Monitoring Belgian COVID-19 infections in work sectors in 2022

Geert Molenberghs[1,2], Johan Verbeeck[1], Godelieve Vandersmissen[3], and Lode Godderis[3,4]

[1]Data Science Institute, I-BioStat, Universiteit Hasselt, Hasselt. Belgium
[2]I-BioStat, KU Leuven, Leuven, Belgium
[3]IDEWE, External Service for Prevention and Protection at Work, Heverlee, Belgium
[4]Centre for Environment and Health, Department of Public Health and Primary Care, KU Leuven, Leuven, Belgium

Version 28 – 23 February 2022

1 Introduction

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

1.1 RSZ/ONSS data

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

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

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

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

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

1.2 Contact tracing

For companies affiliated with IDEWE, COVID-19 positive tested employees are reported to IDEWE starting from 22 July 2020. Of these index cases, contact tracing is performed of high and low-risk contact within the company. Subsequently, appropriate measures are taken within the company and by high-risk contacts to limit spread of the infection. Since 11 March 2021, index cases are asked about the work relatedness of their infection. At the start of the contact tracing, data were registered in a shared Excel file. From 29 October 2020 onwards, a 'tracing application' was used to register all notifications of index cases in companies under medical surveillance of IDEWE. Note that high and low-risk contacts are registered only for contacts in the

company, contacts at home or in leisure time are not registered.

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

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

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

For instance, the NACE sector 'education' contains only information on positive cases among employees, while the contact tracing data also 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 (8–21 February 2022) and presented together with the COVID-19 14-day incidence over all work sectors ($\sim$ 4.5 million individuals) and the COVID-19 14-day incidence in the general population ($\sim$ 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.

2.2 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 and the four-weekly percentage of index cases with two or more high risk contacts are evaluated.

Since 3 February 2022, the vast majority of index cases is no longer contacted by telephone to capture risk contacts. After registration in the tracing application, they automatically receive an e-mail asking them to pass on their high-risk contacts via the government's website (myhealth.belgium.be). Information on high-risk contacts, source of the infection and vaccination is no longer available in the tracing application for the majority of index cases since 3 February 2022.

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.

Since the new testing strategy was implemented on 10 January 2022, fully vaccinated and boosted high-risk contacts without symptoms are no longer tested and don't need to go into quarantine. For this reason we have to take into account that since the beginning of February 2022 less index cases are reported to our services causing underreporting of the number of COVID-19 infections in companies.

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 21 February 2022 significantly above the working population average is Human health and social work activities (sector Q) and Education (sector P) (Table 1 and Figure 1). The 14-day incidences continue to decline, althouh slightly less steep, in all sectors.

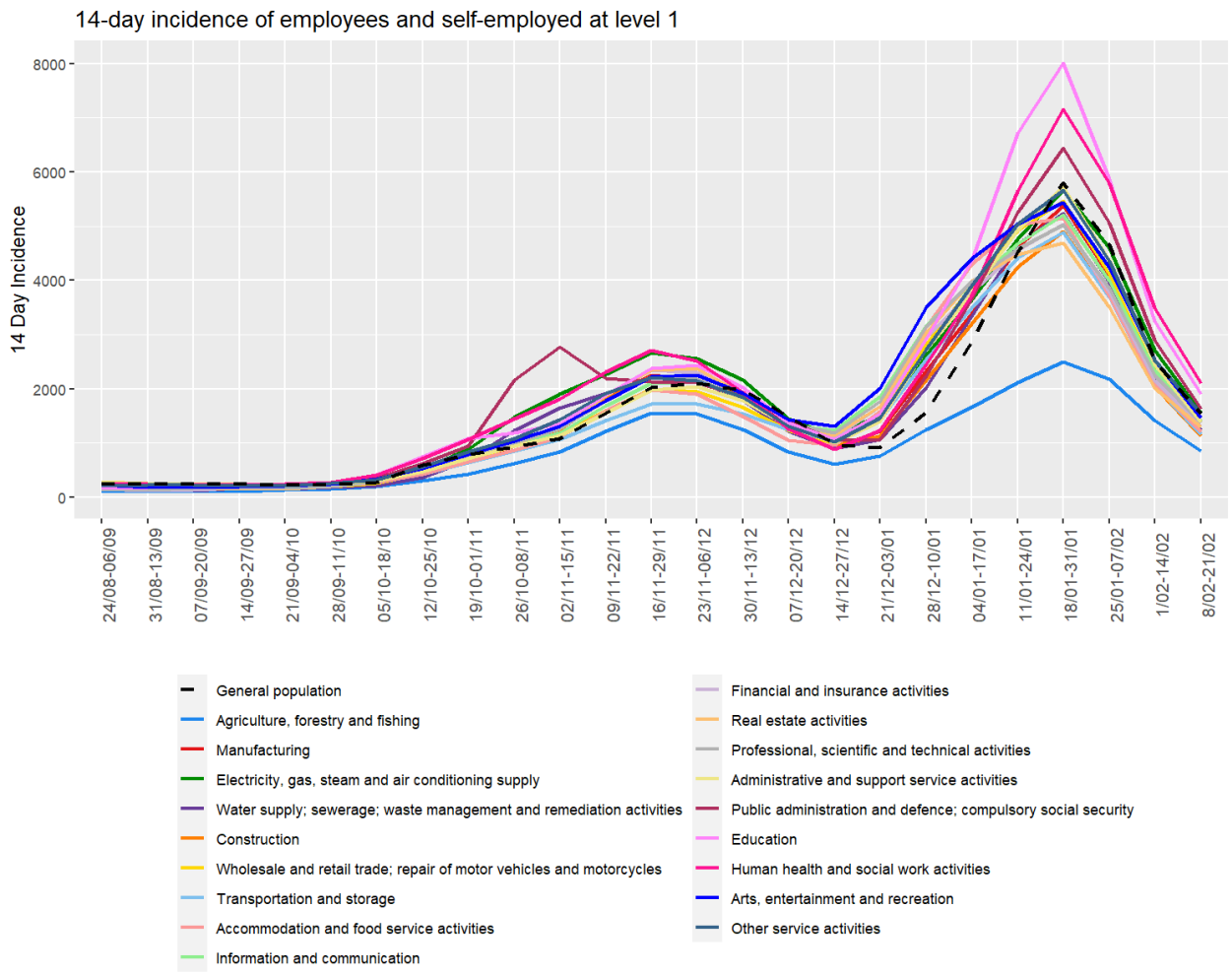

Figure 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 in both employees and self-employed workers

