

# Monitoring Belgian COVID-19 infections in work sectors in 2021

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# 1 Introduction

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

## 1.1 RSZ/ONSS data

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

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

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

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

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

## 1.2 Contact tracing

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

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

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

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

For instance, the NACE sector ‘education’ contains only information on positive cases among employees, while the contact tracing data also 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

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 (21 September–4 October 2021) 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 (29 October 2020–30 September 2021) and the four-weekly percentage of index cases with two or more high risk contacts are evaluated.

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

## 3 Results

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

### 3.1 Level 1 work sector

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

14-day incidence of employees and self-employed at level 1

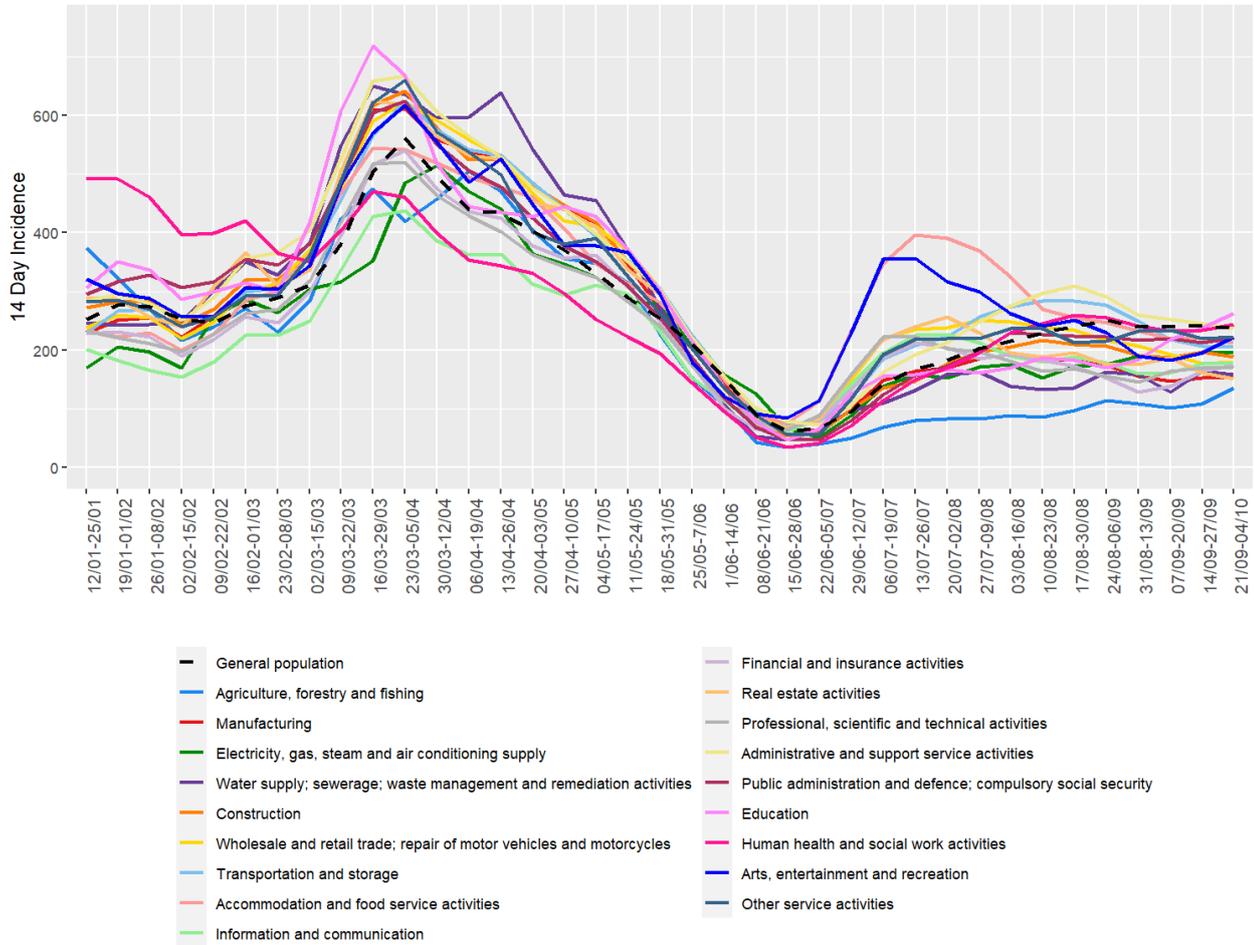


Figure 1: 14-Day incidence of COVID-19 infection of all 21 sectors at Level 1 in both employees and self-employed workers

