Translating Wastewater Data for Policymaking

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Overview of presentation

Impact of standardization on wastewater trends and alerts

Contextualizing wastewater data for policymakers

Triangulating information through data synthesis
Impact of standardization on wastewater trends and alerts

North Carolina

Haywood county
Pop. 61,971
27% connected to WWTP

Jackson county
Pop. 43,327
31% connected to WWTP

Research was conducted in partnership with the Tuckasegee Water & Sewer Authority, Jackson County Department of Public Health, and University of Wisconsin-Milwaukee's School of Freshwater Sciences and supported by a grant from Dogwood Health Trust.
Influence of different parameters on trends

(A) Unstandardized viral concentration

Haywood county

Spearman’s rho: 0.69 – 0.84
(max @ 2-3d lag)

(B) Standardization by flow rate, service population, & viral recovery (BCov)

Spearman’s rho: 0.72 – 0.87
(max @ 7-8d lag)

(C) Standardization by a human biomarker (PMMoV)

Spearman’s rho: 0.68 – 0.86
(max @ 1-2d lag)
Influence of different parameters on trends

Jackson county

(A) Unstandardized viral concentration

Spearman’s rho: 0.76 – 0.84
(max @4d lag)

(B) Standardization by flow rate, service population, & viral recovery (BCov)

Spearman’s rho: 0.75 – 0.83
(max @0-4d lag)

(C) Standardization by a human biomarker (PMMoV)

Spearman’s rho: 0.73 – 0.84
(max @1-4d lag)
What criteria should trigger an alert?

**Should alerts be based on:**
- Levels crossing a threshold? Based on absolute levels or percent change?
- Sustained increase for X days? How many days? Ignore large spikes?
- Statistically significant increase? What type I error rate is appropriate?
- Regression modeling of trends? Ability to handle non-linear effects?
Contextualizing wastewater data for policymakers
Utah DEQ wastewater dashboard

WW viral load vs. confirmed cases
Mathematica wastewater dashboard

Testing & risk

WW viral load vs. confirmed cases + policy/community Δs

Regional context

Community vulnerability

Population risk factors

Contact us: info@mathematica.com | 212.924.8600
Curated COVID-19 repository

Vaccination
Racial Disparities
Case Counts and Testing Rates
Surveillance Tools
Diagnostic Testing Methods and Coding
Contact Tracing

Provider Capacity and Patient Needs
Identifying At-Risk Populations
Secondary Impacts
Forecasting Tools
Policy Actions and Preventing Spread of the Virus
Other Resources

COVID-19 Curated Data, Modeling, and Policy Resources

Vaccination

These sites provide detailed data, information, and resources related to vaccine development, vaccination rates, and vaccine acceptance.

US COVID Risk and Vaccine Tracker

Source: Covid Act Now

Covid Act Now (which joined forces with the Covid Exit Strategy and includes partners from Navigare, Stanford, and Harvard) provides state and county-level data on COVID-19 cases, deaths, and hospitalizations, as well as test positivity. ICU occupancy and vaccination rates. Testing and ICU occupancy data come from the U.S. Department of Health and Human Services. The tracker aggregates these resources into an overall risk-viewing COVID risk indicator and a state measure of community vulnerability. The tracker offers email alerts for regions of concern as well as a weekly roundup of new research on COVID-19.
Triangulating information through data synthesis

Montana

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Site Drug Use Profiles

Urban (0.36)

Rural (0.73)

Average Estimated Dose (mg/person)

- Anti-depressant
- Opioid
- Stimulant

- #1 Methamphetamine (0.73)
- #2 Tramadol
- #3 Methamphetamine
- #4 Amphetamines

- #1 Methamphetamine (0.36)
- #2 Tramadol
- #3 Methamphetamine
- #4 Amphetamines
Estimating Black Market Activity

Methamphetamines

Wastewater dose

Prescription dose

Estimated dose (mg/person)

Apr 15  Apr 29  May 13  May 27  Jun 10  Jun 24
Predicting Need for Overdose Response

Heroin overdose call involving heroin

Estimated dose (mg/person)

Apr 15  Apr 29  May 13  May 27  Jun 10  Jun 24

EMS overdose call involving heroin

Non-detectable
Measuring Law Enforcement Impact

[Graph showing the estimated dose of meth/amphetamines over time from April 15 to June 24, with a large seizure noted on May 13.]
Some publications on our wastewater work

**Call to action around the opioid epidemic**

**Taking lessons from the opioid epidemic for COVID-19**

**Developing a flexible national surveillance system**
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Questions?