

Enhancing respiratory viruses surveillance in Belgium: a validation of the wastewater-based surveillance of influenza, RSV, and SARS-CoV-2 in the 2024/2025 winter season

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Abstract

Background

During the 2024/2025 respiratory virus season, Belgium recorded the highest incidence of general practitioner visits for influenza-like illness since the COVID-19 pandemic. The pressure on healthcare systems was driven by epidemics of influenza and respiratory syncytial virus (RSV), while SARS-CoV-2 activity remained at low levels. This exceptional situation was observed through conventional surveillance as well as via a novel wastewater-based surveillance program integrating influenza, RSV, and SARS-CoV-2 measurements.

Methods

The innovative program monitors over 4.5 million inhabitants, representing 38% of the Belgian population, on a weekly basis by analysing samples from 30 wastewater treatment plants. The present study aims to validate wastewater data on influenza, RSV, and SARS-CoV-2 by comparing it with conventional surveillances. Wastewater-based epidemiological thresholds were computed using a quartile method

Results

Throughout the entire season, high levels of correlation were observed between wastewater data and cases confirmed by sentinel laboratories. Wastewater-based thresholds effectively monitored viruses circulation.

Conclusions

Wastewater-based data was assessed to provide information of added value for monitoring SARS-CoV-2 through wastewater compared to conventional surveillance, offering a large and general population coverage, a short and constant reporting time, and a feature for pandemic preparedness. Several perspectives are proposed in this work to increase the quality of RSV and influenza wastewater monitoring.

Contributions to the Literature

- Literature lacks information on the integration of wastewater-based surveillance into existing tools that support public health responses
- This work presents the wastewater program used in Belgium during the 2024/2025 winter to monitor respiratory viruses

- This program was assessed to provide information of added value for monitoring SARS-CoV-2, compared to existing conventional surveillance.

Background

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic prompted the scientific community to develop methods for monitoring virus circulation in large populations. Early in the pandemic, global efforts resulted in the implementation of SARS-CoV-2 surveillance in municipal wastewater samples and in publications on temporal correlation between wastewater data and coronavirus disease 2019 (COVID-19) cases ¹⁻⁴. Motivated by these works, public health authorities in many countries established surveillance programs at various scales, supported by guidelines published by international organizations such as the European Commission and World Health Organization ^{5,6}. The latter published guidance and capacity development plans for Influenza, SARS-CoV-2, Cholera, Typhoid, Paratyphoid, monkeypox virus, and poliovirus ⁷.

In Belgium, the surveillance of respiratory viruses in wastewater began in 2020 with SARS-CoV-2. At the time, our team published a paper concluding that the national wastewater-based surveillance program provided complementary and valuable information to conventional surveillances for COVID-19 monitoring ⁸, similarly to international findings ⁹. The benefits of wastewater data in the pandemic context were to cover a stable, large and general population in various demographic groups, to deliver information independently from conventional surveillance data sources avoiding testing strategy biases, privacy concerns and to lead cases by at least one week in some areas ¹⁰. In order to build a robust surveillance system, the wastewater program was expanded during the 2024/2025 respiratory virus season to include influenza and respiratory syncytial virus (RSV).

In many European countries, measurement of influenza and RSV in wastewater is currently investigated ¹¹. For influenza, several papers report a strong association between the concentrations in wastewater and clinical cases, with the ability to differentiate subtypes A/B ¹²⁻¹⁵. Some studies report a high proportion of quantified samples, whereas others note a predominance of measurements falling below the limit of quantification ¹⁵. Regarding RSV, literature data are similar as association with clinical cases, the possibility of subtype differentiation, and a range of concentrations are reported ¹⁶⁻¹⁹.

In the European Union during the 2024/2025 respiratory virus season, the pressure on healthcare systems was driven by epidemics of influenza and respiratory syncytial virus (RSV), while SARS-CoV-2 activity remained at low levels ²⁰. Furthermore that season in Belgium was characterized by the highest incidence of general practitioner visits for influenza-like illness recorded since the COVID-19 pandemic. Additionally, respiratory viruses caused an excess of all-cause mortality in the first weeks of 2025 ²¹. Other conventional surveillances recorded a major respiratory virus activity through hospitalization for severe acute respiratory infections and consultations for influenza-like illness in nursing homes ²². Although wastewater-based surveillance has proven to be valuable for monitoring SARS-CoV-2

circulation, its utility in tracking other respiratory viruses, such as influenza and RSV, and its operational integration into public health decision-making frameworks remain insufficiently studied²³. To the best of the authors' knowledge, there is a paucity of scientific literature assessing how wastewater-based surveillance can be incorporated into existing tools that support public health responses. Reducing this gap is particularly relevant, given that enhanced surveillance and improved communication strategies are key components of an effective response to respiratory virus outbreaks²⁴.

