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 (30 August– 12 September 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 12 September 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 continue to decrease in all sectors. The working population average is slightly lower (4%) than the general population average.
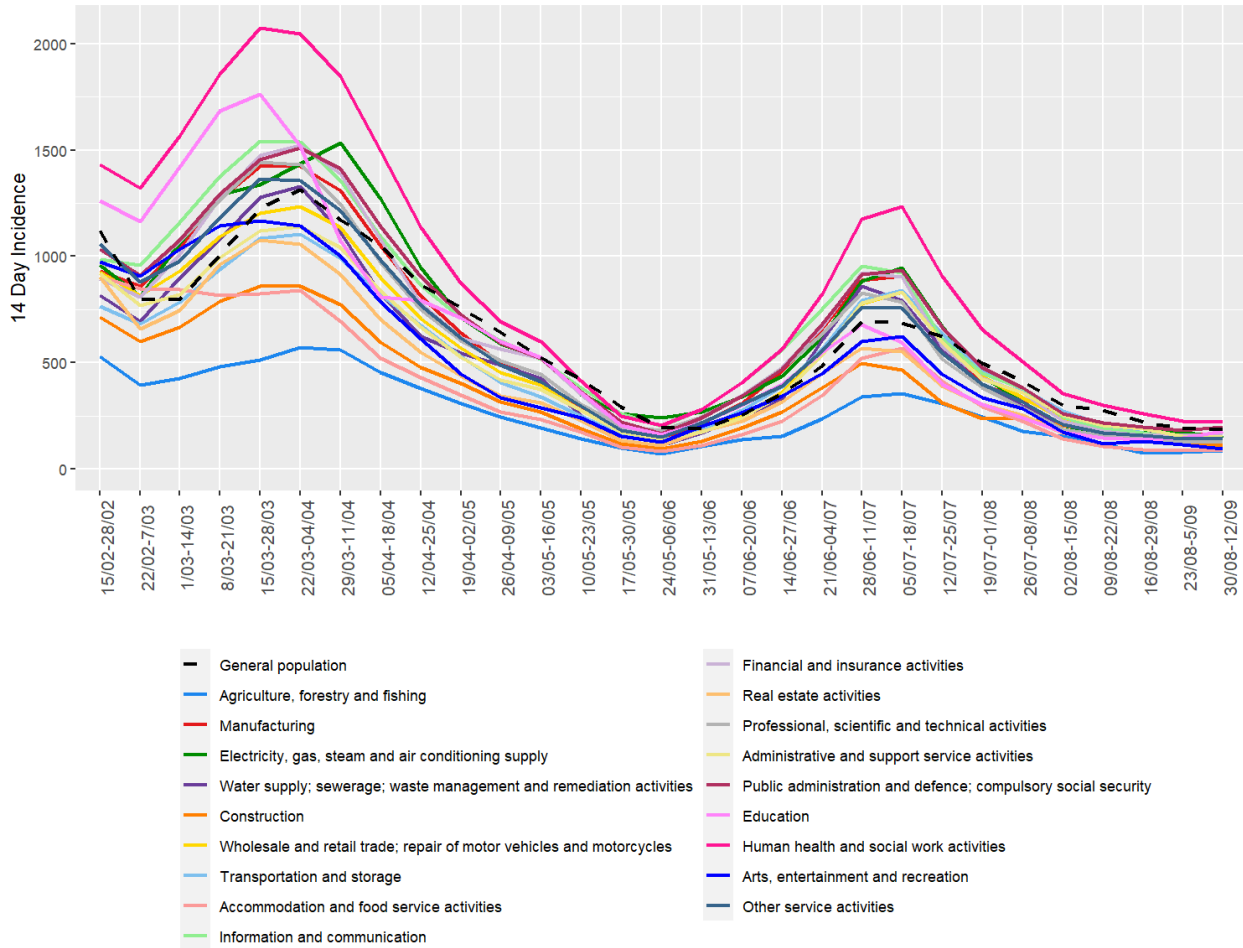
Figure 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 in both employees and self-employed workers

