- **Adviesaanvraag**

Vraagsteller	Regeringscommissariaat Corona
Datum van adviesaanvraag	27/09/2021
Onderwerp	Residual risks and uncertainties linked to the current epidemiological situation, mental health, assessment of mental health and models used during the pandemic
Vraag	

- **Adviesverstrekking t.a.v. het Overlegcomité**

Datum van adviesverstrekking	20/10/2021 (updated version)
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- **Executive summary**

1. **The current epidemiological situation in Belgium is evolving rapidly**: after a high 'plateau' over the past six weeks, the daily number of cases is increasing rapidly now. Also the number of hospitalisations and deaths are gradually rising. On October 20th 2021, the 14-day incidence has increased to 319/100k i.e. 7-day average of 3151 cases/d (+ 50%). The R-value for the country is 1.26 (1.16-1.37). The doubling number for the country is now 12 d, and as short as 6 and 9 days for West-Vlaanderen and Limburg respectively. The total number of tests remained stable, the positivity rate has increased to 6.6 %. The increase in cases is widespread, but **remarkable increases** (compared to the previous 7 days) have been noted in the provinces of Antwerp (+57%), Limburg (+74%), Oost-Vlaanderen (+67%), West-Vlaanderen (+115%), Brabant-Wallon (+69%), Hainaut (+ 59%) and Namur (+53%).
2. **Cases** have been predominantly in **children** (0-9 y) and **adolescents** (10-19 y) but we observe now an increase of cases in older age group as wells: **20-39 y**, and to a lesser extent 40-64 y and even 65+. **Recent findings from the RSZ-data** show higher than general population incidences among those working in **youth work associations**, **education**, **nurseries and daycare**, **health and care sectors** and **passenger land transport,** which require careful attention. In the context of the more transmissible Delta variant of SARS-CoV-2 (being the only circulating strain for the moment), it is particularly important to carefully monitor incidence of COVID-19 in the sectors with high-risk, multiple close physical proximity, especially with younger, not yet vaccinated individuals. Increases in the student population have been noted as well.We assume that the actual epidemiological situation (for number of infections) is a **consequence of the October 1st relaxations, season change and the reopening of at risk-sectors where many people convene** (i.e. the educational system, nightlife,...) leading to more than 20% of increase of at risk contacts between people. The further evolution of these trends needs to be followed closely, because the **ratio cases/hosp/ICU/deaths remains established** (i.e. 35-37 % increase in hospitalisations if number of cases doubles).
3. **The number of hospitalisations is now linearly increasing**: on October 20th on average 79.1 hosp./d, leading to 947 hospital beds (+ 41%) and 230 of 1,992 (+ 14%) ICU beds occupied i.e. 11.5%. Hospitalisations occur predominantly in non-vaccinated and highly vulnerable fully-vaccinated persons, but the **incidence of hospitalisations is significantly higher among non-vaccinated people.** As a historical comparison, data for 20/10/2020 were as follows: 2978 hospital beds and 487 ICU beds occupied, with 205 new admissions/d. A year later (20/10/2021), hospital figures have thus been reduced to 31.8% of the 2020 situation in terms of total beds occupied and 47.2% of the 2020 ICU-occupation. Even with **high levels of acquired immunity** against SARS-CoV-2 in the population by a combination of vaccination and past infection, **hospitalisations could further increase substantially (i.e. up to three times the current levels)**. The **above mentioned recent changes in the epidemiology need to be followed up closely**.
4. **Mortality figures** have declined significantly since the start of the vaccination campaign, but are **gradually increasing again** (from 6.3/d mid-september to currently 11.1/day). At a year base, the current number would still lead to an additional 4052 deaths. In current figures, in 2020 Belgium reported 19,720 COVID-19 deaths, with 5975 COVID-19 deaths in 2021 to date.
5. **International benchmarking** shows that **we maintain a very low stringency of measures**, while our incidence of cases, mortality and certainly hospitalisations and positivity rates are not the lowest.
6. Mental wellbeing: during the COVID-19 crisis the general population's mental wellbeing was under pressure, particularly for younger people. In September 2021, the **mental health of the population seems to be evolving positively**. Indeed, the results of the Motivation Barometer and the Great

Corona Study show that our motivation is rising again and that our mental health (measured with GHQ-12) is again at the same level as before the COVID-19 crisis. It is to be acknowledged however that these results concern self-selected participants. Therefore, some vulnerable groups may be under-represented. However, good follow-up data on vulnerable groups are lacking, so we need to rely on expert opinions and testimonies for these groups. Regarding the psychological well-being of health care workers, especially nurses in ICU, the evidence of their being at risk of exhaustion and moral distress was well documented in 2020. Follow-up studies are being organised. The psychological well-being of mental and social health workers remains an under investigated issue. In terms of their sickness absence, the situation seems to be stable, however needs to be followed up given that sick leave often increases after a stressful period.

7. According to the ECDC, there are currently **three variants of concerns** (VOC), (i.e. Beta, Gamma, and Delta) **likely to have an impact on the epidemiological situation in Europe and hence Belgium**. **Two VOIs** are currently defined, being Mu and Lambda. Furthermore, a wide set of variants under monitoring are defined. To some extent there is an indication that they could have **properties similar to those of a VOC** (e.g. the combination of Delta with the mutation of concern E484Q which characterises Kappa). At present, and since the past 10 weeks, Delta is the dominant strain in Belgium. From a virological perspective, it can be expected that this variant may be replaced by another variant at a certain point in time. It is however unclear when and by which type of variant this would occur. There are no global indications either at the moment.
8. Due to lack of influenza circulation in the past year, the timing of a **possible influenza epidemic** in Europe is difficult to predict. In recent weeks, an increasing number of cases of influenza **A(H3N2)** virus have been reported from several countries across Europe. **Earlier onset** of the seasonal influenza epidemic (usually peaking in February to March) than in pre-COVID-19 seasons is possible, potentially adding pressure and burden on healthcare settings. **Vaccine effectiveness** (VE) data from previous regular influenza seasons for A(H3N2) viruses have been overall **low** to very low, particularly in the elderly who are most at risk of severe disease. In addition, there is also a considerable risk that there will be an **antigenic mismatch** between the vaccine strain and the circulating strain, since the low number of detections in the Southern hemisphere make predictions difficult. The limited circulation during this and last year might also contribute to a **higher susceptibility** in the population with less people being exposed to influenza viruses, even though older persons might be more protected due to exposure in previous years[1]. Taken together, the **burden of disease and burden of care** from influenza in **Belgium** can be considerable. Based on observations from earlier years with lower (2014) and higher (2018) influenza burden, the burden could be estimated at **19,726 to 76,530 GP consultations per week, 356 to 1,575 hospital admissions per week and 62 to 80 additional ICU admissions per week during the peak.** Taken together, the combined burden of a new COVID-19 wave (up to 100-200 hospitalisations/day and 350-400 occupied beds on ICU) plus a heavy winter influenza peak (up to 225 extra hospitalisations per day and 11.4 extra ICU admissions/day) could lead to saturation of 550-600 ICU beds hence a significant burden on the already exhausted health care system. Obviously, there is a lot of uncertainty in both directions: peaks might be eventually lower, or not occur together, or might be yet higher than foreseen due to increases in at-risk contact behaviour.
9. In conclusion, the actually observed gradually worsening data on cases, hospitalisations, and mortality and the expected additional burden from an unpredictable influenza epidemic call for prudence and stability with regards to **remaining measures and defense lines** (e.g. testing, contact tracing, isolation, ventilation, indoor mask wearing...) and to maintain a stable set of measures **during winter period,** moreover because our viral circulation levels are higher than in many

[1] https://www.nature.com/articles/ni1530

neighbouring countries. This would include also the **maintenance of the actual testing and contact tracing capacity**, as a complement to pre-existing regional contact tracing capacity which is also needed for non-COVID-infectious diseases containment (e.g. TBC, legionellosis, salmonellosis,...). Applying caution during the entire upcoming winter period could bring us in line with most other surrounding countries, in particular those with higher vaccination coverages and a better epidemiological situation.

In addition to this 'fixed and stable set of defence lines', and in the light of the actual fast deterioration of the epidemiological situation, **additional measures such as renewed emphasis on telework and more extensive use of the CST need to be considered**.

1.1. Expected epidemiological situation and remaining risks for the healthcare and hospital system

- **Current situation**

- The current epidemiological situation is extensively described in the weekly reports of the RAG. As a synopsis, we observe the following:

The current epidemiological situation in Belgium is evolving rapidly: after a high 'plateau' over the past six weeks, the daily number of cases is increasing rapidly now. Also the number of hospitalisations and deaths are gradually rising. On October 20th 2021, the 14-day incidence has increased to 319/100k i.e. 7-day average of 3151 cases/d (+ 50%). The R-value for the country is 1.26 (1.16-1.37). The doubling number for the country is now 12 d, and as short as 6 and 9 days for West-Vlaanderen and Limburg respectively. The total number of tests remained stable, the positivity rate has increased to 6.6 %. The increase in cases is widespread, but **remarkable increases** (compared to the previous 7 days) have been noted in the provinces of Antwerp (+57%), Limburg (+74%), Oost-Vlaanderen (+67%), West-Vlaanderen (+115%), Brabant-Wallon (+69%), Hainaut (+ 59%) and Namur (+53%).

Cases have been predominantly in **children** (0-9 y) and **adolescents** (10-19 y) but we observe now an increase of cases in older age group as wells: **20-39 y**, and to a lesser extent 40-64 y and even 65+. **Recent findings from the RSZ-data** show higher than general population incidences among those working in **youth work associations**, **education**, **nurseries and daycare**, **health and care sectors** and **passenger land transport,** which require careful attention. In the context of the more transmissible Delta variant of SARS-CoV-2 (being the only circulating strain for the moment), it is particularly important to carefully monitor incidence of COVID-19 in the sectors with high-risk, multiple close physical proximity, especially with younger, not yet vaccinated individuals. Among students, a large increase was found recently. For instance, a large increase in recent infections in students (KULeuven), traced back to high risk events in the nightlife. These early signals remind the fact that high vaccination coverage, which only partially prevents transmission in low-risk environments, cannot prevent transmission of COVID-19 in a context with frequent high-risk events and contacts. This highlights the importance of maintaining testing and contact tracing capacity (include ref).

We assume that the actual epidemiological situation (for number of infections) is a **consequence of the October 1st relaxations, season change and the reopening of at risk-sectors where many people convene** (i.e. the educational system, nightlife,...) leading to at least 20% of increase of at risk contacts between people. The further evolution of these trends needs to be followed closely, because the **ratio cases/hosp/ICU/deaths remains established** (i.e. 35-37 % increase in hospitalisations if n of cases doubles - see below).

The number of hospitalisations is now linearly increasing: on October 20th on average 79.1 hosp./d, leading to 947 hospital beds (+ 41%) and 230 of 1,992 (+ 14%) ICU beds occupied i.e. 11.5%. Hospitalisations occur predominantly in non-vaccinated and highly vulnerable fully-vaccinated persons, but the **incidence of hospitalisations is significantly higher among non-vaccinated people.** As a historical comparison, data for 20/10/2020 were as follows: 2978 hospital beds and 487 ICU beds occupied, with 205 new admissions/d. A year later (20/10/2021), hospital figures have thus been reduced to 31.8% of the 2020 situation in terms of total beds occupied and 47.2% of the 2020 ICU-occupation. Even with **high levels of acquired immunity** against SARS-CoV-2 in the population by a combination of vaccination and past infection, **hospitalisations could further increase as high as three**

times the current levels. The **above mentioned recent changes in the epidemiology need to be followed up closely**.

Mortality figures have declined significantly since the start of the vaccination campaign, but are **gradually increasing again** (from 6.3/d mid-september to currently 11.1/day). At a year base, the current number would still lead to an additional 4052 deaths. In current figures, in 2020 Belgium reported 19,720 COVID-19 deaths, with 5975 COVID-19 deaths in 2021 to date.

Relationship between cases and hospitalisation.

Whereas in the earlier version (June 2021), Belgium was treated as a whole, it is meaningful to separate out the three regions, given their rather different epidemiological situation, especially during Waves 2 and 4.

Belgium: Effect on hospitalizations when confirmed cases double				
Wave	**Time frame**	**Flanders**	**Wallonia**	**Brussels**
Wave 2 (wildtype / Spanish)	31 August – 2 November 2020	54% [52%;56%]	51% [49%;54%]	51% [48%;54%]
Wave 3 (Alpha)	1 February – 12 April 2021	56% [55%;58%]	52% [50%;54%]	49% [47%;51%]
Wave 4 (Delta)	21 June – current	35% [34%;37%]	35% [33%;37%]	37% [35%;38%]

The main conclusion is that in Waves 2 and 3, a doubling of cases produced a 50-55% increase in hospitalizations, whereas this dropped to about 35% in Wave 4. It is striking that the three regions behave very similarly in this regard. Of course, the incidences can be very different between regions. This was the case in Wave 2 (at peak about 1000 in Flanders, 2000 in Brussels, and 3000 in Wallonia), and it is currently as well (Flanders about 250, Wallonia about 375, Brussels about 475).

Considerations on mortality

Thus, in each of the three Belgian regions, a doubling of confirmed cases leads to an increase in hospitalizations with 35% (and narrow confidence intervals of about 33 to 37%). The cases doubled over the course of about two weeks. Should this happen four times, then it is expected that the number of hospitalizations would about triple. Assuming a tight relationship between hospitalizations and ICU admission, it is expected that about 500-600 ICU beds would be needed. This has three major consequences: (a) more non-covid care will have to be postponed; (b) the stress on the HCW will

increase further; (c) this stress on the system might be compounded with hospital needs should there be an important influenza wave (see below).

Until now, about 26,000 covid deaths have been reported in Belgium. Roughly 20,000 in 2020, with about another 6000 in 2021 to date. In an average influenza season, the death toll is about 1000. In other words, in about 20 months, have we seen the equivalent of 25 influenza seasons.

If the number of cases would double for four consecutive weeks, and hospitalizations triple, it is safe to assume that the number of deaths will about triple as well. This implies 1000 deaths per month, rather than 300, a rate at which we are now. Recall that in June 2021, we reached a low point of about 1 death per day, i.e., about 30 per month.

Accepting higher viral circulation levels implies therefore also accepting high mortality rates. In the opposite direction, the 'acceptable' mortality rate (which is in fact a societal and political discussion) is closely linked to a maximum level of viral circulation.

If we would assume that COVID-19 mortality rates should not exceed the 'average' yearly influenza mortality of 1000 (which is actually about four times less the actual projected COVID-mortality at 11 deaths/day i.e. 4015/y), then the hospitalisation rate should also decrease by a factor 4, hence the incidence of positive cases should be about 25 times smaller than it is now.

For instance, if we'd assume that COVID-19 mortality rates should not exceed that of yearly car traffic accidents (n = 660/year), the viral circulation should be about 60 times smaller than it is now.

In this context, it is to be noted that the actual COVID-19 mortality is exceeding already with a factor 4 the average yearly influenza mortality, and is still increasing. In 2020, the COVID-19 death toll was about 20 times that of the average influenza mortality.

Prospects from modeling work (for details see Annex 1).

Modelling the SARS-CoV-2 pandemic in Belgium is becoming more challenging given that the model calibration against the time-dependent reproduction number proves to be more complex, likely because of changes in test strategies and compliance. There is a clear need for representative and reliable (serological) data on natural (humoral) immunity especially for those who aren't vaccinated.

Preliminary conclusions new SIMID COVID-19 report (Confirmed by discussions within the EpiPose consortium: a long way away from normal behaviour)

Social mixing and thus risk behavior still drive the projected burden of disease. An increase of +20% of the risk behavior we estimated for late September 2021 would result in a limited increase of the hospital load on the national level. The likelihood of this increase in transmission for the coming period cannot be confirmed at this point in time, though this scenario should be interpreted as a plausible range.

The regional analysis for the Brussels Capital Region is not conclusive. The regional variability in hospital admissions is hard to capture and the model input does not allow to describe the trends in confirmed cases and the corresponding reproduction number (Rt) from August--September 2021.

More recent age-specific, and preferably regional, data on hospital admissions and sero-prevalence could improve the estimation of local transmission to project new hospital admissions.

The regional analysis for the Flemish region shows a stable hospital admission trend with ongoing transmission dynamics and a moderate increase in hospital admissions when a 20% increase in risk behaviour is assumed. The latter amplifies the regional increasing trends in Rt for September 2021, which end up in almost three times the current hospital admissions. This scenario shows large model uncertainty, which should be considered with the projected average.

For the Walloon region, we observe a mismatch between Rt based on model output and Rt based on observations for August, 2021, hence the regional hospital forecast requires great caution. Assuming a prolongation of current Rt trends, hospital admissions are likely to remain stable or even decrease. A 20% increase in risk behaviour would lead to a resurgence of hospital admissions. This increase is relatively less compared to the forecasts for Flanders, due to the relatively stable trend in confirmed cases and Rt for September 2021 in the Walloon region.

The analyses are not spatially explicit, hence, the included disease transmission does not accommodate for (social) interactions/mobility within and between Belgian regions nor between the region under study and other countries. Circulation of SARS-CoV-2 in other regions has the potential to boost local community transmission, and requires outcomes to be handled with care. Analyses for Belgium are conducted independent of regional analyses and based on averages. As such, the combination of regional analyses is likely to differ from the national forecasts.

1.2. International perspective on vaccination coverage, stringency epidemiological evolution (see also Annex 2)

The relatively stable situation, although at a high plateau, in Brussels is not easy to explain. There are several hypotheses for this evolution (e.g. background of natural immunity), but to draw more reliable conclusions, more studies and analyses should be carried out. In the meantime, the following two elements might explain (partly) why the situation does not worsen: (i) there are still effective measures in place in Brussels and (ii) contact behaviour is not very high, albeit increasing (note that there is only limited data on contact behaviour in Brussels). What should be taken into account to correctly analyse the situation in Brussels, is the actual seroprevalence status. There might be an underreporting of immunity level due to undetected cases, but to have better insights, seroprevalence should be analysed, taking into account waning immunity. However, care should be taken in collecting and analysing results from a seroprevalence study, since it might be biased by the population that is most easily reached. Furthermore, even though there is no conclusive explanation for the stable evolution that is observed, care should be taken in changing measures, as some comparisons to other regions and countries with similar vaccination rates show.

A comparison to some US states with similar vaccination rates as Brussels, Flanders, and Wallonia can help provide insights into the current situation and what can still be expected.

- The states comparable to Flanders exhibit a situation that is relatively under control.
- Maine and Washington State, comparable to Wallonia, have a relatively high ICU occupancy, and actually hospitalisation curves at or higher than previous peaks. New Jersey, because of its more stringent measures, has a low level of hospitalisation and ICU occupancy.
- The states comparable to Brussels, in particular Florida and Texas, have worrisome hospitalisation and ICU levels. In both Florida and Texas, the situation is slightly better than it

was a few weeks ago, but we still have total ICU occupancies between 80 and 90%. A few weeks ago, in both states half of the ICU beds were taken by COVID patients. Illinois, in spite of its low vaccination rate, is doing relatively well, because of its high stringency. Especially the large metropolis in the state, Chicago, maintains a very stringent regime.

Also the comparative relationship between vaccine coverage, stringency on measures and the actual epidemiological evolution in several (European) countries can bring perspective in what could still be expected (data 16/10/2021 - rapidly evolving in many countries, including Belgium):

Country	14-day incidence	Daily hosp. per million	Daily deaths per million	Partial vaccination of total population	Full vaccination of total population	Stringency index	Pos. Rate
Portugal	85	0.5	0.6	88%	86%	39	1.4%
Spain	60	0.6	0.9	81%	79%	42	2.4%
Denmark	110	2.2	0.3	77%	75%	24	1.4%
Belgium	234	5.3	0.8	74%	73%	29	4.8%
Italy	70	1.9	0.7	76%	69%	69	1.0%
Netherlands	152	1.9	0.3	75%	68%	42	6.3%
UK	706	10.4	1.6	72%	66%	41	4.0%
France	108	3.1	0.8	75%	66%	67	1.0%
Germany	134	2.0	0.7	68%	65%	56	6.6%
Israel	548	12.8	2.0	70%	65%	56	2.5%
Luxembourg	194	1.6	0.2	66%	63%	34	4.5%
Lithuania	894	22.3	8.8	66%	61%	30	8.9%
USA	444	23.1	5.1	64%	55%	62	8.4%
Slovenia	575	20.8	2.7	50%	50%	35	19.4%
Latvia	743	35.1	5.1	51%	47%	38	
Estonia	749	21.5	3.2	58%	47%	25	13.6%
Serbia	1373		7.2	44%	42%	47	3.1%
Croatia	423	19.8	3.2	45%	42%	34	14.3%
Montenegro	939		11.1	40%	35%		
Romania	754		11.2	31%	29%	50	23.1%
Bulgaria	386		12.9		20%	44	11.3%

- Lithuania has a vaccination rate higher than Brussels, and a stringency higher than the Belgian one. The fact that its situation is deteriorating rapidly, not only in terms of incidence but also in terms of hospitalisations and mortality, is a warning signal.
- Italy, Netherlands, UK, and France have very similar vaccination rates, but very different stringency. The relationship with stringency is not perfect. For example, it is clear that among these four countries the UK has the lowest stringency, which is visible in its hospitalisations and mortality. France has high stringency but not the best statistics, and in the Netherlands it is the reverse. In France, the poor epidemic situation in the DOMTOM has played an important role and to a lesser extent the epidemiologically more difficult situation in some southern regions. Also, compliance with measures is an issue. In the Netherlands, stringency is relatively low (although higher than in Belgium), but certain high risk activities (e.g., nightlife) are still closed after the debacle early July 2021.

- Note that the UK would restore NPIs if one of the following conditions is satisfied: (1) large outbreaks in schools; (2) large outbreaks on the work floor; (3) waning immunity; (4) new variant-of-concern with unfavorable characteristics.

A more elaborate overview of different countries and regions in comparison with Belgium can be found in annex 2.

1.3. New variants and their impact

In the context of baseline genomic surveillance of SARS-CoV-2 in Belgium, 624 sequences of positive samples collected in week 38 and 39 have been analysed. Among these, B.1.617.2 and its sublineages (Delta) represented 100% of the circulating strains. This means that the genomic diversity of SARS-CoV-2 in Belgium is comparable with the situation described over the last 9 weeks.

According to the ECDC, there are currently (updated 07/10/2021) **three variants of concerns** (VOC), namely Beta, Gamma, and Delta, for which evidence is available indicating a significant impact on transmissibility, severity and/or immunity, **likely to have an impact on the epidemiological situation in Europe and hence Belgium**. For variants of interest (VOI), evidence is available on genomic properties, epidemiological evidence or in vitro evidence that could imply a significant impact on the epidemiological situation. **Two VOIs** are currently defined, being Mu and Lambda. Furthermore, a wide set of variants under monitoring are defined, all detected as signals through epidemic intelligence, rules-based genomic variant screening or preliminary scientific evidence. To some extent there is an indication that they could have **properties similar to those of a VOC (e.g. the combination of Delta with the mutation of concern E484Q which characterises Kappa)**.

At present, and since the past 10 weeks, Delta is the dominant strain in Belgium. From a virological perspective, it can be expected that this variant may be replaced by another variant at a certain point in time. It is however unclear when and by which type of variant this would occur. There are no global indications either at the moment.

1.4. Expected flu season and impact on the healthcare system - The risk of the coming flu season combined with COVID-19

The risk of the coming flu season combined with COVID-19 is addressed in the most recent Rapid risk Assessment of ECDC published on 30 September 2021.

Since the implementation of strict public health and physical distancing measures in February 2020, seasonal influenza virus circulation has been significantly reduced in the EU/EEA as well as globally. This situation of very low influenza circulation continued during the 2020/21 season.

However, in recent weeks, an increasing number of cases due to influenza **A(H3N2)** virus have been reported from several countries across the European Region. Influenza A(H3N2) viruses have been shown in the past to primarily affect the **elderly** and the very young (i.e. children below five years of age), can cause severe and large outbreaks in long-term care facilities and lead to high excess mortality in the elderly population and increase pressure on healthcare systems. **Vaccine effectiveness** (VE) data from previous regular influenza seasons for A(H3N2) viruses have been overall **low** to very low, particularly in the elderly who are most at risk of severe disease. In addition, there is also a considerable risk that there will be an **antigenic mismatch** between the vaccine strain and the

circulating strain, since the low number of detections in the Southern hemisphere make predictions difficult.

The limited circulation during this and last year might also contribute to a **higher susceptibility** in the population with less people being exposed to influenza viruses.

Due to lack of influenza circulation in the past year, the timing of an eventual influenza epidemic in Europe is difficult to predict. An **earlier onset** of the seasonal influenza epidemic (usually peaking in February to March) than in pre-COVID-19 seasons is possible, potentially adding pressure and burden on healthcare settings.

Influenza and SARS-CoV-2 co-infections have been only documented rarely, which is likely due to the limited circulation of influenza viruses during this pandemic. One study in the United Kingdom showed **higher severity** in these co-infected cases early in the pandemic when influenza was still circulating[2].

The **risk groups** for severe influenza disease largely **overlap** with groups most at risk of severe COVID-19 disease and death, and groups more likely to have impaired immunity. Therefore, there could be several benefits to the **co-administration** of COVID-19 **vaccines** with seasonal influenza vaccination campaigns, which has been approved by the Belgian NITAG. We have to keep in mind that due to cold chain issues, the co-administration might not be evident.

Similar to seasonal influenza, respiratory syncytial virus (RSV) detection levels were significantly lower during the 2020/21 season in many countries. Belgium reported an **out-of-season RSV epidemic** in 2021 from March to June.

The **burden of disease and burden of care** from influenza in **Belgium** can be considerable:

- The yearly number of GP consultations for influenza varied from 124,199 (in 2014) to 458,133 (in 2018). The peak incidence of confirmed influenza cases at the GP varied from 170/100k/week (in 2014) to 638/100k/week (in 2018). This corresponds to **19,726 to 76,530 GP consultations per week during the peak**.

[2] Stowe J, Tessier E, Zhao H, Guy R, Muller-Pebody B, Zambon M, et al. Interactions between SARS-CoV-2 and influenza, and the impact of coinfection on disease severity: a test-negative design. Int J Epidemiol. 2021;50(4):1124-33. Available at: https://academic.oup.com/ije/article/50/4/1124/6263422

Over the past decade, the flu epidemic of February-March 2018 was the most intense, coinciding with considerably excess mortality, whereas the flu epidemic of February 2014 was the least intense, with no excess mortality.

The total number of hospital admissions for influenza varied from 2,065 (in 2014) to 9,700 (in 2018) according to the Minimal Hospital Data. Based on the SARI surveillance, we estimate that the peak incidence of influenza hospital admissions varied from 3.2/100k/w (in 2014) to 13.8/100k/w (in 2018). This corresponds to **356 to 1,575 hospital admissions per week during the peak**.

According to the SARI surveillance data, the total number of ICU admissions for influenza in the period January to April varied from 188 (in 2014) to 582 (in 2018). The peak incidence of ICU admissions for influenza varied from 0.6/100k/w (in 2014) to 0.7/100k/w (in 2018). This corresponds to **62 to 80 ICU admissions per week during the peak**.

Taken together, the combined burden of a new COVID-19 wave (up to 100-200 hospitalisations/day and 350-400 occupied beds on ICU) plus a heavy winter influenza peak (up to 225 extra hospitalisations per day and 11.4 extra ICU admissions/day) could lead to saturation of 550-600 ICU beds hence a significant burden on the already exhausted health care system. Obviously, there is a lot of uncertainty in both directions: peaks might be eventually lower, or not occur together, or might be yet higher than foreseen due to increases in at risk contact behaviour.

2. Post hoc assessment of findings from different scenarios in SIMID-models

Hens *et al.* have provided the federal government during the course of the pandemic with models forecasting a great many different possible scenarios. Although proper extensive assessments will be made by the SIMID consortium in due time, accounting for the uncertainties at the time of analysis related to changing epidemiological insights, policy options and data available to the modellers, the following very brief assessments may help explain why some scenarios did and others did not materialise.

- Fall 2020: The surge of SARS-CoV-2 during November 2020 was already a forecasted scenario in March 2020. This scenario materialised, but the wave did not weaken as modelled, most likely due to more extensive rises in contact behaviour than projected (although nowhere near pre-Covid levels).
- Winter 2020: One of the scenarios forecasted a rise in cases and hospitalisations during the Christmas holidays, whilst another scenario indicated a stable evolution if contacts remained limited. Due to clear messages from the government and great adherence from the public, the latter scenario actualised.
- Spring 2021: Due to the introduction and dominance of the alpha-variant and uncertainties in vaccination planning, the scenarios for spring 2021 had a very high uncertainty. Although the forecasting of cases and hospitalisations were quite accurate (e.g. by taking into account the effect of school holidays), ICU data was not in line with initial expectations.
- Summer/Fall 2021: A clear fourth wave can be observed, although not as large as initially forecasted, mainly due to more careful behaviour than what is allowed. However, an increase in contact behaviour (both in children and adults) can be seen in the third week of September compared to the first week, which means there could just be a shift in timing of the peak.

3. Belgian COVID-19 infection in work sectors

In annex 3 one can find the Monitoring report on Belgian COVID-19 infections in work sectors in 2021. In brief, both the contact tracing as the RSZ/ONSS data demonstrates that 14-day COVID-19 incidences remain stable since the summer 2021 in most sectors, except in education. In education, the incidences linearly increase. The contact tracing also shows a sharp increase in incidences in the education segment since the start of the school year 2021.

As the incidence in the general population is currently higher than the incidence in the working population, this indicates an increased proportion of incidences is coming from children. With an increased circulation of the delta variant of concern of SARS-CoV-2, it is important to carefully monitor incidence of COVID-19 in the sectors with high-risk, multiple close physical proximity, especially with younger, not yet vaccinated individuals. Youth work associations, primary, secondary and other education, Nurseries and creches, Health and care sectors and Passenger land transport for example all show higher incidences and require careful attention. Especially in the context of increased high-risk contacts, as shown by the contact tracing.

We strongly recommend all sectors to apply the Generic Guide and the sector protocols to prevent the spread of the virus. Especially hygiene protocols in Arts, entertainment and recreation (sector R), Cleaning and Accomodation and food service (sector I), require continuous vigilance, as subsectors such as Football club activities and Restaurants with limited service show high incidences. It would be worthwhile to evaluate the hygiene protocols and its practice in these sectors. Although the incidence in non-medical contact professionals is comparable to the working and general population average, the incidence in employees in non-medical contact professions show a clear increased incidence compared to the self-employed professionals.

