8 HEALTH SYSTEM RESILIENCE TO THE COVID-19 CRISIS

8.1 What is health system resilience?

Health system resilience is defined as "*the capacity of a health system to (a) proactively foresee, (b) absorb, and (c) adapt to shocks (…) in a way that allows it to (i) sustain required operations, (ii) resume optimal performance as quickly as possible, (iii) transform its structure and functions to strengthen the system, and (iv) (possibly) reduce its vulnerability to similar shocks and structural changes in the future*".[10, 16, 88]

The above definition encompasses four main components of resilience:[16, 89]

a) Preventive capacity: the ability of the health system to proactively foresee the advent of a shock and minimise its potential future impact

b) Absorptive capacity: the capacity of the health system to cushion the impact of shocks

c) Adaptative capacity: the capacity of the health system to sustain required operations

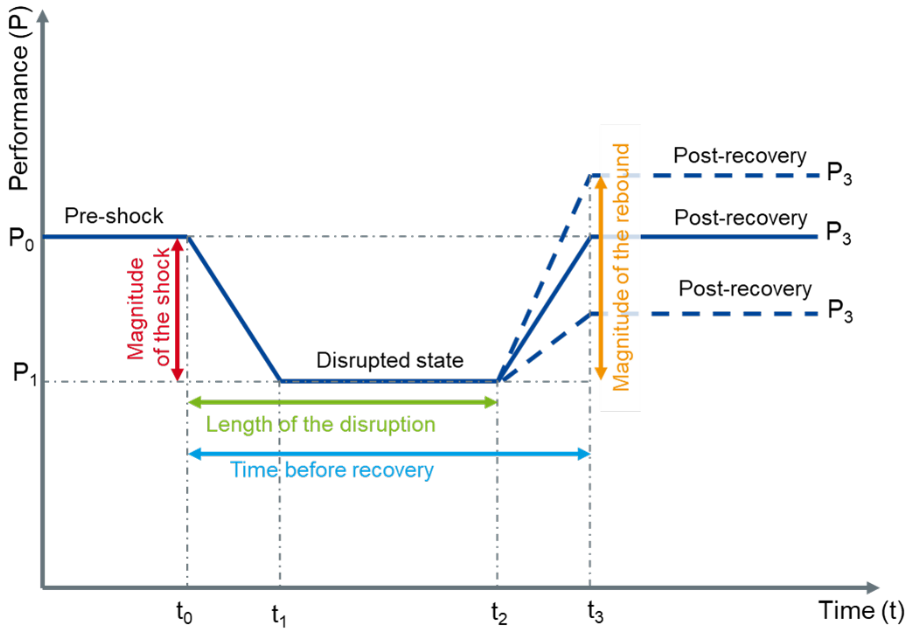
d) Transformative capacity: the capacity of the health system to transform its structure and functioning, making the system less vulnerable to future shocks.

Although, many types of very different shocks may affect the healthcare system in various ways, in this report, the analysis is restricted to health system resilience to the COVID-19 crisis only.

The concept of health system resilience can be graphically illustrated as shown in Figure 4 where P_t represents a given quantifiable time-dependant indicator of health system performance. When the health system experiences a shock that impacts it negatively, it is likely that the value of P_t will decrease. Then, the value of P_t will stay below its pre-shock state for a period of time that can be short or long. Eventually, P_t will increase again, to reach its post-recovery state. In this latter state, the value of P_t can be the same as in the pre-shock state, but in some cases it can either stay below the pre-shock state or, if the system has the ability to transform itself as a response to the shock, the value of P_t in the post-recovery state can even be above its initial value.

From this, resilience can be defined as the ability to minimise the impact of the crash (measured by the distance between P_0 and P_1), to minimise the duration of the disruption (measured by the distance between t_0 and t_2) and the time before recovery (measured by the distance between t_0 and t_3), and to transform its structure such that P_3 is equal to or higher than P_0. The preventive component of resilience is only studied in complementary analyses (see section 8.5) but does not constitute the focus of this chapter.

Figure 4 – Health system performance variation following a shock



Source: inspired by EU Expert Group on Health System Performance Assessment (2020)[16]

8.2 The COVID-19 crisis in Belgium

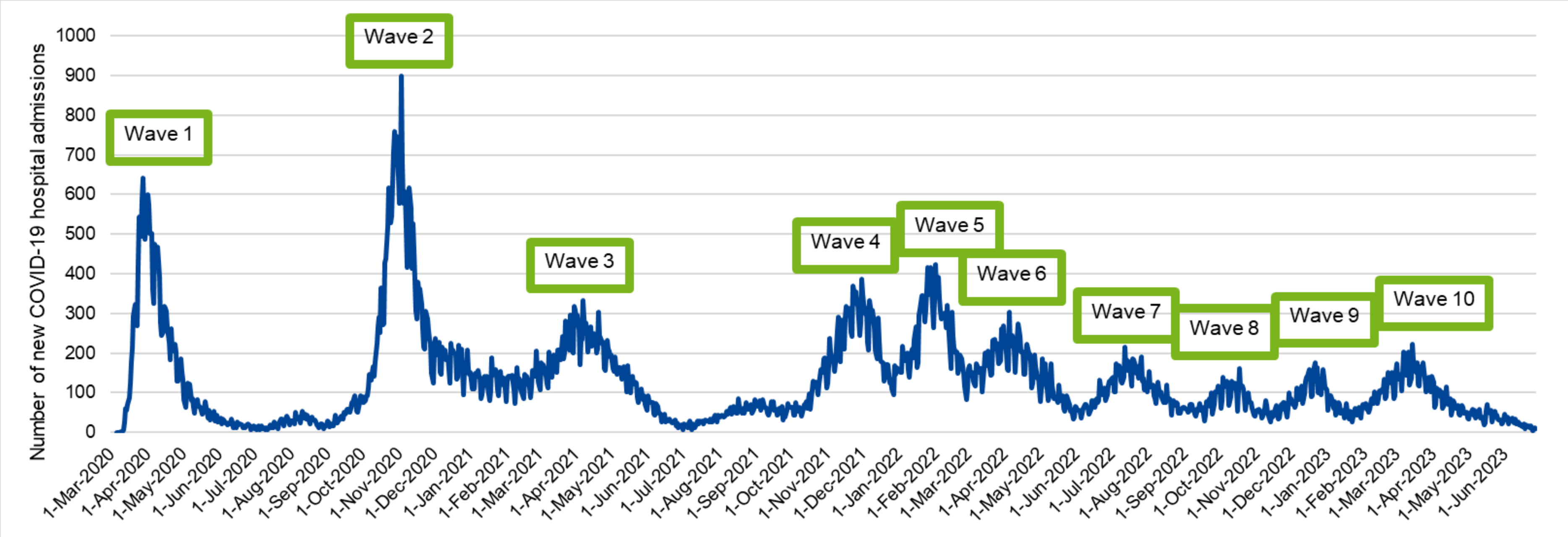
Health system resilience to the COVID-19 crisis must be analysed according to the successive waves of the pandemic. Between March 2020 and June 2023, ten waves have been identified in Belgium as shown in Table 18. An “interwave” period was clearly observed between the first and the second wave, as well as between the third and the fourth. This was not the case for the other waves. It is important to note that the designation of theses waves does not necessarily represents the severity of the epidemiologic situation or the public health burden during these periods. For instance, as shown on Figure 5, the number of COVID-19 hospital admissions was very different from one wave to another. For more information about the evolution of the COVID-19 crisis in Belgium, the interested reader is referred to epidemiological data available on the Sciensano dashboard and to key data in healthcare (organisation, care activity, funding and quality) released by the FPS Public Health on the healthybelgium.be website.

Table 18 – Waves of the COVID-19 epidemic in Belgium

COVID-19 epidemic wave	Start date
First wave	1 March 2020
Interwave	22 June 2020
Second wave	31 August 2020
Third wave	15 February 2021
Interwave	27 June 2021
Fourth wave	4 October 2021
Fifth wave	27 December 2021
Sixth wave	28 February 2022
Seventh wave	30 May 2022
Eighth wave	12 September 2022
Ninth wave	21 November 2022
Tenth wave	23 January 2023

Source: Sciensano (2023)[90]

Figure 5 – Number of new COVID-19 hospital admissions in Belgium, March 2020 – June 2023



Source: Sciensano (https://epistat.wiv-isp.be/covid).