14-Days incidence Education per Level 1 Sector

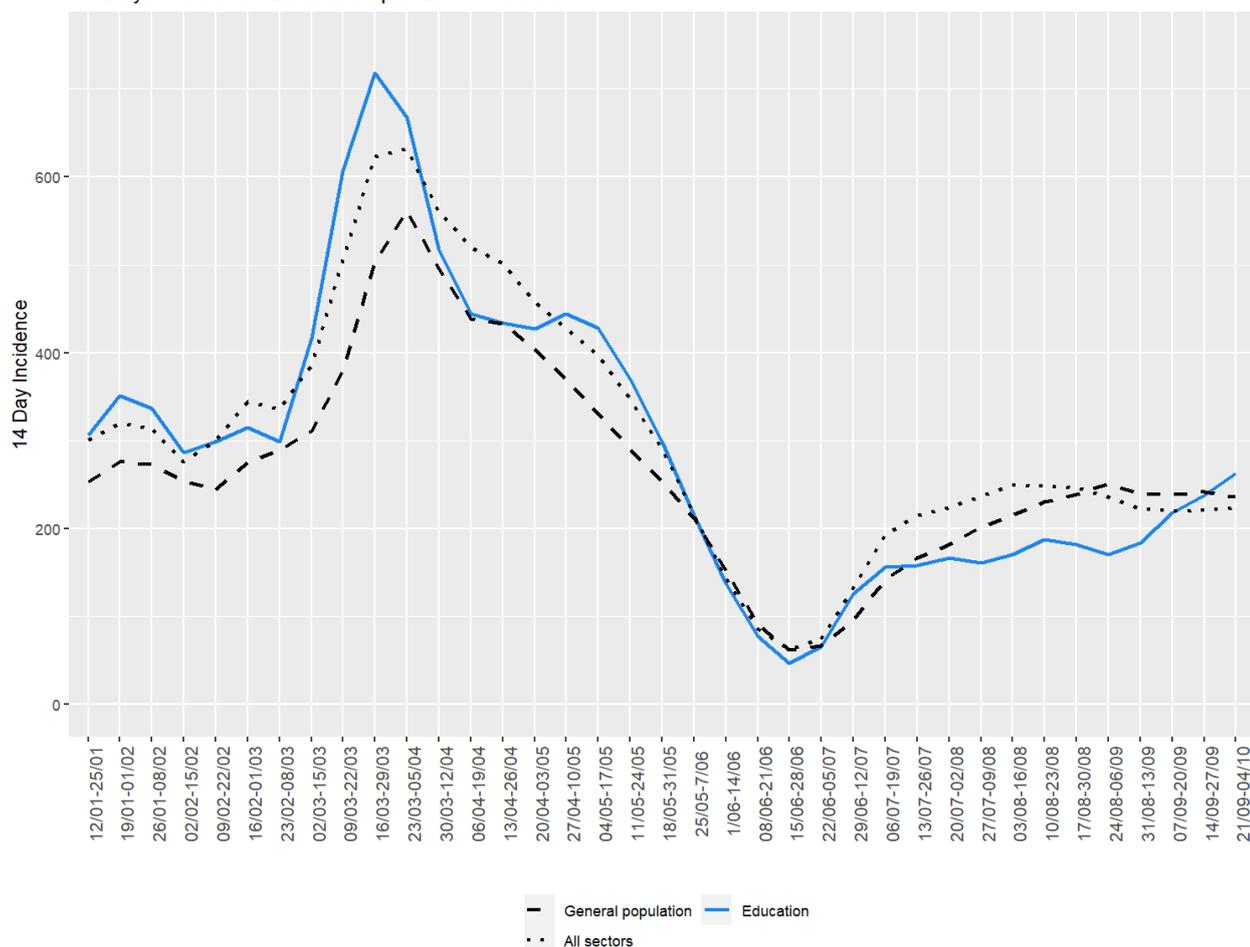


Figure 2: 14-Day incidence of COVID-19 infection of Education at Level 1 in both employees and self-employed workers

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

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

### 3.2 Level 2 work sector

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

14-Days incidence at Level 2 Employees and Self-employed

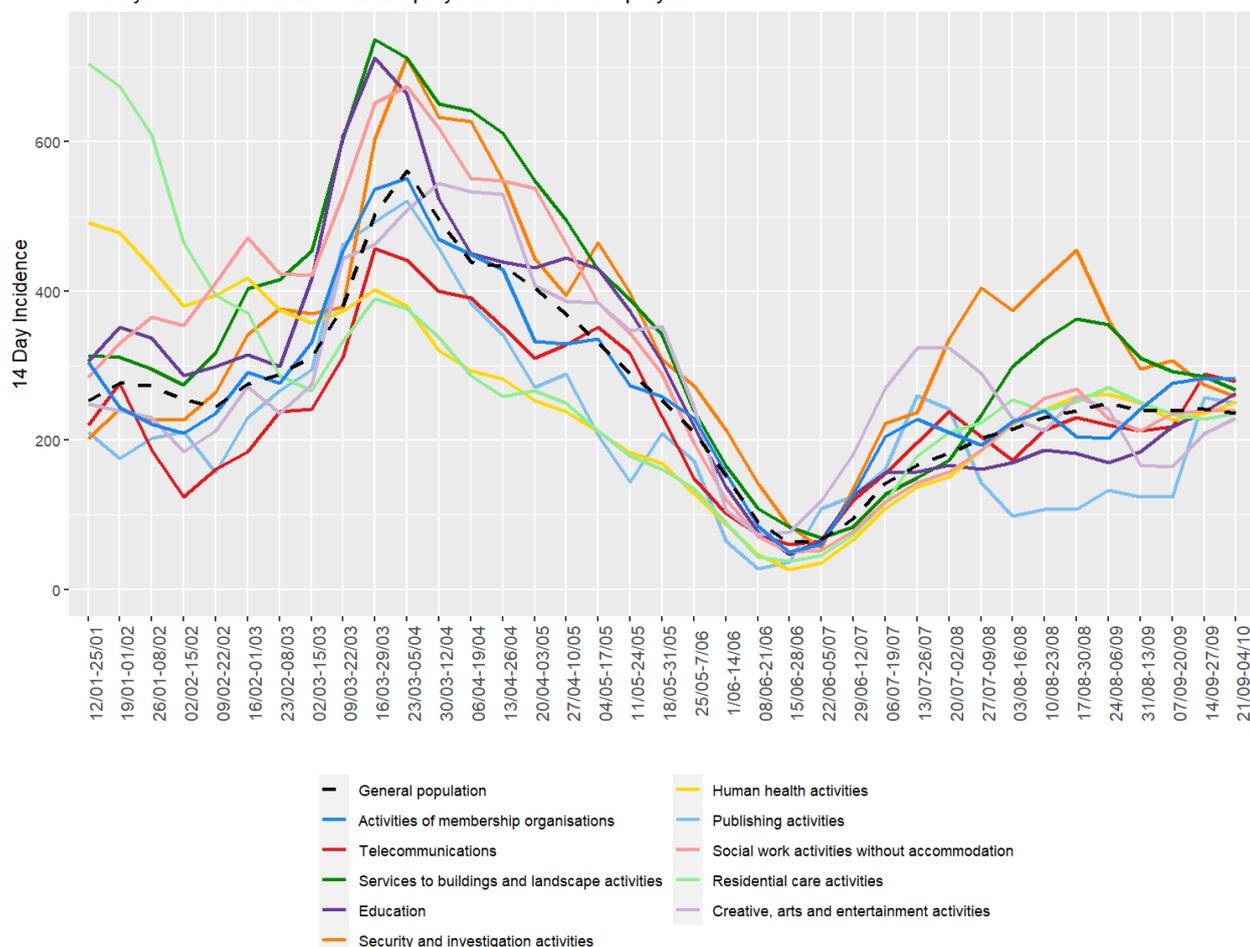


Figure 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 in both employees and self-employed workers

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

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

### 3.3 Level 3 work sector

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

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

and secondary education, all employees are counted as secondary education employees. Employees under the NACE-BEL code primary education are employees in schools that offer only primary education.