Finally, despite the high degree of vaccination, COVID-19 infection remains possible. Contact tracing data show that almost half (47%) of employees with a positive PCR-test were fully vaccinated, although care should be taken in interpreting these data as this percentage might be heavily skewed by vaccination coverage. The vaccine effectiveness against infection as calculated in the report with the contact tracing data is in line with recent information of a decline of protection against infection by a half, starting five months after vaccination[3]. Although protection against hospitalisation remains high (93%) 6 months after vaccination, continuous monitoring of breakthrough infections and their clinical severity is warranted (although this might be very optimistic and not applicable to all schedules and vaccines, cfr range 77-93% (UK, PHE, pre-print).

4. Evolution mental health and motivation

Based on various studies summarised in the MAG report, the following conclusions can be drawn:

- The findings of long-term studies (Motivation Barometer and the Great Corona Study) indicate a **positive shift in mental health**, which is again at the **same level as before the COVID-19 crisis**. Younger individuals, females and those suffering from co-morbidity report lower well-being, as was also the case in pre-COVID times.
- Given the selective nature of sampled participants in these large-scale questionnaires, vulnerable groups may be under-represented. For instance, there is a clear shortage of beds to treat **eating disorder** patients and young people with general psychiatric disorders, with **waiting lists being 4 times longer than during pre-corona times** (5-8 months). At the same

[3] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02183-8/fulltext

time, the **numbers of applications for (crisis) youth aid** (data from Opgroeien) **dropped to levels of previous years**, after a rise in applications in the beginning of 2021.

- **Vaccinated people report slightly better mental health than unvaccinated people**. Vaccinated individuals report greater **autonomy** and satisfaction of **relatedness** needs, but also more insecurity to be infected compared to unvaccinated individuals. Said differently, vaccinated people are enjoying more the freedom that is given, which likely explains the connection they feel with oher; yet, they also stay vigilant and concerned to be infected.
- Parallelling these differences in perceived concerns, **vaccinated people stay more motivated to adhere to the measures**, a motivational gap that has been widening since April 2021. Unvaccinated individuals also report actually being less adherent to different sanitary measures (i.e., keeping distance, disinfecting hands, face covering), except for restricting social contacts.
- When looking at the working population, data from Group IDEWE show that there is **no clear impact of the crisis on the satisfaction of Belgian employees and their intention to stay**. However, there seems to be a **small increase in risk of burnout**, but these results need to be interpreted with caution as the data are not representative.
- Data from Steunpunt Werk regarding (un)employment show that the simplified procedure for temporary unemployment has shown a clear decrease in use compared to last year, but the number of temporary unemployed is still three times as high as before the crisis. Furthermore, the labour market is under pressure: there are fewer unemployed jobseekers than last year, and the number of vacancies is at an all-time high.
- On a larger, worldwide level, **OECD urges to respond effectively to the impact of the COVID-19 crisis on population mental health, integrated and cross-sectoral policies to improve mental health support are needed**. A recent article published by The Lancet supports these findings and states that taking no action to address the burden of major depressive disorder and anxiety disorders should not be an option. During the year 2020, the risk factors for poor mental health – financial insecurity, unemployment, fear – increased, while protective factors – social connection, employment and educational engagement, access to physical exercise, daily routine, access to health services – decreased. Across countries, the mental health of unemployed people and those experiencing financial insecurity was worse than that of the general - a trend that pre-dates the pandemic but seems to have accelerated in some cases.

5. General recommendations

In conclusion, the actually observed gradually worsening data on cases, hospitalisations, and mortality and the expected additional burden from an unpredictable influenza epidemic call for prudence and stability with regards to **remaining measures and defense lines** (e.g. testing, contact tracing, isolation, ventilation, indoor mask wearing...) and to maintain a stable set of measures **during winter period,** moreover because our viral circulation levels are higher than in many neighbouring countries. This would include also the **maintenance of the actual testing and contact tracing capacity**, as a complement to pre-existing regional contact tracing capacity which is also needed for non-COVID-infectious diseases containment (e.g. TBC, legionellosis, salmonellosis,...). Applying caution during the entire upcoming winter period could bring us in line with most other surrounding countries, in particular those with higher vaccination coverages and a better epidemiological situation.

In addition to this 'fixed and stable set of defence lines', and in the light of the actual fast deterioration of the epidemiological situation, additional measures such as renewed emphasis on telework and more extensive use of the CST need to be considered.

- **Annex 1. SIMID COVID-19 report - SARS-CoV-2 and vaccination in Belgium (12/10/2021)**

Modelling results by the SIMID consortium

This document contains model estimates of hospital and ICU admissions and load using observational data up to October 08th, 2021, by a stochastic dynamic transmission model. All previous reports are available via simid.be and the covid-en-wetenschap blog.

Preliminary conclusions

- Social mixing and thus risk behavior still drive the projected burden of disease. An increase of +20% of the risk behavior we estimated for late September 2021 would result in a limited increase of the hospital load at the national level. It seems quite certain that the relaxations of September and October will lead to some increase in transmission. Whether the expected increase in transmission is of the specific magnitude we projected for the coming period is impossible to predict at this point in time, but it is presented here as a plausible scenario.
- The regional analysis for the Brussels Capital Region is not conclusive. The regional variability in hospital admissions is hard to capture and the model input does not allow to describe the trends in confirmed cases and the corresponding reproduction number (Rt) from August-September 2021. More recent age specific, and preferably regional, data on hospital admissions and sero-prevalence could improve the estimation of local transmission to project new hospital admissions.
- The regional analysis for the Flemish region shows a stable hospital admission trend with ongoing transmission dynamics and a moderate increase in hospital admissions when a 20% increase in risk behaviour is assumed. The latter amplifies the regional increasing trends in Rt for September 2021, which end up in almost three times the current hospital admissions. This scenario shows large model uncertainty, which should be considered with the projected average.
- For the Walloon region, we observe a mismatch between Rt based on model output and Rt based on observations for August, 2021, hence the regional hospital forecast requires great caution. Assuming a prolongation of current Rt trends, hospital admissions are likely to remain stable or even decrease. A 20% increase in risk behaviour would lead in a resurgence of hospital admissions. This increase is relatively less compared to the forecasts for Flanders, due to the relative stable trend in confirmed cases and Rt for September 2021 in the Walloon region.
- The analyses are not spatially explicit, hence, the included disease transmission does not accommodate for (social) interactions/mobility within and between Belgian regions nor between the region under study and other countries. Circulation of SARS-CoV-2 in other regions has the potential to boost local community transmission, and requires outcomes to be handled with care. Analyses for Belgium are conducted independent of regional analyses and based on averages. As such, the combination of regional analyses is likely to differ from the national forecasts.
- Main updated modelling features: (1) contrary to previous analyses, the current analyses are calibrated to hospital admissions for both COVID-19 and non-COVID-19 (i.e. hospitalised for other pathologies than COVID-19, but with a positive SARS-CoV-2 test in the last 24h); (2) the most recently observed Comix social contact data are included; (3) vaccine-induced protection against transmission was specified; (4) the hospital hazard ratio was re-estimated for infections with the VOC.

Dynamic Transmission Model

Summary: The stochastic model as described by Abrams et al. (2021) has been adapted to include vaccination and the emergence of one VOC from December 2020 (i.e. B.1.1.7 or “Alpha”) and another VOC from May 2021 (i.e. B.1.617.2 or “Delta”). The model is calibrated on early sero-prevalence data, genomic surveillance data, hospital admission data, hospital surge data, mortality data and social

contact data from the Belgian CoMix survey. All model projections account for an increasing vaccine uptake and hospital load is directly captured within the transmission model.

Model input and assumptions

1. **Gradually accumulating naturally-acquired immunity** in the population is accounted for, as well as immunity induced by vaccination. Vaccine-induced immunity is assumed to last till the end of the simulations.
2. The **introduction of VOCs in the Belgian population** is accounted for by using data from the baseline genomic surveillance of SARS-CoV-2 in Belgium at the National Reference Laboratory.
3. **Alpha VOC**: We aggregated the proportion of Alpha, Beta and Gamma VOC in the population to account for the replacement of the wild-type variant by more infectious and severe VOCs (for which increased transmissibility and severity is assumed to be equal). The additional transmissibility of the aggregated VOC, which we will denote in this report by the dominant VOC Alpha, is estimated by the model at 36% (95% credible interval (CrI): 29%-42%) relative to the wild-type variant. The model assumes no differential hospital admission probability with respect to the Alpha VOC. Upon infection, the model allows for a VOC-specific differential hospital length-of-stay and risk of ICU admission.
4. **Delta VOC**: The impact of the Delta VOC is modelled by the introduction of a second VOC from May 2021 onward with an average increase in transmissibility of 80% (95% CrI: 65%-99%) relative to the Alpha variant. This increase is estimated based on the baseline genomic surveillance data. We assume a hazard ratio for hospitalization of 2 for the Delta VOC relative to the Alpha VOC. Mean values of 1.8-2.6 have been reported in the UK (with 95% confidence interval up to 4.36, see PHE, Sheikh).
5. Our model results contain stochastic variation in the transmission process and parameter uncertainty based on 20 model parameter configurations. The calibration procedure relies on likelihood-based MCMC sampling resulting in 20 posterior samples of the joint distribution, each of which is used to generate a single stochastic realization within each social mixing and/or vaccine uptake scenario. The MCMC procedure is, in general, based on the adaptive Metropolis-within-Gibbs algorithm, and parameter configurations are updated starting from previous calibration results based on an additional number of iterations (1000 iterations) with 10 realizations per iteration, periodicity of 10 iterations and leading to 20 different chains based on 20 initial starting configurations.
6. This model is **fully age-structured** but does not simulate the physical interactions of subgroups like nursing home residents and nursing home personnel or healthcare workers in general. Vaccine uptake for health care workers is therefore implemented at the level of the ages of the target group.
7. **New since this report, is that we complement the reported hospital admissions with the number of new positive cases in the Belgian hospitals in the last 24h that have been admitted for another pathology**. Given that these positive cases contribute to the hospital load related to COVID-19, we include these new patients in our analysis and all figures. Hospital admission data is still the main source of information to inform and calibrate the model given the frequent changes in the Belgian SARS-CoV-2 testing policy.
8. The model is calibrated using social contact data up to the 30th wave of the Belgian CoMix survey conducted from August 29th till September 7th, 2021. For each wave, we estimate age-specific parameters (i.e., proportionality factors) to translate social contact data into transmission rates (with estimated social contact rates used as a proxy for effective contacts enabling disease transmission and proportionality factors adjusting for other factors that influence this relation).

This captures, among other things, age-specific susceptibility and risk behavior during social contacts.

9. We designed two **social mixing scenarios** to explore the impact of behavioral changes by re-using estimated transmission dynamics from previous stages in the Belgian COVID-19 epidemic. All scenarios start from the social mixing and transmission behavior we estimated and have a simulation horizon up until December 2021. None of the scenarios include the effect of the introduction of infected cases as a result of international travel. All behavioral changes are introduced linearly over 7 days.
   - **Scenario A**: We assume no changes in risk behavior.
   - **Scenario B**: We assume a behavioral shift on October 1st, 2021, in line with an increased risk of +20% with respect to the latest estimations for the transmission dynamics. This behavior is assumed to be maintained until the end of the simulation.
10. **Vaccine protection**
    - **Infection**: we use a "leaky" vaccination approach. For example, vaccination with 50% effectiveness, implies that for a vaccinated individual the likelihood to acquire infection is 50% less compared to a non-vaccinated individual of the same age. The level of protection against infection is presented in Table 1.
    - **Hospital admissions**: vaccinated individuals who acquire infection are at lower risk of a COVID19 related hospital admission. The level of protection against severe disease, which we assume to be in line with hospital admissions, is presented in Table 1.
    - **Transmission**: vaccinated individuals who acquire infection have a lower risk of transmitting the disease. This assumption is based on a study in the UK on the effect of vaccination on household transmission of SARS-CoV-2 (Harris et al, 2021). The level of protection against transmission is presented in Table 1.
    - **Severe non-hospitalized cases** are currently not separately modelled, hence the impact of vaccination on non-hospitalized severe cases, seen in primary care, is not separately shown.
    - **Vaccine-induced immunity** against infection is implemented as a step function with a switch from e.g. 0% to 50% protection against infection 21 days after the first vaccine dose. Vaccine-induced protection against hospital admission is implemented incrementally on the protection against infection. Protection from the 2nd dose is assumed to be present 7 days after administration. We consider differences between mRNA and adenovirus-based vaccines in how they induce immunity and protection.
    - The reported JnJ and Curevac vaccines are accounted for in the model as (being similar to) AstraZeneca. Their numbers of administered vaccine doses are too low to outweigh the increase in computational burden and complexity of the model when adding an additional subdivision in the model.
    - **Waning immunity** is not included at this stage. Therefore, potential differences in effectiveness over time of the different vaccine schedules is not explored in the current analyses.
    - **Booster doses** are not included at this stage. This might encounter the absence of waning immunity in the analyses.
11. **Vaccine uptake**
    - The vaccine-type and age-specific uptake in the model of first and second doses over time at national and regional level are based on the reported uptake by Sciensano, derived from Epistat on October 1st, 2021. For the model projections, we extrapolate the uptake rate of mRNA vaccines of the last 2 weeks, until 85% coverage is reached at the national level. If the reported uptake is more than 85%, we use the reported uptake. For the projected uptake, the

time between 2 mRNA doses is assumed to be 3 weeks. The uptake by age group is presented in Figure 5.

- We do not account explicitly for risk-group vaccination, since the model structure does not allow to model a subpopulation with a differential risk and potentially a more severe COVID-19 disease episode once infected (i.e., a higher probability of hospitalization and/or a higher probability of dying upon hospitalization).
- By default, we include vaccine uptake in the population from 12 years of age. For 12-19-year-olds, this is implemented in our 10-year age grouped model structure by applying a proportionate fraction to the 10-19 year age group, i.e. having 80% of 10-19 year old potentially take up vaccines.

***Table 1**: Vaccine efficacy for adeno-based and mRNA-based vaccines against the Alpha and Delta variant by clinical outcome derived from Bernal et al. (2021) and Stowe et al. (2021).*

Clinical outcome	Vaccine type	Alpha variant	Delta variant
Infection (Bernal, 2021)	Adeno: 1st dose	49%	30%
Infection (Bernal, 2021)	Adeno: 2nd dose	74%	76%
Infection (Bernal, 2021)	mRNA: 1st dose	48%	36%
Infection (Bernal, 2021)	mRNA: 2nd dose	94%	88%
Severe disease (Stowe, 2021)	Adeno: 1st dose	80%	71%
Severe disease (Stowe, 2021)	Adeno: 2nd dose	89%	92%
Severe disease (Stowe, 2021)	mRNA: 1st dose	80%	94%
Severe disease (Stowe, 2021)	mRNA: 2nd dose	95%	96%
Transmission (Harris, 2021)	mRNA and Adeno	45%	45%

Region-specific models

- The transmission model we developed for Belgium has been re-calibrated for the Flemish, Walloon and Brussels Capital Region using regional population details and reported hospital admissions. The time-specific age distribution of hospital admissions for Belgium are adopted for the regional models. The number of initial cases in 2020 and the introductions of Alpha and Delta VOC cases are down-scaled in relation to the regional population size. The temporal transmission dynamics (so called age-specific "q-parameters") are re-calibrated from March 2020 onward.
- The age-specific vaccine uptake per region is based on the reported uptake by Sciensano, derived from Epistat on October 1st, 2021. The uptake of the first dose for ages 20-99y is kept fixed, but we account for the administration of the second doses of the mRNA vaccine. Target vaccine uptake levels for persons aged 12-18y are assumed in line with the reported uptake for the 20-30y age group. The uptakes by age group are presented in Figures 6, 7 and 8.

Major limitations

- This transmission model is suited for scenario analyses to investigate possible future paths, it is not a prediction model.
- The model is calibrated on hospitalizations and informed by the Belgian CoMix social contact data survey. These empirical social contact data inform mainly the frequency and age structure of person-to-person social interactions, but are less informative with regards to the adherence to restrictions. The fact that the model is primarily calibrated on hospitalizations, and given the time lag between incurring infection and being admitted to hospital, makes this model less sensitive for rapidly changing dynamics. Another issue is that empirical data on social contact patterns to inform the model is also lagging.

- The (weekly) age distribution of hospitalized patients is derived from the individual hospital survey up to August 17th, 2021, in which patients are only included at hospital discharge. This implies a considerable delay in the availability of up to date information concerning the age distribution of hospitalizations. In a transition phase in which the weekly age distribution changes drastically, e.g. due to the depletion of susceptible persons in older age groups as a result of vaccination, this delay could have a considerable impact on future trajectories.
- We are using data on the penetration of the Delta VOC making the implicit assumption that this will remain the dominant strain throughout the simulations. Nonetheless, other VOCs may take over with different transmission probabilities and probabilities to cause disease, hospitalization, death, and different vaccine effectiveness characteristics against each of these manifestations.
- The transmission model does not evaluate the prevented (severe) outpatient cases, which affect pressure exerted on primary care. The model does not include parameter uncertainty on vaccine uptake and effectiveness yet, and assumes no waning of vaccine-induced and naturally acquired immunity.
- The incremental transmissibility by the Alpha and Delta VOCs, which we include in the model, is not age-specific.
- We attribute the growth advantage of the VOCs completely to transmissibility, and as such, ignore the potential effect of immune escape on the speed of penetration.
- Vaccine-induced immunity is implemented by a step function. As such, it is assumed that build-up of immunity in vaccinated persons is not a gradual, but a stepwise process.
- We illustrate the reproduction number over time (Rt) in the simulation model with the Rt based on the confirmed cases by Sciensano using the R package “EpiEstim”. For the model, we calculate Rt based on the new symptomatic cases over time.
- This model does not explicitly account for importation by returning travelers which could have a large impact on the evolution of the epidemic. Importantly, an implicit attribution of such cases to local transmission is used instead. Therefore, results need to be interpreted with caution.
- The regional modeling exercises are based on applying a stochastic age-discretized compartmental model to the regional incidence data as mentioned above. However, the models are not spatially explicit, hence, disease transmission does not accommodate (social) interactions/mobility between Belgian regions nor between the region under study and other countries. Consequently, all (regional) infections are assumed to result from local transmission.
- We present our modelling results by the mean and pointwise 95% credible interval based on 40 model realizations, which capture stochastic effects and parametric uncertainty. The interplay between these two sources of uncertainty is subject of future research.

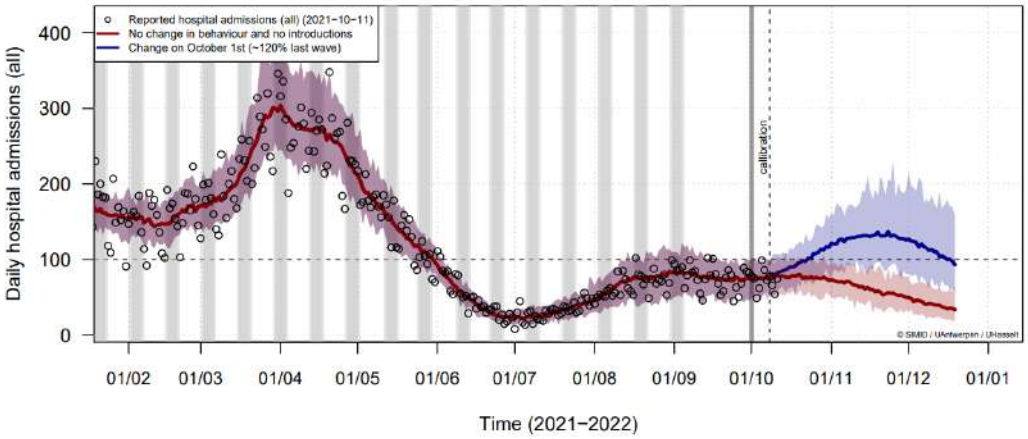
Model results and discussion

The following figures depict the results of our scenario analyses with respect to social mixing. All projections show a large 95% credible interval and should therefore be interpreted with great caution. The main conclusions are listed at the start of this document. Some additional observations are listed hereunder:

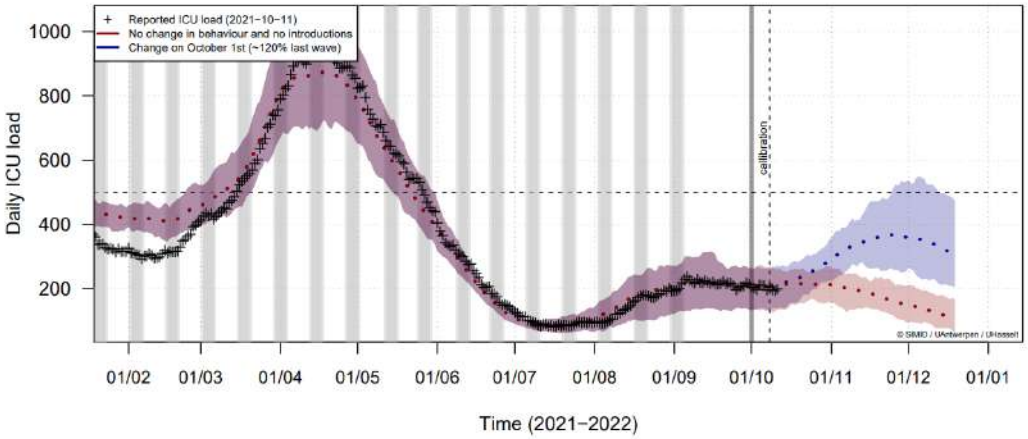
- Social mixing behaviour still drives the projected hospital admissions. An increase of +20% in behavior that we estimate for September 2021 on the national level (Scenario B) shows an increase in hospital admissions and ICU load.
- The decreasing trend in the effective reproduction number (Rt) that we observed for August-September 2021 at the national level could be the result of a mix of an increase in local transmission and a decrease of introductions due to international travel.

- The parameter estimation and model calibration are mainly driven by hospital admission data. Both scenarios that are explored provide plausible results up to the current time point (based on available hospital data) and therefore provide a plausible range of outcomes for the coming period. The scenarios under study aim to translate assumptions with respect to social contact behavior into the hospital burden when accounting for vaccine uptake.
- The national model does not account for local differences in immunity. As such, herd immunity effects in sub-populations with immunity levels above the national level are underestimated

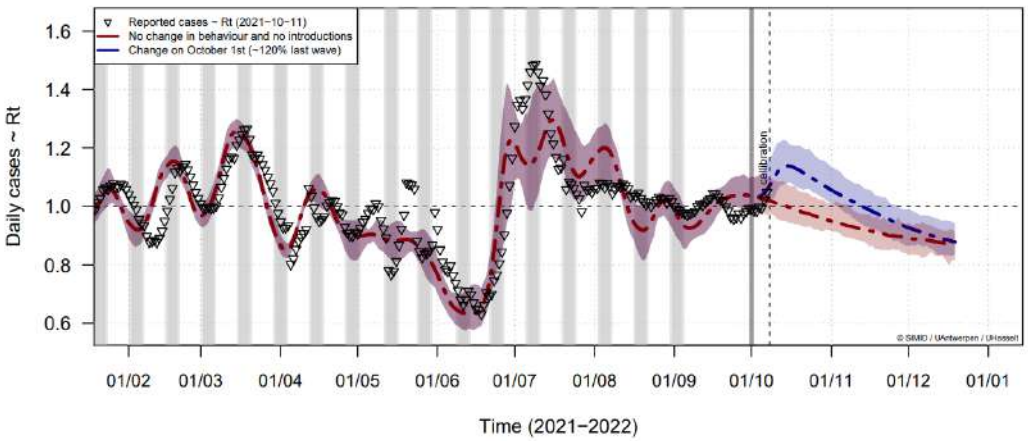
Scenario analysis for Belgium:



(a) Daily hospital admissions



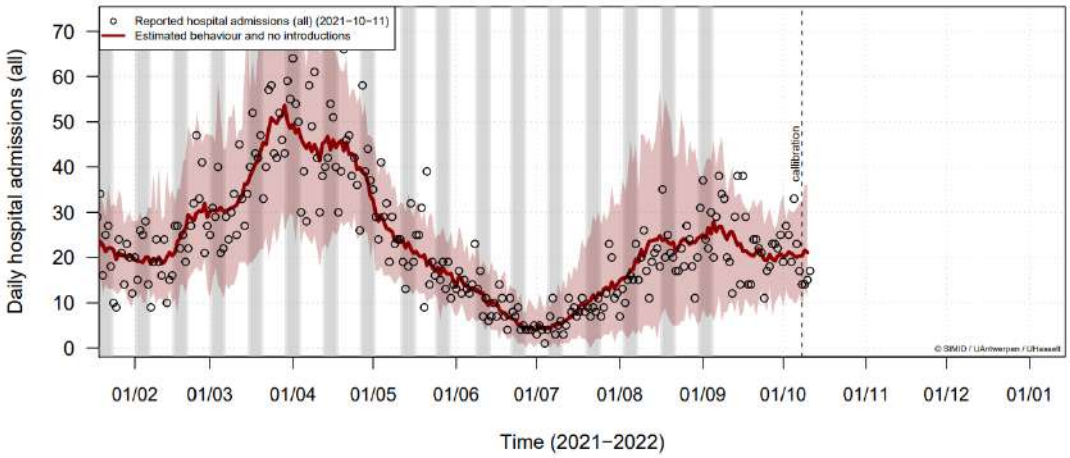
(b) ICU occupancy



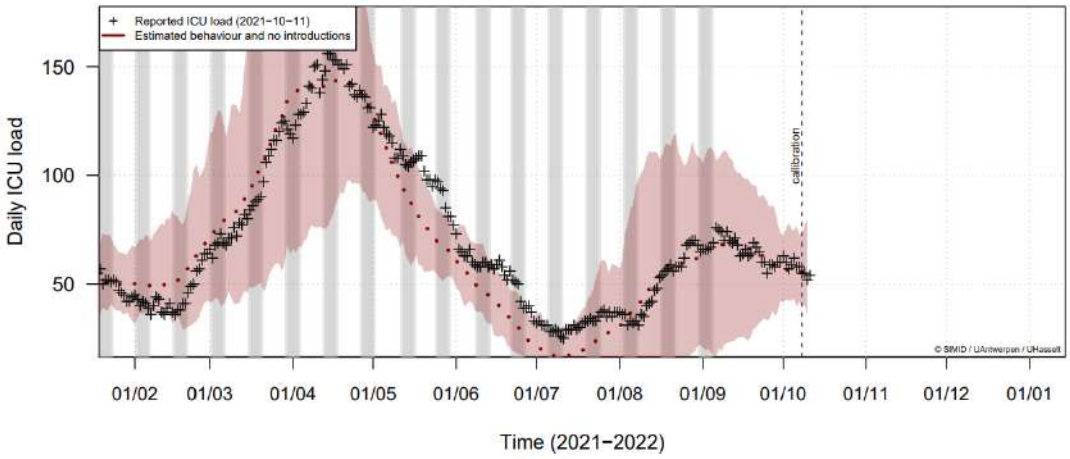
(c) Reproduction number over time (Rt)

***Figure 1**: Model projections for Belgium on daily hospital admissions, ICU occupancy and reproduction number for different assumptions on social contact behavior from October 1st, 2021. The results are summarized by the mean (line) and 95% point-wise credible intervals (shaded area) of 40 model runs.*

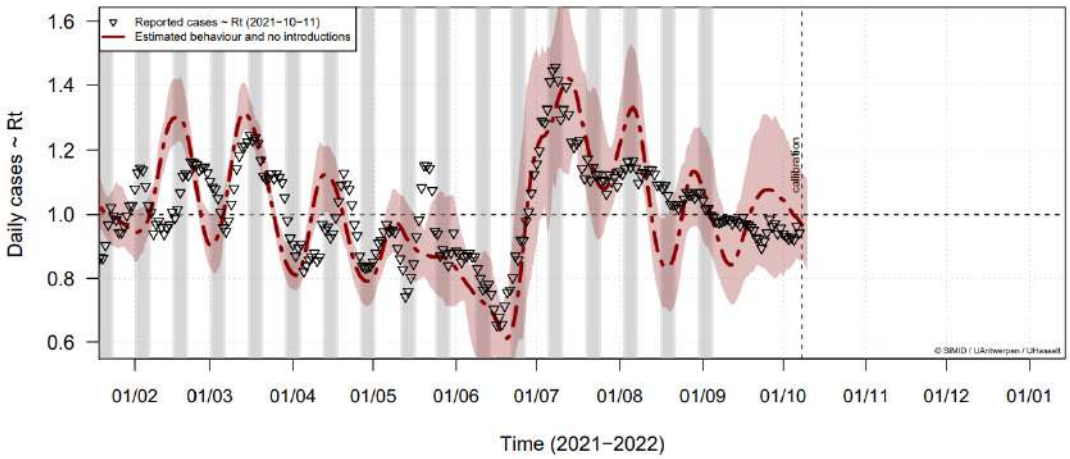
Scenario analysis for the Brussels Capital Region:



(a) Daily hospital admissions



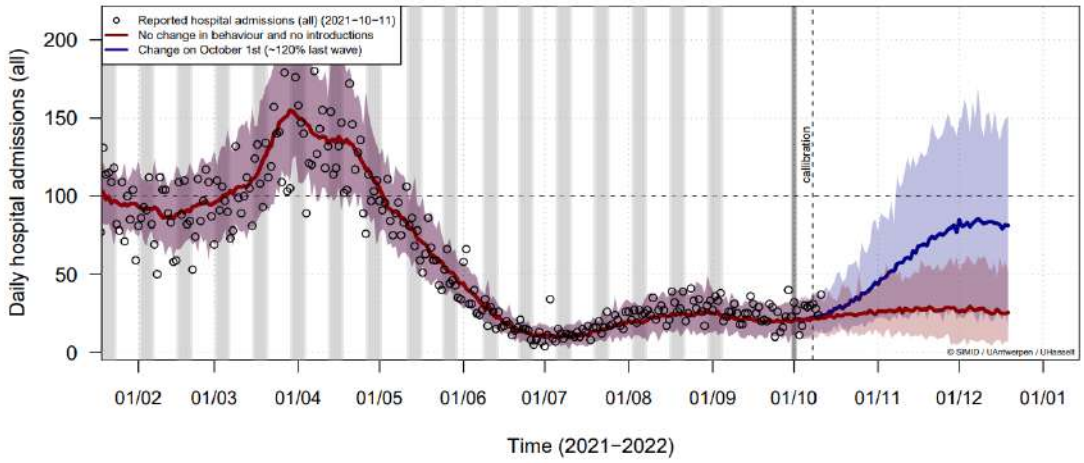
(b) ICU occupancy



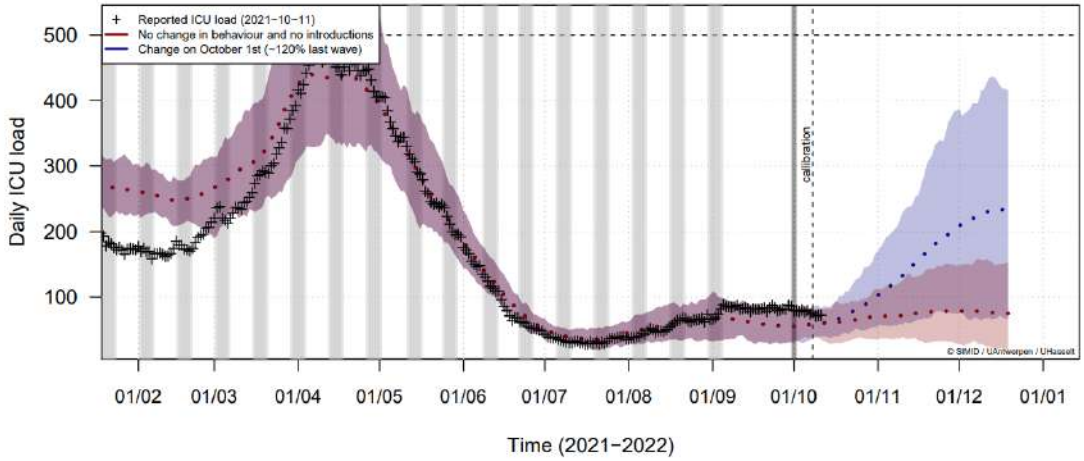
(c) Reproduction number over time (Rt)

***Figure 2**: Model results for the Brussels Capital Region on daily hospital admissions, ICU load and reproduction number for different assumptions on social contact behavior from October 1st, 2021. The model projections are not conclusive and omitted from the graph. The results are summarized by the mean (line) and 95% point-wise credible intervals (shaded area) of 40 model runs.*

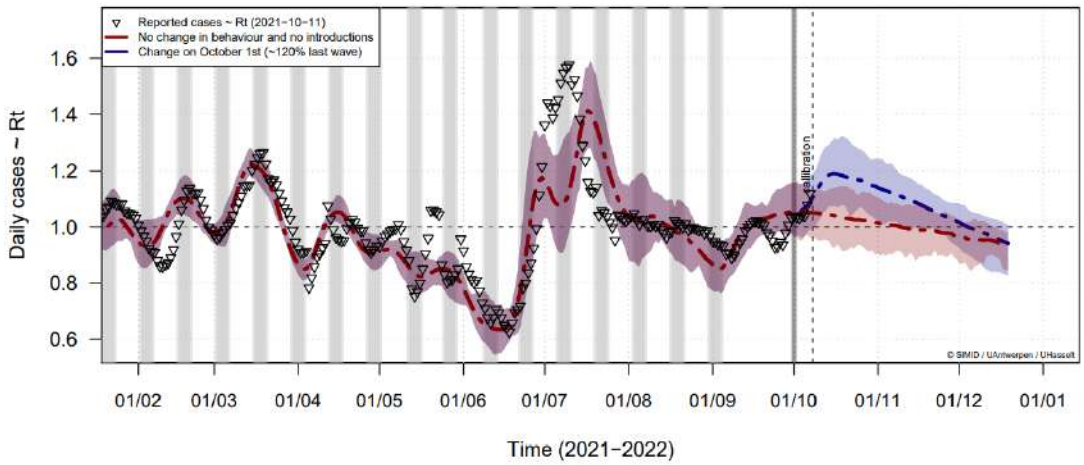
Scenario analysis for the Flemish Region:



(a) Daily hospital admissions



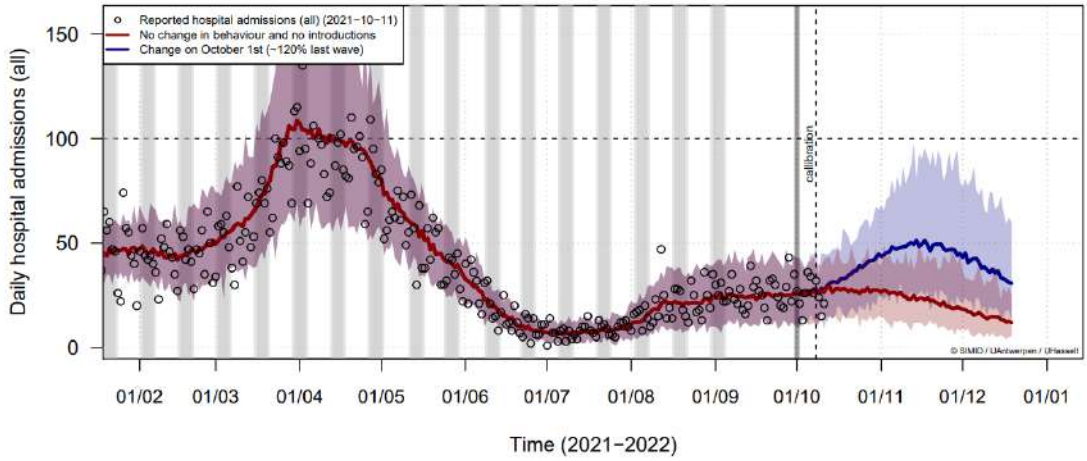
(b) ICU occupancy



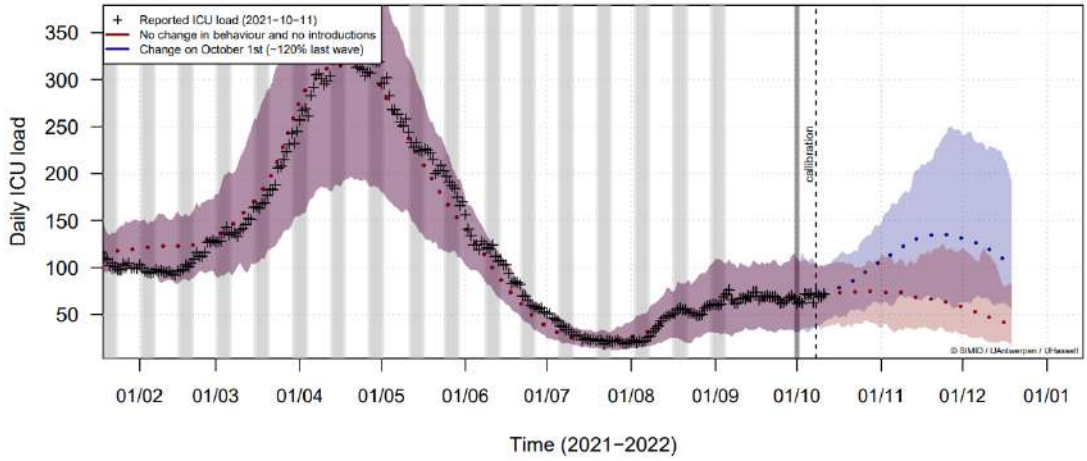
(c) Reproduction number over time (Rt)

***Figure 3**: Model projections for the Flemish Region on daily hospital admissions, ICU load and reproduction number for different assumptions on social contact behavior from October 1st, 2021. The results are summarized by the mean (line) and 95% point-wise credible intervals (shaded area) of 40 model runs.*

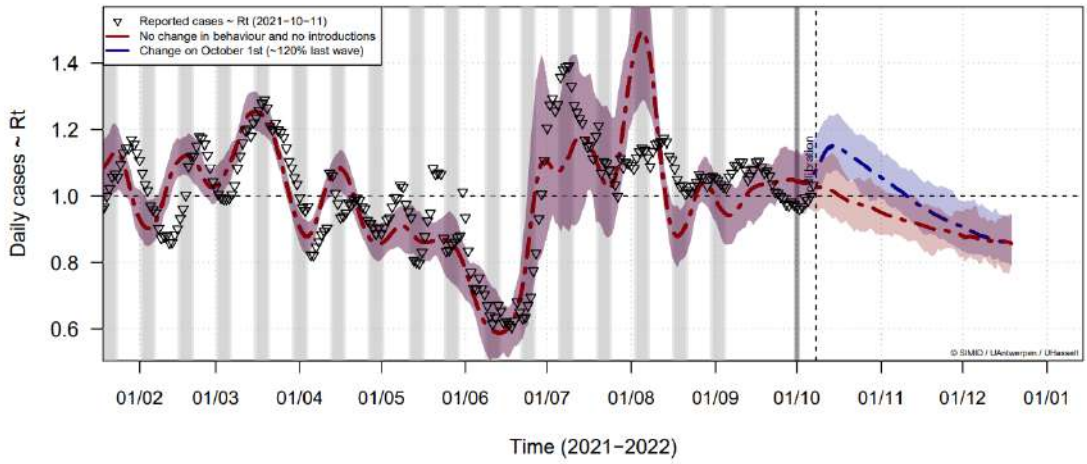
Scenario analysis for the Walloon Region:



(a) Daily hospital admissions



(b) ICU occupancy



(c) Reproduction number over time (Rt)

***Figure 4**: Model projections for the Walloon Region on daily hospital admissions, ICU load and reproduction number for different assumptions on social contact behavior from October 1st, 2021. The results are summarized by the mean (line) and 95% point-wise credible intervals (shaded area) of 40 model runs.*

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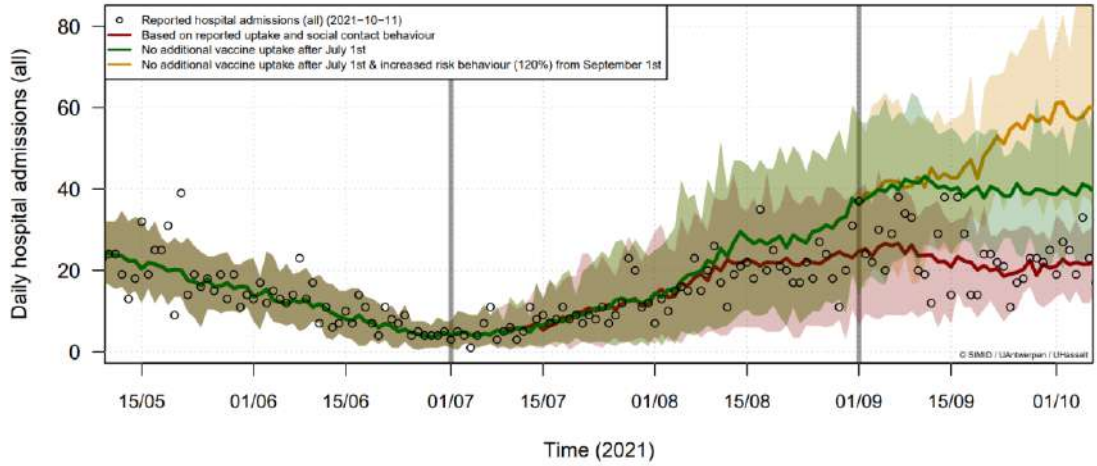
Figures on the vaccine uptake by age based on the reported uptake can be found in the full report which will be published online

<u>SUPPLEMENT: Retrospective analysis for the Brussels Capital Region.</u>

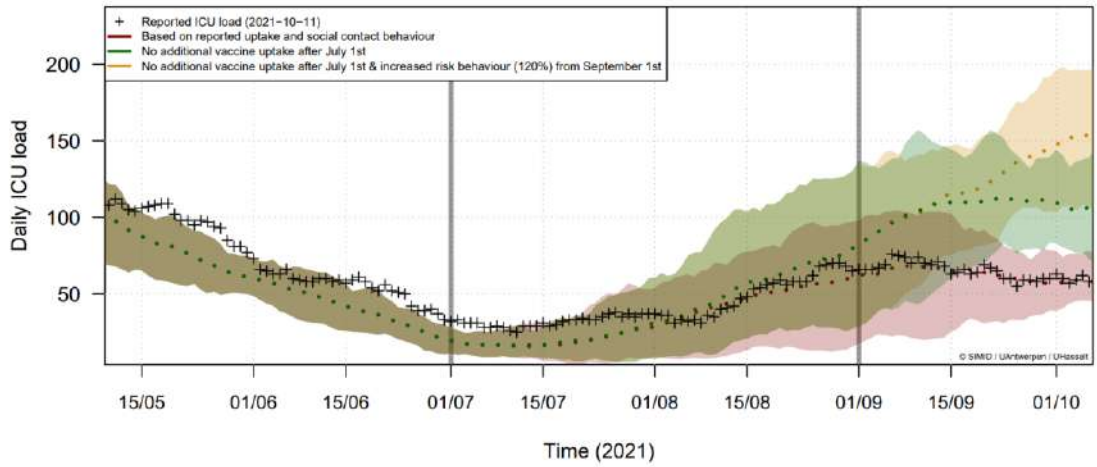
We ran some counterfactual scenarios to explore the impact of vaccine uptake and behavioral changes for the Brussels Capital Region for July–September 2021. All scenarios start from the social mixing and transmission dynamics we estimated based on reported hospital admissions, and have a simulation horizon up until the last observation at moment of writing. None of the scenarios include the effect of the introduction of infected cases.

- We use the estimated risk behaviour over time and included the reported vaccine uptake by age.
- We use the estimated risk behaviour over time but excluded all vaccine uptake from July 1st.
- We assume no vaccine uptake from July 1st and add a behavioral shift on September 1st, 2021. The latter is introduced linearly over 7 days and in line with an increased risk of +20% with respect to the latest regional estimates.

This counterfactual analysis qualitatively explores the benefit of the vaccine uptake over summer in the Brussels Capital Region and a potential burden of disease prevented. Note that this analysis assumes no behavioural changes w.r.t. the absence of vaccine uptake. A retrospective approach is used to exclude uncertainty on future social contact behaviour.



(a) Daily hospital admissions



(b) ICU occupancy

***Figure 9**: Model results for the Brussels Capital Region on daily hospital admissions and ICU load for different assumptions on vaccine uptake from July 1st, 2021, and social contact behavior from September 1st, 2021. The results are summarized by the mean (line) and 95% point-wise credible intervals (shaded area) of 40 model runs.*

● Annex 2. Key epidemiological characteristics for a set of selected countries (08/10/2021) relative to Belgium

The percentage of the entire Belgian population that is fully vaccinated is:

- Belgium 74%
- Flanders 80%
- Wallonia 70%
- Ostbelgien 65%
- Brussels 55%

Of the 211 ECDC regions, 10 were dark red in week 2021/38, 67 red, 92 orange and 42 green. The number of dark red regions has been shrinking for several weeks, but doubled again from week 2021/37 to week 2021/38, predominantly due to rapid increases in the Eastern and Central European member states. This trend continued in week 2021/39, with 13 dark red zones. Apart from Guyana, all of these are located in Eastern and Central European countries, with the highest 14-day incidence for Bucharest, where this 14-day incidence increased in one week from 713 to 1,333/100,000.

Brussels was in 10th place (508) in 2021/38, and moved to place 17 in week 2021/39 (460). As a result, Brussels moved back to red instead of dark red. The other two Belgian regions are in 40th place (Wallonia; 291) and 73th place (Flanders; 152). Note that the ranking of Brussels has improved but remains very high, and that the Walloon and Flemish positions have been deteriorating. Clearly, Flanders has seen a coherent but gentle decline in incidence, but other regions have seen more rapidly decreasing incidences.

Let us consider a selected set of countries, with both higher and lower vaccination rates, and with higher and lower stringencies.

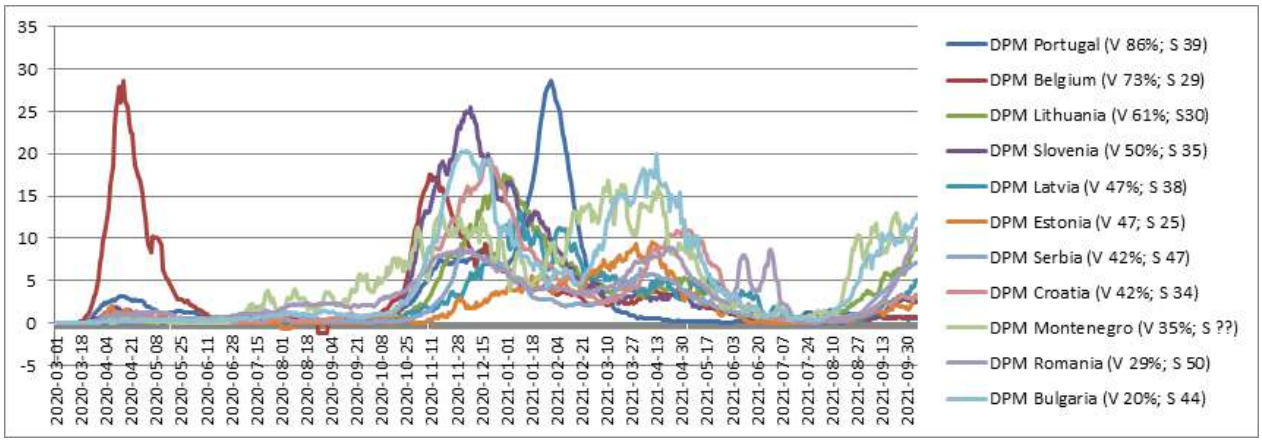
In the table below (situation 08/10/2021), countries are ranked according to full vaccination percentage (percentage of the entire population that is fully vaccinated). It is clear that hospitalisations and deaths go up with decreasing vaccination percentage. At the same time, there is an impact of stringency and, through positivity rate, there is an impact of testing policy.

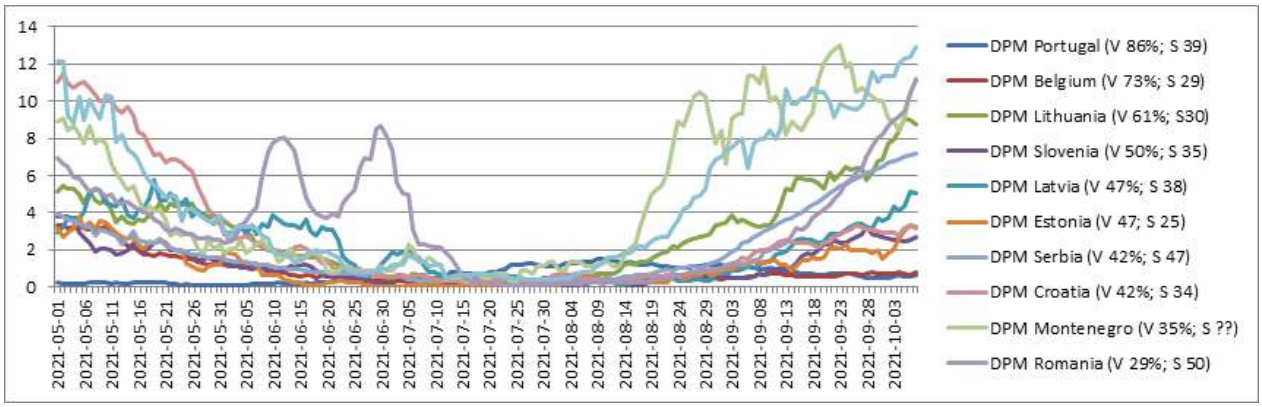
8 October 2021							
Country	**14-day incidence**	**Daily hosp. per million**	**Daily deaths per million**	**Partial vaccination of total population**	**Full vaccination of total population**	**Stringency index**	**Pos. Rate**
Portugal	85	0.5	0.6	88%	86%	39	1.4%
Spain	60	0.6	0.9	81%	79%	42	2.4%
Denmark	110	2.2	0.3	77%	75%	24	1.4%
Belgium	234	5.3	0.8	74%	73%	29	4.8%
Italy	70	1.9	0.7	76%	69%	69	1.0%
Netherlands	152	1.9	0.3	75%	68%	42	6.3%
UK	706	10.4	1.6	72%	66%	41	4.0%
France	108	3.1	0.8	75%	66%	67	1.0%
Germany	134	2.0	0.7	68%	65%	56	6.6%
Israel	548	12.8	2.0	70%	65%	56	2.5%
Luxembourg	194	1.6	0.2	66%	63%	34	4.5%
Lithuania	894	22.3	8.8	66%	61%	30	8.9%
USA	444	23.1	5.1	64%	55%	62	8.4%
Slovenia	575	20.8	2.7	50%	50%	35	19.4%

Latvia	743	35.1	5.1	51%	47%	38	
Estonia	749	21.5	3.2	58%	47%	25	13.6%
Serbia	1373		7.2	44%	42%	47	3.1%
Croatia	423	19.8	3.2	45%	42%	34	14.3%
Montenegro	939		11.1	40%	35%		
Romania	754		11.2	31%	29%	50	23.1%
Bulgaria	386		12.9		20%	44	11.3%

18 October 2021							
Country	**14-day incidence**	**Daily hosp. per million**	**Daily deaths per million**	**Partial vaccination of total population**	**Full vaccination of total population**	**Stringency index**	**Pos. Rate**
Portugal	84	0.5	0.8	88%	86%	47	1.4%
Spain	53	0.7	0.6	81%	79%	42	2.0%
Denmark	130	2.2	0.3	77%	76%	24	1.5%
Belgium	308	4.8	0.9	74%	73%	40	6.4%
Italy	65	1.6	0.6	77%	70%	71	0.9%
Netherlands	183	2.3	0.4	75%	68%	45	7.9%
UK	736	11.4	1.8	72%	66%	41	4.3%
France	102	2.8	0.5	75%	67%	67	1.0%
Germany	137	2.2	0.7	68%	65%	54	6.7%
Israel	402	8.2	1.4	71%	65%	56	1.8%
Luxembourg	207	1.1	0.7	66%	63%	38	4.1%
Lithuania	1024	13.9	10.5	66%	61%	30	10.7%
USA	404	21.1	5.0	65%	56%	62	7.4%
Slovenia	562	18.1	1.9	55%	51%	35	21.0%
Latvia	972	50.6	6.7	54%	50%	47	10.0%
Estonia	898	23.3	3.0	58%	55%	25	15.2%
Serbia	1326		7.6	44%	42%	41	29.6%
Croatia	441	19.7	4.0	46%	43%	34	15.5%
Montenegro	864		8.4	40%	37%		
Romania	898		17.0	34%	29%	55	22.0%
Bulgaria	428		12.7	20%	20%	47	15.2%
Russia	246		6.6	35%	32%	54	5.4%

Let us display the deaths per million curves for some of the countries in the above table, including Portugal and Belgium, and then several of the countries with currently an unfavorable epidemiological situation, in terms of level of metrics and unfavorable evolution thereof. The legend displays the percentage of the total population that is vaccinated (V) as well as the stringency (S). The curves are displayed for the entire period since the beginning of the pandemic, as well as for the period starting May 1, 2021.





- Note first that the very high mortality peak of Belgium in Spring 2020 still stands out. Please recall that higher peaks were realised in several countries such as Italy, Spain, and UK (not in graph), not in terms of raw COVID-19 mortality, but after correcting for underreporting of COVID-19 mortality.
- It is clear that at this time mortality rapidly rises in various countries, and that this trend worsens with:
    - Lower vaccination rate
    - Lower stringency
    - Higher positivity rate
- Belgium has, apart from Denmark and Estonia, the lowest stringency. It is obvious that Belgium now has lower stringency than the UK, in spite of "Freedom Day" in the UK. The UK has a vaccination rate a little under the Walloon rate but well above the Brussels rate. It currently has one of the higher incidences in Europe, and a very poor performance in terms of hospitalisation, given its vaccination rate.
- The Baltic states as well as several former Yugoslav republics show a rapidly deteriorating picture. Note that the vaccination levels and stringencies are very low in several of these countries. Mortality and hospitalisation statistics, to the extent known, are very poor in these countries. A strong warning is issued by Lithuania: a vaccination rate of 60%, combined with very low stringency, can lead to a rapidly deteriorating epidemiological situation. However, **Lithuania has a vaccination rate higher than Brussels, and a stringency higher than the Belgian one. The fact that its situation is deteriorating rapidly, not only in terms of incidence but also in terms of hospitalisations and mortality, is a warning signal.**
- Likewise, we see rapidly increasing incidences and deteriorating statistics in countries like Bulgaria, Romania, and Croatia. Some countries, especially Montenegro, Bulgaria, and Romania, experience mortality that is both rising and already back to the levels of May 2021.

Romania and Bulgaria have increased their stringency, but the low vaccination rate is detrimental. The epidemiological situation in these countries is very rapidly declining.

- Spain and Portugal, on the other hand, have very high vaccination levels, and moderate stringency (higher than Belgium). It is clear that these countries experienced several severe waves in the past, as follows from their epidemic curves, including mortality in 2020 (in Spring 2020 in Spain, in mid-Winter 2020-2021 in Portugal). Their epidemic situation is now well under control. Portugal is vaccination champion worldwide but still maintains a reasonably high stringency. Its incidence is still slowly decreasing but, importantly, the country does well in terms of hospitalisation and mortality. Note that some of the death toll still can be seen as the aftermath of the delta peak that the country experienced in June 2021.
- Italy, Netherlands, UK, and France have very similar vaccination rates, but very different stringency. The relationship with stringency is not perfect. For example, it is clear that among these four countries the UK has the lowest stringency, which is visible in its hospitalisations and mortality. France has high stringency but not the best statistics, and in the Netherlands it is the reverse. In France, the poor epidemic situation in the DOMTOM has played an important role and to a lesser extent the epidemiologically more difficult situation in some southern regions. Also, compliance with measures is an issue. In the Netherlands, stringency is relatively low (although higher than in Belgium), but certain high risk activities (e.g., nightlife) are still closed after the debacle early July 2021.
- Note that the UK would restore NPIs if one of the following conditions is satisfied: (1) large outbreaks in schools; (2) large outbreaks on the work floor; (3) waning immunity; (4) new variant-of-concern with unfavorable characteristics.
- Denmark has the lowest stringency in the list and seems to be able to combine this with good statistics. However, right after the lifting of most measures, the positivity was 0.5% whereas it has increased to 1.4% now. Also, the number of hospitalisations is increasing. This points to the fact that the epidemic is expanding again but with less monitoring than before (Denmark had a very extensive CST system prior to the lifting of restrictions). Compatible with this phenomenon is the fact that incoming travelers from Denmark in week 2021/38 had a 7.1% positivity, higher than all other countries with a large number of incoming travelers.
- France has a higher vaccination level at this time, when compared to what it was before the 14 July declaration of President Macron (now 66.5% fully vaccinated, 74.8% at least partially vaccinated), and the most stringent measures in the list. It suffered for a while from the aftermath of a high peak during Summer 2021. Also, the incidence is very variable across French regions. The DOMTOM have influenced national statistics for a long time. The national incidence has been improving and the performance is much better than, for example, that of the UK, even though the vaccination level is the same. Of course, France has maintained much more stringent measures.
- Israel has a similar vaccination level to France (64.7% fully vaccinated, 70.3% at least partially vaccinated); that being said, vaccination is very heterogeneously spread among its population, i.e., very low in the orthodox Jewish and Arab strata. These sub-populations keep providing fuel to the epidemic, resulting in relatively poor statistics, especially at the level of hospitalisation. Currently, the situation is improving in Israel.
- In the same vein, the US has very poor performance, driven by the fact that the vaccination rates are very heterogeneous across states, ranging from about 40% in some southern states to 75% in some New England states. The same is true for stringency. The national figure masks the fact that in some states (in particular some with low vaccination rates, like Texas and Florida) the stringency is extremely low.

- Several of the Eastern and Central European countries have worrying positivity rates as well: Slovenia about 20%, Croatia and Estonia about 15%, and Romania near 25%. In these countries, the vaccination rate is low to extremely low, and the stringencies are generally too low to keep the epidemic under control, even though in some countries, such as Romania, additional measures have been taken.

United States of America

We consider a selection of states with vaccination levels comparable to Flanders, Wallonia, and Brussels, respectively.

States with vaccination percentage around that of Flanders (80%)				
State	**Vaccination**	**ICU (non-covid)**	**ICU (covid)**	**Remarks**
Washington DC	76%	70%	10%	3-fold increase in hospitalisations compared to July
Rhode Island	74%	70%	10%	Hospitalisations under control
Vermont	72%	60%	15%	Higher peak than ever in cases; hospitalisations to peak level; but has been under control in the past

States with vaccination percentage around that of Wallonia (67%)				
State	**Vaccination**	**ICU (non-covid)**	**ICU (covid)**	**Remarks**
Maine	69%	60%	20%	Hosp. to peak level
New Jersey	66%	40%	5%	Hosp. at half peak level
Washington State	63%	50%	30%	Cases at peak; hosp. at 175% of previous peaks

States with vaccination percentage around that of Brussels (55%)				
State	**Vaccination**	**ICU (non-covid)**	**ICU (covid)**	**Remarks**
Florida	59%	55%	25%	Hospitalisation at 175% of previous peaks; mortality at double the previous peak; ICU(covid) declining but went up to 40%
Texas	53%	50%	40%	Hospitalisation at same level as previous peaks; mortality at the same level as previous peaks; ICU(covid) now declining but went up to 50%
Illinois	55%	55%	10%	Hospitalisation under control (stringent measures, in particular in Chicago)

The states comparable to Flanders exhibit a situation that is relatively under control.

Maine and Washington State, comparable to Wallonia, have a relatively high ICU occupancy, and actually hospitalisation curves at or higher than previous peaks. New Jersey, because of its more stringent measures, has a low level of hospitalisation and ICU occupancy.

The states comparable to Brussels, in particular Florida and Texas, have worrisome hospitalisation and ICU levels. In both Florida and Texas, the situation is slightly better than it was a few weeks ago, but we still have total ICU occupancies between 80 and 90%. A few weeks ago, in both states half of the ICU beds were taken by COVID patients. Illinois, in spite of its low vaccination rate, is doing relatively well, because of its high stringency. Especially the large metropolis in the state, Chicago, maintains a very stringent regime.

Africa

Several countries went through a peak in July and August 2021, with severe mortality (expressed in number of daily deaths per million), for example:

- Botswana (16)
- Namibia (30)
- Zimbabwe (5)
- South Africa (7)

This should be compared to 0.8 for Belgium in the table above, and 12.9 for Bulgaria. Of course, different countries, especially in different continents, may have very differing monitoring and reporting systems.

