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 (27 – 10 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 10 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 continue to increase at the same speed in all sectors. The working population average is similar to the general population average.
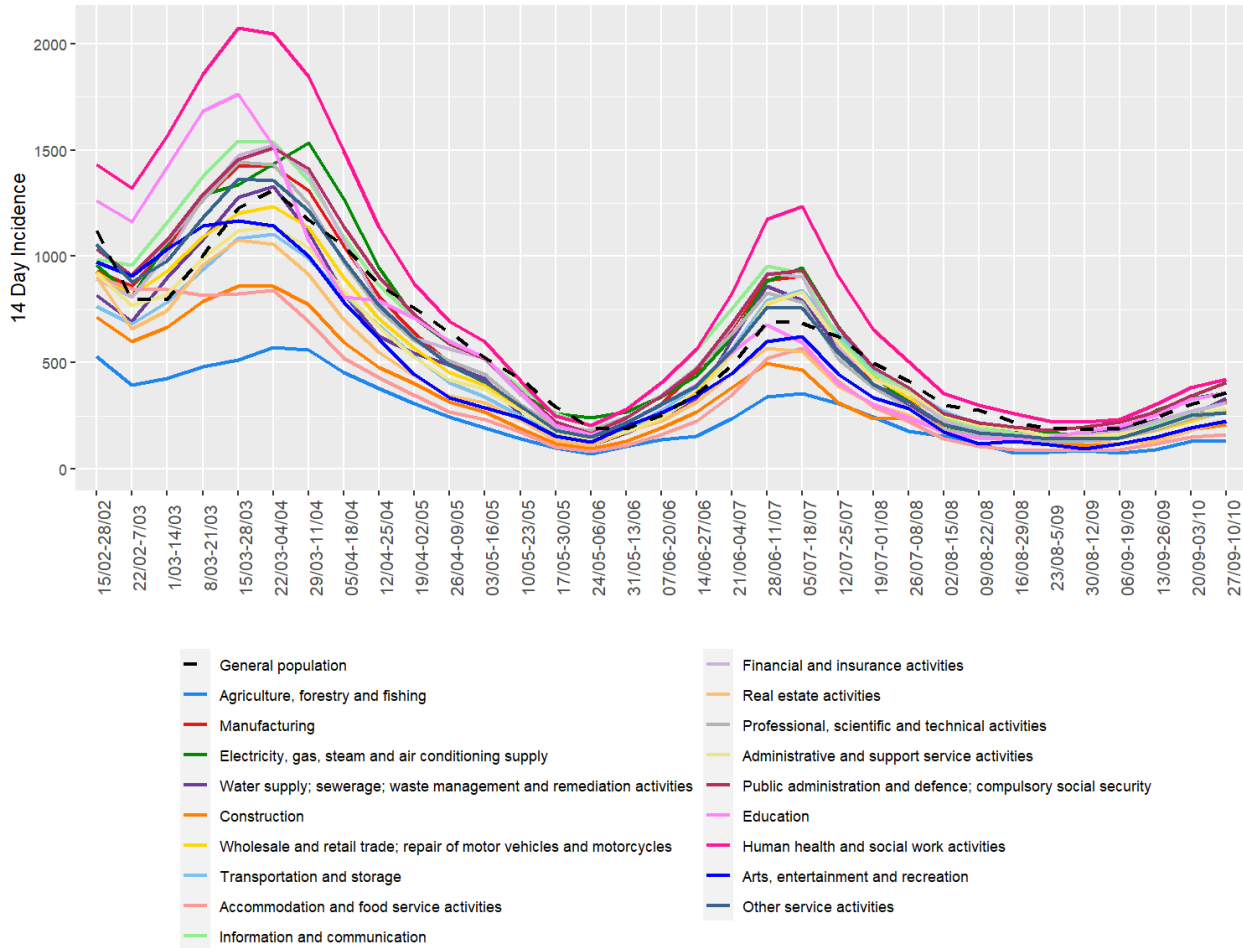
Figure 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 in both employees and self-employed workers

Table 1: 14-Day incidence of COVID-19 infection of 20 sectors at Level 1 on 10 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	680523	421(406;437)	429(413;445)	324(279;376)	8.17
Public administration and defence; compulsory social security	O	536543	405(388;422)	405(388;422)		0.20
Electricity, gas, steam and air conditioning supply	D	21330	361(289;451)	375(299;470)		6.20
Education	P	613296	361(346;376)	366(351;382)	260(205;330)	4.60
General population			**359**	**359**	**359**	
Working population		**4598011**	**352(347;357)**	**352(347;357)**		
Water supply; sewerage; waste management and remediation activities	E	40909	330(279;391)	337(284;400)		5.82
Manufacturing	C	627900	319(305;333)	331(316;346)	210(177;249)	10.38
Financial and insurance activities	K	160064	313(287;342)	353(322;388)	173(135;222)	22.29
Information and communication	J	190645	310(286;336)	344(314;377)	225(188;269)	29.20
Administrative and support service activities	N	451399	286(271;302)	308(291;326)	186(158;218)	18.29
Professional, scientific and technical activities	M	405674	282(266;299)	334(311;359)	221(201;243)	46.41
Wholesale and retail trade; repair of motor vehicles and motorcycles	G	850185	271(260;282)	293(280;306)	195(176;216)	22.75
Other service activities	S	161364	264(240;290)	313(277;353)	212(182;247)	49.48
Transportation and storage	H	319392	263(246;281)	274(256;294)	151(112;204)	9.13
Real estate activities	L	58874	231(195;273)	270(213;342)	202(159;256)	58.21
Arts, entertainment and recreation	R	117699	226(200;255)	233(202;269)	211(170;261)	34.87
Construction	F	384615	208(194;223)	242(223;263)	157(138;178)	40.85
Accommodation and food service activities	I	357407	162(149;176)	160(146;175)	168(140;201)	20.93
Agriculture, forestry and fishing	A	95455	132(111;157)	66(46;96)	186(153;227)	57.40