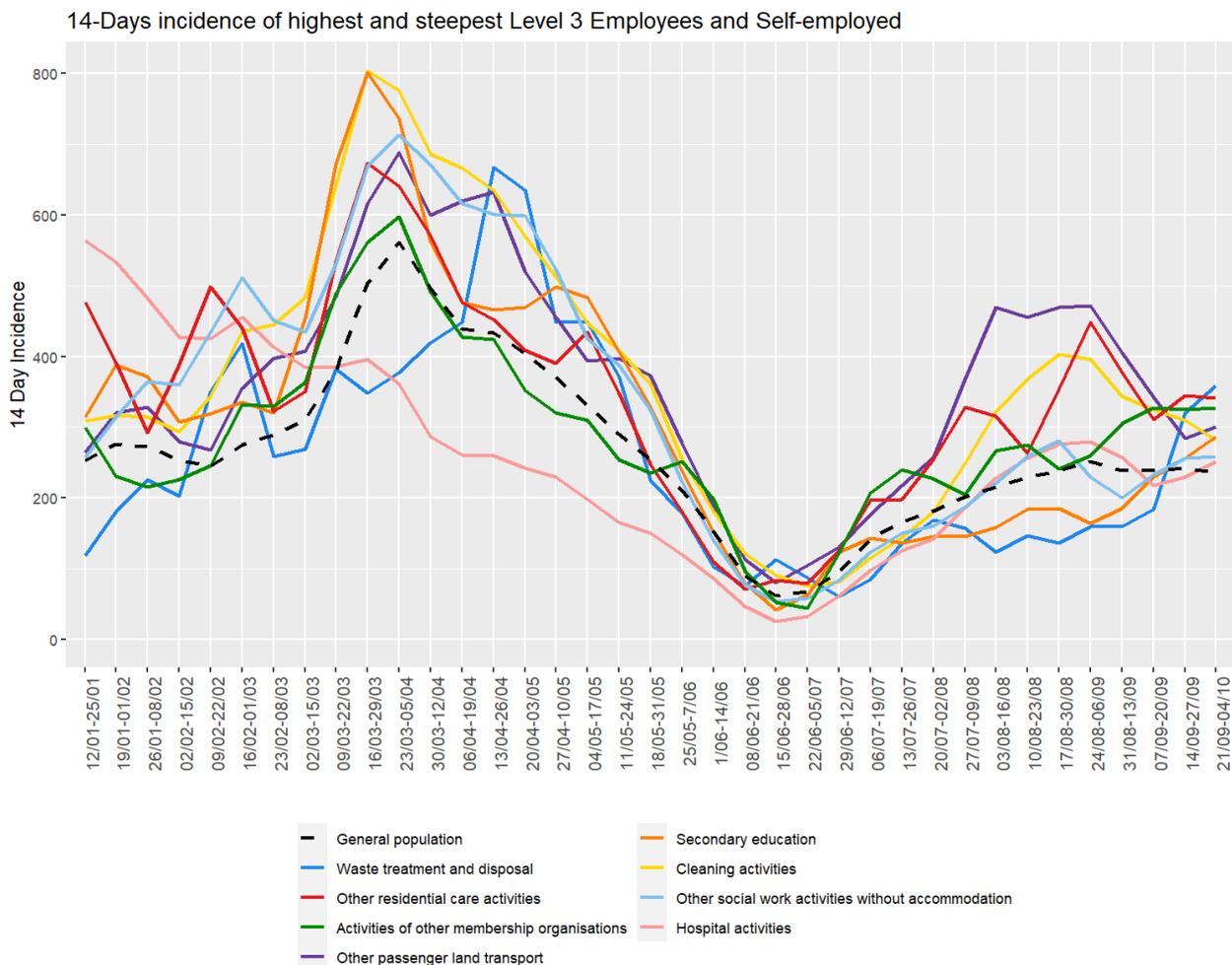


Figure 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 in both employees and self-employed

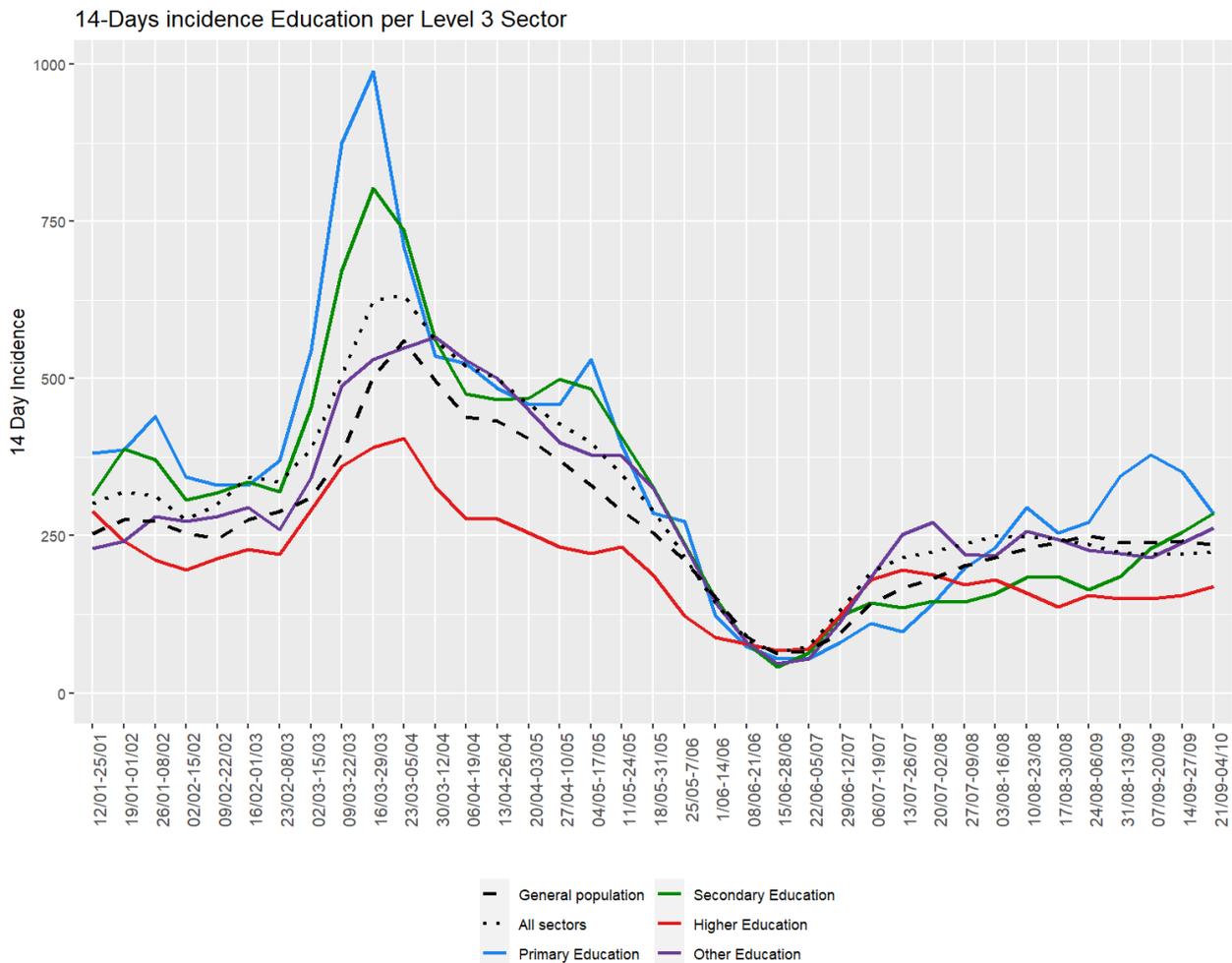


Figure 5: 14-Day incidence of COVID-19 infection in Education sectors at Level 3 in both employees and self-employed

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

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

### 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 4 October 2021 significantly higher than the working population average are: Cleaning activities (sector 8129, 8121), Activities of other membership organisations (sector 9499), Child day-care (sector 8891), Residential care activities (sector 8790), Passenger land transport (sector 4939, 4932, 4931), Activities of sport clubs (sector 9312), Other construction installation (sector 4329), Secondary and other education (sector 8531, 8559), Hospital activities (sector 8610) (Table 4 and Figure 6).