To address this gap, the present study examines Belgium's first full-season of wastewater-based surveillance for influenza, RSV, and SARS-CoV-2 during the 2024/2025 respiratory season, which was marked by substantial co-circulation of influenza and RSV. The objective of this work is to assess the added value of integrating wastewater data into the national surveillance infrastructure. This investigation analyses the correlation between wastewater and patient-based data, and evaluates how wastewater signals can strengthen existing conventional surveillance systems. By providing a validation framework grounded in real-world data, this study contributes to the scientific understanding of how wastewater surveillance can enhance epidemic preparedness and support timely, data-driven decision-making at a national level.

Methodology

Timeframe and population targeted

To ensure representativeness at national and provincial level, 30 wastewater treatment plants were sampled weekly, covering approximately 4.5 million inhabitants representing 38% of the Belgian population. Treatment plants are located in areas with high population densities. For the purpose of representativity, each province is at least covered by two treatment plants. The number of inhabitants covered by the treatment plants was provided by the regional wastewater agencies. Analyses were performed weekly for SARS-CoV-2 between September 4th 2023 and May 12th 2025. For RSV and influenza, the weekly analyses started at the beginning of January 2024, lasted until May 12th 2025, and were interrupted during the 2024 summer period running from May 6th to August 28th 2024. Analyses for RSV and influenza started later than for SARS-CoV-2 due to a longer validation process of the analytical method. Furthermore, interruption of RSV and influenza tests during summer was motivated by the established seasonality of these two pathogens circulation.

Sample collection, concentration, extraction and quantification

Sample collection, concentration, extraction and quantification

On Mondays, 24-h time-proportional samples were collected at the inlet of the wastewater treatment plants using auto-samplers and transported at 4°C to one of the two laboratories performing the analyses. 250 mL was analysed within 24 hours, while 250 mL of raw wastewater was stored at -20°C in

case retrospective analyses were required. Localization of the treatment plants, inhabitant equivalent, and corresponding laboratory performing analysis can be seen in Fig. 1.

Samples were analysed in two laboratories (Sciensano and UAntwerpen) with the same analytical method, based on a preliminary study conducted by Boogaerts et al.²⁵. Samples were prepared by concentrating 50 mL of raw wastewater with Centricon® Plus-70 Centrifugal filters. Reverse transcription digital PCR (RT-dPCR) was used to quantify SARS-CoV-2, influenza A virus (FluA), influenza B virus (FluB), respiratory syncytial virus A (RSV-A), respiratory syncytial virus B (RSV-B), and the human fecal indicator pepper mild mottle virus (PMMoV) in all RNA extracts. The eluted RNA was used for a one-step reverse transcription digital PCR (RT-dPCR) using the QIAcuity One 5plex Platform (QIAGEN GmbH, Hilden, Germany) and the QIAcuity OneStep Advanced Probe Kit (QIAGEN GmbH).

Limits of detection (LOD) and limits of quantification (LOQ) were determined using certified RNA reference materials. The values varied between laboratories, therefore mean values were computed. For RSV and Influenza, LOQ was computed at 8 copies / mL and LOD at 3 copies / mL. For SARS-CoV-2, LOQ and LOD were computed at 10 and 4 copies / mL, for influenza at 21 and 2 copies / mL, for RSV at 5 and 1 copies / mL, and for PMMoV at 80 and 1 copies / mL. For visualization purposes, a LOQ was estimated for the SARS-CoV-2 to PMMoV ratio. The ratio values obtained in samples having a SARS-CoV-2 concentration close to LOQ (8–10 copies / mL) were averaged. Therefore, an LOQ for the ratio was estimated at $200 \cdot 10^{-6}$ SARS-CoV-2 copies / PMMoV copies. Further details on preparation and PCR is available as supplementary materials.

Wastewater-based surveillance

High levels of SARS-CoV-2 virus present in wastewater samples allowed to determine virus concentrations and to develop quantitative wastewater-based indicators. This was not the case for influenza and RSV, which demonstrated lower concentration levels in wastewater, precluding quantification. Therefore, qualitative indicators were applied to describe either the presence or absence of RSV and Influenza in samples.

For SARS-CoV-2, the viral concentration was computed as the mean of E and N1 gene fragment concentrations. These fragments were selected for their stability towards mutations in order to mitigate risk of non-detection caused by frequently emerging variants. In addition, PMMoV was used to reduce dilution effects caused by rain events and population mobility. This fecal marker is widely used in wastewater-based epidemiology and is known to undergo no substantial seasonal fluctuation^{26,27}. The ratio between SARS-CoV-2 and faecal marker concentrations was used to develop a high circulation indicator and an increasing trend indicator, both having a Boolean format. The high circulation indicator is set to 1 when the ratio exceeds 30% of the maximal value recorded during a reference period, otherwise it is set to 0. The reference period is selected as the most recent timeframe of high SARS-CoV-2 virus circulation. The increasing trend indicator is set to 1 if the moving average on the past 14 days of the normalized concentration in wastewater has increased for more than 6 days. Otherwise, it is set to 0.

These adaptations of indicators build upon previously published work ⁸. Both indicators are computed at different geographical scales: individual areas covered by a treatment plant, provincial, regional, and national level. At the provincial, regional, and national level the indicators are computed using weighted means of the viral ratio, with the population covered by each treatment plant used as the weighting factor.

