

Monitoring Belgian COVID-19 infections in work sectors in 2022

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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.

Additionally, information on absenteeism per paritair comité in the entire year 2021 is provided by RSZ/ONSS for ~ 1.33 million of the ~ 4.5 million employees. Per paritair comité, weekly data is available for days worked and for days not worked. The latter is subdivided into temporary unemployment (including Corona force majeure, quarantine, child care, economic reason, . . .), sickness ≥ 30 days, sickness < 30 days and other. Limitations of the absenteeism data is that not all employees are covered and only includes year 2021. Moreover, absenteeism information is available only at the level of paritair comité and not the NACE-BEL code. In order to estimate absenteeism based on COVID-19 incidence, only very specific sectors for which a reasonable match exists between paritair comité and NACE-BEL code can be evaluated.

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 contain pupils. In schools, a considerable amount 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

2.1.1 COVID-19 14-day incidence

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 backtransformed 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 (18 –31 January 2022) 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 worker 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.

2.1.2 Absenteeism

To estimate the relationship between absenteeism and 14-day COVID-19 incidence, a linear model is fitted to the data. Absenteeism including temporary unemployment and sickness, y_w^{tus} , is expressed as a linear effect of 14-day incidence x_w , with or without the stringency index s_w , and a possible non-linear weekly effect w :

$$y_w^{tus} = \beta_0^{tus} + \beta_1^{tus} x_w + \beta_2^{tus} s_w + f(w) + \epsilon_w^{tus},$$

where w are the weeks 1 to 52 and $\epsilon_w^{tus} \sim N(0, \sigma_{tus}^2)$. The stringency index is a summary measure, that expresses the level of stringency of the COVID-19 mitigation measures on a scale from 0 to 100 (with 100 the most strict). The stringency index is extracted from Our World in Data and helps to explain part of absenteeism due to temporary unemployment. The possible non-linear weekly effect $f(w)$ is modelled with fractional polynomials, piecewise linear functions or splines.

Absenteeism due to sickness only, y_w^s , is modelled by a linear effect of 14-day incidence x_w :

$$y_w^s = \beta_0^s + \beta_1^s x_w + \epsilon_w^s, \tag{1}$$

where w are the weeks 1 to 52 and $\epsilon_w^s \sim N(0, \sigma_s^2)$. As absenteeism due to only sickness does not include temporary unemployment due to Corona force majeure, the stringency index is not expected to improve the model.

As both absenteeism and COVID-19 14-day incidence are time series, it is expected that serial autocorrelation is present. While estimation of the β parameters by ordinary least squares is unbiased in the presence of autocorrelation, the estimation of the variance is biased. Therefore, the ordinary least squares variance estimation in both models for absenteeism is corrected with the Andrews & Monahan sandwich estimator, without pre-whitening, which corrects for both serial autocorrelation and heteroskedasticity. Both the Wald 95% confidence interval for the β parameters and the partial quasi-t tests for testing whether the parameter is different from zero, are based on the sandwich variance estimator. The inference is thus corrected for serial autocorrelation in the time series.

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 2020–19 January 2022) 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 20 sectors at level 1, the sector with a 14-day incidence on 31 January 2022 significantly above the working population average is Education (sector P) and Human health and social work activities (sector Q) (Table 1 and Figure 1). While the increase in the 14-day incidences in most sectors shows indication of leveling off, the incidence Education (sector P), Human health and social work activities (sector Q) and Public administration and defence; compulsory social security (sector O) continues to increase sharply.

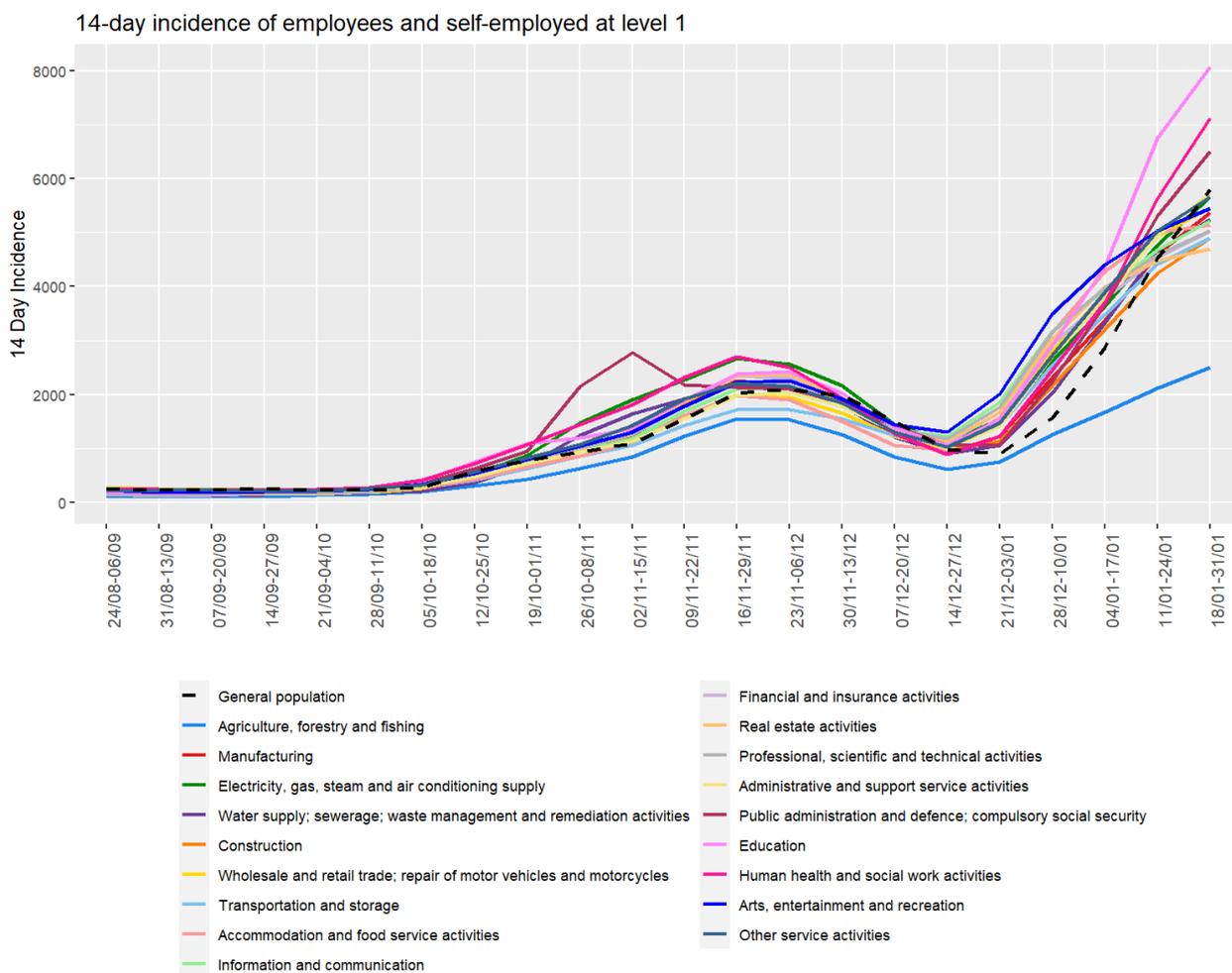


Figure 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 in both employees and self-employed workers

Table 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 on 31 January 2022

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	722518	8078(8015;8141)	8156(8092;8221)	6006(5725;6300)	3.73
Human health and social work activities	Q	653884	7119(7057;7182)	7293(7227;7359)	5170(4986;5360)	8.51
Working population		4548435	6743(6720;6766)	6743(6720;6766)		
Public administration and defence; compulsory social security	O	578331	6507(6444;6571)	6513(6450;6577)		0.18
Administrative and support service activities	N	436052	5739(5670;5808)	6087(6009;6166)	4172(4035;4313)	18.61
Other service activities	S	158952	5669(5556;5784)	6129(5966;6297)	5194(5041;5352)	50.25
Electricity, gas, steam and air conditioning supply	D	21381	5664(5362;5982)	5803(5488;6135)		6.20
Wholesale and retail trade; repair of motor vehicles and motorcycles	G	822884	5471(5422;5520)	5966(5908;6025)	3800(3715;3887)	23.45
Arts, entertainment and recreation	R	96880	5448(5307;5593)	6032(5839;6231)	4615(4413;4825)	41.93
Manufacturing	C	616980	5371(5315;5428)	5528(5468;5589)	4021(3872;4176)	10.55
Water supply; sewerage; waste management and remediation activities	E	35870	5244(5018;5480)	5323(5088;5569)		6.64
Information and communication	J	183030	5215(5114;5318)	5441(5318;5566)	4681(4507;4862)	30.35
Accommodation and food service activities	I	280486	5140(5059;5222)	5745(5646;5845)	3340(3210;3475)	26.05
Financial and insurance activities	K	158984	5037(4931;5146)	5402(5277;5529)	3757(3563;3961)	22.34
Professional, scientific and technical activities	M	392670	5034(4966;5103)	5627(5529;5727)	4372(4280;4466)	47.95
Construction	F	379527	4904(4836;4973)	5620(5526;5716)	3850(3755;3947)	41.38
Transportation and storage	H	307232	4895(4819;4972)	5032(4951;5114)	3555(3346;3776)	9.43
Real estate activities	L	58333	4704(4535;4879)	6157(5863;6465)	3647(3452;3852)	58.83
Agriculture, forestry and fishing	A	79303	2498(2392;2609)	2602(2418;2800)	2446(2317;2582)	66.97
General population			5802	5802	5802	

3.2 Level 2 work sector

In the sectors at level 2 with a minimum of 5,000 workers, the sectors with the highest 14-day incidence on 31 January 2022 are: Education (sector 85), Health and care sector (sector 86,87), Social work without accommodation (sector 88), several Manufacture activities (sector 30, 21, 28, 24) and Employment activities (sector 78) (Table 2 and Figure 2).

