Relationship between SARS-CoV-2 concentration in wastewater and cumulative incidence over pandemic waves

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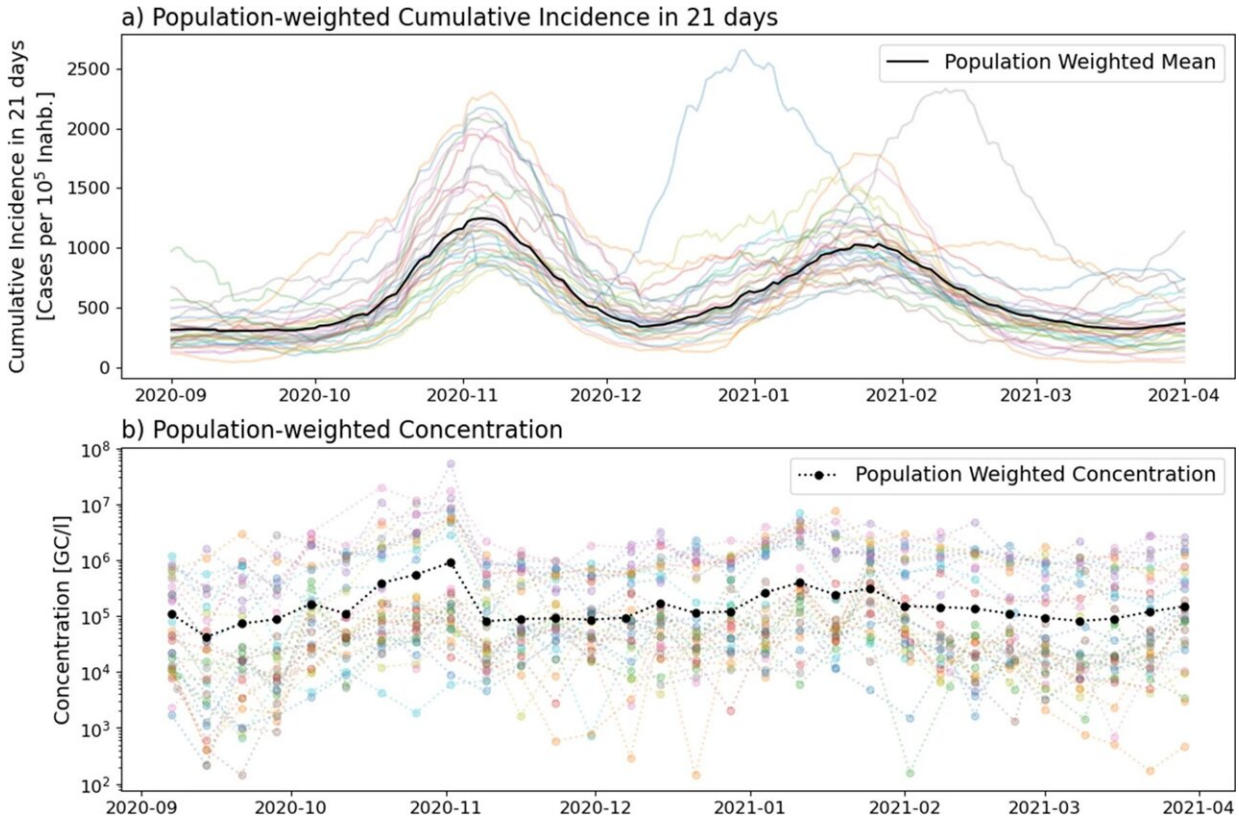

Population-averaged 21-day cumulative incidence [cases per 10^5 inhabitants] and concentration [GC/l]. Transparent colored lines show the data corresponding to each BHA and WWTP, and the black lines show the population-weighted averages. Credit: *Scientific Reports* (2022). DOI: 10.1038/s41598-022-18518-9

Wastewater-based epidemiology has proven a useful tool for epidemiological monitoring during the COVID-19 pandemic. However, few quantitative models comparing virus concentrations in wastewater samples and cumulative incidence have been established.

In this context, academic and research organizations, including Cetaqua and the BIOCOM-UPC research group, have published a paper in which they used a mathematical model to study the relationship between SARS-CoV-2 concentration in wastewater and the cumulative incidence for full infection waves during the pandemic. Under the title "Assessing wastewater-based epidemiology for the prediction of SARS-CoV-2 incidence in Catalonia," the work was featured in the COVID-19 collection of *Scientific Reports*.

Establishing a numerical relationship makes it possible to know the number of infected people in a defined area by analyzing a sample of drainage water. Thus, the mathematical model developed allows to relate virus concentration at the influent of wastewater treatment plants with the cumulative incidence reported at hospitals in the corresponding area during an infection wave. The model was then used for short-term forecasting during infection waves and compared to a local linear model.

Both scenarios were tested using a dataset composed of samples from 32 wastewater treatment plants and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) incidence data covering the corresponding geographical areas during a seven-month period, including two infection waves.

Digital Area project manager Bernat Joseph Duran says, "The mathematical model based on wastewater data has shown a good correlation with cumulative cases and has allowed us to anticipate SARS-CoV-2 incidence in one week, which is of special relevance in situations in which the epidemiological monitoring system cannot be fully

implemented."

BIOCOM-UPC researcher Clara Prats says, "We have demonstrated that it is possible to conduct quantitative epidemiological monitoring based on wastewater analysis, which is a viable and interesting proposal. Collaborating with Cetaqua has been a privilege: public-private collaboration in research is essential."

More information: Bernat Joseph-Duran et al, Assessing wastewater-based epidemiology for the prediction of SARS-CoV-2 incidence in Catalonia, *Scientific Reports* (2022). DOI: 10.1038/s41598-022-18518-9

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