Review Comments on the COVID-19 and the Water Sector Assessment Report and Experience of Wastewater Surveillance Study in Thailand

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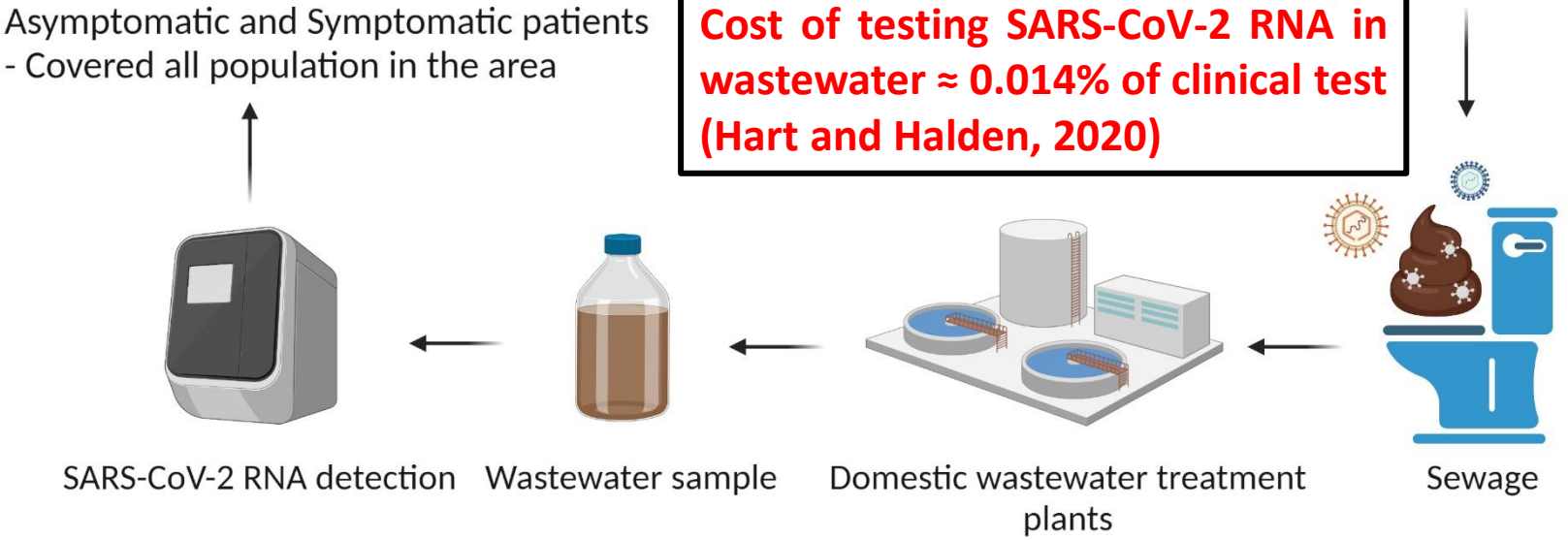
Tracking of COVID-19: WBE & Clinical test

Clinical test

Asymptomatic COVID-19 cases ranged from 40% to 79%

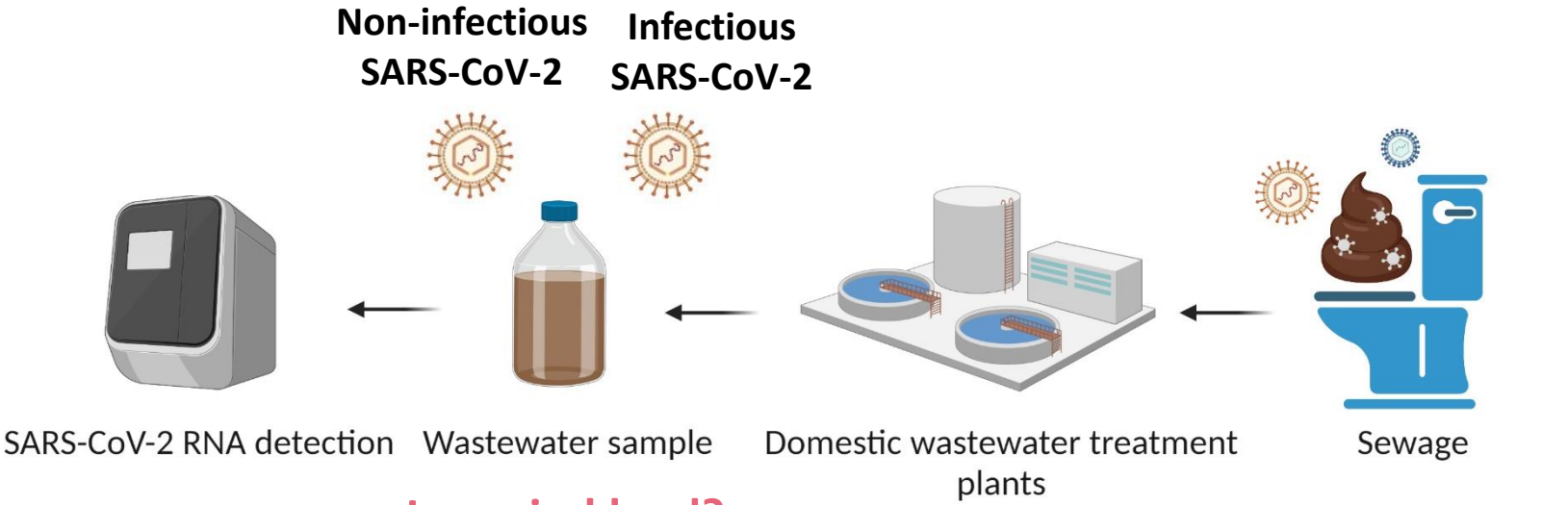
Higher number of clinical samples for RT-qPCR