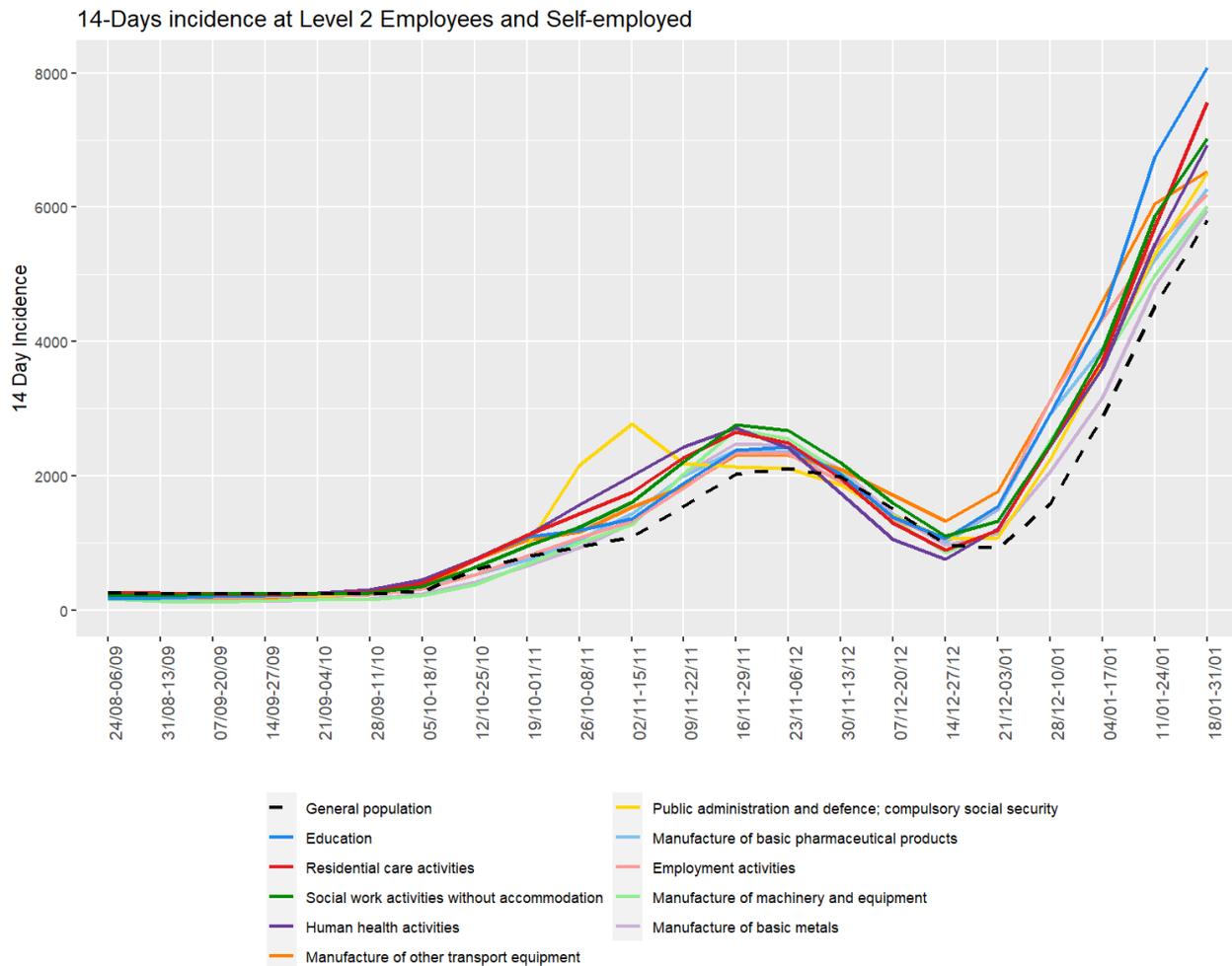


Figure 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 in both employees and self-employed workers

Table 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 31 January 2022

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	85	722518	8078(8015;8141)	8156(8092;8221)	6006(5725;6300)	3.73
Residential care activities	87	167747	7562(7436;7689)	7616(7489;7745)	3691(2994;4543)	1.40
Social work activities without accommodation	88	172571	7018(6898;7139)	7049(6927;7173)	6061(5456;6728)	3.24
Human health activities	86	314808	6922(6834;7011)	7246(7148;7345)	5087(4892;5289)	15.35
Working population		4548435	6743(6720;6766)	6743(6720;6766)		
Manufacture of other transport equipment	30	6510	6528(5953;7154)	6802(6197;7462)		6.29
Public administration and defence; compulsory social security	84	578331	6507(6444;6571)	6513(6450;6577)		0.18
Manufacture of basic pharmaceutical products and pharmaceutical preparations	21	35133	6279(6030;6537)	6308(6057;6569)		1.32
Employment activities	78	80996	6183(6019;6351)	6267(6099;6439)	4070(3428;4826)	3.83
Manufacture of machinery and equipment n.e.c.	28	37359	6020(5783;6266)	6231(5981;6491)	3484(2872;4221)	7.69
Manufacture of basic metals	24	25604	5956(5673;6253)	6006(5717;6308)		2.97
General population			5802	5802	5802	

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 31 January 2022 significantly higher than the working population average are: Primary and Secondary education (sector 853, 852), Residential care activities (sector 879, 871, 873, 872), Hospital activities (sector 861), Other social work without accommodation (sector 889) and Activities of call centres (sector 822) (Table 3 and Figure 3).

After the seasonal holidays, the 14-day incidence in the primary and secondary schools increased much sharper than in other and certainly higher education (Figure 4). The increase in primary and secondary education goes well beyond the working population average. 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.

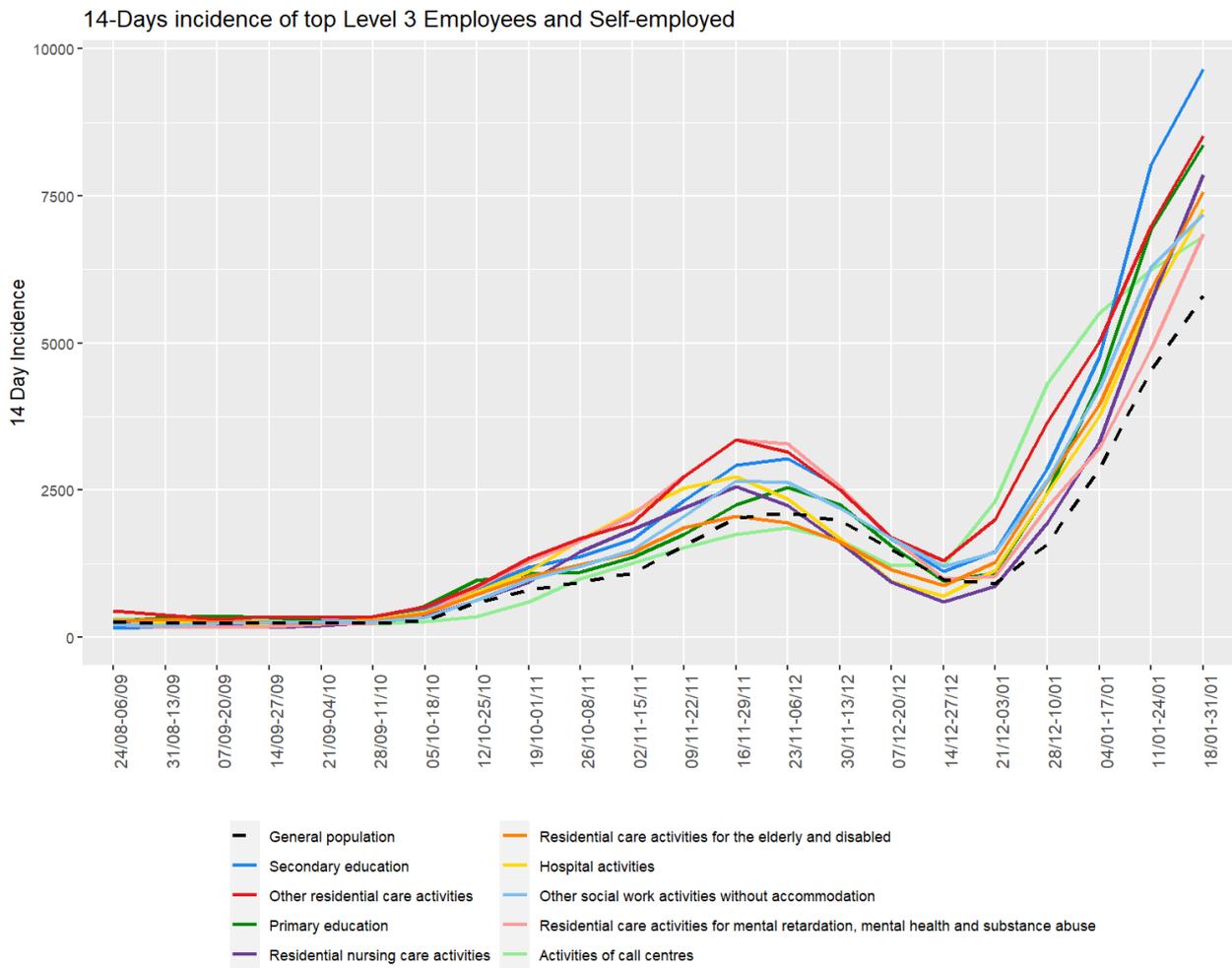


Figure 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 in both employees and self-employed

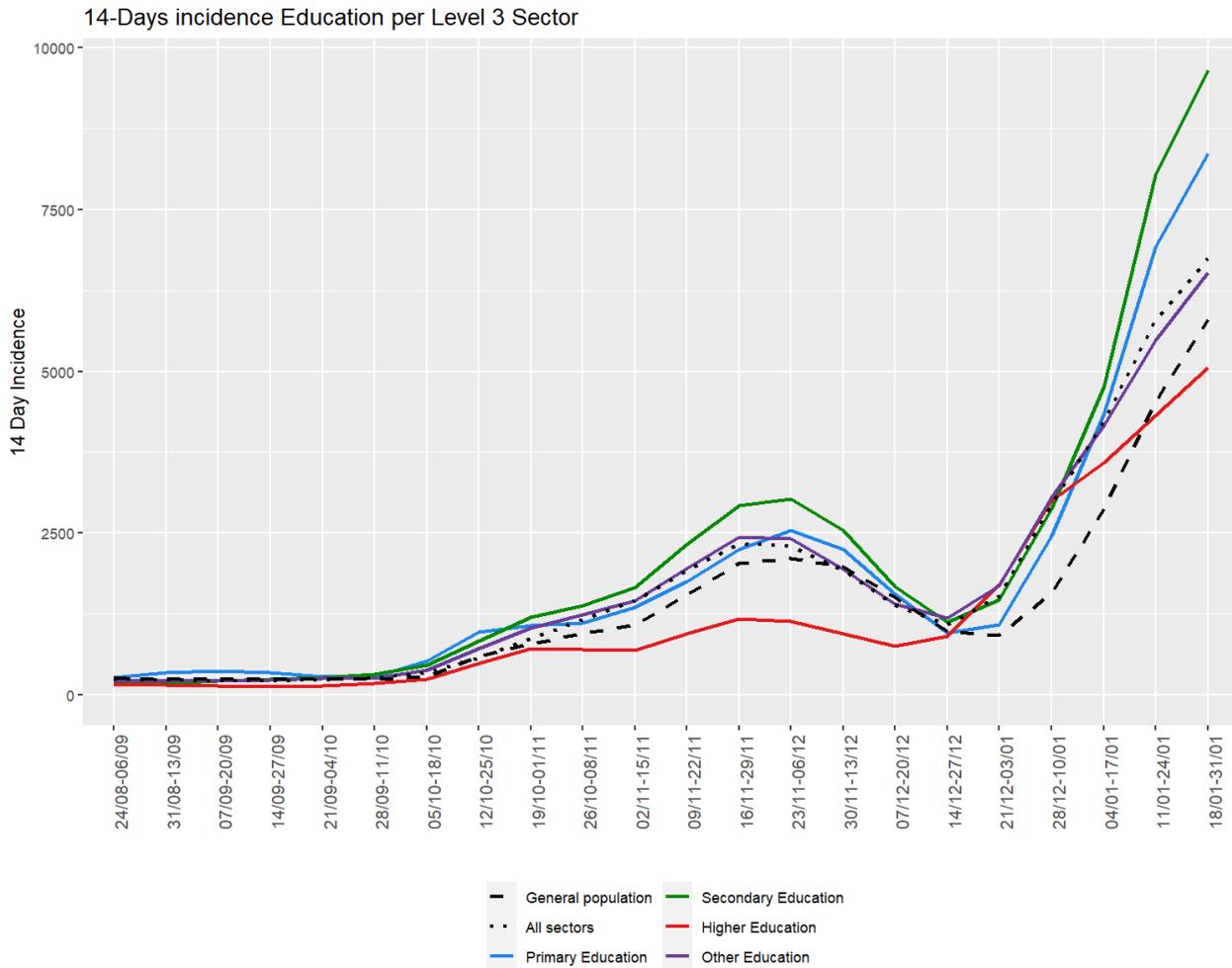


Figure 4: 14-Day incidence of COVID-19 infection in Education sectors at Level 3 in both employees and self-employed

