

COVID-19 Infection Across Workplace Settings in Qatar, a Comparison of COVID-19 Positivity Rates of Screened Workers From March 1st Until July 28th, 2020

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Abstract

Introduction

COVID-19 transmission was significant amongst Qatar's working population during the March-July 2020 outbreak. The study aimed to estimate the risk of exposure for COVID-19 across various workplace settings in the State of Qatar.

Methods

A cross-sectional study was conducted utilizing surveillance data of all workplaces with ten or more laboratory-confirmed cases of COVID-19. These workplaces were categorized using a mapping table adapted from the North American Industry Classification System (NAICS) codes 2017 version. The data was then analyzed to estimate and compare the positivity rate as an indicator of the risk of developing COVID-19 infection across various workplace settings in the State of Qatar.

Results

The highest positivity rate was reported amongst the Construction (40.3%) and the Retail & Wholesale Trade sectors (40.3%) whereas, the lowest positivity rate was attributed to the healthcare workplace setting (11.0%). The private funded sector employees had higher positivity rates than employees of the governmental funded sector.

Conclusion

The elevated risk of infection amongst screened workers in Construction and Retail & Wholesale Trade was probably due to Environmental and Educational vulnerabilities. On the other hand, the better containment within healthcare workplace settings can be attributed to the enforcement of infection control and occupational safety measures. These findings underline the importance of appropriately using preventive and surveillance strategies for high-risk workplace settings to mitigate the risk of infection.

Introduction

The current COVID-19 outbreak that emerged in Wuhan City, Hubei Province, China^[i], represents one of the most challenging public health threats faced globally. On January 30, 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern^[ii]. By the second week of July 2020, there had been more than 13 million confirmed cases across 215 countries^[iii].

The initial stage of the epidemic in the State of Qatar started on February 29th, 2020, with a COVID-19 positive case of a Qatari citizen traveling back from Iran, who was isolated upon his arrival, followed by additional citizens traveling back to the State of Qatar, who were also put into isolation to avoid community spread. On March 11th, the State of Qatar witnessed a sudden surge of 226 locally

transmitted new cases in one day, which entailed an outbreak through localized transmission, wherein sporadic infections with the pathogen occurred. On May 22nd, the Ministry of Public Health declared that the State of Qatar had entered the peak phase of the pandemic represented by widespread human infection in the country. By the second week of July, Qatar had recorded more than 109,000 confirmed COVID-19 cases, relative to a total of 2.7 million inhabitants^[iv].

A major route of COVID-19 transmission has already been identified as the workplace setting^[v]. The association between workplace site exposure and the disease is significant: the first documented case was amongst persons working in a seafood wholesale market in Wuhan^[vi]. Additionally, it has been officially declared as an occupational disease in countries like South Africa and Canada when it is considered the result of occupational exposure. Germany and Italy have also identified COVID-19 as an occupational disease but only limited to the healthcare sector^[vii].

Moreover, several research papers have been published, illustrating the prevalence of exposed workers in the healthcare industry^{[viii] [ix]}. According to preliminary data from China, healthcare workers (HCWs) facing COVID-19 represent a high-risk category^{[x] [xi]}. Although healthcare workers are exposed to a particular risk of infection because of the nature of their work, workers in other workplace settings could also have increased risk for COVID-19 infection because of the environment they work in and continuity of their work during the pandemic; this includes front line workplace settings, food-related workplace settings and work that requires proximity based interactions. The US Occupational Information Network (O*NET) has developed a COVID-19 Occupational Risk Score to determine which occupations face the highest risk of exposure to COVID-19 based on three criteria: contact with others, physical proximity, and exposure level. The O*NET risk scores place healthcare workers, paramedics, and flight attendants in the high-risk categories^[xii].

In Qatar, the government has strategized and implemented restrictions due to the pandemic to allow partial functioning of all workplaces. However, many workplace settings remained fully operational, which highlights the importance of understanding the burden of COVID-19 at the workplace as well as its parameters. This study will estimate the risk of exposure of screened workers at various workplace settings in the State of Qatar by analyzing and comparing the respective positivity rates.