14-Days incidence of top 15 Level 4 Employees and Self-employed

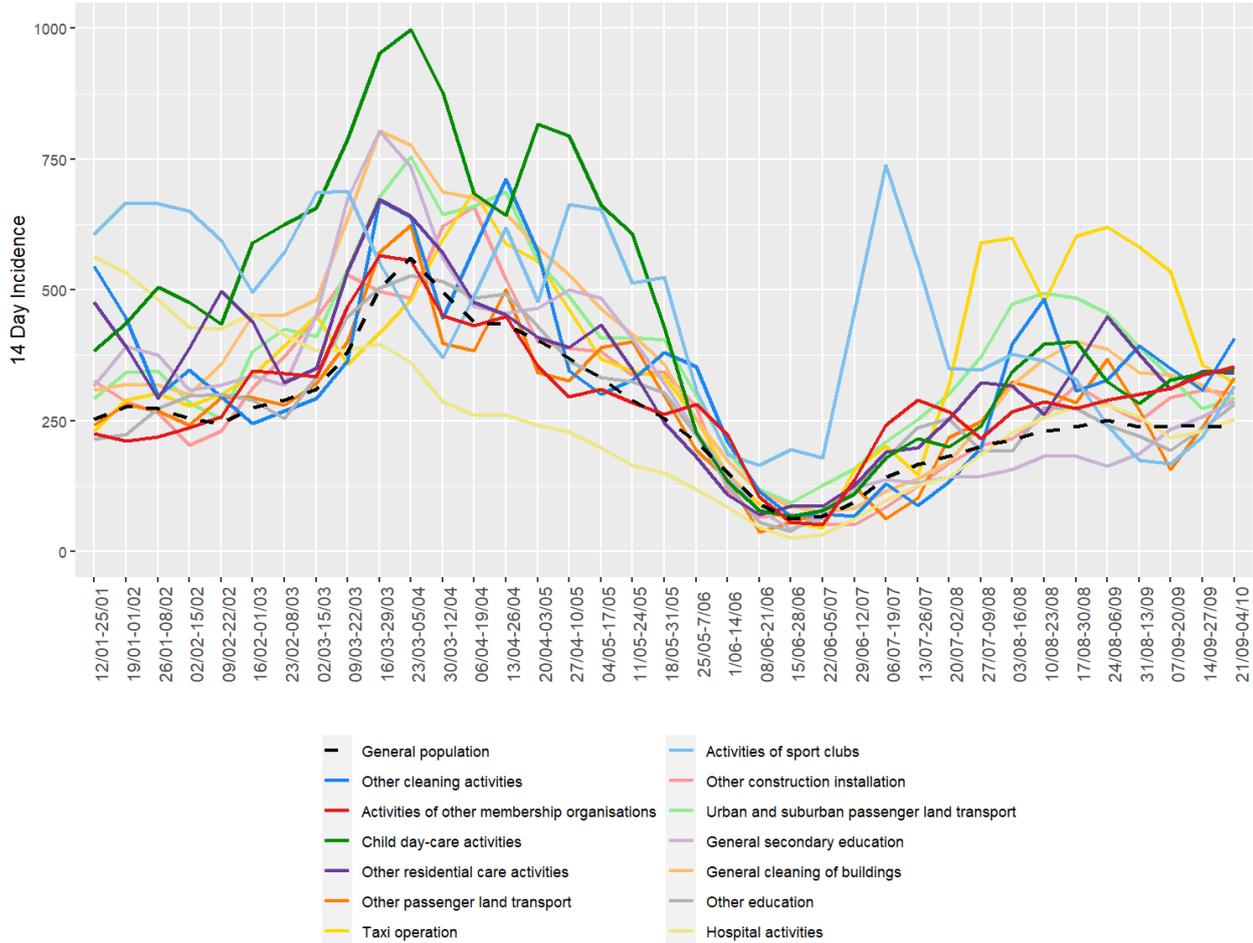


Figure 6: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 in both employees and self-employed

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

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

### 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 4 October 2021 significantly higher than the working population average are: Youth work associations (sector 94991), General secondary and other education (sector 85311, 85599), Cleaning activities (sector 81290, 81210), Activities of football clubs (sector 93212), Nurseries and crèches (sector 88911), Health care (sector 86904, 86909, 86101), Cargo handling (sector 52249), Other construction installation (sector 43299), Passenger land transport (sector 49390, 49320, 49310), and Restaurants with limited service (sector 56102) (Table 5 and Figure 7).

