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. In contrary to previous reports only one source of information on infection in work sectors will be used: the RSZ/ONSS data. Due to changed policy concerning testing and contact tracing in March 2022, insufficient incidence data is available from the IDEWE contact tracing.

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.

2 Methodology

2.1 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 (11 – 24 October 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.

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 sectors with a 14-day incidence on 24 October 2022 significantly above the working population average is Human health and social work activities (sector Q) and Public administration and defence; compulsory social security (sector O) (Table 1 and Figure 1). The 14-day incidences decreases again in all sectors. The working population average is 19% smaller then the general population average.
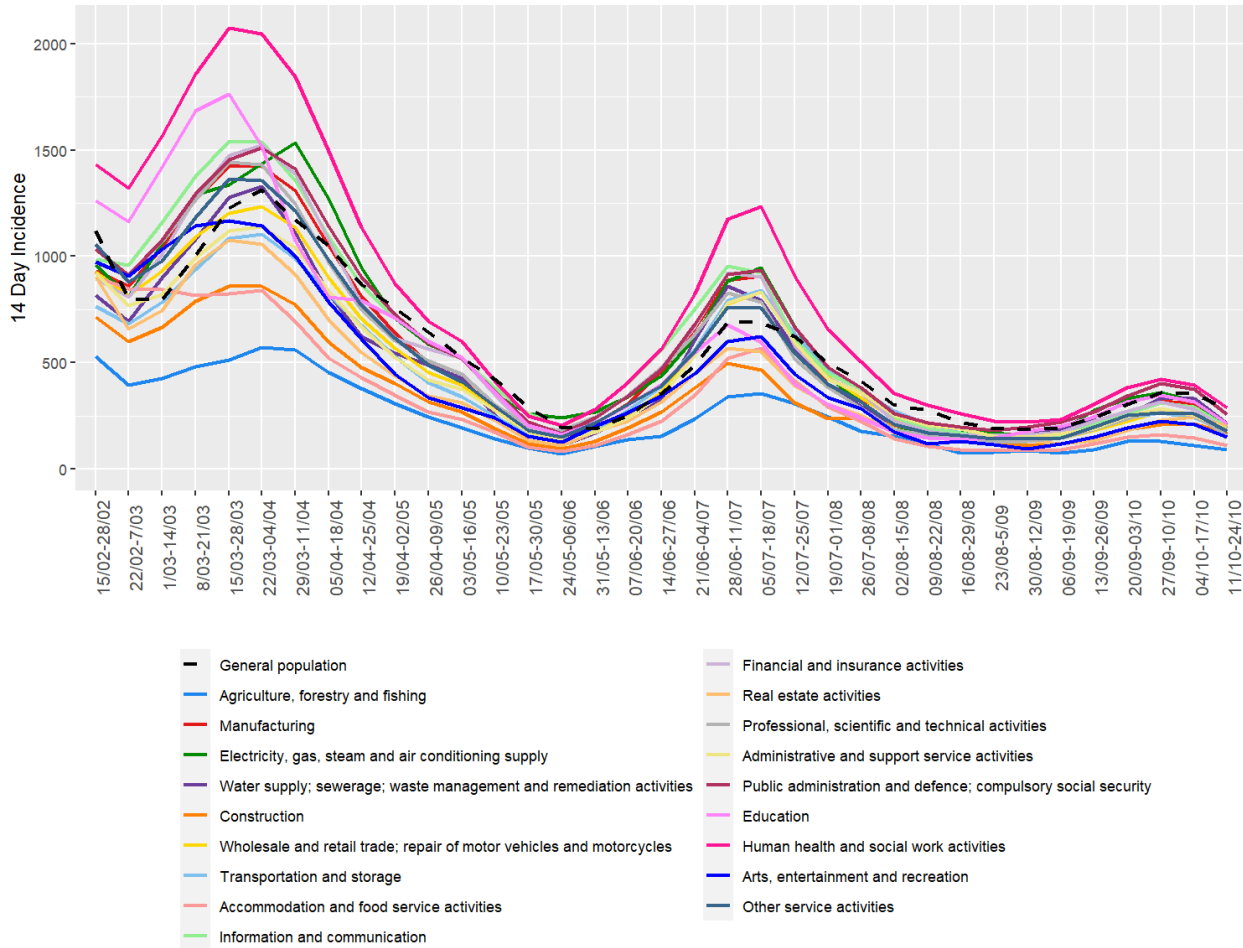
Figure 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 in both employees and self-employed workers