Methodology

A cross-sectional study was conducted utilizing surveillance data available from various sources. All workplaces with ten or more laboratory-confirmed cases of COVID-19 during the period of March 1st to July 28th, 2020, were included for analysis. Any confirmed cases not working in the identified companies, people below 18 years of age, students, and retired people, were excluded from the study.

A list of 1,800 workplaces with at least 10 confirmed COVID-19 cases, as of July 28th, 2020, was generated from the surveillance database for COVID-19 case investigations. The surveillance database aggregates patient laboratory data and the corresponding patients' employment data to identify workplace clusters.

The researchers have categorized these workplaces using a mapping table adapted from the North American Industry Classification System (NAICS) codes 2017 version^[i]. The NAICS classifies businesses and industries into different levels of aggregation based on the economic sectors. In this study, the researchers used the broader NAIC categories (20 codes) and adapted them to Qatar's economic and social contexts (11 codes):

1. The Oil & Gas sector that includes companies specialized in energy upstream, midstream, and downstream.
2. The construction and related workplace setting that comprises the construction and contracting companies as well as manufacturers specialized in construction equipment and material.
3. The Retail and Wholesale trades setting that includes grocery stores, pharmacies as well as factories, manufacturers, and agriculture domain.
4. The Finance & Business workplace setting that consists of banks and financial institutions as well as private businesses offering consulting services or administrative support.
5. The Transportation and Warehousing workplace setting that includes transportation services and facilities and entities specialized in warehousing and storage.
6. The Support, Waste Management, and Remediation Services workplace setting that comprises cleaning companies, the hospitality sector, private security services, and waste & facility management services.
7. The Healthcare workplace setting, including health centers, hospitals, private clinics, medical laboratories, and healthcare headquarters.
8. The National Security workplace setting, including Qatar Armed forces, military, and police.
9. The Public service workplace setting, including ministries and other entities offering public services such as education.
10. Accommodation & Food workplace setting that includes restaurants & Hotels and residential complexes.
11. The holding/Conglomerate with diversified services workplace setting that includes holding companies offering more than one type of service. For the majority, Holdings are offering real estate, construction, and retail services.

Subsequently, the surveillance data was mapped to the list of categorized workplace settings. The final database created for this study consisted of patient demographics, workplace category, and COVID-19 laboratory results.

The data was analyzed to estimate and compare the positivity rate amongst screened individuals, as an indicator of the risk of developing COVID-19 infection across various workplace settings and occupations in the State of Qatar.

Results

During the period ranging from March 1st, 2020 to July 28th, 2020, a total of 477,194 individuals were tested for COVID-19, out of which, 109,597 tested positive. Case investigation data identified 54,584 cases belonging to a workplace cluster, with 10 or more positive cases. Table 1 shows the positivity rate in all workplace tested individuals was 27.6%. The highest test positivity was reported in workplaces related to the retail and wholesale trade sector as well as the construction and related sector (40.3%). The lowest positivity was reported in the health care sector (11.0%).

Table-2 shows that the positivity rate among tested employees in the private sector was significantly higher in comparison to the employee positivity rate in the public funded sectors (33.7% vs. 17.1%), P-value <0.001.

Table 1: Number of individuals tested, positive cases, and positivity rate per sector (original)

Workplace sector	Tested individuals	Positive cases	Positivity rate
Retail and Wholesale Trade	20,382	8,221	40.3%
Construction	51,228	20,641	40.3%
Finance & Business	5,312	1,864	35.1%
Support, Waste Management and Remediation Services	21,690	7,558	34.8%
Accommodation and Food Services	6,150	2,061	33.5%
Holding/Conglomerate with diversified services	5,618	1,748	31.1%
Transportation and Warehousing	14,565	4,278	29.4%
National Security	25,189	5,486	21.8%
Oil & Gas	8,947	1,669	18.7%
Public Service	15,970	2,816	17.6%
Health Care	22,801	2,516	11.0%
Total	197,852	54,584	27.6%

Table 2: Number of individuals tested, positive cases, and positivity rate per private funded sectors vs governmental funded sectors (original)

Workplace sector	Tested individuals	Positive cases	Positivity rate	P value
Public funded sector	72,907	12,487	17.1%	P-value <0.001
Private funded sector	124,945	42,097	33.7%	

Trend of infection in various workplaces

Analysis of the total number of positive COVID-19 cases per month across the various workplace sectors identified three patterns in the peaks of the respective curves resulting in the different workplace settings being grouped into one of three groups, according to their peak patterns.