8.3 Health system resilience to the COVID-19 crisis in Belgium

In what follows, HSPA indicators are used to measure, in the context of the COVID-19 crisis in Belgium:

- The **pre-shock** value of the indicator (P_0)
- The **worst** value of the indicator during the COVID-19 crisis (P_1). On Figure 4, P_1 is inferior to P_0, but the opposite can be true depending on the indicator. Therefore the term 'worst' is used rather than minimum or maximum.
- The post-recovery value of the indicator (P_3). In most cases, the most recent value of the indicator does not correspond to the best value of the indicator. Therefore, two values are calculated for P_3: "**most recent**" and "**best**" (that can be a maximum or a minimum depending on the indicator).
- The magnitude of the disruption (represented by the red arrow on Figure 4). Measuring the distance between P_0 and P_1 allows to assess the absorptive capacity, i.e. the ability to cushion the impact of the shock. The smaller the difference between P_0 and P_1 is, the more resilient the system is. Concretely, the magnitude of the disruption is calculated as **the difference between the pre-shock value and the worst value for the indicator** measured during the COVID-19 crisis.
- The length of the disruption (represented by the green arrow on Figure 4). Measuring how long it takes before the indicator starts bouncing back allows to assess the adaptative capacity of the system. A more resilient system starts bouncing back sooner. Concretely, the length of the disruption measures **the time between the moment a negative change is observed and the moment the bouncing back effect is observed** (i.e. a significant positive change is observed).
- The magnitude of the rebound (represented by the orange arrow in Figure 4). Comparing the post crisis value of the indicator with its disrupted level (P_1) allows to assess the capacity of the system to recover and even transform its structure and functioning. Concretely, the magnitude of the rebound is calculated as **the difference between the best (post-shock) value and the worst value for the indicator**.
- The time before recovery (represented by the blue arrow on Figure 4). It is calculated as **time between the moment a negative change is observed and the moment the best value is observed.**

For ease of presentation, indicators are grouped in three categories: (1) ensure adequate workforce (R-1, R-2 and R-3), (2) maintain essential health services and routine public health services (R-4 and R-5) and (3) scale-up existing capacity and implement new health services (R-6, R-7, R-8, R-9, R-10 and R-11).

For many of them a definitive assessment is premature. In particular, it is certainly too soon to entirely grasp the magnitude of the rebound. Also, in some cases the post-recovery level can be temporarily higher than the pre-shock level because of some catching-up effect (as the system has been disturbed for a while, it overcompensates during some time, but this effect does not necessarily last). For other indicators, it is difficult to assess the magnitude of the shock, for instance because data were not collected before the shock. Therefore, in many cases, only a partial analysis measuring some of the above elements is carried out.

To retrieve the magnitude of the disruption, the length of the disruption, the magnitude of the rebound and the time before recovery, a figure depicts, for each indicator, the evolution of the value over time (along with the stage of the pandemic as defined in Table 18) for Belgium and the three regions (Figure 6 to Figure 16). When possible, the pre-shock value, the worst value, the best value, and the most recent value are shown for Belgium and the three regions in Table 19.

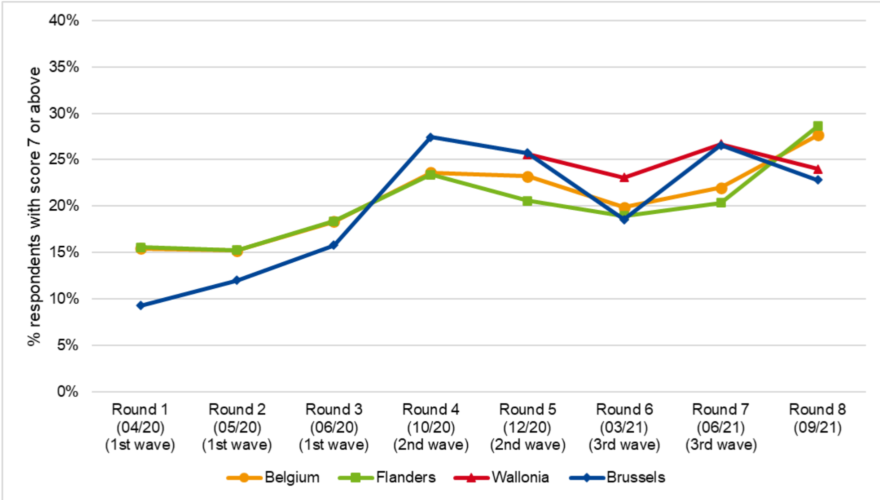
Ensure adequate workforce

It is largely acknowledged that the COVID-19 period exerted considerable pressure on healthcare professionals, in terms of increased workload, but also in terms of physical and psychological symptoms.[91-94] To counter that, countries have implemented various schemes to support the mental health of healthcare professionals and to offer financial and practical assistance.[95]

To measure Belgian health system resilience regarding the wellbeing of healthcare professionals, we use data from the Power to Care survey carried out by Sciensano and LIGB – KU Leuven. This survey counts eight rounds (of which the first four do not include professionals from Wallonia) between April 2020 and September 2021. The survey is not a longitudinal study and the number of respondents varies between rounds and regions. Therefore evolution across time should be interpreted with caution.

The **share of healthcare professionals with a high score for the item "considering leaving the profession"** (R-1, see Figure 6) increased from 15.4% in April 2020 to 23.6% in October 2020. This share was still 23.2% in December 2020, then slightly decreased but increased again to reach 27.6% in September 2021. This share was constantly higher in Wallonia and lower in Flanders, compared to national results, except in the last round. Between the first and the last round of the survey, the share of healthcare professionals considering leaving the profession increased by 12.2 percentage points. This increase can be qualified as the magnitude of the disruption. However, it should be kept in mind that no data are available for the pre-COVID period and that the four first round do not include respondents from Wallonia. A rebound (i.e. a permanent improvement of the indicator) could not be observed in the data, but no data are available after September 2021. In another survey carried out between December 2021 and February 2022 among 2 183 nurses working in intensive care units 43.9% of them had the intention to leave their job and 26.5% had the intention to leave the nursing profession.[96] This percentage was higher in Wallonia (37.5%) and Brussels (34.9%) than in Flanders (17.4%).

Figure 6 – Power to Care survey: share of healthcare professionals with a high score for "considering leaving the profession"



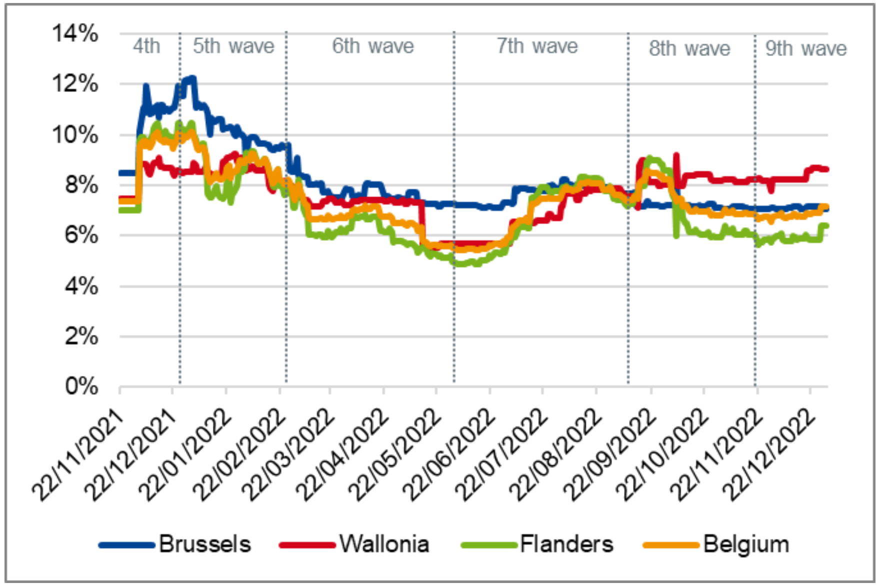
Source: Sciensano, calculations: KCE.

Shortage of staff resulting from absence of healthcare professionals, in particular nurses working in hospital services, is known to be both a consequence of the COVID-19 crisis and an obstacle to quality of care in COVID-19 times.[97, 98] Although nursing shortages were reported in most industrialised countries before the crisis, the COVID-19 pandemic amplified the issue. In Belgium, absences of health professionals have been quantified in limited contexts[99] but no administrative comprehensive data exist at the national level. To quantify the hospital staff absences and their evolution during the COVID-19 pandemic, we therefore rely on proxies.

As part of the daily data registered in the context of surge capacity plans, hospitals must register the number of **hospital beds closures due to staff absences or force majeure** (R-2, see Figure 7). These data were analysed for the period between 22 November 2021 and 31 December 2022. The share of hospitals beds closed due to staff absences or force majeure ranged between 5.4% and 10.1% over the studied period. It decreased between January and August 2022, then increased in September, before decreasing again and stabilising at the end of the year. In relative terms, more ICU beds were closed than other beds and strong provincial differences appear both for the share of hospitals beds closed as for the share of ICU beds closed. As the data were only collected from October-November 2021 onwards, it is not possible to assess the magnitude of the disruption.