Because of poor monitoring of incidences and difficulties with hospitals (capacity and reporting), the mortality statistic is relatively speaking the better one to consider. Even though the peak figures have declined, fortunately, there are hints of a new rise in Botswana and Zimbabwe.

Latin America

Incidences and other metrics are rising in some though not all Latin American countries. Unlike in, for example, Europe and North America, there is considerable variability in the circulating variants. For example, in Brazil, delta is nearing dominance (about 90%). In Colombia, a roughly 50-50 mix of mu and delta is observed. In Chili, gamma is still dominant, whereas in Peru lambda is the dominant strain. Arguably, it is a matter of time before delta will dominate these countries, with the risk of a surge in the epidemic.

Why is making Delta our life so difficult?

For the sake of argument, assume we have a very large population of susceptibles. Assume we have 4 people infected with seasonal flu, and that the virus is passed on generation after generation, in a population with pre-pandemic contact behavior. After 10 generations, 684 people would be infected. Should we do the exercise for SARS-CoV-2 (Wuhan variant), then after 10 generations 354,292 people are infected. But for the delta variant, we would reach about 5 billion people. This is because the basic reproduction numbers are about 1.5, 3.0 and 8.0, respectively.

So, with the combined effects of vaccination, depletion of susceptibles through natural infection, and NPIs, we manage to more or less keep the epidemic under control, but it remains difficult.

The above calculations underscore why the Delta variant, when reaching a population such as India in March 2020 (with low vaccination rate and extensive contact behavior), produces a very high peak in a short time period, then declines rapidly as well. The virus in such a case quickly burns through the population.

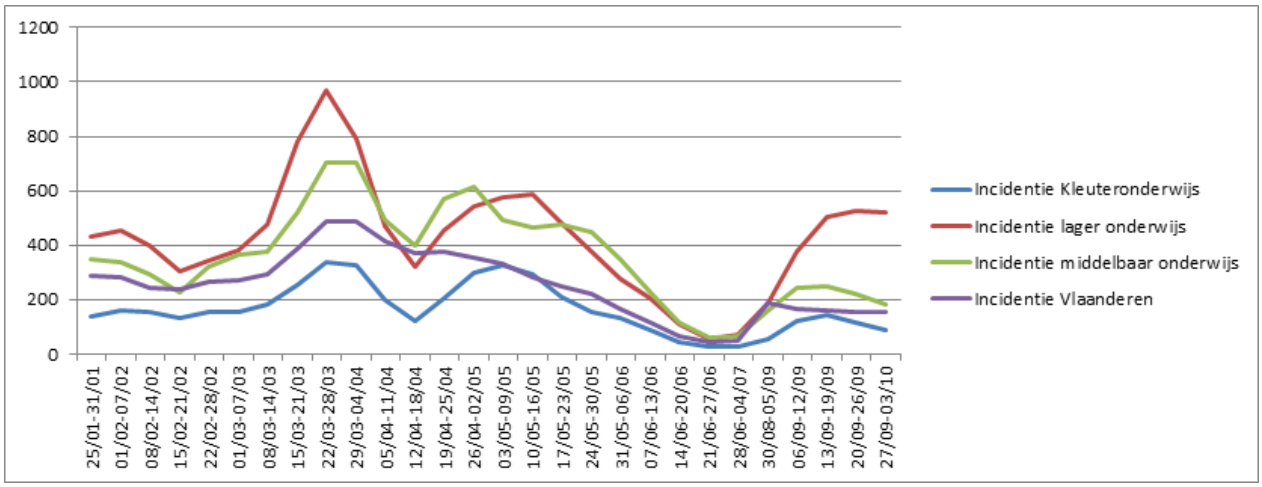
Of course, populations are not infinite, and for realistic scenarios in the presence of measures and vaccination proper mathematical modeling is needed. But it underscores the pressure that delta is exercising on a society.

Some lessons drawn from the national and international situation

Based on the cases and hospitalisation data, a doubling of cases in Belgium still leads to an increase of hospitalisations by 44% (confidence interval 43% - 45%). So it does remain important to keep case numbers under control. In the pre-vaccination period (cf. second wave in Fall 2020), this rate was 53%. So, while there is a decrease due to vaccination, it remains important to keep case numbers under control.

Several regions in Europe and beyond, with vaccination, stringency, and positivity levels similar to that in Brussels or Wallonia, or with values somewhat better, have poor or rapidly deteriorating situations. The fact that the epidemiological situation is not rapidly deteriorating in the Belgian regions at this time, should therefore not lead to complacency.

The education and higher education systems require attention in their own right. The below figure shows the evolution of the Flemish compulsory education systems, against the background of the Flemish incidence.



The incidence in especially the primary education system is very high, around 550, although it appears to be stabilising a bit. The RSZ/ONSS monitoring, combined with IDEWE monitoring, shows high incidences as well. General secondary education, which in fact combines secondary and primary school personnel, has incidence around 430 in the RSZ data (RSZ report 15, by Molenberghs, Verbeeck, Vandersmissen and Godderis).

The Genomic surveillance of SARS-CoV-2 in Belgium report #48, by Cuypers et al. (2021_48), points to a rapid rise in infections in the student population. 14day incidences approach 1400, i.e., about 10 times the general Flemish incidence. The positivity ratio is a bit over 6%. Contact tracing evidence refers to events in the nightlife sphere. The authors recommend maintaining an efficient testing and tracing system to help keep the spread under control.

The report from the Université de Liège suggests a situation under control, with low positivity (about 0.3% among students and staff) and vaccination rate about 90% (students and staff). Currently, only 60% seem to have a sufficient level of antibodies, but test results are delayed and should be updated in the near future. A cause of concern is that the remaining NPIs (e.g., distance, greeting without physical contact,…) are not well observed.

● Annex 3. Monitoring Belgian COVID-19 infections in work sectors in 2021 (Version 15 – 8 October 2021)

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1. Introduction

The workplace is among the main activities for a large proportion of the population, and consequently a source of potential infection. Hence, it is often (up to 25%) reported in the contact centre database as one of the collectivities visited by the index case. It is important to monitor the incidence of COVID-19 by sector as it can help us to better understand causes of increased infection rates and it can offer us ways to reduce infections without jeopardising the continuity of these sectors/companies for the benefit of all, first and foremost the companies and their workers. Two sources of information on infection in work sectors will be used in this report: the RSZ/ONSS data and the contact tracing data.

○ 1.1. RSZ/ONSS data

The RSZ/ONSS data analyses of COVID-19 infections in the working population were set up in the first place to allow for signal detection. The alerts consist of 2 or more cases in the same company as well as the identification of employment of an index case in a risk sector as defined by the regional contact tracing agencies (daily alerts are sent by the RSZ/ONSS to the regions). Aggregated data show the evolution over time of the incidence in the sectors. It helps to better understand the spread of the virus in the active population. The latter is of interest here.

Data description: RSZ-ONSS has been receiving information regarding positive COVID-19 cases from Sciensano since 8 September 2020. RSZ-ONSS links this information to workplace-related databases, at the level of the national number (NISS). The linkage is allowed during a period of 14 days, after which the information on positive cases is destroyed, while the aggregated output tables are stored. Linkage is done of positive cases with the NSSO Dimona database of active workers since 8 September 2020. This covers most of the workers, such as private and public sectors, interim employment and job students. Since 12 January 2021, additional linkage of positive cases with the ARZA-RGTI (Algemeen Repertorium van de Zelfstandige Arbeiders - Répertoire Général des Travailleurs Indépendants) database was allowed, which covers self-employed workers.

Each company is classified by sector of its main activity (as attributed by the RSZ-ONSS), which are identified by the NACE code. This standard code classifies workplaces into 21 main sectors and then in subcategories for which the specificity depends on the chosen granularity (which can have up to 943 subcategories). However, although some companies or self-employed workers may be active in more than one sector, only one NACE number associated with the main activity is used in the analysis. This limitation is particularly important to consider for employees within national education. Because a vast majority of schools provide both primary and secondary education, the employees will be registered as working in “Secondary education” even when in reality they are primary school teachers.

Further, since the link of the cases is only identified at the level of the company, no information is available on the type of the job of the index case (e.g., administrative work in metal industry will be registered under metal industry). Further, information on the exact employment location is not always available and/or accurate (e.g., information on telework or temporary unemployment is not available).

Finally, the actual source of infection (in particular: at the workplace or elsewhere) cannot be traced back from this database. Thus, the size and extent of the database allows us to obtain a clear and precise picture of the level of infection within a given sector, without link to the source and circumstances of infection.

1.2. Contact tracing

For companies affiliated with IDEWE, COVID-19 positive tested employees are reported to IDEWE starting from 22 July 2020. Of these index cases, contact tracing is performed of high and low-risk contact within the company. Subsequently, appropriate measures are taken within the company and by high-risk contacts to limit spread of the infection. Since 11 March 2021, index cases are asked about the work relatedness of their infection. At the start of the contact tracing, data were registered in a shared Excel file. From 29 October 2020 onwards, a 'tracing application' was used to register all notifications of index cases in companies under medical surveillance of IDEWE. Note that high and low-risk contacts are registered only for contacts in the company, contacts at home or in leisure time are not registered.

An index case can be any person present in the company. It can be an employee, but also an interim worker, an intern, etc. Importantly, for schools, the index case can also be a student. Of the index cases the employer information is retrieved via the INSZ number by IDEWE. Information of the employer is subsequently grouped by region and by customer segments. Although some customer segments are similar to the NACE code sectors, this is not true in general. IDEWE considers 10 customer segments based on the NACE codes of the companies, but these segments resemble only partially level 1 and 2. The segment classification is based on similarities in the needs of IDEWE's customers and in the services IDEWE provides for them.

The incidences in the RSZ/ONSS sectors may differ from those in the contact tracing customer segments due to two aspects:

1. The RSZ/ONSS data concerns all employees and self-employed workers, while the contact tracing data concerns only companies under surveillance.
2. Similar named sectors and customer segments may contain different companies.

For instance, the NACE sector 'education' contains only information on positive cases among employees, while the contact tracing data also contains pupils. In schools, a considerable number of index cases were pupils, especially since the onset of increased testing of children in January 2021. Finally, the contact tracing for the education segment is performed by regionally organised Student Guidance Centres (SGC). The organisation of the contact tracing by the SGC can vary from centre to centre and often only index cases with high-risk contacts are reported to IDEWE.

IDEWE has 9 regional offices that cover the surrounding areas and that are called after the city where they are located. Most Belgian provinces have one regional office, except Antwerp that is served by the regions Antwerpen, Mechelen and Turnhout, and Namur that serves all of Wallonia. The sole exception is Public transport. Companies belonging to this segment are not regionally divided.

Note that some larger companies have organised contact tracing by their internal prevention service. Data of these companies are however not included in this analysis, causing an underestimation of index cases in general. For some segments this underestimation might be more important than for others.

2. Methodology

2.1. RSZ/ONSS data

The data provided by RSZ/ONSS will be shown per work sector. Work sectors are divided by NACE codes and grouped into 5 levels of detail, going from 21 sectors at level 1 to 943 sectors at level 5. The evolution of the 14-day incidence of positive COVID-19 cases among all employees registered in the same sector (number of cases per 100,000 employees) is presented for the 5 levels of work sectors. A 95% confidence interval (CI) for the incidence is calculated on a logit transformation of the incidence, after which it is back transformed to the original scale.

At each of the 5 levels of detail of the work sectors, the highest incidences in the last 14-day period are selected (21 September-4 October 2021) and presented together with the COVID-19 14-day incidence over all work sectors (∼4.5 million individuals) and the COVID-19 14-day incidence in the general population (∼11.5 million individuals) for reference.

Because the number of employees in some occupational sectors is low compared to others, the precision of the 14-day incidence is low in such small sectors. Therefore, we select the highest incidences for level 1 sectors with a minimum of 10,000 employees and self-employed workers. For level 2 and 3 sectors with a minimum of 5,000 employees and self-employed workers are selected, while for level 4 and level 5, sectors with a minimum of 3,000 and 1,500 employees, respectively, are selected.

Note that for 25% of the self-employed a sector is missing in the ARZA-RGTI data. Positive cases of self-employed workers with missing sector information are left out of the analysis. Linkage to occupational data shows that missing sector information is dispersed over many sectors, so that the impact of missing data is not affecting a single sector excessively. There will be a slight underestimation of the true incidence, but the ordering among sectors is likely not affected.

Finally, we cannot exclude varying testing preparedness and custom between sectors.

2.2. Contact tracing

In addition to the comparison of the 14-day incidence of index cases between customer segments under surveillance, also the 14-day incidence of index cases between regions are compared. The reported day is the last day of the 14-day period.

Since its initiation on 29 October 2020, the tracing application registers in a standardized manner, besides information on incidences, also information on high-risk and low-risk contacts of index cases. Per segment and per region, the mean number of high-risk contacts by the index case over the entire study period (29 October 2020–30 September 2021) and the four-weekly percentage of index cases with two or more high risk contacts are evaluated.

There might be an underreporting of high-risk contacts because the number of contacts for an index case is set equal to 0 by default by the application. For index cases, who for example could not be contacted or who refused to answer, the number of high and low-risk contacts is reported 0, which may not coincide with reality. The incidences reported by contact tracing depend on the testing willingness in sectors and accuracy in reporting high-risk contact.

3. Results

This report is accompanied with an Excel sheet, listing all sectors and all NACE-BEL sectors for further examination.

3.1. Level 1 work sector

Of the 21 sectors at level 1, the sectors with a 14-day incidence on 4 October 2021 significantly above the working population average are Education (sector P) and Human health and social work activities (sector Q) (Table 1 and Figure 1). Since the 14-day incidences in the working population is significantly below the general population incidence, many sectors have a 14-day incidence significantly lower than the general population average. Education (sector P) is the only sector with an incidence significantly above the general population incidence, due to the linear increase of incidence, since the opening of primary and secondary schools in September (Figure 2). Also, Arts, entertainment and recreation (sector R) shows an increase in incidences in the last two weeks.

Figure 1: 14-Day incidence of COVID-19 infection of all 21 sectors at Level 1 in both employees and self-employed workers

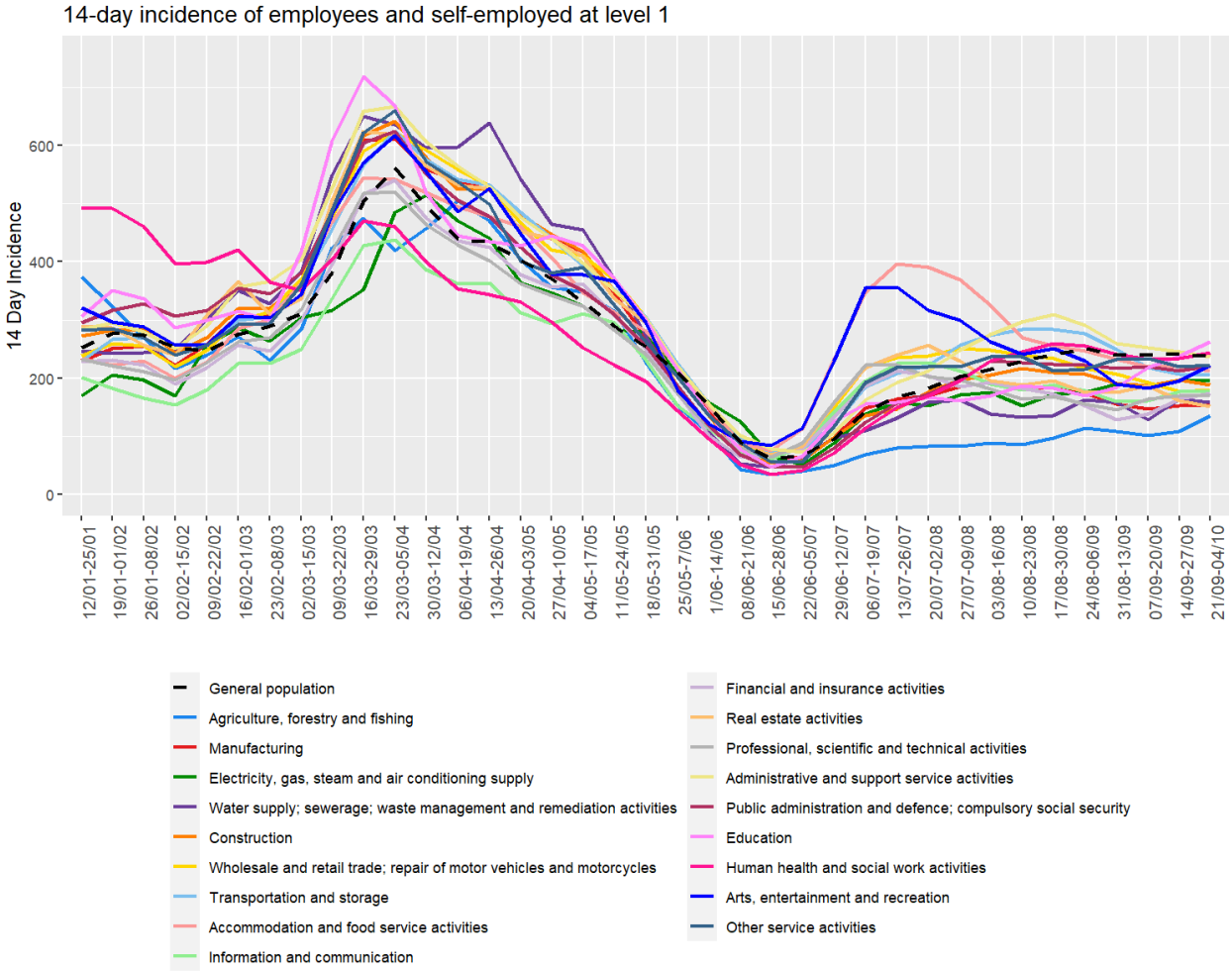


Figure 2: 14-Day incidence of COVID-19 infection of Education at Level 1 in both employees and self-employed workers

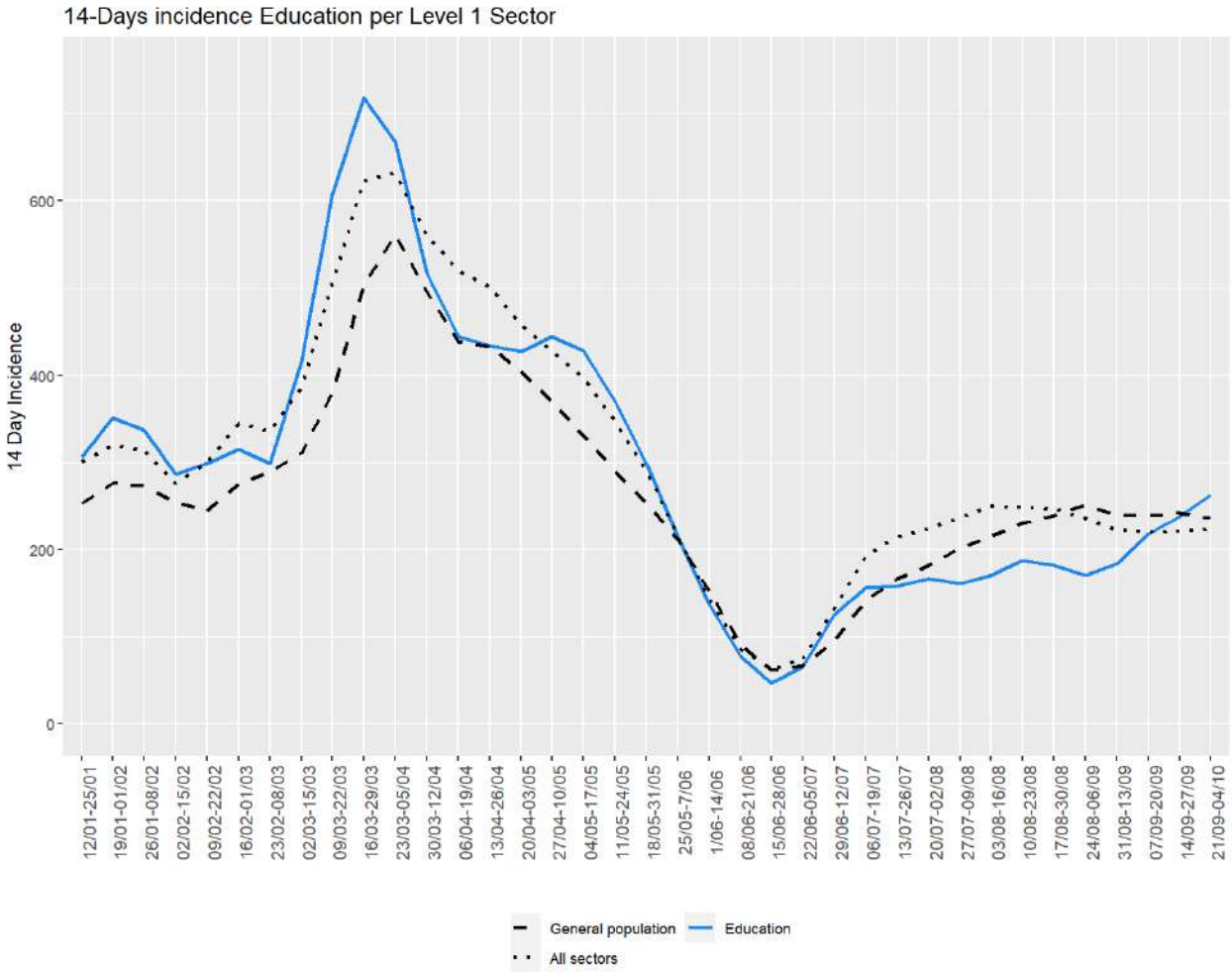


Table 1: 14-Day incidence of COVID-19 infection of all 21 sectors at Level 1 on 4 October September 2021

Table 1: 14-Day incidence of COVID-19 infection of all 21 sectors at Level 1 on 4 October September 2021

DESCRIPTION	NACE-code	Total number of workers	Incidence (95%CI) all workers	Incidence (95%CI) employees	Incidence (95%CI) self-employed	Percentage of self-employed workers
Education	P	548669	263(250;277)	265(251;279)	233(181;299)	4.93
Human health and social work activities	Q	652459	244(232;256)	242(230;255)	264(224;311)	8.47
Administrative and support service activities	N	445339	236(222;251)	249(233;266)	178(151;210)	18.3
General population			**236**	**236**	**236**	
Working population		**4470982**	**224(220;228)**	**224(220;228)**		
Other service activities	S	160360	222(200;246)	260(227;297)	183(155;216)	49.8
Arts, entertainment and recreation	R	109009	222(196;252)	241(207;280)	188(150;236)	37.42
Public administration and defence; compulsory social security	O	542986	221(209;234)	221(209;234)		0.2
Accommodation and food service activities	I	333333	213(198;229)	223(206;242)	177(149;211)	22.37
Transportation and storage	H	310732	205(190;222)	205(189;222)	204(158;264)	9.3
Electricity, gas, steam and air conditioning supply	D	21538	195(144;264)	183(133;252)		6.15
Construction	F	382979	188(175;202)	178(162;196)	202(181;226)	40.99
Wholesale and retail trade; repair of motor vehicles and motorcycles	G	837430	179(170;188)	182(172;193)	167(150;186)	22.98
Information and communication	J	184270	178(160;198)	176(155;200)	183(150;223)	30.18
Financial and insurance activities	K	160920	174(155;196)	196(173;222)	96(69;134)	22.16
Professional, scientific and technical activities	M	395858	169(157;182)	175(158;194)	163(146;182)	47.71
Water supply; sewerage; waste management and remediation activities	E	36709	158(122;204)	166(128;215)		6.48
Manufacturing	C	622727	154(145;164)	156(146;167)	134(108;166)	10.43
Real estate activities	L	58940	151(123;186)	159(117;217)	145(110;192)	58.24
Agriculture, forestry and fishing	A	100000	135(114;160)	134(105;171)	135(107;170)	53.93

3.2. Level 2 work sector

In the sectors at level 2 with a minimum of 5,000 workers, the sectors with a 14-day incidence on 4 October 2021 significantly higher than the working population average are: Activities of membership organisations (sector 94), Services to buildings and landscape activities (sector 81), Education (sector 85) and Human health activities (sector 86) (Table 2 and Figure 3).

Figure 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 in both employees and self-employed workers

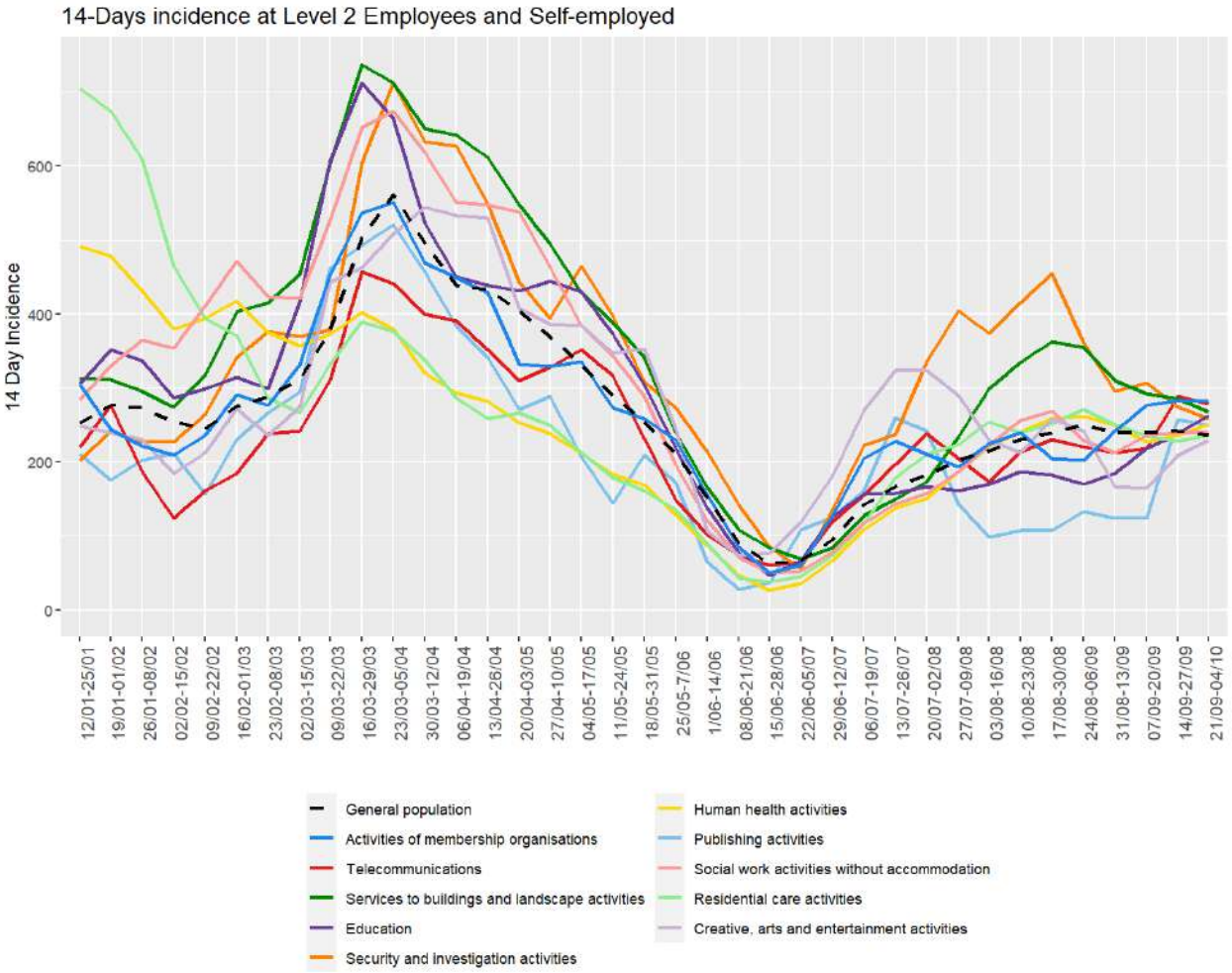


Table 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 4 October 2021

Table 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 4 October 2021

DESCRIPTION	NACE-code	Total number of workers	Incidence (95%CI) all workers	Incidence (95%CI) employees	Incidence (95%CI) self-employed	Percentage of self-employed workers
Activities of membership organisations	94	58865	282(242;328)	295(251;347)	217(142;333)	16.85
Telecommunications	61	21505	279(217;359)	269(205;353)	374(187;746)	10.01
Services to buildings and landscape activities	81	238060	268(248;290)	279(257;303)	201(158;256)	14.06
Education	85	548669	263(250;277)	265(251;279)	233(181;299)	4.93
Security and investigation activities	80	20930	258(198;337)	258(198;337)		5.13
Human health activities	86	315139	251(234;269)	251(233;271)	250(209;299)	15.32
Publishing activities	58	11245	249(172;360)	299(197;454)	154(69;342)	34.81
Social work activities without accommodation	88	169167	240(218;264)	236(214;261)	350(223;548)	3.22
Residential care activities	87	168220	236(214;260)	235(213;259)	304(145;636)	1.40
General population			**236**	**236**	**236**	
Creative, arts and entertainment activities	90	44541	229(189;278)	237(184;306)	219(162;295)	45.38
Working population		**4470982**	**224(220;228)**	**224(220;228)**		

3.3. Level 3 work sector

In the sectors at level 3 with a minimum of 5,000 workers, the sectors with a 14-day incidence on 4 October 2021 significantly higher than the working population average are: Waste treatment and disposal (sector 382), Other residential care activities (sector 879), Activities of other membership organisations (sector 949), Other passenger land transport (sector 493), Secondary education (sector 853), Cleaning activities (sector 812), Other social work activities without accommodation (sector 889) and Hospital activities (sector 861) (Table 3 and Figure 4).

Since the start of the primary and secondary schools on 1st September, employees in these schools show an increase in 14-day incidences, as well as employees in other education (Figure 5). A comparison between primary and secondary schools is inaccurate based on the available data. Indeed, the NACE-BEL code for school employees is assigned to the main activity of the school. Hence, for schools offering both primary and secondary education, all employees are counted as secondary education employees. Employees under the NACE-BEL code primary education are employees in schools that offer only primary education.