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 10 October 2022 above the working population average are: Manufacturing (sector 30, 21, 22), Human health activities (sector 86), Insurance and pension funding (sctor 65), Public administration and defence; compulsory social security (sector 84) and Social work activities without accommodation (sector 88) (Table 2 and Figure 2).
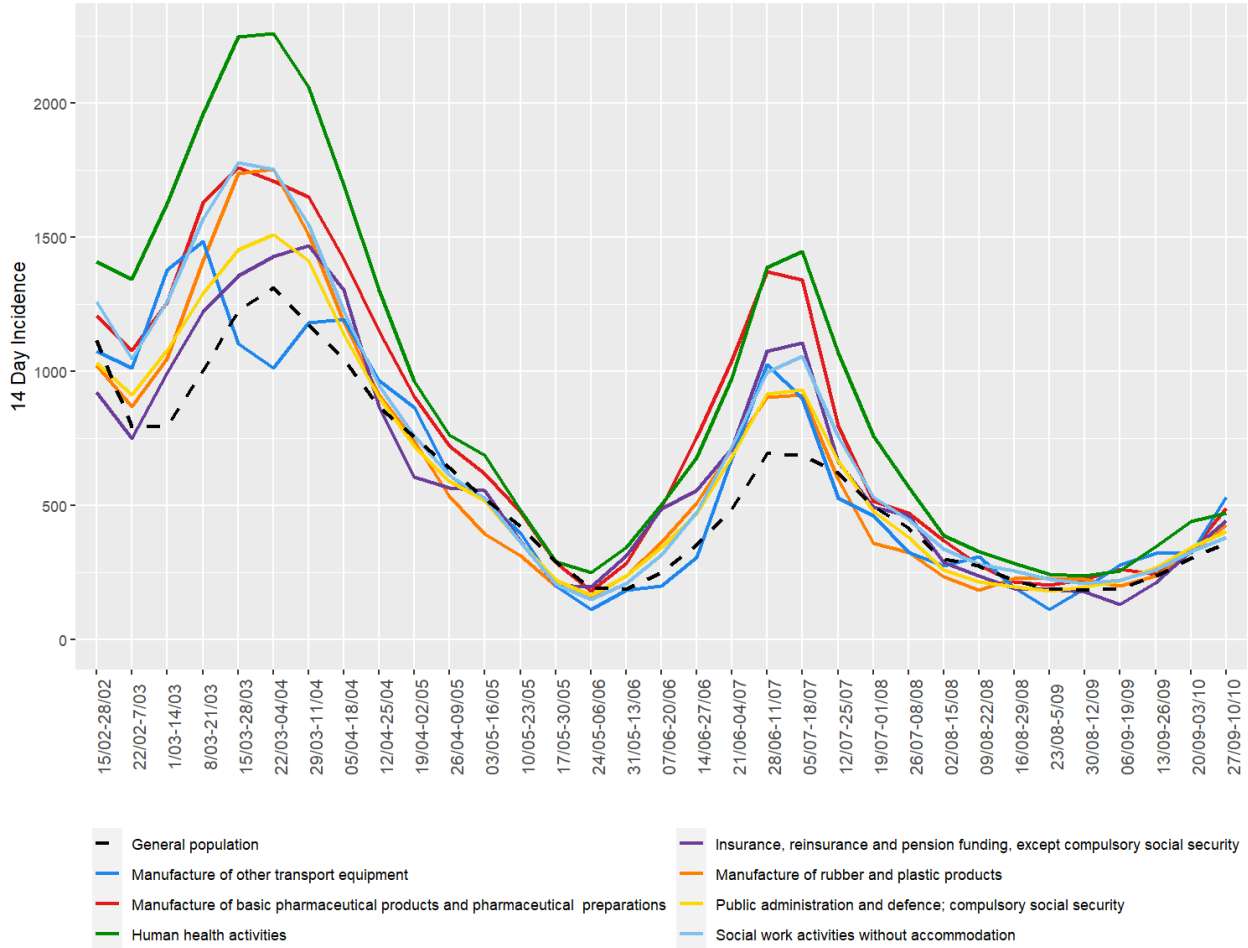
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Figure 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 in both employees and self-employed workers