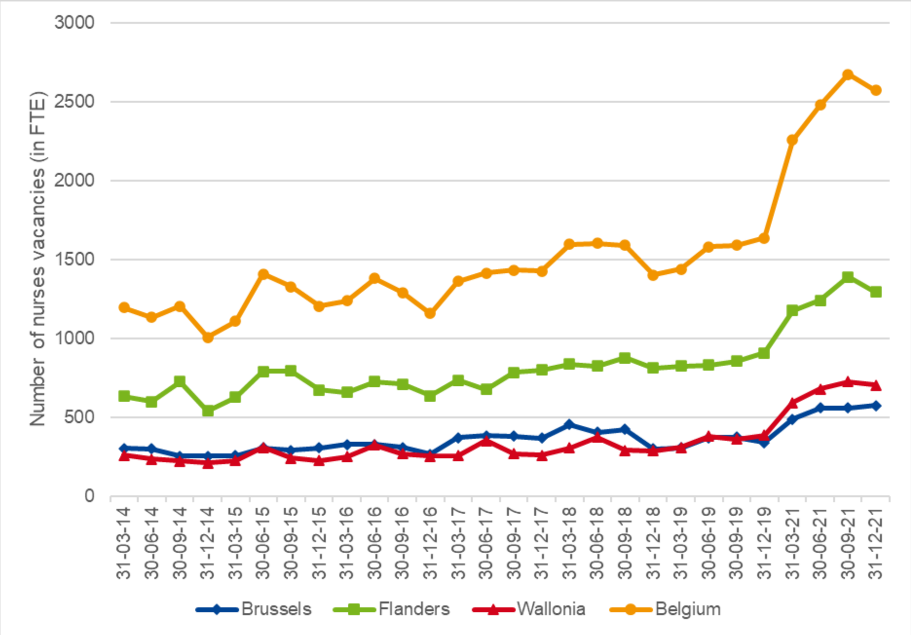
The yearly survey of hospital statistics contains, since 2013, a question about the **number of nurses vacancies** (R-3, see Figure 8). The number of vacancies is defined as “the number of vacancies for which a call (intern/extern) is launched”. Hospitals are asked to complete this question for four moments in time each year: 31 March, 30 June, 30 September and 31 December. For 31 December 2021, 2 572 nurses vacancies in FTE were reported in the Belgian hospitals. The number of nurses vacancies in hospitals, which reflect the capacity of hospitals to recruit and to retain nurses, was impacted by the COVID-19 pandemic. The highest disruption was observed in Wallonia in September 2021 (+100.3% compared to September 2019), followed by Flanders (+62.4% compared to September 2019). In Brussels, the peak was observed in December 2021 (+68.3% compared to December 2019). It is nevertheless not possible to determine the exact magnitude of the disruption due to the lack of data for 2020.

Figure 7 – Share of hospital beds that are closed due to staff absences or force majeure



Source: FPS Public health, calculations: KCE.

Figure 8 – Number of nursing vacancies in hospitals (in FTE)



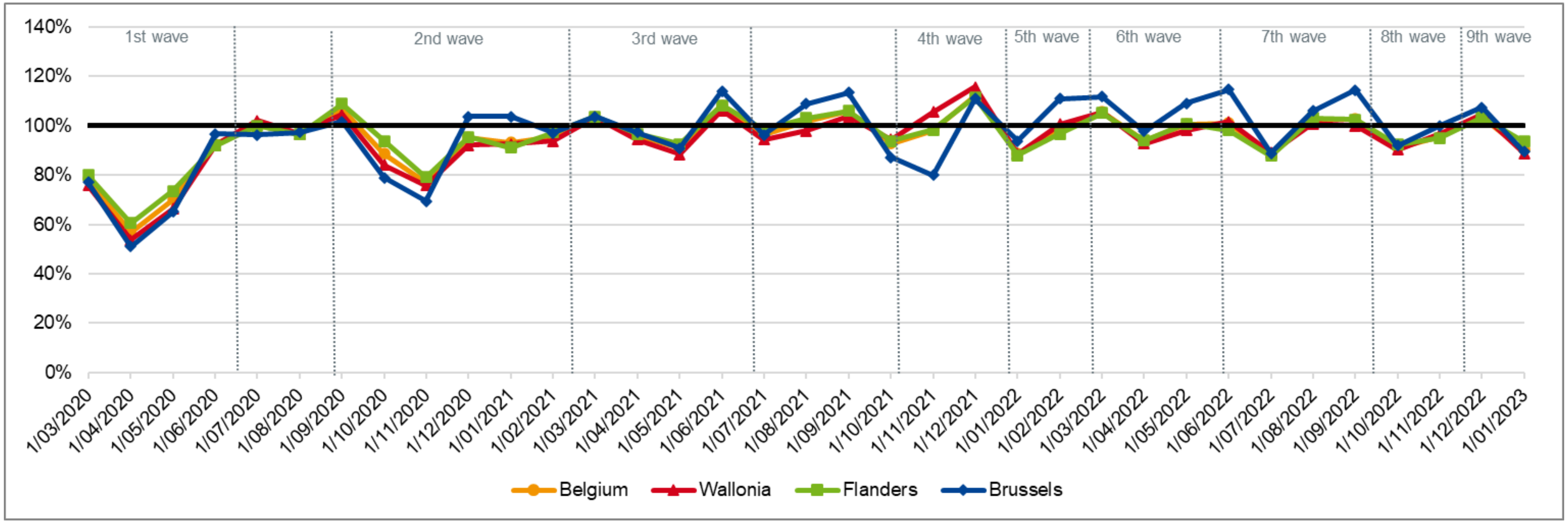
Data 2020 not available. Source: FPS Public Health; KCE calculations.

Maintain essential health services and routine public health services

From mid-March 2020, hospitals in Belgium and in other countries were asked to stop non-essential activities in order to free up equipment, nurses and physicians for the treatment of COVID-19 patients.[100] Belgian hospitals had to stop all elective consultations, investigations and procedures. It was however specified that essential care could continue. Nevertheless, no concrete formal definition of essential and non-essential care was provided. Hospitals were allowed to resume regular hospital care in a stepwise manner from 4 May 2020. During the first wave of the COVID-19 pandemic, several analyses showed indications of a decrease of non-essential care in Belgian hospitals, but also some decrease in essential regular care.[100-102] During subsequent waves of COVID-19, hospitals were asked to discontinue non-essential activities wherever this could impact the ICU capacity that was reserved for COVID-19 patients.

To assess the ability of hospitals to maintain essential activities, we use the number of hospital regular essential surgical hospital activities that was maintained with respect to what was expected based on 2018-2019 data (R-4, see Figure 9) following the methodology of the Hospital Audit Unit within RIZIV – INAMI, FPS Public Health and FAGG – AFMPS.[103, 104] In April 2020, 5.7% of non-essential hospital surgical activities were maintained, 29.8% of mixed activities (that can be essential or not depending on the context) and 56.9% of essential activities. This means that, although considered essential, 43.1% of these surgical activities were suspended in April 2020 (i.e. a magnitude of the disruption of -43.1%). These decreases were slightly less marked in Flanders than in the other regions. A second drop was observed in November 2020 but was less important. During this second wave, 76.8% of essential activities were maintained. A rebound was observed from November 2020 onwards (length of the disruption = 9 months). In 2021 and 2022, variations were much less marked. A minimum of 88.0% of essential activities were maintained. The percentage of maintained essential activities reached 100% for the first time in March 2021 (time before recovery = 13 months).

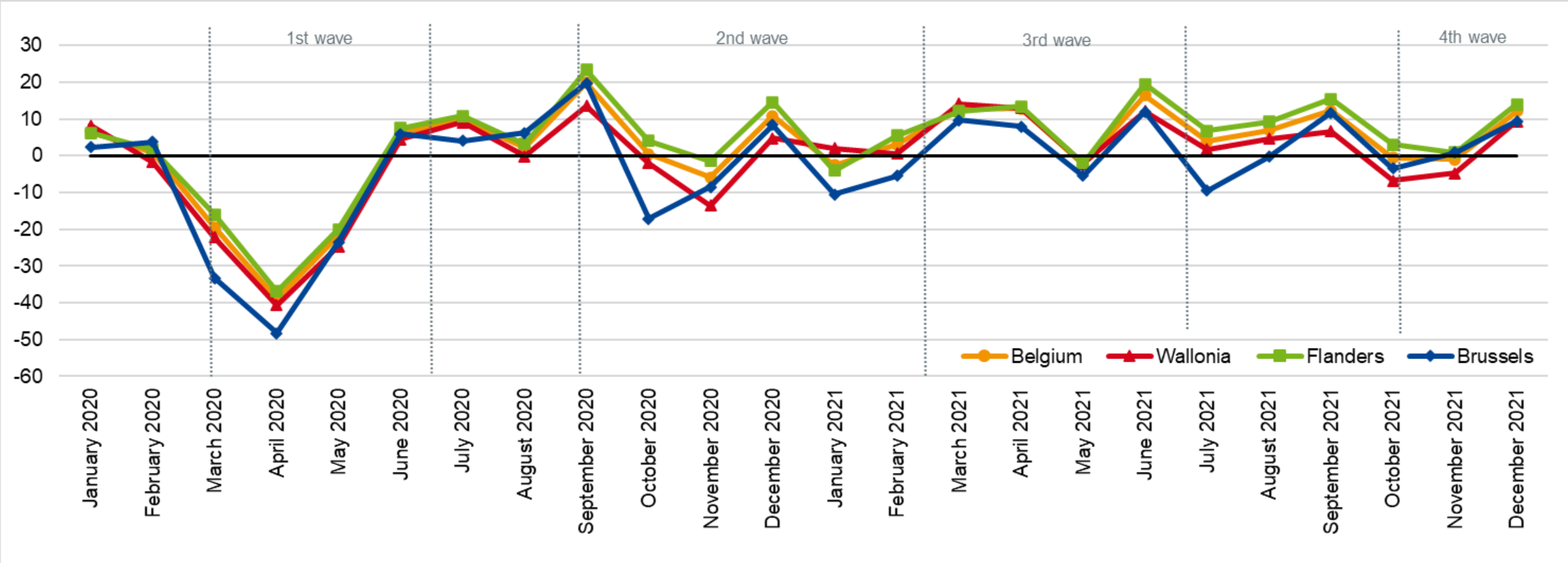
Figure 9 – Share of expected (based on 2018 and 2019 data) regular essential surgical hospital activities that was maintained