Figure 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 in both employees and self-employed

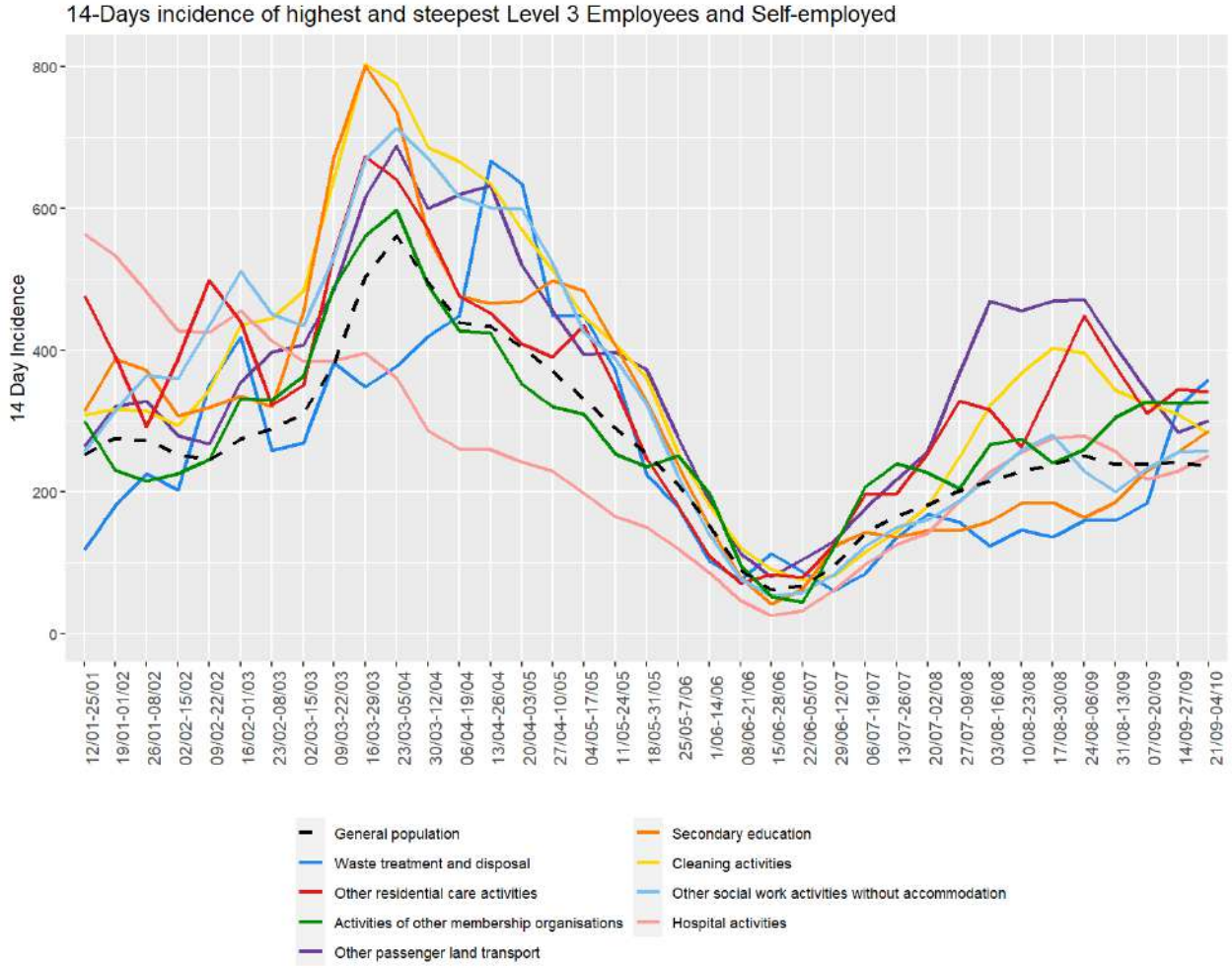


Figure 5: 14-Day incidence of COVID-19 infection in Education sectors at Level 3 in both employees and self-employed

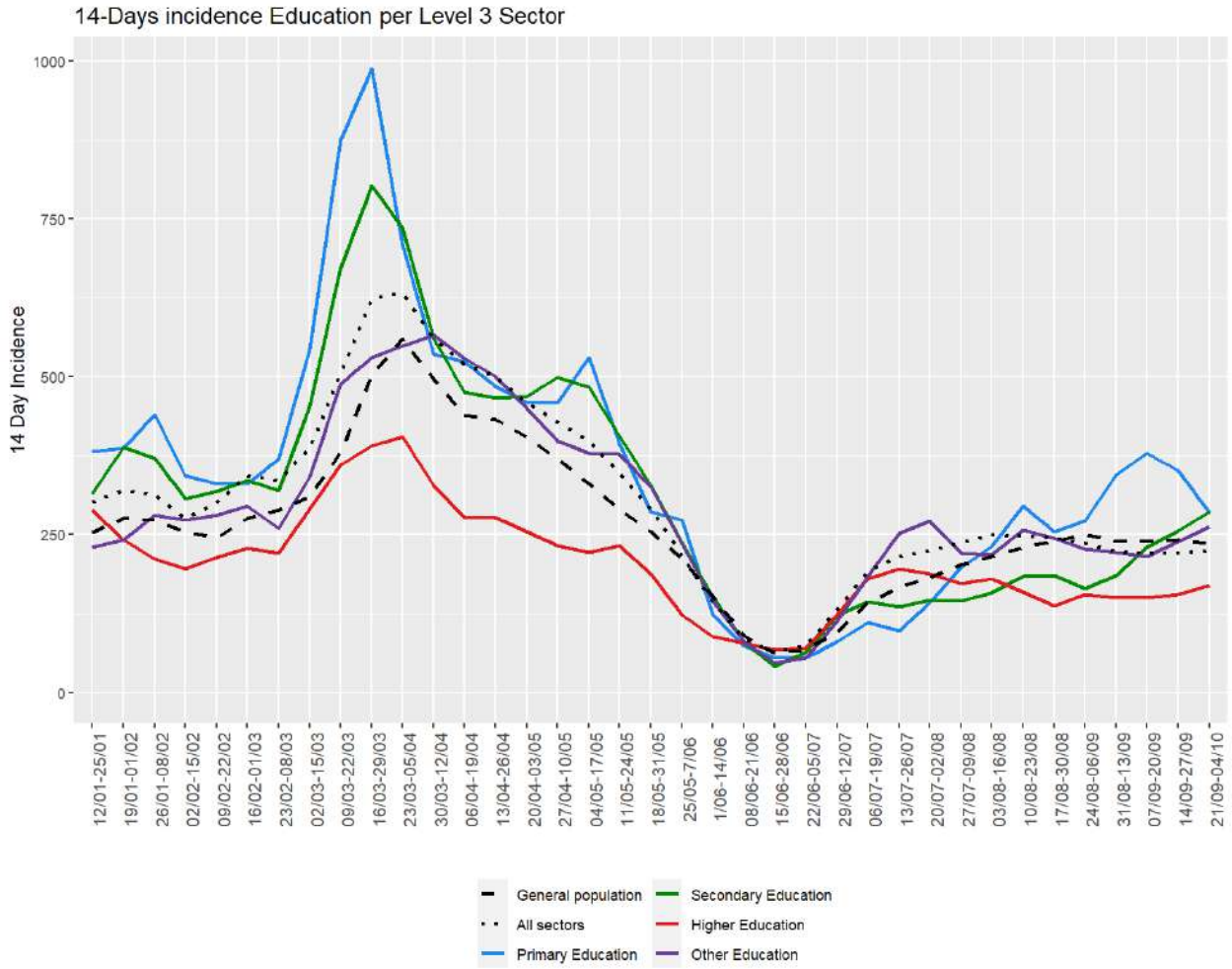


Table 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 4 October 2021

Table 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 on 4 October 2021

DESCRIPTION	NACE-code	Total number of workers	Incidence (95%CI) all workers	Incidence (95%CI) employees	Incidence (95%CI) self-employed	Percentage of self-employed workers
Waste treatment and disposal	382	8078	359(250;516)	359(250;516)		6.85
Other residential care activities	879	16422	341(263;443)	341(261;445)		3.55
Activities of other membership organisations	949	35168	327(272;392)	334(275;405)	279(162;480)	13.58
Other passenger land transport	493	47333	300(255;354)	286(239;342)	399(265;600)	12.39
Secondary education	853	389860	286(270;303)	286(270;303)		0.22
Cleaning activities	812	198936	282(260;306)	287(264;312)	193(126;296)	5.70
Other social work activities without accommodation	889	120543	258(231;288)	253(226;284)	376(240;589)	4.21
Hospital activities	861	215476	252(232;274)	252(232;274)		0.33
General population			**236**	**236**	**236**	
Working population		**4470982**	**224(220;228)**	**224(220;228)**		

3.4. Level 4 work sector

In the sectors at level 4 with a minimum of 3,000 workers, the sectors with the highest 14-day incidence on 4 October 2021 are: Cleaning activities (sector 8129, 8121), Activities of other membership organisations (sector 9499), Child day-care (sector 8891), Residential care activities (sector 8790), Passenger land transport (sector 4939, 4932, 4931), Activities of sport clubs (sector 9312), Other construction installation (sector 4329), Secondary and other education (sector 8531, 8559), Hospital activities (sector 8610) (Table 4 and Figure 6).

Figure 6: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 in both employees and self-employed

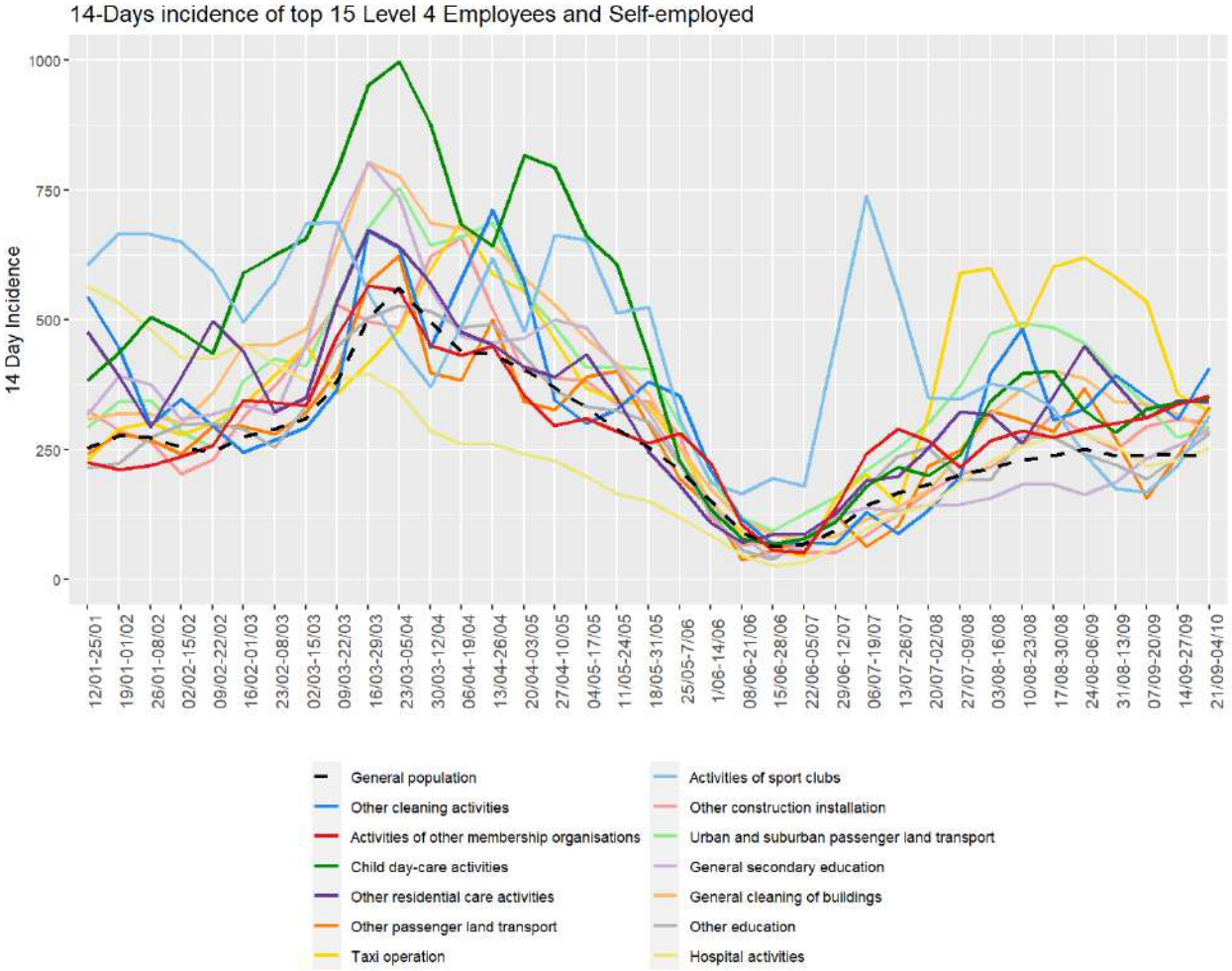


Table 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 on 4 October 2021

Table 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 on 4 October 2021

DESCRIPTION	NACE-code	Total number of workers	Incidence (95%CI) all workers	Incidence (95%CI) employees	Incidence (95%CI) self-employed	Percentage of self-employed workers
Other cleaning activities	8129	3186	408(237;701)	408(237;701)		29.76
Activities of other membership organisations n.e.c.	9499	27119	354(290;432)	373(302;461)	246(132;457)	15.10
Child day-care activities	8891	28653	349(287;424)	342(279;419)	448(224;893)	6.27
Other residential care activities	8790	16422	341(263;443)	341(261;445)		3.55
Other passenger land transport n.e.c.	4939	8408	333(230;482)	301(194;466)	453(227;903)	21.44
Taxi operation	4932	8978	323(225;464)	225(128;396)	466(290;748)	41.19
Activities of sport clubs	9312	11392	316(228;438)	395(271;575)	197(103;378)	40.35
Other construction installation	4329	15182	303(227;404)	257(164;403)	346(237;504)	51.48
Urban and suburban passenger land transport	4931	29592	294(238;363)	294(238;363)		2.77
General secondary education	8531	380903	288(271;306)	288(271;306)		0.17
General cleaning of buildings	8121	172598	281(257;307)	285(261;312)	157(79;314)	3.05
Other education n.e.c.	8559	36299	281(231;341)	295(233;373)	256(182;360)	35.84
Hospital activities	8610	215476	252(232;274)	252(232;274)		0.33
General population			**236**	**236**	**236**	
Working population		**4470982**	**224(220;228)**	**224(220;228)**		

3.5. Level 5 work sector

In the sectors at level 5 with a minimum of 3,000 workers, the sectors with the highest 14-day incidences on 4 October 2021 significantly higher than the working population average are: Youth work associations (sector 94991), General secondary and other education (sector 85311, 85599), Cleaning activities (sector 81290, 81210), Activities of football clubs (sector 93212), Nurseries and creches (sector 88911), Health care (sector 86904, 86909, 86101), Cargo handling (sector 52249), Other

construction installation (sector 43299), Passenger land transport (sector 49390, 49320, 49310), and Restaurants with limited service (sector 56102) (Table 5 and Figure 7).

Figure 7: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 5 in both employees and self-employed

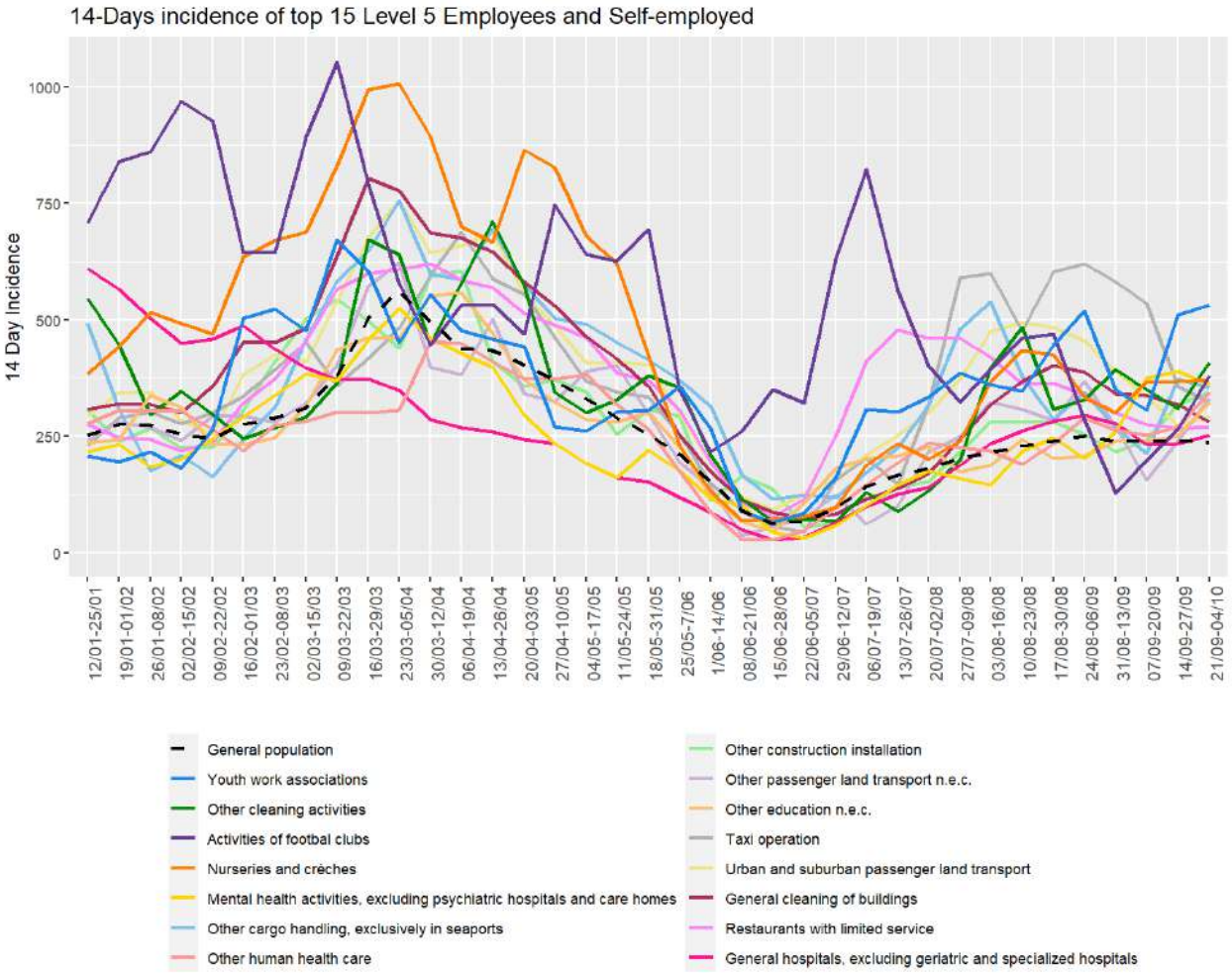


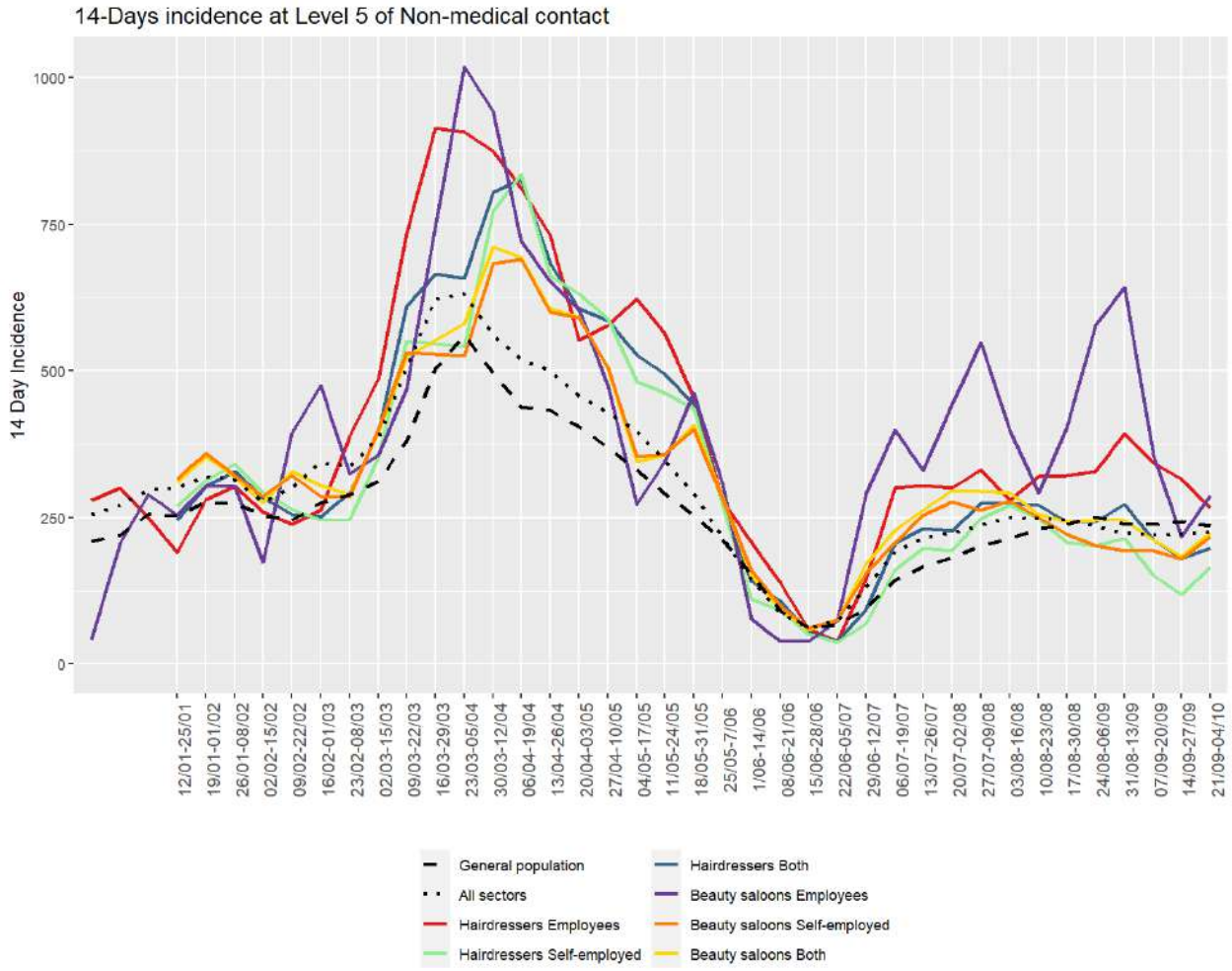
Table 5: 14-Day incidence of COVID-19 infection of sectors with the highest incidence at Level 5 on 4 October 2021

Table 5: 14-Day incidence of COVID-19 infection of sectors with the highest incidence at Level 5 on 4 October 2021

DESCRIPTION	NACE-code	Total number of workers	Incidence (95%CI) all workers	Incidence (95%CI) employees	Incidence (95%CI) self-employed	Percentage of self-employed workers
Youth work associations	94991	5075	532(365;775)	541(366;799)		8.92
General secondary education	85311	151163	430(398;464)	430(398;464)		0.01
Other cleaning activities	81290	3186	408(237;701)	408(237;701)	307(128;735)	29.76
Activities of footbal clubs	93121	5789	380(250;576)	478(309;740)	125(31;498)	27.98
Nurseries and crèches	88911	25269	372(304;455)	372(302;458)	372(167;826)	6.44
Mental health activities, excluding psychiatric hospitals and care homes	86904	6925	361(244;534)	365(207;642)	358(208;616)	53.44
Other cargo handling, exclusively in seaports	52249	9915	353(254;491)	361(258;505)		4.89
Other human health care	86909	11047	344(250;472)		320(228;450)	93.58
Other construction installation	43299	7849	344(236;501)	247(129;474)	429(270;680)	53.71
Other passenger land transport n.e.c.	49390	8408	333(230;482)	301(194;466)	453(227;903)	21.44
Other education n.e.c.	85599	13003	323(239;437)	462(283;753)	272(185;399)	73.50
Taxi operation	49320	8978	323(225;464)	225(128;396)	466(290;748)	41.19
Urban and suburban passenger land transport	49310	29592	294(238;363)	294(238;363)		2.77
General cleaning of buildings	81210	172598	281(257;307)	285(261;312)	157(79;314)	3.05
Restaurants with limited service	56102	96679	271(240;306)	280(244;321)	246(191;317)	25.48
General hospitals, excluding geriatric and specialized hospitals	86101	177778	252(230;276)	252(230;276)		0.26
General population			**236**	**236**	**236**	
Working population		**4470982**	**224(220;228)**	**224(220;228)**		

Finally, when considering specifically the non-medical contact professions, such as hairdressers and beauty salons, we see a higher incidence in non-medical contact professions employees compared to self-employed (Figure 8).

Figure 8: 14-Day incidence of COVID-19 infection at Level 5 of non-medical contact professions.



3.6. Additional analyses

3.6.1. Cross-level overview

When contemplating the 14-day incidences across NACE-BEL sectors, it is possible to gauge the contribution of each sub-level sector to the higher level incidence (Figure 9).

The 14-day incidence in the Education (sector P) is markedly elevated compared to the working and general population, mainly due to all levels of education, except for Higher education (sector 8554) (Figure 9).

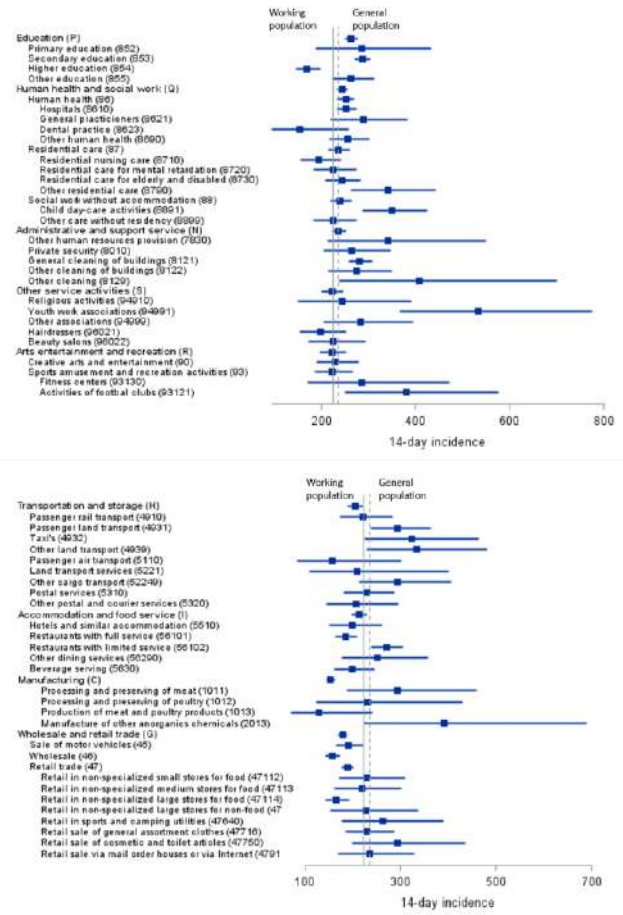
The incidence in the Human health and social work sector (sector Q) is increased compared to the working population average, but not to the general population average. Elevated incidences are present in Child day-care activities (sector 8891), Other residential care (sector 8790) and Hospitals (sector 8610) (Figure 9).

Although the 14-day incidence in Administrative and support service activities (sector N), Other service activities (sector S), Arts, entertainment and recreation (sector R) and Accommodation and food service activities (sector I) is around the working and general population average, individual subsectors show an increased incidence. General cleaning of buildings (sector 8121), Other cleaning (sector 8129), Youth work associations (sector 94991), Activities of football clubs (sector 93121) and Restaurants with limited service (sector 56102) show increased incidences compared to the general population.

The incidence in Transportation and storage (sector H) is significantly below the working population average, although all subsectors related to land transportation (sector 4931, 4932, 4939) have an incidence significantly above the working population average.

The sectors Manufacturing (sector C) and Wholesale and retail trade (sector G) are sectors with the highest number of sublevels. In all manufacturing sectors the incidence is below or close to the working and population average, except for the small sector of manufacture of anorganic chemicals (sector 2013). In all subsectors of Sale of motor vehicles (sector 45) Wholesale (sector 46) and Retail sale (sector 47), the incidence is similar or below the working population average (Figure 9).

Figure 9: Forest plot of 14-Day incidence and 95% CI of selected sectors on 4 October 2021 in both employees and self-employed.



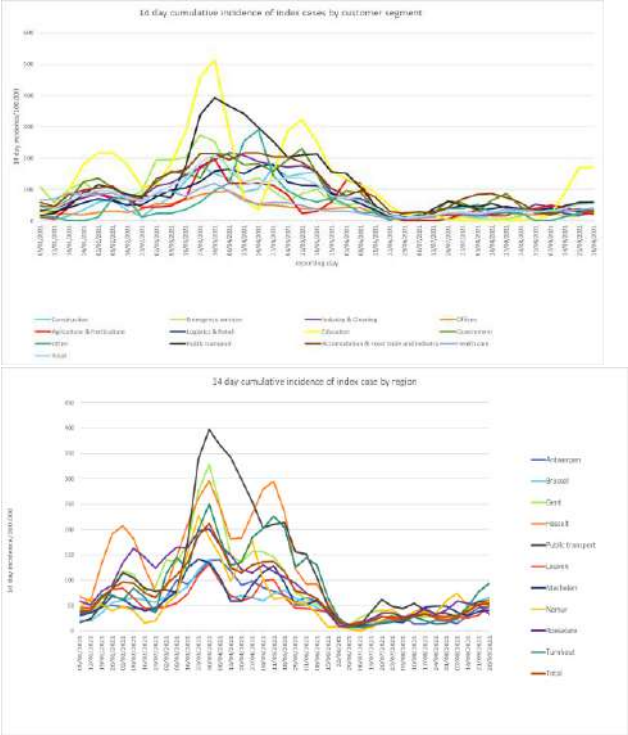
3.7. Contact tracing

In 2020-2021 about 800,000 employees are under medical surveillance of IDEWE. Among these, 21,475 COVID-19 index cases were registered between 22 July 2020 (week 30) and 30 September 2021, for whom the customer segment, region and the registration date are known for 21,195 index cases.

