



# SARS CoV-2 Disease Incidence, Transmission and Mortality in Bangladesh (2020-2023)

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## Research Article

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## Abstract

COVID-19 was the worst devastation of the current century that undermined health, the economy, and daily life. This study assessed the status and correlates of SARS-CoV-2 testing, infection, recovery, and death from March 2020 to January 2023 (N=1061 days) to comprehensively understand Bangladesh's position toward COVID-19. The study obtained data from various government agencies. Total cases, infections, recoveries, and deaths during the study period were 13119034, 1988858, 1854732, and 33301, respectively. In 2020, the total cases, infections, recoveries, and deaths were 2390782, 462586, 365235 and 6582. In 2021, total cases, infections, recoveries, and deaths were 6633977, 1004738, 1004738, 10919,591,591, and 5928. Infections, recoveries, and deaths were 1690239, 91421, 168047 and 391. In 2023, total cases, infections, recoveries, and deaths were 69942, 436, 4201, and 0. Results revealed a moderate association between testing and infection, moderate to strong correlations between infection and testing, recovery and testing, and death and testing. Test vs infected, recovery, and death were significant at 0.00 and 0.01 where the mean was 12478.66, 12517.66, and 14383.63. Infected versus recovered, mortality was significant at 0.00 and 0.05 while the mean was 39.01, 1904.98. Recovery versus mortality was significant at 0.00 where the mean was 1865.97. SARS-CoV-2 spread throughout Bangladesh and affected sixty-four districts. The continued incidence of COVID-19 infection has emphasized the importance of rapid accurate and advanced laboratory diagnostics to limit its spread. In such a situation, people avoided public gatherings and returned home after finishing work as soon as possible. A major factor in mitigating the impact of Corona was widespread vaccination across the country.

**Keyword:** COVID-19; SARS-CoV-2; Tests; Infections; Recoveries; Deaths; Relationship; Regression; Bangladesh

## Introduction

Bangladesh is an emerging agricultural country that will become a middle-income country in 2026. The coronavirus affects various sectors globally such as the

economy, agriculture, and environment [1] and many more [2]. Coronavirus is not a new viral disease now, it is known as a deadly disease [3]. Everyone, young and old, knows that coughing means spreading the coronavirus to other people. Because of this, people have become cautious since the

outbreak of the coronavirus stopped. Now everyone in the city tries to keep their distance [4], but in the village, it is the same as before. The impact of the coronavirus cannot be seen or understood by going to the village every week. However, there is clear evidence that the current government has been successful in dealing with COVID-19. This was an exciting issue that was well managed by the present Awami League government. During the coronavirus people are doing many things including social distancing, coronavirus vaccination, doctor, medicine, hospital system, coronavirus tests, and following mosque distance, as a result, coronavirus has been kept far away from Bangladesh [5]. The government's policy to switch the coronavirus was to keep the general public away from public places through lockdowns, curb market activity, and tight security at schools, colleges, universities, and places of worship, such as mosques with a small number of worshippers or madrasa-based institutions. This virus disease also affects the environment [5]. Dealing with coronavirus was a seriously challenging issue for Bangladesh. Confirmation of the coronavirus vaccine within a short time of this system has reduced the mortality rate of coronavirus as well as control the percentage of infections. The country's budget also included coronavirus incentives that helped the poor financially. Priority is given to working people of Bangladesh, senior citizens above 50 years of age. Later mass vaccinations were given to help control the virus.

Human infection with SARS-CoV-2 the virus causing the respiratory disease COVID-19, was first perceived in China in the last month of the year 2019 [6]. It was conspicuously matching (88%) to two bat-derived SARS-like coronaviruses and additional identically similar to SARS-CoV (79%) and MERS-CoV (50%) [7]. It is a contagious epidemic that has disease-ridden more than 200 countries worldwide. It has spread to different countries and is now recognized as a global epidemic [8]. On January 30, 2020, the WHO declared the severe outbreak a public health emergency of international concern, and it became a pandemic on March 11 [9]. In this pandemic situation, the COVID-19 tests, infestation, and death were increased during this period in Bangladesh. Compared to other countries of the world, the number of infected and dead has increased slowly in this country [10]. The present study describes the status of tests, infections, recoveries, and fatalities in Bangladesh from May 1 to June 30, 2021.