Table 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 on 31 January 2022

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
Secondary education	853	448949	9659(9573;9746)	9671(9585;9758)		0.19
Other residential care activities	879	16288	8528(8109;8967)	8716(8285;9167)		3.58
Primary education	852	8616	8368(7802;8972)	8804(8198;9450)		8.55
Residential nursing care activities	871	41099	7864(7608;8128)	7907(7649;8173)		0.99
Residential care activities for the elderly and disabled	873	68376	7567(7371;7768)	7608(7410;7810)		1.30
Hospital activities	861	215638	7277(7168;7387)	7294(7185;7405)		0.33
Other social work activities without accommodation	889	120258	7197(7052;7344)	7242(7094;7393)	6162(5531;6860)	4.23
Residential care activities for mental retardation, mental health and substance abuse	872	42273	6853(6616;7098)	6929(6689;7177)		1.79
Activities of call centres	822	12841	6822(6399;7271)	6867(6439;7321)		1.68
Working population		4548435	6743(6720;6766)	6743(6720;6766)		
General population			5802	5802	5802	

3.4 Level 4 work sector

In the sectors at level 4 with a minimum of 3,000 workers, the sectors with a 14-day incidence on 31 January 2022 significantly higher than the working population average are: Child day-care (sector 8891), Education (sector 8531, 8520, 8532, 8551), Residential care (sector 8790, 8710, 8730), Regulation of providing health care, education, cultura and other services (sector 8412), Retail sale of cosmetics (sector 4775), Fitness facilities (sector 9313) and Hospital activities (sector 86100) (Table 4 and Figure 5).

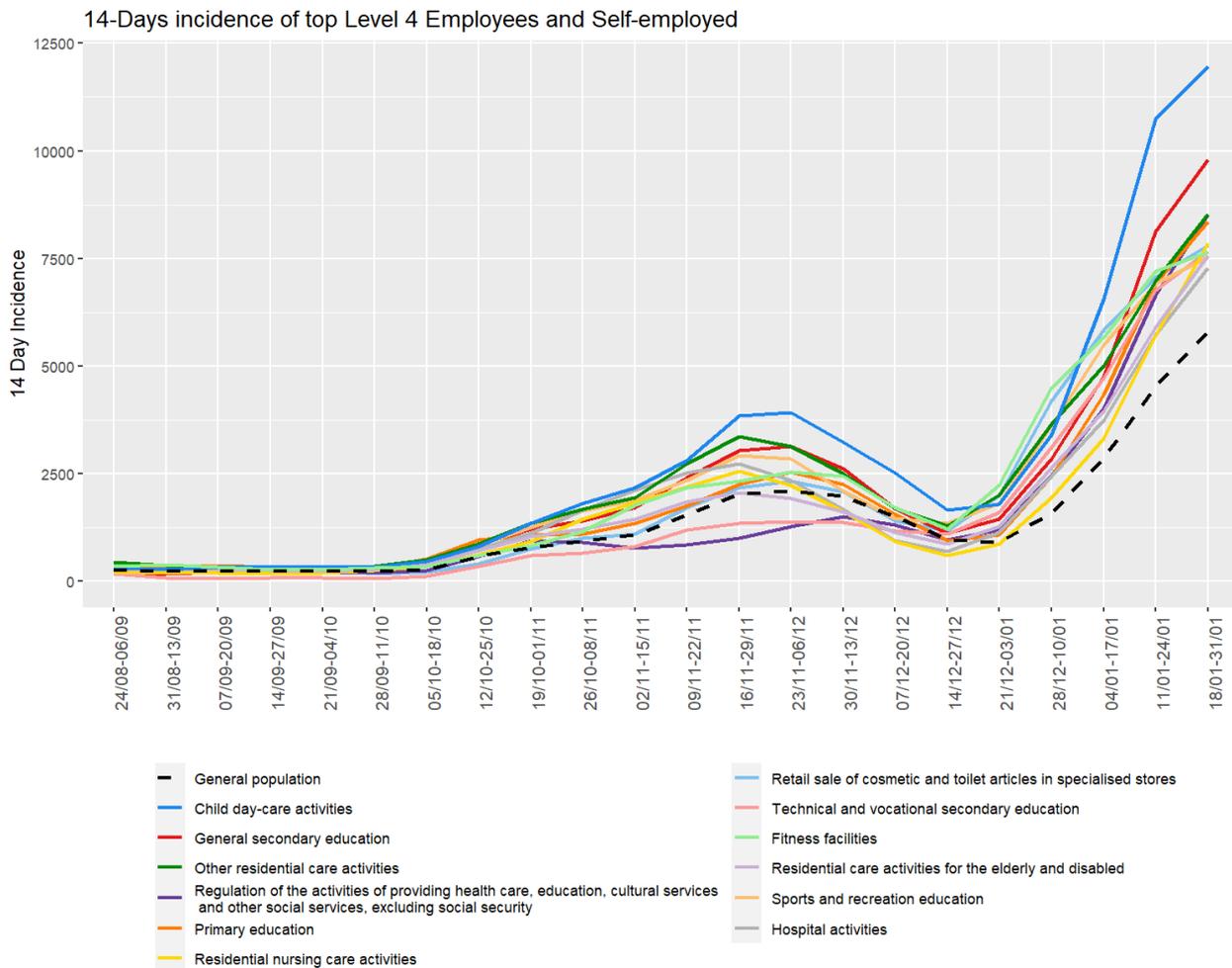


Figure 5: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 in both employees and self-employed

Table 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 on 31 January 2022

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
Child day-care activities	8891	28487	11960(11588;12342)	12173(11786;12571)		6.34
General secondary education	8531	419255	9800(9710;9890)	9810(9720;9900)		0.16
Other residential care activities	8790	16288	8528(8109;8967)	8716(8285;9167)		3.58
Regulation of the activities of providing health care, education, cultural services and other social services, excluding social security	8412	40722	8509(8242;8784)	8517(8249;8793)		0.33
Primary education	8520	8616	8368(7802;8972)	8804(8198;9450)		8.55
Residential nursing care activities	8710	41099	7864(7608;8128)	7907(7649;8173)		0.99
Retail sale of cosmetic and toilet articles in specialised stores	4775	8861	7798(7258;8375)	8448(7817;9125)	5437(4506;6547)	21.77
Technical and vocational secondary education	8532	29664	7676(7378;7984)	7699(7400;8009)		0.69
Fitness facilities	9313	5471	7658(6982;8393)	8106(7314;8975)		24.36
Residential care activities for the elderly and disabled	8730	68376	7567(7371;7768)	7608(7410;7810)		1.30
Sports and recreation education	8551	9744	7533(7025;8074)		7421(6889;7990)	90.45
Hospital activities	8610	215638	7277(7168;7387)	7294(7185;7405)		0.33
Working population		4548435	6743(6720;6766)	6743(6720;6766)		
General population			5802	5802	5802	

3.5 Level 5 work sector

In the sectors at level 5 with a minimum of 3,000 workers, the sectors with a 14-day incidence on 31 January 2022 significantly higher than the working population average are: Nurseries and crèches (sector 88911), Secondary education (sector 85314, 85319, 85311, 85321, 85324, 85204), Integrated youth work with housing (sector 87901), Regulation of providing health care, education, cultura and other services (sector 84120), Youth work associations (sector 94991), Residential care (sector 87201, 87101, 87301), Retail sale (sector 47750, 47192), Fitness centres (sector 93130), Mental health activities (sector 86904), Sports and recreation education (sector 85510), Education for Social promotion (sector 85591), General hospitals (sector 86101) and Public centers for social welfare (sector 84115) (Table 5 and Figure 6).