Table 2: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 2 on 10 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
Manufacture of other transport equipment	30	6191	533(379;749)	553(391;781)		6.61
Manufacture of basic pharmaceutical products and pharmaceutical preparations	21	36789	492(425;569)	496(429;574)		1.27
Human health activities	86	326216	473(450;497)	495(470;522)	341(292;398)	14.89
Insurance, reinsurance and pension funding, except compulsory social security	65	23371	445(367;539)	445(367;539)		3.27
Manufacture of rubber and plastic products	22	24419	430(355;520)	430(355;520)		5.50
Public administration and defence; compulsory social security	84	536543	405(388;422)	405(388;422)		0.20
Social work activities without accommodation	88	172251	382(354;412)	388(359;419)	184(99;342)	3.18
General population			**359**	**359**	**359**	
Working population		**4598011**	**352(347;357)**	**352(347;357)**		

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 10 October 2022 significantly above the working population average are: Hospital activities (sector 861), Manufacturing (sector 212, 231, 105, 222), Social work activities without accommodation for the elderly (sector 881), Insurance (sector 651), Administration of the state (sector 841) and Secondary education (sector 853) (Table 3 and Figure 3).

The incidences in primary, secondary and other education continue to increase, while the incidence in employees in higher education have increased substantially since the start of the academic year. The incidences in education attain incidences higher or similar to the working and general 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.
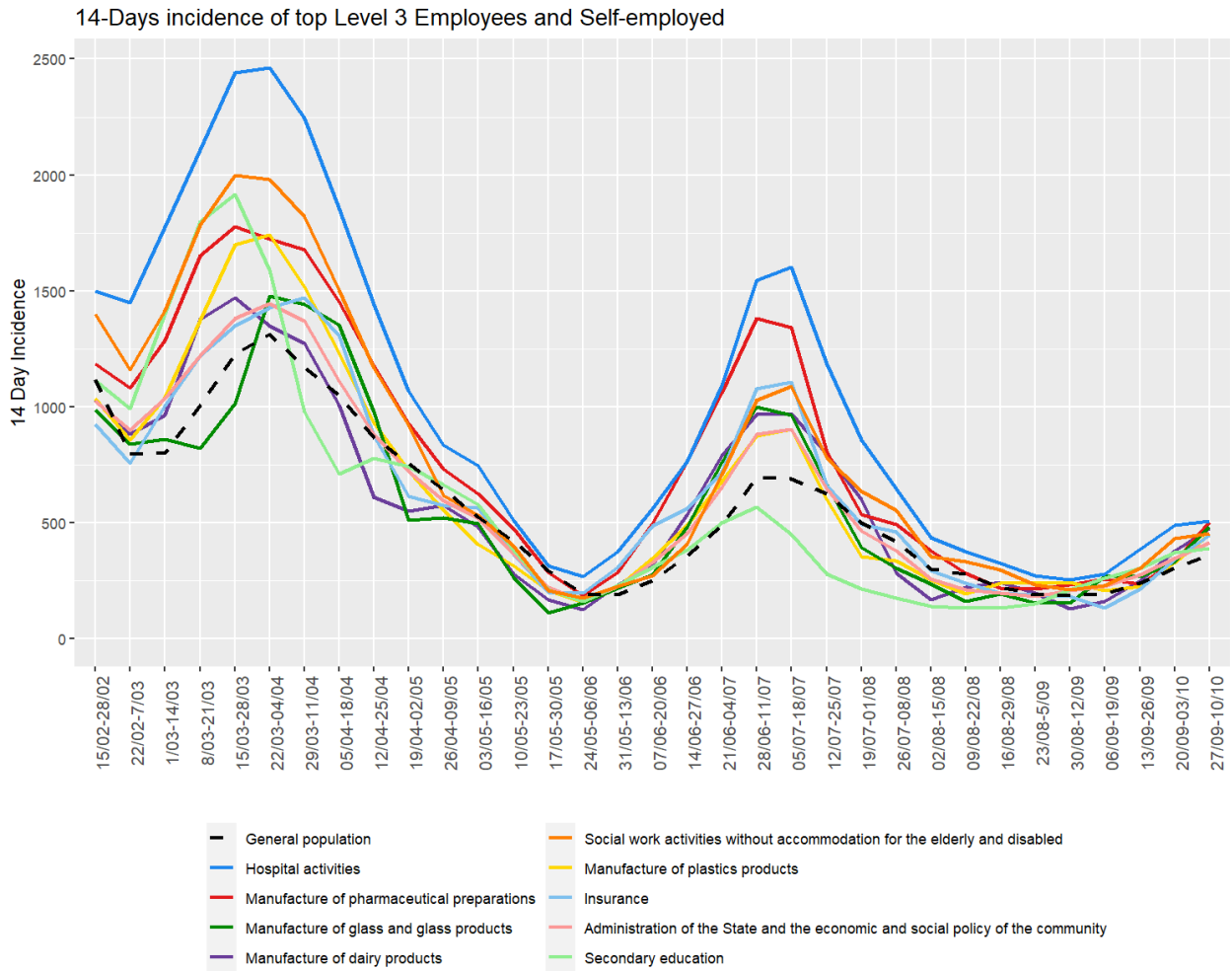
Figure 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 in both employees and self-employed
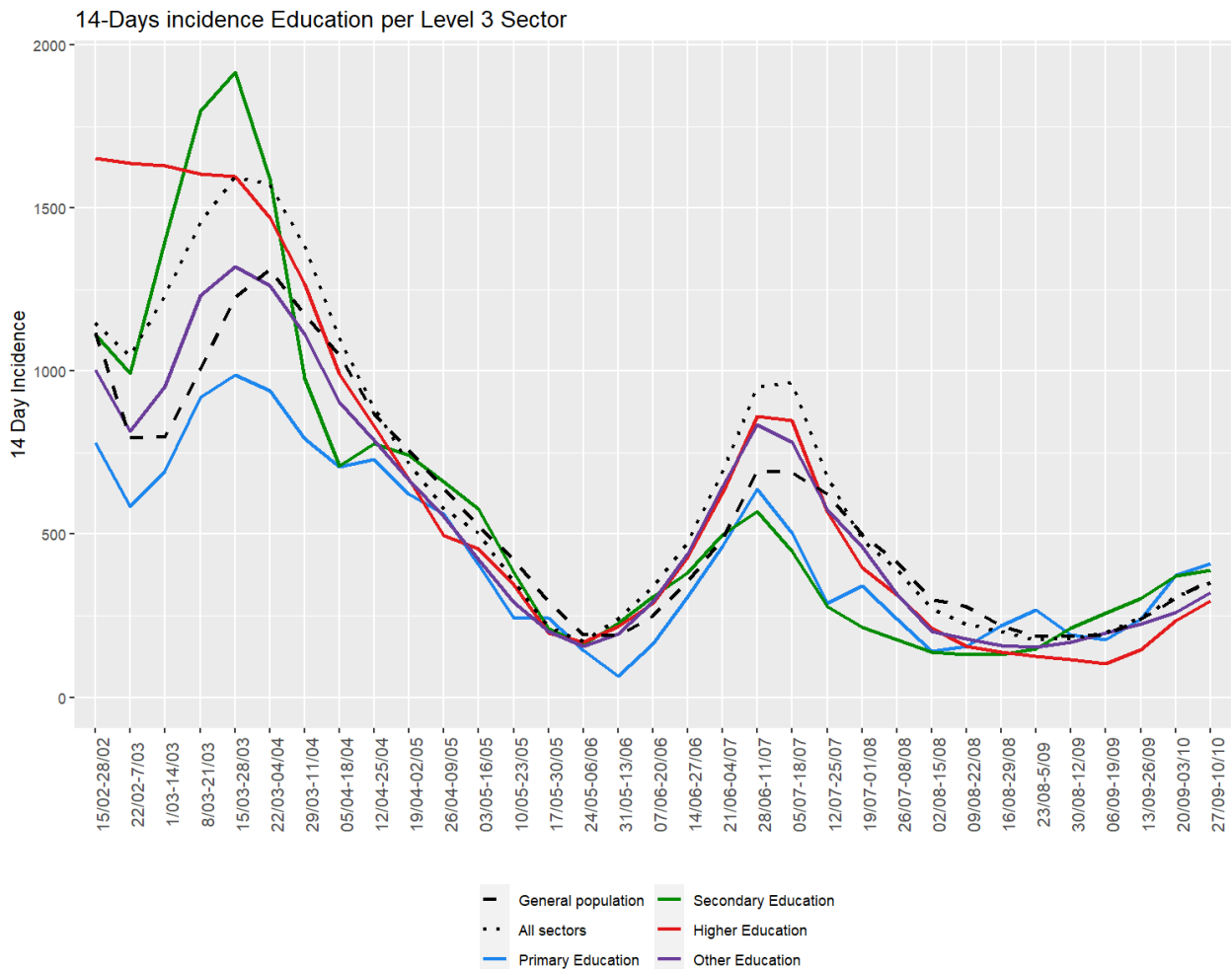
Figure 4: 14-Day incidence of COVID-19 infection in Education sectors at Level 3 in both employees and self-employed

