Abstract of Contribution 413

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Assessing relationships between wastewater testing data for infections diseases such as COVID-19 and Flu/RSV and demographics factors within locations in Oregon using transportation network data.

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Understanding the spread of infectious diseases, such as COVID-19 and Flu/RSV, through networks that characterize the movement of people is crucial for making informed public health decisions. Since mid-2020, the wastewater surveillance team at Oregon State University has collected sewage samples at wastewater treatment plants every week from communities around Oregon. Wastewater-based epidemiology is an effective approach to monitor the presence, prevalence, and trend of COVID-19 and other diseases. Wastewater samples are processed using RT-ddPCR and the resulting measure is the concentration of SARS-CoV-2 in log10 gene copies per liter. Through the inclusion of highway-traffic networks, we explore how the movement of people affects the relationships between Oregon wastewater data and publicly available metrics such as COVID-19 case counts, hospitalizations, and deaths. We further consider how these transportation networks could impact the effectiveness of public policies enacted to slow the spread of COVID-19, such as masking mandates and stay-at-home orders.

The networks used for this paper are multilayer temporal networks formed by considering cities as nodes and a temporal layer for each week of wastewater testing. A second network, representing a highway network with intersections between major highways as nodes, is used to assess the connectivity and movement of traffic between the locations. Data derived from public sources are used to supplement these networks, including nodal covariates such as demographic variables, COVID-19 case counts, and hospitalizations; and dyadic covariates such as the movement of traffic over highway sections. The R programming language will be used for deriving descriptive statistics and visualizing the data. These networks will be visualized and descriptive statistics will be presented to assess the relationships between wastewater testing data, transportation networks, and COVID-19 outcomes.