14-Days incidence of top 15 Level 5 Employees and Self-employed

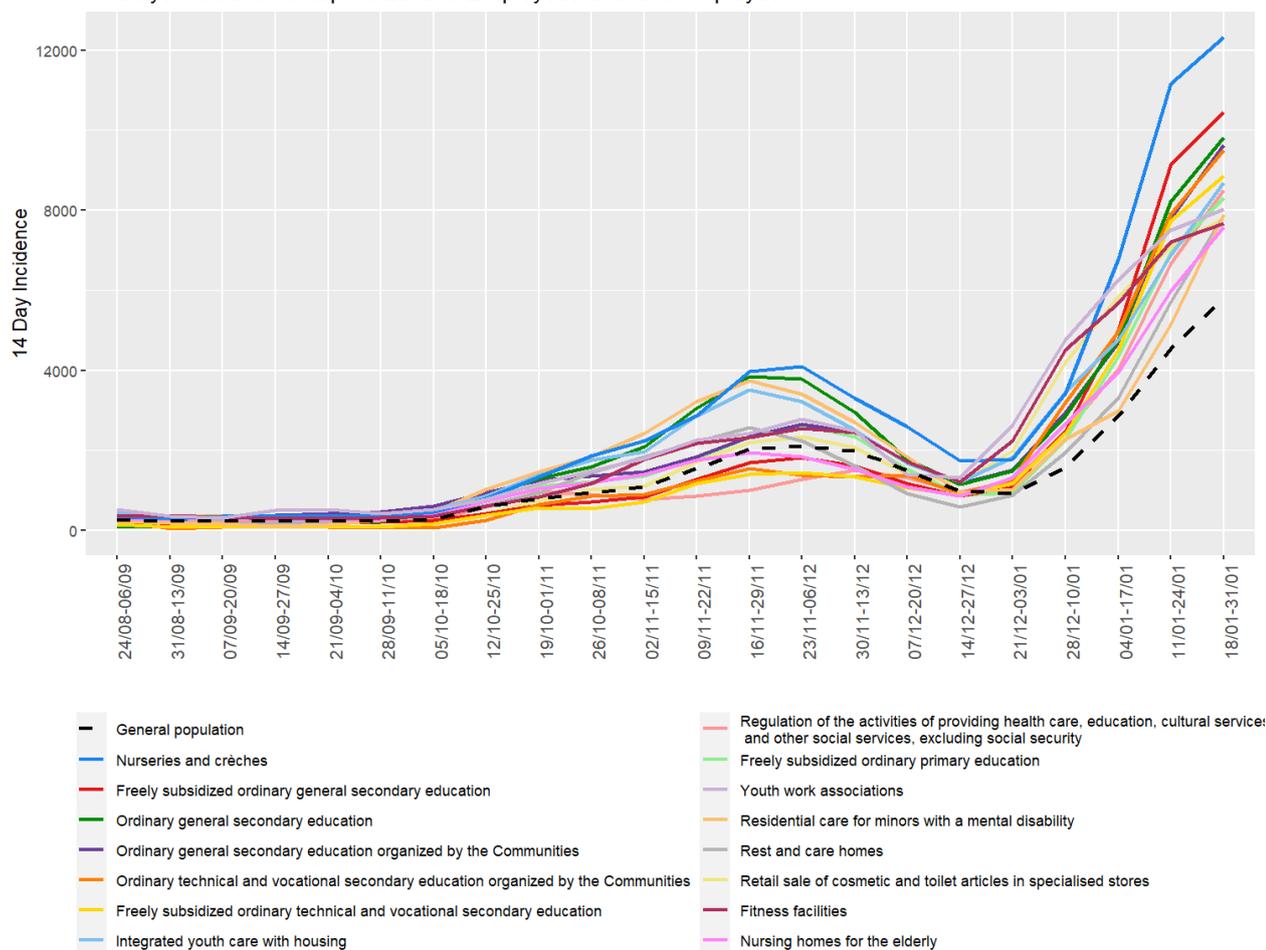


Figure 6: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 5 in both employees and self-employed

Table 5: 14-Day incidence of COVID-19 infection of sectors with the highest incidence at Level 5 on 31 January 2022

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
Nurseries and crèches	88911	25172	12327(11927;12739)	12566(12149;12995)	8844(7554;10329)	5.22
Freely subsidized ordinary general secondary education	85314	42614	10445(10158;10739)	10554(10264;10851)		1.41
Ordinary general secondary education	85319	209649	9814(9687;9942)	9815(9688;9943)		0.02
Ordinary general secondary education organized by the Communities	85311	164624	9628(9486;9771)	9628(9486;9771)		0.01
Ordinary technical and vocational secondary education organized by the Communities	85321	4896	9497(8707;10351)	9482(8692;10335)		0.06
Freely subsidized ordinary technical and vocational secondary education	85324	14648	8861(8411;9332)	8898(8446;9372)		0.72
Integrated youth care with housing	87901	12506	8700(8219;9207)	8866(8373;9385)		2.88
Regulation of the activities of providing health care, education, cultural services and other social services, excluding social security	84120	40722	8509(8242;8784)	8517(8249;8793)		0.33
Freely subsidized ordinary primary education	85204	6889	8318(7689;8994)	8802(8125;9530)		9.17
Youth work associations	94991	4973	8023(7300;8811)	8492(7714;9341)		9.21
Residential care for minors with a mental disability	87201	9085	7892(7355;8465)	7949(7407;8527)		1.27
Rest and care homes	87101	41065	7868(7612;8132)	7911(7653;8177)		0.95
Retail sale of cosmetic and toilet articles in specialised stores	47750	8861	7798(7258;8375)	8448(7817;9125)	5437(4506;6547)	21.77
Fitness facilities	93130	5471	7658(6982;8393)	8106(7314;8975)		24.36
Nursing homes for the elderly	87301	58387	7589(7377;7807)	7633(7419;7852)		1.09
Mental health activities	86904	6926	7537(6938;8183)	7596(6739;8552)	7483(6671;8385)	53.55
Sports and recreation education	85510	9744	7533(7025;8074)		7421(6889;7990)	90.45
Education for Social Promotion	85591	5237	7485(6803;8230)	7589(6896;8346)		29.19
General hospitals	86101	177569	7356(7235;7478)	7369(7248;7492)		0.26
Retail trade in non-specialized stores where food, beverages and tobacco do not predominate (sales area from 2500 m ²)	47192	10748	7350(6872;7859)	7478(6989;7998)		2.87
Public Centers for Social Welfare	84115	93933	7269(7105;7437)	7275(7111;7443)		0.14
Working population		4548435	6743(6720;6766)	6743(6720;6766)		
General population			5802	5802	5802	

Finally, when considering specifically the non-medical contact professions, we continue to see that the incidence in the employees is higher than the incidence in the self-employed. Moreover, the average incidence in the beauty saloons is similar to the working population average, while the average incidence in the hairdressers is similar to the general population average. (Figure 7).

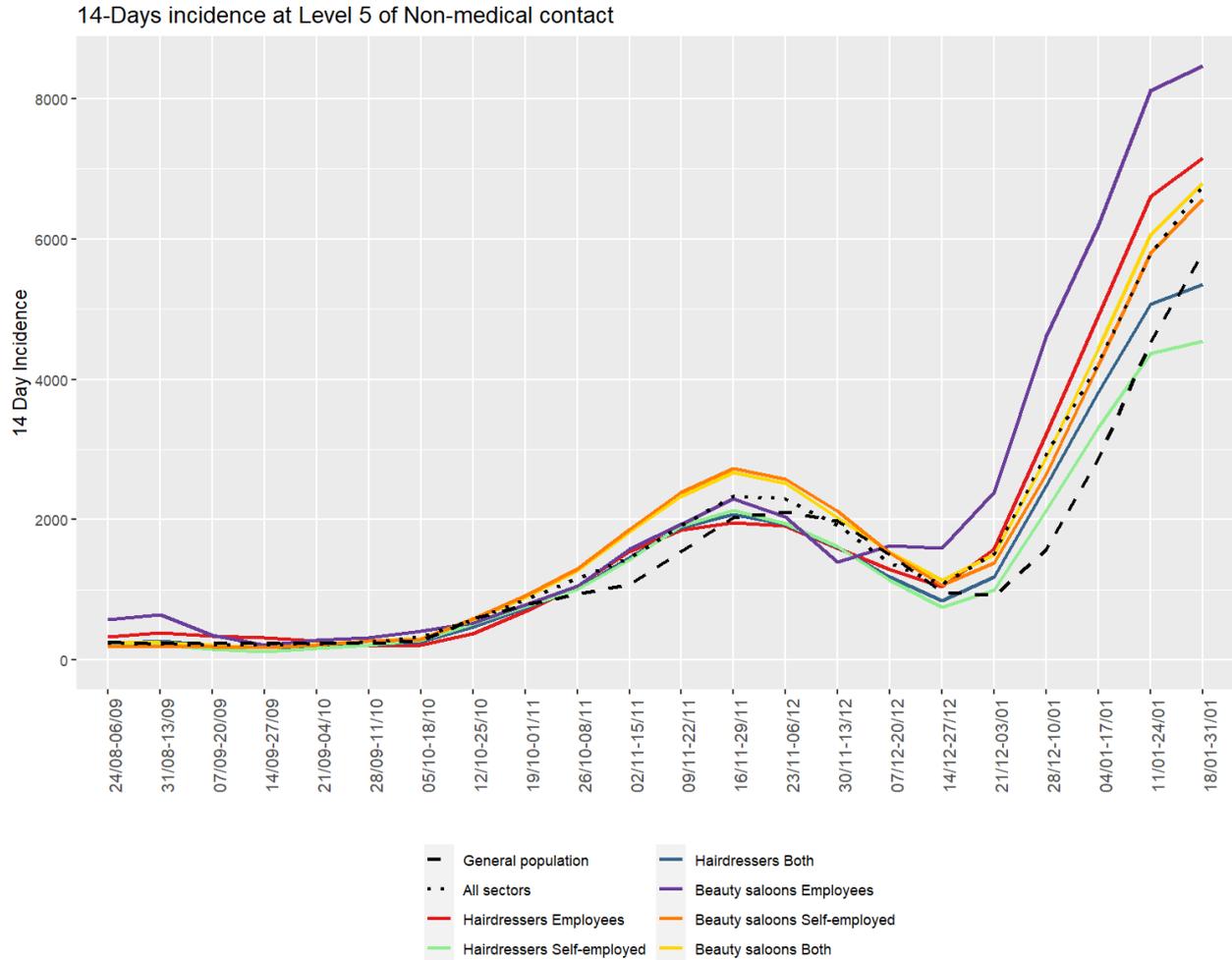


Figure 7: 14-Day incidence of COVID-19 infection at Level 5 of non-medical contact professions.

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 8).

The 14-day incidence in the Education (sector P) and Human health and social work sector (sector Q) are elevated compared to the working and general population (Figure 8). The increased incidence in Education comes primarily from the increase in incidences in all subsections of Secondary education and Primary education, while in the health and social work sector the increase in incidence is broadly present, mostly in Residential care, with an extreme in Child day-care activities

Although the 14-day incidence in Public administration and defence (sector O), Other service activities (sector S) and Arts, entertainment and recreation (sector R) is around or below the working population average, individual subsectors show an increased incidence. Regulation of providing social services (sector 8412), Youth associations (sector 94991), Beauty salons (sector 96022), Operation of arts facilities (sector 9004) and Fitness facilities (sector 9313) all show increased incidences compared to the working population.

It is encouraging that the incidence in Accommodation and food service activities (sector I) and Transportation and storage (sector H) is similar to or below the general 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, while only two retail trade sectors (Retail sale in non-specialised stores and cosmetics (sector 4719, 4775)) show an increased incidence compared to the working population average (Figure 8).