Table 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 on 12 September 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	692308	221(210;232)	225(214;237)	177(145;216)	8.01
Public administration and defence; compulsory social security	O	577387	199(188;211)	199(188;211)		0.19
General population			**186**	**186**	**186**	
Working population		**4691620**	**179(175;183)**	**179(175;183)**		
Education	P	676705	176(166;186)	177(167;188)	149(109;204)	3.98
Manufacturing	C	640741	162(152;172)	168(158;179)	113(90;142)	10.20
Financial and insurance activities	K	159877	162(143;183)	179(157;204)	102(74;141)	22.17
Water supply; sewerage; waste management and remediation activities	E	42236	161(127;204)	163(128;208)		5.65
Administrative and support service activities	N	450336	149(138;161)	160(148;173)	99(79;123)	18.05
Electricity, gas, steam and air conditioning supply	D	21622	148(105;209)	153(108;217)		6.16
Information and communication	J	190411	146(130;164)	170(149;193)	86(65;114)	29.25
Other service activities	S	162500	144(127;164)	153(129;182)	135(112;163)	49.19
Transportation and storage	H	321168	137(125;150)	142(129;156)	88(59;130)	9.04
Real estate activities	L	59398	133(107;166)	168(125;226)	106(76;147)	57.71
Professional, scientific and technical activities	M	403788	132(121;144)	161(145;179)	98(85;113)	46.48
Wholesale and retail trade; repair of motor vehicles and motorcycles	G	859690	129(122;137)	137(128;146)	98(85;113)	22.33
Construction	F	386607	112(102;123)	130(116;146)	85(72;101)	40.62
Arts, entertainment and recreation	R	119588	97(81;116)	98(79;122)	96(70;132)	34.29
Accommodation and food service activities	I	366292	89(80;99)	91(81;102)	78(60;102)	20.27
Agriculture, forestry and fishing	A	103488	86(70;106)	43(28;65)	127(100;161)	52.18

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 12 September 2022 above the working population average are: Human health activities (sector 86), Manufacturing of basic pharmaceutical products and preparations (sector 21), Social work activities without accommodation (sector 88), Residential care activities (sector 87) and Public administration and defence; compulsory social security (sector 84) (Table 2 and Figure 2).
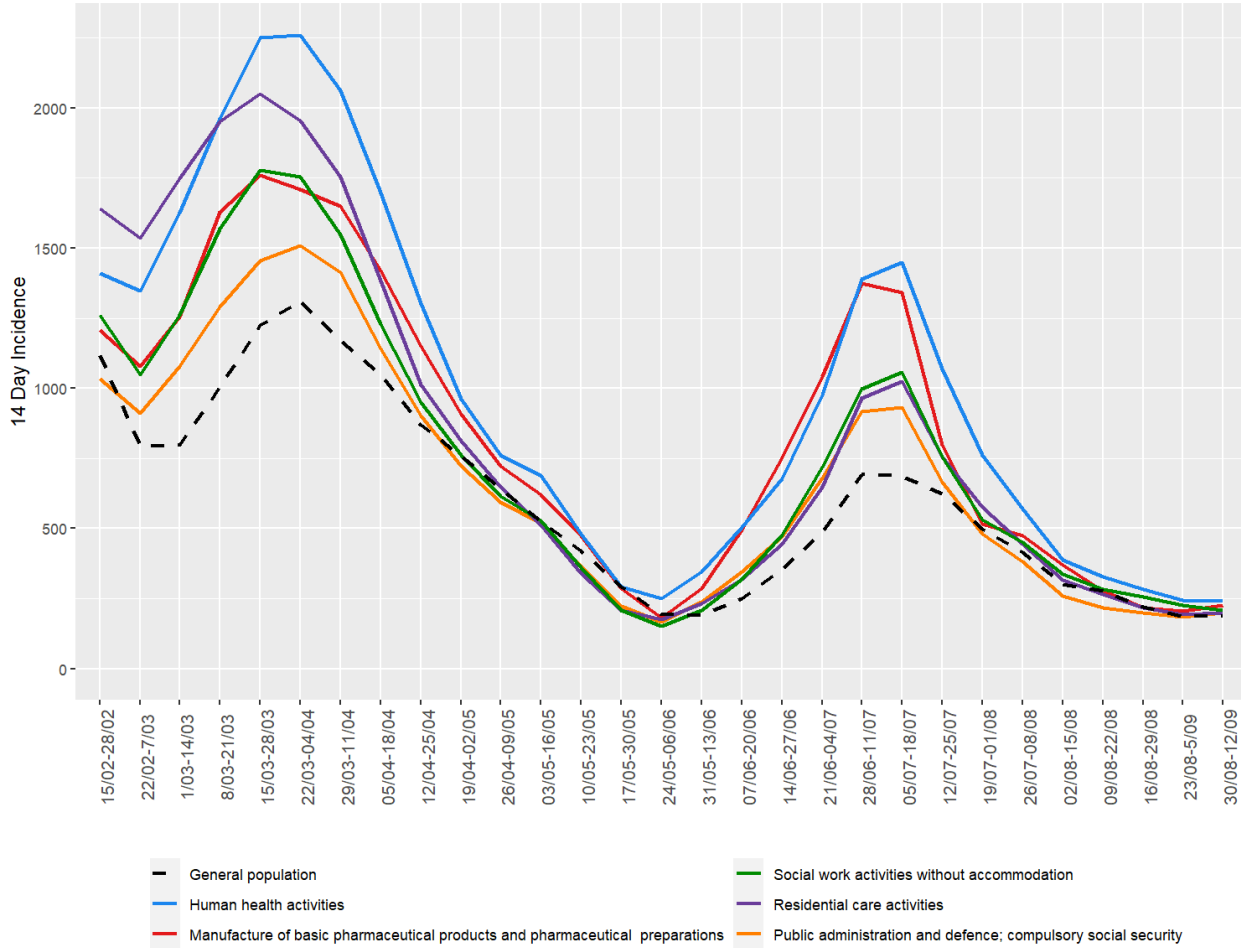
Figure 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 in both employees and self-employed workers