Source: Audit Ziekenhuizen RIZIV – FOD Volksgezondheid – FAGG / Audit Hôpitaux INAMI – SPF Santé Publique – AFMPS

In the week of 16 March 2020, organised population screening programmes for female breast cancer, cervical cancer, and colorectal cancer were suspended. They resumed mid-May 2020. Figure 10 shows the percentage change in new invasive cancer diagnoses per month relative to the same month in 2017-2019 (R-5) based on the Belgian Cancer Registry's incidence database. In March 2020, the number of new invasive cancer diagnoses was 19.3% lower than the average of March 2017-2019. This corresponds to a number of 1 222 "missing" cancer diagnoses in March 2020. In April 2020, the number of new invasive cancer diagnoses was 39.0% lower than the average of April 2017-2019, corresponding to 2 181 "missing" cancer diagnoses (magnitude of the disruption = -39.0%). In May 2020, the start of the rebound was observed (length of the disruption = 2 months). The number of new cancer diagnoses was still lower (by 21.7%) than in May 2017-2019, corresponding to 1 366 "missing" cancer diagnoses. In June 2020, the number of new invasive cancer diagnoses reached back its level of 2017-2019 (time before recovery = 4 months). In September 2020, it was higher (by 19.9%) than its level of 2017-2019. After that, it remained within the range -5.8%; +16.6% compared to its level of 2017-2019. The percentage of change in the number of new invasive cancer diagnoses followed a similar trend in the three regions of the country. However, the decreases were stronger in Brussels than in the other regions. This was not compensated by larger subsequent increases.

Figure 10 – Percentage of change in the number of new invasive cancer diagnoses during 2020-2021 compared to 2017-2019



Source: Belgian Cancer Registry.

Scale-up existing capacity and implement new health services

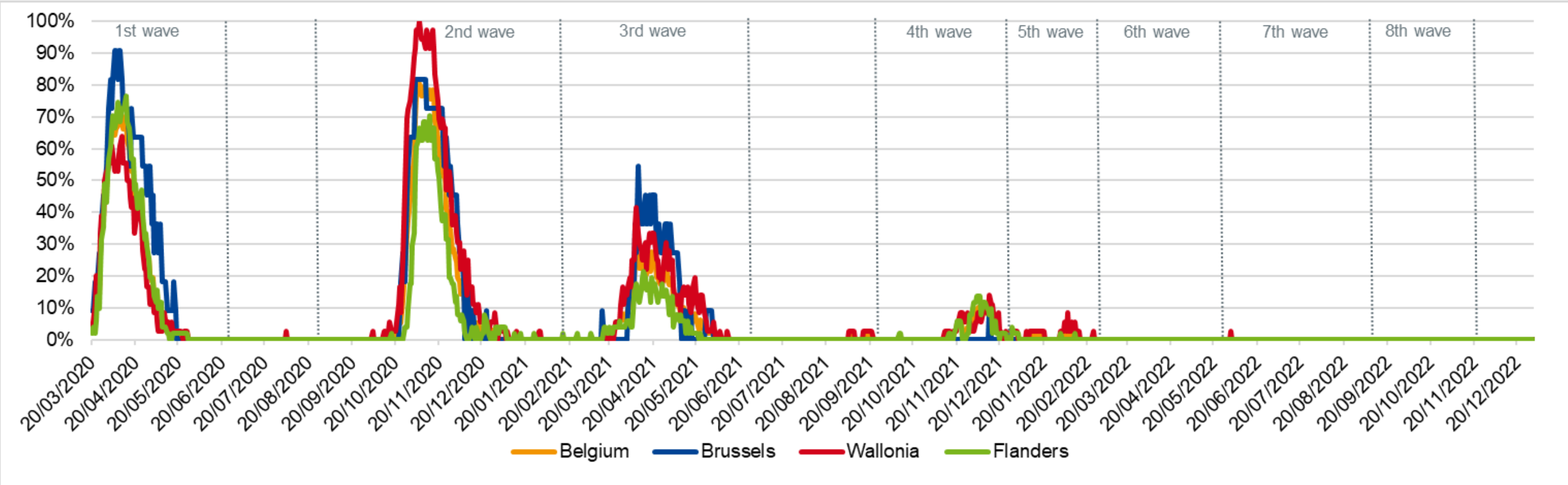
Intensive care resources faced enormous pressure during the pandemic, resulting in some places in intensive care demand exceeding available supply.[17] Increasing occupancy rates in intensive care units have been associated with increasing mortality.[105] In response, many countries increased their ICU capacity, creating "surge" capacity. From mid-March 2020, all Belgian hospitals were urged to create extra bed capacity ("surge capacity"), notably in ICUs. In particular, on 17 March 2020, hospitals were required to "do everything possible to create extra capacity in ICU".[106] On 1 April 2020, hospitals registered a maximum of 1 182 extra ICU beds, on top of the 1 993 licensed ICU beds, increasing total capacity by almost 60%. Later on, more concrete instructions were given regarding required number of surge beds, depending on the stage of the pandemic. Belgium has been praised for its ability to quickly increase its beds capacity.[95, 107]

However, it was rapidly noted that the increase in ICU bed capacity was difficult to manage due to a lack of nurses with ICU expertise.[100, 108, 109] An analysis of in-hospital mortality of COVID-19 patients treated in ICU in Belgium during the first wave has shown evidence that the "ICU overflow" (when the number of ICU beds occupied by COVID-19 patients exceeds the number of licensed ICU beds reserved for COVID-19 patients) was an explanatory variable of in-hospital mortality of COVID-19 patients.[110] From 30 September 2020, hospitals have been encouraged to search for a better distribution of COVID-19 patients between hospitals, rather than using extra ICU bed capacity.[100] The Patient Evacuation Coordination Center was also mandated to help hospitals in the distribution of COVID-19 patients.[111]

We analyse occupancy rates at the hospital level in order to capture variation between hospitals and provide insights on whether patients were distributed in a way that reduced mortality risks associated with overflow. Indeed, although national occupancy rate could stay high, a better distribution of patients across hospitals should lead to a reduction in the share of "overflowed" hospitals. As a measure of overflow, we follow Taccone et al. (2021)[110] and divide the number of COVID-19 patients by the number of licensed ICU beds reserved for COVID-19 patients that was set in March 2020 at 60% of the total number of licensed ICU beds.

Figure 11 shows the **share of hospitals with occupancy rate for COVID-19 patients in ICU licensed beds above 60%** (R-6). During the first COVID-19 wave, a maximum of 70.4 % of hospitals in Belgium faced an overflow in the ICU (i.e. an occupation rate above 60% of the licensed ICU beds). This share reached 80.6% during the second wave. Considering that share of overflowed hospital was null before the pandemic, the magnitude of the shock is equal to 80.6%. In April 2021, while the occupancy rate for COVID-19 patients in licensed ICU beds was still close to 50%, only 30% of the hospitals presented an ICU overflow, showing that the system has adapted. In December 2021, when the occupancy rate for COVID-19 patients in licensed ICU beds was again above 40% at the national level, only 10% of the hospitals presented an ICU overflow.

Figure 11 – Share of hospitals with occupancy rate for COVID-19 patients in ICU licensed beds above 60%

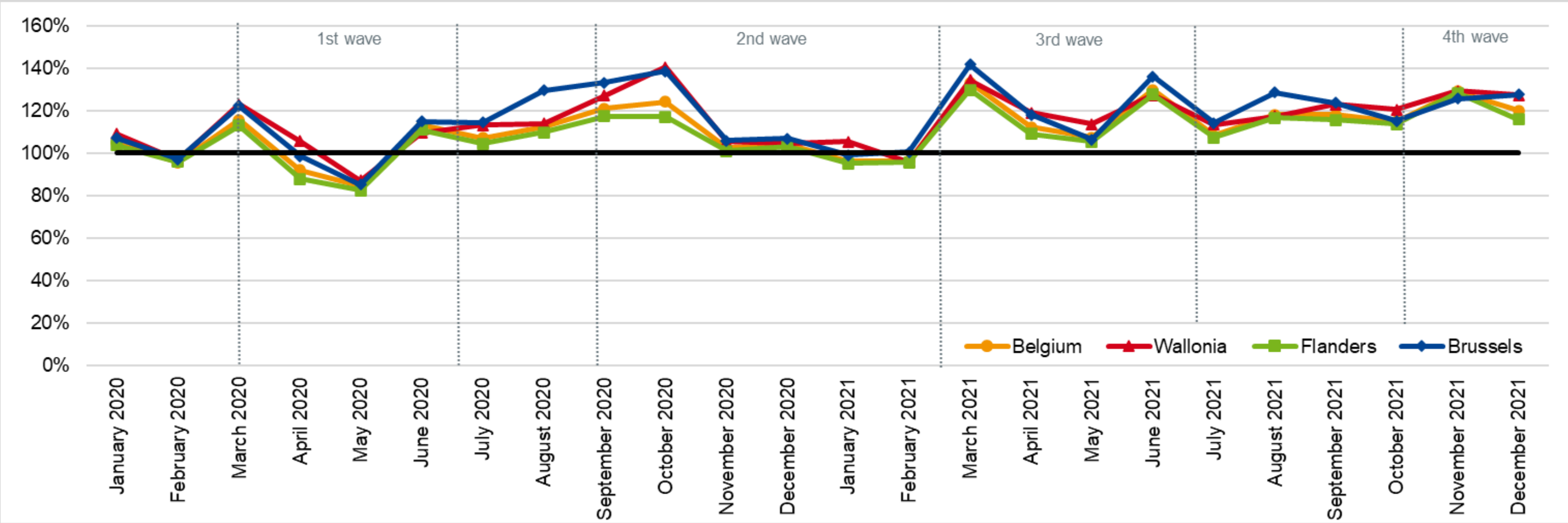


Source: FPS Public health, calculations: KCE.