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

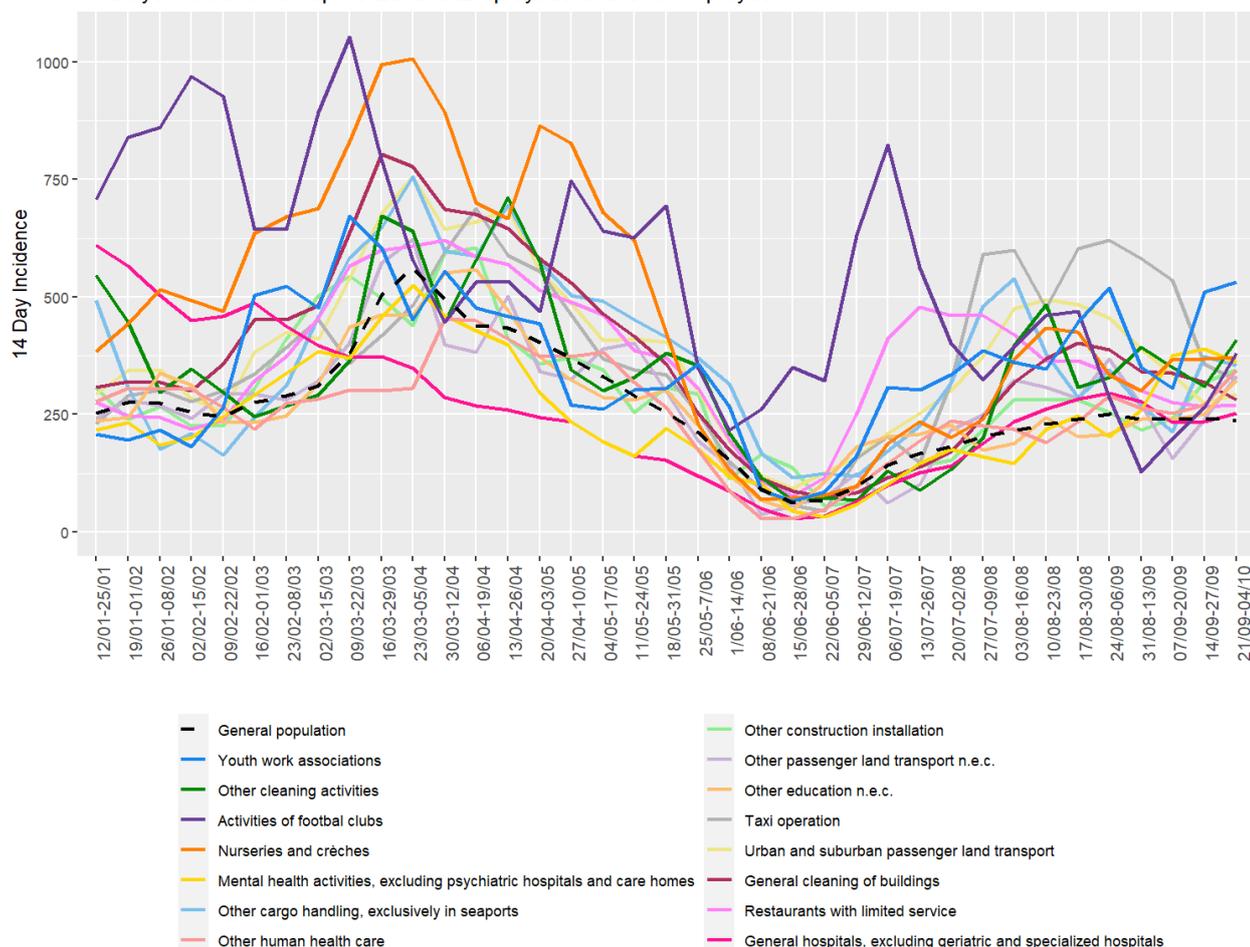


Figure 7: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 5 in both employees and self-employed

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

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

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

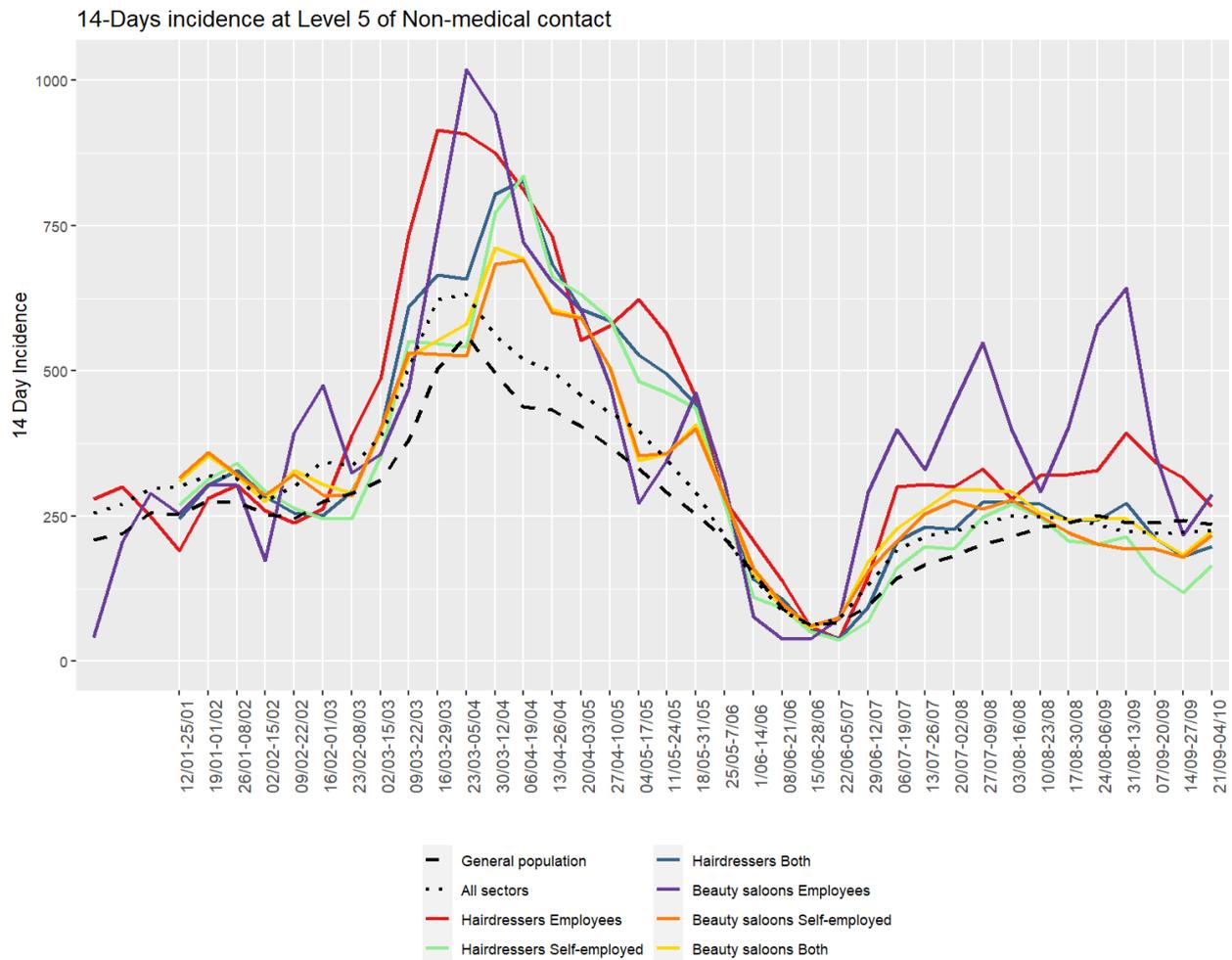


Figure 8: 14-Day incidence of COVID-19 infection at Level 5 of non-medical contact professions.

### 3.6 Additional analyses

#### 3.6.1 Cross-level overview

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

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

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

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

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

The sectors Manufacturing (sector C) and Wholesale and retail trade (sector G) are sectors with the highest number of sublevels. In all manufacturing sectors the incidence is below or close to the working and population average, except for the small sector of manufacture of anorganic chemicals (sector 2013). In all subsectors of

Sale of motor vehicles (sector 45) Wholesale (sector 46) and Retail sale (sector 47), the incidence is similar or below the working population average (Figure 9).