Cost of testing SARS-CoV-2 RNA in wastewater ≈ 0.014% of clinical test (Hart and Halden, 2020)



WBE application

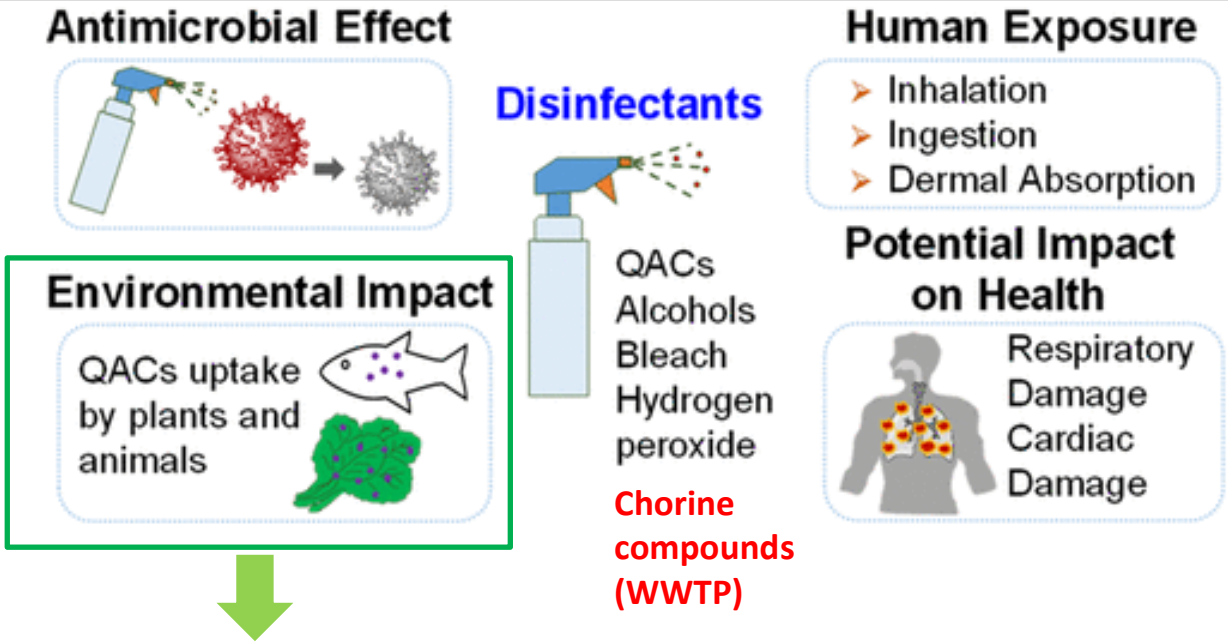
WWTP Efficiency & WBE



- **Detection of SARS-CoV-2 RNA in WW includes both infectious and non-infectious viral particles**
- **The RNA could be from inactivated virus**

Presence of SARS-CoV-2 in effluent does mean the WWTS is inefficient

Disinfection and Antimicrobial resistance



Effects of residual chlorine on aquatic life
Effects of DBPs on aquatic life

- **As COVID-19 patients are a target of opportunistic bacteria resulting in high requirement of drug treatment**

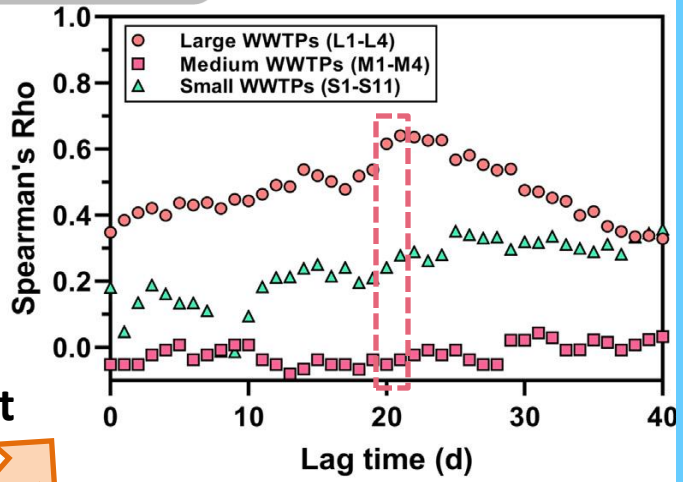
COVID-19 may driven ongoing antibiotic resistant bacteria and gene (ARB and ARG) crisis