The COVID-19 pandemic forced public authorities to encourage innovative ways of providing healthcare services. Among them, teleconsultations (as an alternative to in-person contact with physicians) have been largely promoted in many countries.[17] In Belgium, teleconsultations in primary care were initiated in March 2020 (by the creation of three billing codes) in order to ensure continuity of care while preventing the spread of the virus by avoiding direct contact between patients and health professionals. These teleconsultations were free of charge for the patient. Since August 2022, this temporary system has been replaced by a permanent one that implies a small co-payment for the patient.[112]

Figure 12 shows the **number of contacts (including teleconsultations) with a GP**, as a percentage of the total number of contacts with a GP in the same month of 2019 (R-7). During the first wave of COVID-19, a large drop of face-to-face contacts with GPs was experienced in the three regions of the country, but was largely compensated by the development of teleconsultations. A small disruption was observed in April and May 2020, the number of contacts including teleconsultations representing respectively 92.0% and 84.5% of the number of contacts in same month of 2019 (magnitude of the disruption = -15.5%). A bouncing back was already observed from June 2020 onward (length of the disruption = 2 months). After that, the number of contacts with GPs including teleconsultations was constantly above or close to its level for the same month of 2019 (time before recovery = 3 months).

Figure 12 – Total number of contacts (including teleconsultations) with a GP (as a percentage of the total number of contacts with a GP in the same month of 2019)



Source: RIZIV – INAMI, calculations: KCE.

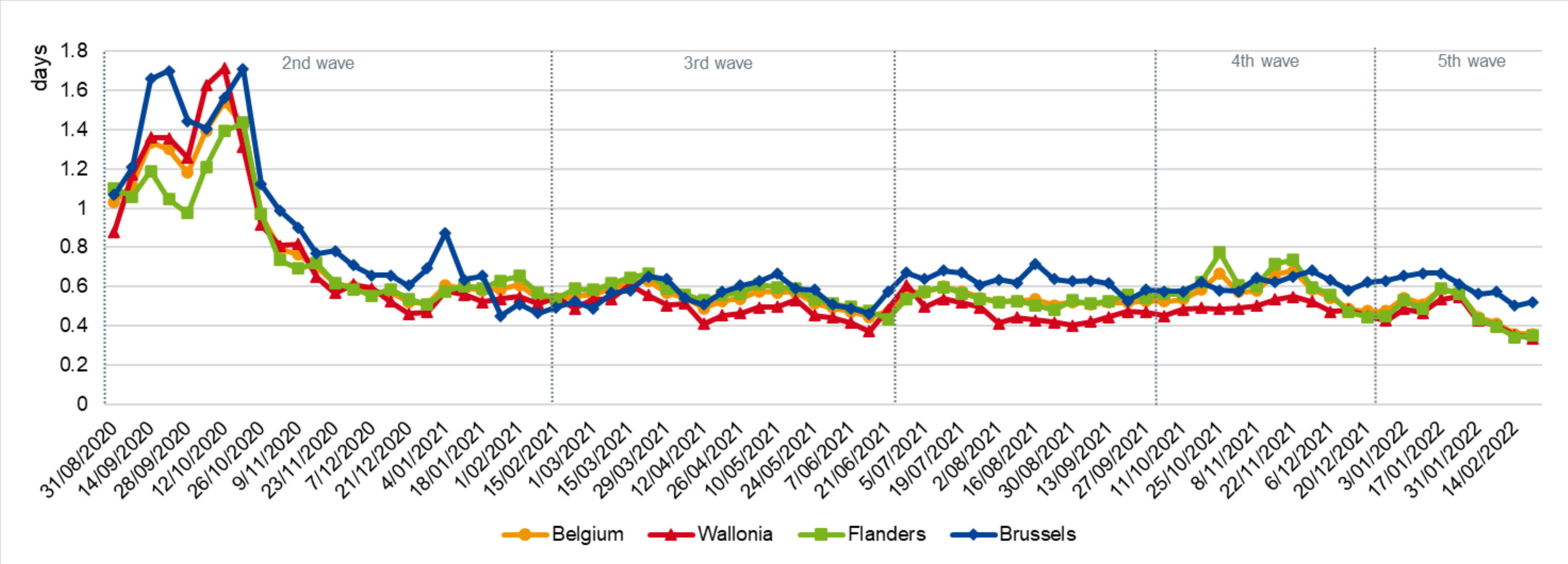
Large-scale population testing was also one of the essential means to control the outbreak.[113] To ensure efficient isolation and proper contact tracing, shortening the delay between sampling and results was also crucial. The EU health preparedness plan recommended that countries aim to have a Turn-Around-Time (TAT) of 24 hours (from request to be tested to communication of the test result) as a target.[114] TAT can be split up in two different phases: the time required from the prescription of a test to the moment the sample is taken, and the time between the sampling and the communication of the test result. The first phase is an indicator of sampling capacity while the second is more representative of testing capacity.

Figure 13 shows the latter, i.e. the **average duration between sampling of a COVID-19 test and test result** (R-8). Unfortunately, no data are available before September 2020, so that the average duration during the first wave of the COVID-19 pandemic cannot be estimated. During the second wave (September-October 2020), the average duration between sampling and test result reached 1.54 days. From November 2020 onwards, the average duration between sampling and test result remained below one day in all three regions, even when a very large number of tests was performed.

Part of this can be explained by the development of rapid diagnostic tools such as antigenic tests that were inexistent at the beginning of the pandemic but have been increasingly used later on. As this mode of sampling was characterised by an almost immediate communication of the result, their use decreased the average duration between sampling and result. Nevertheless, even at latter stages of the pandemic, these tools did not represent a large proportion of the samplings performed. Therefore, the observed reduction of the average duration between sampling and test result is also driven by a reduction of delays in molecular testing.

Regarding the delay between prescription and sampling (secondary indicator, not shown here), the average duration was around one day during most of the year 2021, so that the average TAT remained superior to one day. At the end of 2021, the average duration between prescription and sampling was reduced, reaching half a day in February 2022. During that period the average TAT was inferior to one day.

Figure 13 – Average duration between sampling of a COVID-19 test and test result (in days)



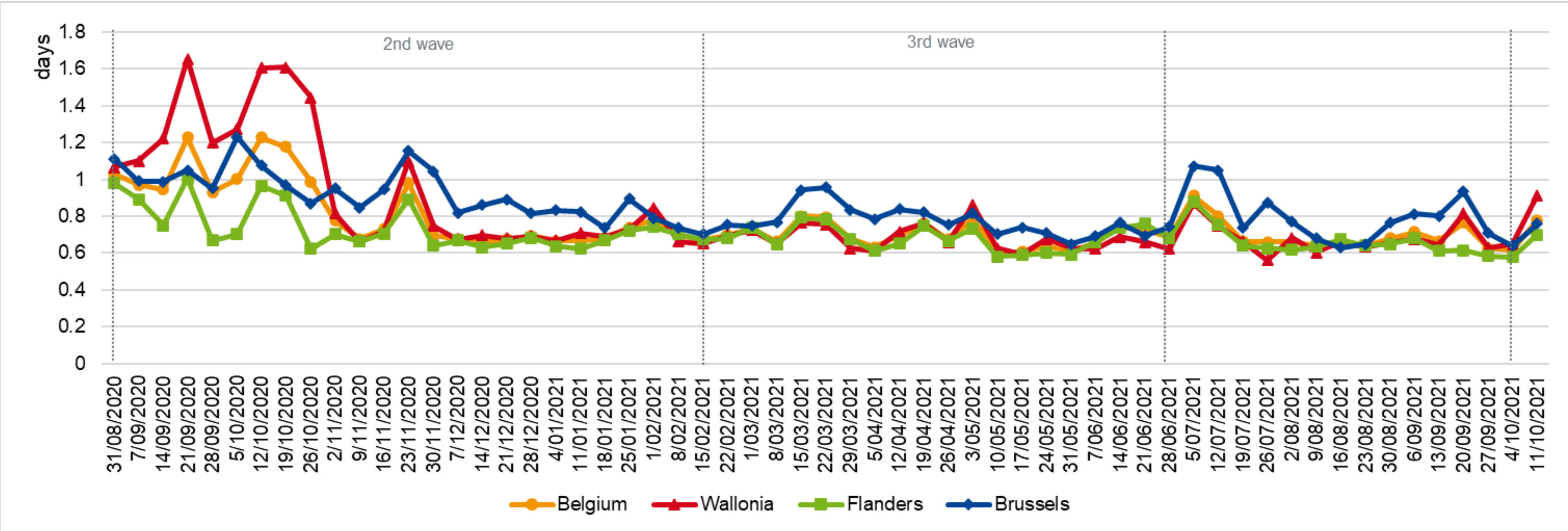
Source: Sciensano.

