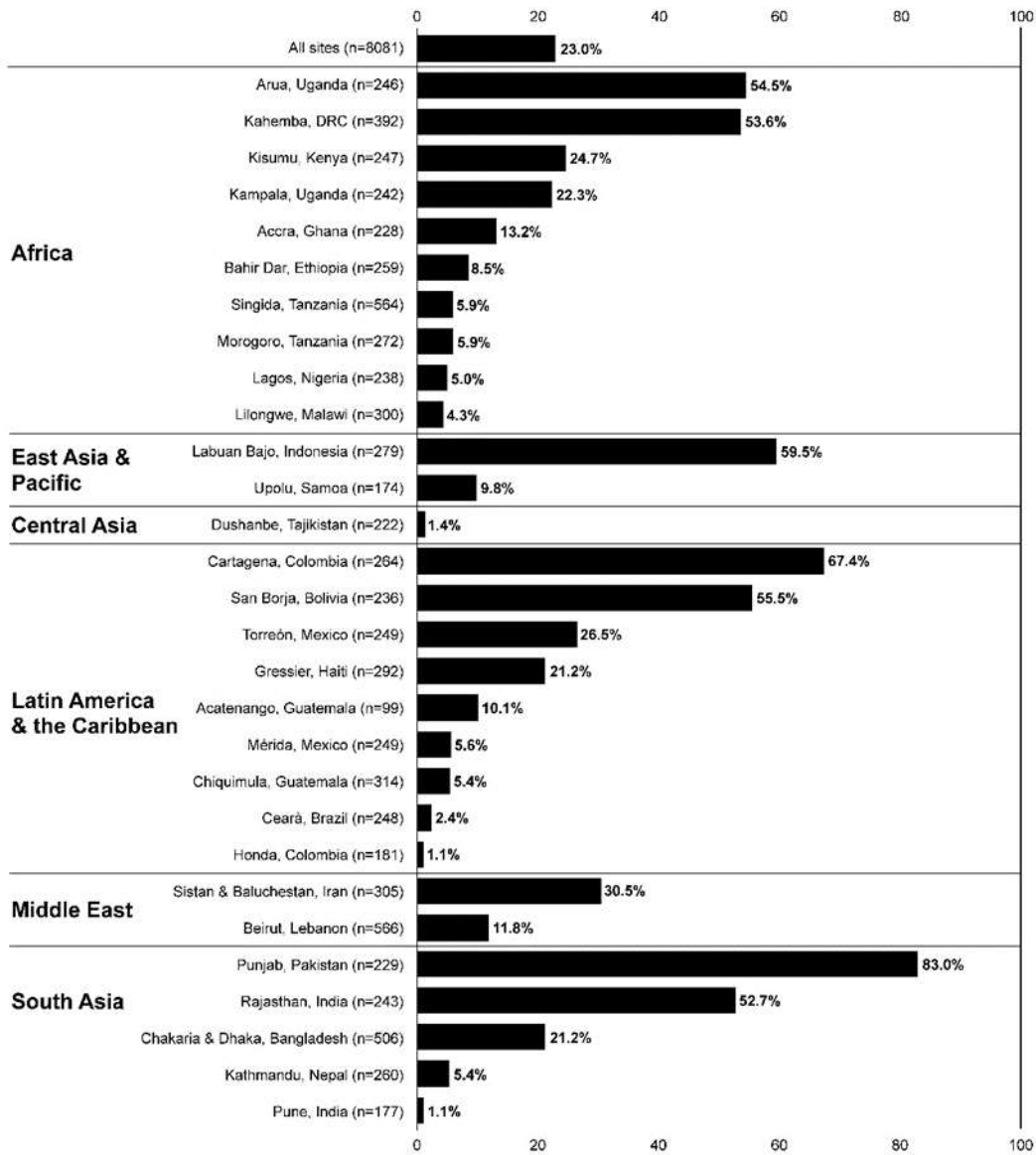
9. World Health Organization and the United Nations Children’s Fund, “WASH in health care facilities: Global Baseline Report 2019” (WHO and UNICEF, Geneva, 2019; <https://apps.who.int/iris/bitstream/handle/10665/311620/9789241515504-eng.pdf?ua=1>)
- 5 10. G. Hutton, M. Varughese, "The Costs of Meeting the 2030 Sustainable Development Goal Targets on Drinking Water, Sanitation, and Hygiene" (World Bank, Washington, DC, 2016; <https://openknowledge.worldbank.org/handle/10986/23681>)

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Figure 1: Proportion of Respondents Surveyed by the HWISE Consortium Reporting Inability to Wash Hands in Last 30 Days. (2)



ⁱ Note: the [Household Water Insecurity Experiences \(HWISE\) Scale](#) is a 12-item tool to measure household water access and use. It takes only 3 minutes to administer and can be used to track the prevalence of issues with water, including the inability to wash hands, in low- and middle-income settings. In the 29 sites in which we collected data in 2017-2018, one quarter of households were unable to wash hands. Nationally representative data are currently being collected in Africa and India by Gallup World Polls; data are urgently needed for other regions of the world. An open-access manual with instructions on implementing the tool can be found [here](#).