Table 3: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 3 on 10 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
Hospital activities	861	226233	507(479;537)	507(479;537)		0.32
Manufacture of pharmaceutical preparations	212	34195	503(433;584)	505(435;586)		0.92
Manufacture of glass and glass products	231	9317	483(361;646)	491(366;659)		3.75
Manufacture of dairy products	105	10526	475(360;626)	504(380;668)		9.57
Social work activities without accommodation for the elderly and disabled	881	49227	453(397;516)	456(400;520)		1.08
Manufacture of plastics products	222	21826	449(368;547)	449(368;547)		5.58
Insurance	651	23094	446(368;541)	446(368;541)		2.97
Administration of the State and the economic and social policy of the community	841	363527	414(394;435)	414(394;435)		0.17
Secondary education	853	407179	390(371;410)	390(371;410)		0.21
General population			**359**	**359**	**359**	
Working population		**4598011**	**352(347;357)**	**352(347;357)**		

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 10 October 2022 significantly higher than the working population average are: Manufacturing sectors (sector 3030, 1051, 2120, 2222, 2229), Sewerage (sector 3700), Renting and leasing of cars (sector 7711), Hospital activities (sector 8610), Regulation of more efficient operation of businesses (sector 8413), General medical practice activities (sector 8621), Social work activities without accommodation for the elderly and disabled (sector 8810), Regulation of activities of providing health care, education, cultural services and other social services (sector 8412), Public order and safety activities (sector 8424), General public administration (sector 8411) and General secondary education (sector 8531) (Table 4 Figure 5).
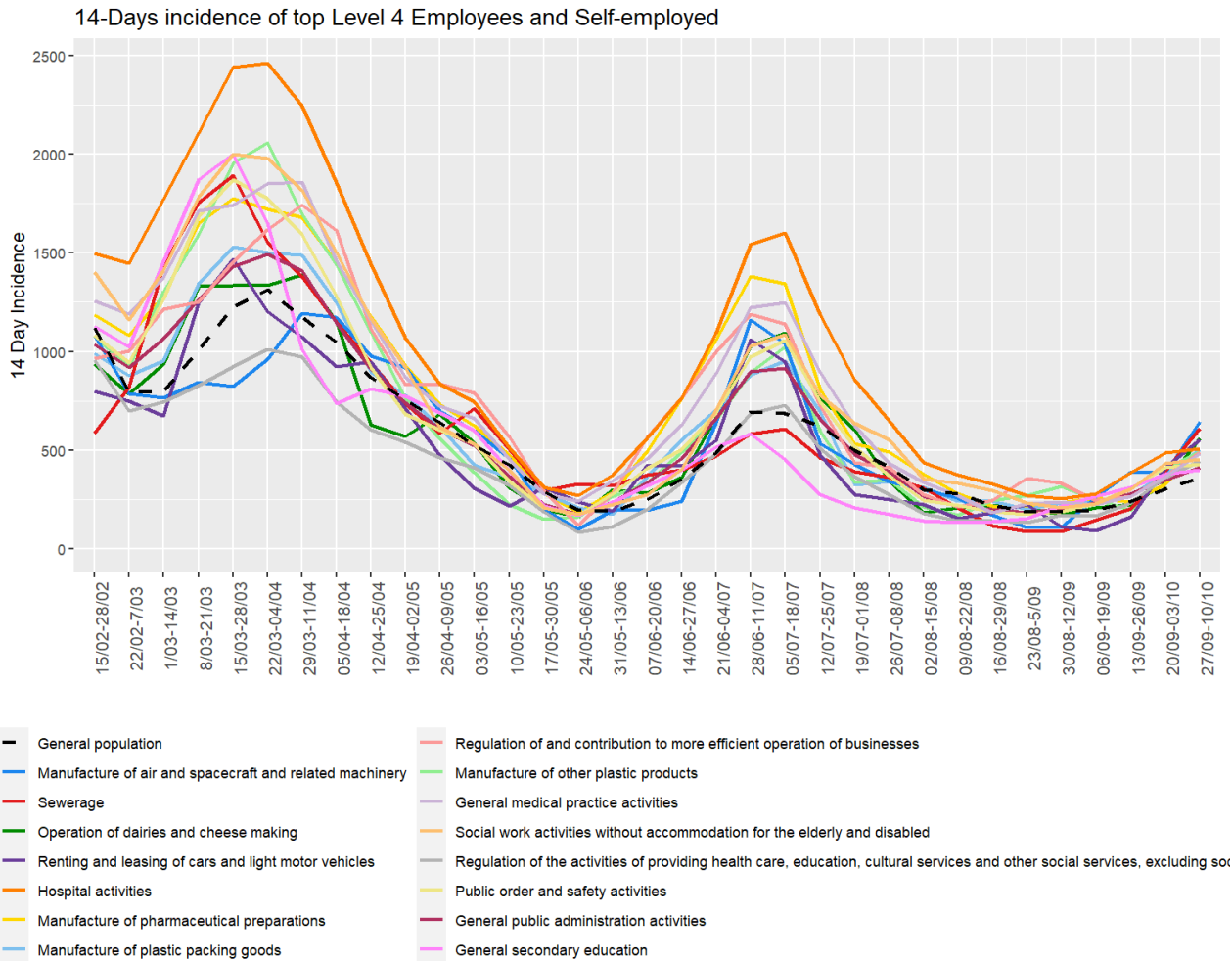
Figure 5: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 in both employees and self-employed

Table 4: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 4 on 10 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
Manufacture of air and spacecraft and related machinery	3030	4658	644(451;920)	644(451;920)		2.51
Sewerage	3700	3777	609(405;915)	616(402;943)		9.79
Operation of dairies and cheese making	1051	7487	561(415;758)	561(415;758)		4.19
Renting and leasing of cars and light motor vehicles	7711	4356	551(370;821)	566(357;897)		27.08
Hospital activities	8610	226233	507(479;537)	507(479;537)		0.32
Manufacture of pharmaceutical preparations	2120	34195	503(433;584)	505(435;586)		0.92
Manufacture of plastic packing goods	2222	6175	502(353;713)	502(353;713)		3.37
Regulation of and contribution to more efficient operation of businesses	8413	9350	492(369;656)	492(369;656)		1.19
Manufacture of other plastic products	2229	8571	490(362;662)	490(362;662)		6.39
General medical practice activities	8621	17355	484(391;599)	531(420;672)	345(208;571)	25.65
Social work activities without accommodation for the elderly and disabled	8810	49227	453(397;516)	456(400;520)		1.08
Regulation of the activities of providing health care, education, cultural services and other social services, excluding social security	8412	20852	446(364;546)	444(362;544)		0.65
Public order and safety activities	8424	54695	426(375;484)	426(375;484)		0.18
General public administration activities	8411	333171	410(389;432)	410(389;432)		0.13
General secondary education	8531	393703	397(378;417)	397(378;417)		0.17
General population			**359**	**359**	**359**	
Working population		4598011	**352(347;357)**	**352(347;357)**		

