WEEKLY REPORT – WASTEWATER-BASED EPIDEMIOLOGICAL SURVEILLANCE OF THE SARS-COV-2

–

RESULTS OF 01/03/2023

Authors: R. Janssens[1], H. Maloux[1], S. Hanoteaux[1], L. Van Poelvoorde[3], N. Roosens[3], B. Verhaegen[2], K. Van Hoorde[2], K. Dierick[2], S. Quoilin[1], K. Blot[1], M. Lesenfants[1]*

[1] Sciensano, Service Epidemiology of infectious diseases
[2] Sciensano, Service Foodborne pathogens
[3] Sciensano, Transversal activities in Applied Genomics
*Project leader and contact: marie.lesenfants@sciensano.be

In collaboration with:

TABLE OF CONTENTS

TABLE OF CONTENTS 2
1. Summary 3
2. Introduction 4
3. Methodology 4
3.1. SAMPLE COLLECTION AND ANALYSIS 4
3.2. WASTEWATER RESULTS 5
3.3. ALERTING INDICATORS 5
3.4. CASES RESULTS 6
3.5. CAUTION POINTS FOR THE RESULTS INTERPRETATION 6
4. Results 7
4.1. NATIONAL LEVEL 7
4.2. REGIONAL LEVEL 10
4.3. PROVINCIAL LEVEL 12
4.4. INDIVIDUAL CATCHMENT AREAS LEVEL 14
5. Appendix – Areas classified by alerting indicator 17

1. Summary

In the present work, the circulation of the SARS-CoV-2 virus in the environment is assessed based on three indicators. The analysis of wastewater samples collected in 42 wastewater treatment plants covers 45% of the Belgian population, with increased accuracy in the urban areas. The results of the wastewater surveillance are a source of complementary information to the infection cases number. Indeed, the wastewater results do notably include all asymptomatic persons, and are independent of the testing strategy.
Here are the conclusions based on the latest results of March 01th 2023:

- At the national level: A maximum number of areas in High Circulation was recorded on the 15th February 2023 after several weeks of increase. Since this date, this number is slowly decreasing. However, the situation differs amongst the three regions.
- At the regional level: Both the Fast Increase and Increasing Trend indicators are positive in Brussels. In Flanders, only the High Circulation is positive. In Wallonia, only the Increasing Trend is positive.
- At the provincial level: The Increasing Trend indicator is positive in 5 provinces: Brabant Wallon, Brussels, Hainaut, Liège and Namur, and was in 5 last week. The Fast Increase indicator is positive in 2 provinces: Brussels and Liège, and was in 3 last week. The High Circulation indicator is positive in 3 provinces: Antwerpen, Limburg and Oost-Vlaanderen, and was in 5 last week.
- At the covered areas level: among the 42 areas covered[1], the number of treatment plants positive to the different indicators are 24 for the Increasing Trend indicator, 6 for the Fast Increase indicator, and 14 for the High Circulation indicator.
- An alerting situation is evidenced for the covered area of Dendermonde as all three indicators are positive.

The wastewater situation can be followed on a weekly basis on:

- The graphics available on the public COVID-19 dashboard
- The Risk Assessment Group (RAG) updating the weekly epidemiological situation through a report validated by the Risk Management Group (RMG) and published every Friday in French and Dutch.
- Further details on the methodology applied for the wastewater surveillance can be found in the Appendix Methodology document (access available online).The methodology was updated on June 20th 2022.

[1] Due to the 2021 flooding events, the treatment plants from Wegnez (Verviers) is temporarily out of order. This area is therefore not screened for SARS-CoV-2. Liège is still well represented within this surveillance, however Verviers is not. Since the 13th of October, the covered area of Soumagne is added to the surveillance.

2. Introduction

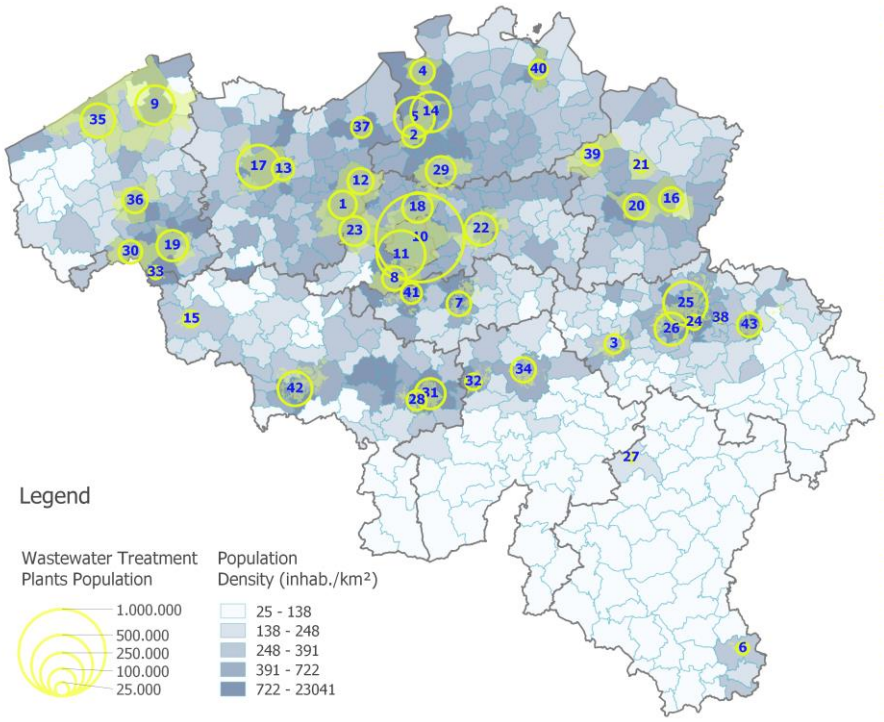
In mid-September 2020 started the SARS-CoV-2 national wastewater surveillance project. The present report is an outcome of this project aiming to assess weekly the wastewater-based epidemiological situation of Belgium.
The surveillance is based on the analysis of water samples collected twice per week from the influent of 42 WasteWater Treatment Plants (WWTPs) spread over Belgium. The evolution of the SARS-CoV-2 wastewater concentrations measured over time in the different treatment plants is analysed at different levels: regional, provincial, and the catchment area covered by the individual treatment plants. Also, three alerting indicators were developed to highlight areas of concern regarding the high circulation, the fast evolution, and the increasing trend of the observed wastewater concentrations.