Once a week, results are published on the Belgian public health dashboard ²⁸ and a wastewater-based epidemiology report is made publicly available discussing the situation observed at several geographical scales ²⁹. The situation in wastewater is assessed through the number of areas in alert, with each area corresponding to the geographical territory served by a treatment plant. For SARS-CoV-2, an area is in alert if the threshold for the high circulation indicator is reached in the corresponding sample, while for RSV and influenza, an area is in alert if the virus was detected in the sample. To facilitate the communication, four activity levels were established based on the number of areas in alert. These levels are revised annually in September using a percentile method on the last two years of data. In further details, thresholds for activity levels are determined by identifying the value below which 50% (low), 75% (moderate), and 95% (very high) of the data falls. Data used is the weekly number of areas in alert per pathogen. For influenza, this methodology was applied to the limited data obtained between January and September 2024 to establish activity levels for the 2024/2025 season. Levels computed for influenza were used for RSV as the number of detection data recorded until September 2024 was insufficient to apply the percentile method for RSV. Activity levels are presented in Table 1.

Table 1
Thresholds used to define the activity levels (low, moderate, high, very high).

Season	Surveillance	Low	Moderate	High	Very High
2023/2024 and 2024/2025	Excess mortality	< 10%	> 10–15%	> 15–20%	> 20%
2023/2024	SARI	0–4.3	> 4.3–9.8	> 9.8–33.7	> 33.7
2023/2024	NH	0–6	> 6–12	> 12–20	> 20
2023/2024	ILI	0–182	> 182–503	> 503–792	> 792
2023/2024	ARI	0–1207	1208–1293	1294–1984	> 1984
2023/2024 and 2024/2025	WBE SARS-CoV-2	0–5	> 5–10	> 10–19	> 19
2024/2025	SARI	0–9.5	> 9.5–13.5	> 13.5–17.6	> 17.6
2024/2025	NH	0–6	> 6–10	> 10–16	> 16
2024/2025	ILI	0–230	> 230–503	> 503–812	> 812
2024/2025	ARI	0–1327	> 1327–1687	> 1687–2034	> 2034
2024/2025	WBE influenza	0–5	> 5–10	> 10–19	> 19
2024/2025	WBE RSV	0–5	> 5–10	> 10–19	> 19

Legend: Thresholds depends on the surveillance and the respiratory virus season: percentage of death in excess (Excess mortality), number of hospital admissions for severe acute respiratory infections (SARI), number of consultations for influenza-like illness in nursing homes (NH), number of consultations by a general practitioner for influenza-like illness (ILI), number of consultations by a general practitioner for acute respiratory infections not classified as ILI (ARI), and number of areas in alert according to the wastewater-based epidemiology surveillance (WBE). An area is the geographical surface covered by a treatment plant. SARI, ILI and ARI levels are expressed as incidences per 100 000 inhabitants. NH level is expressed as incidence per 1000 residents. Activity levels are applied from September to September during the season indicated in the table.

Comparison of wastewater and patient-based data

For the comparison of wastewater and patient-based data, the most reliable surveillances were selected, leading to the use of different patient-based data for each pathogen.

For SARS-CoV-2, an exhaustive laboratory-based surveillance was initiated during the COVID-19 pandemic. This surveillance of COVID-19 tests was based on mandatory reporting, via the platform Healthdata.be, of all tests performed by laboratories or rapid antigen tests performed under supervision of a health professional. Cases are defined based on the first positive test, per individual, in a 60-day period. The characteristics of reported tests reflect the testing strategy in place at a given time. During the study period, testing of symptomatic individuals was no longer generally recommended nor reimbursed, except in specific circumstances. The majority of tests in the study period were performed among individuals aged over 60, in hospital settings or long-term care facilities.

For influenza, data used to compute the incidence is collected through a well-established network of sentinel general practitioners. The incidence of consultations by a general practitioner for influenza was estimated using the number of medical consultation for influenza-like illness and the positivity ratio of tests for influenza. In further details, in Belgium, a network of sentinel general practitioners records on a voluntary basis the number of consultations for influenza-like illness. In case of respiratory virus symptoms, swab samples from a selection of patients are collected and sent to Sciensano (national reference centre for Respiratory pathogens) for analysis and typing.

For RSV, patient-based data for RSV are collected through a network of sentinel laboratories that voluntarily submit the results of diagnostic tests.

Conventional surveillance of respiratory infections

Conventional surveillances refer to: all-cause excess mortality (Excess mortality), number of hospital admissions for severe acute respiratory infections (SARI), number of consultations for influenza-like symptoms in nursing homes (NH), number of general practitioner consultations for influenza-like symptoms (ILI), number of general practitioner consultations for symptoms other than influenza-like (ARI). The all-cause excess mortality surveillance is used as a proxy for the severity of respiratory infections expressing excess mortality as a percentage difference between observed and expected deaths over the past five years ³⁰.

The epidemiological situation of respiratory infections is assessed weekly based on conventional surveillances. Activity levels are defined for each surveillance program as presented in Table 1 and re-evaluated yearly on September 1st .