Pattern Group A

The Group A pattern includes Construction & Related, Retail and Wholesale Trade, National Security, Transportation & Warehousing, Support and Remediation services and Business & Finance workplace settings.

For the workplaces where the infection trends peaked in May, two patterns emerge. The construction, retail and Finance & Business sectors underwent a steep jump in numbers between April and May in comparison to the March – April period, and then gradually decreased in newly infected numbers throughout June and July. Alternatively, Transportation & Warehousing, Waste Management, and National Security Sectors followed a steady rate of increase up to May followed by a similarly steady decrease in the months of June and July (Figure 1).

With a total of 58,858 positive cases in the months ranging from March to July, Construction (35.07%), Retail (13.97%), and waste management (12.84%) collectively represented approximately 62%, or 36,420 cases out of all 11 categories (Table 1).

Pattern Group B

With regards to Holding & Conglomerates, Public Service, and Accommodation & Food Services, the rate of transmission was relatively low during March & April. This slow trend eventually pushed the peak of positive cases to June instead of May. After gradually climbing between March and June, the numbers rapidly shrank in July (Figure 2).

The total number of positive cases for these sectors represented 11.12% or 6,546 positive cases of the total 58,858 infected (Table 1).

Pattern Group C

The Oil & Gas and Health Sectors gradually increased in March and April, reaching a plateau in May and June, and then gradually decreased after that. These two categories shared some of the lowest infection rates, with 4,185 positive cases between March and July, representing 7.11% of the total 58,858 cases. They also corresponded to some of the lowest positivity rates among all categories, with 11.0% and 18.7% for healthcare and Oil & Gas, respectively. (Figure 3, Table 1).

Discussion

Qatar has taken general precautionary measures to prevent the spread of COVID-19. A number of those measures were related to the workplace. They varied from having a complete shutdown (e.g., Public transportation, Education, and some types of retail stores) to a mandatory 80% workforce to work from home, applied to all other businesses. The exceptions were the healthcare sector, national security, food industry, supermarkets, airport, and some major state construction projects that continued their work as usual. Additionally, the following employee categories were classed as high-risk and were urged to work remotely: employees over the age of 55 years, pregnant employees, employees with chronic diseases such as cardiovascular disease, cancer, diabetes, respiratory conditions and hypertension.

The study revealed that the highest positivity rates, irrespective of the frequency of testing, belonged to the retail and wholesale sector as well as the construction sector. Workers within the retail workplace setting, namely supermarkets, have been considered in the current outbreak as one of the occupational groups at increased risk of contracting COVID-19 disease in the workplace, given the necessary public interaction and frontline-focused nature of work^[i]. Both the construction and the retail sectors followed the same trend, with the number of cases reaching their peak in May. Although construction sites have no direct occupational or even public exposure, such as in retail and wholesale, the high number of cases might be related to environmental and educational factors.

Multiple elements in different areas can interact with each other, resulting in a cumulative risk that can affect and increase the worker's overall risk^[ii]. For example, most construction companies use buses to transport workers, and at the start of the outbreak, there were no educational materials regarding infection prevention translated in the languages of the workers, who mostly come from Asian countries. Furthermore, Craft and Manual Workers live in crowded shared accommodation in constant proximity of one another, increasing the likelihood of COVID-19 transmission amongst them^[iii]. Living in dormitory-style housing compounds challenges with implementing social distancing, and in consequence, increases the risk of spread of COVID-19. Workers also often gather for social and recreational activities, shared dining, and use shared equipment e.g. kitchen appliances. The accommodation type was considered in Qatar as one of the strong forecasters and substantial contributing risk factors for health problems amongst migrant workers^[iv].