Table 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 on 21 February 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
Human health and social work activities	Q	656632	2096(2062;2131)	2152(2116;2189)	1471(1373;1576)	8.44
Education	P	734087	1901(1870;1932)	1911(1879;1943)	1631(1484;1792)	3.69
Working population		**4591123**	**1701(1689;1713)**	**1701(1689;1713)**		
Public administration and defence; compulsory social security	O	582462	1625(1593;1658)	1626(1594;1659)		0.18
Electricity, gas, steam and air conditioning supply	D	21406	1551(1394;1726)	1583(1419;1765)		6.19
Other service activities	S	159638	1546(1487;1608)	1621(1537;1710)	1467(1385;1554)	50.03
General population			**1534**	**1534**	**1534**	
Arts, entertainment and recreation	R	102192	1460(1388;1535)	1589(1494;1690)	1258(1153;1372)	40.05
Information and communication	J	184632	1399(1346;1454)	1454(1390;1520)	1268(1177;1366)	30.14
Administrative and support service activities	N	439118	1383(1349;1418)	1437(1399;1476)	1135(1064;1211)	18.55
Professional, scientific and technical activities	M	395249	1368(1332;1405)	1503(1452;1556)	1216(1167;1267)	47.70
Manufacturing	C	620337	1367(1338;1396)	1392(1362;1423)	1150(1070;1235)	10.51
Wholesale and retail trade; repair of motor vehicles and motorcycles	G	830256	1365(1340;1390)	1464(1435;1494)	1028(983;1075)	23.28
Financial and insurance activities	K	159361	1314(1259;1371)	1431(1366;1499)	900(807;1004)	22.30
Real estate activities	L	58552	1298(1209;1393)	1581(1433;1744)	1090(985;1207)	58.63
Water supply; sewerage; waste management and remediation activities	E	35870	1235(1126;1355)	1242(1129;1366)		6.65
Accommodation and food service activities	I	298337	1203(1165;1243)	1333(1287;1381)	786(723;854)	24.52
Transportation and storage	H	308139	1155(1118;1193)	1184(1145;1225)	867(766;982)	9.41
Construction	F	381915	1128(1095;1162)	1245(1200;1291)	954(907;1004)	41.20
Agriculture, forestry and fishing	A	80305	853(792;919)	783(686;894)	890(813;974)	66.4

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 21 February 2022 higher than the general population average are: Health and care sector (sector 87, 86), Education (sector 85), Social work without accommodation (sector 88), Manufacture of basic pharmaceutical products and pharmaceutical preparations (sector 21), Employment activities (sector 78), Activities of membership organisations (sector 94) and Public administration and defence; compulsory social security (sector 84) (Table 2 and Figure 2).

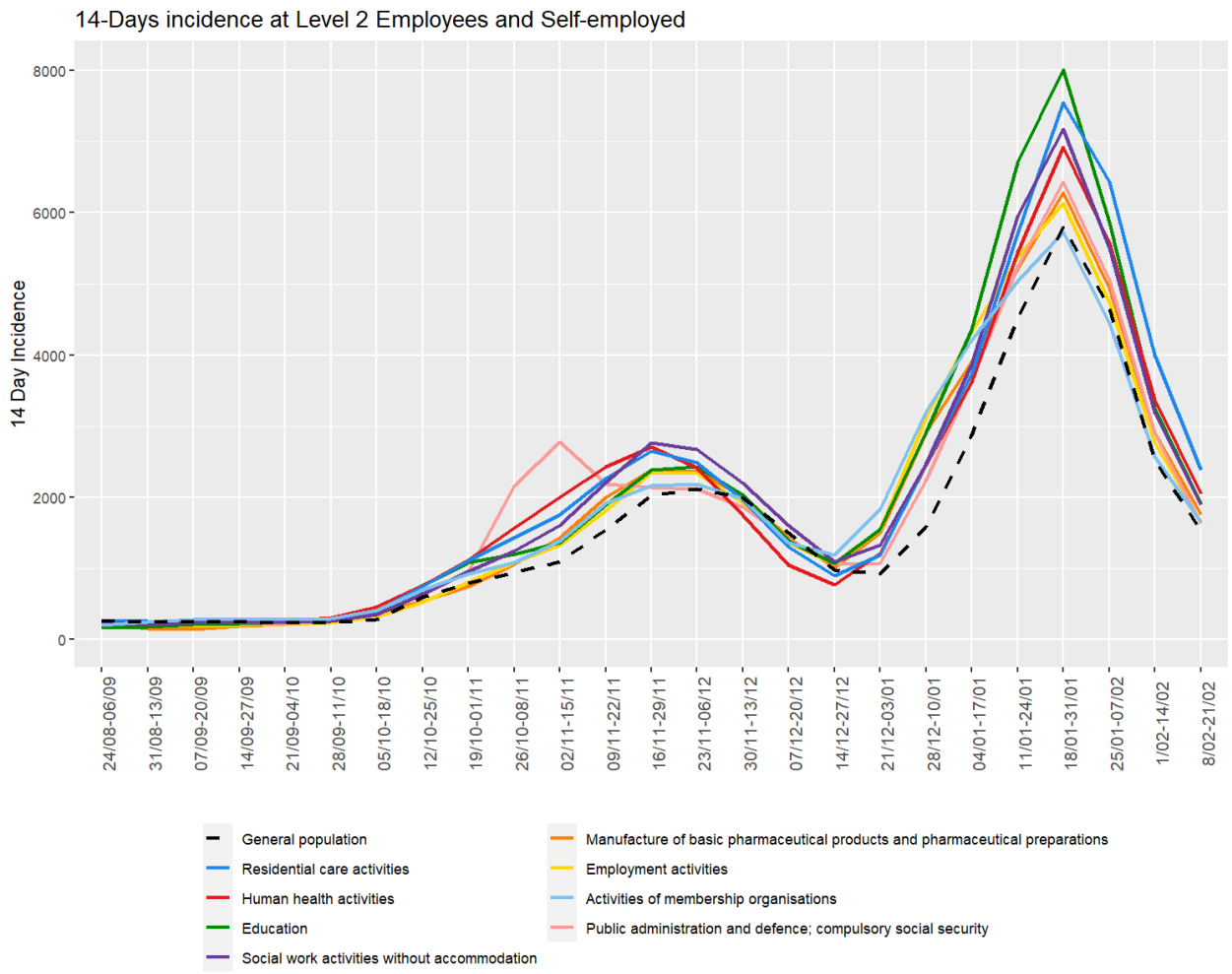

Figure 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 in both employees and self-employed workers

Table 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 21 February 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
Residential care activities	87	172514	2383(2312;2456)	1732(1620;1852)	1419(1136;1771)	1.37
Human health activities	86	315926	2047(1998;2097)	1745(1613;1888)	1480(1375;1593)	15.31
Education	85	734087	1901(1870;1932)	1906(1841;1973)	1631(1484;1792)	3.69
Social work activities without accommodation	88	169259	1890(1826;1956)	1646(1560;1737)	1260(877;1807)	3.24
Manufacture of basic pharmaceutical products and pharmaceutical preparations	21	35297	1748(1616;1890)	2398(2326;2472)		1.32
Working population		**4591123**	**1701(1689;1713)**	**1701(1689;1713)**		
Employment activities	78	82567	1652(1567;1741)	2146(2092;2201)	1809(1395;2343)	3.81
Activities of membership organisations	94	58617	1648(1548;1754)	1626(1594;1659)	1226(1025;1465)	16.94
Public administration and defence; compulsory social security	84	582462	1625(1593;1658)	1911(1879;1943)		0.18
General population			**1534**	**1534**	**1534**	

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 21 February 2022 significantly higher than the working population average are: Residential care activities (sector 871, 873, 872, 879), Hospital activities (sector 861), Higher and Secondary education (sector 854, 853), Social work without accommodation (sector 881, 889) and Other human health activities (sector 869) (Table 3 and Figure 3).