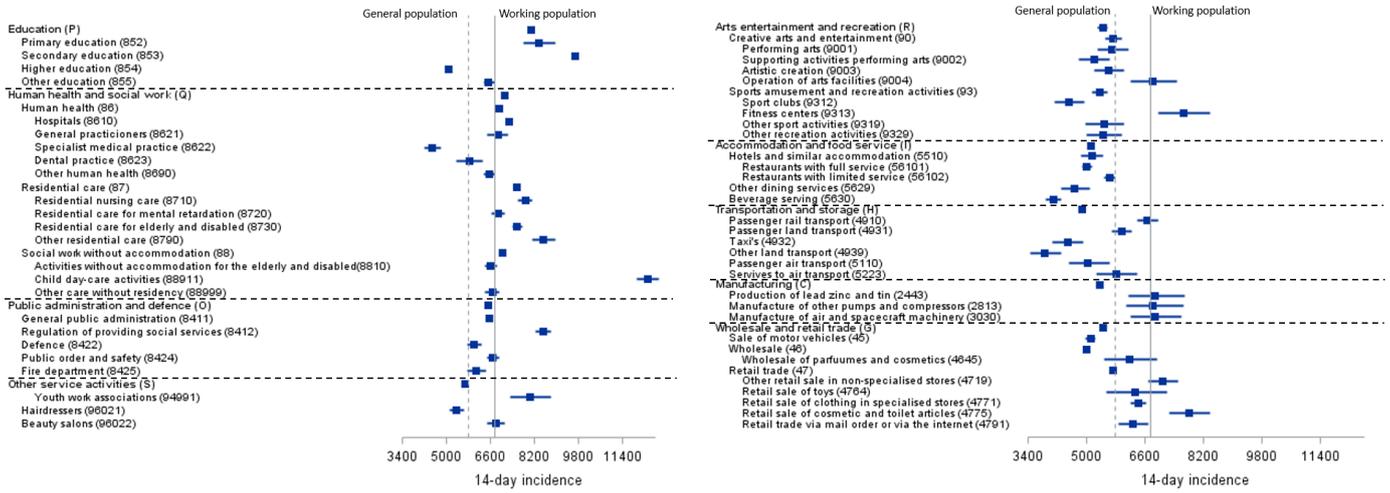


Figure 8: Forest plot of 14-Day incidence and 95% CI of selected sectors on 31 January 2022 in both employees and self-employed.

3.6.2 Absenteeism

With increasing 14-day incidences to levels higher than ever measured, absenteeism at work is a cause of concern for the continuity of activities in companies, sectors and for the chain of economic activities. Information on days worked and on the reason of days not worked in the entire year 2021 is provided by RSZ/ONSS for ~ 1.33 million of the ~ 4.5 million employees. We consider two forms of absenteeism: (1) Absenteeism due to temporary unemployment (including Corona force majeure, quarantine, child care, economic reason,...) and sickness and (2) absenteeism only due to sickness. Of each form of absenteeism, the proportion of days not worked are weekly aggregated over all sectors (Figure 9).

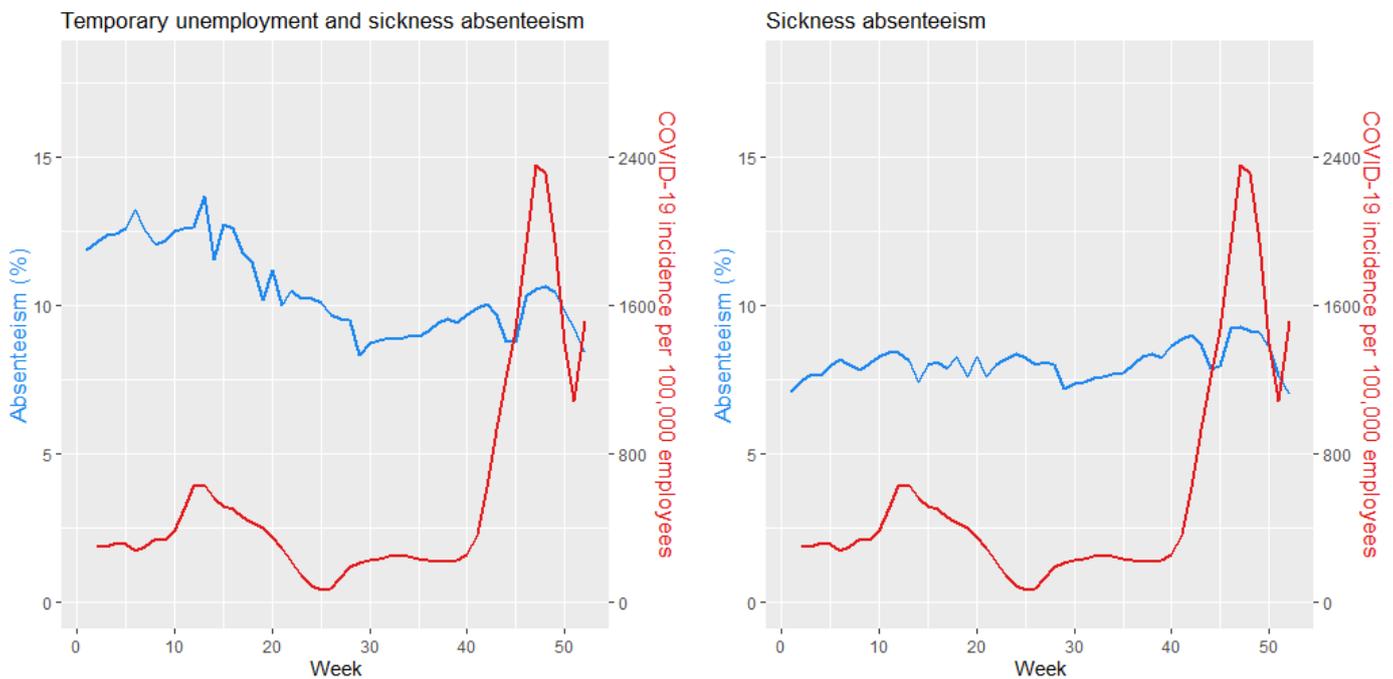


Figure 9: Absenteeism due to temporary employment and sickness and 14-Day incidence of COVID-19 per week in 2021 (left) and Absenteeism due to sickness only (right).

Absenteeism in the year 2021 can roughly be divided into 2 parts. The first half of 2021 is characterized by a higher level of temporary unemployment, likely due to force majeure as a consequence of the mitigation measures (non-pharmaceutical interventions), evidenced by the higher stringency index (Figure 10). The stringency index is a summary measure, that expresses the level of stringency of the COVID-19 mitigation measures on a scale from 0 to 100 (with 100 the most strict). The stringency index is extracted from Our World in Data and helps to explain part of absenteeism due to temporary unemployment. The second half of

2021 is characterized by an increase in absenteeism due to sickness (Figure 10).

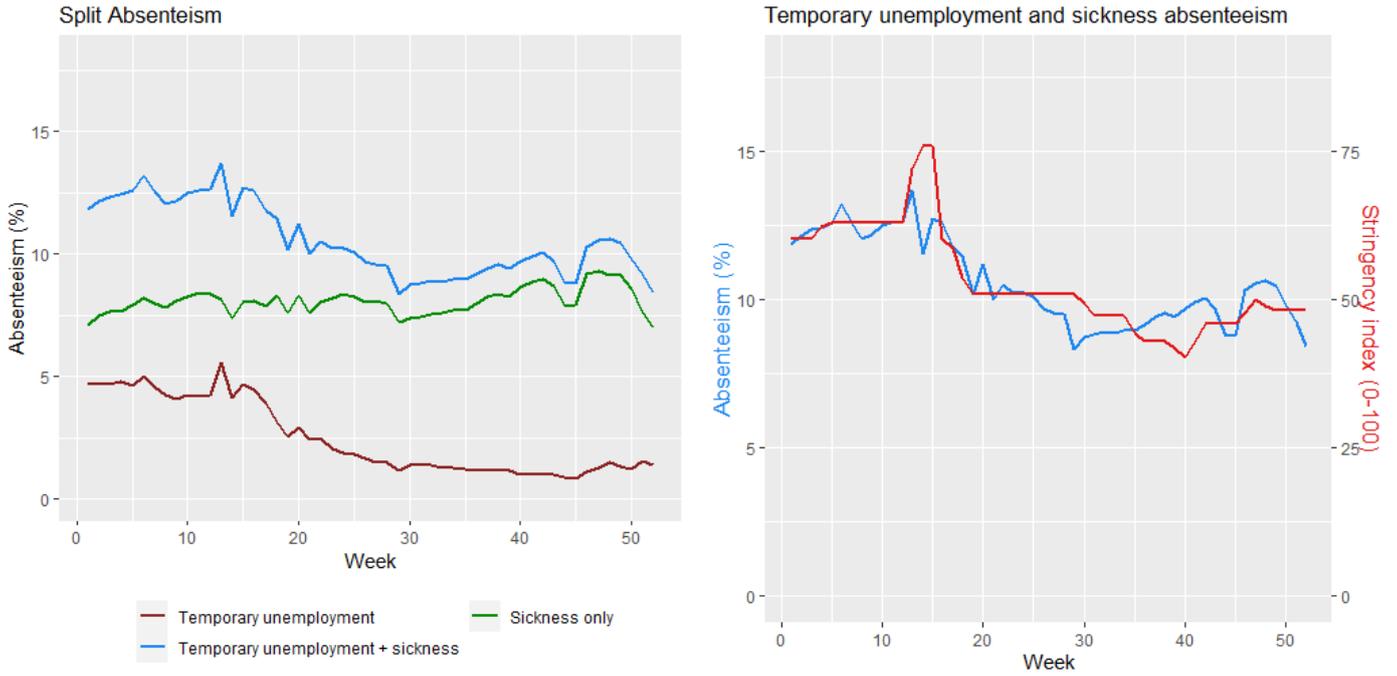


Figure 10: Split of the absenteeism in 2021 by reason of absenteeism (left) and the stringency index versus absenteeism due to temporary employment and sickness (right).

When modelling the effect of increasing 14-day incidences on absenteeism due to temporary employment and sickness, while correcting for a linear time effect and for stringency, an increase of 1000 in the 14-day COVID-19 incidence leads to an increase of absenteeism by on average 1.07% (95% confidence interval: 0.51–1.63) and 1.40 (0.82–1.98)% excluding stringency. When using the weekly COVID-19 incidence, rather than the 14-day incidence, an increase of 1000 in the incidence increases absenteeism by on average 1.71 (0.49–2.92)% including the stringency index and by 2.48 (1.26–3.71)% excluding the stringency index. The baseline absenteeism (absenteeism with a zero COVID-19 incidence) is estimated between 6.7 and 13%, depending on the model (Figure 11 (left)). In model comparisons, of all the non-linear weekly effect $f(w)$ modelled, a linear weekly effect seem to fit the data best.

When modelling the effect of increasing 14-day incidences on absenteeism due to sickness only, no correction for stringency is needed. With an increase of 1000 in the 14-day COVID-19 incidence increases the absenteeism due to sickness by 0.44% (0.27–0.62) and the estimated baseline absenteeism due to sickness is 7.84% (7.63–8.04) (Figure 11 (right)).

