Short Communication

Elevated COVID-19 Case Rates of Government Employees, District of Columbia, 2020–2022

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Abstract

Objectives: To estimate the rate ratio (RR) of reported Coronavirus Disease 2019 (COVID-19) cases among governmental employees from seven District of Columbia (D.C.) departments from March 2020 to February 2022.

Methods: Poisson regression models were used to estimate the RR by department, using D.C. residents as the reference and the person-day as the offset. The COVID-19 surveillance data and the full-time equivalent hours for each department were obtained from the D.C. governmental websites.

Results: Five of the seven departments had statistically significant higher COVID-19 case rates than D.C. residents. Stratified by four pandemic stages, RR of Fire and Emergency Medical Services (FEMS), Office of Unified Communication (OUC), and Metropolitan Police Department (MPD) were consistently >1: FEMS: 3.34 (95% confidence interval, CI [2.94, 3.77]), 2.39 (95% CI [2.06, 2.75]), 2.48 (95% CI [2.06, 2.95]), and 3.90 (95% CI [3.56, 4.26]), respectively; OUC: 1.47 (95% CI [0.92, 2.18]), 2.72 (95% CI [1.93, 3.69]), 1.85 (95% CI [1.09, 2.92]), and 2.18 (95% CI [1.62, 2.85]), respectively; and MPD: 2.33 (95% CI [2.11, 2.58]), 1.96 (95% CI [1.75, 2.18]), 1.52 (95% CI [1.29, 1.77]), and 1.76 (95% CI [1.60, 1.92]), respectively.

Conclusions: The results suggested higher case rates for emergency responders and frontline personnel than for general population in D.C.

Keywords: COVID-19; District of Columbia; emergency responders; occupational health; SARS-CoV-2

Introduction

Due to high frequency and close exposure of human contacts, a higher rate of Coronavirus Disease 2019 (COVID-19) cases may be observed among first responders and essential workers than in the general population (McGuire et al., 2021; Niu et al., 2021). In addition, the elevated risk of disease experienced by first responders, especially firefighters, may be associated with prepandemic lung function decline (Weiden et al., 2021). Here, we estimated the rate ratios (RRs) of COVID-19 cases among personnel from seven District of Columbia (D.C.) departments with reference to D.C. residents from March 2020 to February 2022.
Methods

Obtained from the D.C. COVID-19 surveillance repository (Government of the District of Columbia, 2022a), the dataset contained the aggregated number of personnel tested positive by reported date. Seven departments were selected for analysis: Fire and Emergency Medical Services Department (FEMS), Metropolitan Police Department (MPD), Department of Corrections (DOC), Department of Youth Rehabilitation Services (DYRS), the Office of Unified Communications (OUC), the Child and Family Services Agency (CFSA), and Department of Motor Vehicle (DMV). We used the full-time equivalent (FTE) hours reported in D.C. Government’s budgets to estimate the employee number in each department in 2020, 2021, and 2022 (Government of the District of Columbia, 2022c).

The D.C. vaccination coverage data were retrieved from the CDC COVID-19 vaccination data archive (Centers for Disease Control and Prevention, 2022a,c). On 1 July 2021, 49.9% of D.C. residents (all ages) were fully vaccinated (had a second dose of a two-dose vaccine or one dose of a single-dose vaccine) (Centers for Disease Control and Prevention, 2022c); therefore, this date was used as the cutoff point for 50% of D.C. residents (all ages) were fully vaccinated. Specifically, 57.8, 59.4, and 74.4% of D.C. residents who were 12+, 18+, and 65+, respectively, were considered fully vaccinated on 1 July 2021 (Centers for Disease Control and Prevention, 2022c). In D.C., the first booster dose was available for the immunocompromised on 13 August 2021; the Pfizer booster dose was available for 16+ on 24 September 2021; and the Moderna and Johnson & Johnson booster doses were available for 18+ on 20 October 2021 (Government of the District of Columbia, 2022d).