Contact tracing is also a major public health tool that has been developed to control the spread of COVID-19. However, many countries failed to implement it effectively.[115] Delays may occur at every stage of the process: between onset of symptoms and testing, between testing and results, and between a positive test result and the initiation of contact tracing. To interrupt the transmission of COVID-19, the ECDC recommended that "contact tracing should be done for as many cases as possible as fast as possible".[116]

To monitor this in Belgium, we measure the average duration between positive COVID-19 test result and contact tracing initiation (R-9, see Figure 14). The Sciensano test database was linked with the contact tracing database via the unique pseudonymized national registry number. Unfortunately, no data are available before September 2020, so that the indicator cannot be calculated for the period corresponding to the first COVID-19 wave. In addition, the duration between positive test result and contact tracing initiation is only calculated for index cases (i.e. persons with a positive diagnostic test) that were effectively contacted. As the percentage of index cases that could not be reached varies over time and depends on the number of cases to be contacted, results are not comparable in all periods. The percentage of index cases that could not be reached stayed relatively constant (around 8%-9%) between September 2020 (no data available before) and mid-October 2021. However, this percentage was higher at the end of 2021 and the beginning of 2022 (delta and omicron variant) because of a very high number of index cases. For instance, it was 17.2% during the week of 18 October 2021, 45.8% during the week of 29 November 2021, and reached 67.0% during the week of 15 November 2022.[117-119] During this period several strategies have been used to prioritise the index cases that should be contacted (according for instance to the age, the virus load, the date of sampling, or the COVID-19 incidence in the area) and alternative methods to contact index cases via SMS and an online tool were deployed. As a result, measuring the average duration between positive test result and contact tracing initiation is less relevant for this period, and results could not be compared with the results obtained before October 2021. For that reason, the indicator is only calculated from week 36 of 2020 (week of 31 August 2020) to week 41 of 2021 (week of 11 October 2021).

During most of the study period the average duration between result and contact tracing initiation was shorter than one day in all three regions of Belgium. It was the highest, with a maximum of 1.23 days, at the beginning of the study period (September-October 2020), when a high number of persons needed to be to be contacted. It is not possible to evaluate if it was higher or not before September 2020.

Figure 14 – Average duration between result and contact tracing initiation (in days)



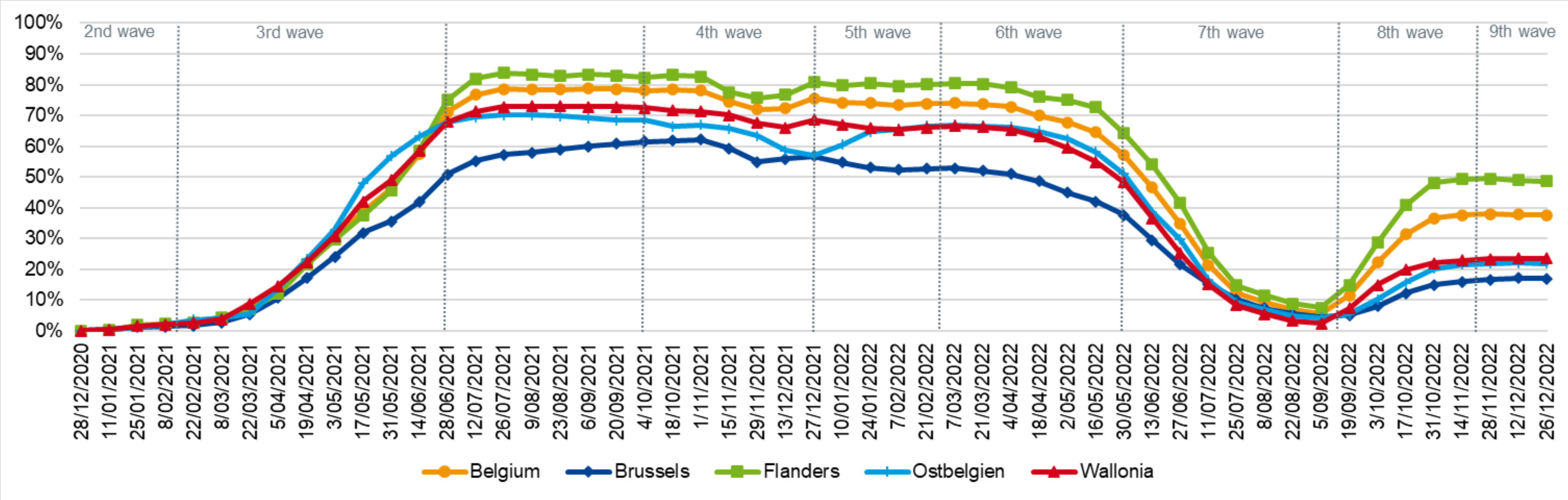
Source: Sciensano.

The rapid development and deployment of vaccines were also important elements contributing to pandemic management.[17] Coverage of COVID-19 vaccination in the adult population and among specific groups (65+, 85+, etc.) have been widely monitored using indicators such as the percentage of the population who received primary course vaccination, or primary course and booster vaccinations.[120] However, as time passes and a large share of the population is vaccinated, continuing to monitor these indicators appears to be less relevant. To assess the evolution of Belgian health system performance regarding COVID-19 vaccination, we use the percentage of the population who received at least one vaccine dose in the last six months (adult population: R-10, see Figure 15; population aged 65 years or more: R-11, see Figure 16).

The relevance of these indicators is highly dependent on stage of the pandemic and the type of variants that are prevalent. In particular, at the beginning of the vaccination campaign, it was advised to have a short delay between doses, in order to ensure a fast protection of the population. The first booster was advised for the whole adult population, and was mainly given during winter. Once the acute phase was passed, an annual booster, before each winter, was advised for at-risk populations. Therefore, the six-month interval is relevant to analyse during the winter, but is less relevant during summer. On the contrary, the number of persons receiving a vaccine dose during summer should be reduced, because these persons would face decreased vaccine effectiveness during the winter. In addition, vaccination is particularly advised to ensure protection against aggressive variants, and should be performed at the adequate moment to ensure it is adapted to the concerned variant. Due to that, the interpretation of the principal indicator must be nuanced, taking into account both the period of the year and the dominant type of variant.

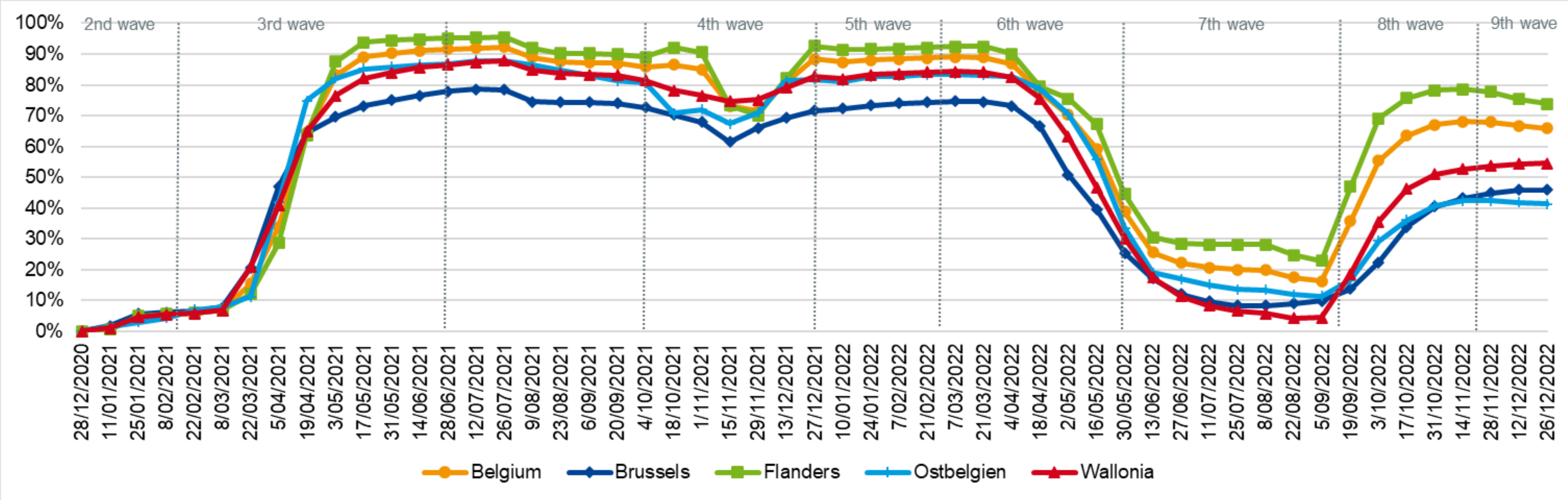
In Belgium, the overall majority (>97%) of persons aged 65 years or more were vaccinated with primary course vaccination. The share reached 89.3% for the overall adult population (aged 18 years or more), above the average in the EU-27 countries (77.0%). Also, more than 90% of the persons aged 65 years or more were vaccinated with primary course and first booster. The share reached 76.3% for the adult population, above the average in the EU-27 countries (65.4%) and in the EU-14 countries (73.1%). After the first booster campaign a decrease was observed in the share of the population who received at least one dose in the last six months. Owing the second and third booster campaigns, this share increased later on, but stayed largely below its previous level (a maximum of 68.1% was reached for the age group 65+ years and 38.0% for the adult population). At the end of 2022, 65.8% of the persons aged 65 years and 37.6% of the adults aged 18 years or more had received at least one dose in the last six months. Theses proportions were 73.8% and 48.6% in Flanders, 54.4% and 23.6% in Wallonia (excluding German-speaking community), 41.3% and 21.9% in the German-speaking community and 45.9% and 17.0% in Brussels.