Table 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 on 24 October 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	676042	288(276;301)	295(282;309)	207(172;249)	8.23
General population			**281**	**281**	**281**	
Public administration and defence; compulsory social security	O	534766	256(243;270)	256(243;270)		0.20
Working population		**4585088**	**228(224;232)**	**228(224;232)**		
Education	P	599535	215(204;227)	216(204;228)	183(138;243)	4.54
Water supply; sewerage; waste management and remediation activities	E	40654	214(173;264)	225(182;278)		5.87
Manufacturing	C	626471	204(193;215)	214(202;226)	121(97;151)	10.46
Real estate activities	L	58911	202(169;242)	288(229;363)	139(104;185)	58.50
Information and communication	J	190452	199(180;220)	225(201;252)	134(107;169)	29.30
Electricity, gas, steam and air conditioning supply	D	21354	192(141;261)	200(147;273)		6.21
Financial and insurance activities	K	158919	185(165;207)	202(178;229)	124(92;167)	22.41
Administrative and support service activities	N	446196	184(172;197)	199(185;214)	114(93;140)	18.41
Transportation and storage	H	317582	182(168;197)	190(175;207)	99(68;143)	9.17
Wholesale and retail trade; repair of motor vehicles and motorcycles	G	845810	179(170;188)	195(185;206)	124(109;141)	23.05
Other service activities	S	161453	179(160;201)	204(175;237)	153(128;183)	49.72
Construction	F	383832	167(155;180)	189(172;208)	134(117;154)	40.93
Professional, scientific and technical activities	M	405096	157(145;170)	187(170;206)	122(107;139)	46.64
Arts, entertainment and recreation	R	117219	151(130;175)	132(109;160)	188(150;236)	35.49
Accommodation and food service activities	I	353636	110(100;121)	116(104;129)	87(68;112)	21.76
Agriculture, forestry and fishing	A	90323	93(75;115)	63(42;94)	114(89;147)	60.04

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 24 October 2022 above the working population average are: Human health activities (sector 86), Residential care activities (sector 87), Social work activities without accommodation (sector 88) and Public administration and defence; compulsory social security (sector 84) (Table 2 and Figure 2).
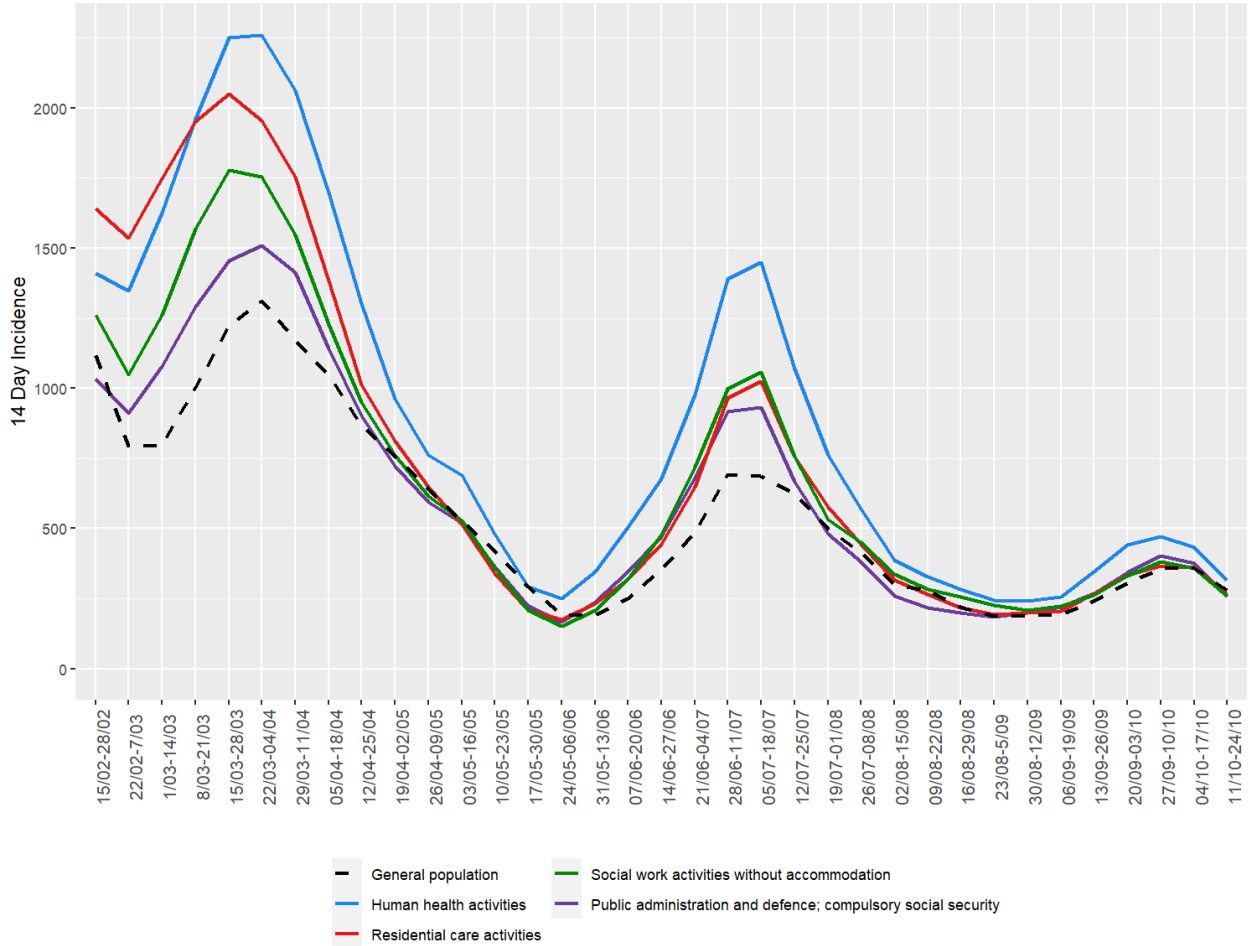
Figure 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 in both employees and self-employed workers

