TECHNICAL NOTES FOR COVID-19 IN YORK REGION INTERACTIVE DASHBOARDS

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Wastewater Surveillance Project

York Region has initiated a pilot project to monitor our wastewater to detect the presence and quantity of the SARS-CoV-2 virus (COVID-19 viral signal), which can be found in the stool of individuals who have COVID-19. This emerging field has the potential to help public health with early detection of outbreaks and cases of COVID-19, including individuals who have not been tested or who show no symptoms.

Wastewater data can also be used to understand the prevalence and growth of Variants of Concern (VOCs) in the community. The objective of this project is to better understand the COVID-19 viral signal in wastewater, and how this can help public health to identify, monitor and manage COVID-19 in York Region.

WASTEWATER COVID-19 VIRAL SIGNAL AND COVID-19 CASES

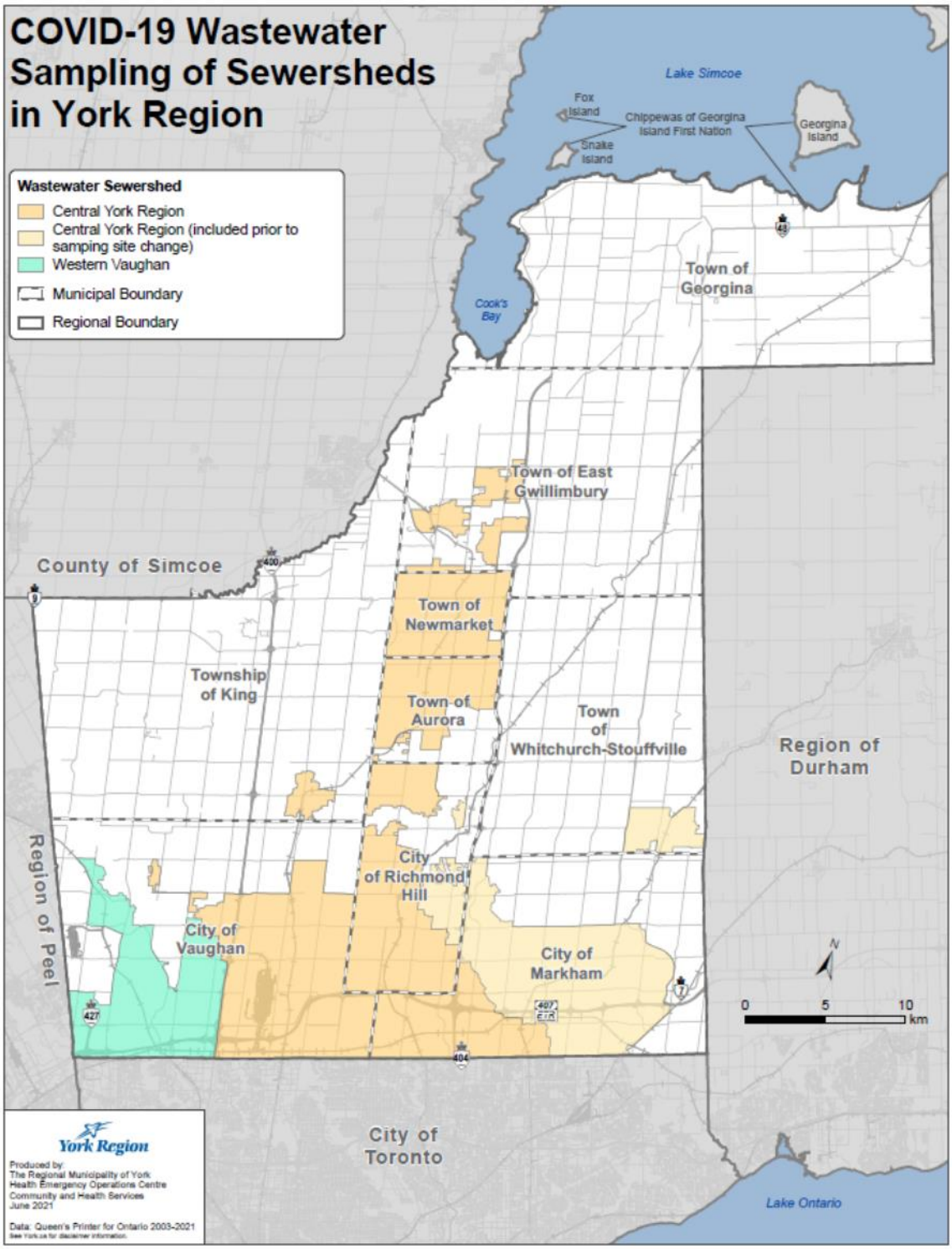
Results from the pilot project show agreement between the COVID-19 viral signal in wastewater and the total number of COVID-19 cases in York Region. These results are promising for the use of wastewater surveillance to better understand the spread of COVID-19 in York Region.