With the reported case number as the dependent variable, we applied Poisson regression models with person-day as the offset to calculate the COVID-19 RR by department, using D.C. residents as the reference. To be specific, we calculated the person-day using the approved FTE numbers for seven assessed departments from 2020 to 2022 multiply the time duration between each study period in days (District of Columbia Office of Chief Financial Officer, 2022a,b,c). We assessed the RR over the entire study period (7 March 2020 through 28 February 2022), and in four distinct time periods: before COVID-19 vaccination (7 March 2020 through 14 December 2020), during vaccine rollout until 50% of D.C. residents were vaccinated (15 December 2020 through 1 July 2021) (Centers for Disease Control and Prevention, 2022c), when Delta was the dominant variant circulating in the USA (2 July 2021 through 2 November 2021), and when vaccine was available to 5- to 11-year-olds and Omicron became the dominant variant (3 November 2021 through 28 February 2022) (Centers for Disease Control and Prevention, 2022b).

On 2 November 2021 (end of the second time period), 59.7% of D.C. residents (all ages) were fully vaccinated (69% for 12 years and older, 69.7% for 18 years and older, and 83.3% for 65 years and older) (Centers for Disease Control and Prevention, 2022c). At the end of the study period (28 February 2022), 67.7% of D.C. residents (all ages) were fully vaccinated (72.3% for 5 years and older, 75.8% for 12 years and older, 76.0% for 18 years and older, and 88.2% for 65 years and older) (Centers for Disease Control and Prevention, 2022c). There was 34.5% of D.C. residents (all ages) who were fully vaccinated and had received a booster dose (36.4% for 18 years and older, 45.7% for 50 years and older, and 50.5% for 65 years and older) (Centers for Disease Control and Prevention, 2022c).

Statistical analysis was performed using R 4.0.3 (R Core Team, R Foundation for Statistical Computing, Vienna, Austria). The Georgia Southern University Institutional Review Board made a non-human subject determination for this project (H20364) under the G8 exemption category according to the Code of Federal Regulations Title 45 Part 46.

Results

Five D.C. departments had statistically significant higher COVID-19 case rate than D.C. residents from 7 March

What’s important about this paper

This is the first study to estimate the rate ratio of Coronavirus Disease 2019 (COVID-19) among District of Columbia governmental employees in different departments over the first 2 years of the pandemic (March 2020 to February 2022). Case rates were greater than the general population among frontline workers, though the case rates ratios varied over the course of the pandemic. This study can serve as a reference for future research about COVID-19 case rates among different occupations in various geographical locations, and guide policy making to reduce disease risks among governmental employees.
2020 through 28 February 2022 (Fig. 1, Supplementary Fig. 1, available at *Annals of Work Exposures and Health* online, Table 1). FEMS employees’ case rate was three times that of the general population (RR = 3.07, 95% confidence interval [CI], [2.91, 3.25]). This was followed by DOC (RR = 2.53, 95% CI [2.34, 2.73]), OUC (RR = 2.15, 95% CI [1.84, 2.50]), MPD (RR = 1.98, 95% CI [1.89, 2.07]), and DYRS (RR = 1.62, 95% CI, [1.39, 1.87]). Stratified by pandemic stages, the RR changed over time. For example, the RR of DOC dropped from 2.88 (95% CI [2.41, 3.41]) before vaccine rollout to 1.75 (95% CI [1.30, 2.16]) after vaccine rollout to 1.10 (95% CI [0.77, 1.52]) after 50% of D.C. residents have been fully vaccinated, and increased to 3.19 (95% CI [2.81, 3.61]) as Omicron variant became dominant. It was noteworthy that after 50% of D.C. residents were fully vaccinated (third time period), only three departments had statistically significant elevated case rates: FEMS (RR = 2.48, 95% CI [2.06, 2.95]), OUC (RR = 1.85, 95% CI [1.09, 2.92]), and...

*Figure 1.* The RR (cross) and 95% CIs (bar) of COVID-19 case rates for seven D.C. departments for five selected time intervals: 7 March 2020–14 December 2020, 15 December 2020–1 July 2021, 2 July 2021–2 November 2021, 3 November 2021–28 February 2022, and 7 March 2020–28 February 2022. The departments analyzed were: FEMS, MPD, DOC, DYRS, the OUC, the CFSA, and DMV.
Table 1. The RR of COVID-19 cases of seven D.C. departments, from 7 March 2020 to 28 February 2022. Dates are displayed as month/day/year.