## Methods

### Study Design and Period

COVID-19 was confirmed in Bangladesh on March 8, 2020. We collected publicly shared daily data from the websites DGHS [11] and IEDCR [12]. The data collection period was from March 2020 to January 2023 (N=1061 days).

### Tests of COVID-19

There are two types of tests:

- Diagnostic (virus) test on bronchial samples (nasal samples). It remains to be seen whether a human has COVID-19 at the moment.
- Antibody tests: in the past, COVID-19 was tested to determine if it was present.

### Data Retrieval

This study included patients with tests, infections, recoveries, and deaths of COVID-19 based on a positive result of the SARS-CoV-2 test by the official websites of IEDCR, DGHS, and MoHFW. Data were acquired from various medical units in Bangladesh states, including 59 different institutions that comprise the Bangladesh health system.

### Code of Ethics

All the data are real, and the data collected from governmental websites, local newspapers, internet news sites, and social networks were cross-checked [13,14].

### Statistical Analysis

All obtained data were double-checked, coded, and entered into a database with Microsoft Excel 2016. From 2020 to 2023, the regression connection was calculated. The Spearman rank correlation compared the correlation of two variables, and statistical significance was accepted at p values of 0.01, 0.05, and 0.1. SPSS version 25.0 (USA) was used to perform all statistical analyses.

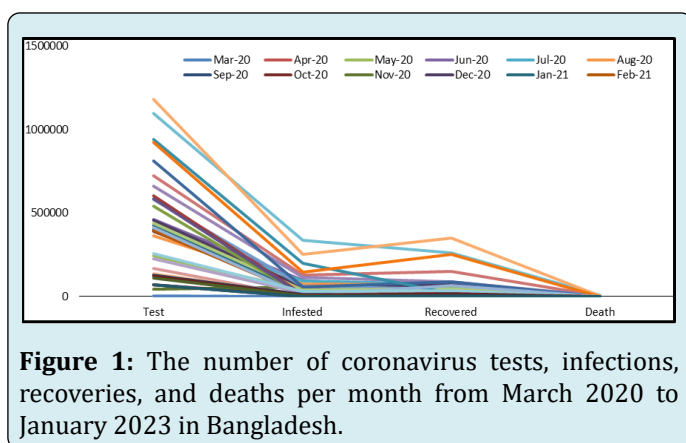
## Results and Discussion

### The Number of Coronavirus Tests, Infections, Recoveries and Deaths Per Month from March 2020 to January 2023 in Bangladesh

In March 2020, the number of COVID-19 tests, infested, recovered, and death were 1482, 49, 25 and 6. In April 2020, the number of COVID-19 tests, infested, recovered, and death were 69252, 7616, 135 and 163. In May 2020, the number of COVID-19 tests, infested, recovered, and deaths were 244064, 39486, 7904, and 472. In June 2020, the number of COVID-19 tests, infested, recovered, and deaths were 460528, 98330, 34845, and 1198. In July 2020, the number of COVID-19 tests, infested, recovered, and deaths were 409503, 92125, 76517, and 1264. In August 2020, the number of COVID-19 tests, infested, recovered, and deaths were 362113, 73070, 69452, and 1125. In September 2020, the number of COVID-19 tests, infested, recovered, and deaths were 397452, 50457, 71600, and 970. In October 2020, the number of COVID-19 tests,

infested, recovered, and deaths were 389452, 44205, 48658 and 666. In November 2020, the number of COVID-19 tests, infested, recovered, and deaths were 43682, 57248, 56099 and 718. In December 2020, the number of COVID-19 tests, infested, recovered, and deaths were 454892, 58948, 70367, and 938. Similar results were observed by Khan AU, et al. [15] in Bangladesh. This virus has increased the number of cases, infections, recoveries, and deaths.

