

## COVID-19 reinfection in Afghanistan: A descriptive analysis of data from DHIS2, 2022

Razia Soltany<sup>1\*</sup>, Mir Salamuddin Hakim<sup>2</sup>, Khwaja Mir Islam Saeed<sup>2</sup>, Shoaib Naeemi<sup>2</sup>

1. BSPH, FETP Alumnus, Afghanistan National Public Health Institute (ANPHI), Kabul, Afghanistan.

2. Afghanistan Field Epidemiology Training Program, Kabul, Afghanistan.

### ARTICLE INFO

Type: Original Article

Received: 2023/09/10

Accepted: 2023/12/30

\*Corresponding Author:

Razia Soltany

Address: BSPH, FETP Alumnus,  
Afghanistan National Public Health  
Institute (ANPHI), Kabul, Afghanistan



[raziasoltany@gmail.com](mailto:raziasoltany@gmail.com)

### ABSTRACT

**Background:** Despite millions of COVID-19 infections worldwide since the beginning of the pandemic, relatively few confirmed cases of COVID-19 reinfection have been reported. In Afghanistan, COVID-19 undetected cases are more than detected cases. This study aims to describe the burden of COVID-19 reinfection cases in Afghanistan, along with the epidemiological and demographical patterns.

**Methods:** A descriptive study of national-wide secondary data on COVID-19 reinfection cases was carried out from January to June 2022. Data were extracted from the District Health Information Software 2 (DHIS2) and managed and analyzed using Microsoft Excel and Epi Info V.7.2.1.

**Results:** In 2022, 79 reinfection cases of COVID-19 were reported, with males being more affected than females. The mean age of re-infected patients was 39, with most from Wardak province. Most cases occurred within six months after the primary infection. Cough was more prevalent among reinfected cases. Only 26 patients had taken two doses of the vaccine, while 44 (55.70%) had not received it. Out of all cases, 44 (55.70%) were recovered and 5 (6.85%) died.

**Conclusion:** The COVID-19 reinfection rate is very low in Afghanistan, which was common in males since other cases might be unreported. Coughing was more common among reinfection patients. Relying on the results, vaccination and awareness-raising may play a protective role in reinfection; hence, enhancement of vaccination and taking preventive measures are recommended to prevent further reinfection.

DOI:

<https://doi.org/10.60141/AJID/V.2.I.1.4>

**Keywords:** COVID-19, Reinfection, Afghanistan, DHIS2

**To cite this article:** Soltany R, Hakim MS, Saeed KMI, Naeemi S. COVID-19 reinfection in Afghanistan: A descriptive analysis of data from DHIS2, 2022. Afghanistan Journal of Infectious Diseases. 2024;2(1):25-32. <https://doi.org/10.60141/AJID/V.2.I.1.4>

## 1. Introduction

COVID-19 is an infectious disease caused by the SARS-CoV-2 virus. Coronaviruses (CoVs) are RNA viruses that belongs to Coronaviridae family which have become a major public health concern. Along with SARS-CoV-2, there are seven human coronaviruses. Those causing mild diseases are the 229E, OC43, NL63 and HKU1, and the pathogenic ones are severe acute respiratory syndrome-(SARS-CoV) outbreak in 2002, Middle East Respiratory Syndrome-CoV (MERS-CoV) outbreak in 2012 (1). The first case of COVID-19 was detected in Wuhan, China in December 2019, with the virus spreading rapidly to all over the world. This led WHO to declare a Public Health Emergency of International Concern (PHEIC) in January 2020, and to characterize the outbreak as a pandemic in March 2020 (2).

As of March 20, 2023, the total number of confirmed cases globally was more than 68 million. Moreover, on the same date, the total number of deaths was 6,819,835 (3). Besides, 66.9% of the world population has received at least one dose of the COVID-19 vaccine. 12.28 billion doses have been administered globally, and 6.11 million are now administered each day. Only 19.6% of people in low-income countries have received at least one dose (4).

Reinfection with the virus that causes COVID-19 means a person was infected, recovered, and then later became infected again. It has been observed in various studies that individuals who have recovered from COVID-19 may have some level of protection against repeat infections (5). Specifically, people who tested positive for anti-N and anti-S antibodies after being infected showed slightly higher protective effects (6,7) and slightly higher protective effects (89–93%). However, reinfections do occur after COVID-19. Among those who survive, previous COVID-19 infection also confers protection against severe outcomes in the event of reinfection (8, 9). Evidence suggests that people who have a positive result from an antibody test may be at lower risk for future infection with COVID-19. An early 2021 study found that people have great protection from COVID-19 reinfection for ancestral, alpha, beta, and delta variants (10).