Table 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 24 October 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 activities	86	324444	315(296;335)	331(310;353)	222(183;269)	15.02
General population			**281**	**281**	**281**	
Residential care activities	87	181509	265(242;290)	267(244;292)	87(22;347)	1.31
Social work activities without accommodation	88	172201	259(236;284)	264(240;290)	110(49;245)	3.19
Public administration and defence; compulsory social security	84	534766	256(243;270)	256(243;270)		0.20
Working population		**4585088**	**228(224;232)**	**228(224;232)**		

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 24 October 2022 significantly above the working population average are: Other human resources provision (sector 783), Construction of other civil engineering projects (sector 429), Hospital activities (sector 861), Compulsory social security activities (sector 843), Social work activities without accommodation for the elderly (sector 881), Residential care (sector 871, 873) and Administration of the state (sector 841) (Table 3 and Figure 3).

The incidences in education follow the trend in the working population and decrease in the last 2 weeks. The incidences in education attain incidences similar to or lower than the working population average (Figure 4). 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.
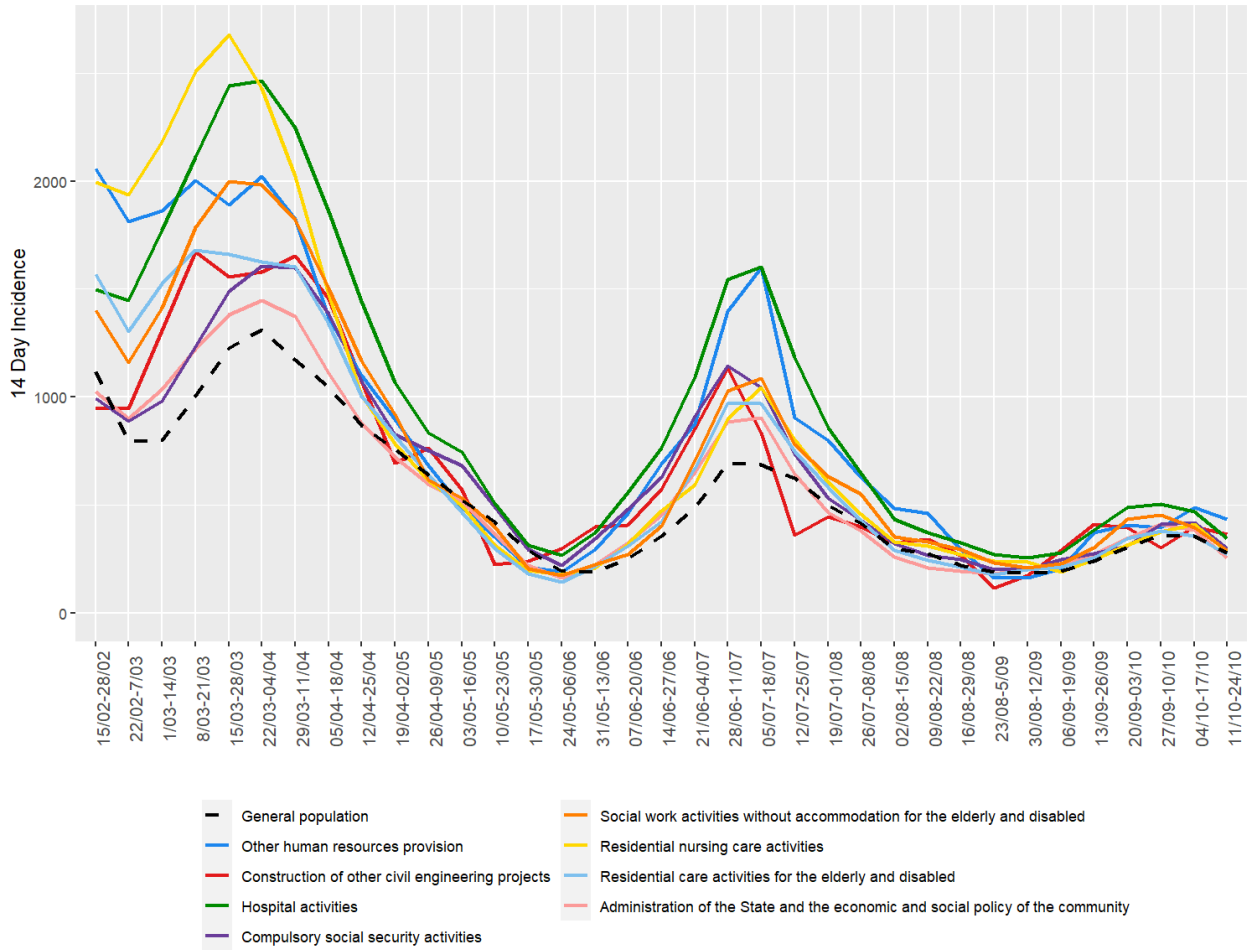
Figure 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 in both employees and self-employed
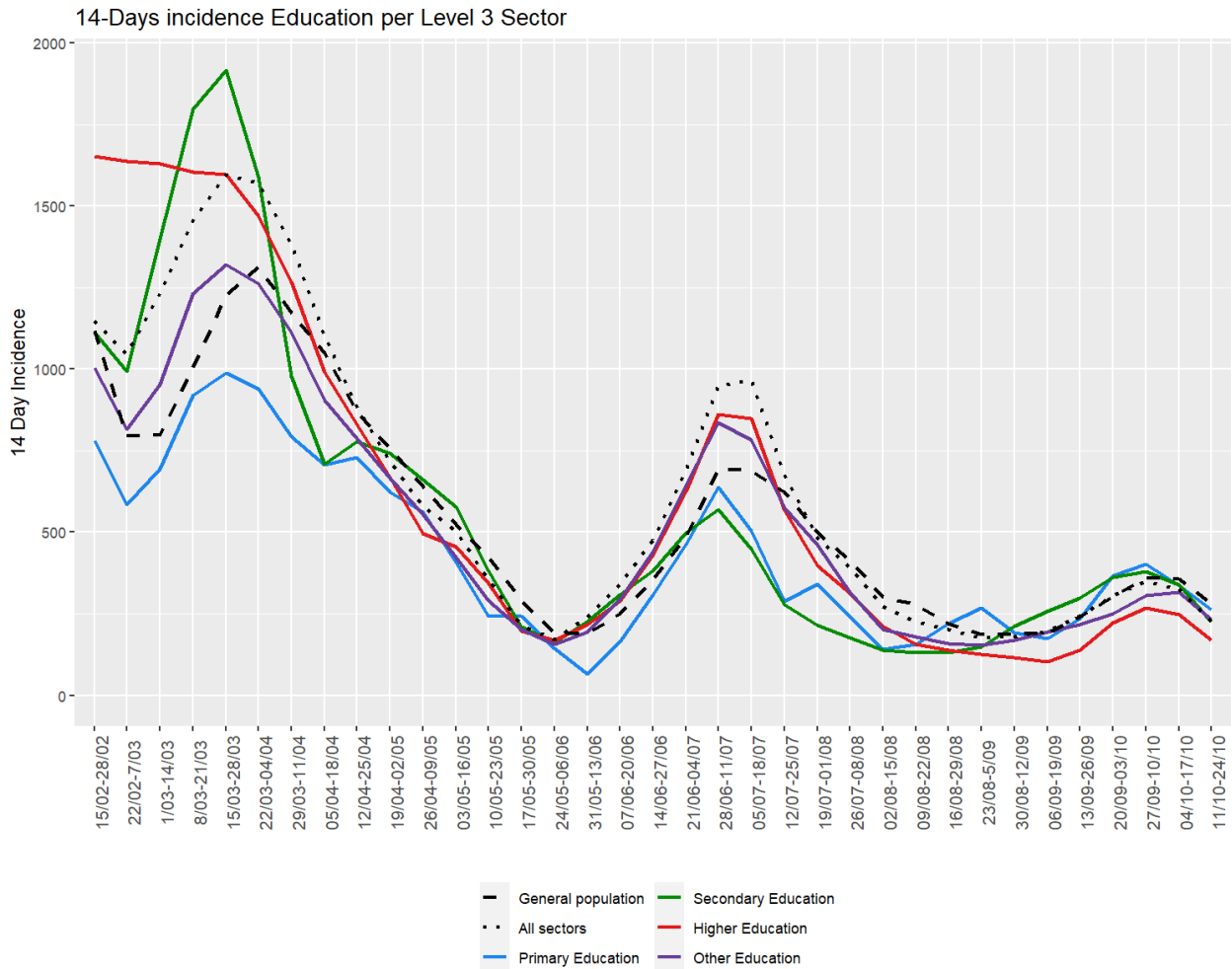
Figure 4: 14-Day incidence of COVID-19 infection in Education sectors at Level 3 in both employees and self-employed

Table 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 on 24 October 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
Other human resources provision	783	5275	436(290;655)			9.68
Construction of other civil engineering projects	429	6887	363(245;537)	383(257;571)		9.13
Hospital activities	861	225434	346(323;371)	347(324;372)		0.32
Compulsory social security activities	843	32886	298(245;363)	298(245;363)		0.96
Social work activities without accommodation for the elderly and disabled	881	49141	291(247;343)	292(248;344)		1.09
Residential nursing care activities	871	52837	282(240;331)	282(240;331)		0.77
General population			**281**	**281**	**281**	
Residential care activities for the elderly and disabled	873	67279	272(235;314)	272(235;314)		1.32
Administration of the State and the economic and social policy of the community	841	361811	254(238;271)	254(238;271)		0.17
Working population		**4585088**	**228(224;232)**	**228(224;232)**		