The 14-day incidence declined in all segments and regions since 11 May 2021 and reached the lowest point on 29 June 2021 of 10 cases per 100,000 employees (Figure 10). Between the third week of July and the end of August incidences stabilized around 28 per 100,000. Since the end of the summer holidays, incidence is rising again to 54 per 100,000 on 28th September. This increase is mostly due the education segment after reopening of schools. The incidence is highest in education (169 per 100,000). The region with the highest incidences are Turnhout (94 cases per 100,000). Note that two factors, mentioned above, may cause bias in the figures: employees of some large companies are not

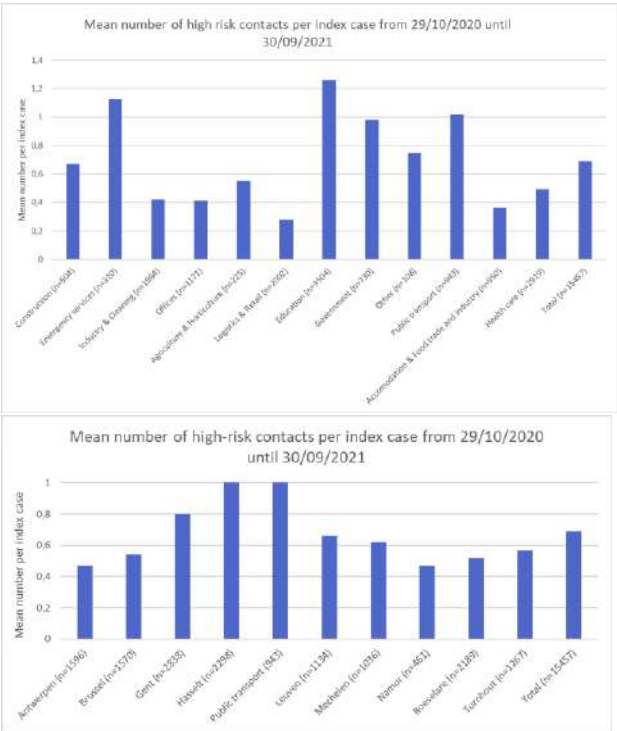
included and beside employees, external persons are also registered as an index case. Especially students and pupils may influence the figures of Education.

Figure 10: 14-Day incidence of index cases by segments under surveillance (left) and by region (right).



Since the establishment of the tracing app on 29 October 2020, there are 15,457 index cases of whom high-risk contacts were recorded. Of 15,330 index cases, the customer segment and region is known. The mean number of high-risk contacts in segment Education, Emergency services and Public Transport is above 1, while in the Hasselt region a higher mean number of high-risk contacts is reported in the period 29 October 2020-30 September 2021 (Figures 11).

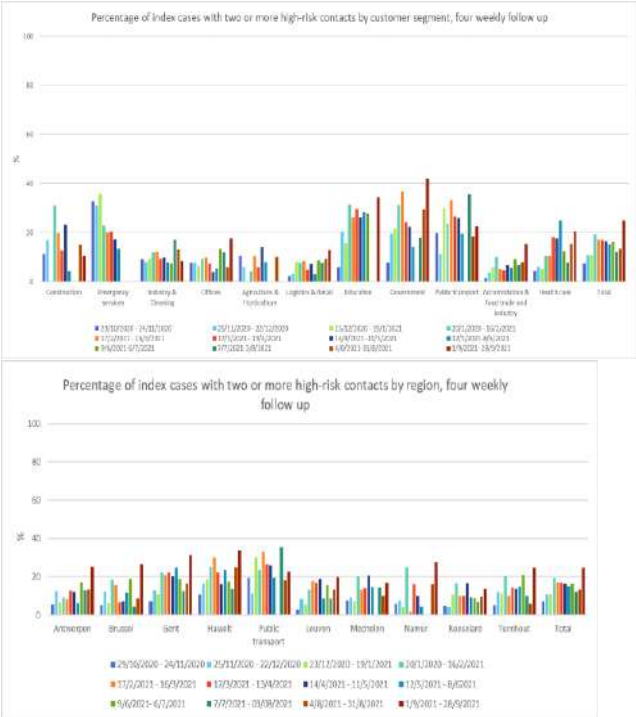
Figure 11: The mean number of high-risk contacts per index case by segments under surveillance (left) and by region (right)



The number of high-risk contacts per index case varies from 0 to 62, with more than 99% being lower than 10 high-risk contacts. Seventy-three percent had 0 high risk contacts. A sole high number of high-risk contact for an index will influence the mean number for a segment importantly, especially when groups are small. To avoid extremely high numbers of contacts influencing results, we report the percentage of index cases who had two of more high-risk contacts per four weeks.

The percentage of index cases with two or more high-risk contacts is increasing in all segments, except for Industry and cleaning, and in all regions in the most recent period (1{28 September 2021), reflecting the changed behavior on the work floor, after alleviation of mitigation measures (Figure 12).

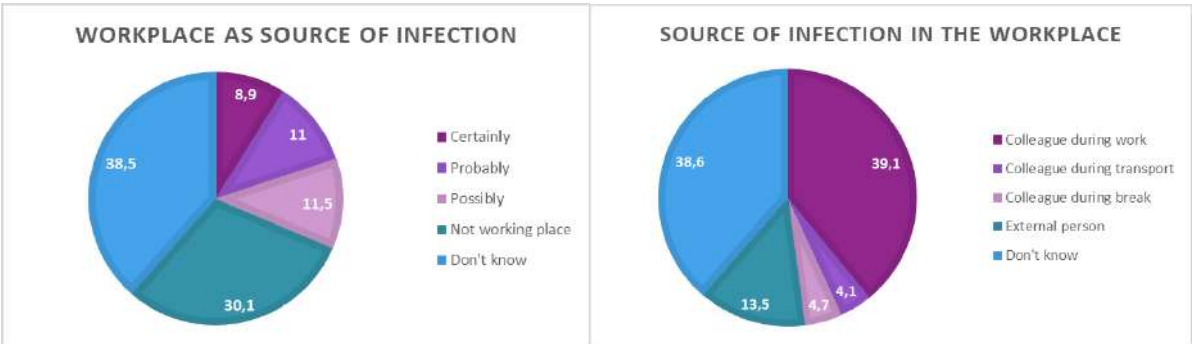
Figure 12: Four weekly percentage of index cases with two or more high-risk contacts by segments under surveillance (left) and by region (right)



Since 11 March 2021, index cases are asked if they contracted COVID-19 during work and if they did, which were the circumstances or the source of the infection. Note that pupils and other external index cases were left out of the following analyses.

From 6,966 index cases, we have information about perceived work relatedness of the source of infection. While 39% of the index cases does not know whether the infection took place at work, 20% responded that they were certainly or probably infected at work (Figure 13 left). From 2,188 (31%) of the index cases that answered they were certainly, probably, or possibly infected at work, further information was obtained on how the infection took place (Figure 13 right). A majority of the index cases (61%) indicates to know the source of infection at work.

Figure 13: Four weekly percentage of index cases with two or more high-risk contacts by segments under surveillance (left) and by region (right)

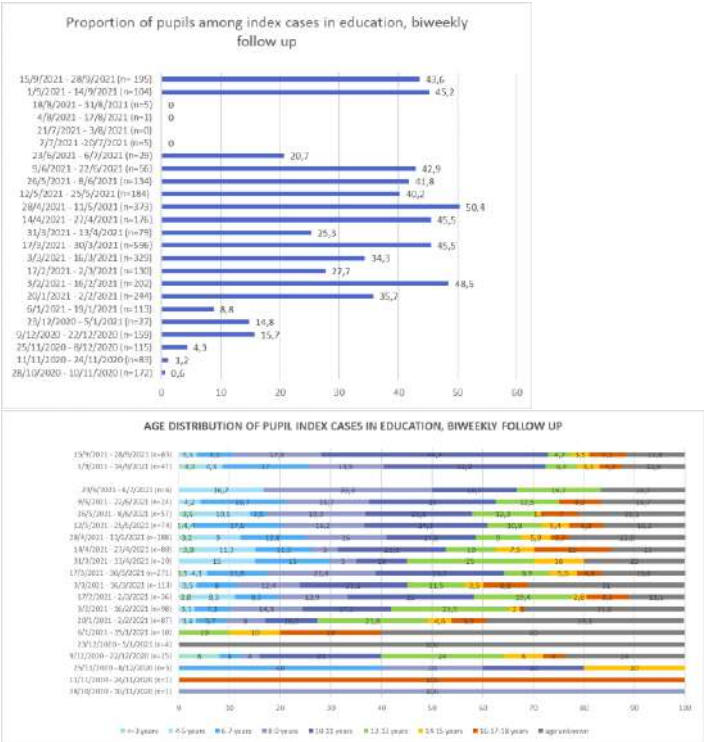


After the decline to zero of the pupil index cases in education during the summer holidays 2021, there is again 44% of the cases in the education segment attributable to pupils since the reopening of primary and secondary education on September 1st (Figure 14 left). The interpretation of these data should be undertaken, however, with caution. Index cases in schools, both pupils and teachers, are reported to IDEWE by CLBs and schools in order to reach high-risk contacts among teachers and provide them with prescriptions for PCR tests and quarantine. The working method is, however, not the same for all CLBs

and schools and therefore notification of index cases may differ between CLBs and regions. Moreover, index cases with only low risk contacts are often not reported to our service, because they do not need prescriptions for tests or quarantine. This might lead to an underestimation of index cases among pupils and teachers. Note that pupils are tested on a larger scale since January 2021.

Since the tracing app came in use, the social security number of most index cases is registered. Age is calculated from the social security number and is available for most index cases. In contrast to the previous school year 2020, the majority of the index cases (almost 75%) in September 2021 is aged under 12 years (Figure 14 right). Note that some type of schools might be over- or underrepresented in comparison to the Belgian school landscape, as a result of which the proportion of age groups might not be representative for the Belgian school population. Before 20 January 2021, biweekly numbers of cases are too small to allow for an interpretation, as well as the period 31 March{13 April 2021 and 9 June-6 July 2021.

Figure 14: The evolution of index cases of pupils in school (left) and their age distribution (right).



Since 7 June 2021, the vaccination status of index cases is registered, with the type of vaccine if applicable. The vaccination dates are retrieved from vaccinnet to evaluate if a person can be considered fully protected. Because only the date of the notication of the index case is available and not the date of a positive PCR test, index cases are considered fully protected if the second dose (or the only dose in case of the Johnson and Johnson vaccine) is administered 3 weeks or more before the date of notification. The assumption is made that the latency between a positive PCR test and the registration via the contact tracing app is maximally 1 week.

From 1,752 adult index cases we had information about their vaccination status: 1,120 were partially or completely vaccinated (766 Cominarty, 213 Vaxzevria, 68 Moderna and 73 Johnson % Johnson) (Figure 15 left). With a vaccination coverage in the working population of 85% on 29 September 2021 (Figure 15 right, data derived from Sciensano), it is important to evaluate these breakthrough index cases. The mean time between notification of infection and the second vaccine dose (or the only dose in case of Johnson & Johnson) for the breakthrough cases was was 91.9 days (SD 53), minimum 15

days, maximum 234 days. The index cases who are fully vaccinated are the largest proportion in the last weeks (Figure 16 left). The vaccine effectiveness (VE) in fully vaccinated and protected workers is estimated using the screening method (see Giesecke: Modern infectious disease epidemiology):

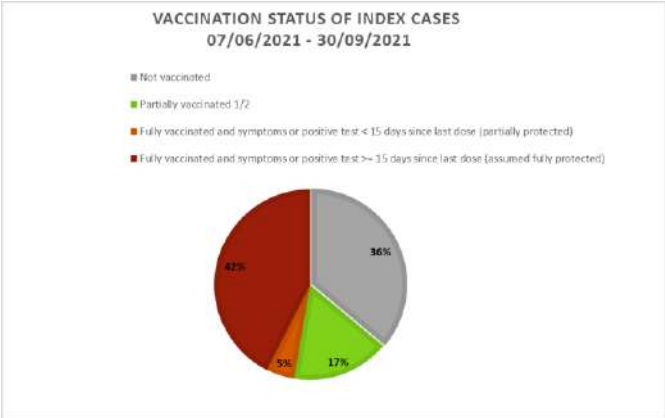
$$
\begin{aligned}
VE &= \frac{(PPV - PCV)}{(PPV(1 - PCV))} \\
&= \frac{0,83 - 0,74}{0,83(1 - 0,74)} \\
&= 0,41
\end{aligned}
$$

with PPV= the proportion of the entire population vaccinated and PCV= the proportion of cases that have been vaccinated.

Note that this result and the biweekly evolution (Figure 16 right) should be interpreted with caution.

Partially vaccinated and partially protected workers are not taken into account in this calculation nor is the rapidly changing vaccination coverage of the population. This method is not recommended by the WHO in the early stages of vaccine roll-out. Moreover, the IDEWE contact tracing covers a relative larger proportion of employees in Flanders, where the vaccinated proportion is larger compared to the vaccination rate overall in Belgium. Taking the vaccination rate in Flanders (89%), rather than the vaccination rate in Belgium, the VE is 66%.

Figure 15: Distribution of the probability of vaccination in the general population (right) and the vaccination status of index cases (left).



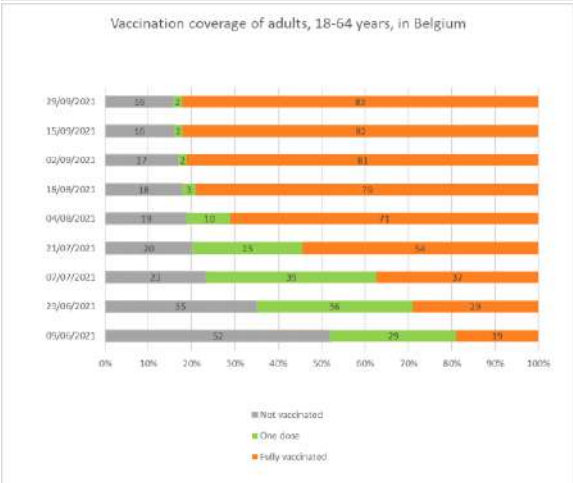
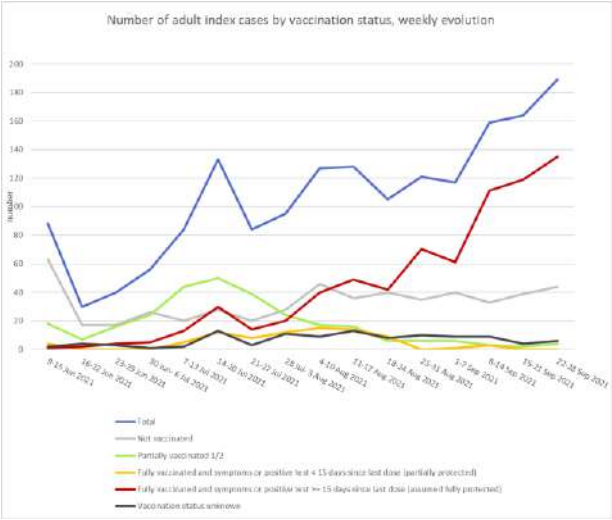
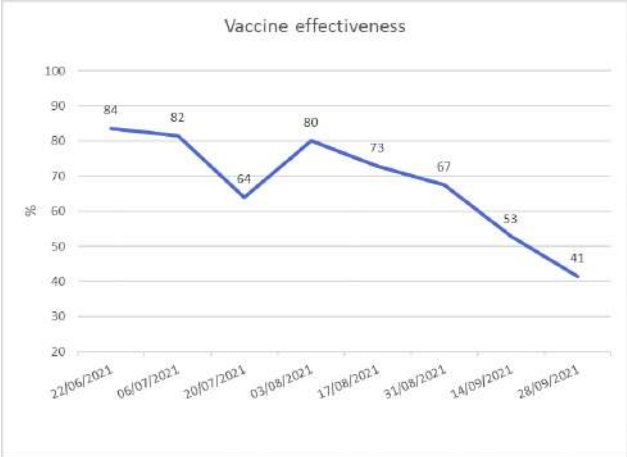


Figure 16: The weekly evolution of index cases and their vaccination status (left) and the vaccine effectiveness (right).





4. Conclusion

Despite the limitations of the data, both the contact tracing as the RSZ/ONSS data demonstrates that the increase of the 14-day COVID-19 incidences in the summer 2021 is reaching a plateau in most sectors, except in education. The incidence in the general population is still higher than to the incidence in the working population, indicating towards an increased proportion of incidences is coming from children. Vigilance is required in sectors with close contact to young children, and in those sectors where workers are exposed to high-risk close physical proximity, and where climate conditions are difficult to control.

Although no conclusions can be drawn regarding the location of infection (workplace or elsewhere) nor the location of employment (at work, telework, or temporarily unemployed) of the employees in the RSZ/ONSS data, the contact tracing in the segments under surveillance by IDEWE shows that in the index cases, where this information was available, 9% indicated that the workplace was certainly the source of infection.

It is clear that in most sectors at level 1 the 14-day incidence follows the pattern that is observed in the general population, except education, where incidences linearly increase. The contact tracing also shows a sharp increase in incidences in the education segment since the start of the school year.

With an increased circulation of the delta variant of concern of SARS-CoV-2, it is important to carefully monitor incidence of COVID-19 in the sectors with multiple close physical proximity, especially with younger, not yet vaccinated individuals. Youth work associations, Primary, secondary and other education, Nurseries and creches, Health and care sectors and Passenger land transport for example all show higher incidences and require careful attention. Especially in the context of increased high-risk contacts, as shown by the contact tracing.

Hygiene protocols in Arts, entertainment and recreation (sector R) and Accomodation and food service (sector I), require continuous vigilance, as subsectors such as Football club activities and Restaurants with limited service show high incidences.

For some sectors the reason for the higher incidences is not immediately obvious, such as Cleaning. It would be worthwhile to evaluate the hygiene protocols and its practice in these sectors.

Although the incidence in non-medical contact professionals is comparable to the working and general population average, the incidence in employees in non-medical contact professions show a clear increased incidence compared to the self-employed professionals.

It is encouraging to note that employees in all manufacturing, retail and wholesale sectors are well protected, as they are often not able to telework.

Finally, despite the high degree of vaccination, COVID-19 infection remains possible. Contact tracing data show that almost half (47%) of employees with a positive PCR-test were fully vaccinated. The vaccine effectiveness against infection (41% in the IDEWE contact tracing data) is in line with recent information of a decline of protection against infection by a half, 5 months after vaccination. Although protection against hospitalization remains high (93%) 6 months after vaccination, continuous monitoring of breakthrough infections and their clinical severity is warranted.

Acknowledgments

We wish to thank Hilde Vanacker, Chris Verbeek and Hilde de Raeve for their contribution to the analysis of the contact tracing data.

- **Annex 4. Mental Health of Belgian Population: update 11/10/2021**

Table of content

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- **Background**

In The Mental Assessment Group report, we describe the current mental health state of the Belgian population through a short description of the results and conclusions of studies and reports. We have compiled the findings according to mental health indicators (well-being, use of medication, consumption of psychological and psychiatric care and data on sickness absence, unemployment…) and per age- or specific group, as available. The report is updated on a regular basis. These results are being used by the GEMS members in the advice they produce, in which key findings concerning the motivation and mental health problems are summarized.

The latest version of this document only includes studies that have had a recent update. For other studies and their results we advise you to check the earlier versions of this report. If you dispose of good quality Belgian data and would like to contribute to this report, we invite you to send a short abstract of your study, together with some figures, to prof. Lode Godderis (lode.godderis@kuleuven.be).

- **Executive summary**

During the COVID-19 crisis our mental wellbeing was under pressure, particularly for younger people. In September 2021, based on available data, the mental health of the population seems to be evolving positively. Indeed, the results of the Motivation Barometer and the Great Corona Study show that our motivation is rising again and that our mental health (measured with GHQ-12) is again at the same level as before the COVID-19 crisis. It is to be acknowledged however that these results concern self-selected participants. Therefore, some vulnerable groups may be under-represented. However, good data on vulnerable groups are lacking, so we need to rely on expert opinions and testimonies for these groups.

When looking at the working population, data of Group Idewe show that there is no clear impact of the crisis on the satisfaction and intention to stay of Belgian employees. However, there seems to be a small increase in risk of burnout, but these results need to be interpreted with caution as the data are not representative.

Regarding the psychological well-being of health care workers, especially nurses in ICU, the evidence of their being at risk of exhaustion and moral distress was well documented in 2020[4], yet follow-up studies are lacking. On the other hand, the psychological well-being of mental and social health workers remains an under investigated issue. In terms of their sickness absence, the situation seems to be improving.

Data regarding (un)employment of Steunpunt Werk show that the use of the simplified procedure for temporary unemployment has known a clear decrease compared to last year, but the number of

[4] Bruyneel, Arnaud ; Smith, Pierre. Comparison of the prevalence of burnout risk between ICU and non-ICU nurses during the COVID-19 outbreak in French-speaking Belgium. Intensive & critical care nursing, 66, p. 103086 (2021). doi:10.1016/j.iccn.2021.103086.

Butera S, Brasseur N, Filion N, Bruyneel A, & Smith P. Prevalence and associated factors of burnout risk among intensive care and emergency nurses before and during the COVID-19 pandemic: A cross-sectional study in Belgium. Journal of Emergency Nursing, Published: September 02, 2021. DOI:https://doi.org/10.1016/j.jen.2021.08.007

Tiete J, Guatteri M, Lachaux A, et al. Mental Health Outcomes in Healthcare Workers in COVID-19 and Non-COVID-19 Care Units: A Cross-Sectional Survey in Belgium. *Front Psychol*. 2021;11:612241. Published 2021 Jan 5. doi:10.3389/fpsyg.2020.612241

Eveline Van Steenkiste, Jessie Schoofs, Shauni Gilis & Peter Messiaen (2021) Mental health impact of COVID-19 in frontline healthcare workers in a Belgian Tertiary care hospital: a prospective longitudinal study, Acta Clinica Belgica, DOI: 10.1080/17843286.2021.1903660

temporary unemployed is still three times as high as before the crisis. Furthermore, the labour market is under pressure: there are fewer unemployed jobseekers than last year, and the number of vacancies is at an all-time high.

On a larger, worldwide level, OECD urges to respond effectively to the impact of the COVID-19 crisis on population mental health, integrated and cross-sectoral policies to improve mental health support are needed. A recent article published by The Lancet supports these findings and states that taking no action to address the burden of major depressive disorder and anxiety disorders should not be an option.

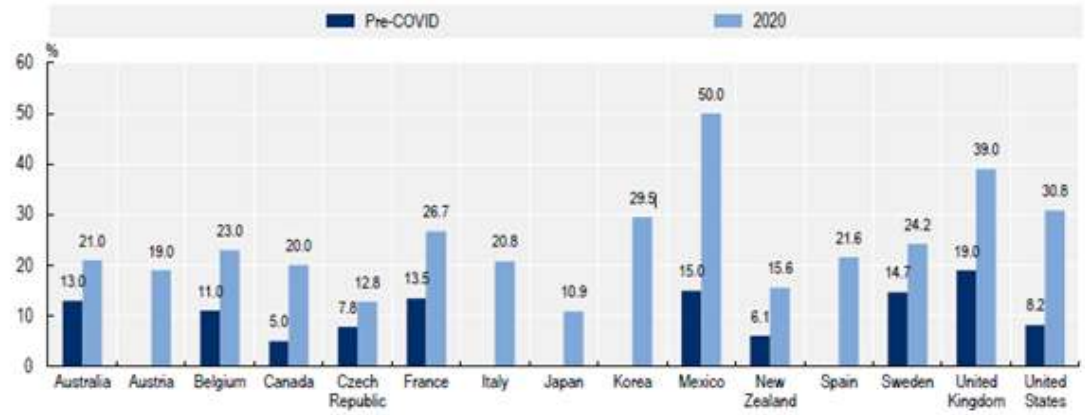
Well-being

1. Mental Health Impact of COVID-19

In May 2021, the Organisation for Economic Co-operation and Development (OECD) published a report about the mental health impact of the COVID-19 crisis[5]. The mental health of the population has worsened significantly during the pandemic. From March 2020 onwards, the prevalence of anxiety and depression has increased significantly (see figures 1 and 2). Periods when the highest rates of mental distress were reported correlated with periods of intensifying COVID-19 deaths and strict confinement measures.

Figure 1: Prevalence of anxiety increased significantly in 2020

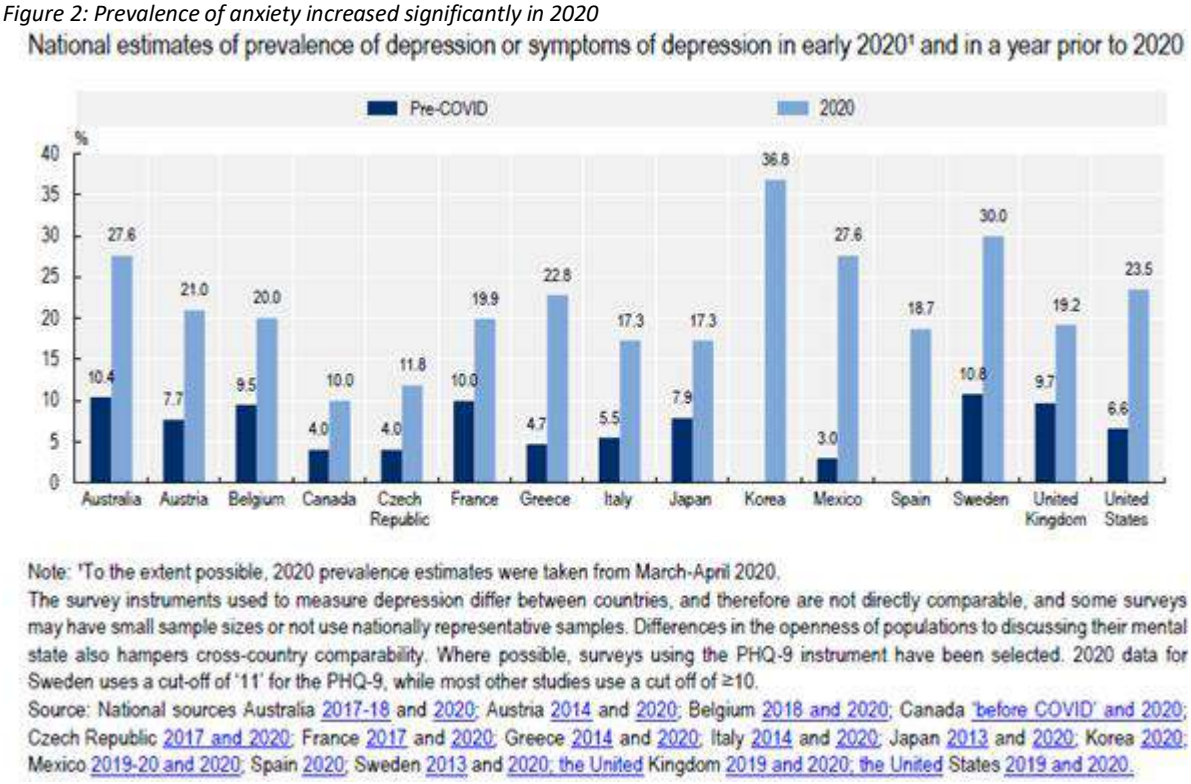
National estimates of prevalence of anxiety or symptoms of anxiety in early 2020[1] and in a year prior to 2020



Note: [1]To the extent possible, 2020 prevalence estimates were taken from March-April 2020.
The survey instruments used to measure anxiety and population samples differ between countries, and therefore are not directly comparable, and some surveys may have small sample sizes and/or not use nationally representative samples. Differences in the openness of populations to discussing their mental state also hampers cross-country comparability. Where possible, surveys using the GAD-7 instrument have been selected. 2013 data for Sweden uses a cut-off of '8' for the GAD-7, while most other studies use a cut off of ≥10.
Source: National sources: Australia 2017-18 and 2020; Austria 2020; Belgium 2018 and 2020; Canada 'before COVID' and 2020; Czech Republic 2017 and 2020; France 2017 and 2020; Italy 2020; Japan 2020; Korea 2020; Mexico 2019-20 and 2020; New Zealand 2016-17 and 2020; Spain 2020; Sweden 2013 and 2020; the United Kingdom 2019 and 2020; the United States 2019 and 2020.

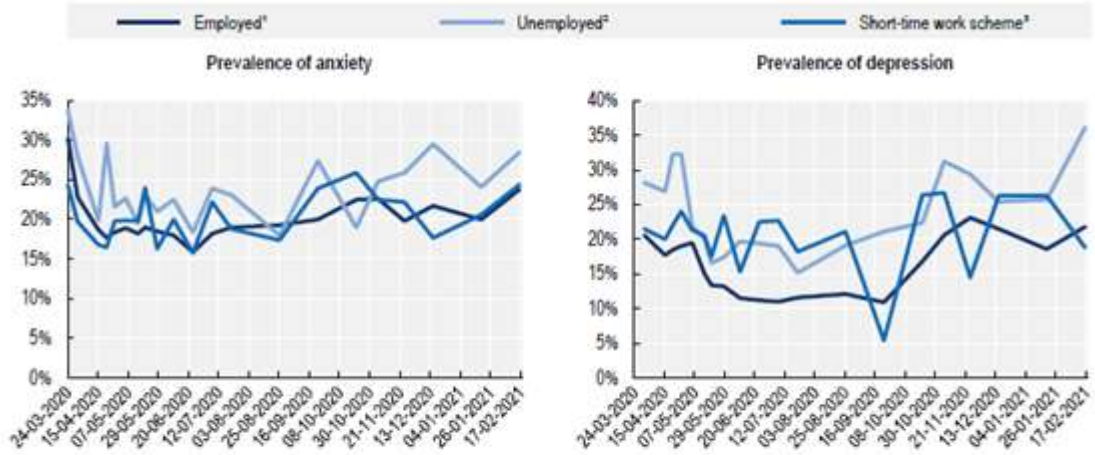
[5] OECD Policy Responses to Coronavirus (COVID-19). Tackling the mental health impact of the COVID-19 crisis: An integrated, whole-of-society response. 12 May 2021. Retrieved from: https://www.oecd.org/coronavirus/policy-responses/tackling-the-mental-health-impact-of-the-covid-19-crisis-an-integrated-whole-of-society-response-0ccafa0b/#:~:text=The%20COVID%E2%80%9119%20crisis%20has,to%20health%20services%20%E2%80%93%20fell%20dramatically

Figure 2: Prevalence of anxiety increased significantly in 2020



During 2020, the risk factors for poor mental health – financial insecurity, unemployment, fear – increased, while protective factors – social connection, employment and educational engagement, access to physical exercise, daily routine, access to health services – decreased. Across countries, the mental health of unemployed people and those experiencing financial insecurity was worse than that of the general - a trend that pre-dates the pandemic but seems to have accelerated in some cases (see figure 3).