Table 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 12 September 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	329583	240(224;257)	250(232;269)	180(146;223)	14.66
Manufacture of basic pharmaceutical products and pharmaceutical preparations	21	36889	225(181;279)	225(181;279)		1.26
Social work activities without accommodation	88	173684	209(189;232)	211(190;234)	148(74;296)	3.14
Residential care activities	87	189000	200(181;221)	200(181;221)	173(65;460)	1.25
Public administration and defence; compulsory social security	84	577387	199(188;211)	199(188;211)		0.19
General population			**186**	**186**	**186**	
Working population		4691620	**179(175;183)**	**179(175;183)**		

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 12 September 2022 significantly above the working population average are: Human health activities (sector 861, 869), Manufacture of plastics and pharmaceutical preparations (sector 222, 212), Residential nursing care activities (sector 871), Secondary education (sector 853), Social work activities without accommodation (sector 889) and Administration of the state (sector 841) (Table 3 and Figure 3).

The incidences in higher education continue to decrease similar to the incidence of the working and general population average, but the incidences in the secondary education has increased substantially in the last week (from 150 cases per 100,000 to 211 or a 41% increase) (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.

14-Days incidence of top Level 3 Employees and Self-employed

Legend:
- General population
- Hospital activities
- Manufacture of plastics products
- Residential nursing care activities
- Manufacture of pharmaceutical preparations
- Other human health activities
- Secondary education
- Other social work activities without accommodation
- Administration of the State and the economic and social policy of the community
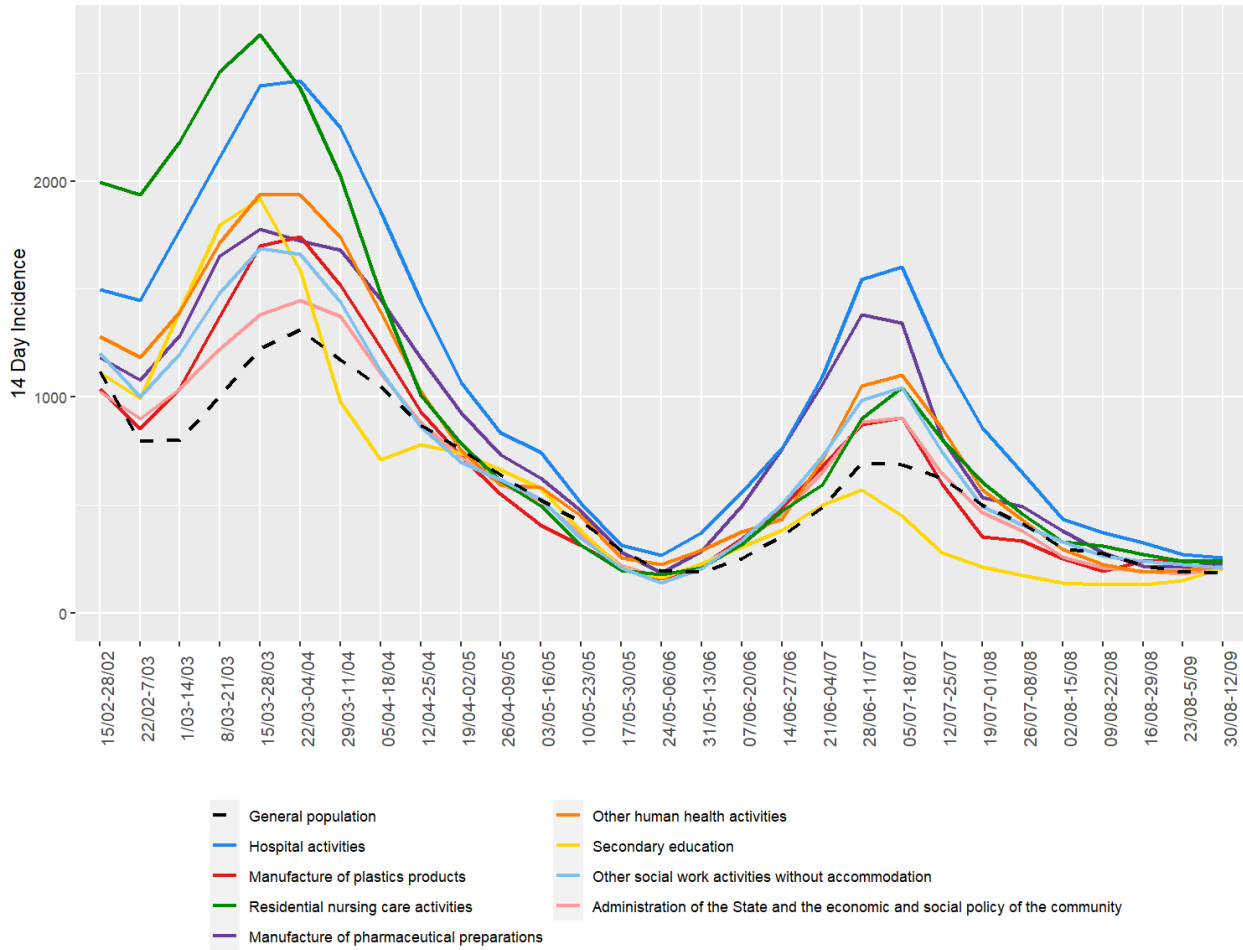
Figure 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 in both employees and self-employed
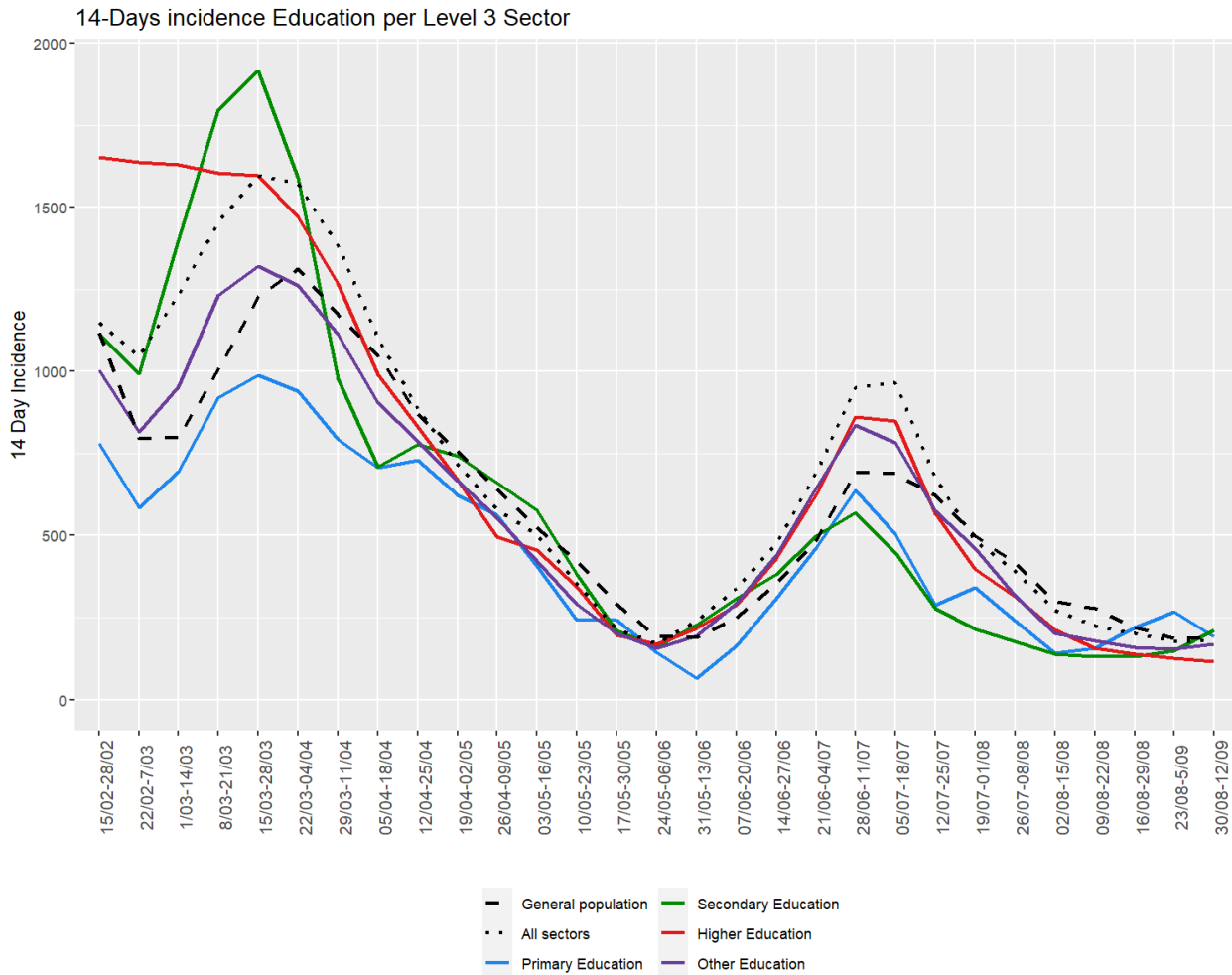
Figure 4: 14-Day incidence of COVID-19 infection in Education sectors at Level 3 in both employees and self-employed