In January 2021, the number of COVID-19 tests, infested, recovered, and deaths were 424034, 21629, 22285, and 568. In February 2021, the number of COVID-19 tests, infested, recovered, and death were 392403, 11077, 17140, and 277. In March 2021, the number of COVID-19 tests, infested, recovered, and deaths were 580409, 63366, 42772, and 618. In April 2021, the number of COVID-19 tests, infested, recovered, and deaths were 722848, 128555, 150816, and 2237. In May 2021, the number of COVID-19 tests, infested, recovered, and deaths were 439111, 36858, 49147, and 975. In June 2021, the number of COVID-19 tests, infested, recovered, and deaths were 661250, 112718, 87012, and 1889. In July 2021, the number of COVID-19 tests, infested, recovered, and deaths were 1094072, 336545, 261962, and 6182. In August 2021, the number of COVID-19 tests, infested, recovered, and deaths were 1182451, 251134, 347770, and 5510. In September 2021, the number of COVID-19 tests, infested, recovered, and deaths were 812638, 55303, 89965, and 1315. In October 2021, the number of COVID-19 tests, infested, recovered, and deaths were 602317, 13517, 16909, and 360. In November 2021, the number of COVID-19 tests, infested, recovered, and death were 538881, 6742, 7542, and 113. In December 2021, the number of COVID-19 tests, infested, recovered, and death were 584064, 8743, 7746, and 89. Similar results were observed by Khan AU, et al. [16] in Bangladesh. This virus has increased the number of cases, infections, recoveries, and deaths (Figure 1).



In January 2022, the number of COVID-19 tests, infested, recovered, and deaths were 941836, 199793, 16544, and

284. In February 2022, the number of COVID-19 tests, infested, recovered, and deaths were 922657, 143744, 250422, and 643. In March 2022, the number of COVID-19 tests, infested, recovered, and death were 413302, 7925, 65755, and 84. In April 2022, the number of COVID-19 tests, infested, recovered, and death were 166471, 1114, 14100, and 7. In May 2022, the number of COVID-19 tests, infested, recovered, and death were 130506, 1032, 6613, and 4. In June 2022, the number of COVID-19 tests, infested, recovered, and death were 225463, 20278, 4855, and 18. In July 2022, the number of COVID-19 tests, infested, recovered, and deaths were 254908, 31106, 34033, and 139. In August 2022, the number of COVID-19 tests, infested, recovered, and death were 138957, 6475, 13791, and 32. In September 2022, the number of COVID-19 tests, infested, recovered, and deaths were 125718, 12251, 8768, and 41. In October 2022, the number of COVID-19 tests, infested, recovered, and death were 123485, 9619, 14826, and 55. In November 2022, the number of COVID-19 tests, infested, recovered, and death were 111429, 1621, 5306, and 11. In December 2022, the number of COVID-19 tests, infested, recovered, and death were 70215, 591, 1821, and 7. Similar results were observed by Khan AU, et al. [11] in Bangladesh. This virus has increased the number of cases, infections, recoveries, and deaths. In January 2023, the number of COVID-19 tests, infested, recovered, and death were 69942, 436, 4201, and 0.

### Descriptive Statistics of the Total Number of Coronavirus Tests, Infections, Recoveries and Deaths in Bangladesh

The data period was 1061 days in Bangladesh. The total test of COVID-19 was noted (15256233.00), where the mean statistic was observed (14379.1074), mean standard error was observed (332.23725), and standard deviation was observed (10821.96220). The total infestation of COVID-19 was noted (2044999.00), where the mean statistic was observed (1927.4260), mean standard error was observed (90.46669), and standard deviation was observed (2946.77091). The total recovered of COVID-19 was noted (2003597.00), where the mean statistic was observed (1891.9707), mean standard error was observed (88.09266), and standard deviation was observed (2866.73614). The total death of COVID-19 was noted (29403.00), where the mean statistic was observed (27.7125), the mean standard error was observed (1.43779), and the standard deviation was observed (46.83302). Khan, et al. [16] observed similar results and the results were overall number of COVID-19 tests, infections, recoveries, and deaths in May 2021 was 439,111, 36,858, 49,147, and 975, respectively. The total number of COVID-19 tests, infections, recoveries, and deaths in June 2021 was 661,250, 112,718, 87,012, and 1,889, respectively (Table 1).

