Methods and resources needed in treating SARS-CoV-2 in wastewater

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Dear Editor,

A growing body of scientific literature suggests that SARS-CoV-2 can also be found in wastewater, with a viral lifespan of 3–4 days. However, the CDC points out that there is no scientific evidence to prove that the virus in untreated wastewater can cause COVID-19 to people who are exposed to it[1]. According to Mallapaty[2], monitoring for viral RNA in wastewater can provide a better estimate on how widespread is the coronavirus pandemic. At present, countries around the world still rely on testing individuals. However, asymptomatic individuals are not included in these tests. As such, the real magnitude of the pandemic might possibly be hidden. Using wastewater with viral RNA might provide a better estimate because it includes viral RNA samples from every member of the population in a given community, including those who have mild or no symptoms of COVID-19[2].

According to Daughton[3], wastewater-based epidemiology measures chemical signatures in sewage like the fragments of SARS-CoV-2. However, the determination of biomarkers in wastewater samples and ensuring their stability can be challenging[4]. In addition, the presence of SARS-CoV-2 in wastewater and the possibility of faecal-oral transmission is not yet clear[5]. As precautionary measures, however, the following methods and resources can be considered by authorities in developing countries in treating wastewater with SARS-CoV-2:

1. Decentralization of wastewater treatment facilities. This includes separating the wastewater treatment of healthcare facilities from the general community so that the removal of viral RNA is better implemented[6]. In Chirisa et al.'s appraisal of centralized and decentralized water systems, centralized wastewater treatment systems such as in the case of Latin America tend to be unsustainable because of its high water consumption[7]. In addition, centralized wastewater treatment facilities can also be more expensive to construct and operate[7], thereby making decentralized wastewater treatment facilities in the context of developing countries more feasible.

2. Point-of-use devices for virus decontamination. Adelodun et al.[6] recommend the use of inexpensive approaches such as the use of filters like iron-oxide bio-sand, zero-valent iron, nanocellulose-based filters and gravity-based ultrafilters, and the use of oxidants like chlorine, as well as ozonation and UV irradiation. The use of flocculants and coagulants that are stored in sachets, moreover, have helped to reduce pathogenic organisms that cause diarrhea in Kenya, Guatemala, and Vietnam[8]. Coagulation and flocculation, however, are not standalone methods but must be used in conjunction with other approaches.

3. Cultivation of microalgae. Wastewater disinfection using cultivated microalgae, specifically the use of *Galdieria sulphuraria* has been proven to remove high rates of coliphages, noroviruses and enteroviruses[9]. Viruses in wastewater can be removed when they are adsorbed onto the biomass of microalgae, followed by the process of sedimentation[9]. Nwoba et al.[10] in addition, asserted that bioproducts that can be obtained from wastewater-grown microalgal biomass may include animal feed, biofuels and biofertilizers. These bioproducts, derived from the innovative and sustainable cultivation of microalgae, can then help to boost the economic status of individuals in impoverished communities.

Examining wastewater for fragments of the SARS-CoV-2 virus provides health and sanitation authorities with the advantage of knowing whether pandemics or outbreaks are likely to occur. Point-of-use devices for virus decontamination are widely available but they are not without risks and disadvantages. Given the present magnitude of the COVID-19 pandemic among developing

countries, it is important that health authorities consider cost-effective mechanisms on how to prevent the further spread of the virus by innovating existing approaches on the treatment of wastewater, in addition to the implementation of physical distancing and community lockdowns.

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CONFLICTS OF INTEREST
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