In this report, the weekly wastewater-based epidemiological situation is presented and discussed at the above-mentioned levels based on the three categories of alerting indicators. Moreover, the remaining sources of uncertainties are discussed together with their expected impacts on the wastewater results interpretation.

3. Methodology

3.1. SAMPLE COLLECTION AND ANALYSIS

The surveillance project, which started in mid-September 2020 covers around 45% of the Belgian population. The population covered is 40% in the Flemish region, 35% in the Walloon region, and nearly 100% in the Brussels region. Figure 1 shows the catchment areas covered by the 42 WWTPs included in the project, which are located in high population density areas. A catchment area is defined by the area delimiting the population covered by a specific wastewater sample, collected at the inlet of the WWTPs. Further coverage details can be found in Table 2 by province (see also Table A1 in the Appendix Methodology document (access available online)) and on the Sciensano public dashboard.
In practice, 24-hour composite samples are collected twice a week on Mondays and Wednesdays from the influent of WWTP and are analysed for the presence of SARS-CoV-2 RNA by three different laboratories. The resulting SARS-CoV-2 concentrations (3 targeted genes) are delivered to Sciensano within 2 days for data analysis purpose. Concretely, the results which are representative of Mondays and Wednesdays are respectively available on Wednesdays and Fridays.



Treatment Plant	Id	Population
Aalst	1	102800
Aartselaar	2	68031
Amay	3	47038
Antwerpen-Noord	4	76949
Antwerpen-Zuid	5	215704
Arlon	6	19440
Basse Wavre (Dyle)	7	78290
Beersel	8	78540
Brugge	9	200401
Bruxelles Nord/Brussel Noord	10	1045863
Bruxelles Sud/Brussel Zuid	11	311866
Dendermonde	12	87633
Destelbergen	13	63771
Deurne	14	213048
Froyennes	15	34710
Genk	16	73364
Gent	17	247550
Grimbergen	18	120627
Harelbeke	19	125230
Hasselt	20	81988
Houthalen-Centrum	21	22357
Leuven	22	137365
Liedekerke	23	112933
Liège (Grosses Battes)	24	27934
Liège Oupeye	25	253780
Liège Sclessin	26	142239
Marche-en-Famenne	27	8633
Marchienne-au-Pont	28	52017
Mechelen-Noord	29	116363
Menen	30	70041
Montignies-sur-Sambre	31	123576
Mornimont	32	34140
Mouscron versant Espierres	33	21179
Namur-Brumagne	34	82175
Oostende	35	153401
Roeselare	36	82137
Sint-Niklaas	37	55038
Soumagne	38	7955
Tessenderlo	39	55546
Tumhout	40	44524
Vallée du Hain (L'Orchis)	41	57050
Wasmuel	42	157342
Wegnez	43	78244

Figure 1: The population located in the areas covered by the wastewater treatment plants (highlighted in yellow) and the population density for each municipality (indicated by the blue scale). Note that due to the recent flooding, the treatment plants of Wegnez is out of order.

3.2. WASTEWATER RESULTS

Between mid-September 2020 and mid-February 2021, the concentration were not quantified for all treatment plant and were expressed in Ct values. In mid-February 2021, the quantification of SARS-CoV-2 viral concentration (RNA copies/ml) was generalized to all the treatment plants investigated. Until 10th June 2022 the NIBSC standard was used to quantify the SARS-CoV-2 and after this date, the EURM standard was used.

In order to account for possible dilution by rainy events and for the number of people persons living in the catchment of each WWTP, a correction is applied on the viral concentration: the concentration is multiplied by the inlet flow and divided by the number of inhabitant equivalent of its respective WWTP and expressed by 100k inhabitant. The units of viral loads are copy/day/100k inhabitants equivalent.

The limit of quantification of the analytical method was estimated at 10 copies/ml .

3.3. ALERTING INDICATORS

To highlight the areas of possible concern, the three alerting indicators are assessed twice a week, based on viral loads (RNA copies/day/100k inhabitants) measured for the three targeted gene fragments (E, N1, and N2):

1. The **Increasing Trend** indicator highlights the catchment areas where the viral loads have been increasing for more than 6 days. The indicator is computed based on the moving average on the past two weeks of the viral load.
2. The **Fast Increase** indicator highlights the catchment areas where the viral loads have rapidly increased for the last week. It corresponds to a situation where the moving average on the past 7 days of the viral load has increased faster than 70% per week if being above the estimated limit of quantification. The increasing slope is normalized for each treatment plant.