Items	Total days	Minimum Statistic	Maximum Statistic	Sum Statistic	Mean		Std. Deviation Statistic
					Statistic	Std. Error	
Test	1061	0	55284	15256233	14379.1074	332.23725	10821.9622
Infested		0	16230	2044999	1927.426	90.46669	2946.77091
Recovered		0	16627	2003597	1891.9707	88.09266	2866.73614
Death		0	264	29403	27.7125	1.43779	46.83302

**Table 1:** Descriptive Statistics of the Total Number of Coronavirus Tests, Infections, Recoveries, and Deaths in Bangladesh.

### Spearman's Rho Correlation Analysis among Tests, Infections, Recoveries and Deaths of COVID-19

Spearman's rank-order correlation investigated the association between variables (tests, infections, recoveries, and deaths) in Bangladesh. Variables were determined to have statistically significant correlations. At the 0.01 level in two-tailed analysis, the results demonstrated a positive, moderate to strong correlation between the variables.

**Tests:** The results revealed a moderate relationship between tests and infections ( $r_s=0.811$ ), recoveries ( $r_s=0.711$ ), and deaths ( $r_s=0.668$ ) of COVID-19.

**Infections:** The results revealed a moderate to strong relationship between infections and tests ( $r_s=0.811$ ), recoveries ( $r_s=0.712$ ), and deaths ( $r_s=0.789$ ) of COVID-19.

**Recoveries:** The results revealed a moderate to strong relationship between recoveries and tests ( $r_s=0.711$ ), infections ( $r_s=0.712$ ), and deaths ( $r_s=0.819$ ) of COVID-19.

**Deaths:** The results revealed a moderate to strong relationship between deaths and tests ( $r_s=0.678$ ), infections ( $r_s=0.789$ ), and recoveries ( $r_s=0.819$ ) of COVID-19. Before calculating  $r_s$ , a visual inspection of the scatterplot of tests, infections, recoveries, and deaths confirmed that the relationship between these variables was non-linear and monotonic.

Similar results were observed by the Spearman correlation. The case study and mortality rated 0.20 and 0.35 and another study also found similar results, and the mean results of Spearman correlation for tests, infections, recoveries, and deaths were 0.31, 0.35, 0.796, and 0.808 in Bangladesh in April [11]. In May and June, a positive correlation was observed between the tests and infections, recoveries, and deaths, and a negative relationship was found between dates and daily tests of COVID-19. Similar results were observed in a study, and the results showed a positive correlation between infections and recoveries and a negative relationship between tests and deaths by COVID-19 in Bangladesh in April 2021 [17]. Similar findings were observed in the positive correlation between infection recoveries and deaths in 2020 [5]. The virus is significantly transmissible, suggesting that the second wave will become

even more dispersed in Bangladesh in 2020 and 2021. The total tests (722,848), infections (128,555), recoveries (150,816), and deaths (2237) were counted in April 2021 [18] (Table 2).

Items	Test	Infested	Recovered	Death
Correlation Coefficient	1	0.811**	0.711**	0.678**
Significance		0	0	0
N	1061			
Correlation Coefficient	0.811**	1	0.712**	0.789**
Significance	0		0	0
N	1061			
Correlation Coefficient	0.711**	0.712**	1	0.819**
Significance	0	0		0
N	1059			
Correlation Coefficient	0.678**	0.789**	0.819**	1
Significance	0	0	0	
N	1061			

**Table 2:** Spearman's rho correlation analysis among tests, infections, recoveries, and deaths of COVID-19 in Bangladesh. (\*\*. Correlation is significant at the 0.01 level (2-tailed)).