Figure 15 – Percentage of the population aged 18+ years who received at least one COVID-19 vaccine dose in the last six months



Source: Sciensano.

Figure 16 – Percentage of the population aged 65+ years who received at least one COVID-19 vaccine dose in the last six months



Source: Sciensano.

Table 19 – Health system resilience

(ID)	Indicator	Score	Belgium	Flanders	Wallonia*	Brussels	Period	Source
R-1 ***New***	Healthcare professionals who consider leaving the profession (% of respondents, Power to Care)		Pre-shock ? Worst 27.6% Best 15.2% Recent 27.6%	Pre-shock ? Worst 28.6% Best 15.3% Recent 28.6%	Pre-shock ? Worst 26.7% Best 23.1%** Recent 24.0%	Pre-shock ? Worst 27.5% Best 9.3% Recent 22.8%	04/20-09/21 (** Wallonia 12/20-09/21)	Sciensano (Power to Care)
R-2 ***New***	Share of hospital beds that are closed due to absence of staff or force majeure		Pre-shock ? Worst 10.1% Best 5.4% Recent 7.2%	Pre-shock ? Worst 10.5% Best 4.9% Recent 6.4%	Pre-shock ? Worst 9.3% Best 5.5% Recent 8.7%	Pre-shock ? Worst 12.2% Best 7.1% Recent 7.1%	22/11/21-31/12/22	FPS Public Health (ICMS)
R-3	Number of nursing vacancies in hospitals		Pre-shock 1636.9 Worst 2675.7 Best 2258.3 Recent 2572.1	Pre-shock 908.3 Worst 1390.2 Best 1176.7 Recent 1293.6	Pre-shock 387.5 Worst 724.9 Best 593.9 Recent 704.6	Pre-shock 341.1 Worst 560.5 Best 487.8 Recent 573.9	31/12/19-31/12/21	FPS Public Health
R-4 ***New***	Number of essential surgical hospital acts (base 2019 = 100)		Pre-shock 100 Worst 56.9 Best 112.1 Recent 90.4	Pre-shock 100 Worst 60.5 Best 111.6 Recent 93.7	Pre-shock 100 Worst 53.7 Best 115.7 Recent 88.8	Pre-shock 100 Worst 51.1 Best 114.7 Recent 89.4	03/20-01/23	RIZIV – INAMI (Hospital Audit Unit)
R-5 ***New***	Number of new invasive cancer diagnoses (per month) (as a percentage of number of new invasive cancer diagnoses in the pre-COVID period)		Pre-shock 100% Worst 61.0% Best 119.9% Recent 112.2%	Pre-shock 100% Worst 63.2% Best 123.4% Recent 114.1%	Pre-shock 100% Worst 59.4% Best 114.2% Recent 109.5%	Pre-shock 100% Worst 51.7% Best 119.8 Recent 109.4%	01/20-12/21	Belgian Cancer Registry
R-6 ***New***	Hospitals with occupancy rate for COVID-19 patients in ICU licensed beds above 60% (% of general hospitals with ICU licensed beds)		Pre-shock ? Worst 80.6% Best 0% Recent 0%	Pre-shock ? Worst 76.5% Best 0% Recent 0%	Pre-shock ? Worst 100% Best 0% Recent 0%	Pre-shock ? Worst 90.9% Best 0% Recent 0%	20/03/20-31/12/22	FPS Public Health (ICMS and SC survey)
R-7 ***New***	Number of contacts (including teleconsultations) with a GP (as a percentage of the total number of contacts with a GP in the pre-COVID period)		Pre-shock 100% Worst 84.5% Best 133.1% Recent 120.0%	Pre-shock 100% Worst 82.5% Best 129.7% Recent 116.0%	Pre-shock 100% Worst 87.1% Best 140.5% Recent 127.2%	Pre-shock 100% Worst 85.2% Best 141.8% Recent 127.6%	01/20-12/21	RIZIV – INAMI
R-8 ***New***	Average duration between COVID-19 sampling and test result (days)		Worst 1.54 Best 0.36 Recent 0.36	Worst 1.44 Best 0.34 Recent 0.35	Worst 1.71 Best 0.34 Recent 0.34	Worst 1.71 Best 0.45 Recent 0.52	31/08/20-21/02/22	Sciensano

R-9 ***New***	Average duration between positive COVID-19 test result and contact tracing initiation (days)	🟡	Worst 1.23 Best 0.61 Recent 0.78	Worst 1.01 Best 0.58 Recent 0.70	Worst 1.65 Best 0.56 Recent 0.91	Worst 1.23 Best 0.63 Recent 0.76	31/08/20-11/10/21	Sciensano
R-10 ***New***	COVID vaccination in the last six months (at least one dose, % of the population)	🟡	Best 78.7% Recent 37.6%	Best 83.8% Recent 48.6%	Best 73.0% Recent 23.6%	Best 62.2% Recent 17.0%	28/12/20-19/11/22	Sciensano
R-11 ***New***	COVID vaccination in the last six months (at least one dose, % of the population 65+)	🟢	Best 92.3% Recent 65.8%	Best 95.5% Recent 73.8%	Best 87.8% Recent 54.5%	Best 78.6% Recent 45.9%	28/12/20-19/11/22	Sciensano

Good (🟢), average (🟡) or poor (🔴) results, globally stable (ST), improving (+) or trend not evaluated (empty).
For contextual indicators (no evaluation): upwards trend (↗), stable trend (→), downwards trend (↘), no trend (C). ** For R-10 and R-11, excluding German-speaking community.*

8.4 Impact of the COVID-19 crisis on other HSPA indicators

Besides the disruptions identified above, the COVID-19 crisis had an impact on many indicators and dimensions of the performance of the health system. However, because repeated data are lacking, it is not possible to measure the magnitude of the disruption, the length of the disruption and the magnitude of the rebound for all indicators. Nevertheless, Table 20 shows a comparison between results before and after/during the COVID-19 pandemic for a selection of relevant indicators identified in other dimensions of the Belgian HSPA framework.

Quality

A decrease in the total use of antibiotics in the ambulatory sector in Belgium (QA-3) was observed between 2016 and 2020, but 2020 shows a sharper fall (from 19.7 to 15.2 DDD per 1 000 inhabitants per day). This drop can be explained by several elements including a reduction of social contacts and therefore of transmission of communicable diseases and a reduction of the number of contacts with GPs. However, the trend then picked up in 2021, and over the next few years consumption will likely return to pre-crisis levels.

Imaging techniques for spine (QA-6) decreased from 10 153 examinations for 100 000 population in 2019 to 8 004 in 2020, as observed for many other hospital services during the pandemic. In 2021, the number of examinations has risen to a level between 2019 and 2020 (9 421 examinations per 100 000 population).

Hospital admission rate for asthma (QE-1) and for COPD (QE-10) both sharply decreased in 2020 compared to 2019, from 23.6 to 13.5 per 100 000 population for asthma and from 277.3 to 180.5 per 100 000 population for COPD. This is in line with the reduction of hospital regular care observed during the COVID-19 waves (see for instance R-4 above). In 2021, the hospital admission rate for asthma stayed close to its 2020 value (13.7 per 100 000 population) while the hospital admission rate for COPD decreased further (169.8 per 100 000 population).

Efficiency

The average length of stay for a normal delivery (E-2) fell from 2.99 days in 2019 to 2.71 days in 2020. This can at least partially be explained by the measures taken during the COVID-19 pandemic, such as early discharge or restricted visits. It is also possible that this led to more long-lasting changes in attitudes towards early discharges. In 2021, the average length of stay for a normal delivery was stable (2.69 days) compared 2020.

Accessibility

Out-of-pocket payments decreased due to lockdowns and the postponement of non-urgent care in response to COVID-19. In relative terms, OOP payments both as a share of current expenditure on health (A-2) and OOP medical spending as a share of final household consumption (A-3) had an important dip in 2020 and a small rebound in 2021. Interestingly, the EU average OOP medical spending as a share of final household consumption did not show a dip as in Belgium, but rather a small surge.

COVID-19 also had a profound impact on OOP payments for hospital care (A-5), with similar contraction rates for co-payments and supplements, for inpatient care and day care. The rebound differed, however, with lower growth rates for inpatient care and co-payments compared to day care and supplements. The combined effect was a decrease in the OOP share of hospital expenditure from 18.6% in 2019 to 17.1% in 2020 and subsequent rebound to 17.6% in 2021.