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 10 October 2022 significantly higher than the working population average are: Activities of medical laboratories (sector 86901), Manufacturing sectors (sector 30300, 10510, 21201, 22220, 22290), Sewerage (sector 37000), Mental health activities (sector 86904), Renting and leasing of cars (sector 77110), Hospitals (sector 86103, 86101, 86104), Youth work associations (sector 94991), Compulsory social security (sector 84301), Regulation of more efficient operational businesses (sctor 84310), General medical practice activities (sector 86210), Local Police (sector 84242), Activities of family and elderly care at home (sector 88101), Regulation of activities of providing health care, education, cultural services and other social services (sector 84120), Governments (sector 84112,

84111, 84114), Public Centres for Social Welfare (OCMW) (sector 84115) and General secondary education (sector 85311, 85319) (Table 5 and Figure 6).
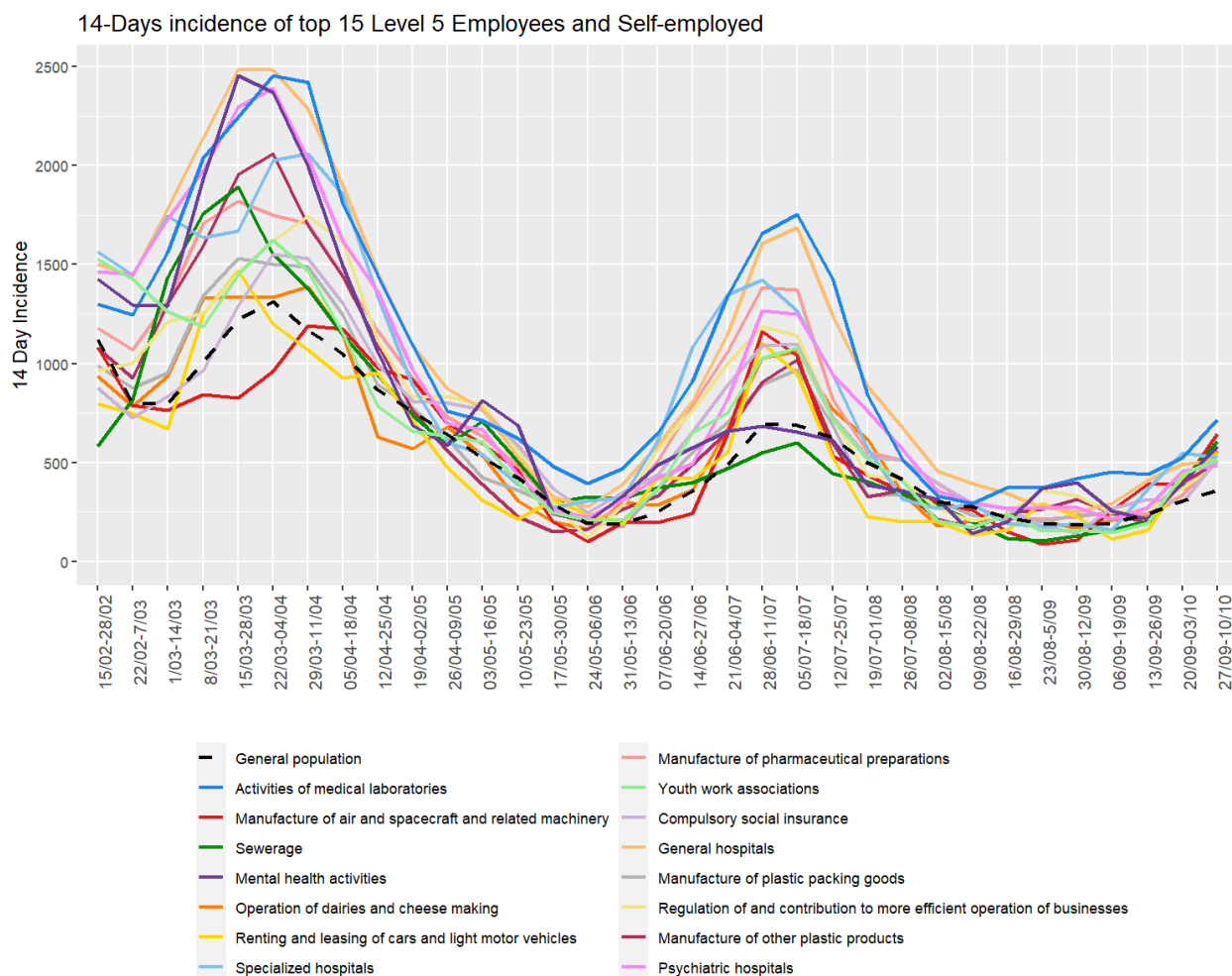