After the sharp and high peak in the 14-day incidence in the primary and secondary school, the incidences decline even sharper and are converging towards the working population average (Figure 4). The last two weeks the incidences in Higher education are declining less than in the other educational subsectors. 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.

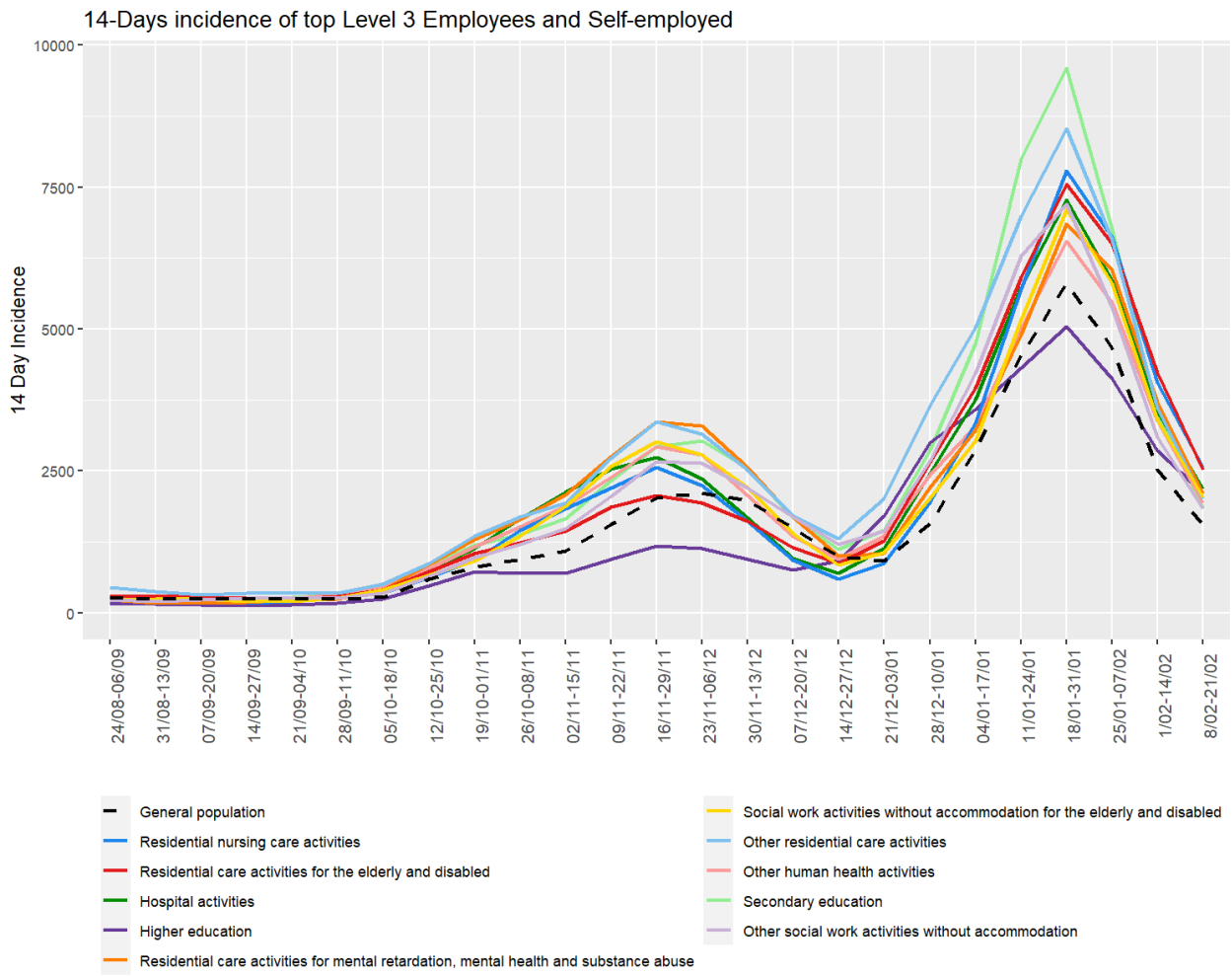

Figure 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 in both employees and self-employed