Data analysis

Data management was performed using SAS (SAS 7.15, NC, USA) while statistical analysis and visualization are carried out with the R software (version 4.5.1) ³¹. The concentrations in wastewater have a non-normal distribution. Spearman correlation coefficients are computed between concentration measured in wastewater samples and the weekly patient-based data registered on the same weeks at national level.

Results

Results presented in Fig. 2 indicate that four peaks of SARS-CoV-2 circulation were observed in Belgium between July 2023 and May 2025. The reference period, used to compute the high circulation indicator, was selected visually from Fig. 2 as running from November 20th 2023 to February 1st 2024. The first peak, starting in July 2023, was caused by the EG.5 variant. JN1 variant caused the second and third peaks, starting in November 2023 and June 2024, respectively. The fourth peak started in August 2024 with a majority of circulation of the KP.3 variant. During the 87 weeks of simultaneous wastewater and clinical-based surveillances, a high and significant correlation level of 0.79 was observed with a p-value below 0.001. However, the peak starting in July 2023 observed in wastewater samples didn't match patient-based data as well as the three following ones.

Influenza and RSV wastewater-based surveillances started in January 2024 and were interrupted during the summer period, between May 6th and August 28th 2024. Therefore, the correlation study was performed on 55 weeks of data presented in Figs. 3 and 4. High and significant correlation levels of 0.85 and 0.68 were observed for influenza and RSV, respectively, with p-values below 0.001. Two influenza peaks can be seen on Fig. 3, while only one is observed for RSV on Fig. 4 as wastewater analyses for RSV permitted to monitor only the end of the 2022/2023 respiratory virus season. Subtyping information, obtained from wastewater, is presented in supplementary material (Figure S1 and S2) as well as information on the simultaneous detection of virus in the three regions of Belgium (Figure S4 and S5).

During winter 2023/2024, an increased pressure on the health care system was observed between week 47 and 52 of 2023 as moderate-to-high activity levels were observed in SARI, NH, ILI and ARI surveillances (see Fig. 5). At that period, these surveillances reported that SARS-CoV-2 and RSV were simultaneously circulating (see Figs. 2, 3, and 4). In wastewater, very high activity levels were observed for SARS-CoV-2 and RSV was not evaluated as no analysis was yet performed. A second period with a rise of health care system pressure was observed in early 2024. Between week 4 and 6 in 2024, high activity levels were observed in SARI, NH, ILI and ARI surveillance. The very high influenza levels measured in wastewater corroborated the results obtained through the patient-based surveillance (see Fig. 4).

Finally, during the 2024/2025 winter season, a high pressure on health care systems was observed with high or very high activity levels recorded for SARI, NH, and ILI surveillances and moderate to high ones for excess mortality. During this exceptional situation, high to very high activity levels were observed for RSV and influenza in wastewater samples, contrary to the low activity levels of SARS-CoV-2. The number of consultations for Influenza was particularly high during this season.

Discussion

This study described the wastewater-based epidemiology surveillance program used in Belgium to monitor SARS-CoV-2, Influenza and RSV during the 2024/2025 respiratory virus season. The findings evidenced high levels of correlation between wastewater data and cases confirmed by sentinel

laboratories. However, the extent to which the wastewater program provided information of added value compared to conventional surveillance varies with the pathogen considered.

For SARS-CoV-2, the information provided by the wastewater-based surveillance was similar to the one obtained through the exhaustive patient-based surveillance. This is validated statistically by a high and significant level of correlation (0.79). However, one of the four peaks observed in wastewater samples didn't match patient-based data as well as the three following ones. The lower correspondence obtained for the peak starting in July 2023 could be explained by a change in immunity, testing strategy, or excretion rate. As the vaccination coverage, and testing strategy remained stable, the lower SARS-CoV-2 concentrations measured in wastewater between July and November 2023 may be attributed to a lower excretion rate of the EG.5 variant ²². Variant proportion can be accessed from a previously published weekly respiratory bulletin ²². Unfortunately, a lack of literature data exist on the variation of excretion rates among variants ³². Furthermore, it is worth noticing that two peaks occurred outside of respiratory virus seasons which run from September to May in the northern hemisphere. This observation suggests that, five years after the COVID-19 pandemics, the virus mutation rate remains high causing a non-seasonality of circulation. In May 2025, the mandatory laboratory-based exhaustive surveillance was interrupted leading to a quality reduction of SARS-CoV-2 monitoring. In view of the non-seasonality of circulation and interruption of the mandatory patient-based surveillance, the wastewater-based surveillance of SARS-CoV-2 is concluded to provide information of added value to public health authorities in future years.

RSV and influenza, unlike SARS-CoV-2, were not quantified in wastewater but reported qualitatively because a high proportion of analyses were below the limit of quantification. The definition of an area in alert was thus modified into areas where the virus was detected.