Although the health care sector has been considered as a workplace with a high risk for occupational exposure to the infection, in this study, health care had the lowest positivity rate. This might be attributed to the enforcement of infection prevention and control and occupational safety measures such as

continuously wearing masks, frequent handwashing, and constant availability of sanitizers. Another explanation could be the higher frequency of mandatory regular random testing of health care professionals. Health authorities have also put in place a range of teleconsultation services that proved quite effective in emergency response to deliver care while reducing the risk of contamination^[v].

A study highlighting work-related COVID-19 transmission in six Asian countries stressed the importance of work-related transmission of COVID-19 outside healthcare settings such as transportation or retail settings. Also, the proportion of healthcare workers (HCWs) among locally transmitted cases was smaller than non-HCWs in the included countries/areas^[vi]. Those findings likely support the efficacy of the use of PPE, screening, and knowledge about the pandemic in healthcare settings. HCWs are also strongly supported by international institutions to prevent and contain any outbreak within healthcare facilities: The World Health Organization has developed several specific guidance documents regarding COVID-19 for HCWs, including rights, roles, and responsibilities with key considerations for safety and health. They have also established a risk assessment tool that is to be used by health care facilities to determine the risk of infection of all HCWs who have been exposed to a COVID-19 patient^[vii].

Periodic testing and isolation could also be one of the possible explanations for the low positivity rate associated with plateau patterns, which occurred in May and June, namely for the Health care sector and Oil & Gas industry. In addition, tracking back the infection source in healthcare settings is also more straightforward, and thus, containment is smoother. It is therefore crucial to protect essential workers not working in healthcare settings because their risk of infection is often under-estimated, especially when compared to the healthcare sector, and their employers might not always provide adequate Protective Equipment, training or screening^[viii].

Qatar began lifting restrictions in a four-phased approach that started in June. The systematic testing of employees who intended to return to work during the first phase of lifting restrictions may explain the sharp increase in cases in the Public Service and the Accommodation & Food industries during this time. This screening initiative enabled the isolation of COVID-19 cases before the opening of public services, hotels, and restaurants to the public.

Lastly, the screened private funded sector was more affected by COVID-19 infections than the public funded sector. It is known that the private sector has higher percentages of workers who perform manual labor than the governmental sector. This disparity requires further investigation for the successful implementation of precautionary measures, given the discrepancy in the level of compliance and in the educational level of the employees between different sectors. These findings also highlight the importance of tailored strategies for prevention and surveillance as well as a tailored communication approach at workplaces to convey consistent health messages that are easy and accessible for all segments of the population for an optimum health outcome.

Declarations

Ethics approval and consent to participate

Not Applicable

Consent for publication

Not Applicable

Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests" in this section.

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Authors' contributions

- JA, MaK and SS extracted the data and categorized all the identified workplaces
- MaK and HaR analyzed and interpreted data and suggested the different points for the discussion section
- MaK AaN and SS (Corresponding Author) were major contributors in writing the manuscript
- The manuscript has been read and approved by all named authors

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Not Applicable

References

1. Koh D. Occupational risks for COVID-19 infection. *Occup Med (Lond)*. 2020;70(1):3-5. doi:10.1093/occmed/kqaa036
2. Sohrabi C, Alsafi Z, O'Neill N, et al. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19) [published correction appears in *Int J Surg*. 2020 May;77:217]. *Int J Surg*. 2020;76:71-76. doi:10.1016/j.ijsu.2020.02.034
3. World Health Organization Situation report 174. Who.int. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200712-covid-19-sitrep-174.pdf?sfvrsn=5d1c1b2c_2. Published 2020. Accessed July 18, 2020.