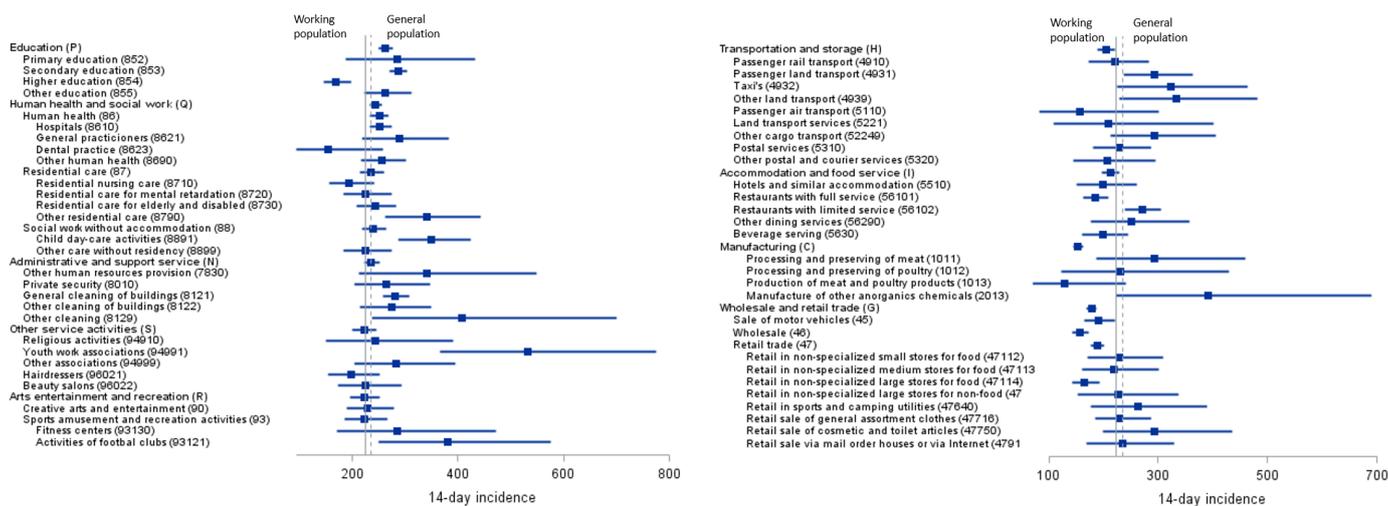


Figure 9: Forest plot of 14-Day incidence and 95% CI of selected sectors on 4 October 2021 in both employees and self-employed.

### 3.7 Contact tracing

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

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

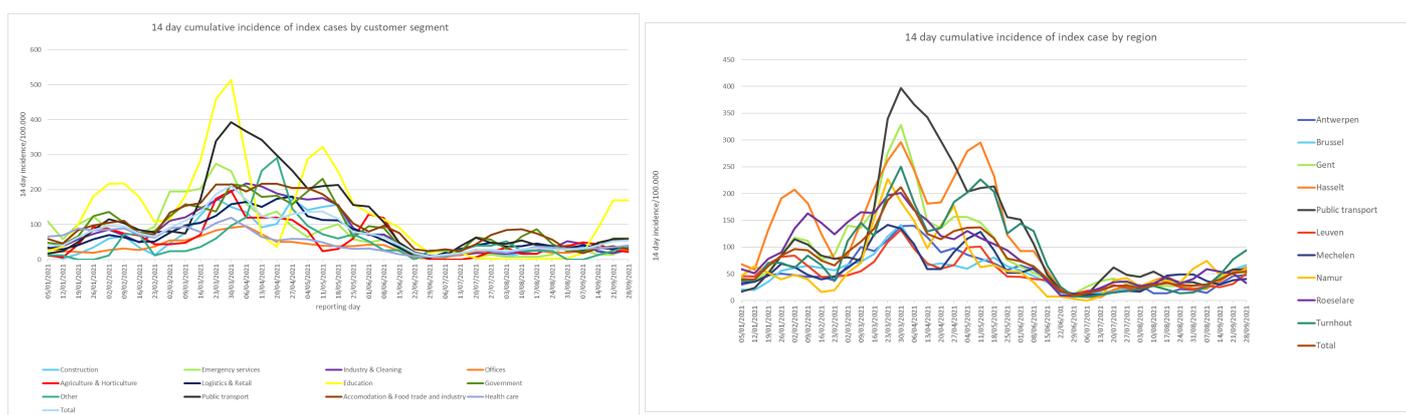


Figure 10: 14-Day incidence of index cases by segments under surveillance (left) and by region (right)

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

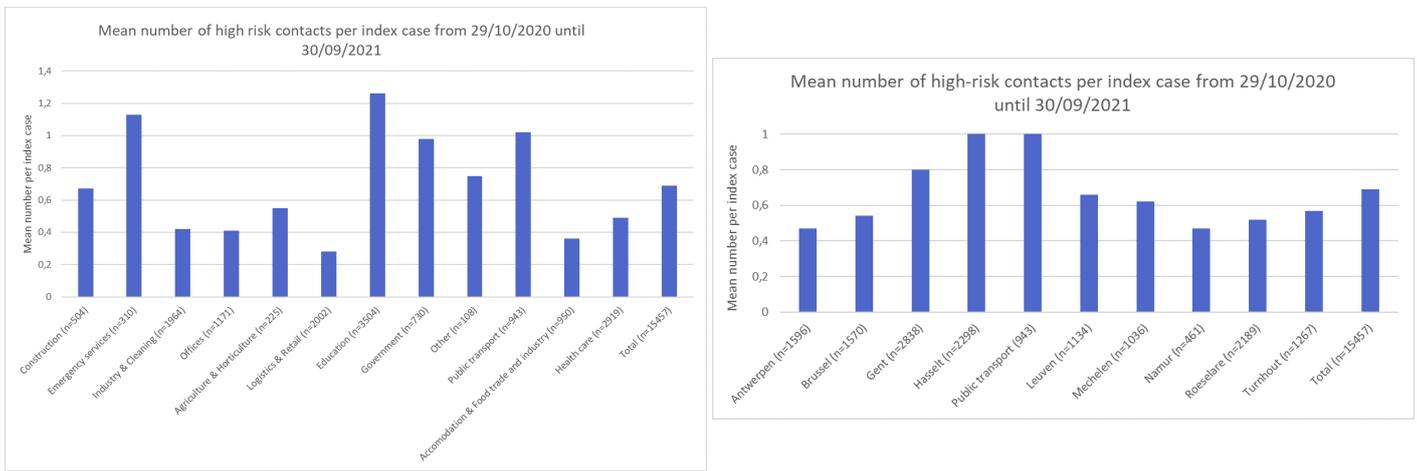


Figure 11: The mean number of high-risk contacts per index case by segments under surveillance (left) and by region (right)