At the start of the influenza winter season, the number of areas where the virus was detected increases rapidly. The maximal activity level was reached in wastewater during one week in January 2024, while it was attained during 8 weeks in 2025. This difference in duration was most likely caused by the higher number of people infected by influenza, as observed through the patient-base surveillance data in Fig. 3, although population immunity and shedding dynamics may also have played a role. In this work, a high correlation factor (0.84) was obtained between patient-based and wastewater-based surveillances, similarly to data available in the scientific literature ^{12–15}. With regards to the pandemic potential of zoonotic influenza, wastewater monitoring may play an important role in the future for pandemic preparedness thanks to a rapid up-scaling potential without maximal capacity, and a proved short reporting time. Therefore, methods to distinguish zoonotic subtypes and sources should be investigated.

Regarding RSV, the early annual epidemic observed in October 2024 through the patient-based surveillance was not monitored in wastewater as the analysis started on January 1st 2024. However, the 2024/2025 epidemic was reported by wastewater- and patient-based surveillance, with a significant correlation factor (0.68). Similar relationships are reported in literature ^{16–19}. For RSV, wastewater-based surveillance encounters an additional challenge as populations covered by patient- and wastewater-

based surveillances are different. This is caused by the fact that children using diapers are not covered by the wastewater-based program. Therefore, an important part of the population at risk do not excrete faeces in sewage systems. Another uncertainty rises from the fact that activity thresholds were not appropriately defined as little historical data was available at the start of the 2024–2025 winter season. Furthermore, further research need to be performed to improve the sensitivity of activity levels as well as the analytical method toward quantification.

Conclusions

This work highlights several advantages of the wastewater-based surveillance for respiratory virus monitoring: large population coverage from various demographic groups allowing more equity, general population monitored independently of healthcare seeking behaviour, non-invasive method of sampling compared to nasal swab, no privacy concerns related to health sensitive data, no requirement of complex IT platform to anonymise the patient data, no extra workload for healthcare provider, short and constant reporting time specially during holiday period, modularity in case of pandemic, and no dependency on testing strategy. In this study, the surveillance of SARS-CoV-2 through wastewater is concluded to provide information of added value compared to existing patient-based surveillances. However, this added value does not extend to influenza and RSV even though high correlation levels were observed. Therefore, several perspectives are proposed to increase the quality of RSV and influenza wastewater based surveillance such as the development of enhanced extraction methods enabling quantification. This may enable higher granularity of results, mitigation of dilution caused by rain events, as well as reducing the impact of population mobility. In this study, the limited historical data available for RSV and influenza constrained the definition of appropriate wastewater activity levels, but results from upcoming seasons are expected to reduce the uncertainty in determining appropriate activity levels. In the future, epidemiological assessment of respiratory viruses conventionally performed with syndromic surveillance may be enhanced with general population information provided by a single wastewater indicator based on three quantified respiratory pathogens. In conclusion, the authors wish to foster the importance of investing in multi-disease surveillance programs such as the one presented in this work for pandemic preparedness ³³.

Abbreviations

- ARI
number of general practitioner consultations for symptoms other than influenza-like
- GP
general practitioner
- ILI
number of general practitioner consultations for influenza-like symptoms
- LOD
Limits of detection

LOQ

Limits of quantification

NH

number of consultations for influenza-like symptoms in nursing homes

RSV

respiratory syncytial virus

SARI

number of hospital admissions for severe acute respiratory infections

SARS-CoV-2

severe acute respiratory syndrome coronavirus 2

Declarations

Ethics approval and consent to participate

The data analyses carried out in this work are among the legal tasks of Sciensano (artikel 4.4 Wet tot oprichting van Sciensano; article 4.4 Law establishment Sciensano). Article 4.4 explicitly states that Sciensano is authorized to collect, validate, analyse, report and archive data of a personal nature concerning public health. Sciensano is further authorized to make these processed data available with approval of the qualified sectoral committees.

I confirm that all necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived, and that any patient/participant/sample identifiers included were not known to anyone (e.g., hospital staff, patients or participants themselves) outside the research group so cannot be used to identify individuals. The study adhered to the Declaration of Helsinki.

Wastewater data are anonymized as samples included in the present work cover treatment plants with a minimum of 10 000 inhabitant equivalent.

Consent for publication

Not applicable

Availability of data and materials

The data that support the findings of this study are available from Sciensano but restrictions apply to the availability of patient-based data, which were used under license for the current study, and so are not publicly available. Wastewater data are available on the Belgian federal geoportal (<https://www.geo.be/catalog/details/002a8732-18f7-4537-8572-9efcbefb2a96?l=en>). Patient based data are however available from the authors upon reasonable request and with permission of Sciensano.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Authors who contributed to the design of the study are: RJ, HM, AM, LDM, KVH, and VH. Data acquisition and analysis was performed by RJ, HM, BV, NB, NBS, and NR. Authors who contributed to the interpretation of results are RJ, GDM, LDM, SD, NBS, PD, KVH, SVG, KB, and VH. All authors agree to be accountable for all aspects of the work ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Figures