As this is an emerging field of research, caution should be used when interpreting the data as uncertainty still exists around best methods and approaches.

METHODOLOGY NOTES

- RNA signals (genetic markers of the COVID-19 virus) are examined as the raw signal (SARS-CoV-2 RNA copies/ml) or the normalized signal (RNA copies/ml relative to a PPMoV control)
- PPMoV is a biological, fecal control used to normalize the SARS-CoV-2 viral signal in wastewater. The control helps us understand the amount of fecal viruses and its variability in wastewater compared to SARS-CoV-2
- Wastewater data is normalized using a 7 day-rolling average. This means we average 7-days of information to account for unexpected variability in the data
- Case data is specific to the wastewater system boundary, aggregated based on the wastewater system boundaries
- Only cases that have a valid address were included in this analysis (approximately 95%)
- The case data was geo-spatially mapped to each sewershed boundary, so the sewershed data was then only compared to cases residing within that specific sewershed boundary
    - This data is subject to change upon further analysis of the dataset
- Two RNA viral targets, here titled N1 and N2, were averaged and normalized against an endogenous control, Mild Mottled Pepper Virus (PPMV), to control for the amount of feces found in wastewater samples
- Samples are considered below the limit of quantification around an estimated 3.5 RNA copies/ml

COVID-19 WASTEWATER SAMPLING OF SEWERSHEDS IN YORK REGION



COVID-19 Wave Information

A COVID-19 wave is generally determined by an increase in the of number cases with a defined peak followed by a decline. The dates were determined using local York Region data with the lowest case counts falling on a Sunday to define the start and end of each wave. An epidemiological week starts on a Sunday and ends on a Saturday.

- Wave 1: February 29 2020 to August 29 2020
- Wave 2: August 30 2020 to February 27 2021
- Wave 3: February 28 2021 to July 31 2021
- Wave 4: August 1 2021 to Present

Variant of Concern (VOC)

A Mutation of Interest (MOI) is a viral isolate of SARS-CoV-2 which contains one or more key mutations compared to the reference strain which allows the disease to be more likely to spread quickly, to cause more severe disease, and/or to evade the immune system, potentially leading to re-infection or vaccine failure.

A Variant of Concern (VOC) is a viral isolate of a known SARS-CoV-2 lineage which contains one or more key mutations compared to the reference strain which allows the disease to be more likely to spread quickly, to cause more severe disease, and/or to evade the immune system, potentially leading to re-infection or vaccine failure.

Viral isolates positive for SARS-CoV-2 are screened for mutations common to VOCs by polymerase chain reaction (PCR). VOC isolates may be confirmed by an added diagnostic step through Whole Genome Sequencing (WGS). Due to the significant volume of positive tests, not all positive MOIs will receive laboratory confirmation of a VOC lineage.

Cases identified with a Variant of Concern (VOC) or a Mutation of Interest (MOI) have been included based on the best available information. Classification of these cases within the most recent 14 days may be underestimated due to lab testing and reporting delay. For more information, please visit the *Public Health Ontario Variants of Concern* landing page.

Reproductive Number (Rt)

The reproductive number (Rt) is a measure of disease spread and estimates the average number of people infected for every one person with COVID-19. The Rt value is calculated using the number of all newly infected cases in York Region per day. Rt=1 means the current level of viral spread will remain constant whereas a Rt>1 means viral spread may increase and Rt<1 means viral spread may decrease. The Rt curve is updated using data from the most recent available date, taking into consideration reporting lag of up to two weeks.

The nature of disease transmission varies between COVID-19 strains. Due to the higher transmissibility potential and a shorter incubation period of variants of concern (VOCs), cases can rise and fall more readily than with the reference strain. The proportion of Delta variants are now presumed to be the dominant strain in York Region, making up >90% of all new cases.

Pandemic Tracker

All *York Region* measures are presented for the most recent appropriate timeframe, either as a rolling count, average, or median.

INDICATOR DEFINITIONS

7-Day Average of New Cases in the Community: Daily average of all newly reported community cases only within the most recent week.

Total New Hospitalizations in the Last 7 Days: Daily rolling count of newly hospitalized cases with COVID-19

Total New Institutional Outbreaks in the Last 7 Days: Daily rolling count of newly confirmed COVID-19 institutional outbreaks

Total Active Institutional Outbreaks in the Last 7 Days: Daily rolling count of ongoing confirmed COVID-19 institutional outbreaks that were open at least one day

% of New Cases with an Unknown Source of Infection: Daily moving-average proportion of new cases under investigation or unknown

Reproductive Number: Daily reproductive number estimate by date of infection

% Positivity: Average proportion of all COVID-19 specimens tested positive within the most recent week

% Positive Specimens w/ 24Hr Turnaround Time: Daily moving-average proportion of all COVID-19 specimens reported within 24Hrs of specimen collection

% Positive Specimens w/ 48Hr Turnaround Time: Daily moving-average proportion of all COVID-19 specimens reported within 48Hrs of specimen collection

% of Cases Followed Up within 1 Day: Daily moving-average of proportion of all COVID-19 cases contacted within 1 day of the case report date. Cases referred to FNIHB, lost to follow-up/ untraceable, or out of province are excluded.