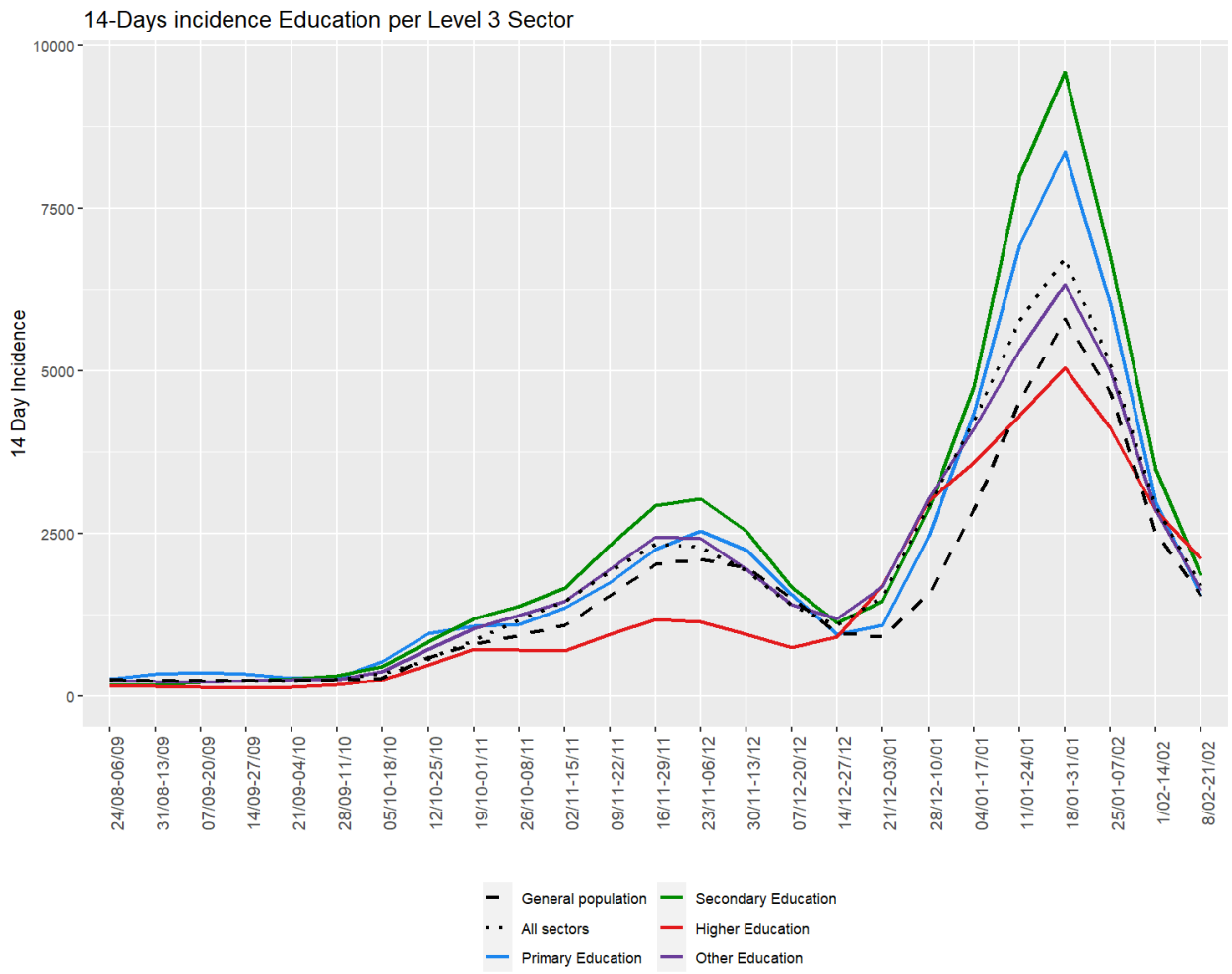

Figure 4: 14-Day incidence of COVID-19 infection in Education sectors at Level 3 in both employees and self-employed

Table 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 on 21 February 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
Residential nursing care activities	871	45416	2563(2422;2712)	2581(2439;2732)		0.90
Residential care activities for the elderly and disabled	873	68569	2523(2408;2643)	2544(2428;2665)		1.31
Hospital activities	861	216314	2176(2115;2238)	2180(2119;2243)		0.33
Higher education	854	207747	2104(2043;2167)	2104(2043;2167)		0.10
Residential care activities for mental retardation, mental health and substance abuse	872	42462	2096(1964;2237)	2107(1974;2249)		1.79
Social work activities without accommodation for the elderly and disabled	881	48797	2037(1915;2166)	2047(1924;2177)		1.09
Other residential care activities	879	16368	2010(1806;2237)	2021(1813;2253)		3.57
Other human health activities	869	54794	1940(1828;2059)	2133(1973;2305)	1721(1569;1888)	47.37
Secondary education	853	455046	1853(1814;1893)	1854(1815;1894)		0.19
Other social work activities without accommodation	889	120612	1829(1755;1906)	1847(1771;1926)	1427(1134;1794)	4.23
Working population		**4591123**	**1701(1689;1713)**	**1701(1689;1713)**		
General population			**1534**	**1534**	**1534**	

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 21 February 2022 significantly higher than the working population average are: Child day-care (sector 8891), Residential care (sector 8710, 8730, 8720, 8790), Other human recources provision (sector 7830), Retail sale of cosmetics (sector 4775), Hospital activities (sector 8610), General secondary and higher education (sector 8542, 8531), Social work activities without accommodation (sector 8810) and Other human health activities (sector 8690) (Table 4 and Figure 5).

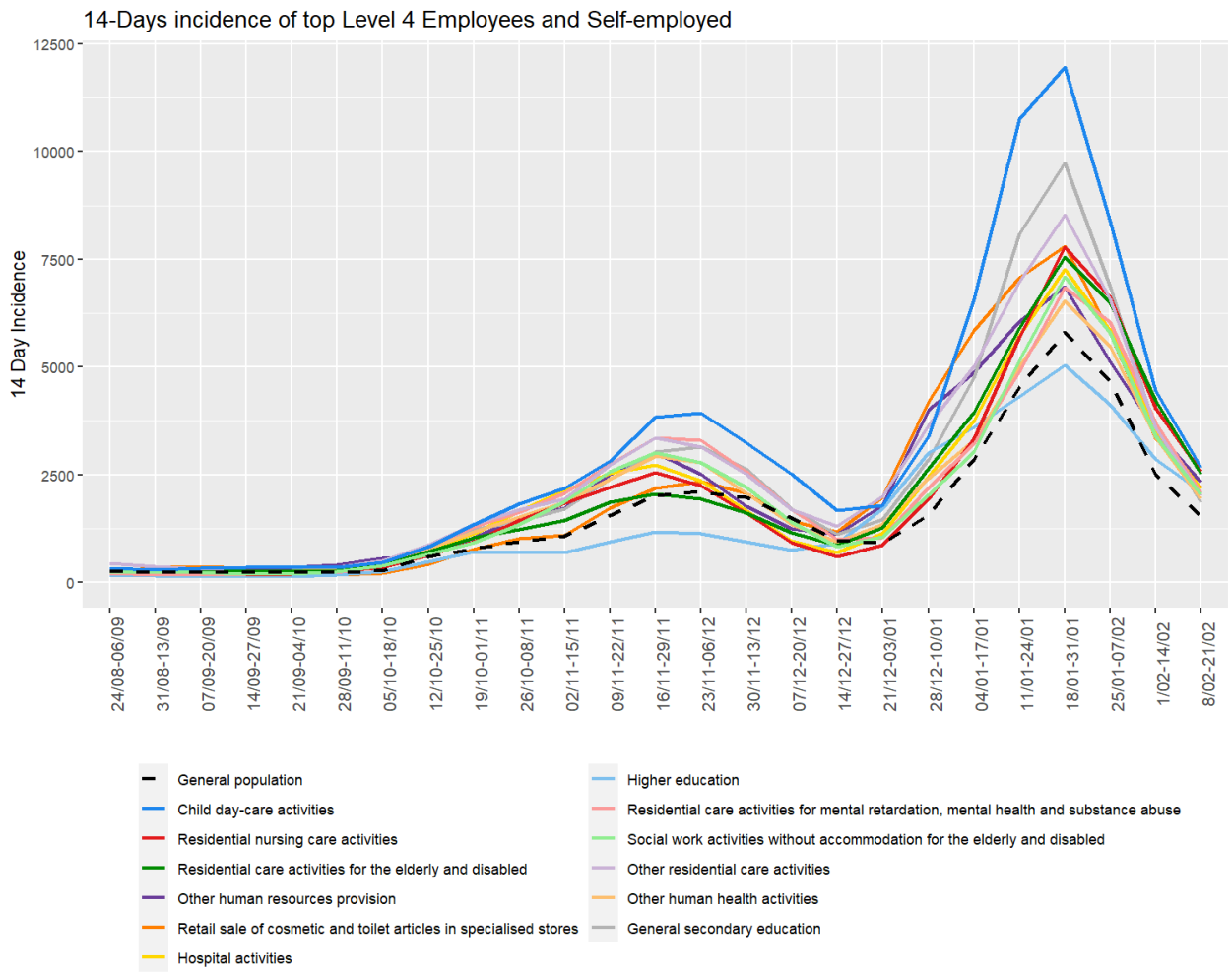

Figure 5: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 in both employees and self-employed