Figure 3: Anxiety and depression are more prevalent among the unemployed in France



To respond effectively to the impact of the COVID-19 crisis on population mental health, integrated and cross-sectoral policies to improve mental health support are needed. OECD therefore proposes to assure access to existing mental health services either in-person or via telemedicine, or both, and to increase access to evidence-based services, including alternatives to mental health promotion

programs in schools or workplaces. Employers must contribute to supporting the mental health of employees, including those who have been on job retention schemes. Policy makers should look further at the implications of long-term teleworking on mental health, and countries should consider scaling-up mental health support for jobseekers through public employment services.

These findings and recommendations are further supported by a recent article published by The Lancet[6]. The authors conducted a systematic review of 5683 unique data sources reporting on the prevalence of major depressive disorder and anxiety disorders during the pandemic. 48 data sources met inclusion criteria. Two COVID-19 impact indicators were found to be associated with increased prevalence of major depressive disorder and anxiety disorders: daily COVID-19 infection rates and reductions in human mobility. Females and younger age groups were more affected by the pandemic than males and older age groups.

The authors conclude that the pandemic has created an increased urgency to strengthen mental health systems in most countries. Mitigation strategies could incorporate ways to promote mental wellbeing and target determinants of poor mental health and interventions to treat those with a mental disorder. Taking no action to address the burden of major depressive disorder and anxiety disorders should not be an option.

2. Children and adolescents

2.1. Youth aid

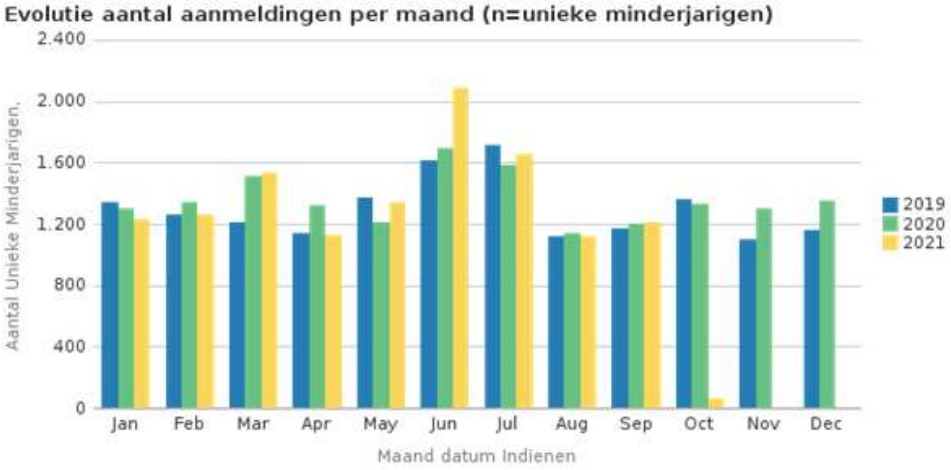
The Flemish agency "Opgroeien"[7] (growing up) is a Flemish organization that consist of "Kind en Gezin" (child and family), "Jongerenwelzijn" (youth welfare) and part of "Vlaams Agentschap voor Personen met een Handicap" (Flemish agency for persons with disabilities). They provide advice, support, guidance, shelter or help for children and young adolescent while growing up. Every month they update the number of applications for crisis youth aid, youth support centers and other youth aid services.

When looking at the number of requests for not directly accessible youth aid (for which an application procedure through the government is necessary), there was no visible impact of COVID-19. In March 2020 and March 2021 there was a noticeable peek in applications. Also in June 2021 there are a lot more applications than in 2020 and 2019.

[6] Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. Published online October 8, 2021 ttps://doi.org/10.1016/S0140-6736(21)02143-7

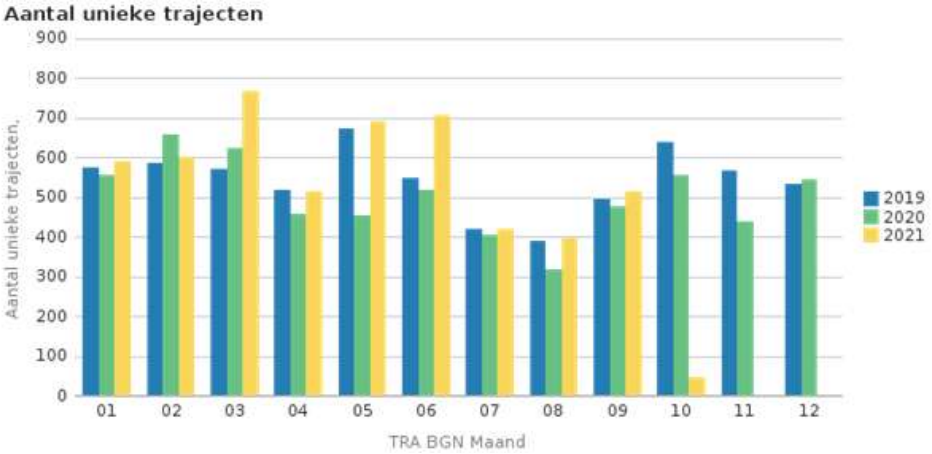
[7] https://www.opgroeien.be/

Figure 4: Number of applications for not directly accessible youth aid (note: numbers of 10/21 not complete)



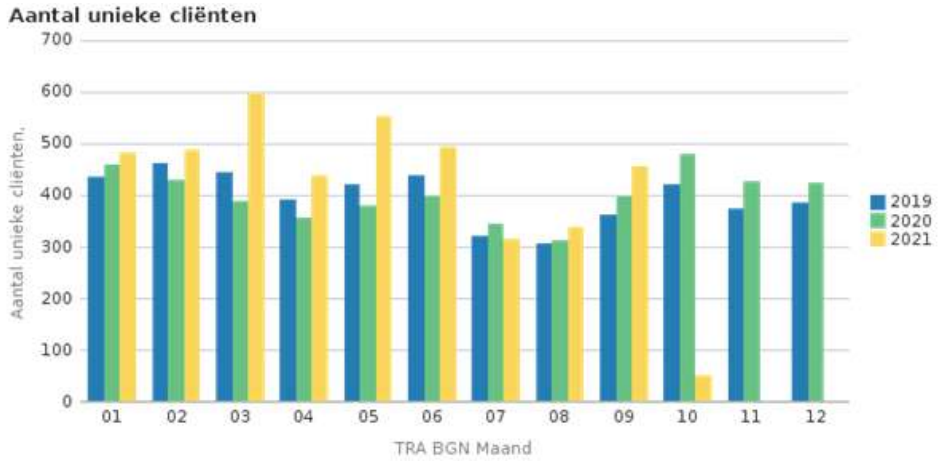
One of the steps in youth aid is crisis youth support for children, young adolescents, and their families when in crisis and urgent care is needed. The dispatch for crisis situations has been receiving more questions every month, and even more so since the beginning over the COVID-19 crisis. The dispatch center first looks for a solution within the environment of the minor. If this is not possible, the dispatch center decides to provide a consult. The number of consults has known a steep rise in 2021, with a record of 756 consults in March 2021. In April 2021 and May 2021, the numbers were around the same level as in 2019, but are still higher than 2020. In June 2021, the numbers are higher than in 2019 and 2020. From July 2021 on, the numbers stabilized to the levels of previous years. September 2021 was again busier, after the summer holidays, but the numbers follow the same pattern as previous years. Within a consult, it is estimated if the situation needs further (crisis) youth support, mental health care support or both.

Figure 5: Number of provided consults after demand for crisis support at the dispatch center (note: numbers of 10/21 not complete).



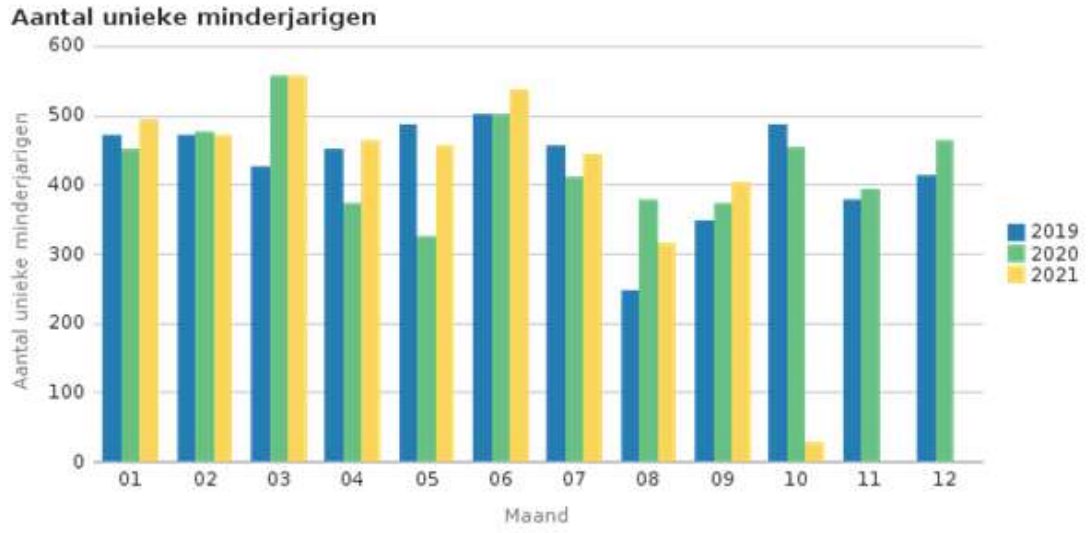
When looking at the number of demands for crisis support where it was decided that crisis youth aid was necessary, there has been a record in applications. Even before the COVID-19 crisis began there were many applications, but since March 2021 the applications have never been higher, with in March an all-time high of 588 unique minors that were referred to crisis youth aid. Most cases are about mental health problems, with a lot of questions about suicide. Especially complex situations that have been difficult for a while, seemed to go into crisis. In July and August 2021 the numbers stabilized, but seem to be rising again in September 2021.

Figure 6: Number of unique minors who are being referred to crisis youth aid every month. (note: numbers of 10/21 not complete)



When voluntary support is difficult or not possible, youth support centers can provide care for children, young adolescents, and their parents. With regard to the number of minors who applied for help at one of the youth support centers, in March 2021 they noted the second highest number of applications ever (512 unique minors). Only in March 2020, right before the start of the COVID-19 crisis there was a higher number (556 unique minors). Since April 2021 the numbers seem to stabilize again to the numbers of 2019, but there are some regional differences. Since September 2021 the numbers are again higher than previous years (especially for the regions of East-Flanders and Limburg).

Figure 7: Number of unique trajectories for minors for whom an application was made for support at a youth support center every month. (note: numbers of 10/21 not complete)



- 2.2. Child psychiatry

In Brussels and Wallonia, according to Dr Sophie Maes (personal communication to the authors), who had alerted at the end of 2020-early 2021 about the risk that the sector of child psychiatry was getting saturated, with presentations of severe disorders in adolescents with or without pre-existing conditions, the situation is getting very tensed again, with inpatient facilities having filled up more quickly this year than in normal times, one week after the start of school.

Clinicians have encountered many requests for hospitalization in crisis beds following suicide attempts by adolescents. Half of these young people had not had any previous psychiatric care but had started their follow-up between January and May of the previous academic year (2020). The summer break

and clinical follow-up were not enough to prevent decompensation for some when school resumed. Paradoxically, in some schools were more social and playful activities were introduced at the beginning of the year to help students connect with one another before the start of the year, situations of adolescents committing suicide at school or during school-trips were encountered. Real mental health promotion programmes at school seem still to be lacking, even if some initiatives do exist, yet not school-based[8].

According to the narratives of the young people encountered in psychiatric services, says Dr Sophie Maes, the welcome speech centered on vaccination in the Brussels schools was sometimes perceived as guilt-inducing and worrying, with adults failing to install a dialogue around the psychological suffering of the young people. Thus, the real psychological needs of children and adolescents, are still not sufficiently taken into account, according to this child and adolescent health specialist. Although the sector has encountered requests for more traditional hospitalization, i.e. not for crisis beds, in the last few days, the situation in the network remains very tense, as some services such as residences, SAJ, SPJ are fully functional again, and also in demand for care which the psychiatric services fail to be able to fully address, leading to a saturation of child psychiatric consultations, with requests for hospitalization in the absence of sufficient outpatient follow-up as a consequence. In addition, requests to SOS-enfants have been sustained throughout the summer, with seemingly more requests for situations concerning newborns, probably due to a lack of professional supervision during the pandemic.

As acknowledged in our executive summary, in the absence of statistics, testimonies of experts in the field need to be taken into account in order to get a broader picture.

■ 2.3. Eating disorders

In Flanders, the knowledge center for eating disorders (Kenniscentrum Eetexpert[9]) provides residential and outpatient care. Their first goal is early detection, prevention, and guidance to specialized care if necessary. In Flanders, there are five specialized residential eating disorder-teams, from which two focus on adolescents younger than 15. There are approximately 80 beds, combined with (daytime) therapy and specialized outpatient programmes.

In October 2021, 'post'-COVID-19, the waiting lists for admission in residential care are four times as high as before COVID-19. Most patients have to wait two to four months for an intake, and five to eight months for admission. Some centers even decided to stop intakes (temporarily) until the waiting lists get shorter. For both younger patients (-15y) and patients older than 15 there is a capacity- and intensity problem.

Due to the increased need for care in COVID-times, the ambulant network also has a capacity problem. Kenniscentrum Eetexpert is therefore working on a capacity expansion both for specialized dieticians as for psychologists. The acute problem, however, is the lack of possibilities to refer to residential care. Therefore, to keep the ambulant network operational, Kenniscentrum Eetexpert urges to ensure additional support from centers for mental health care and to create a buffer in the residential care through rapid short-term admission capacity and daycare services for patients and their parents.

3. Motivation barometer

Since the beginning of the lockdown, the well-being and motivation of the population has been ongoingly monitored within the motivation barometer. Across 91 waves (latest update 01-10.10.2021),

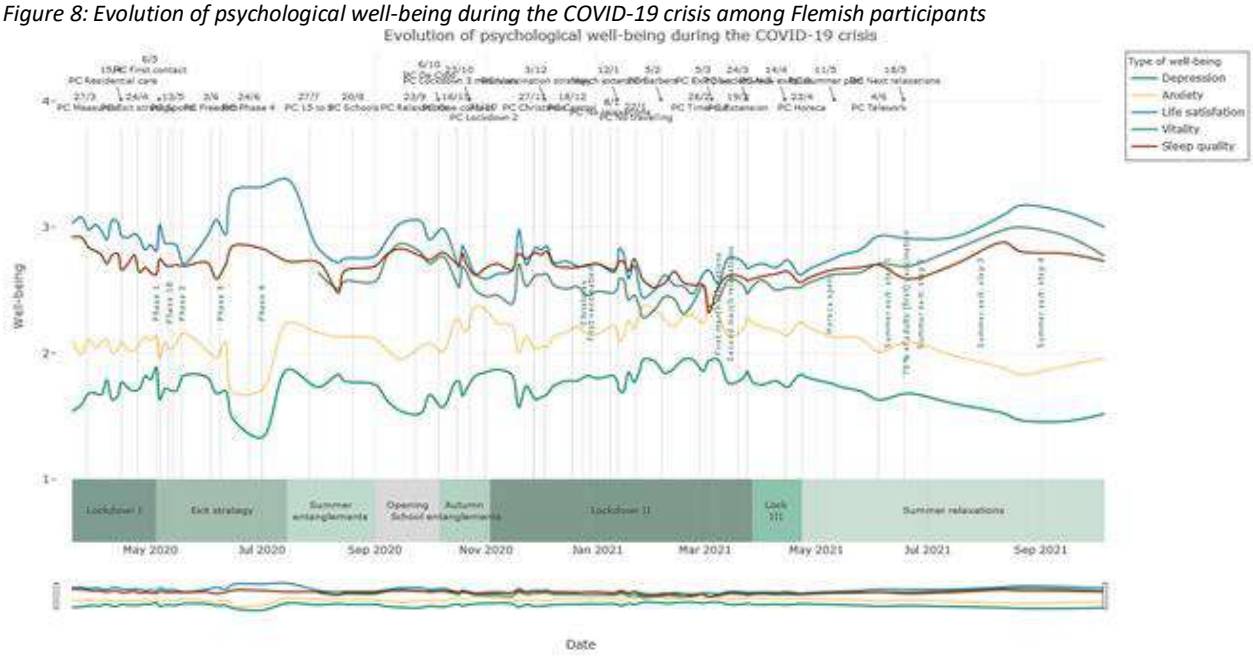
[8] See for instance https://www.home-stress-home.com/.

[9] Author : An Vandeputte, Kenniscentrum Eetexpert.be vzw

more than 300.000 individuals from varying age groups have filled in a brief on-line questionnaire. The latest wave was gathered early October (N = 4144) completed the questionnaire and yielded a mix of participants coming from different regions (66.39% from Flanders; 33.61% from Wallonia; 19% unvaccinated persons).

Figure 8 presents a graphic overview of five well-being indicators (i.e., vitality, life satisfaction, sleep quality, depressive complaints, symptoms of anxiety) that have been monitored among Flemish participants since the beginning of the crisis. As can be noticed, there has been a steady increase in well-being since the measures were relaxed before the summer, with this increase levelling off in September-October and well-being even slightly decreasing. After controlling for various socio demographic covariates, a systematic effect of age, gender, and co-morbidity was observed, with younger individuals, females, and individuals with co-morbidity being more vulnerable for poorer well-being.

Figure 8: Evolution of psychological well-being during the COVID-19 crisis among Flemish participants



Although vaccination status yielded no systematic relation with well-being, it yielded a clear, yet differential effect on different critical resources of well-being, a finding observed mixed samples of French- and Dutch-speaking participants. As can be noticed in Figures 9 and 10, unvaccinated persons and in particular those who were covid-infected before, report less insecurity to be infected (figure 9), yet they experience also lower autonomy (figure 10) and relatedness need satisfaction compared to vaccinated persons. Said differently, vaccinated persons are enjoying more the freedom that is afforded to them, which likely explains their felt connection with others; yet, they also stay vigilant and concerned to be infected as they perceive higher risks.

Figure 9: Evolution in concerns regarding own health among (un)vaccinated persons

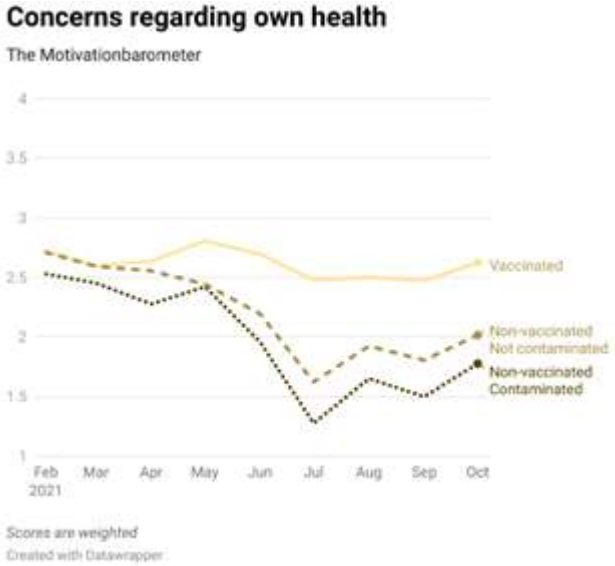
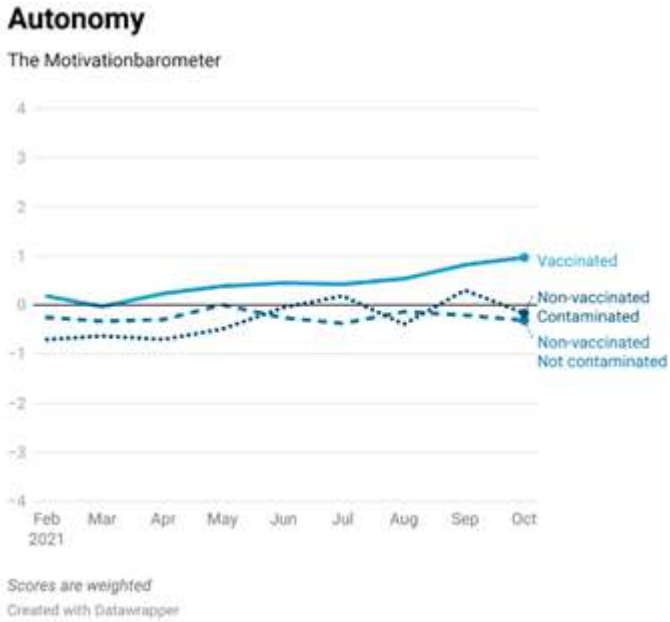


Figure 10: Evolution in autonomy among (un)vaccinated persons



Parallelling these differences in perceived risks and concerns, vaccinated persons stay more motivated to adhere to the measures nowadays. The motivational gap which has been observed between vaccinated and unvaccinated persons is still present today, with unvaccinated persons being less autonomously motivated to stick to the measures and also reporting being less adherent (figures 11 and 12), an effect that was observed for the three assessed sanitary measures (i.e., keeping distance; disinfecting hands; face covering). The adherence gap has been somewhat reduced, with unvaccinated persons especially disinfecting their hands more than before.

Figure 11: Evolution in autonomous motivation among (un)vaccinated persons

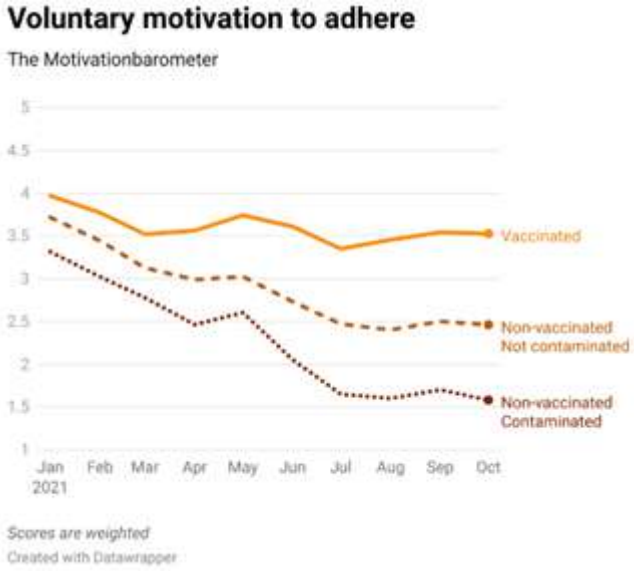
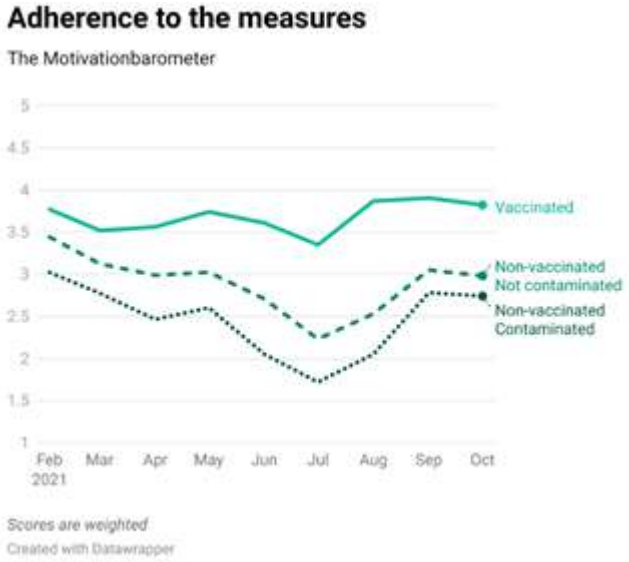


Figure 12: Evolution in adherence to the measures among (un)vaccinated persons



4. Great Corona Study

The Great Corona Study[10,11] (GCS) has been monitoring the Belgian population since 17th March 2020 over 43 waves so far, interspaced one, two or four weeks apart. This web-based survey, which has a citizen science anonymous voluntary design is administered in four languages (NL, FR, DE, EN) on PC, tablet and smartphone and has been taken over 3 million times to date. The first wave attracted over 560,000 respondents, the last wave about 12,000. The survey was predictive of the incidence of detected infections in Belgium[12].

The GCS also showed that age (like in the Motivation Barometer) has an important impact on the evolution of mental wellbeing. At the extremes they found students consistently at the worst end, and retired persons at the best end of the scale.

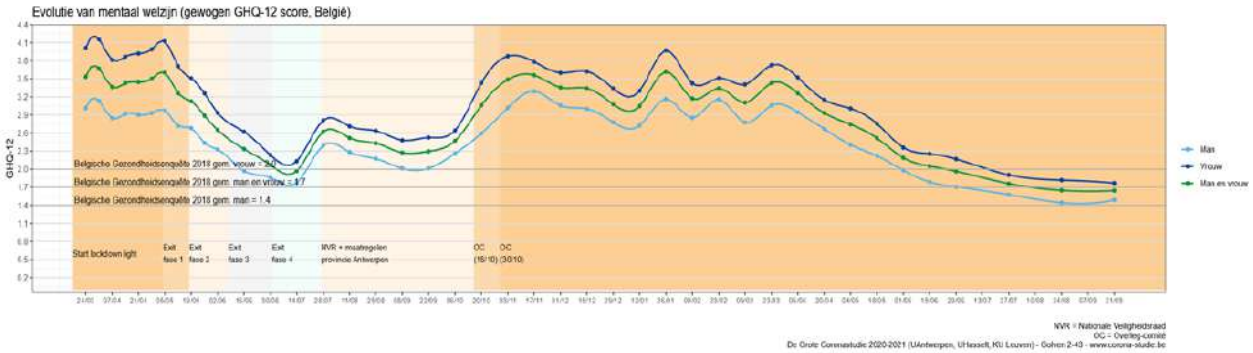
The GCS monitored the mental health of the Belgian population as measured by the General Health Questionnaire (12 item scale; GHQ-12). Positive news in terms of mental well-being: since the end of March, the curve has been moving in the right direction. We feel better, even though young people in particular remained for a long period at a worse level. Perhaps not unexpectedly: vaccinated respondents tended to feel better, and overall mental well being improved with vaccination coverage and over the summer holidays, to the extent that the GHQ-12 is now at the same level as it was before the crisis (2018) (figure 13). There is currently not a single sector of activity that has a markedly worse evolution than other sectors, although there was a very slight worsening for people employed in education and health care, that is not apparent for other sectors (figure 14).

[10] www.corona-studie.be

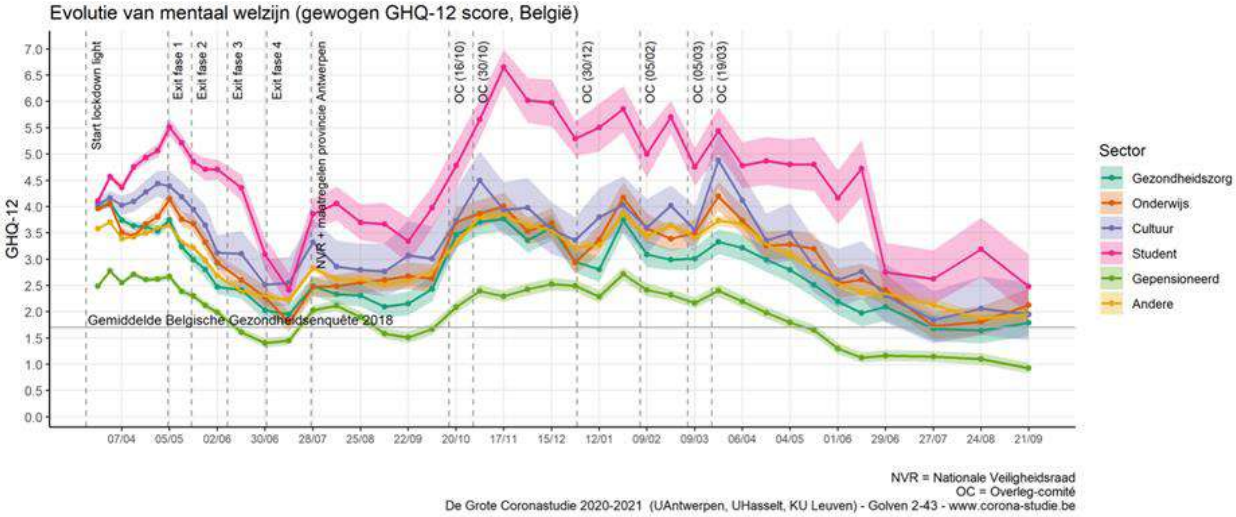
[11] This study has also been communicated on this blog: https://blog.uantwerpen.be/corona/mentaal-welzijn/. See also other results on https://corona-studie.shinyapps.io/corona-studie/

[12] Neyens et al, 2020

Figure 13: Evolution of GHQ-12 as monitored by the Great Corona Study up to Wave 43 (21st September 2021)



- *Figure 14: Evolution of GHQ-12 (GSC) - differences in sector*



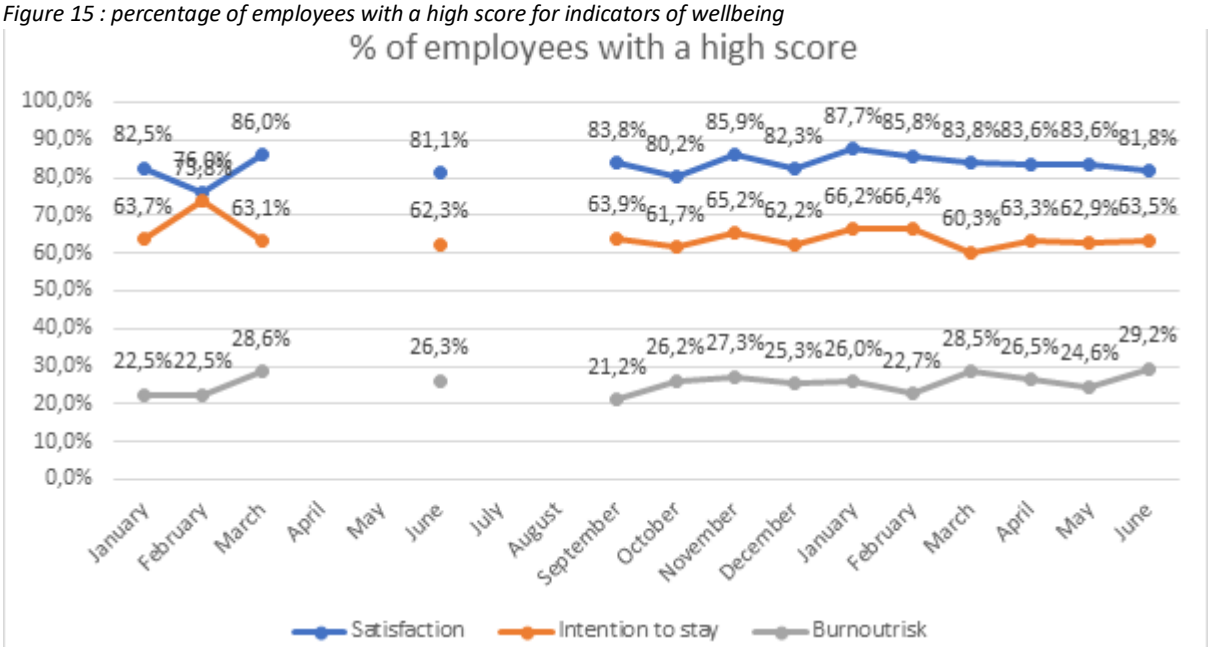
5. Mental health of the working population

To study the impact of corona on the wellbeing of the Belgian working population, Group IDEWE, the largest Belgian external service for protection and well-being at work, used data of the numerous risks analysis surveys regarding psychosocial well-being that they perform for their customers. These risk assessments focus on the well-being indicators satisfaction, intention to stay and burnout risk.