METHODOLOGY DATA SOURCE

Case data are extracted once at 3pm daily from an internally created and maintained database at York Region Public Health. Data in the most current update may differ from other data presented by York Region. The statistics presented in this report represent the most current disease counts in York Region and supersede all previous reports. Case counts include residents of York Region only, or any outbreaks with York Region as the location of exposure. Community cases are determined by removing estimated number of congregate cases based on bed counts of group homes, emergency or seasonal shelters, and long-term care facilities

Geocortex Map Maps

WHY FORWARD SORTATION AREAS (FSA)?

A FSA (Forward Sortation Area) is a way to designate a geographical unit based on the first three characters in a Canadian postal code. All postal codes that start with the same three characters are together considered an FSA. FSA boundaries follow a combination of both road and physical features, as well as certain political boundaries. These maps shows a generalized representation of those FSA boundaries and as such is intended to be used for reference only.

Some FSA's are shared with non-York Region municipalities (i.e. L4A, L7E, L0G, L0E). Therefore, these map's FSA boundaries and population estimates have been clipped to York Region only.

The data source for the FSA Boundary is from TomTom (via Environics Analytics, 2020).

RATE FORMULA

The Case Rate of Community COVID-19 per 100,000 Residents Map shows the rate of COVID-19 cases and vaccine coverage (eligible population 12+) in York Region residents by location. People may work, play, or socialize outside of their immediate neighborhoods. Therefore, these maps do not necessarily represent areas where people might have been exposed to, or were infected with COVID-19.

GEOSPATIAL PROCESSING

- Population estimates by FSA are based on 2021 Environics DemoStats data redistributed across FSA, based on block weighted centroids.

School Outbreak Reporting

SCHOOL OUTBREAKS

A school outbreak may be declared by York Region Public Health in a school when there are two or more lab-confirmed COVID-19 cases in students and/or staff (or other visitors) with an epidemiological link within a 14-day period, where at least one case could have reasonably acquired their infection in the school (including transportation and before/after school care). If there is a known exposure in the school setting, or if none of the cases have a known source of infection outside of the school setting, then it is reasonable to presume the infection had been acquired in the school.

School outbreaks can be declared over after 14 days if there has been no evidence of ongoing transmission related to the exposures in the school, and if there are no further cases in students and/or staff (or other visitors) which can be linked to exposed individuals with pending tests.

SCHOOLS UNDER SURVEILLANCE

A school may be placed under surveillance by York Region Public Health when at least one student and/or staff (or other visitor) are identified as a probable or confirmed COVID-19 case, and when

infection was unlikely acquired in the school setting, and where there is no evidence of transmission within the school. Schools under surveillance are not declared in outbreak.

A positive case at school does not mean the individual was exposure to COVID-19 at school. Cases associated with a school under surveillance will be investigated as community-related cases.

Schools under surveillance may be declared over by York Region Public Health when any probable or confirmed students and/or staff (or other visitors) is determined upon investigation not to be a case, or when the case is resolved after 14 days from symptom onset, the first positive lab result, or the last day at school, whichever is longest, and where there is no evidence of transmission within the school.

REPORTING

In alignment with the Ontario Ministry of Health *COVID-19 Guidance for School Outbreak Management*, all school-related case counts will be made publicly available (including licenced child care centres). To protect the privacy and confidentiality of students, staff, and essential visitors, case-specific information will not be posted on our external website. During the school year (from September to June), data on schools and case counts are updated daily during the week at 5pm (except for statutory holidays). No data would be reported during July and August when schools are closed. Discrepancies in counts may result from this routine reporting schedule. Discrepancies in counts between York Region Public Health and other sources of school outbreaks data may result from this routine reporting schedule. Additional information can be found at The Ontario Ministry of Health *COVID-19 Cases in Schools and Child Care Centres*.

Immunization

VACCINE ELIGIBILITY

All individuals born in 2009 (turning 12 in 2021) or earlier are eligible to receive their first or second dose of Pfizer (as of August 18, 2021). All individuals aged 18 years and over are eligible for Pfizer or Moderna.

VACCINATION STATUS

Vaccination status refers to the number of doses an individual has received and the number of days following each dose.