Figure 6: 14-Day incidence of COVID-19 infection in sectors with the highest incidence at Level 5 in both employees and self-employed

Table 5: 14-Day incidence of COVID-19 infection of sectors with the highest incidence at Level 5 on 10 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
Activities of medical laboratories	86901	6294	715(534;956)	772(573;1039)		11.55
Manufacture of air and spacecraft and related machinery	30300	4658	644(451;920)	644(451;920)		2.51
Sewerage	37000	3777	609(405;915)	616(402;943)		9.79
Mental health activities	86904	7045	582(429;789)	703(472;1047)	468(291;752)	52.58
Operation of dairies and cheese making	10510	7487	561(415;758)	561(415;758)		4.19
Renting and leasing of cars and light motor vehicles	77110	4356	551(370;821)	566(357;897)		27.08
Specialized hospitals	86103	6107	524(371;740)	514(362;730)		1.15
Manufacture of pharmaceutical preparations	21201	32302	517(444;601)	517(444;602)		0.67
Youth work associations	94991	5222	517(355;753)	524(354;774)		8.72
Compulsory social insurance	84301	11479	514(398;663)	514(398;663)		0.56
General hospitals	86101	182583	511(479;545)	512(480;546)		0.25
Manufacture of plastic packing goods	22220	6175	502(353;713)	502(353;713)		3.37
Regulation of and contribution to more efficient operation of businesses	84130	9350	492(369;656)	492(369;656)		1.19
Manufacture of other plastic products	22290	8571	490(362;662)	490(362;662)		6.39
Psychiatric hospitals	86104	36907	485(419;561)	481(415;557)		0.32
General medical practice activities	86210	17355	484(391;599)	531(420;672)	345(208;571)	25.65
Local police	84242	36957	460(396;534)	460(396;534)		0.11
Activities of family and elderly care at home	88101	44812	453(395;520)	453(395;520)		0.85
Regulation of the activities of providing health care, education, cultural services and other social services, excluding social security	84120	20852	446(364;546)	444(362;544)		0.65
Governments of communities and regions	84112	42166	434(376;501)	434(376;501)		0.14
Federal government	84111	30023	433(365;514)	433(365;514)		0.03
Public Centers for Social Welfare (O.C.M.W.)	84115	85647	425(384;471)	425(384;471)		0.16
General secondary education organized by the Communities	85311	153155	412(381;445)	412(381;445)		0.01
General secondary education	85319	210758	409(383;437)	409(383;437)		0.02
Municipal government	84114	147870	399(368;432)	399(368;432)		0.13
General population			**359**	**359**	**359**	
Working population		4598011	**352(347;357)**	**352(347;357)**		

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).
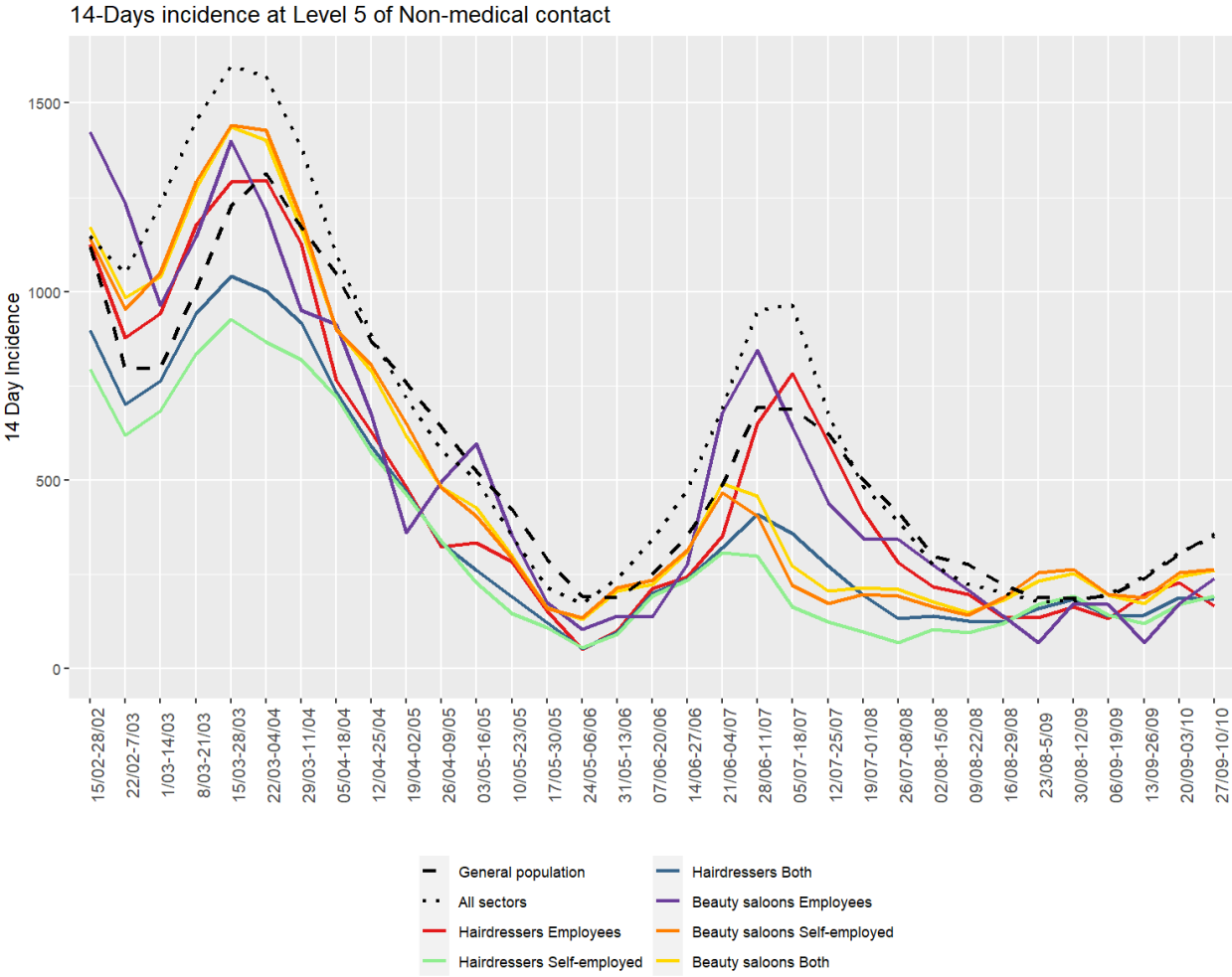