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 24 October 2022 significantly higher than the working population average are: Driving school activities (sector 8553), Other human resources provision (sector 7830), Construction of water projects (sector 4291), Hospital activities (sector 8610), Justice and juidical activities (sector 8423), Compulsory social security activities (sector 8430), Social work activities without accommodation for the elderly and disabled (sector 8810), Residential care (sector 871, 873) and General public administration (sector 8411) (Table 4 Figure 5).
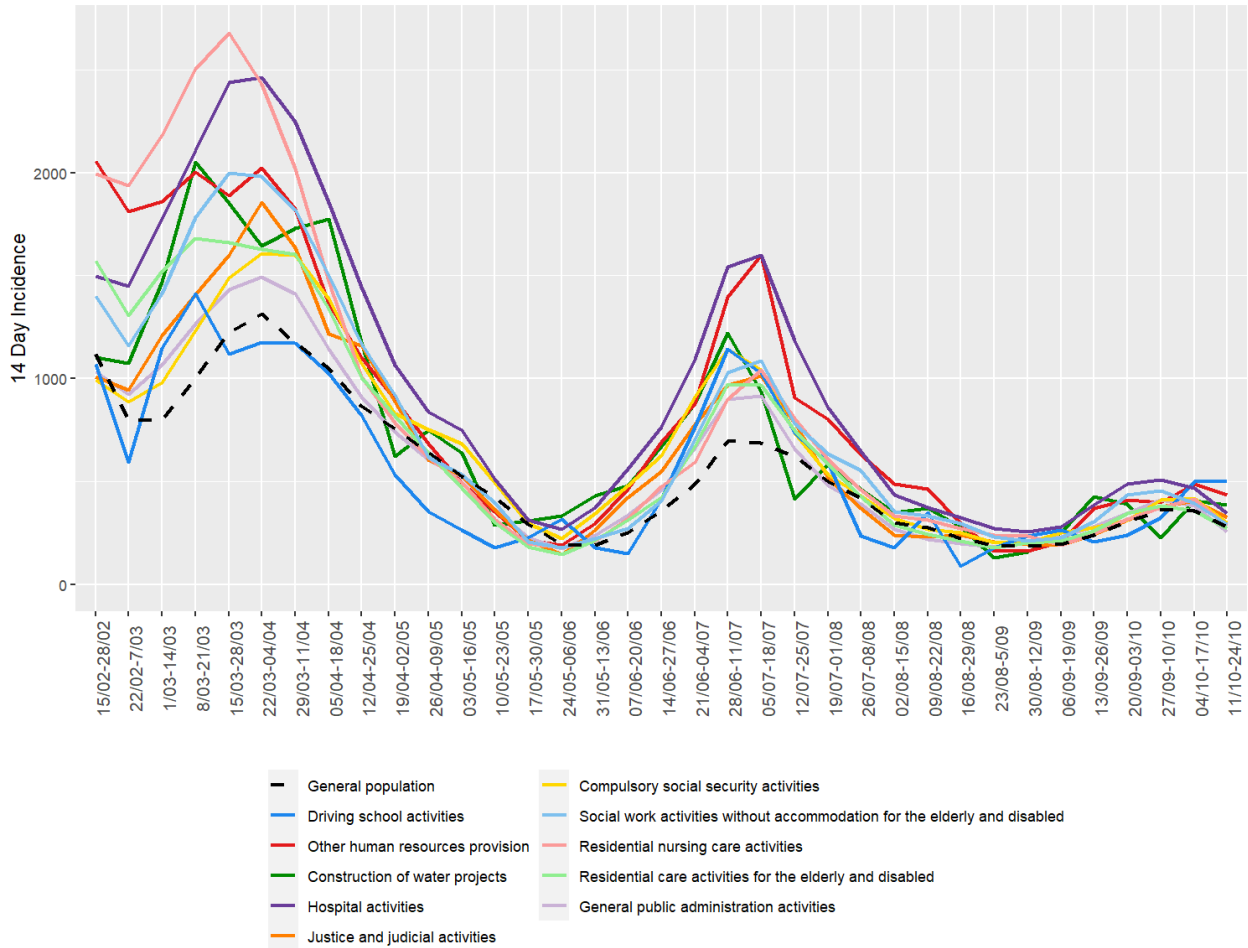
Figure 5: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 in both employees and self-employed

Table 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 on 24 October 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
Driving school activities	8553	3386	502(312;806)			34.58
Other human resources provision	7830	5275	436(290;655)	437(285;669)		9.68
Construction of water projects	4291	4404	386(240;620)	386(240;620)		7.17
Hospital activities	8610	225434	346(323;371)	347(324;372)		0.32
Justice and judicial activities	8423	28173	323(263;397)	323(263;397)		0.11
Compulsory social security activities	8430	32886	298(245;363)	298(245;363)		0.96
Social work activities without accommodation for the elderly and disabled	8810	49141	291(247;343)	292(248;344)		1.09
Residential nursing care activities	8710	52837	282(240;331)	282(240;331)		0.77
General population			**281**	**281**	**281**	
Residential care activities for the elderly and disabled	8730	67279	272(235;314)	272(235;314)		1.32
General public administration activities	8411	331102	254(237;272)	254(237;272)		0.13
Working population		**4585088**	**228(224;232)**	**228(224;232)**		