Table 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 on 12 September 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
Hospital activities	861	227953	254(234;276)	254(234;276)		0.31
Manufacture of plastics products	222	22541	244(187;318)	244(187;318)		5.39
Residential nursing care activities	871	55508	236(199;280)	236(199;280)		0.73
Manufacture of pharmaceutical preparations	212	34335	233(187;290)	232(186;289)		0.92
Other human health activities	869	55046	218(182;261)	256(204;321)	175(131;234)	47.13
Secondary education	853	385308	211(197;226)	211(197;226)		0.22
Other social work activities without accommodation	889	124286	210(186;237)	212(187;240)	158(79;316)	4.08
Administration of the State and the economic and social policy of the community	841	401463	205(191;219)	205(191;219)		0.15
General population			**186**	**186**	**186**	
Working population		4691620	**179(175;183)**	**179(175;183)**		

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 12 September 2022 significantly higher than the working population average are: Manufacturing sectors (sector 2512, 2229, 2120), Regulation to more efficient operation of businesses (sector 8413), Child day-care activities (sector 8891), Hospital activities (sector 8610), Residential nursing care activities (sector 8710), Other human health activities (sector 8690), General secondary education (sector 8531) and General public administration (sector 8411) (Table 4 Figure 5).
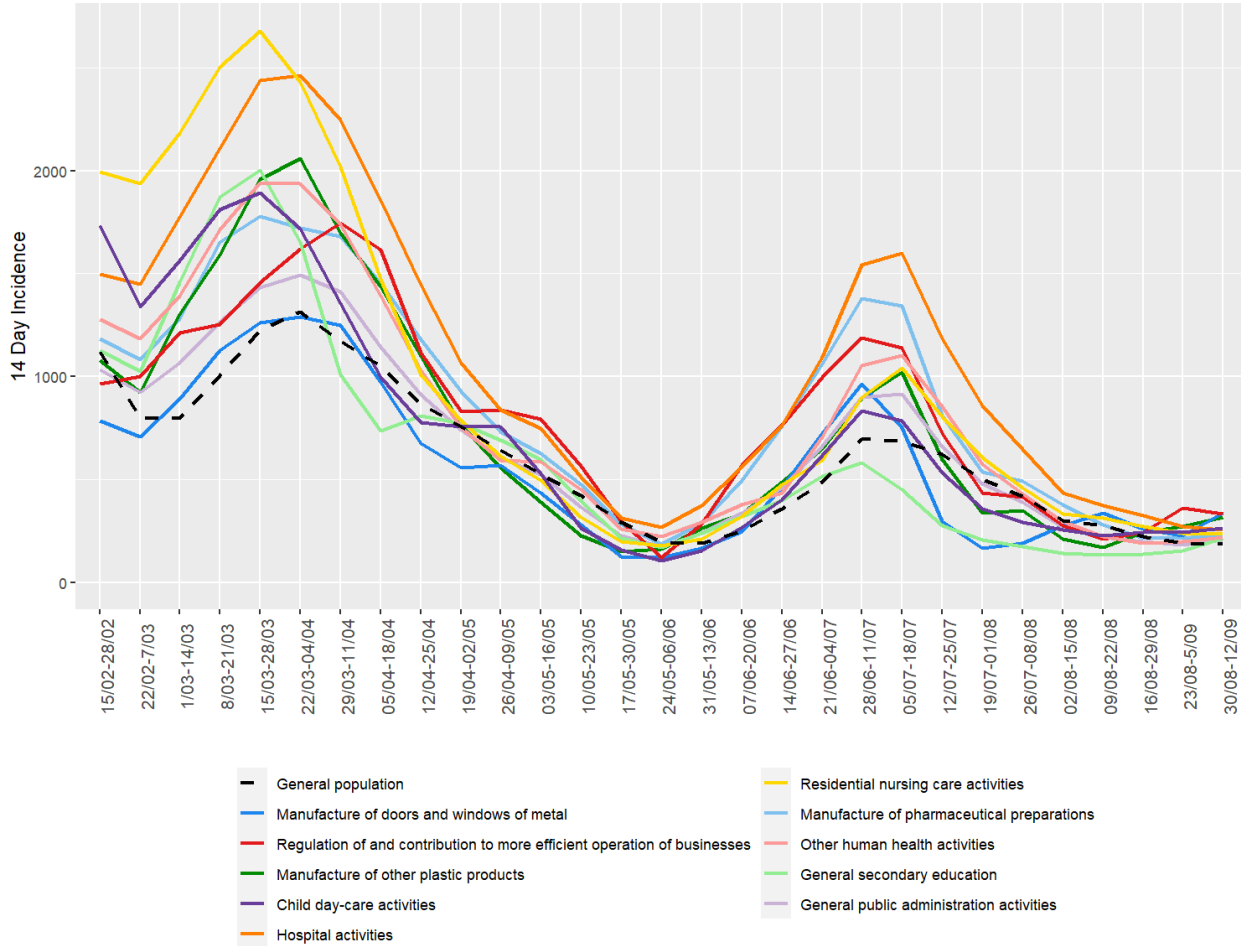
Figure 5: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 in both employees and self-employed