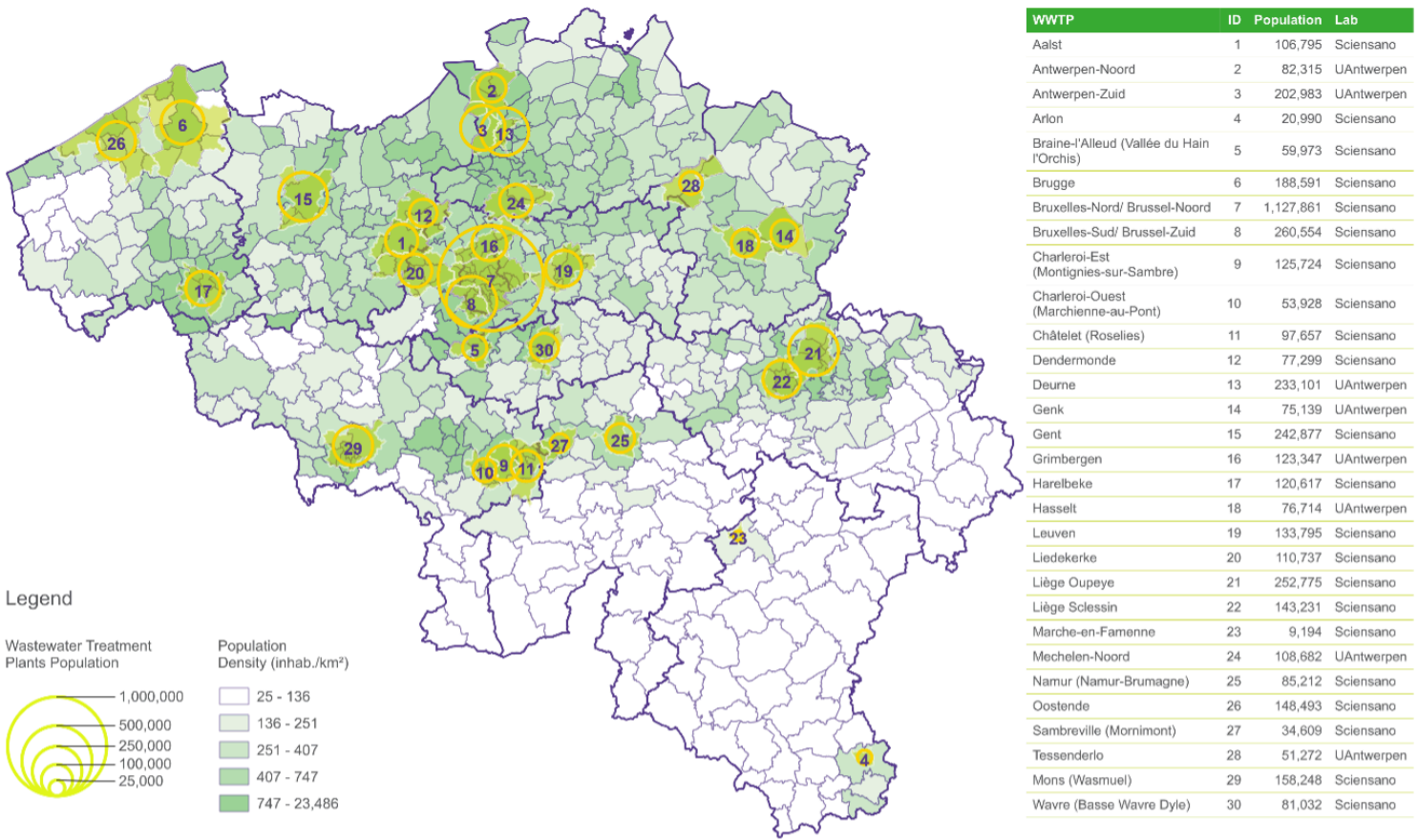


Figure 1

Location of the wastewater treatment plants sampled weekly in Belgium.