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 24 October 2022 significantly higher than the working population average are: Other human resource provision (sector 78300), Service flats for the elderly (sector 87302), Processing and preservation of potatoes (sector 10311), Rental and operation of social housing (sector 68202), Hospitals (sector 86101, 86104), Activities of medical laboratories (sector 86901), Compulsory social security (sector 84301), Other human health activities (sector 86909), Penal institutions (sector 84232), Activities of family and elderly care at home (sector 88101), Professional education (sector 85592), Public Centres for Social Welfare (OCMW) (sector 84115), Rest and care homes (RVT) (sector 87101) and Sheltered workshops (sector 88995) (Table 5 and Figure 6).
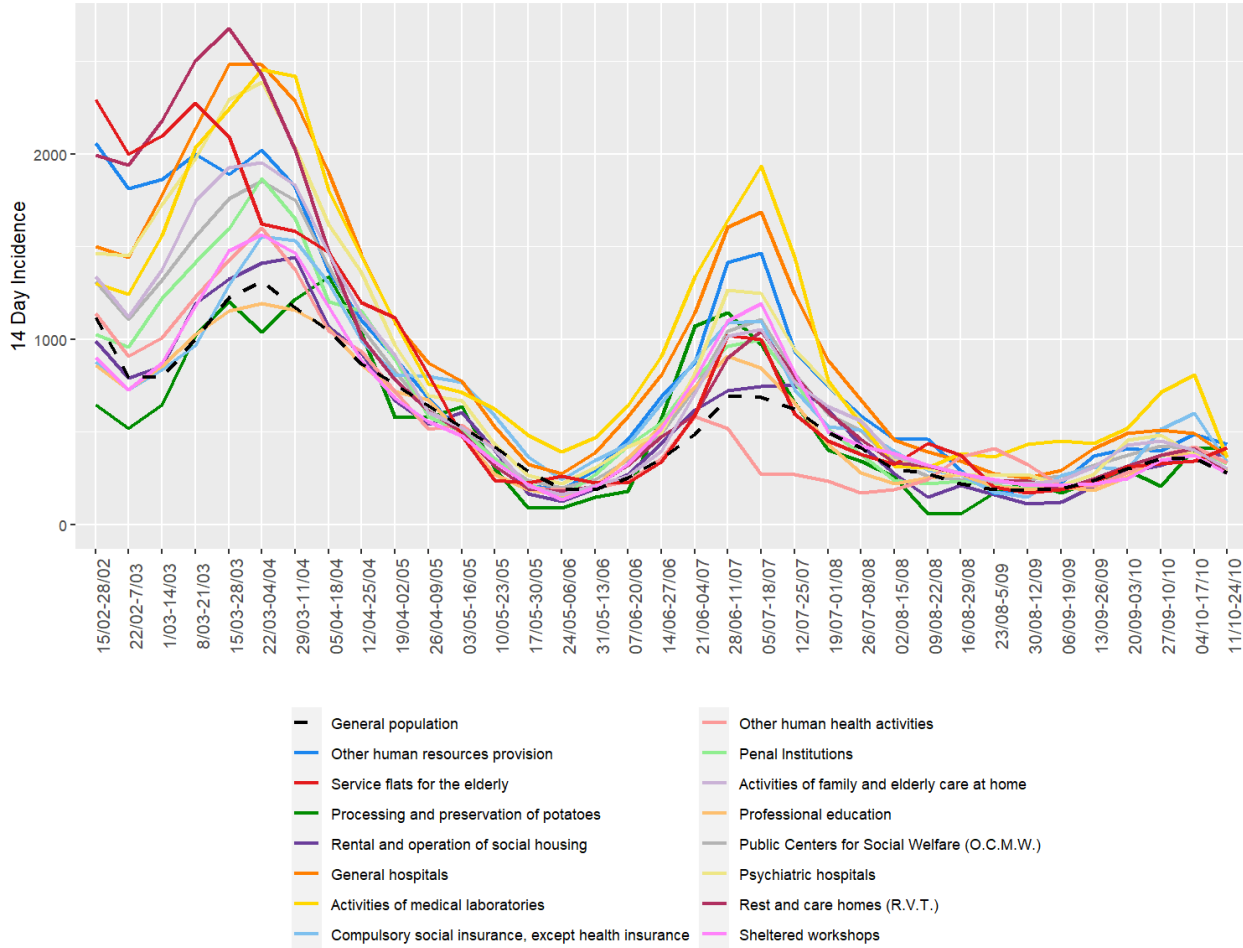
Figure 6: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 5 in both employees and self-employed