Table 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 on 12 September 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
Manufacture of doors and windows of metal	2512	9792	337(240;474)	351(246;502)		12.78
Regulation of and contribution to more efficient operation of businesses	8413	9366	331(233;470)	331(233;470)		1.18
Manufacture of other plastic products	2229	8861	316(218;457)	316(218;457)		6.16
Child day-care activities	8891	30566	265(213;329)	274(220;341)	112(28;447)	5.89
Hospital activities	8610	227953	254(234;276)	254(234;276)		0.31
Residential nursing care activities	8710	55508	236(199;280)	236(199;280)		0.73
Manufacture of pharmaceutical preparations	2120	34335	233(187;290)	232(186;289)		0.92
Other human health activities	8690	55046	218(182;261)	256(204;321)	175(131;234)	47.13
General secondary education	8531	367130	216(201;232)	216(201;232)		0.18
General public administration activities	8411	353659	205(191;220)	205(191;220)		0.12
General population			**186**	**186**	**186**	
Working population		**4691620**	**179(175;183)**	**179(175;183)**		

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 12 September 2022 significantly higher than the working population average are: Activities of medical laboratories (sector 86901), Manufacturing sectors (sector 25120, 22290, 21201), Regulation of more efficient businesses (sector 84130), Child day-care activities (sector 88911), General and psychiatric hospitals (sector 86101, 86104), General secondary education (sector 85311, 85319), Public Centres for Social Welfare (OCMW) (sector 84115), Rest and care homes (sector 87101) and Activities of family and elderly care at home (sector 88101) (Table 5 and Figure 6).

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

Legend:
- General population
- Activities of medical laboratories
- Manufacture of doors and windows of metal
- Regulation of and contribution to more efficient operation of businesses
- Manufacture of other plastic products
- Child day-care activities
- Psychiatric hospitals
- General hospitals
- General secondary education organized by the Communities
- Public Centers for Social Welfare (O.C.M.W.)
- Rest and care homes (R.V.T.)
- Manufacture of medicines
- Activities of family and elderly care at home
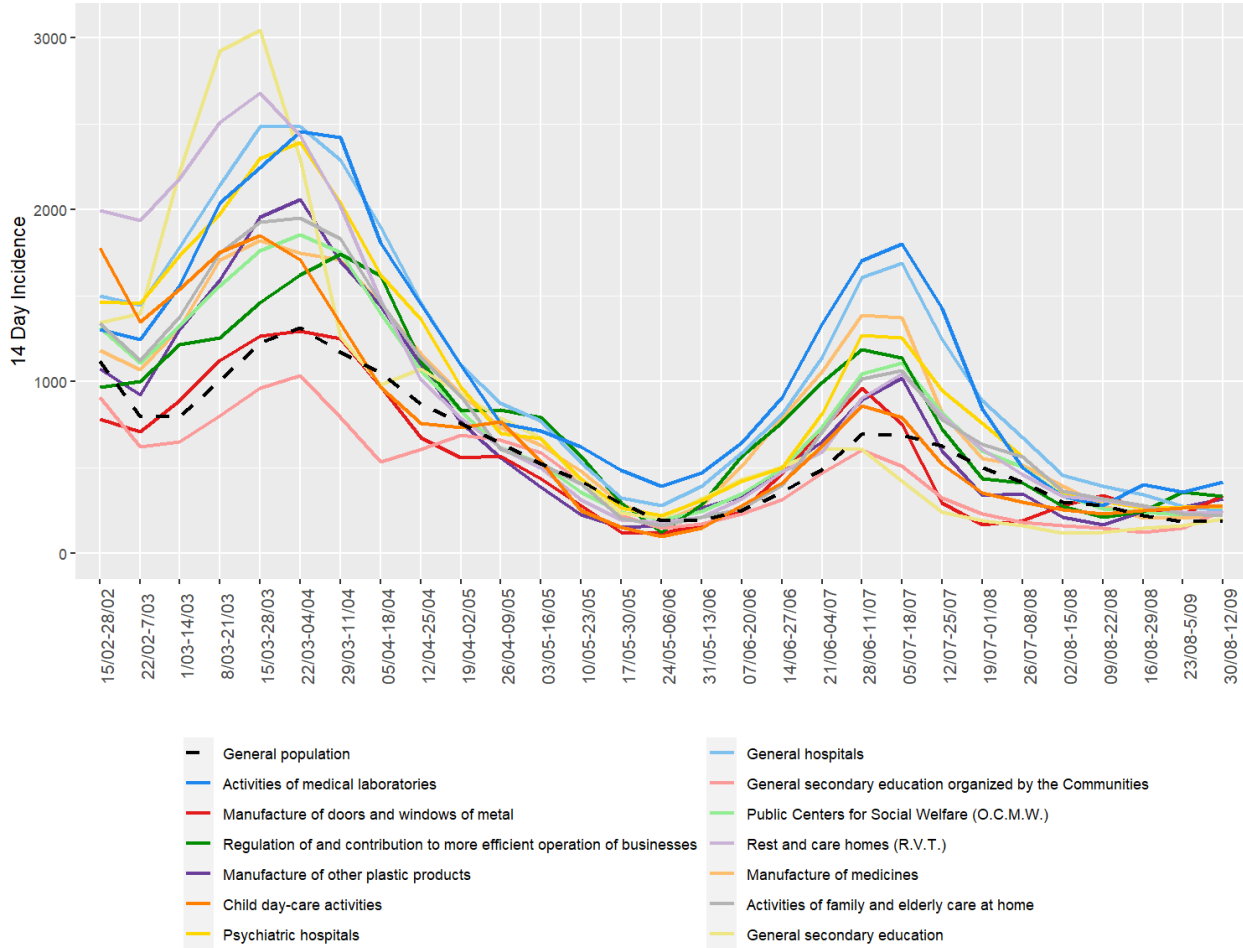- General secondary education