4. Ministry of Public Health in the State of Qatar-COVID 19 daily updates. Moph.gov.qa. <https://www.moph.gov.qa/english/Pages/default.aspx>. Published 2020. Accessed July 18, 2020.
5. Fusco FM, Pisaturo M, Iodice V, et al. COVID-19 infections among Healthcare Workers in an Infectious Diseases specialized setting in Naples, Southern Italy: results of a cross-sectional surveillance study [published online ahead of print, 2020 Jun 18]. *J Hosp Infect*. 2020;105(4):596-600. doi:10.1016/j.jhin.2020.06.021
6. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*. 2020;382(13):1199-1207. doi:10.1056/NEJMoa2001316
7. Can COVID-19 be considered an occupational disease? | International Social Security Association (ISSA). Ww1.issa.int. <https://ww1.issa.int/news/can-covid-19-be-considered-occupational-disease>. Published 2020. Accessed July 29, 2020.
8. Ran L, Chen X, Wang Y, Wu W, Zhang L, Tan X. Risk Factors of Healthcare Workers with Corona Virus Disease 2019: A Retrospective Cohort Study in a Designated Hospital of Wuhan in China [published online ahead of print, 2020 Mar 17]. *Clin Infect Dis*. 2020;ciaa287. doi:10.1093/cid/ciaa287
9. Istituto Superiore di Sanità. Integrated surveillance of COVID-19 in Italy. https://www.epicentro.iss.it/en/coronavirus/bollettino/Infografica_10aprile%20ENG.pdf. Published 2020. Accessed July 29, 2020.
10. Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention [published online ahead of print, 2020 Feb 24]. *JAMA*. 2020;10.1001/jama.2020.2648. doi:10.1001/jama.2020.2648
11. Zhang, M. Protecting Healthcare Workers in China During the Coronavirus Outbreak. The BMJ opinion. Weblog. [Online] Available from: <https://blogs.bmj.com/bmj/2020/02/14/min-zhang-protecting-healthcare-workers-china-coronavirus-outbreak/> [Accessed 29 July 2020].
12. Baker MG, Peckham TK, Seixas NS. Estimating the burden of United States workers exposed to infection or disease: A key factor in containing risk of COVID-19 infection. *PLoS One*. 2020;15(4):e0232452. Published 2020 Apr 28. doi:10.1371/journal.pone.0232452
13. Pam Sadowski S. NAICS Search. Census.gov. <https://www.census.gov/cgibin/sssd/naics/naicsrch?chart=2017>. Published 2020. Accessed July 29, 2020.
14. Koh D, Goh HP. Occupational health responses to COVID-19: What lessons can we learn from SARS?. *J Occup Health*. 2020;62(1):e12128. doi:10.1002/1348-9585.12128
15. Fox MA, Spicer K, Chosewood LC, Susi P, Johns DO, Dotson GS. Implications of applying cumulative risk assessment to the workplace. *Environ Int*. 2018;115:230-238. doi:10.1016/j.envint.2018.03.026

16. Alahmad B, Kurdi H, Colonna K, Gasana J, Agnew J, Fox MA. COVID-19 stressors on migrant workers in Kuwait: cumulative risk considerations. *BMJ Glob Health*. 2020;5(7):e002995. doi:10.1136/bmjgh-2020-002995
17. Bener A. Health Status and Working Condition of Migrant Workers: Major Public Health Problems. *Int J Prev Med*. 2017;8:68. Published 2017 Sep 6. doi:10.4103/ijpvm.IJPVM_396_16
18. Iyengar K, Mabrouk A, Jain VK, Venkatesan A, Vaishya R. Learning opportunities from COVID-19 and future effects on health care system [published online ahead of print, 2020 Jun 20]. *Diabetes Metab Syndr*. 2020;14(5):943-946. doi:10.1016/j.dsx.2020.06.036
19. Lan F, Wei C, Hsu Y, Christiani D, Kales S. Work-related COVID-19 transmission in six Asian countries/areas: A follow-up study. *PLoS ONE*. 2020;15(5):e0233588. doi:10.1371/journal.pone.0233588
20. Risk assessment and management of exposure of health care workers in the context of COVID-19: interim guidance. Who.int. <https://www.who.int/publications/i/item/risk-assessment-and-management-of-exposure-of-health-care-workers-in-the-context-of-covid-19-interim-guidance>. Published 2020. Accessed July 29, 2020.
21. The Lancet. The plight of essential workers during the COVID-19 pandemic. *Lancet*. 2020;395(10237):1587. doi:10.1016/S0140-6736(20)31200-9