3. The **High Circulation** indicator highlights the catchment areas where the viral loads are high. It corresponds to a situation where the viral loads exceed half of the highest value recorded during the ninth wave (i.e. from 21th of November 2022 till first of January 2023).

The indicators were developed in order to be able to track the different phases of an outbreak. Typically, when the viral loads in wastewaters in an area start to increase, the indicator Increasing Trend will be the first fulfilled. If the viral loads increase quickly, the Fast Increase indicator will be fulfilled. Finally, after the initial increasing phase, the viral loads in an area may be sufficiently high to result in the High Circulation to be fulfilled.

3.4. CASES RESULTS

The cases number data presented in this report come from the COVID-19 laboratory-confirmed cases database centralized by Sciensano. The cases number, used to compute the 14 days-incidence, only accounts for the physical areas covered by the wastewater project (see Figure 1).

3.5. CAUTION POINTS FOR THE RESULTS INTERPRETATION

Only the trends, observed through the alerting indicators, should be assessed for the comparison of different areas. As the viral load values differ from a WWTP to another, notably due to the differences in population sizes covered, absolute values should not be compared. Additionally, the situation comparison between the regions should be considered with caution. The degree of comparability is not yet known and depends on the comparability of the results between the different laboratories performing the analyses (see the Appendix Methodology document (access online)).
Moreover, the wastewater viral loads and the cases numbers presented in this report do not originate from the same population, even though the positive cases are selected only for the municipalities covered by the wastewater surveillance. For instance, the wastewater results account for all infected persons (whatever age or symptomatic condition) while the cases numbers include only the persons clinically tested positive. Likewise, an infected person covered by the wastewater results could be associated with another area in the clinical surveillance as the person's postal code is used for clinical statistics, i.e. mobility bias. Therefore, the correlation between the wastewater viral load and the cases number varies according to the area considered. The wastewater results are thus complementary and independent information to the results of the cases.

The correlation between the wastewater viral loads and the cases numbers could also be influenced by the vaccination campaign and the circulation of variants.

4. Results

4.1. NATIONAL LEVEL

Table 1 shows the national results allowing to track the changes between the situation as of today (March 01th 2023) and the situation as of last week (February 22th 2023). In this table, any change in indicator fulfilment (i.e. if the value for any indicator has changed from 0 to 1 or from 1 to 0) is indicated in **coloured bold text**.

The Increasing Trend indicator is positive at the national level.

Table 1: Alerting indicators fulfilled (1) or not (0) on September 28th 2022. Columns represent the population coverage of Belgium (Pop. coverage) and the three alerting indicators High Circulation (High), Fast Increase (Fast) and Increasing Trend (Incr.). The specifications of the four last columns are explained in the footnotes 1-4 below the table. Missing data is indicated with a "/".

Country	Pop. coverage	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm. evol. (%/week)[3]	Incr. days[4]
Belgium	44%	0	0	1	46	1.3	51	9

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicate of the three targeted gene fragments as explained in section "3.2 Wastewater results". The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

Figure 2 was developed to show the localization of the covered areas by the wastewater surveillance in Belgium and the state of the three alerting indicators in each of them. Figure 3 was developed to offer a dynamic view of the three alerting indicators over time. For further insights on the dynamic of the different indicators, see Section 3.3.

A maximum number of areas in High Circulation was recorded on the 15th February 2023 after several weeks of increase. Since this date, this number is decreasing. However, the situation differs amongst the three regions.