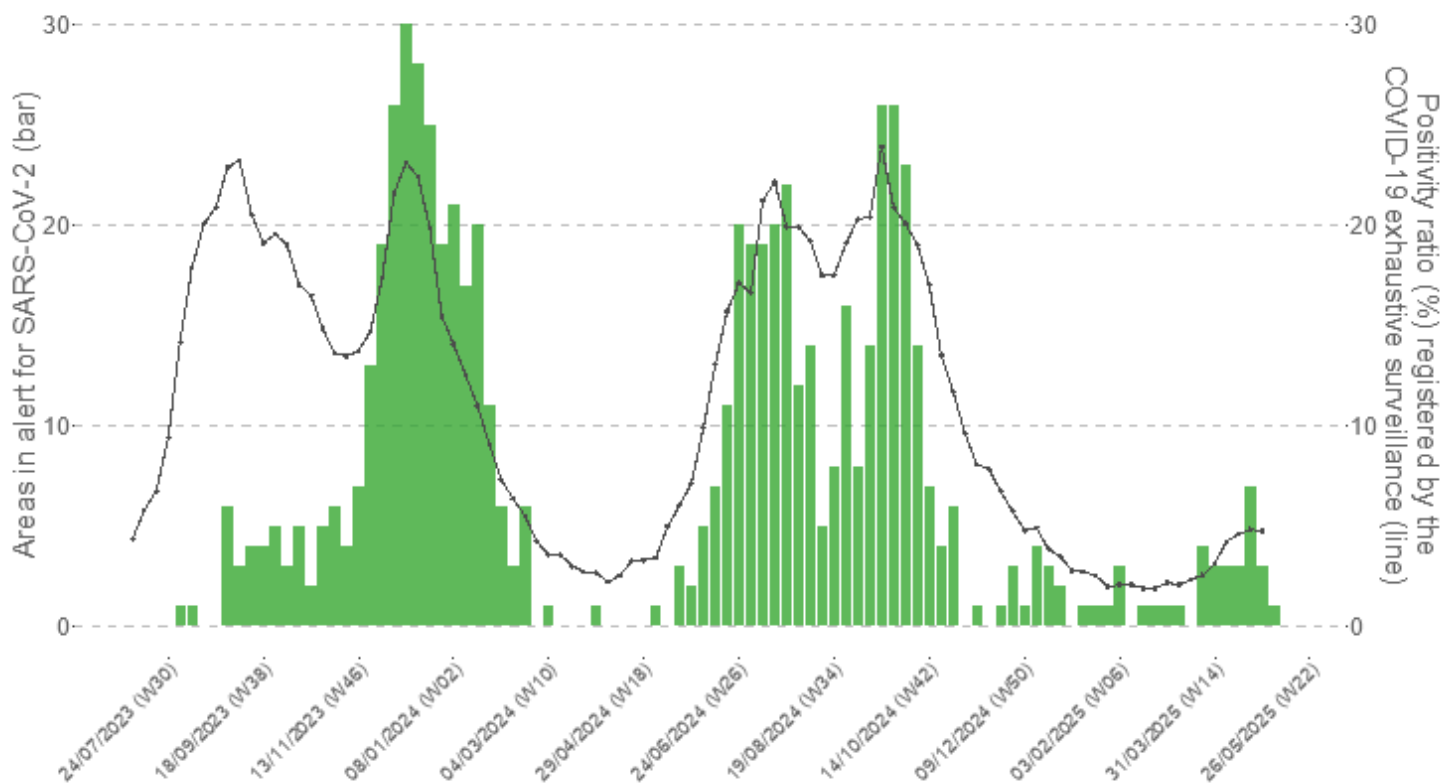


Figure 2

Wastewater-based and patient-based surveillance of SARS-CoV-2.

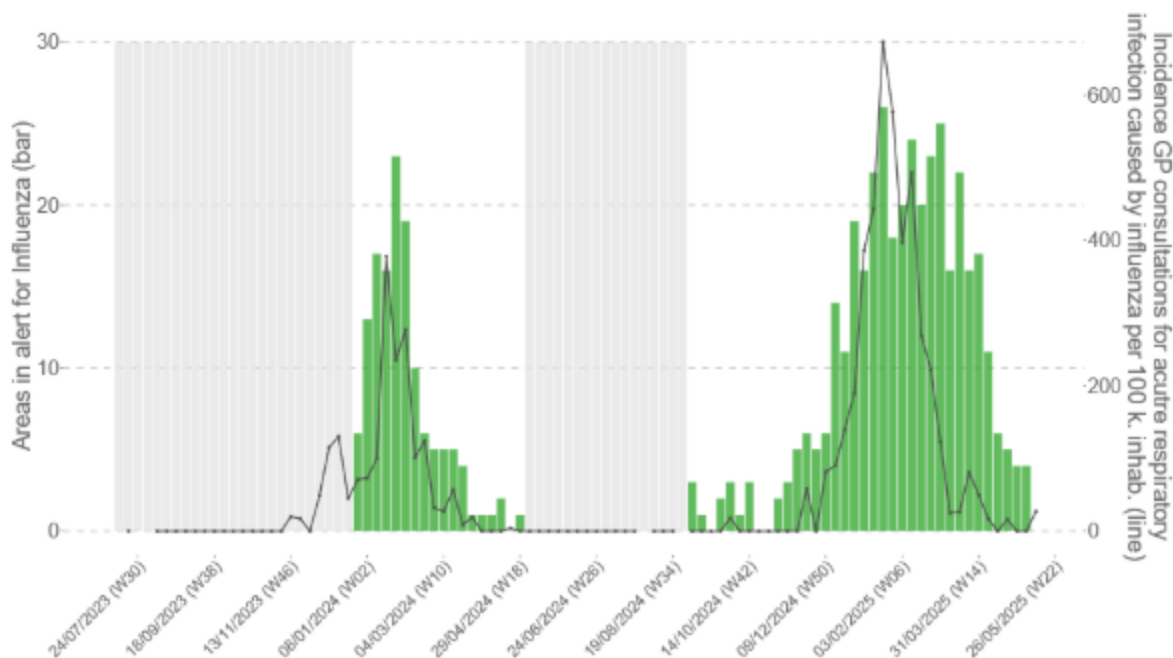


Figure 3

Wastewater-based and patient-based surveillance of Influenza.