Despite over millions of COVID-19 infections worldwide since the beginning of the pandemic, few confirmed cases of COVID-19 reinfection have been confirmed (11). In fact, the CDC still uses the 90-day window to exclude counting new positives as reinfections (12). However, a study in Denmark found that while pre-Omicron reinfections were rare (593 out of 4.4 million people), many occurred within 60 days of infection (13). In addition, two additional studies confirmed reinfections occurred as early as 20 days after infection during the first Omicron wave (reinfections remained rare; 1,739 out of 1.8 million people) (14, 15). As in the U.K., reinfections comprised around 1% of cases in April 2021. With the introduction of Omicron, reinfection rates quickly increased to 11% of all infections. Right now, reinfections make up about 25–27% of cases in the U.K. (16).

Before Delta, a study in the U.K. found reinfections were associated with a 61% lower risk of death than primary infections (17). Furthermore, a study in Qatar found that reinfections had 90% lower odds of resulting in hospitalization or death than primary infections (18). Those who were vaccinated had a lower risk of severe reinfection compared to those who were not vaccinated. Meanwhile, getting vaccinated can prevent infection with COVID-19. In 2021, the U.K. found that viral load was significantly reduced after reinfections compared to primary infections and thus protected against severe disease (19). Besides, in a study among those re-infected, 20% were hospitalized during the first infection (20).

As of March 20, 2023, the total number of COVID-19 cases in Afghanistan was 209749, and there were 7896 deaths (3). Unfortunately, dimensional tissue models (12, 18). Scientists can optimize the effectiveness of drugs by identifying promising candidates and refining dosing schedules using these models. To comprehend virus-cell interactions and assess the efficacy of drugs against highly infectious viruses such as COVID-19, 3D tissue models are essential resources (19). These patterns produce physiologically significant copies that can be utilized in drug research and high-throughput screening procedures (20). Tissue engineering provides multiple pathways to facilitate the

development of 3D tissue models for COVID-19 (1, 21).

Unfortunately, in Afghanistan, COVID-19 undetected cases are more than detected cases. Probably due to low health-seeking behavior or the weakness of the surveillance system to expand the infected cases, which can't be representative. Meanwhile, as in a study, the vaccine hesitancy rate for COVID-19 among medical students in Kabul, Afghanistan, was 42.3% (21), which showed that there is a lack of COVID-19 vaccination in Afghanistan due to vaccine hesitancy and sharing nasty rumors between people. Accordingly, doing a study in Afghanistan about COVID-19 reinfection, which is studied in other countries, can help to inform the global community about the existence of reinfection cases in Afghanistan and support the health system, as well as to recommend to health policymakers concerning COVID-19 reinfections. This study aims to describe reinfection cases in Afghanistan along with the epidemiological and demographic patterns.

## 2. Material and methods

A descriptive study was designed to review, analyze, and report the mean, median, and mode proportions, percentages, clinical profiles, geographical and demographical characteristics, and epidemiological features of COVID-19 reinfection cases in Afghanistan. This is a secondary data analysis that was conducted in July 2022. The study population was 13324 cases of COVID-19 in the first six months of 2022, of which 79 cases were re-infected with COVID-19, which we include in this study. The data were extracted from the District Health Information System 2 (DHIS2) database, which is developed by the Ministry of Public Health (MOPH) for Ms. Excel, from January to June 2022. As maintained by the surveillance department, there were no recordings of reinfection cases from the first two years of 2020 and 2021. The reinfection case is defined by National Disease Surveillance and Response (NDSR) in the Ministry of Public Health for case identification (as the confirmation of cases was affirmed when the sample was positive for the second time by a public health laboratory using PCR tests). In this study, data management was

conducted using Microsoft Excel, Epi Info version 7.2.1, and GIS for designing the map. The burden of reinfection cases was analyzed nationally according to sex, age group, health status, vaccination, underlined condition, occupation, and health outcome.

## 3. Results

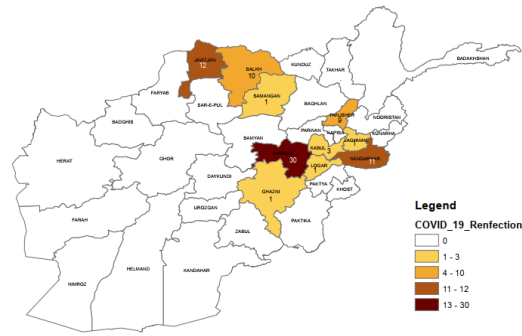
Out of 13324 COVID-19 positive cases, 79 (0.59%) reinfection cases of COVID-19 were reported and included in this study in 2022. Out of all reported reinfected cases, 45 (57%) were male. The mean ( $\pm$  standard deviation) age of patients was 39.02 SD  $\pm$  15.26, with an age range of 10–90 years old, and most of the cases were in the age range of 30–50 years (49%). A large number of cases were from Wardak Province 30 (38%) (Map 1). Most of the reinfection patients were housewives; 31 (39%) and 11 (14%) were health workers (Table 1). In total, 43 (54%) specimens were taken with nasopharyngeal swabs and 21 (27%) specimens were taken with oropharyngeal swabs; only 6 (8%) of cases were hospitalized. Moreover, 46 (58%) reinfection cases occurred six months after the first infection, 29 (37%) cases re-infected greater than six months, and 4 (5%) cases infected less than half and one month (Figure 1).