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 12 September 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
Activities of medical laboratories	86901	6475	417(286;607)	435(294;643)		11.21
Manufacture of doors and windows of metal	25120	9792	337(240;474)	351(246;502)		12.78
Regulation of and contribution to more efficient operation of businesses	84130	9366	331(233;470)	331(233;470)		1.18
Manufacture of other plastic products	22290	8861	316(218;457)	316(218;457)		6.16
Child day-care activities	88911	26619	278(221;349)	292(232;367)	62(9;439)	6.15
Psychiatric hospitals	86104	38290	269(222;326)	269(222;326)		0.31
General hospitals	86101	182937	252(230;276)	252(230;276)		0.25
General secondary education organized by the Communities	85311	141935	248(223;275)	248(223;275)		0.01
Public Centers for Social Welfare (O.C.M.W.)	84115	87603	242(212;277)	242(212;277)		0.15
Rest and care homes (R.V.T.)	87101	55508	236(199;280)	236(199;280)		0.70
Manufacture of medicines	21201	32301	226(180;284)	226(180;284)		0.67
Activities of family and elderly care at home	88101	45455	220(181;268)	220(181;268)		0.85
General secondary education	85319	195025	201(182;222)	201(182;222)		0.03
General population			**186**	**186**	**186**	
Working population		**4691620**	**179(175;183)**	**179(175;183)**		

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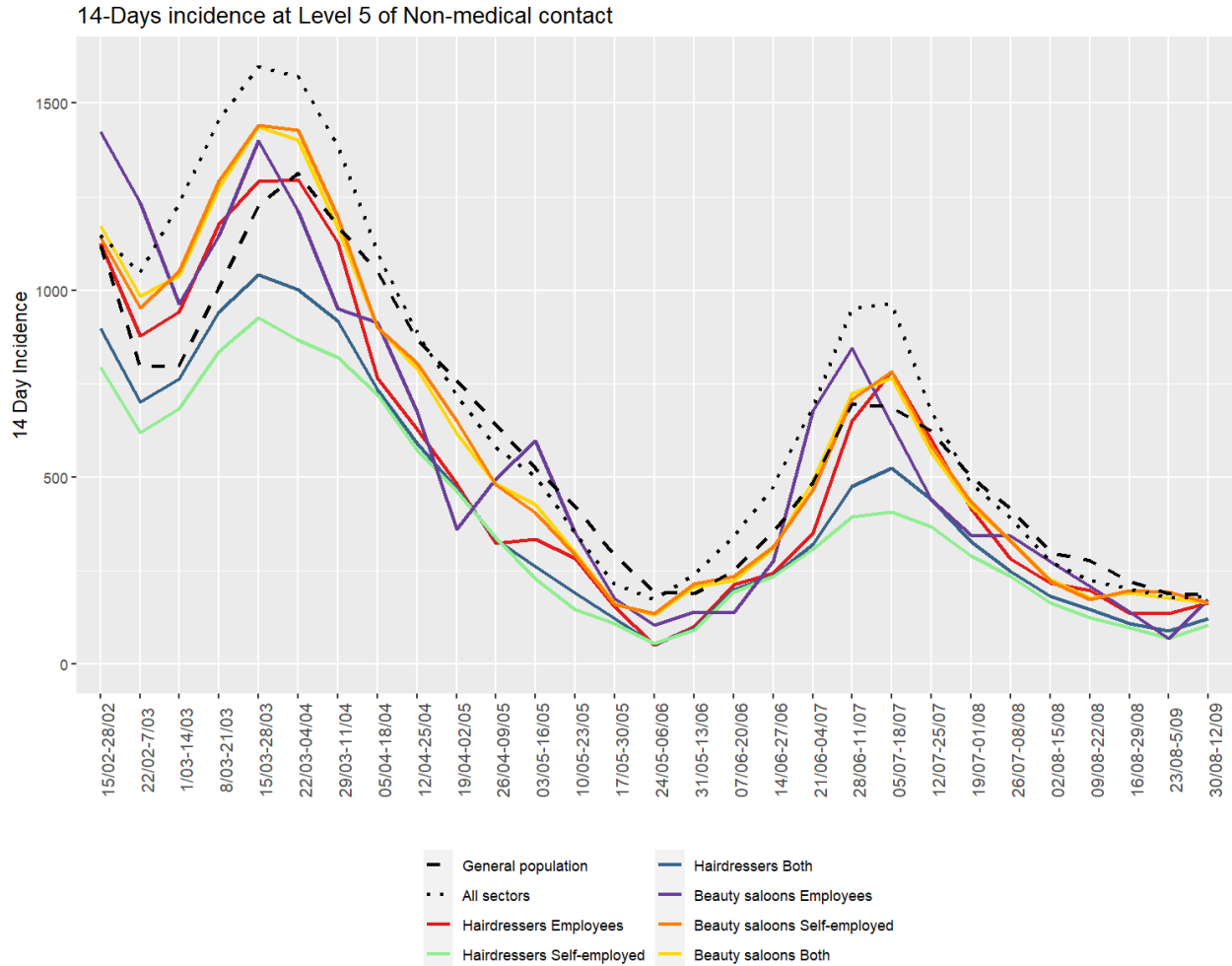
Figure 7: 14-Day incidence of COVID-19 infection at Level 5 of non-medical contact professions.

