# Wastewater Epidemiology & SARS COV-2 Detection
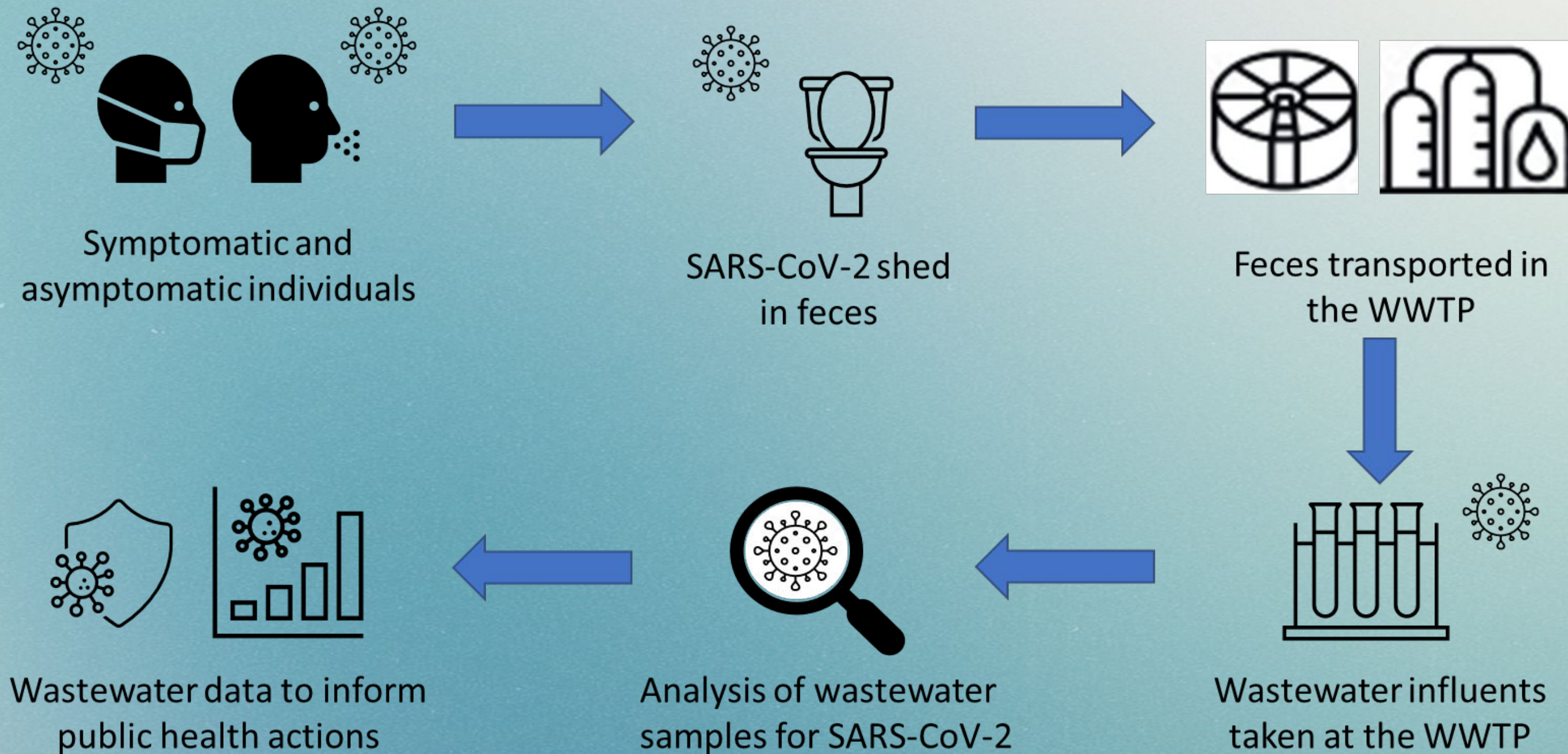
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**Hypothesis: SARS-Cov-2 Transmission increases with drops in temperature, suggesting a seasonal pattern in virus spread.**

# Wastewater Epidemiology Collecting Data Close to the Source. Advantages:

### Early Warning System

Wastewater testing can detect the presence of the virus shed in feces before patients start showing symptoms. This can serve as an early warning system for impending outbreaks or the rise in case numbers, allowing for prompt public health interventions.

### Community-Level Monitoring

Allows for the monitoring of entire communities or specific populations, such as those in a university campus or residential area, without the need to test every individual. This is particularly useful for understanding the spread of the virus in areas where individual testing is challenging or limited.

### Non-Invasive Data Collection

Since it does not involve direct testing of individuals, wastewater testing is non-invasive and preserves the privacy of individuals, which can be a significant advantage in certain sociocultural contexts.

# What to measure?

## SARS-CoV-2

SARS-CoV-2 is shed in human feces, saliva, sputum, and mucus, which then enters wastewater systems. the N-gene is often targeted in PCR (Polymerase Chain Reaction) assays to detect the presence of the virus in wastewater samples. The high prevalence of the N-gene in the virus makes it a reliable marker for detecting the presence of SARS-CoV-2 in community wastewater systems.

## N_Gene_gc_g_dry_weight

Our SARS-COV-2 RNA was pulled from the nucleocapsid gene, per gram of dried solid, and measured in copies per gram of each dry solid sample.

To test our hypothesis, we needed N_gene concentrations available by collection date. This data was readily available via Wastewaterscan.org

## Weather Data

It was not enough to just compare data from generally warm and cold regions. We needed to find an API that could produce weather data specific to the locations and and specific to the date of the wastewater collection.

The Weatherbit API was able to produce said data.

# Here is our live demo

http://htmlpreview.github.io/?https://raw.githubusercontent.com/gwenlukman/Project-3/main/display/vis.html

# Wastewater Genomic Data:

**What We Learned:**

Cold weather leads to increased transmission of SARS-CoV-2.

Genomic testing of wastewater is effective for community testing.

Wastewater Epidemiology holds great promise for future data analysis

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LIMITATIONS OF CURRENT TECHNIQUES

Is transmission linked to weather or seasonal indoor gathering?

Beyond air temperature, what role does humidity play in transmission?

What role does indoor ventilation play in transmission, and what could be possible best practices for minimizing the risk of airborne pathogens?

# Thank You

Do you have any questions about our research?