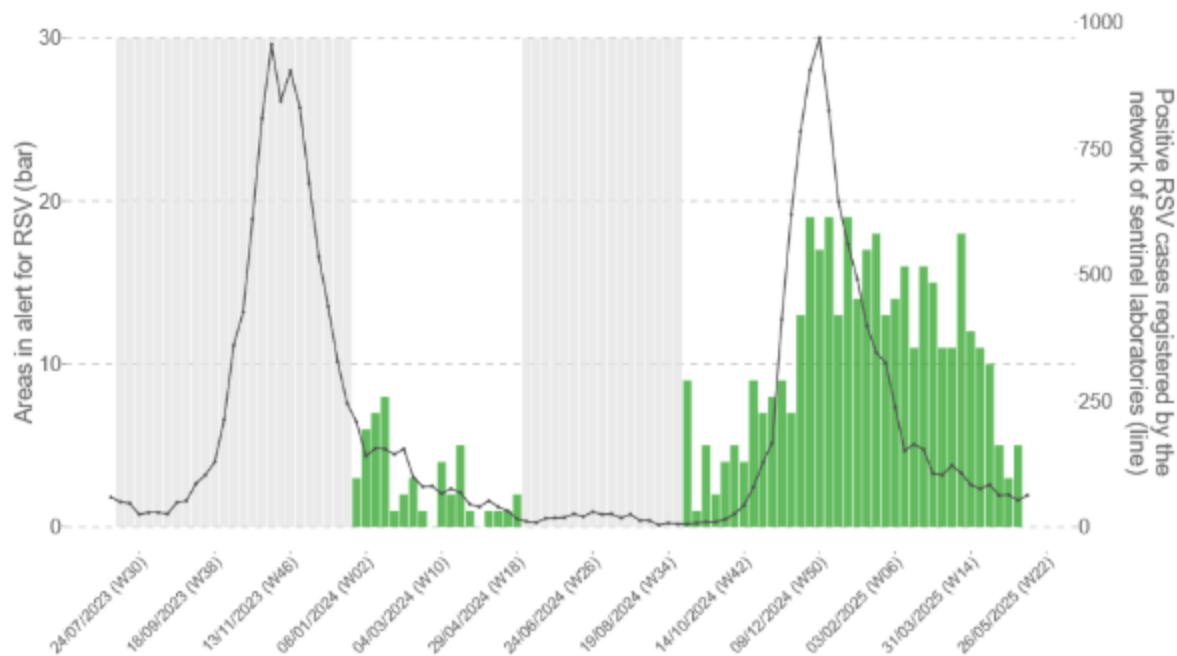


Figure 4

Wastewater-based and patient-based surveillance of RSV.

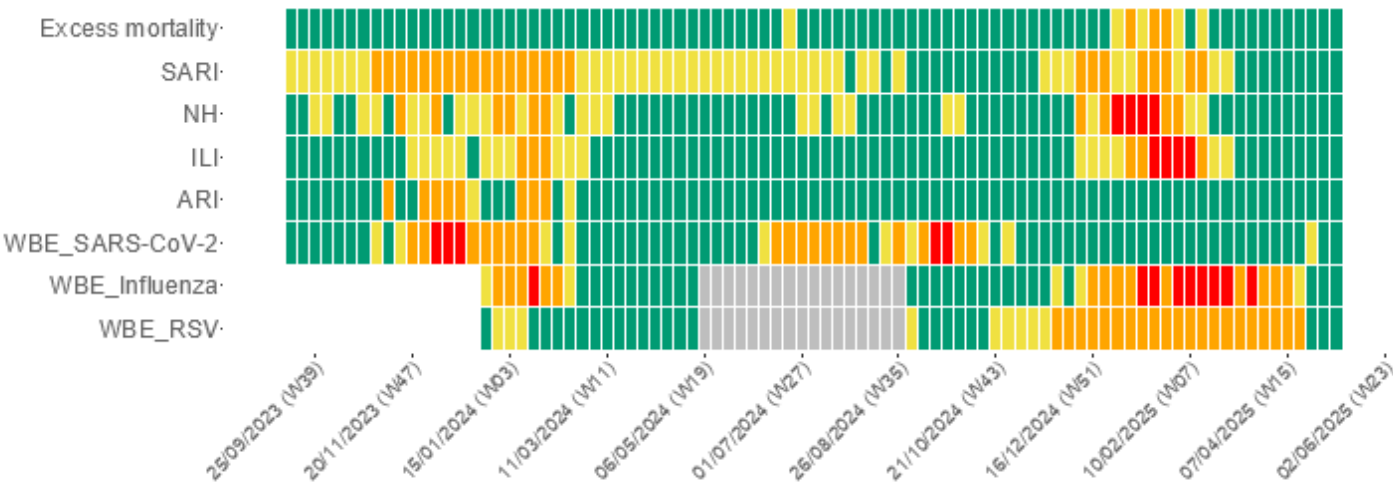


Figure 5

Activity levels reported by wastewater-based and patient-based surveillances.

Supplementary Files

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