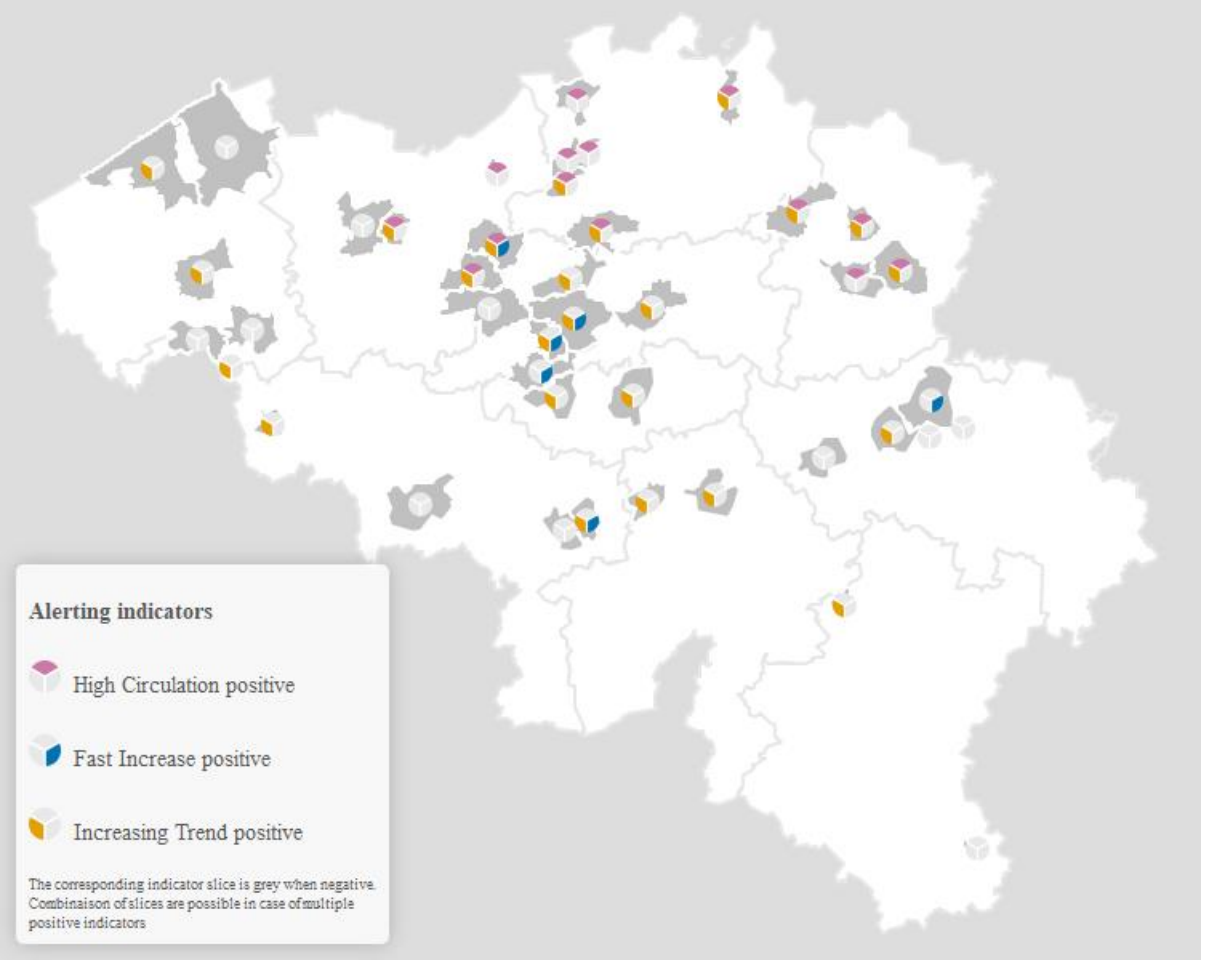


Figure 2: Localisation of the covered areas (grey polygons) by the wastewater surveillance in Belgium. In each area, the fulfillment of the High Circulation, Fast Increase and Increasing Trend indicator is indicated by a pink, blue and yellow slice, respectively. The names of the covered areas with respect of their localization can be found in Figure 1.

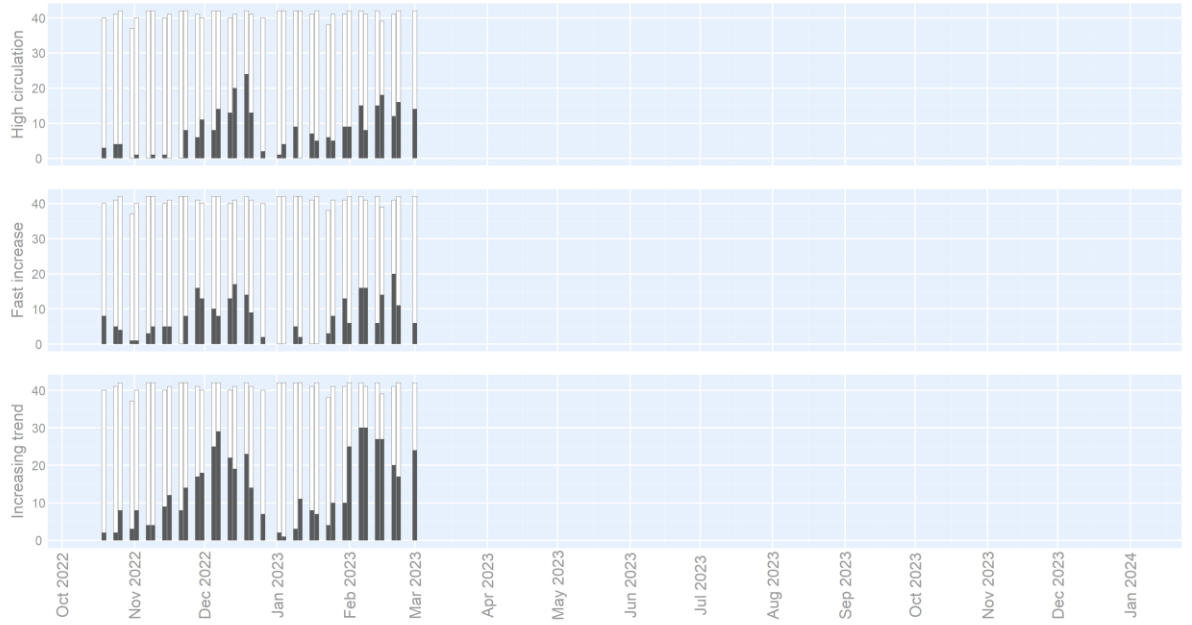


Figure 3: The number of areas (among the 42 covered by the wastewater surveillance this week and the 42 normally considered), with positive alerting indicators (black) compared to the total number of areas considered every week in the wastewater surveillance (white). Latest results (last bar) are from March 01th 2023. The white bars represent the total number of areas considered every week in the wastewater surveillance. Before the date marked by the vertical dashed line, the NIBSC standard was used to quantify the SARS-CoV-2 and after this date, the EURM standard was used.