The COVID-19 crisis had an impact on postponement of care in general, but not on the downward trend in self-reported unmet needs due to financial reasons (A-6 and A-7). The COVID-19 related measures such as the lockdowns and reduction of non-urgent care had an impact on the access to medical and dental care. The impact is particularly pronounced in the EU-SILC wave 2021, with a substantial higher share of individuals aged 16+ who needed but were unable to receive medical care (resp. dental care) in the past 12 months (i.e. during the course of 2020 and early 2021) for all reasons combined: 2.2% in 2020, 3.0% in 2021 and 1.6% in 2022 (resp. 4.8% in 2020, 5.9% in 2021 and 3.9% in 2022). However, when examining the reasons of unmet needs, not financial reasons, but “other reasons” and “waiting lists” were listed as main reason for inaccessibility of care. The percentage of respondents with self-reported unmet medical need due to waiting lists (A-13B and A-14B) increased from 0.0%-0.1% in the four preceding years (2017-2020) to 0.5%-0.6% in 2021. In 2022, these percentages went back to their pre-COVID levels.

Sustainability

An increase in public funding of healthcare was observed during the COVID-19 pandemic. As a percentage of current expenditure on health, public funding of healthcare (S-3) increased by 2.67 percentage points between 2019 and 2020. This was mainly financed by an increase in transfers from government domestic revenue.

Preventive care

A substantial decrease in the estimated incidence of measles (P-5) was observed (from 38.1 cases per million to 4.0 cases per million), likely due to the restrictions put in place to stop the transmission of COVID-19. However, underreporting or delays in the notification of measles during the COVID-19 epidemic cannot be excluded. This decrease continued in 2021 (0.4 cases per million). On the other hand, an increase in the preventable mortality rates (P-13) is observed due to COVID-19 being added as a preventable cause of death.

Breast cancer screening (P-6 and P-7) also slowed down due to the COVID-19 crisis (see also R-6 above). The percentage of women aged 50-69 years who had a breast cancer screening decreased in 2020 compared to 2019. A bouncing back effect is observed in 2021, although the percentages are still lower than in 2019. In the same way, the percentage of the population aged 3 years and over with regular contacts with a dentist (P-11) decreased in 2020 compared to 2019 (from 55.7% to 54.4%). However, no direct bouncing back effect is observed, as it continued to decrease in 2021 (53.8%).

Influenza vaccination (P-4) benefitted from increased awareness during the COVID-19 period, so that the percentage of the population aged 65 years and over vaccinated increased from 52.9% in 2019 to 62.1% in 2020. In 2021, it decreased to 57.3%, which is still higher than in 2019.

Care for older people

The proportion of population aged 65 years and over receiving long-term care at home (OLD-2) slightly dropped in 2020 compared to 2019 (from 7.6% to 7.3%), likely due to the COVID-19 pandemic. In 2021, this proportion increased back to its 2019 level (7.6%).

End-of-life care

Over the period 2008-2019, the proportion of cancer patients who died at home (EOL-4) was more or less stable. In 2020 however there was an increase to 28.6% (from 22.6% in 2019), likely linked to the COVID-19 pandemic. No further data are available yet.

Table 20 – Impact of the COVID-19 crisis on other HSPA indicators

ID	Indicator	Pre-COVID value	Year	COVID value	Year	Post-COVID value	Year
	Quality						
QA-3	Use of antibiotics (total DDD/1000 inhabitants/day)	19.7	2019	15.2	2020	16.0	2021
QA-6	Spine imaging (X-ray, CT scan, MRI units per 100 000 population)	10 153	2019	8 004	2020	9 421	2021
QE-1	Asthma hospital admissions in adults (admission rate per 100 000 population)	23.6	2019	13.5	2020	13.7	2021
QE-10	Hospital admission for COPD in adults (admission rate per 100 000 population)	277.3	2019	180.5	2020	169.8	2021
	Efficiency						
E-2	Average length of stay for a normal delivery (days)	3.0	2019	2.7	2020	2.7	2021
	Accessibility						
A-2	Out-of-pocket (OOP) payments (% of current expenditure on health)	19.8	2019	17.4	2020	17.9	2021
A-3	Out-of-pocket (OOP) medical spending (% of final household consumption)	4.0	2019	3.6	2020	3.7	2021
A-5	Out-of-pocket (OOP) payments for hospital care (% of total hospital care expenditures (excluding budgetary twelfths))	18.6	2019	17.1	2020	17.6	2021
A-13a	People with self-reported unmet need for medical examination due to waiting time reasons (% of respondents, EU-SILC)	0.0	2020	0.5	2021	0.0	2022
A-14b	People with self-reported unmet need for dental care due to waiting time reasons (% of respondents, EU-SILC)	0.0	2020	0.6	2021	0.1	2022
	Sustainability						
S-3	Public funding of healthcare (% of current expenditure on health)	75.3	2019	77.9	2020	77.6	2021
	Preventive care						
P-4	Influenza vaccination (% pop aged ≥65 years)	52.9	2019	62.1	2020	57.3	2021

P-5	Incidence of measles (new cases per million population)	38.1	2019	4.0	2020	0.4	2021
P-6	Breast cancer screening (% women aged 50-69 years)	61.0	2019	57.7	2020	59.0	2021
P-7	Breast cancer screening - organised programme (% women aged 50-69 years)	32.3	2019	30.3	2020	31.5	2021
P-11	Regular contacts with dentist (% pop aged ≥3 years)	55.7	2019	54.4	2020	53.8	2021
P-13a	Preventable mortality, men (rate per100 000 population, age-adjusted)	193.4	2019	243.1	2020	-	-
P-13b	Preventable mortality, women (rate per100 000 population, age-adjusted)	91.6	2019	113.8	2020	-	-
	Care for older people						
OLD-2	Long-term home nursing care (% pop aged 65+)	7.6	2019	7.3	2020	7.6	2021
	End-of-life care						
EOL-4	Death at usual place of residence (home or in residential care) (% of cancer patients with poor prognosis who died)	22.6	2019	28.6	2020	-	-

8.5 Other indicators for health system resilience

Preparedness is one element of health system resilience. Table 21 describes two indicators of preparedness that are not specific to the COVID-19 pandemic: the perceived likelihood that government would be prepared for the next pandemic (R-13) and the country preparedness to public health risks and acute events (R-14). In 2021, approximately 37% of Belgian respondents to the OECD Survey on Drivers of Trust in Public Institutions ("Trust Survey") expressed confidence that the government would be prepared for the next pandemic, which was lower than in the EU-14 (49%) and EU-27 (48%) countries. Using a self-assessment tool, the all-capacity average International Health Regulations (IHR) score provides information about a country's preparedness capacity to public health risks and acute events. In 2022, Belgium's all-capacity average IHR score (63%) was lower than both the EU-14 (77%) and EU-27 (76%) average scores. Belgium's lowest IHR capacity scores were for "Policy, legal and normative instruments to implement IHR", "IHR Coordination, National IHR Focal Point functions and advocacy", "Zoonotic diseases" and "Food safety".

Table 21 also contains an indicator on the constitution of a workforce reserve (R-12). This indicator was judged highly relevant to assess resilience to the COVID-19 pandemic, but, as no repeated data were available, has not been included in the above analysis. During the COVID-19 pandemic, Belgium has set up reserve lists to support the actual practising health workforce, with registration possible via dedicated platforms. Based on data from the Federated entities, it appears that almost about 19 000 health professionals have registered on these platforms: 12 779 were registered in Flanders on 28 April 2021, 5 865 new registrations were done in Wallonia between 2020 and 2022, 133 registrations were done in Brussels between August 2020 and December 2020 and 37 registrations were done for the German-speaking Community (no reference period given).

Table 21 – Other indicators for health system resilience

(ID)	Indicator	Score	Year	Flanders	Wallonia	Brussels	German Community	Source
R-12 *New*	Number of health professionals registered in workforce reserve	C	2020-2021	~12 779	~5 865	~133	~37	Federated entities

(ID)	Indicator	Score	Belgium	Year	Source	EU-14	EU-27
R-13 *New*	People who perceived that the government is likely to be prepared for the next pandemic (% of respondents, Trust)	poor (red)	37	2021	OECD Trust Survey	49	48
R-14 *New*	Country preparedness to public health risks and acute events (average score on a 1-100 scale)	average (yellow), –	63	2022	SPAR, WHO	77	76

Good (green), average (yellow) or poor (red) results, globally stable (ST), improving (+) or trend not evaluated (empty).
For contextual indicators (no evaluation): upwards trend (↗), stable trend (→), downwards trend (↘), no trend (C).

Conclusion

As in many other countries, the Belgian health system performance was affected by the COVID-19 pandemic crisis. During the first waves of the epidemic, indicators related to workforce, essential health services and routine public health services showed major disruptions. However, after this shock, the system showed some resilience, and a large group of indicators bounced back more or less rapidly to their pre-crisis level. Although it is premature to assess the extent of the rebound post-crisis, for many HSPA indicators, results in 2021 are better than in 2020, sometimes back to the 2019 level. The Belgian health system has also been able to adapt and transform itself, for instance limiting overcrowding in ICU by transfers between hospitals, developing teleconsultations, and implementing vaccination programs.

However, for indicators related to the system's ability to provide an adequate workforce, the situation is more alarming. In this chapter, indicators measuring healthcare professionals' well-being and absenteeism are analysed. Although these indicators are imperfect and only partially measure well-being and absenteeism, no bouncing back can be observed yet.

Also, confidence in the public authorities' preparedness for future crises is limited.