The figure below shows the percentage of employees with a high score on these indicators per month in 2020 and 2021[13]. For satisfaction and intention to stay it holds that the higher the percentages are, the better the results; for burnout risk, the reverse is true (figure 15). The data of the months April, May, July and August (2020) and April and May (2021) were excluded due to none or far too little data.

[13] Authors: Schouteden M, Vandenbroeck S, Godderis L

Figure 15 : percentage of employees with a high score for indicators of wellbeing



The results suggest no clear impact of COVID-19 on the different indicators of well-being in workers. There seems to be a small increase in burnout risk. However, following limitations need to be taken into account:

- Possible strong selection bias: only companies who are still 'capable to perform a risk assessment' are in the data; implying that these companies are still active, financially sound, and none of their employees are temporarily unemployed. For the months April – June 2020, numerous cancellations of risk assessments took place; in the months July – August 2020, no risk assessments were performed (standard procedure).
- The data are non-representative, due to (1) the low number of companies in certain months, (2) the fact that larger companies have a higher weight in the analyses, and (3) only rather large companies tend to perform a risk assessment survey so that, for instance, self-employed employees or small companies are not represented.

6. Mental health expenditures

The global COVID-19 pandemic and the measures taken to contain it have evidently harmed the physical health of Belgian citizens, but their mental health has also been affected. In this short summary, we evaluate to what extent this influenced healthcare use for mental health by comparing 2020 and 2021 to previous years. To this effect, we make use of healthcare use data up to April 2021 from the National Institute for Sickness and Disability Insurance (INAMI/RIZIV)[14].

Looking at the booked healthcare payments for psychiatrists and child psychiatrists in the figures below, it is observable how the total healthcare expenditures for psychiatrists and child psychiatrists fell below previous years from April to July 2020 (first wave), in October 2020 and January 2021 (second and third wave). This was also the case for consultations, visits and advice at doctors' offices. The peaks in expenditures can be explained by quarterly billing in psychiatric hospitals. For the services from 01/07/2020 onwards, we have switched to monthly billing (this is not yet visible in these figures, as there is an average delay of 2 months in the bookings in the hospitals).

[14] Authors: Lode Godderis and Jonas Steel

In total, in 2019 the booked payments for psychiatrists and child psychiatrists were €304,375,400, while 2020 saw €297,486,000 booked: a reduction and possible under-consumption of -2,3%. This is paired with 10,993,139 booked cases in 2019, and 10,616,831 booked cases in 2020: a reduction of -3.4%.

In the context of the COVID-19 crisis, there are two types of measures:

1. Measures without budgetary impact: for example, classic benefits are replaced by remote benefits, including psychological and psychiatric care;
2. Measures under separate heading 89 are measures with a budgetary impact. As far as mental health is concerned, this relates to the extension for children and 65+ year olds of the reimbursement of first-line psychological care in 2020 (the expenditure for this is quite limited). From 2021 onwards, however, this extension is structurally included within the medical care objective.

Looking in more detail, from March 2020 onwards there is a lower expenditure on therapies, psychotherapies, and pediatric psychiatric consultations in comparison with previous years. If distance consultations (which started in April 2020) are factored in, the gap stays apparent between March and June 2020. However, since March 2021 the expenditures rise above levels of previous years when taking into account the distance consultations.

Figure 16: psychiatrist and child psychiatrist booked expenditures (000 EUR), 2019-2021 (consultations, (psycho-)therapies, paediatric psychiatry, admissions in psychiatric hospitals, revalidation camps, & distance consultations)

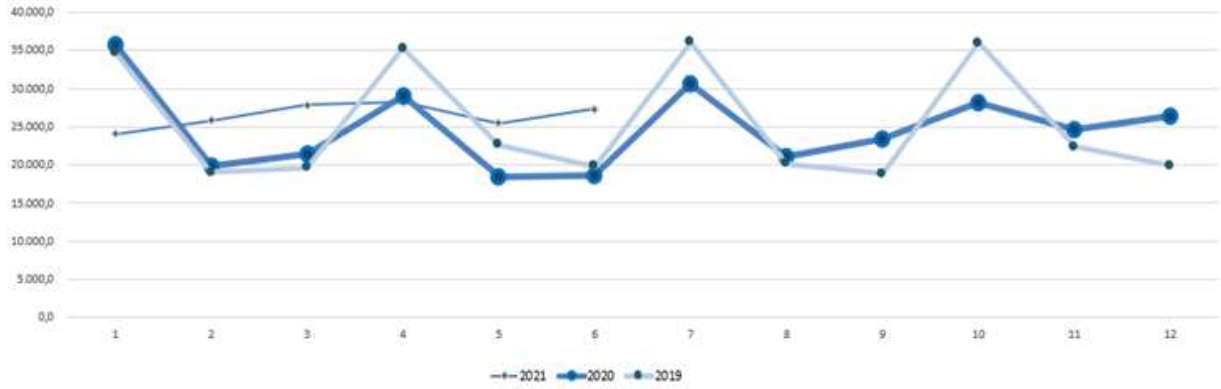
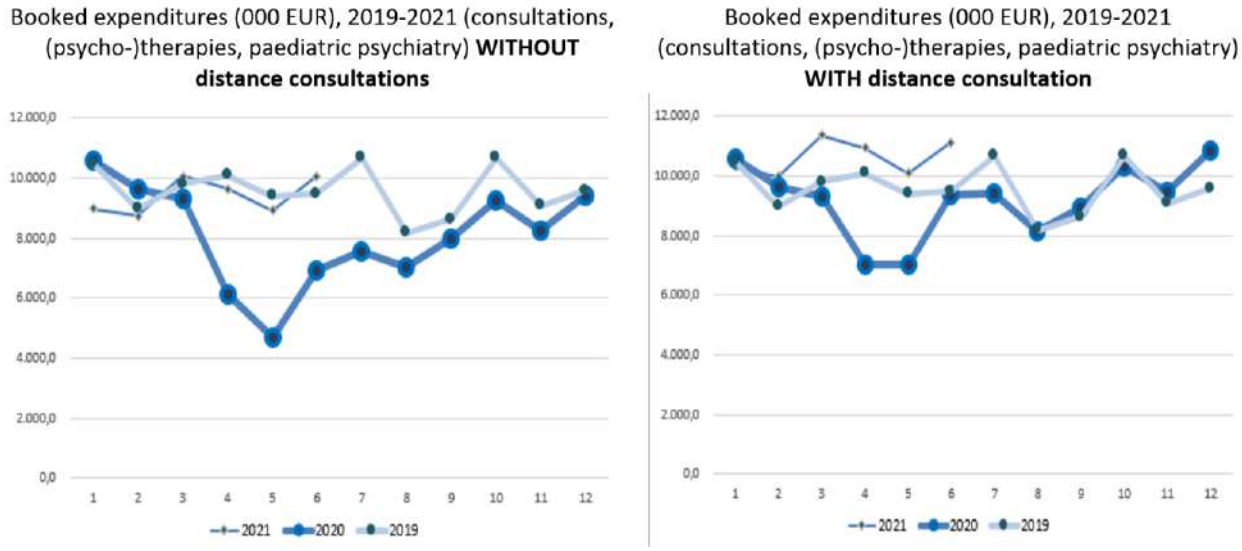


Figure 17: booked expenditures without and with distance consultations



Admissions in psychiatry drop slightly below the values of previous years from April to July 2020, in October 2020, in January 2021. In February and March 2021, the admissions are higher than previous years, lower in April 2021, and again higher in May and June 2021. This can be explained by the change to monthly billing instead of quarterly billing. The expenditures on revalidation camps for children and adults in 2020 were lower overall, since many camps were cancelled.

A multitude of factors play a role in these trends: from delaying care due to contact restrictions and lockdowns, to increased mental health complaints due to COVID-19 and the measures taken to prevent it. While the data does not allow us to discern between these causes, it is certain COVID-19 has had an impact on Belgian citizens' expenditures for healthcare contacts with psychiatrists and child-psychiatrists.

Figure 18: Admissions in psychiatric hospitals booked expenditures (000 EUR), 2019-2021.

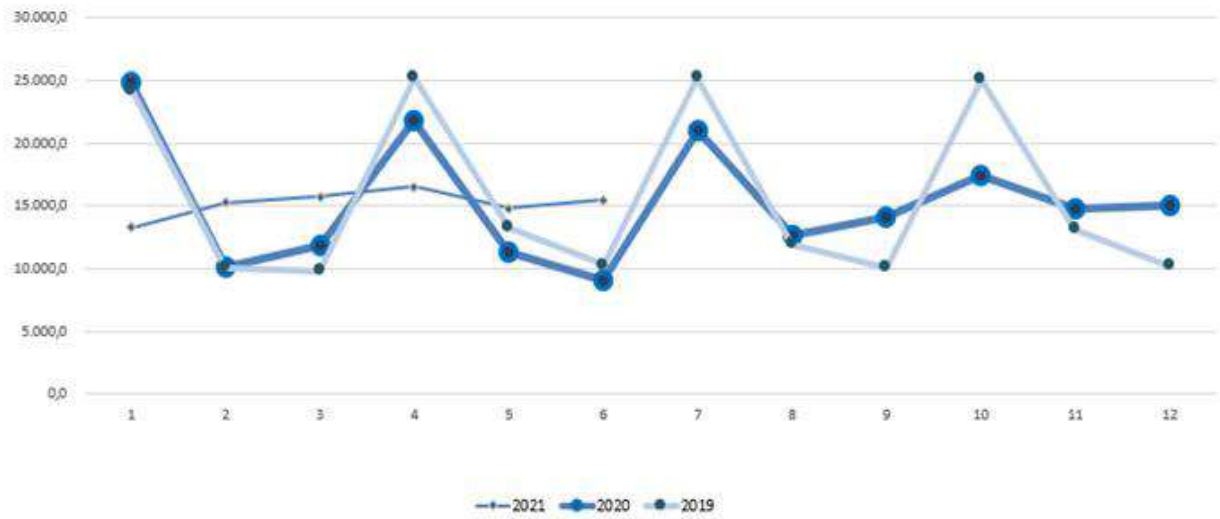
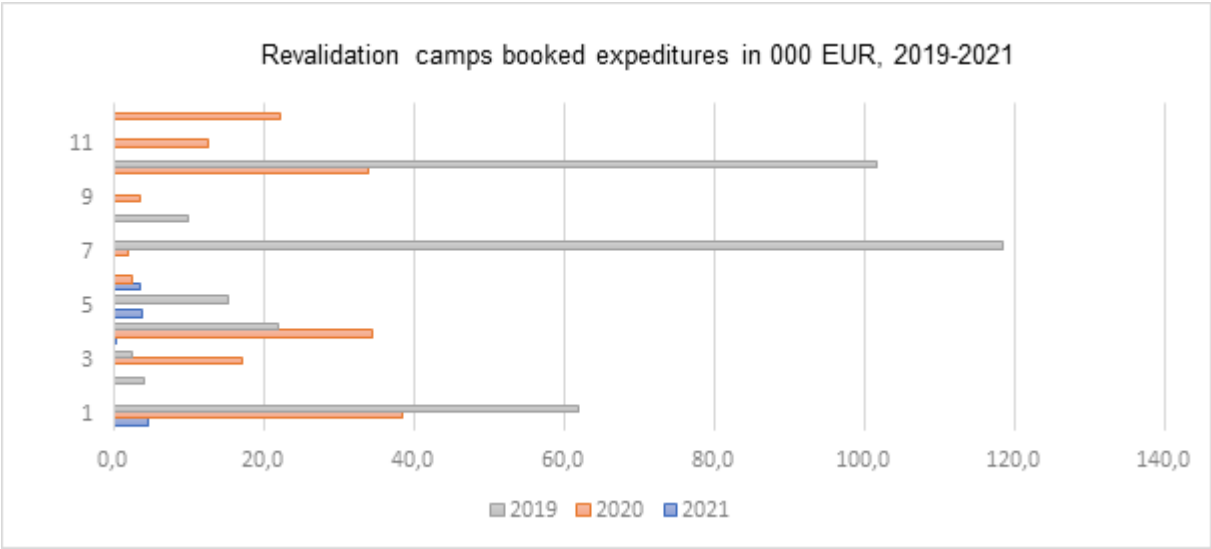


Figure 19: Revalidation camps booked expenditures. Source: National Institute for Sickness and Disability Insurance (INAMI/RIZIV).



7. Sickness absence

Concern is rising about increasing sick leave in the healthcare sector. In response, we analyzed actual data about short-term sick leave (sickness less than one month), medium-term sick leave (sickness between 1 month and 1 year), long-term sick leave (more than 1 year) in data provided by ACERTA derived from a set of 260,000 employees employed by more than 40,000 employers in the private

sector, which includes both SMEs and large enterprises, and on a dataset of 28,000 employees from the healthcare sector. The health sector includes PC 330 (e.g. hospitals, rest homes, health centers...) and PC 331 (childcare, welfare and health institutions and services...).

Across all sectors, 3.4% of workable hours in 2020 were not performed due to illness less than one month (figure 20). For the first half of 2021 this number decreased to 2.9%. In general, short-term sick leave fell by 3.7% in 2020 (vs 2019) and continued to decrease in 2021 (vs 2020) with 8.5%, most likely due to telework and more limited physical contact decreasing common infections, which are one of the most reported reasons for short sick leave.

Figure 20: Short-term sickness absence - evolution 2020-2021

In contrast, medium-term sick leave (sickness between 1 month and 1 year) increased slightly in 2020 compared to 2019 with 1.3%. In 2021 the medium-term sick leave clearly decreases in all sectors. Remarkably, if we zoom in specifically on short-term sick leave in the health care sector, it was 9.8% higher in 2020 than in 2019, but decreased again in 2021 with 15.8% compared to 2020.

We further compared the evolution in 2020 and 2021 (data until August) in relation to the previous year (thus 2019, 2020 respectively) in different sectors for all categories of sickness absence. Taking all forms of absences due to illness (short, medium, and long) together, in 2020 and 2021 healthcare faced respectively 36.2% and 35.6% more absence compared to the other sectors in relation to the year before. The difference with the other professional sectors is higher in the case of long-term illnesses - absences of a year or more - at +46.5%, respectively +49.6%. Short-term sick leave - less than one month, with guaranteed pay - in the Belgian healthcare sector was 24.6% and 14.6% higher in respectively 2020 and 2021 than short-term sick leave for all sectors combined. Medium-term sickness absence - between one month and one year, with guaranteed pay - was 30.6% (2020 vs 2019) and 34.0% (2021 vs 2020) higher in the care sector compared to the average across all sectors.

Consequently, we cannot confirm the alarming signals about short sick leave in the healthcare sector yet. While there was a 9.8% increase in 2020, we now see a 15.8% decrease compared to last year. Also in the comparison with the global figures across the sectors, we see that in terms of short sick leave, the situation is improving. Last year (2020) there was 24.6% more short-term sickness absence in health care than globally, now (2021 to July) only 14.6% more in health care than globally. In medium- and long-term sickness we see that the care sector does perform worse compared to global, however without major differences.

8. Temporary unemployment

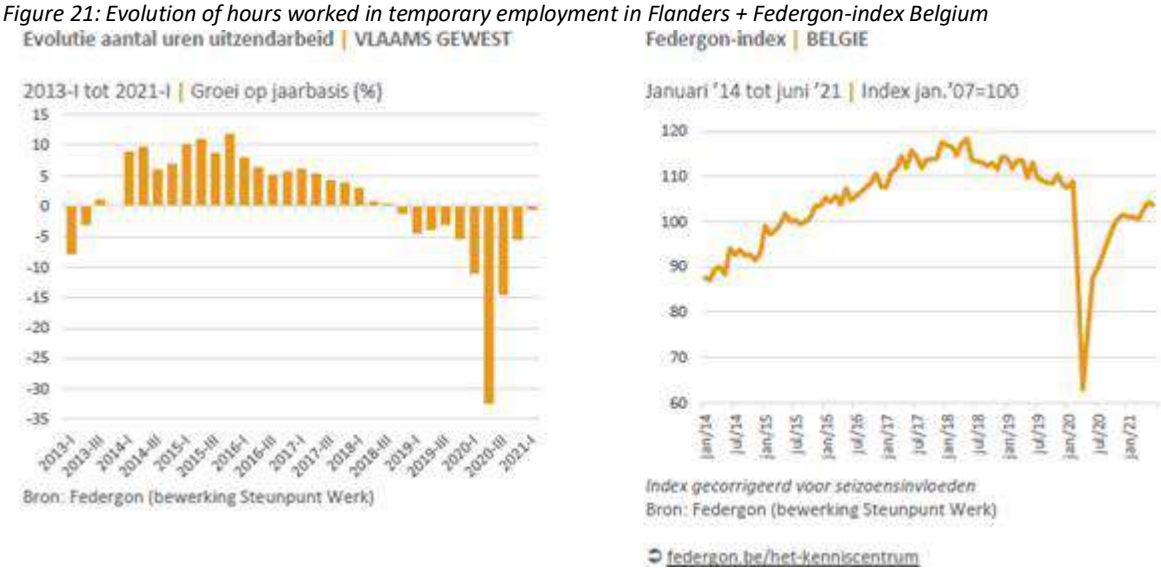
According to 'Steunpunt Werk'[15] the COVID-19-pandemic has had a clear impact on the Flemish labour market. For quite some time now, they have been monitoring the trend indicators of the Flemish

[15] www.steunpuntwerk.be

labour market in the field of the economic situation, activity and unemployment, employment and sectors, and vacancies and shortage.

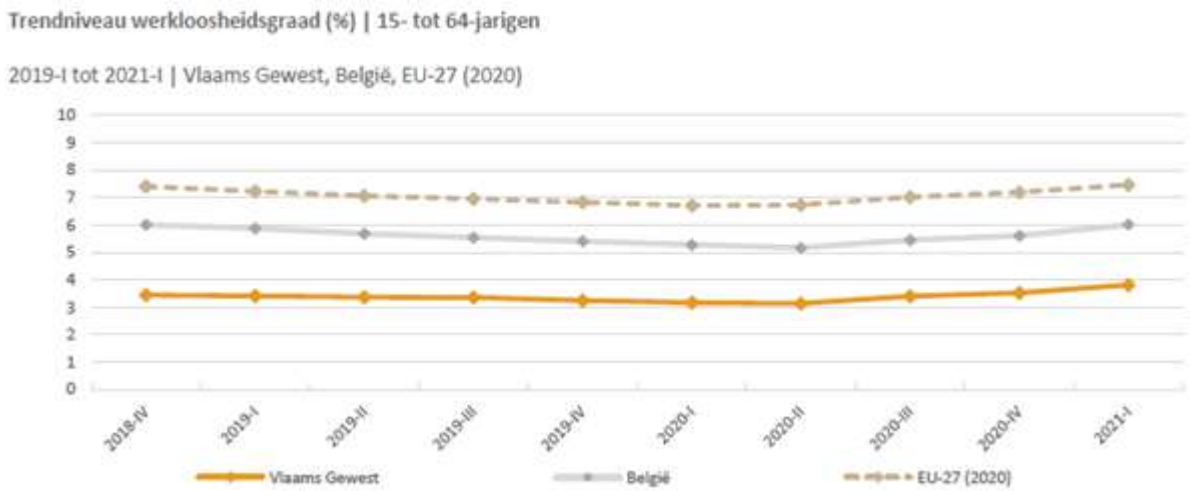
The Federgon index (Figure 21) is an indicator growth of temporary employment (uitzendarbeid) on a yearly basis, based on worked hours. There was a drop in growth due to the COVID-19-crisis since March 2020. The recovery in the number of hours of temporary employment that started in May 2020 has known a somewhat unsteady course over the past six months. In the first quarter of 2021 there was a temporary capping, with even a slight drop compared to the fourth quarter of 2020 (-3.0%). However, April and May 2021 saw a new momentum, with the Federgon index rising by +2.1% and +1.6% respectively on a monthly basis. However, in June 2021 this growth came stagnated again, with even a slight decrease compared to May 2021 (-0.7%). While temporary employment is clearly in a better situation than last year (+18.1%), the pre-crisis level is far from being reached. The Federgon index remains -5.2% below the level of February 2020 and -8.3% lower than June 2019.

Figure 21: Evolution of hours worked in temporary employment in Flanders + Federgon-index Belgium



In the first quarter of 2021, there is an increase in the trend level of the unemployment rate both in Flanders (3.8%) and in Belgium (6.0%) (Figure 22). The change is most pronounced amongst 15- to 24-year-olds (+3.7ppt), persons who were born outside EU-28 (2.3ppt) and those with a short education (1.2ppt).

Figure 22: Trend level unemployment rates



Due to the COVID-19 crisis, it was decided to simplify the procedure of temporary unemployment. This procedure is provisionally extended until the end of September 2021. After the number of temporarily unemployed in the Flemish Region stabilized around 230,000 for several months, it seems, based on provisional numbers that a sharp fall can be seen in May and June 2021. In June 2021, the RVA counts 115,000 temporarily unemployed in Flanders as a result of COVID-19, the numbers for Belgium also show a clear decline (from 409,000 in April to 208,000 in June 2021) (Figure 23). Nevertheless, in June 2021 the number of temporarily unemployed is still well above the level before the start of the corona crisis. This number is almost three times as high as in June 2019. Most of temporary unemployment is based in the industrial, administrative and hospitality sector (Figure 24).

Figure 23: Temporary unemployment due to COVID-19, reference months

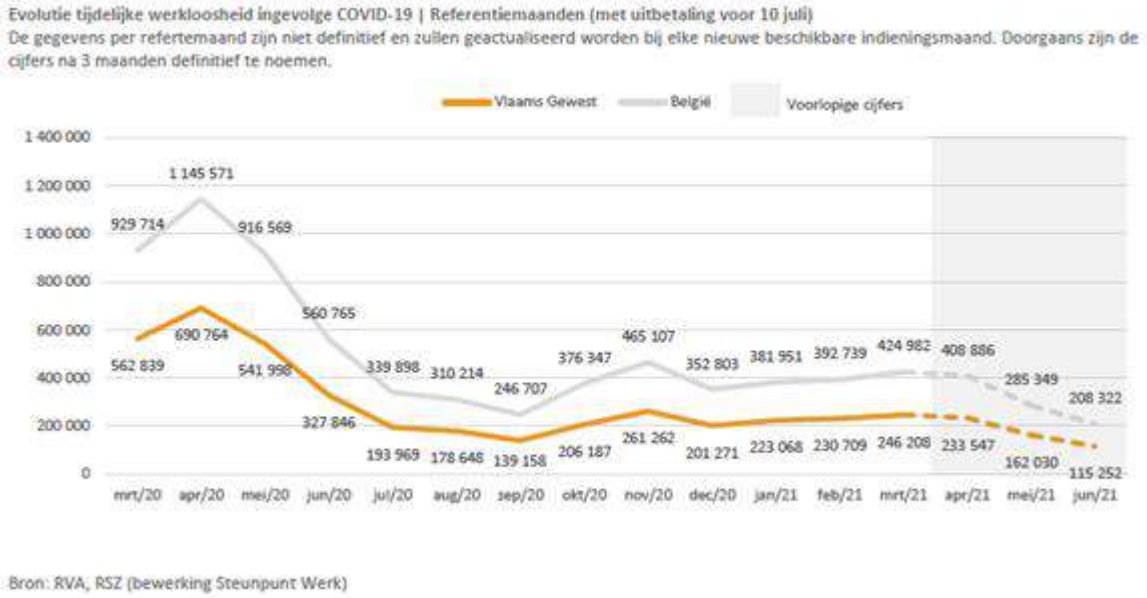
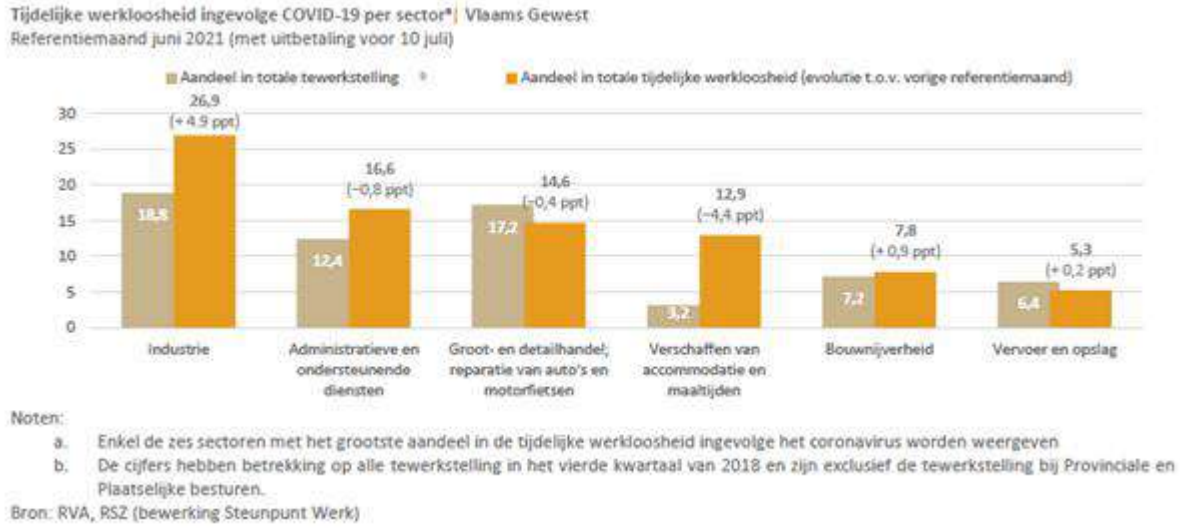


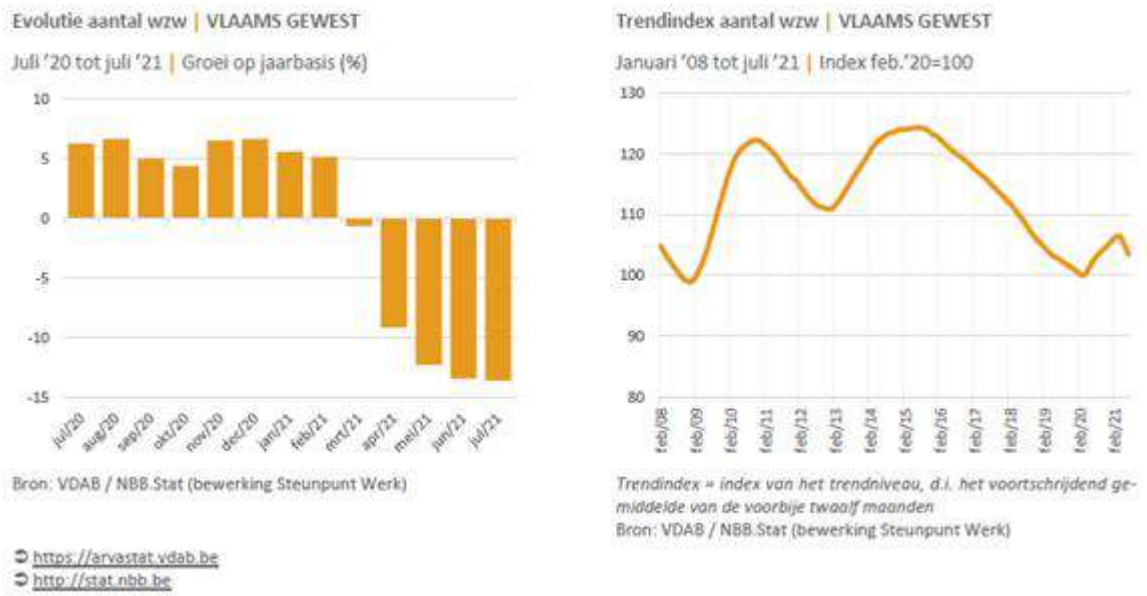
Figure 24: Temporary unemployment due to COVID-19 per sector



Since June 2021, Steunpunt Werk does not longer report on unemployed jobseekers (nwwz). VDAB has been using another classification for jobseekers. Since the first quarter of 2021, Steunpunt Werk reports on jobseekers that are unemployed (wzw). Since the outbreak of the COVID-19-crisis, there has been a continuous positive annual growth of 'wzw'. After a steep rise of this number in April-June 2020, this annual growth systematically declined. Only the second lockdown at the end of 2020 caused

a temporary reversal of this trend. From March 2021 onwards, the number of wzw knows only a small decrease. Compared to last year, there are more than 30.000 less wzw, which is a decrease of -13.6% (Figure 25).

Figure 25: Evolution unemployed job seekers



The number of vacancies received in June 2021 is on an all-time high, with 33,760 vacancies. This is 58.1% more than in June 2020 (12,405 vacancies) and 57.7% more than in June 2019 (12,346). Year-on-year growth so far is strongest for vacancies requiring experience (+56.8%), high-skilled (46.3%) jobs and permanent contracts (44.9%). This vacancy growth continues in almost all of the ten largest sectors: the strongest growth is found in services (66.3%) and public administration 56.0%). Despite the increased number of wzw, we note an increasing tightness on the Flemish labor market, influenced by the increasing number of vacancies.

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The following administrations and/or ministerial cabinets were heard:

- Sciensano
- RIZIV-INAMI
- Farmaflux
- Opgroeien