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

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

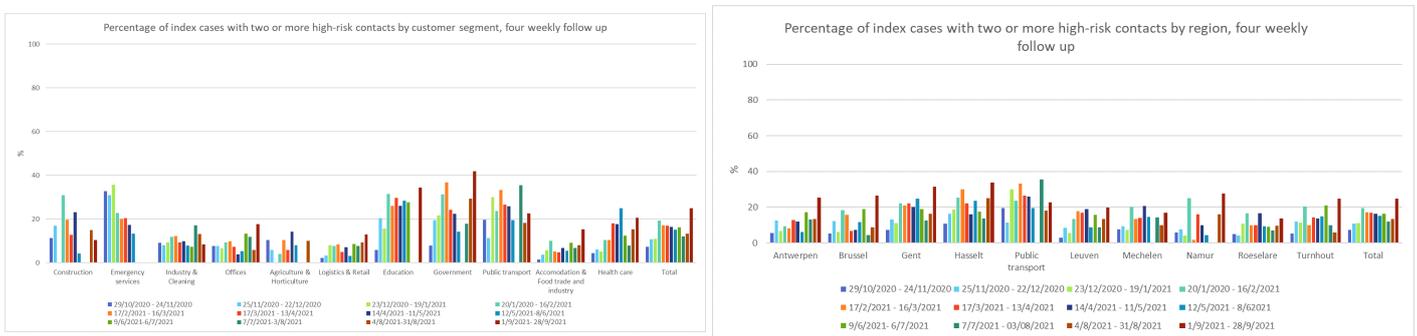


Figure 12: Four weekly percentage of index cases with two or more high-risk contacts by segments under surveillance (left) and by region (right)

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

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

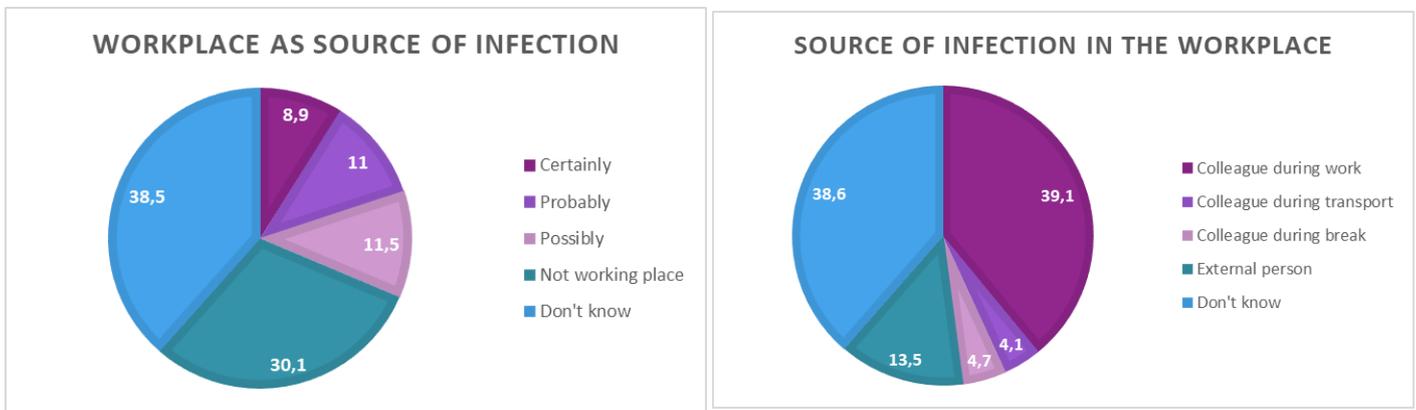


Figure 13: Distribution of the probability and source of infection at work by index case

After the decline to zero of the pupil index cases in education during the summer holidays 2021, there is again 44% of the cases in the education segment attributable to pupils since the reopening of primary and secondary education on September 1st (Figure 14 left). The interpretation of these data should be undertaken, however, with caution. Index cases in schools, both pupils and teachers, are reported to IDEWE by CLBs and schools in order to reach high-risk contacts among teachers and provide them with prescriptions for PCR tests and quarantine. The working method is, however, not the same for all CLBs and schools and therefore notification of index cases may differ between CLBs and regions. Moreover, index cases with only low risk contacts are often not reported to our service, because they do not need prescriptions for tests or quarantine. This might lead to an underestimation of index cases among pupils and teachers. Note that pupils are tested on a larger scale since January 2021.

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

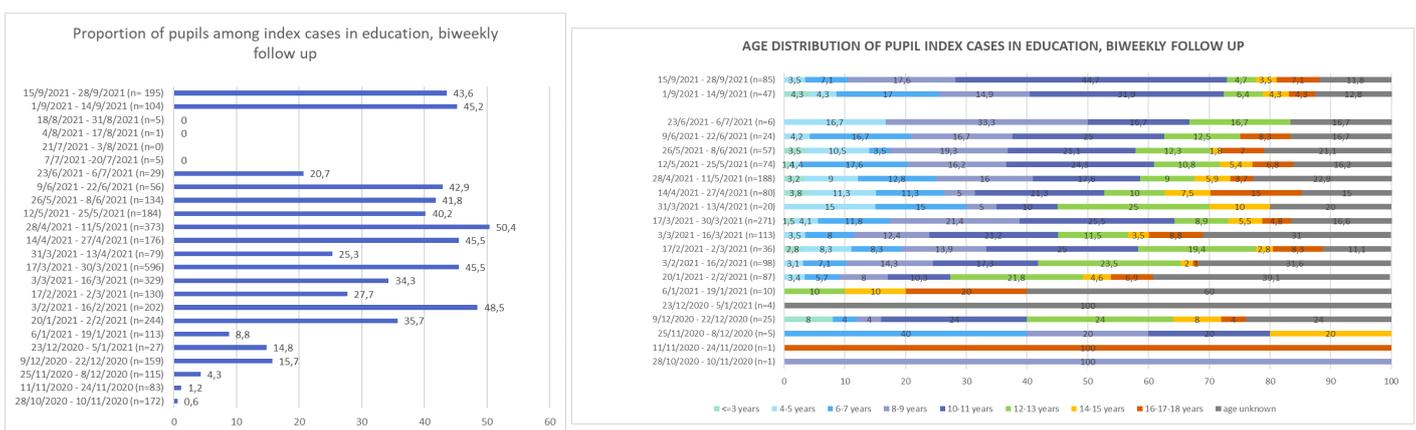


Figure 14: The evolution of index cases of pupils in school (left) and their age distribution (right).