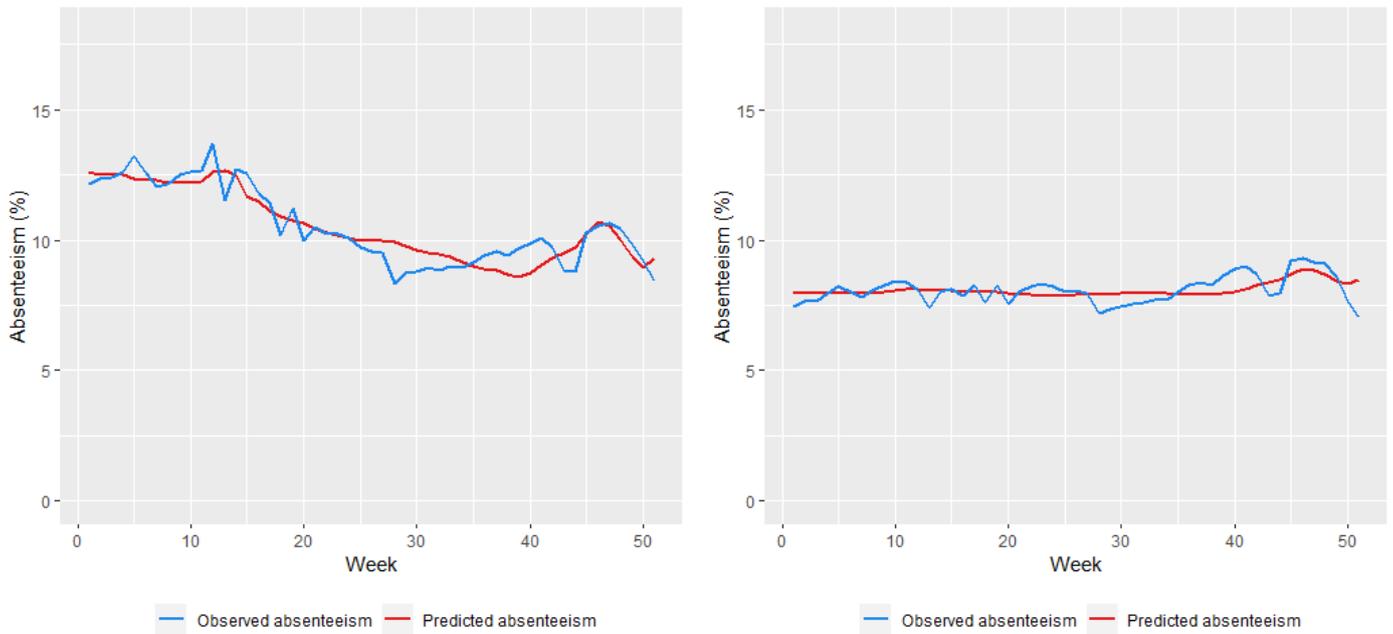


Figure 11: Prediction of absenteeism due to temporary employment and sickness (left) and prediction of absenteeism due to sickness only by the linear models (right).

Absenteeism may however also depend on the work context, such as the possibility of teleworking and the contact risk environment. In sectors where employees are not able to telework and/or have regular high-risk contacts on the workforce, a SARS-CoV-2 infection may lead more often to absenteeism than in sectors where employees can telework.

The Health care, Food processing, and Horeca sectors are sectors where telework is not possible. Moreover, the first sector is an essential sector which was not impacted by mitigation measures, while the latter two were impacted by mitigation measures, but in a different degree (Figure 12). In the bank sector in theory teleworking would be possible and a SARS-CoV-2 infected employee may be able to continue to work from home if his or her health status would allow it. Consequently, absenteeism in the bank sector was not impacted by mitigation measures in 2021 (Figure 12).

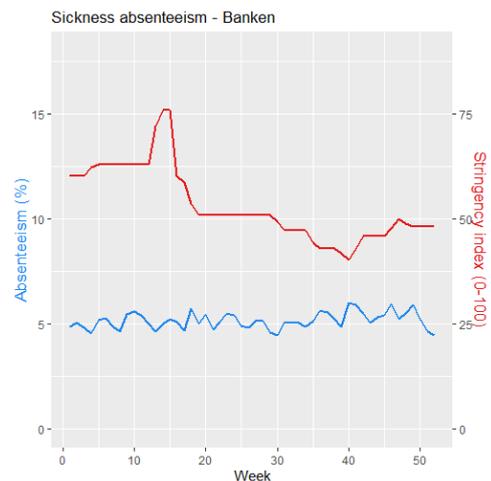
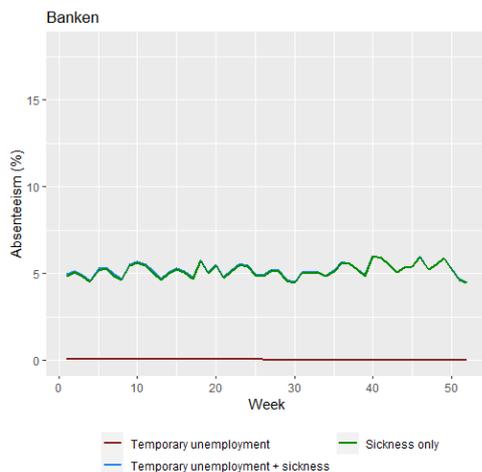
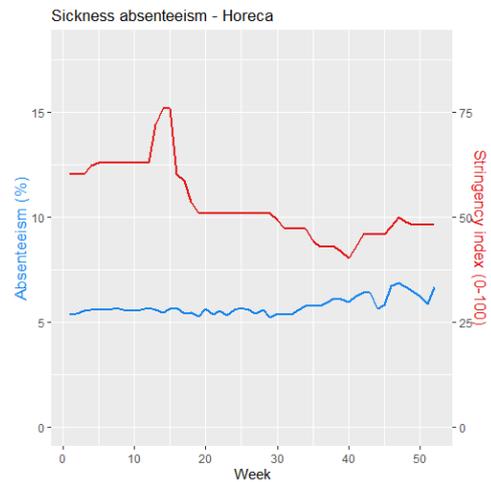
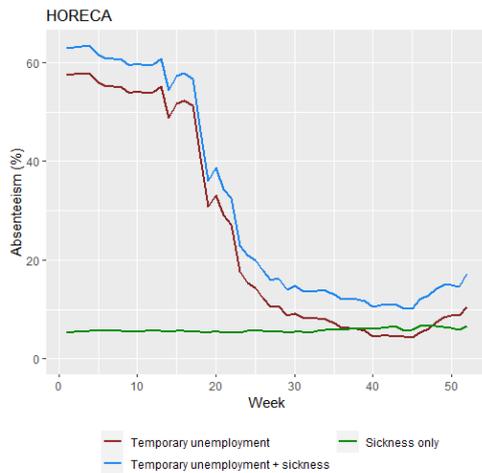
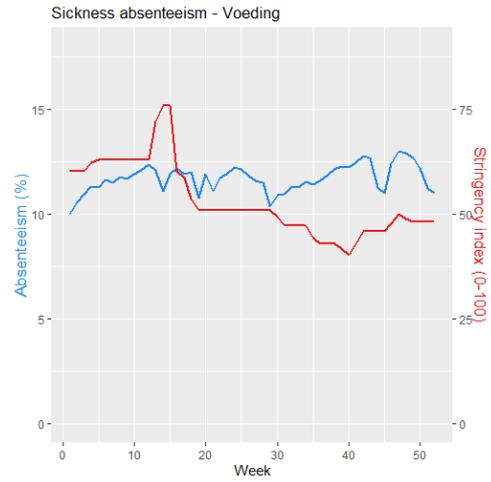
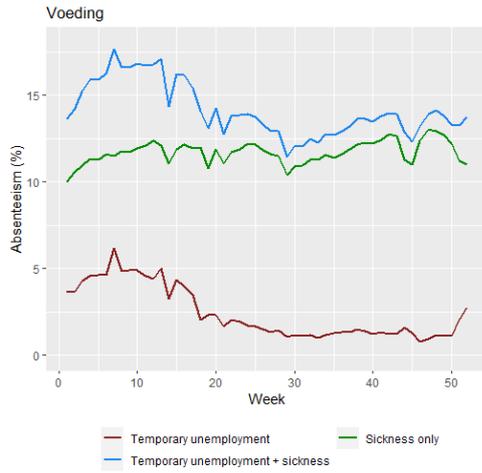
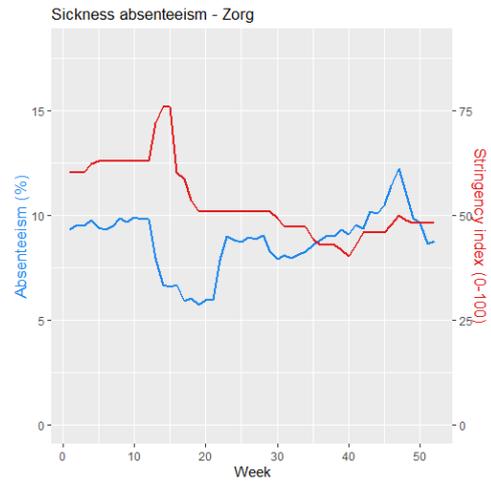
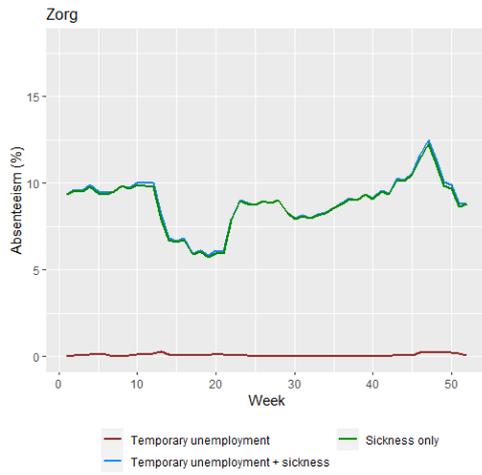


Figure 12: Split of the absenteeism in Health care, Food processing, Horeca and Bank sector by reason of absenteeism (left) and the stringency index versus absenteeism due to temporary employment and sickness (right).

Additionally, the COVID-19 incidence in each of the sectors was different in the year 2021 (Figure 13). The effect of vaccination in the Health care sector is clearly observable by the absence of a peak in the Spring of 2021. Surprisingly, the combination of vaccination and a peak in the non-Health care sectors have lead to a sudden decline in absenteeism in the Health care sector during 10 weeks (Figure 13 (top left)).