| Departments                        | 3/7/2020–12/14/2020 | 12/15/2020–7/1/2021 | 7/2/2021–11/2/2021 | 11/3/2021–2/28/2022 | 3/7/2020–2/28/2022 (overall) |
|-----------------------------------|---------------------|---------------------|-------------------|---------------------|-------------------------------|
|                                   | RR                  | 95% CI              | RR                | 95% CI              | RR                            | 95% CI                        | RR                  | 95% CI              |
| FEMS                              | 3.34 (2.94, 3.77)   | 2.39 (2.06, 2.75)   | 2.48 (2.06, 2.95) | 3.90 (3.56, 4.26)   | 3.07 (2.91, 3.25)             |
| MPD                               | 2.33 (2.11, 2.58)   | 1.96 (1.75, 2.18)   | 1.52 (1.29, 1.77) | 1.76 (1.60, 1.92)   | 1.98 (1.89, 2.07)             |
| DOC                                | 2.88 (2.41, 3.41)   | 1.75 (1.30, 2.16)   | 1.10 (0.77, 1.52) | 3.19 (2.81, 3.61)   | 2.53 (2.34, 2.73)             |
| Youth Rehabilitation Services     | 1.93 (1.39, 2.60)   | 1.86 (1.32, 2.52)   | 0.71 (0.34, 1.28) | 1.73 (1.32, 2.23)   | 1.62 (1.39, 1.87)             |
| OUC                               | 1.47 (0.92, 2.18)   | 2.72 (1.93, 3.69)   | 1.85 (1.09, 2.92) | 2.18 (1.62, 2.85)   | 2.15 (1.84, 2.50)             |
| CFSA                              | 0.62 (0.38, 0.96)   | 1.41 (1.02, 1.89)   | 0.76 (0.43, 1.23) | 0.74 (0.55, 1.02)   | 0.99 (0.85, 1.16)             |
| DMV                               | 1.76 (1.04, 2.78)   | 1.72 (1.01, 2.70)   | 0.51 (0.13, 1.31) | 1.00 (0.89, 1.12)   | 0.79 (0.57, 1.06)             |

*Residents of D.C. were used as the reference group.
*The first COVID-19 case in D.C. was reported on 7 March 2020.
*The first dose of the Pfizer-BioNTech COVID-19 vaccination was administered in the USA on 15 December 2020.
*Fifty percent of the D.C. residents were considered fully vaccinated on 1 July 2021 (Centers for Disease Control and Prevention, 2022c).
*The Delta variant became dominant in the USA on 7 July 2021 (Crist, 2021; Lovelace, 2021).
*The Centers for Disease Control and Prevention’s Advisory Committee on Immunization Practices made an interim recommendation to use the Pfizer-BioNTech COVID-19 vaccine in teens aged 12–15 years on 12 May 2021, and in children aged 5–11 years on 2 November 2021.
*The first cases of Omicron variant in D.C. were announced on 13 December 2021 (Trujillo, 2021).
MPD (RR = 1.52, 95% CI [1.29, 1.77]). As Omicron variant spread rapidly in D.C. (fourth time period), five D.C. departments had statistically significant elevated case rates: FEMS (RR = 3.90, 95% CI [3.56, 4.26]), DOC (RR = 3.19, 95% CI [2.81, 3.61]), OUC (RR = 2.18, 95% CI [1.62, 2.85]), MPD (RR = 1.76, 95% CI [1.60, 1.92]), and DYRS (RR = 1.73, 95% CI [1.32, 2.23]).

Discussion

This report highlighted that five of the seven D.C. departments analyzed here experienced a higher COVID-19 case rate than the D.C. general population over the first 2 years of the pandemic. This reflected the increased risk associated with emergency responders and associated professions serving the public in the frontline. The estimated RR of FEMS and MPD was consistently significantly greater than one, over all time periods, reflecting that their employees have the highest risk of COVID-19 infection among the departments, as the pandemic continues.

At the beginning of the pandemic (first time period), the RR of CFSA (RR = 0.62, 95% CI [0.38, 0.96]) was significantly lower than other departments. The control measures, such as closing the CFSA offices to the general public between 16 March and 31 March 2020, may contribute to lowering the RR of COVID-19 infections among their employees (Child Welfare League of America, 2020; Government of the District of Columbia, 2020b).