4.2. REGIONAL LEVEL

Figure 4 represents the quantitative SARS-CoV-2 RNA viral loads in the wastewaters and the 14 days incidence for each region, compiling the incidence data of the area covered by the wastewater surveillance.

One wave can be seen in Figure 4:

- The 8th wave starting on 12th October 2022.

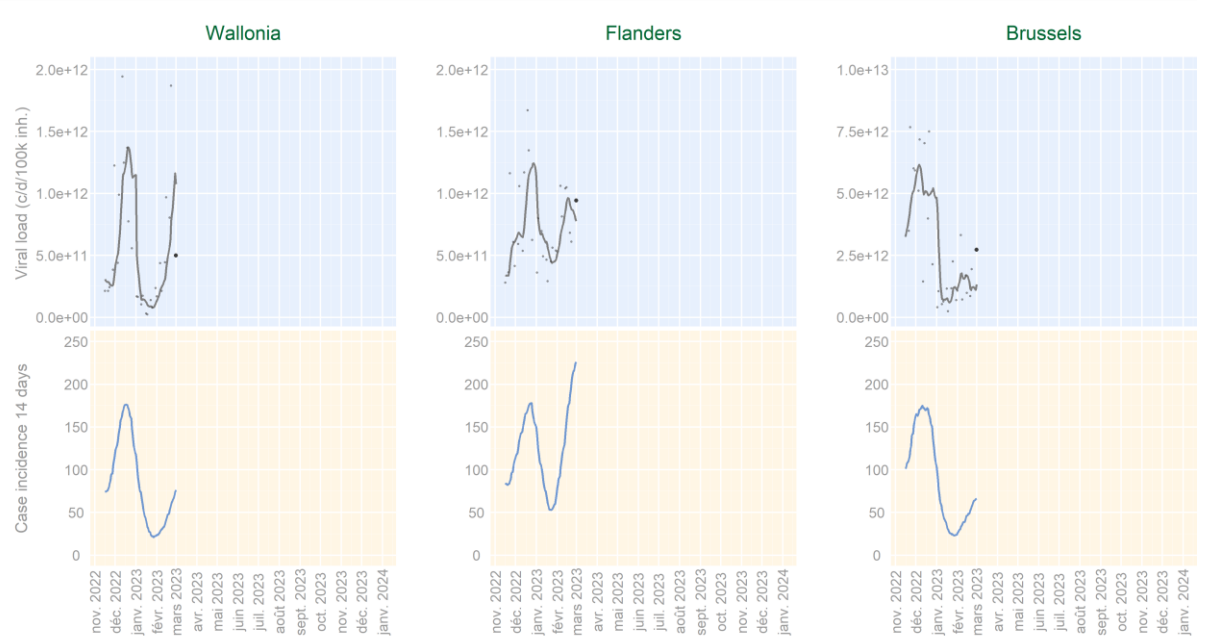


Figure 4: The SARS-CoV-2 RNA viral loads expressed as copies/days/100k habitants (based on the past two weeks moving average applied on the linear interpolation) (Top), and the 14 days incidence in the population covered by the wastewater surveillance since mid-February 2021 (bottom). Before the date marked by the vertical dashed line, the NIBSC standard was used to quantify the SARS-CoV-2 and after this date, the EURM standard was used.

Table 2 shows, for each region, the results associated with the samples of Wednesday March 01th 2023. It allows to track the changes between the situation as of today (March 01th 2023) and the situation as of last week (February 22th 2023). Hereby, two distinct cases are taken into account:

1. If a region has at least one indicator fulfilled this week and it was not the case last week, its **name is displayed in bold** in the table.
2. If a region has at least one indicator fulfilled this week and if it also was the case last week, any change in indicator fulfilment (i.e. if the value for any indicator has changed from 0 to 1 or from 1 to 0) is indicated in **coloured bold text**.

Both the Fast Increase and Increasing Trend indicators are positive in Brussels. In Flanders, the High Circulation is positive. In Wallonia, the Increasing Trend is positive.

Table 2: Alerting indicators fulfilled (1) or not (0) on March 01th 2023. Columns represent the population coverage of the regions (Pop. coverage) and the three alerting indicators High Circulation (High), Fast Increase (Fast) and Increasing Trend (Incr.). The specifications of the four last columns are explained in the footnotes 1-4 below the table. Missing data is indicated with a "/".

Region	Pop. coverage	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm. evol. (%/week)[3]	Incr. days[4]
Brussels	100%	0	1	1	34	2.73	149	14
Flanders	41%	1	0	0	63	0.94	1	3
Wallonia	31%	0	0	1	21	0.50	49	15

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicate of the three targeted gene fragments as explained in section "3.2 Wastewater results". The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

4.3. PROVINCIAL LEVEL

Table 3 shows, for each Province, the results associated with the samples of Wednesday March 01th 2023. It allows to track the changes between the situation as of today (March 01th 2023) and the situation as of last week (February 22th 2023). Hereby, two distinct cases are taken into account:

1. If a province has at least one indicator fulfilled this week and it was not the case last week, its **name is displayed in bold** in the table.
2. If a province has at least one indicator fulfilled this week and if it also was the case last week, any change in indicator fulfilment (i.e. if the value for any indicator has changed from 0 to 1 or from 1 to 0) is indicated in **coloured bold text**.