Table 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 on 21 February 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	28598	2661(2481;2854)	2715(2527;2916)	1846(1315;2585)	6.33
Residential nursing care activities	8710	45416	2563(2422;2712)	2581(2439;2732)		0.90
Residential care activities for the elderly and disabled	8730	68569	2523(2408;2643)	2544(2428;2665)		1.31
Other human resources provision	7830	4620	2316(1920;2792)	2287(1874;2789)		10.12
Retail sale of cosmetic and toilet articles in specialised stores	4775	8967	2197(1913;2522)	2268(1945;2643)	1934(1404;2658)	21.45
Hospital activities	8610	216314	2176(2115;2238)	2180(2119;2243)		0.33
Higher education	8542	206682	2110(2049;2173)	2110(2049;2173)		0.10
Residential care activities for mental retardation, mental health and substance abuse	8720	42462	2096(1964;2237)	2107(1974;2249)		1.79
Social work activities without accommodation for the elderly and disabled	8810	48797	2037(1915;2166)	2047(1924;2177)		1.09
Other residential care activities	8790	16368	2010(1806;2237)	2021(1813;2253)		3.57
Other human health activities	8690	54794	1940(1828;2059)	2133(1973;2305)	1721(1569;1888)	47.37
General secondary education	8531	424639	1871(1831;1912)	1873(1833;1914)		0.16
Working population		**4591123**	**1701(1689;1713)**	**1701(1689;1713)**		
General population			**1534**	**1534**	**1534**	

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 21 February 2022 significantly higher than the working population average are: Nurseries and créches (sector 88911), Residential care (sector 87301, 87101, 87302, 87201, 87202, 87901), Other human resources provision (sector 78300), Hospitals (sector 86101, 86103, 86104), Retail sale of cosmetics (sector 47750), Nursing activities (sector 86906), Higher and secondary education (sector 85422, 85421, 85318), Public centers for social welfare (sector 84115), Activities of family and elderly care at home (sector 88101) and Other forms of non-residential social services (sector 88999) (Table 5 and Figure 6).

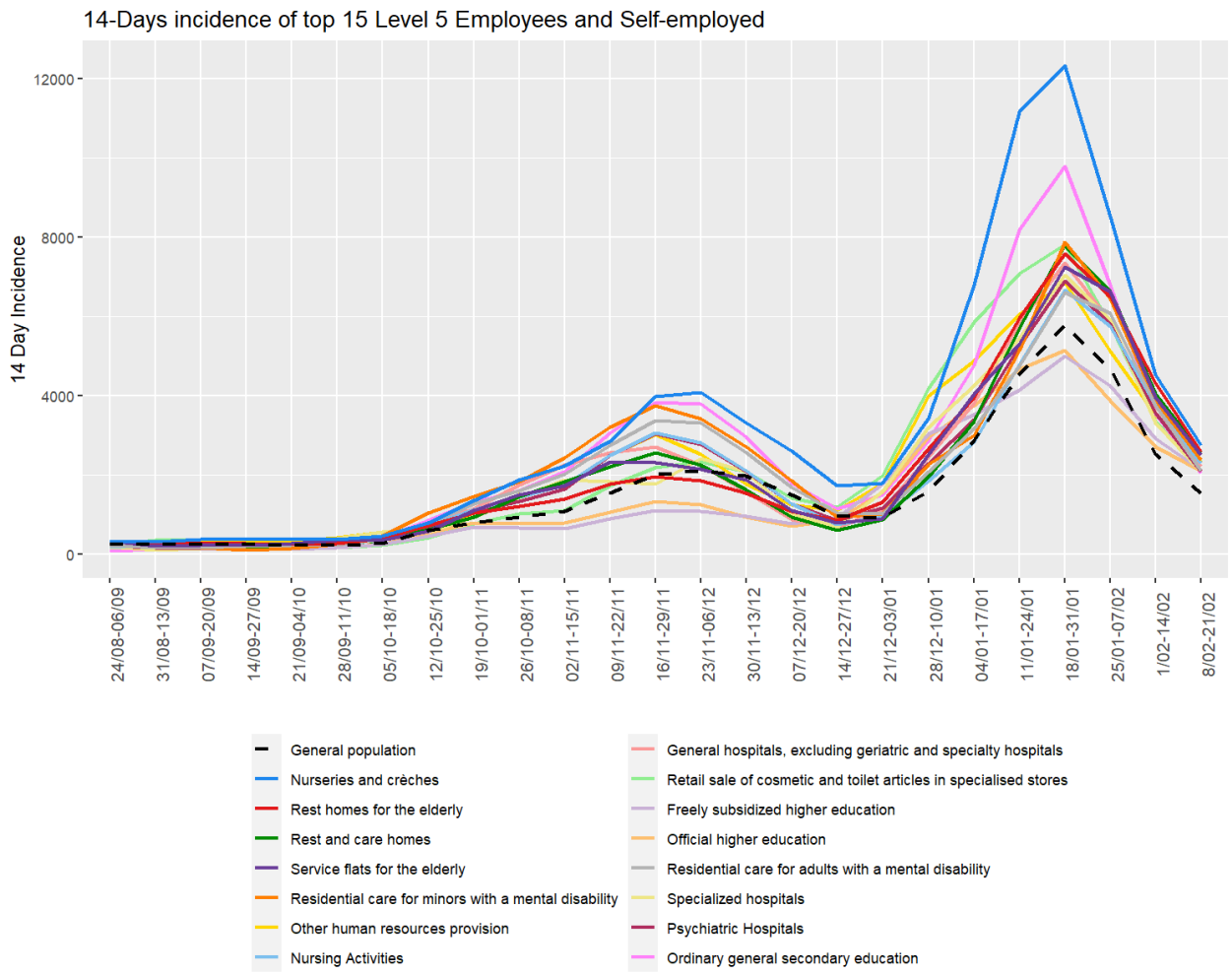

Figure 6: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 5 in both employees and self-employed

Table 5: 14-Day incidence of COVID-19 infection of sectors with the highest incidence at Level 5 on 21 February 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	25272	2754(2559;2963)	2803(2600;3021)	2041(1455;2857)	6.48
Rest homes for the elderly	87301	58450	2580(2455;2712)	2597(2470;2730)		1.10
Rest and care homes	87101	45380	2565(2423;2715)	2582(2439;2733)		0.86
Service flats for the elderly	87302	6370	2496(2140;2909)	2547(2182;2971)		3.27
Residential care for minors with a mental disability	87201	9164	2368(2076;2700)	2365(2071;2699)		1.26
Other human resources provision	78300	4620	2316(1920;2792)	2287(1874;2789)		10.12
Nursing Activities	86906	16521	2288(2071;2527)	2358(2122;2619)	1818(1331;2479)	13.08
General hospitals, excluding geriatric and specialty hospitals	86101	178061	2197(2130;2266)	2200(2133;2269)		0.26
Retail sale of cosmetic and toilet articles in specialised stores	47750	8967	2197(1913;2522)	2268(1945;2643)	1934(1404;2658)	21.45
Freely subsidized higher education	85422	139471	2118(2044;2195)	2118(2044;2195)		0.10
Official higher education	85421	66445	2101(1995;2213)	2101(1995;2213)		0.05
Residential care for adults with a mental disability	87202	27992	2097(1936;2272)	2114(1951;2291)		1.69
Specialized hospitals	86103	4567	2080(1704;2537)	2080(1704;2537)		1.52
Psychiatric Hospitals	86104	32610	2073(1924;2233)	2073(1924;2233)		0.37
Public Centers for Social Welfare	84115	90232	2068(1977;2163)	2068(1977;2163)		0.15
Ordinary general secondary education	85319	211371	2049(1989;2110)	2049(1989;2110)		0.02
Integrated youth care with housing	87901	12556	1999(1768;2259)	2017(1782;2282)		2.88
Activities of family and elderly care at home	88101	44901	1971(1846;2104)	1986(1860;2120)		0.86
Other forms of non-residential social services	88999	36654	1847(1714;1990)	1916(1776;2067)	913(607;1370)	6.96
Working population		**4591123**	**1701(1689;1713)**	**1701(1689;1713)**		
General population			**1534**	**1534**	**1534**	

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. Additionally, 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).

