Environmental impact of hand-sanitizing practices during the COVID-19 pandemic

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The use of hand sanitizing gels and increased hand-washing practices throughout the COVID-19 pandemic has had a negative impact on the environment and—by extension—public health.

In the first study of its kind, scientists underline that the environmental damage caused has been significant and more eco-friendly options are needed.

Among the headline findings are that the production and use of hand sanitizing gels has contributed around 2% of our usual carbon footprint; and that, on average and depending on the sanitizing gel or handwashing practice used, human health has been affected such that people may lose between 16 and 114 hours per year based on a comprehensive disability-adjusted life years (DALYs) impact analysis.

Hand hygiene is one of the most important means of avoiding or reducing pathogen transmission, which is why the World Health Organization (WHO) and NHS England recommend hand washing with soap and water or cleaning hands with alcohol sanitiser to provide some protection against COVID-19.

However, these practices have an impact on planetary health (the health of human civilisation and the natural systems on which it depends). For example, washing hands requires water, while the production of sanitizing gel packaging contributes to carbon emissions—as do the active ingredients themselves—and thus ozone layer breakdown and global climate change.

Until now, the significance of these impacts was unknown.

In the study, just published in the journal *Environmental Science and Pollution Research*, the scientists conducted a detailed analysis in which they modeled the impacts of the UK population adopting each of the following four hand-washing practices over the course of one year: 1) ethanol-based sanitizing gel; 2) isopropanol-based sanitizing gel; 3) liquid soap and water; and 4) bar soap and water.

They compared the impacts across 16 different categories (which included climate change, freshwater ecotoxicity, ozone layer depletion, water use etc.).

Key findings

- All forms of hand hygiene have an environmental cost
- Isopropanol-based sanisiting gels had the lowest impacts in 14 of the 16 categories
- For the climate change impact category, these gels had a four-times lower impact than did liquid soap hand washing (producing the equivalent of 1,060 million Kg CO_2 compared with 4,240 million Kg CO_2)
- At the lower end of the scale, using isopropanol-based sanitizing gels would cause a per person loss of 16 hours in disability-adjusted life years (a small reduction in life expectancy)
- At the upper end, using a liquid soap and hand-washing approach would cause a per person loss of 114 hours (almost five days in life expectancy)

Dr. Brett Duane, associate professor in Trinity College Dublin's School of Dental Science, is the first author of the journal article. He said: "Hand hygiene has certainly made a big difference in slowing the transmission of COVID-19 over the past two years, but this research—the first of its kind that assesses the use of sanitizing gels and increased hand-washing practices in a way that clearly quantifies the impacts on human and planetary health—shows these practices do cause significant harm.

"Importantly, the work shows that sanitizing gels cause less harm than soap-and-water practices, with isopropanol-based gels in particular leaving a relatively lower impact. That is useful information for reducing further damage but the work also underlines the need for new gels that

are more environmentally friendly."

More information: Brett Duane et al, Hand hygiene with hand sanitizer versus handwashing: what are the planetary health consequences?, *Environmental Science and Pollution Research* (2022). DOI: 10.1007/s11356-022-18918-4

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