Table 3 shows, for each Province, the results associated with the samples of Wednesday March 01th 2023, for the three alerting indicators:

- The Increasing Trend indicator is positive in 5 provinces: Brabant Wallon, Brussels, Hainaut, Liège and Namur, and was in 5 last week.
- The Fast Increase indicator is positive in 2 provinces: Brussels and Liège, and was in 3 last week.
- The High Circulation indicator is positive in 3 provinces: Antwerpen, Limburg and Oost-Vlaanderen, and was in 5 last week.

Table 3: Alerting indicators fulfilled (1) or not (0) on March 01th 2023. Columns represent the population coverage of the WWTPs within the Province (Pop. coverage) and the three alerting indicators High Circulation (High), Fast Increase (Fast) and Increasing Trend (Incr.). The specifications of the four last columns are explained in the footnotes 1-4 below the table. Missing data is indicated with a "/".

Province	Pop. coverage	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm. evol. (%/w)[3]	Incr. days[4]
Antwerpen	39%	1	0	0	87	0.47	-35.0	3
Brabant Wallon	33%	**0**	0	**1**	22	0.33	-45.5	13
Brussels	100%	0	**1**	1	34	2.73	149.4	14
Hainaut	29%	**0**	**0**	1	13	0.33	26.1	16
Liège	43%	**0**	1	1	27	0.75	112.4	10
Limburg	26%	1	0	0	141	0.70	6.0	6
Luxembourg	10%	**0**	**0**	**0**	11	0.31	0.0	5
Namur	23%	0	0	1	17	0.24	-17.3	30
Oost-Vlaanderen	38%	1	0	0	67	1.28	29.0	3
Vlaams-Brabant	49%	0	0	0	20	0.96	24.7	5
West-Vlaanderen	52%	0	0	0	33	1.27	0.4	3

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicates of the three targeted gene fragments as explained in section "3.2 Wastewater results". The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

4.4. INDIVIDUAL CATCHMENT AREAS LEVEL

Table 4 shows, for each catchment area, the values of the three alerting indicators obtained based on the results of last Wednesday's sample. Table 4 is a snapshot of the areas for which the indicators are positive for the last results obtained. It allows to track the changes between the situation as of today (March 01th 2023) and the situation as of last week (February 22th 2023). Hereby, three distinct cases are taken into account:

1. If an area has at least one indicator fulfilled this week and it was not the case last week, its **name is displayed in bold** in the table.
2. If an area has at least one indicator fulfilled this week and if it also was the case last week, any change in indicator fulfilment (i.e. if the value for any indicator has changed from 0 to 1 or from 1 to 0) is indicated in **coloured bold text**.
3. Any area which had at least one indicator fulfilled last week but not this week is listed below Table 4.

Here are the results associated with the samples of March 01th 2023:

- The Increasing Trend indicator is positive in 24 covered areas. Amongst these areas, the viral load is continually increasing since more than two weeks in at least one area. Further details can be found in Appendix A3. Last week, this indicator was positive in 17 covered areas.
- The Fast Increase is positive in 6 covered areas: Beersel (228.9% increase per week), Liege Oupeye (217.7% increase per week), Brussels-North (166.9% increase per week), Dendermonde (127.7% increase per week), Brussels-South (90.9% increase per week) and Montignies-sur-Sambre (75.8% increase per week) (see Appendix A2 for more details). Last week, this indicator was positive in 11 covered areas.
- The High Circulation indicator is positive in 14 covered areas. The full list of these areas can be found in Appendix A1. Last week, this indicator was positive in 16 covered areas.
- An alerting situation is evidenced for the covered area of Dendermonde as all three indicators are positive.

The wastewater results at the level of the local covered areas can be accessed online for each area on the COVID-19 dashboard.

Table 4: Alerting indicators fulfilled (1) or not (0) on March 01th 2023. Columns represent the provinces, different WWTPs within the Provinces and the three alerting indicators High Circulation (High), Fast Increase (Fast) and Increasing Trend (Incr.). The specifications of the four last columns are explained in the footnotes 1-4 below the table. Missing data is indicated with a "/".

Province	WWTP	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm evol. (%/week)[3]	Incr. days[4]
Oost-Vlaanderen	**Aalst**	1	0	1	149.64	2.88	-18.9	7
Antwerpen	Aartselaar	1	**0**	1	198.19	0.45	5.0	14
Antwerpen	**Antwerpen-Noord**	1	0	0	114.93	0.48	-61.4	0
Antwerpen	**Antwerpen-Zuid**	1	0	0	58.40	0.33	-46.3	0
Brabant Wallon	Basse Wavre (Dyle)	**0**	0	1	25.60	0.36	-62.1	16
Vlaams-Brabant	**Beersel**	0	1	0	21.64	1.01	228.9	0
Brussels	**Brussels-North**	0	1	1	33.58	3.14	166.9	9