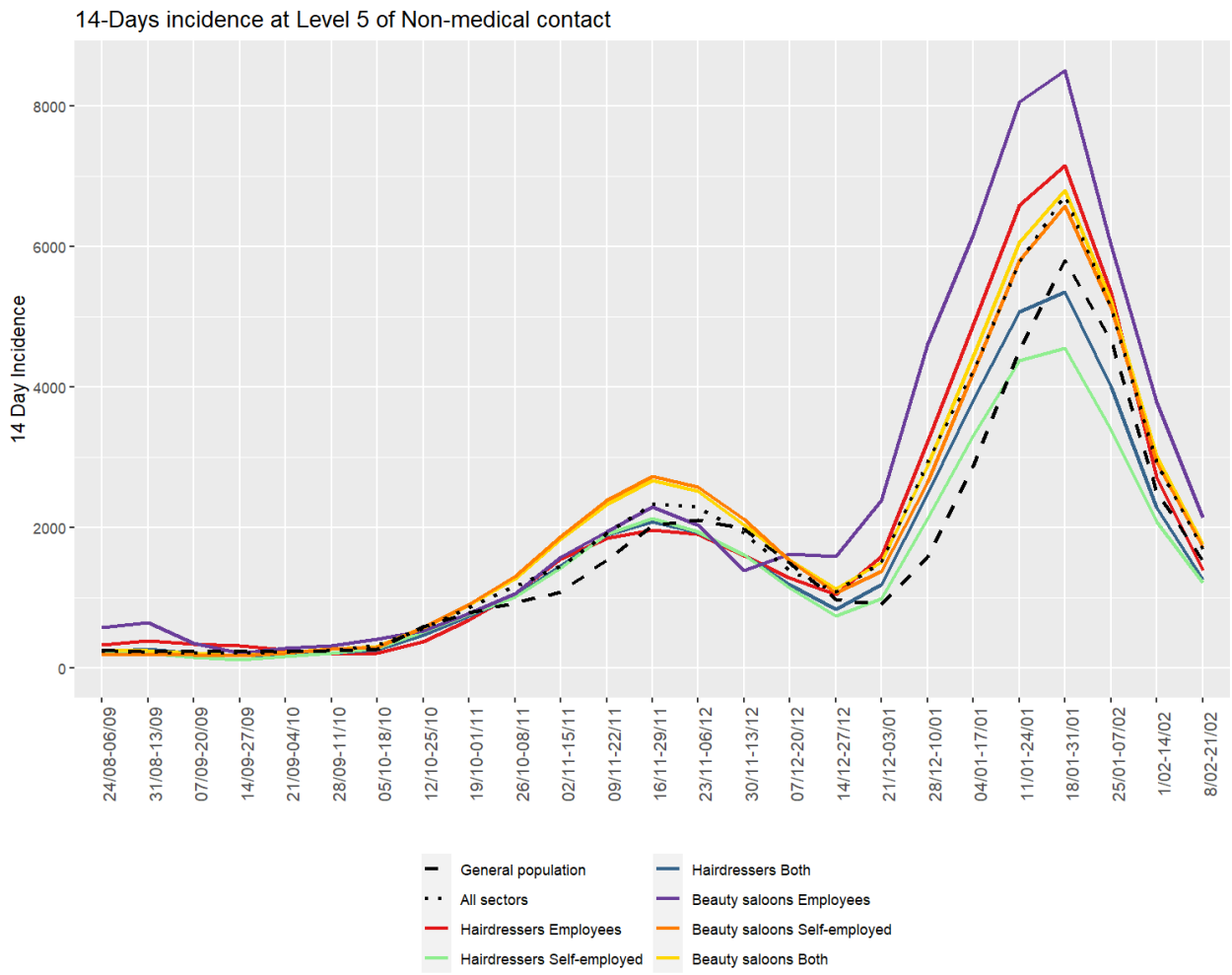

Figure 7: 14-Day incidence of COVID-19 infection at Level 5 of non-medical contact professions.

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

Although the 14-day incidence in Public administration and defence (sector O) and Administative and support service activities (sector N) is around or below the working population average, individual subsectors show an increased incidence. Public Centers for Social Welfare (sector 84115) and Other human resources provision (sector 78300) show increased incidences compared to the working population.

It is encouraging that the incidence in Other service activities (sector S), Arts, entertainment and recreation (sector R), 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, whole and retail sectors the incidence is below or close to the working and population average, except Retail sale in cosmetics (sector 4775)), which shows an increased incidence compared to the working population average (Figure 8).

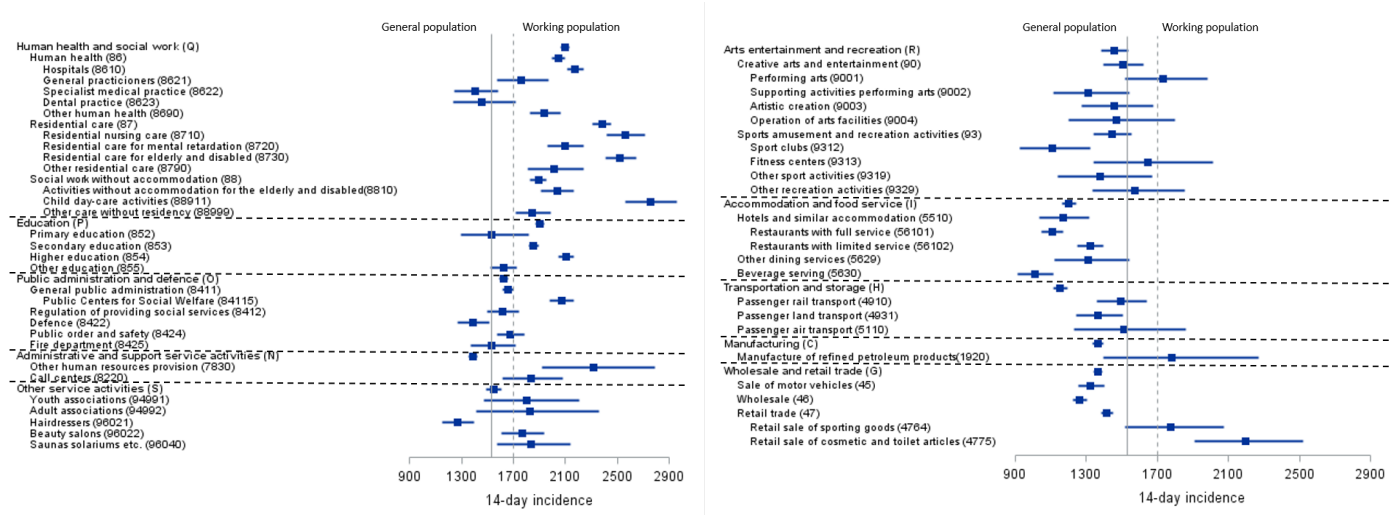

Figure 8: Forest plot of 14-Day incidence and 95% CI of selected sectors on 7 February 2022 in both employees and self-employed.