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

From 1,752 adult index cases we had information about their vaccination status: 1,120 were partially or completely vaccinated (766 Cominarty, 213 Vaxzevria, 68 Moderna and 73 Johnson % Johnson) (Figure 15 left). With a vaccination coverage in the working population of 85% on 29 September 2021 (Figure 15 right,

data derived from Sciensano), it is important to evaluate these breakthrough index cases. The mean time between notification of infection and the second vaccine dose (or the only dose in case of Johnson & Johnson) for the breakthrough cases was 91.9 days (SD 53), minimum 15 days, maximum 234 days. The index cases who are fully vaccinated are the largest proportion in the last weeks (Figure 16 left). The vaccine effectiveness (VE) in fully vaccinated and protected workers is estimated using the screening method (see Giesecke: Modern infectious disease epidemiology):

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

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

Note that this result and the biweekly evolution (Figure 16 right) should be interpreted with caution. Partially vaccinated and partially protected workers are not taken into account in this calculation nor is the rapidly changing vaccination coverage of the population. This method is not recommended by the WHO in the early stages of vaccine roll-out. Moreover, the IDEWE contact tracing covers a relative larger proportion of employees in Flanders, where the vaccinated proportion is larger compared to the vaccination rate overall in Belgium. Taking the vaccination rate in Flanders (89%), rather than the vaccination rate in Belgium, the VE is 66%.

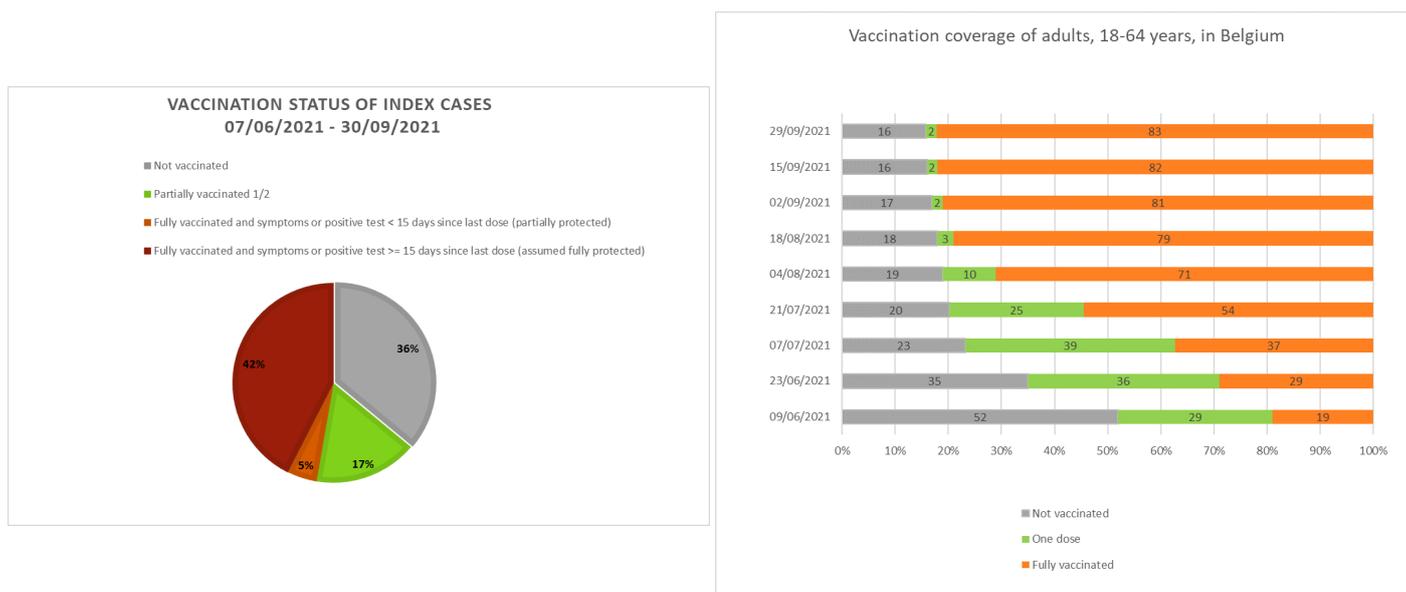


Figure 15: Distribution of the probability of vaccination in the general population (right) and the vaccination status of index cases (left).

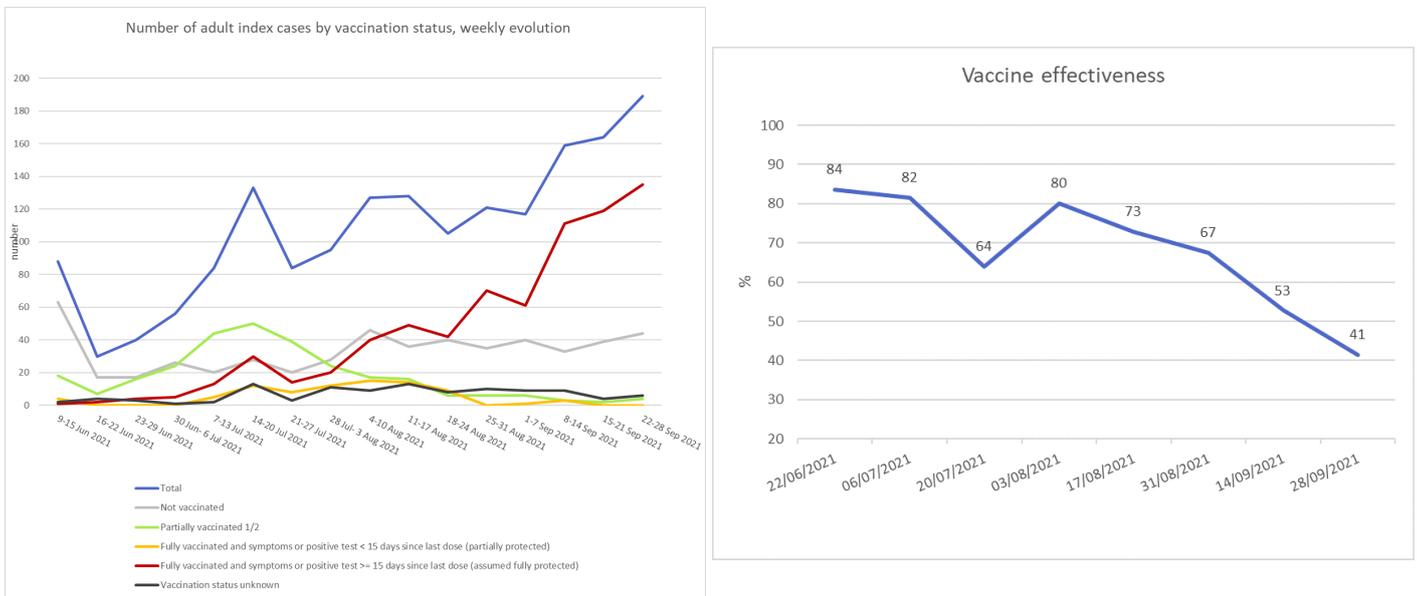


Figure 16: The weekly evolution of index cases and their vaccination status (left) and the vaccine effectiveness (right).

## 4 Conclusion

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

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

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

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

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

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

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

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

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

## **Acknowledgments**

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