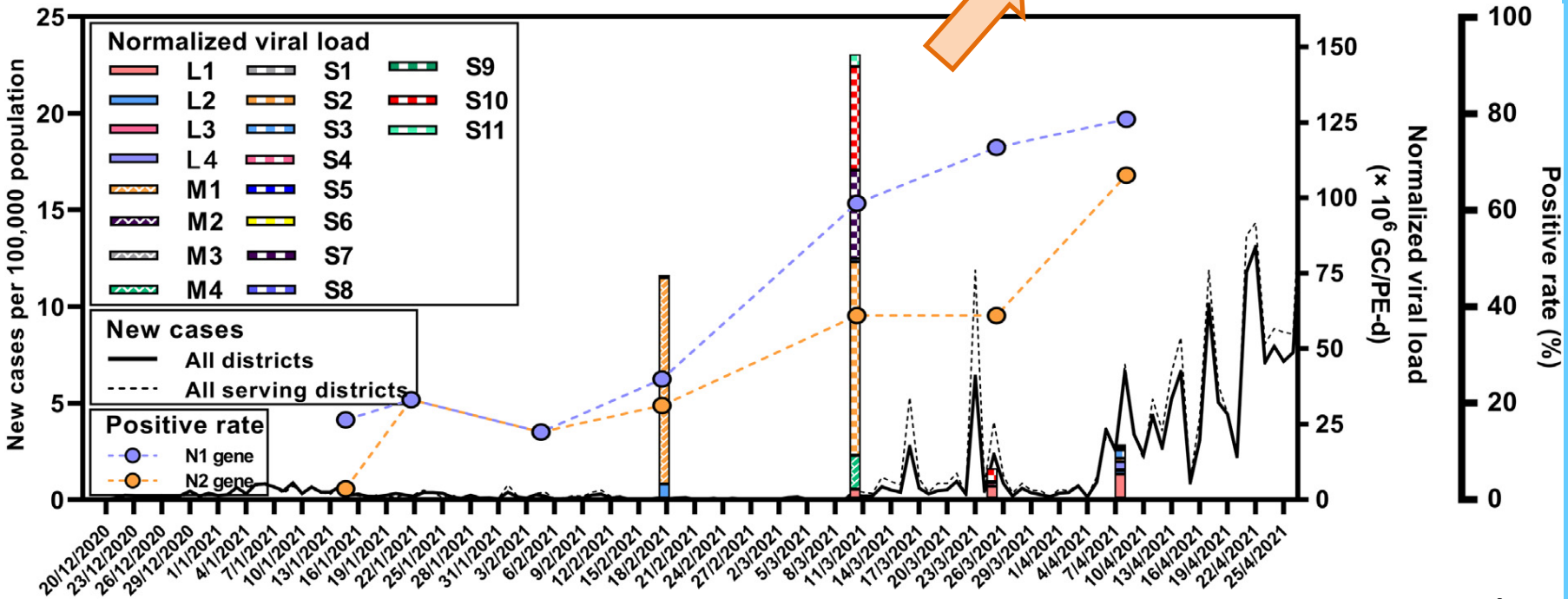
Source:Horváth et al., 2016
Disk diffusion method

Picture source: Hannah et al., 2022 Increased Use of Disinfectants During the COVID-19 Pandemic and Its Potential Impacts on Health and Safety

WBE Application in Thailand

- First detection of SARS-CoV-2 RNA in 19 WWTPs located in Bangkok, Thailand
- Large WWTPs reflected city-scale dynamics of viral load and daily case
- Detection of SARS-CoV-2 RNA in WW can be used as early warning 22-24 days prior first clinical case report





Sangsanont et al. (2022) SARS-CoV-2 RNA surveillance in large to small centralized wastewater treatment plants preceding the third COVID-19 resurgence in Bangkok, Thailand. *Science of the Total Environment*

WBE Application in Thailand

Monitoring of SARS-CoV-2 RNA in sewer from fresh markets

- SARS-CoV-2 RNA was detected in sewage receiving WW from toilets
- SARS-CoV-2 RNA was also detected in samples that did not contain WW from toilets ⇨ Surface contamination
- Correlation between COVID-19 cases and SARS-CoV-2 RNA

Ongoing project

Monitoring of SARS-CoV-2 variants in wastewater from Airports and centralized WWTPs in Bangkok and Phuket

Collection of wastewater sample in fresh markets