The body temperatures of reinfection cases were mostly between 37 and 39.2 °C. Reinfection patients had different signs and symptoms; out of all, 73 (92%) had a cough, 60 (76%) had a fever, 57 (72%) had a headache, 47 (59%) had fatigue, 42 (53%) had a shortage of

breath, and finally 19 (24%) cases had diarrhea (Figure 3). Furthermore, about 18 (23%) cases had different underlined conditions, such as chronic lung diseases, cardiovascular diseases, and other conditions. Unfortunately, only 26 (33%) patients had vaccinated two doses, 8 patients had vaccinated only the first dose, and 44 (56%) hadn't received vaccination. Out of all COVID-19 reinfection cases, 44 (56%) were recovered, 5 (7%) died, and 30 (38%) were lost during follow-up.

Table 1. General information of the participants

Variables	Frequency	(%)
<b>Sex</b>		
Female	34	42
Male	45	56
<b>Age groups</b>		
10-20	6	8
21-30	22	28
31-40	21	27
41-50	14	18
51<	16	20
<b>Occupation</b>		
Driver	2	2.53
Government Employee	1	1.27
Health worker	11	14
Housewife	31	39
Jobless	17	22
Media Staff	1	1.27
Student	1	1.27
Other	6	8
<b>Provinces</b>		
Wardak	30	38
Jawzjan	12	15
Nangarhar	11	14
Balkh	10	13
Panjshir	9	11
Kabul	3	4
Logar	1	1.27
Laghman	1	1.27
Samangan	1	1.27
Ghazni	1	1.27



Map 1: Provinces with COVID-19 reinfection

4. Discussion

The findings of this study reveal that there will be 1 case per person re-infected with COVID-19 in 2022. As stated by the surveillance department, there were no recordings of reinfection cases of COVID-19 from the first two years of 2020 and 2021, which, if data were provided, could give a better picture of COVID-19 reinfection cases from the beginning of the COVID-19 pandemic. Whereas, in a study in Vojvodina, Serbian reinfection cases were recorded at 5.49%, which is opposed to this study (22). The rate of COVID-19 reinfection in males was higher than that in females (>50%), which is completely like the primary infection of COVID-19 in Afghanistan. In addition, the relationship between COVID-19 and its complications with gender is complex and can be due to differences in comorbidities, behavioral factors, workplace, lifestyles, and the difference in immune response due to hormonal differences, which needs further investigation (24). The cases who were unvaccinated had a significantly higher likelihood of reinfection, which is consistent with a study in Kentucky, USA (25).

This finding supports the CDC recommendation that all eligible persons be offered the COVID-19 vaccination, regardless of their previous SARS-CoV-2 infection status. The signs and symptoms of COVID-19 reinfection differ from primary infection. As cough was in high percentage and afterwards, fever was more common in reinfection, while in COVID-19 infection, fever was more common than cough. One important limitation is that the detection of all cases in the country is a big challenge. Besides that, we have faced the unavailability of exact data. Due to the scarcity of research, further studies are required to determine and reflect the different aspects of COVID-19 infection and reinfection cases.

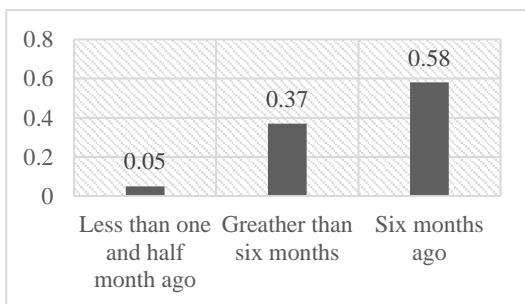


Figure 1: The interval between first and second infection

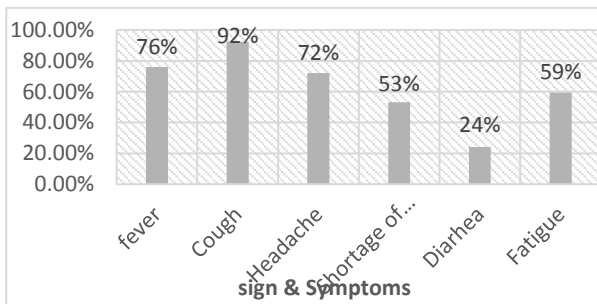


Figure 3: Frequency of sign and symptoms in reinfection cases

## 5. Conclusion

The COVID-19 reinfection rate is very low in Afghanistan in 2020, which may be due to reflection of the fact that other cases might be unreported. Most of the cases were in age range of 30-50 years. Large number of cases were from Wardak province. Cough was more common symptom among reinfection patients. Since there is uncertainty about the immunity after COVID-19 infection, the possibility of reinfection and recurrence after recovery is not unexpected. Relying on the results, vaccination may play a protective role in reinfection, hence, enhancement of vaccination and doing the preventive measures is recommended to prevent further. Moreover, raising peoples` awareness on preventive measure of COVID-19, especially in remote areas with low access to health services, could play an important role in this regard.

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