- **Unvaccinated** is defined as those who have not had any doses of a COVID-19 vaccine, or who are within 13 days or fewer since dose one of a Health Canada approved COVID-19 vaccine
- **Fully vaccinated** is defined as those who have received both doses of a two-dose Health Canada approved COVID-19 vaccine, specifically those who are 14 days or more after receiving both doses or at least 14 days after a single-dose vaccine

DATA SOURCE

- The data source for the York Region residents' vaccination status are from the COVID-19 Vaccine Management System (COVax), available through Intelihealth Ontario.

Glossary

ACTIVE

A case which is admitted to the hospitalized, in the ICU, self-isolating or under investigation

CASE AND CONTACT MANAGEMENT (CCM)

is an information system for the reporting and surveillance of COVID-19 in Ontario

CHILDCARE OUTRBREAK

An outbreak is declared in child care settings with two or more laboratory-confirmed COVID-19 cases within a 14-day period among children, staff/providers or other visitors with an epidemiological link where at least one case could have reasonably acquired their infection in the child care setting

CLOSE CONTACT

Close contact can result from: providing care for a positive case (e.g., healthcare workers, family members or other caregivers), living with a case, or having similar close physical, or prolonged face-to-face contact with a positive case while the case was ill

DATE REPORTED

Date the case was reported on the public website

ESTIMATED DATE OF ONSET

Date of symptom onset for a case, based on a hierarchy of dates. This is a calculated field using the earliest date available in iPHIS/CCM for each stage of the hierarchy to provide the closest possible approximation of onset date. If symptom onset date is not available, specimen collection date is used. If the specimen collection date is not available, the lab test date is used. If the lab test date is not available, the lab report date is used. If the lab report date is not available, the case report date is used.

EFFECTIVE REPRODUCTIVE NUMBER

The effective reproductive number, Rt, estimates the average number of people infected for every one person with COVID-19 and it is a measure of virus spread in the community. Rt is estimated based on the estimated date of infection.

INSTITUTIONAL OUTBREAK

Institutional Outbreak is defined as one or more resident or health care/child care worker case(s)

INTEGRATED PUBLIC HEALTH INFORMATION SYSTEM (IPHIS)

is an information system for the reporting and surveillance of Diseases of Public Health Significance (such as COVID-19) in Ontario

INDETERMINATE

Lab result could not be determined

HOSPITALIZED – ICU

Individuals who have been admitted to the Intensive Care Unit (ICU) at the hospital

HOSPITALIZED – NOT IN ICU

Individual admitted to the hospital, but not in the Intensive Care Unit (ICU)

NORTHERN 6

Municipality grouping which includes Aurora, East Gwillimbury, Georgina, Newmarket, King and Whitchurch – Stouffville

ONTARIO LABORATORIES INFORMATION SYSTEM (OLIS)

is an information system for the reporting and surveillance of lab test orders and results of Public Health Significance (such as COVID-19) in Ontario

LOCAL TRANSMISSION

Individuals who did not have close contact with a travel-related case or any known case of COVID-19

LAB REPORT DATE

Date that laboratory results were reported to York Region public health

RESOLVED

A case is considered resolved 10 days since the original date of symptom onset, meaning the individual is no longer infectious. If the case received ICU-level care the case is considered resolved after 20 days.

SCHOOL OUTBREAKS

A school outbreak may be declared by York Region Public Health in a school when there are two or more lab-confirmed COVID-19 cases in students and/or staff (or other visitors) with an epidemiological link within a 14-day period, where at least one case could have reasonably acquired their infection in the school (including transportation and before/after school care). If there is a known exposure in the

school setting, or if none of the cases have a known source of infection outside of the school setting, then it is reasonable to presume the infection had been acquired in the school.

SCHOOL UNDER SURVEILLANCE

A school may be placed under surveillance by York Region Public Health when at least one student and/or staff (or other visitor) are identified as a probable or confirmed COVID-19 case, and when infection was unlikely acquired in the school setting, and where there is no evidence of transmission within the school. Schools under surveillance are not declared in outbreak.

SELF-ISOLATING

Separating yourself, avoiding contact with other people and staying home (e.g., not attending work, school)

SPECIMEN COLLECTION DATE

Date that a lab specimen was collected

TRAVEL

Case is a result of travel outside of Canada

UNDER INVESTIGATION

A case which has been newly reported to public health and the investigation is ongoing

UNKNOWN EXPOSURE SOURCE

A case where the exposure source is unknown

VACCINATION STATUS

Vaccination status refers to the number of doses an individual has received and the number of days following each dose. Unvaccinated is defined as those who have not had any doses of a COVID-19 vaccine, or who are within 13 days or fewer since dose one of a Health Canada approved COVID-19 vaccine. Fully vaccinated is defined as those who have received both doses of a two-dose Health Canada approved COVID-19 vaccine, specifically those who are 14 days or more after receiving both doses or at least 14 days after a single-dose vaccine

WORKPLACE CLUSTER

Workplace cluster is defined more than one case among employees