Province	WWTP	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm evol. (%/week)[3]	Incr. days[4]
Brussels	Brussels-South	0	1	1	33.70	1.33	90.9	30
Oost-Vlaanderen	**Dendermonde**	1	1	1	67.95	0.29	127.7	7
Oost-Vlaanderen	**Destelbergen**	1	0	1	76.82	1.30	17.7	7
Antwerpen	**Deurne**	1	0	0	65.59	0.39	-43.3	0
Hainaut	Froyennes	0	0	1	17.59	0.45	21.4	35
Limburg	Genk	1	0	1	141.87	0.88	20.6	9
Vlaams-Brabant	**Grimbergen**	0	0	1	17.62	1.33	-22.4	7
Limburg	Hasselt	1	0	0	172.07	0.63	-37.6	0
Limburg	**Houthalen-Centrum**	1	0	1	56.13	0.70	32.9	9
Vlaams-Brabant	Leuven	0	0	1	26.72	0.99	32.1	9
Liège	Liege Oupeye	0	1	0	25.10	0.65	217.7	0
Liège	Liege Sclessin	0	0	1	28.64	1.05	6.2	35
Luxembourg	Marche-en-Famenne	0	0	1	4.62	0.16	0.0	16
Antwerpen	**Mechelen-Noord**	1	0	1	81.60	0.56	-26.8	7
Hainaut	Montignies-sur-Sambre	0	1	1	24.61	0.54	75.8	37
Namur	Mornimont	0	0	1	6.90	0.24	22.2	35
Hainaut	Mouscron versant Espierres	0	0	1	14.95	0.76	1.1	23
Namur	Namur-Brumagne	0	0	1	21.57	0.24	-33.7	28
West-Vlaanderen	**Oostende**	0	0	1	28.11	1.25	-28.1	7
West-Vlaanderen	**Roeselare**	0	0	1	30.25	1.19	-12.6	7
Oost-Vlaanderen	**Sint-Niklaas**	1	0	0	70.79	0.60	-29.4	0
Limburg	**Tessenderlo**	1	0	1	128.23	0.57	40.1	9
Antwerpen	Turnhout	1	0	1	125.09	1.34	22.7	9
Brabant Wallon	**Vallee du Hain (L'Orchis)**	0	0	1	17.94	0.29	-22.7	9

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicates of the three targeted gene fragments as explained in section “3.2 Wastewater results”; The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

The following areas had the corresponding indicator fulfilled last week but not this week:

- Increasing Trend indicator: Amay, Arlon, Liege (Grosses Battes), Marchienne-au-Pont, Soumagne and Wasmuel.
- Fast Increase indicator: Arlon, Liedekerke, Liege (Grosses Battes) and Soumagne.
- High Circulation indicator: Amay, Arlon, Liege (Grosses Battes) and Soumagne.

Further details on covered area without positive indicators can be found in Table A4.

5. Appendix – Areas classified by alerting indicator

Table A1: Areas for which the High Circulation indicator is positive (14 out of 42 on March 01th 2023).

Province	WWTP	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm evol. (%/week)[3]	Incr. days[4]	Date Max cc[5]
Antwerpen	Aartselaar	1	0	1	198.19	0.45	5.0	14	09/01/2023
Limburg	Hasselt	1	0	0	172.07	0.63	-37.6	0	13/02/2023
Oost-Vlaanderen	Aalst	1	0	1	149.64	2.88	-18.9	7	15/02/2023
Limburg	Genk	1	0	1	141.87	0.88	20.6	9	15/02/2023
Limburg	Tessenderlo	1	0	1	128.23	0.57	40.1	9	16/01/2023
Antwerpen	Turnhout	1	0	1	125.09	1.34	22.7	9	01/03/2023
Antwerpen	Antwerpen-Noord	1	0	0	114.93	0.48	-61.4	0	06/02/2023
Antwerpen	Mechelen-Noord	1	0	1	81.60	0.56	-26.8	7	9th wave
Oost-Vlaanderen	Destelbergen	1	0	1	76.82	1.30	17.7	7	17/10/2022
Oost-Vlaanderen	Sint-Niklaas	1	0	0	70.79	0.60	-29.4	0	13/02/2023
Oost-Vlaanderen	Dendermonde	1	1	1	67.95	0.29	127.7	7	06/02/2023
Antwerpen	Deurne	1	0	0	65.59	0.39	-43.3	0	16/01/2023
Antwerpen	Antwerpen-Zuid	1	0	0	58.40	0.33	-46.3	0	12/10/2022
Limburg	Houthalen-Centrum	1	0	1	56.13	0.70	32.9	9	9th wave

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicates of the three targeted gene fragments as explained in section "3.2 Wastewater results". The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

[5] : date at which the measured viral load was the highest since the beginning of the ninth wave. If the date was between the 21th of November 2022 and the first of January 2023, the date is considered to be during the ninth wave and mentioned as such.

Table A2: Areas for which the Fast Increase indicator is positive (6 out of 42 on the March 01th 2023).

Province	WWTP	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm evol. (%/week)[3]	Incr. days[4]	Date Max cc[5]
Vlaams-Brabant	Beersel	0	1	0	21.64	1.01	228.9	0	9th wave
Liège	Liege Oupeye	0	1	0	25.10	0.65	217.7	0	22/02/2023
Brussels	Brussels-North	0	1	1	33.58	3.14	166.9	9	9th wave
Oost-Vlaanderen	Dendermonde	1	1	1	67.95	0.29	127.7	7	06/02/2023
Brussels	Brussels-South	0	1	1	33.70	1.33	90.9	30	03/10/2022
Hainaut	Montignies-sur-Sambre	0	1	1	24.61	0.54	75.8	37	22/02/2023

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicates of the three targeted gene fragments as explained in section "3.2 Wastewater results". The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

[5] : date at which the measured viral load was the highest since the beginning of the ninth wave. If the date was between the 21th of November 2022 and the first of January 2023, the date is considered to be during the ninth wave and mentioned as such.