Figures

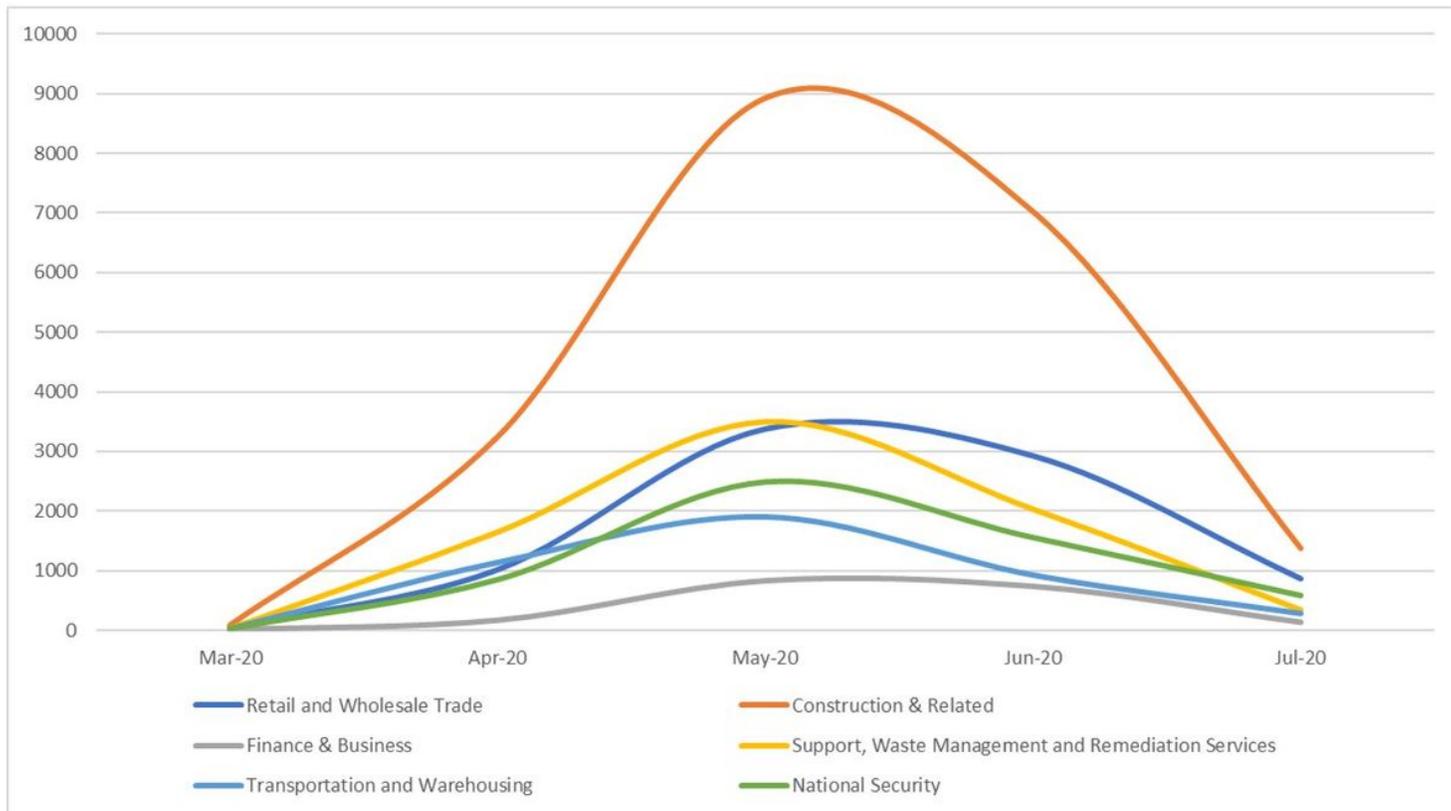


Figure 1

Group A monthly trend of infection (original figure)