Table 5: 14-Day incidence of COVID-19 infection of sectors with the highest incidence at Level 5 on 24 October 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
Other human resources provision	78300	5275	436(290;655)	437(285;669)		9.68
Service flats for the elderly	87302	5556	414(275;622)	414(275;622)		3.60
Processing and preservation of potatoes	10311	3390	413(245;696)	413(245;696)		3.12
Rental and operation of social housing	68202	7754	374(260;538)	390(269;564)		7.58
General hospitals	86101	180488	369(342;398)	369(342;398)		0.26
Activities of medical laboratories	86901	5525	362(234;560)	362(234;560)		11.71
Compulsory social insurance, except health insurance	84301	11471	340(249;465)	340(249;465)		0.57
Other human health activities	86909	11111	333(241;459)		320(228;450)	92.93
Penal Institutions	84232	27273	330(268;406)	330(268;406)		0.00
Activities of family and elderly care at home	88101	44850	301(254;356)	301(254;356)		0.86
Professional education	85592	22408	299(235;380)	318(248;408)	170(71;408)	13.27
Public Centers for Social Welfare (O.C.M.W.)	84115	85274	292(258;331)	292(258;331)		0.16
Psychiatric hospitals	86104	36749	283(234;343)	283(234;343)		0.33
Rest and care homes (R.V.T.)	87101	52837	282(240;331)	282(240;331)		0.74
General population			**281**	**281**	**281**	
Sheltered workshops	88995	49270	274(232;324)	273(230;323)		1.05
Working population		**4585088**	**228(224;232)**	**228(224;232)**		

Finally, when considering specifically the non-medical contact professions, we see that the incidence in the beauty saloons and the hairdressers remain well below the working and general population average (Figure 7).
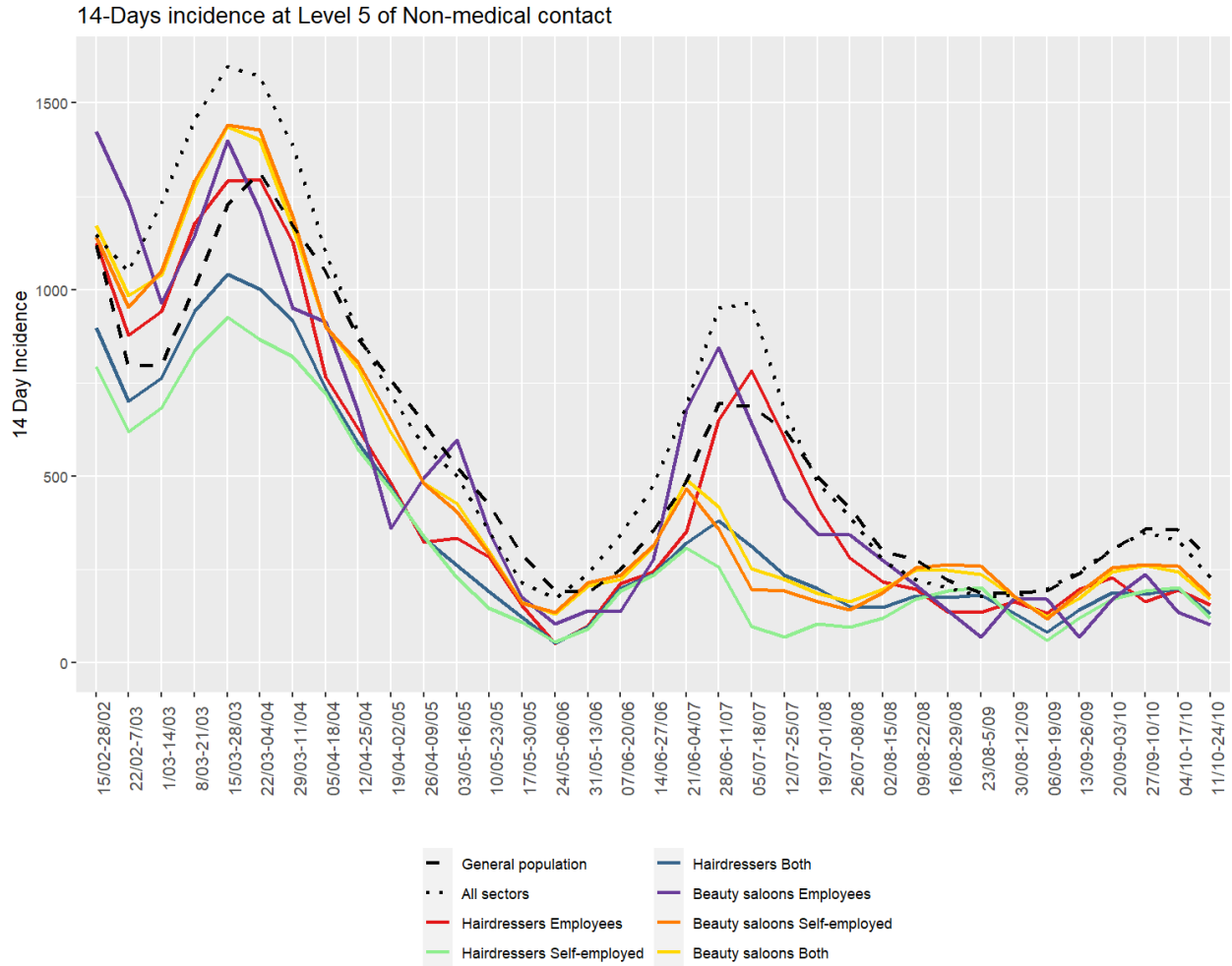
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Figure 7: 14-Day incidence of COVID-19 infection at Level 5 of non-medical contact professions.