3.7 Contact tracing

In 2020–2021 about 800,000 employees are under medical surveillance of IDEWE. Among these, 57,191 COVID-19 index cases were registered between 22 July 2020 (week 30) and 17 February 2022, for whom the customer segment, region and the registration date are known for 56,459 index cases.

Since February 2022, incidence is decreasing to 418 per 100.000 in 14 days on 15 February 2022. It is difficult to estimate the contribution in decline due to the decrease in virus circulation and due to the changed testing strategy. A decrease is seen in all segments, but particularly in the education segment, which does no longer show the highest incidence. The highest incidence is seen in the government segment, 668 per 100.000 in 14 days followed by the emergency services, 565 per 100.000 in 14 days (Figure 9).

Analysis by region shows that currently Turnhout has the highest "notification" incidence of index cases , 519 per 100.000 in 14 days, while the lowest incidence is seen in Brussels, 270 per 100.000 in 14 days (Figure 9).

The incidence figures of regions and segments should be interpreted with caution, since they are affected by willingness of employers to pass index cases to IDEWE, as there is no longer a need for intervention by IDEWE for contacting high-risk contacts and the prescription of PCR tests and quarantine.

Additionally, as mentioned above, bias in the figures can also be caused by: 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.

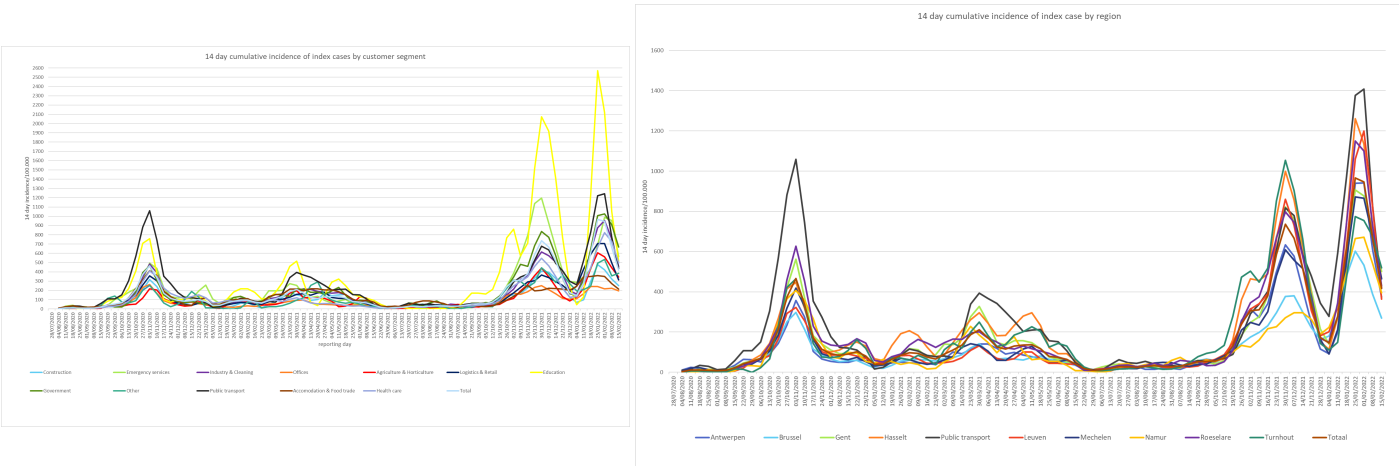

Figure 9: 14-Day incidence of index cases by segments under surveillance (left) and by region (right)

Since January 2022 index cases are encouraged to register their high-risk contacts via the government web-

site (myhealth.belgium.be) and since 3 February 2022 the majority of index cases are no longer contacted by telephone. As a result, high-risk contacted are no longer listed in our registration application.

Between 11 March 2021 and 3 February 2022, 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 33,489 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 10 left). From 8,174 (24%) 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 10 right). A majority of the index cases (65%) indicates to know the source of infection at work.

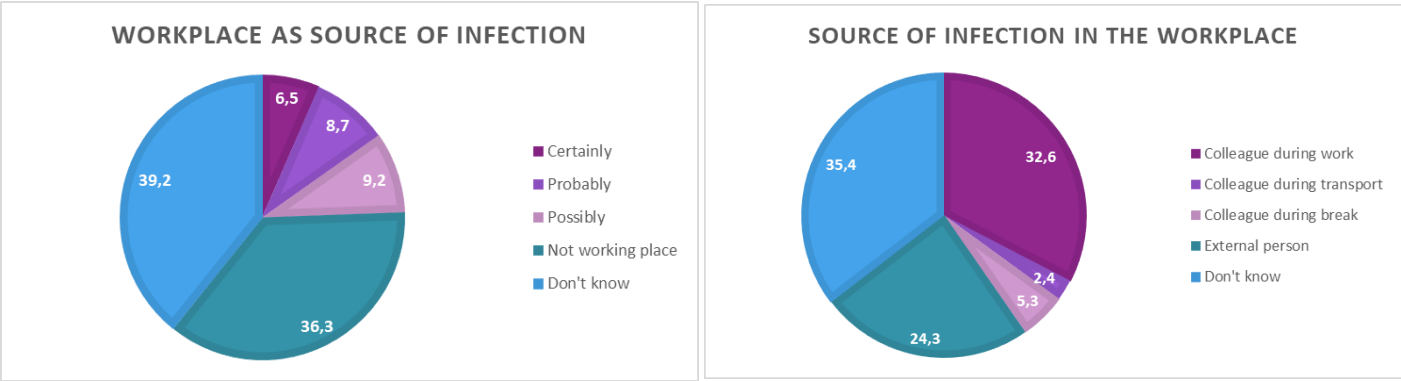

Figure 10: Distribution of the probability and source of infection at work by index case

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 less than 1%, mainly due to the changed testing strategy (Figure 11 left). Since January 2022, due to a change of the testing strategy for adults and children and the availability of an online registration platform for high-risk contacts on the government's website, the notification of index cases in the education segment and especially in pupils fell sharply. The interpretation of these data should be undertaken, however, with caution. Index cases in schools, both pupils and teachers, were 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. However, CLBs no longer provide contact tracing and testing since 28th January 2022.

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 in school year 2022 is aged under 12 years. Due to the small number of reported index cases, the age proportions after the end-year holidays numbers do not allow any interpretation (Figure 11 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 2021–15 February 2022.