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 Public administration and defence (sector O) is elevated compared to the working and general population (Figure 8), which is mainly caused by increased incidences in Regulation of efficient operation of businesses and Public centres for social welfare for the Public administration sector, while an increased incidence is present most subsectors of the human health and social work sector.

Although the 14-day incidence in Education (sector P) is around or below the working population average, secondary education (sector 853) shows an increased incidence.

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 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 a few sectors in the manufacturing and wholesale sector show an increased incidence and none in the retail sale sector (Figure 8).
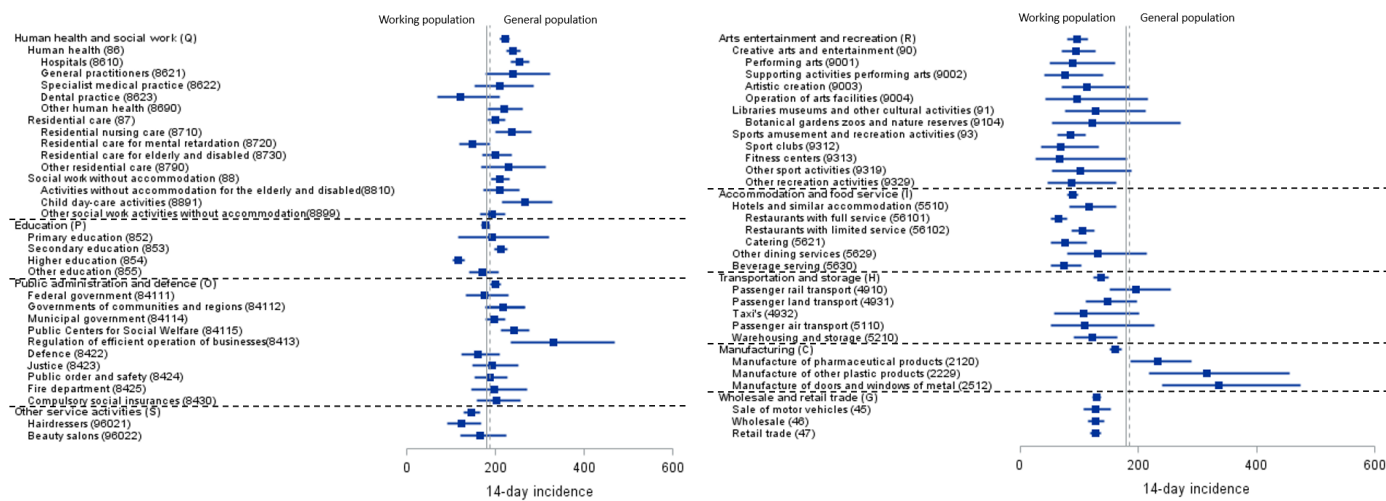
Figure 8: Forest plot of 14-Day incidence and 95% CI of selected sectors on 12 September 2022 in both employees and self-employed.

4 Conclusion

Despite the limitations of the data, the RSZ/ONSS data demonstrates that a plateau phase is reached in the 14-day COVID-19 incidences in most sectors. The highest incidences are still present in the health and residential care sector. The average incidence in the working population is slightly lower (4%) than the average incidence in the general population, suggesting that infections are equally 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 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, secondary education and some manufacturing sectors 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 Regulation of efficient operation of businesses. 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, with slightly higher incidences in beauty saloons compared to hairdressers.

It is encouraging to note that employees in accommodation and food services, transportation, arts, entertainment and recreation, other service activities and whole 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 vaccination, is warranted and additional booster vaccination for high risk employees in the health and residential care sector should be considered.

Acknowledgments