Table A3: Areas for which the Increasing Trend indicator is positive (24 out of 42 on the March 01th 2023).

Province	WWTP	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm evol. (%/week)[3]	Incr. days[4]	Date Max cc[5]
Hainaut	Montignies-sur-Sambre	0	1	1	24.61	0.54	75.8	37	22/02/2023
Hainaut	Froyennes	0	0	1	17.59	0.45	21.4	35	9th wave
Liège	Liege Sclessin	0	0	1	28.64	1.05	6.2	35	9th wave
Namur	Mornimont	0	0	1	6.90	0.24	22.2	35	9th wave
Brussels	Brussels-South	0	1	1	33.70	1.33	90.9	30	03/10/2022
Namur	Namur-Brumagne	0	0	1	21.57	0.24	-33.7	28	10/10/2022
Hainaut	Mouscron versant Espierres	0	0	1	14.95	0.76	1.1	23	9th wave
Brabant Wallon	Basse Wavre (Dyle)	0	0	1	25.60	0.36	-62.1	16	15/02/2023
Luxembourg	Marche-en-Famenne	0	0	1	4.62	0.16	0.0	16	22/02/2023
Antwerpen	Aartselaar	1	0	1	198.19	0.45	5.0	14	09/01/2023
Brussels	Brussels-North	0	1	1	33.58	3.14	166.9	9	9th wave
Limburg	Genk	1	0	1	141.87	0.88	20.6	9	15/02/2023
Limburg	Houthalen-Centrum	1	0	1	56.13	0.70	32.9	9	9th wave
Vlaams-Brabant	Leuven	0	0	1	26.72	0.99	32.1	9	9th wave
Limburg	Tessenderlo	1	0	1	128.23	0.57	40.1	9	16/01/2023
Antwerpen	Turnhout	1	0	1	125.09	1.34	22.7	9	01/03/2023
Brabant Wallon	Vallee du Hain (L'Orchis)	0	0	1	17.94	0.29	-22.7	9	9th wave
Oost-Vlaanderen	Aalst	1	0	1	149.64	2.88	-18.9	7	15/02/2023
Oost-Vlaanderen	Dendermonde	1	1	1	67.95	0.29	127.7	7	06/02/2023
Oost-Vlaanderen	Destelbergen	1	0	1	76.82	1.30	17.7	7	17/10/2022
Vlaams-Brabant	Grimbergen	0	0	1	17.62	1.33	-22.4	7	9th wave
Antwerpen	Mechelen-Noord	1	0	1	81.60	0.56	-26.8	7	9th wave
West-Vlaanderen	Oostende	0	0	1	28.11	1.25	-28.1	7	9th wave
West-Vlaanderen	Roeselare	0	0	1	30.25	1.19	-12.6	7	9th wave

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicates of the three targeted gene fragments as explained in section "3.2 Wastewater results". The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

[5] : date at which the measured viral load was the highest since the beginning of the ninth wave. If the date was between the 21th of November 2022 and the first of January 2023, the date is considered to be during the ninth wave and mentioned as such.

Table A4: Areas for which none of the three indicators is positive (11 out of 42 on the March 01th 2023).

Province	WWTP	High	Fast	Incr.	Norm. viral load (%)[1]	Mean viral load[2]	Norm evol. (%/week)[3]	Incr. days[4]	Date Max cc[5]
Liège	Amay	0	0	0	36.06	0.40	-59.9	0	15/02/2023
Luxembourg	Arlon	0	0	0	14.28	0.37	0.0	0	9th wave
West-Vlaanderen	Brugge	0	0	0	28.63	0.94	15.5	0	9th wave
Oost-Vlaanderen	Gent	0	0	0	29.73	1.10	29.8	0	9th wave
West-Vlaanderen	Harelbeke	0	0	0	38.13	1.11	-8.8	0	9th wave
Vlaams-Brabant	Liedekerke	0	0	0	12.96	0.49	-76.2	0	9th wave
Liège	Liege (Grosses Battes)	0	0	0	20.31	0.66	6.3	0	22/02/2023
Hainaut	Marchienne-au-Pont	0	0	0	4.22	0.15	0.0	0	9th wave
West-Vlaanderen	Menen	0	0	0	46.39	2.63	51.3	0	17/10/2022
Liège	Soumagne	0	0	0	49.68	1.19	42.1	0	22/02/2023
Hainaut	Wasmuel	0	0	0	6.33	0.14	0.0	0	9th wave

[1] : the viral load normalized with the maximum viral load measured in the corresponding catchment area during the ninth wave (i.e. from 21th of November 2022 till the first of January 2023).

[2] : the viral load computed on the mean of the replicates of the three targeted gene fragments as explained in section "3.2 Wastewater results". The mean viral load is expressed in 10^12 copies/day/100k inhabitants.

[3] : the slope (%/week) of the past 7 days moving average of the viral load if the corresponding concentration is above the estimated limit of quantification.

[4] : the cumulative number of days of increase of the past 14 days moving average of the viral load.

[5] : date at which the measured viral load was the highest since the beginning of the ninth wave. If the date was between the 21th of November 2022 and the first of January 2023, the date is considered to be during the ninth wave and mentioned as such.