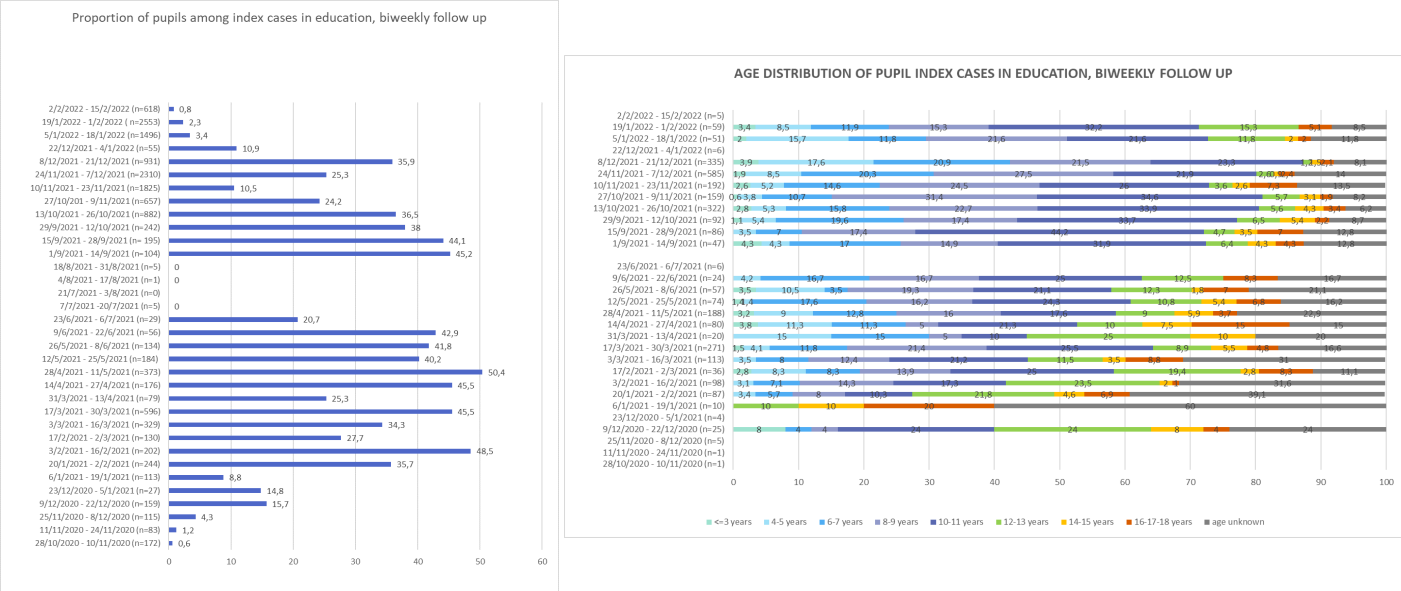

Figure 11: The evolution of index cases of pupils in school (left) and their age distribution (right).

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. Moreover, since only a minority of index cases is contacted by telephone since 3 February 2022, the vaccination status of 92% of index cases was unknown in the last week, 9–15 February 2022.

From 27,673 adult index cases we had information about their primo-vaccination status: 24,653 were partially or completely vaccinated (16,866 Cominarty, 3,265 Vaxzevria, 1,761 Moderna and 1,333 Johnson & Johnson and 1,428 did not know the type of vaccine) (Figure 12 left). 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 2022 is most likely due to the misinterpretation of the term “partially vaccinated” (Figure 12 right). From 14 January, primo-vaccination and booster vaccination is addressed separately in contact tracing to prevent this misunderstanding. From 8,231 index cases we have information about their booster vaccination status: 6,054 received a booster when they tested positive for SARS–Cov–2 between 12 January and 3 Feburary 2022. Of these 2,555 received as booster vaccination Cominarty, 3,341 Moderna and 158 did not know the type of vaccine. Because index cases were only rarely contacted by telephone since 3 February 2022, vaccination status of only 17 % of the index cases is known for the last two weeks. A total of 77% of the index cases from the last two weeks received a booster vaccination.

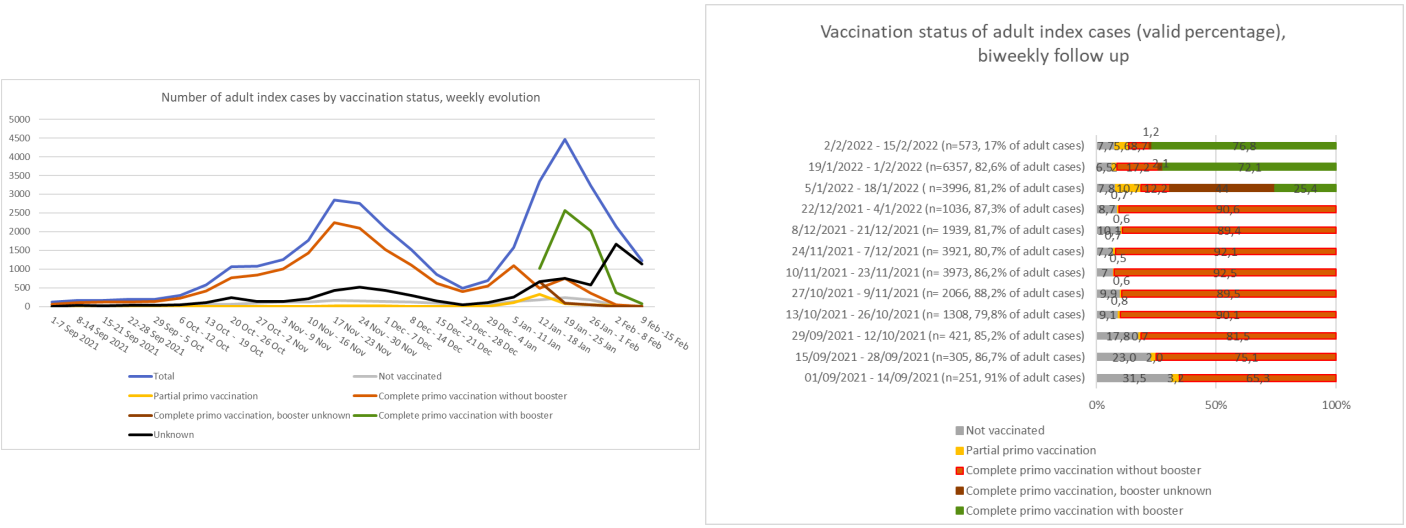

Figure 12: The weekly evolution of index cases and their vaccination status (left) and biweekly evolution of the self-reported vaccination status of index cases (right).

4 Conclusion

Despite the limitations of the data, both the contact tracing as the RSZ/ONSS data demonstrate a continuation of the decrease in 14-day COVID-19 incidences in all sectors and regions. The highest incidences are still present in child-day care, education and residential care. The average incidence in the working population is converging to the average incidence in the general population, suggesting that infections are equally passed among adults and children. Although the changed testing procedure in schools and the general population may influence this comparison.

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.

It is important to carefully monitor the incidence of COVID-19 in all sectors, especially sectors with multiple close physical proximity, and with close proximity with younger, not yet vaccinated individuals. Child-day care, Higher and secondary education, Residential care, Human health activities, Other human resources Provision and Public Centers for Social Welfare all show increased incidences compared to the working population average and continue to 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 an 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, arts entertaiment and recreation and most manufacturing and wholesale and retail 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, despite primo and booster vaccination, and especially protection against hospitalization, is warranted.

Acknowledgments

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