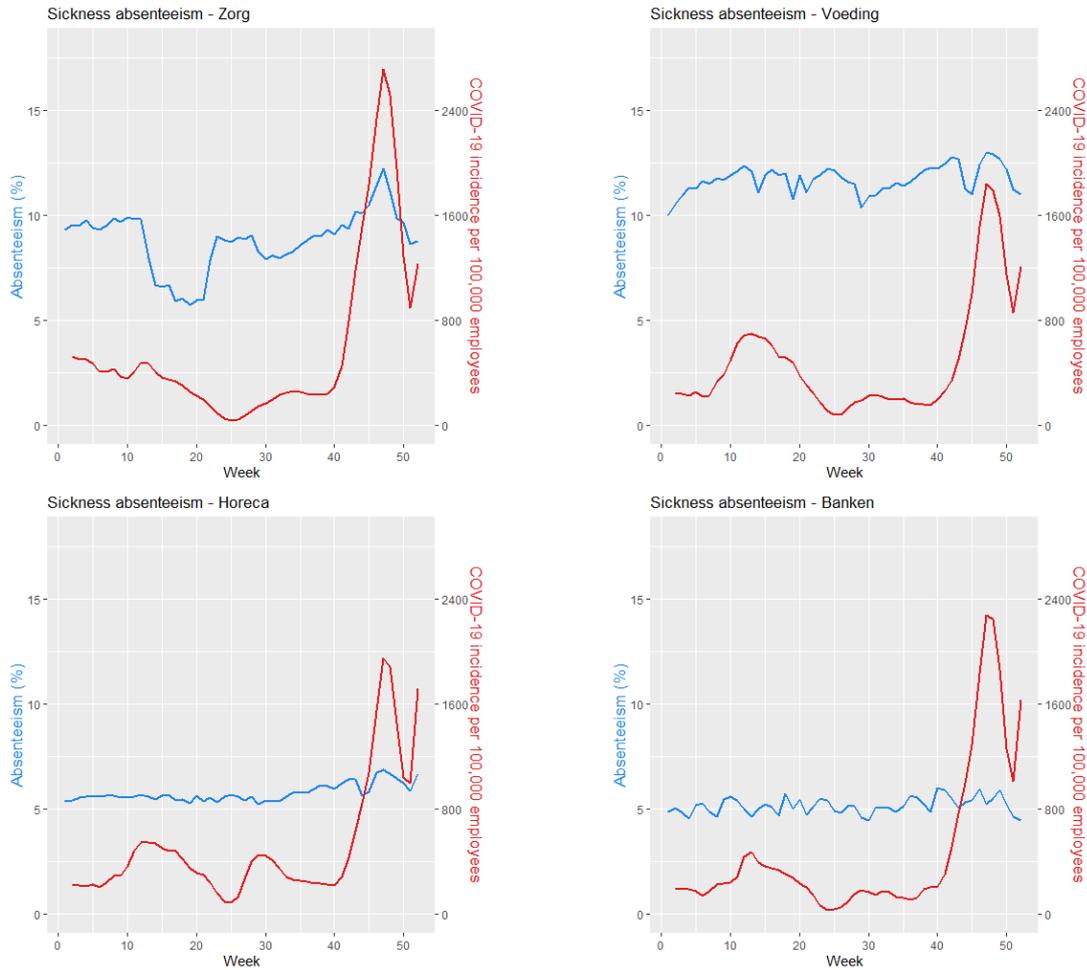


Figure 13: Absenteeism due to sickness and COVID-19 14-day incidence in Health care, Food processing, Horeca and Bank sector.

When modelling absenteeism due to sickness only with model 1 in the different sectors, the increase in absenteeism per 1000 14-day COVID-19 incidence is clearly larger in Health care (1.34%), a sector with high-risk contacts and where teleworking is not possible (Table 6). Teleworking is also not possible in the food processing and horeca sector, which both show evidence for an increased effect of COVID-19 incidence on absenteeism compared to the average. Finally, in the bank sector, where teleworking is possible, the effect of the COVID-19 incidence on absenteeism due to sickness is less than the average over all sector.

Table 6: Model estimates of the baseline absenteeism due to sickness only and the increase in absenteeism per 1000 increase in 14-day COVID-19 incidence for specific sectors (PC=Paritair Comité number).

	PC	NACE	Baseline (95% CI)	Increase per 1000 14-day incidence (95% CI)
Health care	33001	Q	8.02 (7.04; 8.99)	1.34 (0.85; 1.83)
Food processing	118	10	11.46 (11.07; 11.86)	0.55 (0.14; 0.96)
Horeca	30200	I	5.43 (5.24; 5.62)	0.65 (0.50; 0.81)
Bank	31000	641	5.09 (4.95; 5.23)	0.15 (-0.06;0.36)
All sectors			7.84 (7.63; 8.04)	0.44 (0.27; 0.62)

3.7 Contact tracing

In 2020–2021 about 800,000 employees are under medical surveillance of IDEWE. Among these, 46,445 COVID-19 index cases were registered between 22 July 2020 (week 30) and 6 January 2022, for whom the customer

segment, region and the registration date are known for 45,750 index cases.

After a short period of lower incidence in the end-of-year period, the incidence in all segments is sharply increasing again. A new record of weekly incidence was set in the week of 12 January 2022 with 3414 index cases, resulting in a 14 days incidence of 606 per 100.000 in 14 days on January 18th. The highest incidence is seen in Education and Public transport, with 1205 and 827 per 100.000 in 14 days respectively (Figure 14). The 14 day incidence in Education is twice the average incidence in the contact tracing data.

Analysis by region shows that in all regions the incidence is increasing. Currently, Hasselt and Roeselare are the regions with the highest incidence, 717 and 712 per 100.000 in 14 days, respectively (Figure 14).

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.

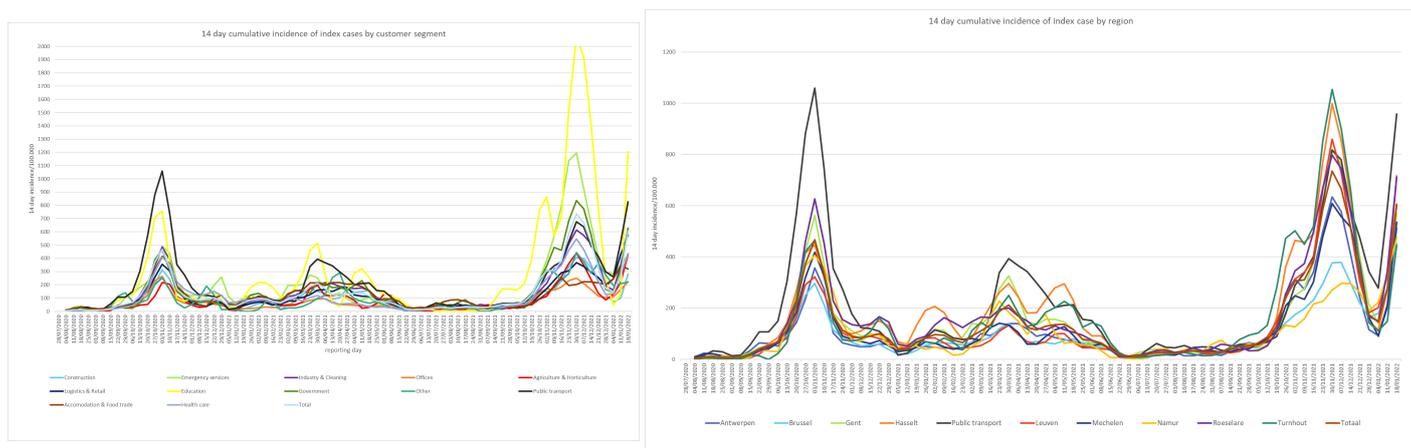


Figure 14: 14-Day incidence of index cases by segments under surveillance (left) and by region (right)

Since the establishment of the tracing app on 29 October 2020, there are 38,627 index cases of whom high-risk contacts were recorded. Of 38,211 index cases, the customer segment and region is known. The mean number of high-risk contacts in segment Emergency services is above 1, while in the Hasselt and Gent region a higher mean number of high-risk contacts is reported in the period 29 October 2020–19 January 2022 (Figures 15).

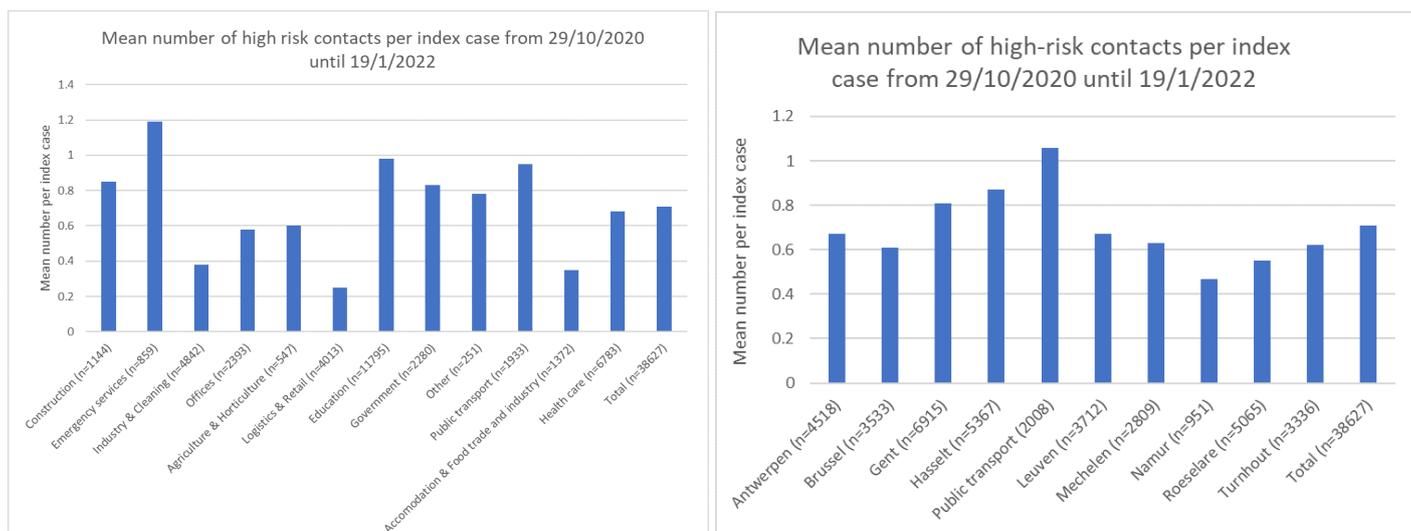


Figure 15: The mean number of high-risk contacts per index case by segments under surveillance (left) and by region (right)

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-two 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 or more high-risk contacts per four weeks.

The percentage of index cases with two or more high-risk contacts increased since September to the highest level measured, 33%, by the end of October. This percentage decreased during the last two to three months to the lowest level ever. Only 6.4% of index cases had two or more high risk contacts during the last four weeks, reflecting the changed behavior on the work floor after the stricter mitigation measures (Figure 16).