Figure 7: 14-Day incidence of COVID-19 infection at Level 5 of non-medical contact professions.

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 quite general in the Public administration and defence sector, while in the Human health and social work sector it is mainly caused by Hospital activities, general practitioners and some social work subsectors.

Although the 14-day incidence in Education (sector P), Water supply, sewerage, waste management and remediation activities (sector E), Administration and support activities (sector N) and Other service activities (sector S) is below or equal to the working population average, Secondary education, Sewerage, Renting and leasing cars and light motor vehicles and Youth work associations show an increased incidence.

It is encouraging that the incidence in 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 a few sectors in the manufacturing show an increased incidence and none in the wholsesale and retail sale sector (Figure 8).
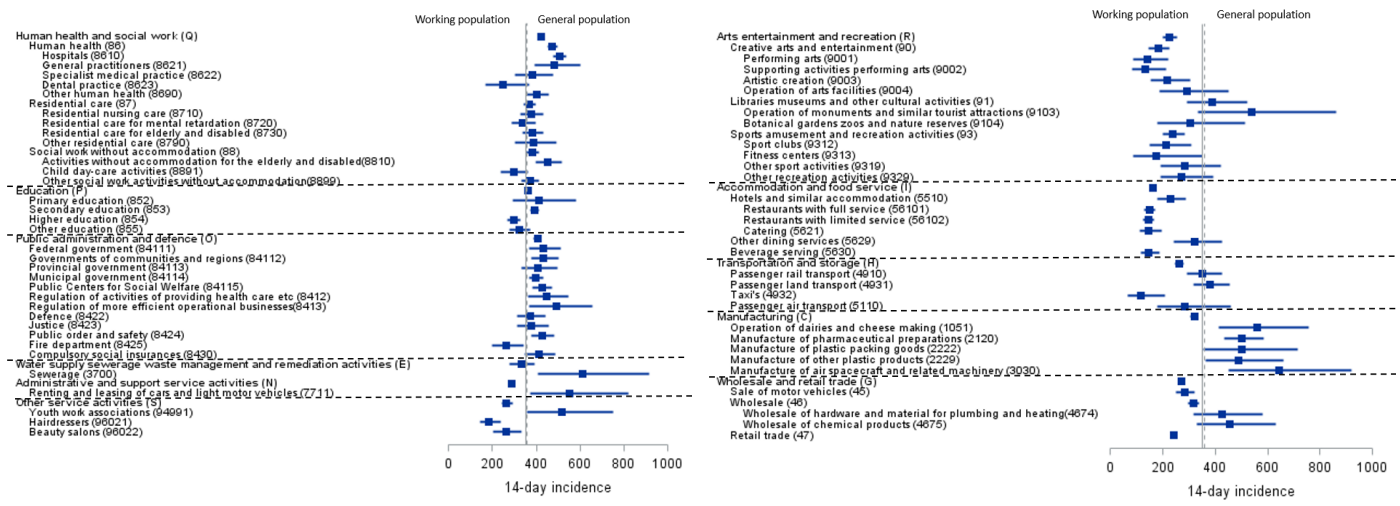
Figure 8: Forest plot of 14-Day incidence and 95% CI of selected sectors on 10 October 2022 in both employees and self-employed.

4 Conclusion

Despite the limitations of the data, the RSZ/ONSS data demonstrates that the 14-day COVID-19 incidences in most sectors continue to increase in the last 2 weeks. The highest incidences are present in manufacturing, public administration and the health and social work sector. The average incidence in the working population is similar to 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 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, social work without accommodation, public centres for social welfare, public administration, education and youth work associations 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 Sewerage, renting and leasing of cars and some manufacturing sectors. 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 accommodation and food services, arts, entertainment and recreation, 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