However, the magnitude of the RR changed over time due to control efforts and the emergence of new variants (Supplementary Fig. 1, available at Annals of Work Exposures and Health online). Prior to the Omicron wave, a gradual decline in RR was observed in some departments, such as MPD and DOC. For instance, DOC’s decline in RR over time is consistent with their effort to suppress COVID-19 transmission among its staff and residents as described elsewhere (Eping et al., 2021). However, DOC had a major surge among its personnel and residents when the Omicron variant was rapidly spreading in D.C. in the fourth time period (Gathright, 2021). Without additional information from the DOC, we cannot ascertain the possible causes of this late surge in the fourth study period except for the higher transmissibility of the Omicron variant. However, on 15 February 2022, the D.C. DOC settled a lawsuit over inmate COVID-19 conditions with the American Civil Liberties Union public defender services by agreeing to five unannounced inspections of the D.C. Jail over the next 6 months by an independent expert, data sharing, and continued inmate access to swift medical attention and sanitizing materials (American Civil Liberties Union, 2022; Hsu, 2022; Massimo, 2022; Serban, 2022). This settlement of the lawsuit may suggest there might be management loopholes in DOC’s effort to contain the spread of COVID-19 in the D.C. Jail.

Our study had limitations. First, this was an ecological study using aggregated case count data. Line lists with demographic and clinical data of each individual reported case were unavailable to the authors. Thus, gender and age-specific RR by occupation were unavailable as demographic information of D.C. governmental employees was not publicly available. We were unable to adjust RR for gender and age as well as other potential confounders. Second, D.C. governmental employees by departments are somewhat overlapped with the general D.C. residents (the reference group). However, we were unable to create exclusive groups as we did not know how many of the D.C. government employees and those who were cases live in D.C. As a note, many people who work in D.C. live in neighboring counties (namely, Arlington County, Virginia, Montgomery County, Maryland, and Prince George’s County, Maryland); therefore, it is not appropriate to simply subtract the number of D.C. governmental employees and that of their cases from the number of D.C. residents and that of their cases. Third, the division of the time period was arbitrary. They were meant to provide indicators of different stages of the pandemic, as experienced in D.C., but they were not meant to demonstrate any causality between a specific event (such as when vaccine first became available, or when vaccine coverage reached 50%) and changes in RR. Fourth, the data were analyzed by the report date as the symptom onset date was unavailable. The incubation period, delays from symptom onset to getting tested and delays from tests to reports meant the date of case report lagged the time of infection by approximately 9 days in the USA. It further reinforces the previous point that the precise division of time periods was arbitrary and was meant to provide indicators to illustrate the changing nature of RR over time. Fifth, we were unable to ascertain if there was any differential reporting between the occupations analyzed here and the general population in D.C. However, we suspected D.C. government employees, especially first responders, were more likely to report COVID-19-positive testing results than D.C. residents. For instance, the first responders had better access to COVID-19 testing through the free testing centers located at firehouses across D.C. beginning on 15 June 2020 (Government of the District of Columbia, 2020a). Furthermore, D.C. government employees had a temporary ‘COVID Sick Leave’
benefit provided by the Families First Coronavirus Response Act between 16 October 2020 and 29 August 2021 (Government of the District of Columbia, 2021). Therefore, differential reporting was possible. Thus, the RRs among D.C. government employees might be overestimated.

Conclusions

Five D.C. departments had occupation-specific elevated COVID-19 case rates in 2020–2022. Government employees provide service in the front lines. Our results support the COVID-19 Vaccination Requirements for D.C. governmental employees in effect on 24 January 2022 (Government of the District of Columbia, 2022b).

Supplementary data

Supplementary data are available at Annals of Work Exposures and Health online.

Funding

We do not receive any external funding to conduct this study.

Ethical approval

The Georgia Southern University Institutional Review Board made a non-human subject determination for this project (H20364) under the G8 exemption category according to the Code of Federal Regulations Title 45 Part 46.

Conflict of interest

We have no conflicts of interest to declare.

Summary

Government employees from five District of Columbia departments, especially fire fighters and police officers, experienced higher COVID-19 case rates than local residents.

Data availability

The data underlying this article are publicly available from the Government of the District of Columbia website: https://coronavirus.dc.gov/data.

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