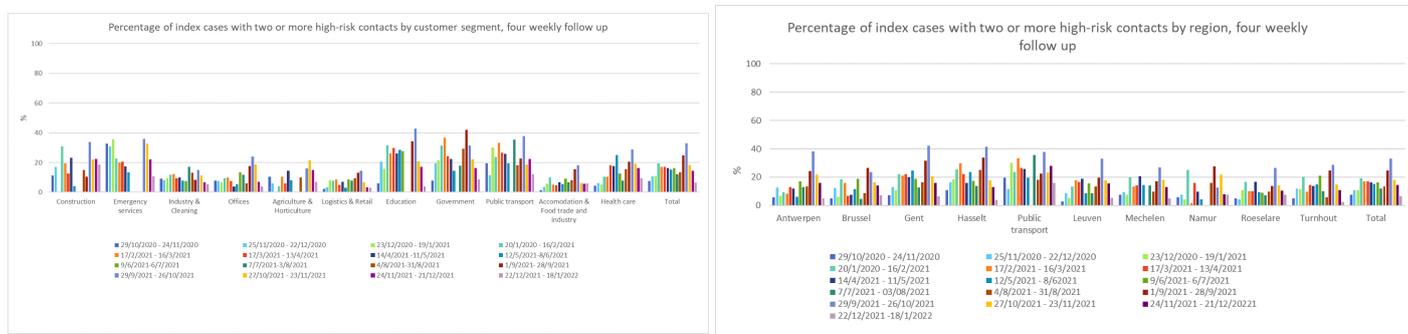


Figure 16: Four weekly percentage of index cases with two or more high-risk contacts by segments under surveillance (left) and by region (right)

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 26,688 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, 15% responded that they were certainly or probably infected at work (Figure 17 left). From 6,667 (25%) 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 17 right). A majority of the index cases (63%) indicates to know the source of infection at work.

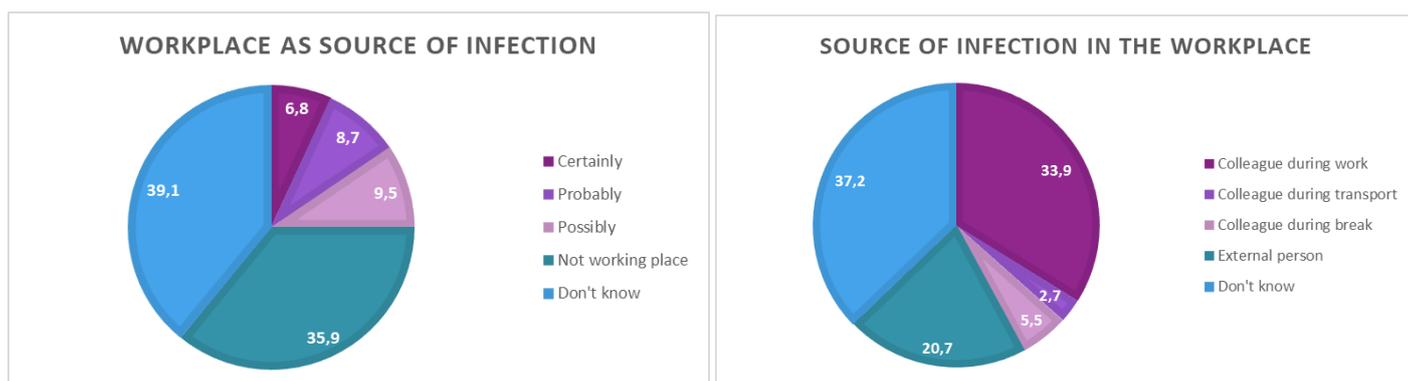


Figure 17: Distribution of the probability and source of infection at work by index case

The proportion of index cases in the Education segment that are attributed to pupils was around 40% during the schoolyear in 2021, but this proportion is now only 3%, partly due to the changed testing strategy. (Figure 18 left). This means that most of index cases in the education segment is among teachers. 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 (87%) in school year 2021 is aged under 12 years (and unvaccinated) and 22% were under 6. The proportion of pupils under 6 was growing before the extended school closure. Due to the small number of reported index cases, the age proportions after the end-year holidays numbers do not allow any interpretation (Figure 18 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, 9 June–6 July 2021 and 22 December 2021–20 January 2022.

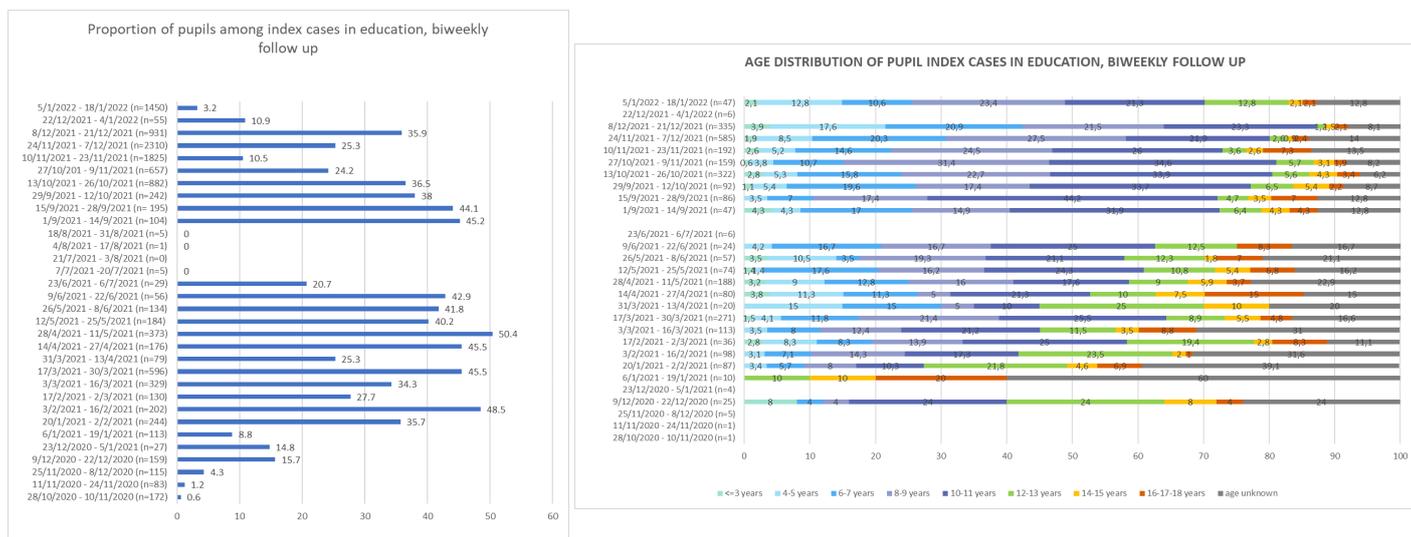


Figure 18: The evolution of index cases of pupils in school (left) and their age distribution (right).

Since 7 June 2021, the vaccination status of index cases is registered, with the type of vaccine if applicable. Because of the large number of index cases since October 2021, it is no longer possible to check the vaccination status of index cases in Vaccinnet. Therefore, self-reported vaccination data are reported and vaccine-effectiveness is no longer calculated, as self-reported data are incomplete and possibly incorrect.

From 18,475 adult index cases we had information about their vaccination status: 18,475 were partially or completely vaccinated (12,447 Cominarty, 2,504 Vaxzevria, 1250 Moderna and 988 Johnson & Johnson and 1286 did not know the type of vaccine) (Figure 19 left). With a vaccination coverage in the working population of 86% since September 2021 (data derived from Sciensano), it is important to evaluate these breakthrough index cases. Vaccination coverage of the population changed rapidly from June until September and is reaching a plateau since that time. The amount of index cases who received only one dose or who became infected within 15 days after their last vaccination dose made up the majority of vaccinated cases until August 2021 and drops to 1% in October 2021. The increase in the proportion of partially vaccinated index cases since January 2021 is most likely due to the misinterpretation of the term “partially vaccinated” (Figure 19 right). Some workers may have considered “not having received the booster vaccination” as “partially vaccinated”. From 14 January, primo-vaccination and booster vaccination will be addressed separately in contact tracing to prevent this misunderstanding.

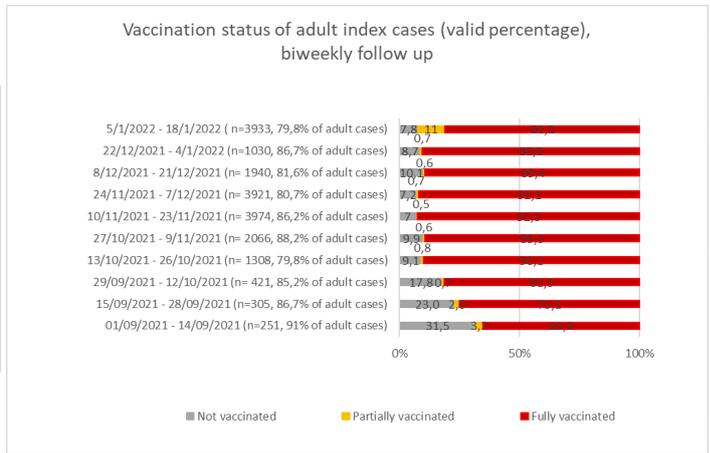
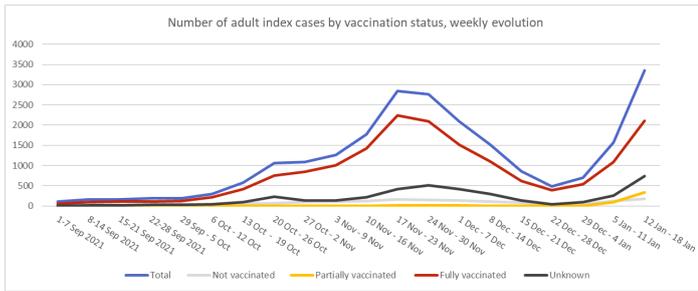


Figure 19: The weekly evolution of index cases and their vaccination status (left) and biweekly evolution of the self-reported vaccination status of index cases (right).

4 Conclusion

Despite the limitations of the data, both the contact tracing as the RSZ/ONSS data demonstrate signs of less steep increases in 14-day COVID-19 incidences in most sectors and regions, except for education, human health and social work and publica administration and defence, where incidences continue to increase. The highest incidences are still present in child-day care and primary and secondary education. The average incidence in the working population is higher than the average incidence in the general population, suggesting that infections are passed mostly among adults. Vigilance of absenteeism is required in especially education, human health, social work and publica administration sectors to safeguard the continuity of activity, since increasing incidences lead to increasing absenteeism.

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, 7% indicated that the workplace was certainly the source of infection.

With the high level of circulation of the omicron variant-of-concern of SARS-CoV-2, it is important to carefully monitor the incidence of COVID-19 and absenteeism in all sectors, especially sectors with multiple close physical proximity, and with close proximity with younger, not yet vaccinated individuals. Child-day care, Secondary and Primary education, Regulation of providing social services, Youth work associations, Residential care, Hospital activities and Fitness facilities all show increased incidences or a sharp increase compared to last week and require careful attention.

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, while the incidence in beauty saloons is higher than in hairdressers.

It is encouraging to note that employees in accommodation and food services, transportation, and most manufacturing 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. Continuous monitoring of breakthrough infections and especially protection against hospitalization is warranted. It is good to note that the percentage of index cases with two or more high-risk contacts remains low, especially under an upcoming more contagious omicron variant-of-concern.

Acknowledgments

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