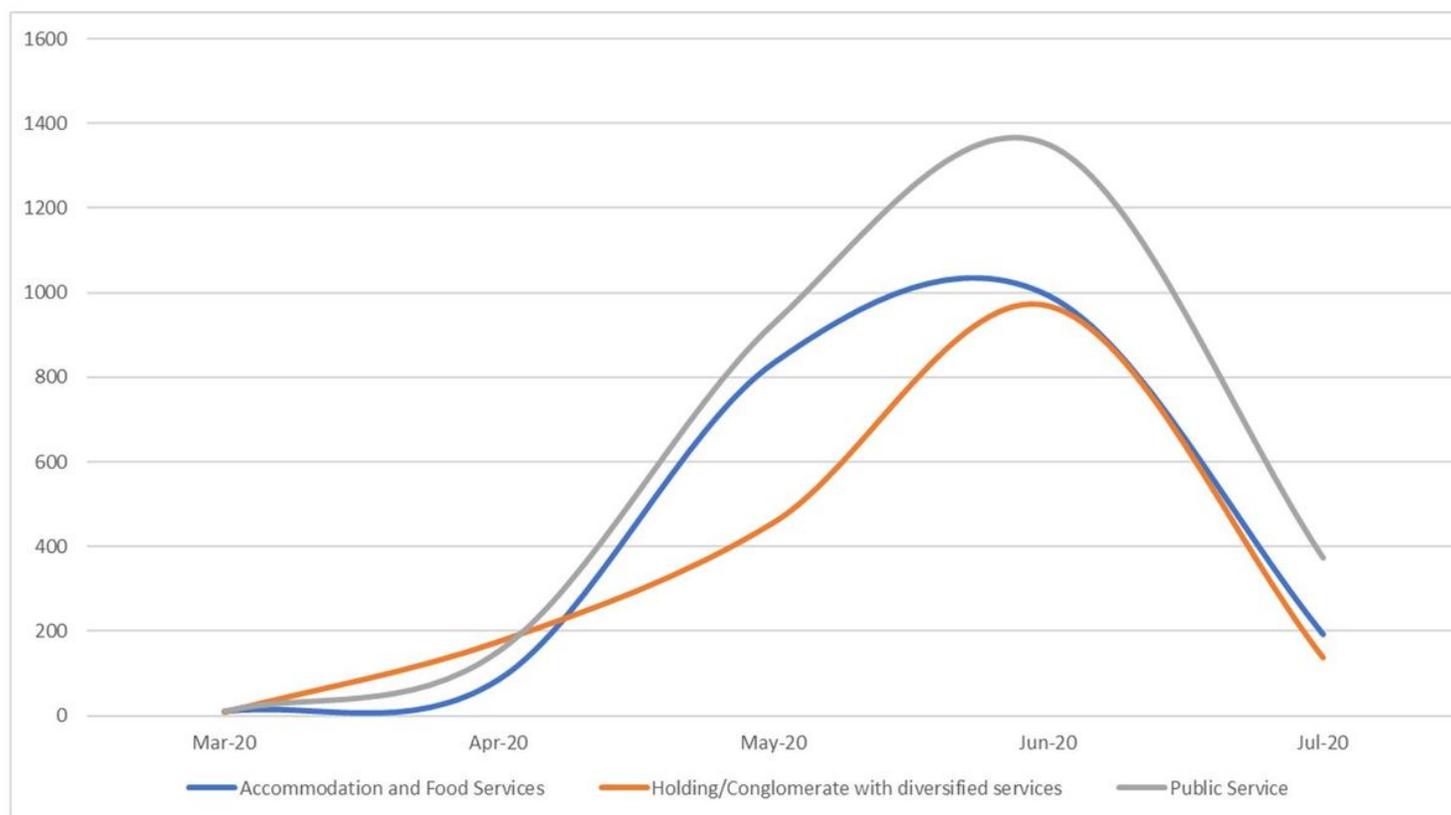


Figure 2

Group B monthly trend of infection (original)