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) is elevated compared to the working and general population (Figure 8), which is mainly due to Hospital activities. There is in general an increase in incidence in the health sector compared to the working population, but in most subsections the incidence is below or equal to the general population average.

The 14-day incidence in the Public administration and defence (sector O) is elevated compared to the working population average, but not to the general population average, which is mainly due to Public Centers for Social Welfare, Justice and compulsory social insurances.

Although the 14-day incidence in Construction (sector F) and Administration and support activities (sector N) is below the working population average, Construction of water projects and Other human resources provision show an increased incidence.

It is encouraging that the incidence in Education (sector P), Other service activities (sector S), Arts, entertainment and recreation (sector R), Transportation and storage (sector H) and Accommodation and food service activities (sector I) is similar to or below the general and working population average.

The sectors Manufacturing (sector C) and Wholesale and retail trade (sector G) are sectors with the highest number of sublevels. This results in large differences in 14-day incidences within the sector. It is encouraging that only one manufacturing sector shows an increased incidence and none in the wholsesale and retail sale sector (Figure 8).
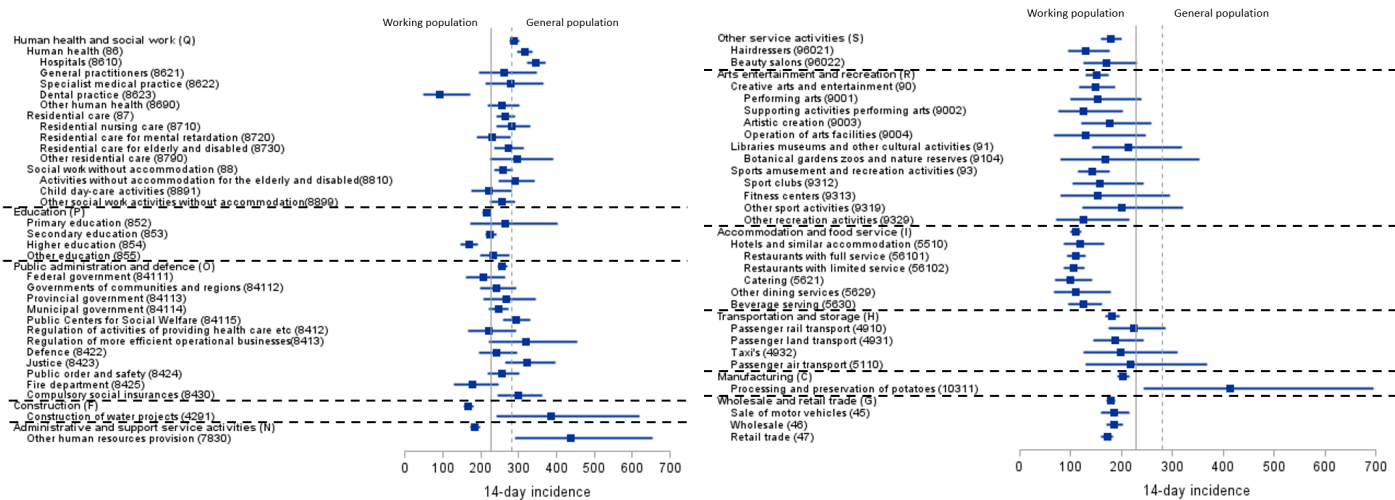
Figure 8: Forest plot of 14-Day incidence and 95% CI of selected sectors on 10 October 2022 in both employees and self-employed.

4 Conclusion

Despite the limitations of the data, the RSZ/ONSS data demonstrates that the 14-day COVID-19 incidences in most sectors decrease again in the last 2 weeks. The highest incidences are present in the health and social work sector and the Public administration. The average incidence in the working population is 19% lower than the average incidence in the general population, suggesting that infections are less common in working adults than in children and the elderly. Although the changed testing procedure in schools and the general population may influence this comparison.

Vigilence is required in especially education, manufacturing, human health, residential care, social work and public administration sectors since they're not able to telework.

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 showed that in the index cases, where this information was available, 7% indicated that the workplace was certainly the source of infection. Due to changed testing policy in March 2022, insufficient data is available from the contact tracing to provide accurate results.

It is important to carefully monitor the incidence of COVID-19 in all sectors, especially sectors with frequent high risk contacts with an increased incidence compared to the working population average. Hospital activities, residential care, social work without accommodation, public centres for social welfare all show an increased incidence compared to the general population average and require continuous careful attention.

For some sectors the reason for the higher incidences is not immediately obvious, such as justice, compulsory social insurance, construction of water projects, other human resources provision and processing and preservation of potatoes. It would be worthwhile to evaluate the hygiene protocols and its practice in these sectors.

The incidence in non-medical contact professionals is below or equal to the working and general population average.

It is encouraging to note that employees in education, other service activities, arts, entertainment and recreation, accommodation and food services, manufacturing, transportation and wholesale and retail sectors are well protected, as they are often not able to telework.

Despite the high degree of vaccination, COVID-19 infection remains possible. Continuous monitoring of breakthrough infections, despite primo and booster vaccinations is warranted. Additional booster vaccination

for high risk employees in the health and residential care, public administation, education and transportation is highly recommended.

Acknowledgments