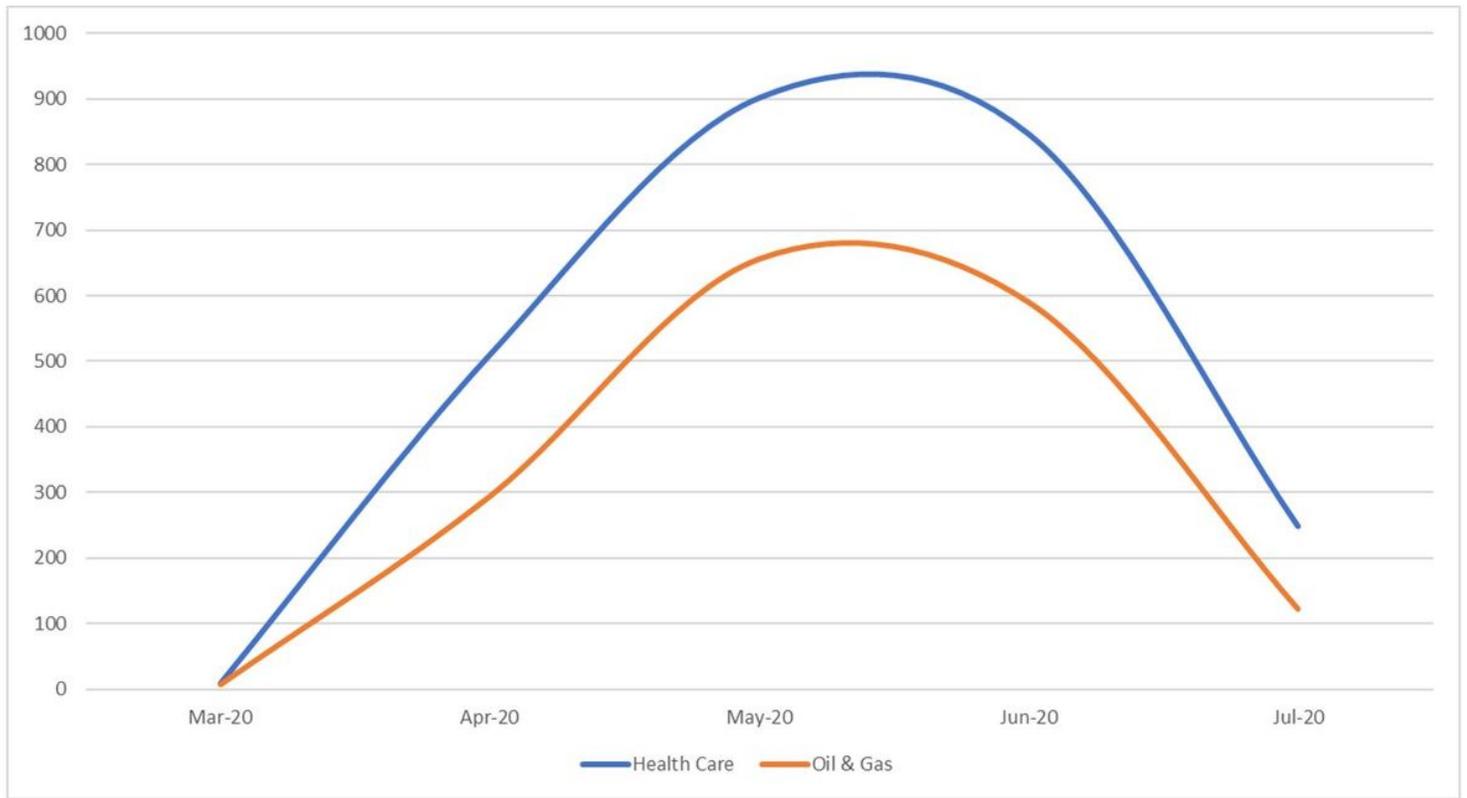


Figure 3

Group C monthly trend of infection (original)