### Correlation between Infestation People with Recovered and Death People Since 19 June 2020

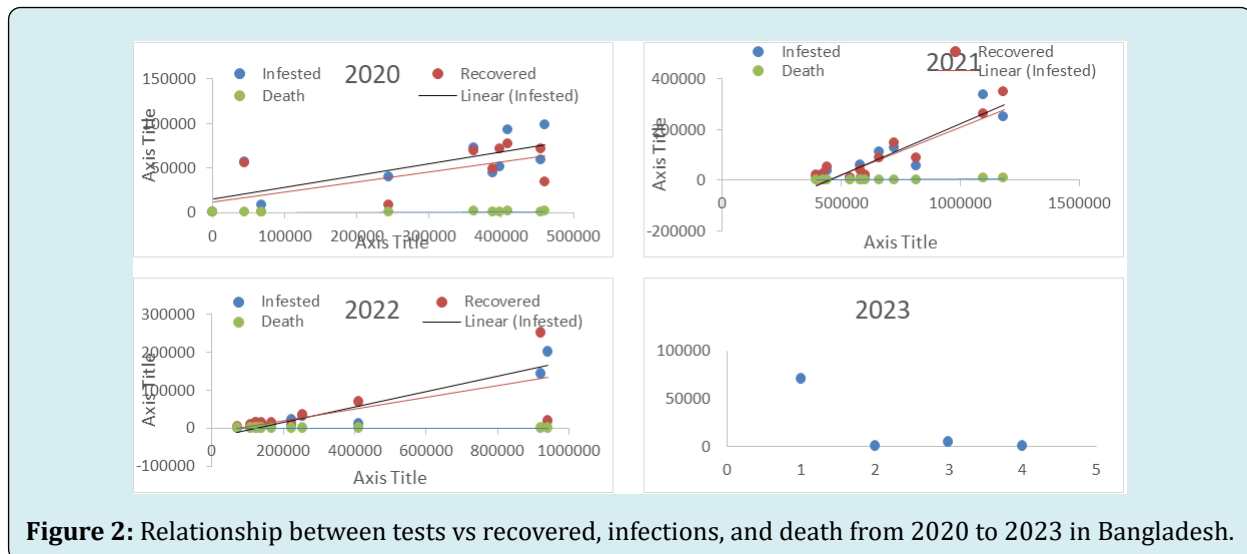
A correlation study was done to establish the relationship between the test of people with infested, recovered, and death of people by COVID-19 in Table 3 and Figure 2. In April, a positive correlation was observed in infested and recovered people and a negative relation was found in tests and death by COVID-19 in Bangladesh. It was evident that the positive and negative equations were  $y=0.2297x-1321.9$ ,  $0.2297x-1321.9$ , and  $y=-317.45x+1E+07$ ,  $y=-0.0019x+132.9$  gave a good fit to the data and the coefficient of determination  $R^2=0.5289$ ,  $0.0000006$  and  $0.2567$ ,  $0.3614$  fitted regression

line had a significant regression coefficient. Similar results were also noted in Bangladesh and the finding was a positive correlation found between infestation with recovered and

death by people ( $R^2 = 0.4804$  and  $0.3159$ ;  $0.7242$  and  $0.4902$ ;  $0.4432$  and  $0.3449$ ,  $p < 0.05$ ) in April to June 2020 [17].

Month	Regression Items	Regression Equation	% Role of Individual Factor	Significant	R <sup>2</sup> Value
2020	Tests vs. Infested	$y = 0.1321x + 14743$	55.48	NS	0.5548
	Tests vs. Recovered	$y = 0.1131x + 11537$	43.46	0.0087	0.4346
	Tests vs. Death	$y = 0.002x + 192.12$	68.09	0.0364	0.6809
2021	Tests vs. Infested	$y = 0.3755x - 164201$	79.07	0	0.7907
	Tests vs. Recovered	$y = 0.406x - 180068$	86.37	0	0.8637
	Tests vs. Death	$y = 0.0075x - 3340.9$	82.96	NS	0.8296
2022	Tests vs. Infested	$y = 0.2007x - 24321$	90.26	NS	0.9026
	Tests vs. Recovered	$y = 0.1539x - 10080$	46.26	0.0087	0.4626
	Tests vs. Death	$y = 0.0005x - 50.271$	77.53	0.0364	0.7753

**Table 3:** The relationships between the infestation of people of COVID-19 with recovery and death of people during the study period.



**Figure 2:** Relationship between tests vs recovered, infections, and death from 2020 to 2023 in Bangladesh.

### The Paired Test among Test, Infested, Recovered and Death of COVID-19 People in Bangladesh

A paired test study was done to establish the relationship between the test vs infested, recovered, and death, infested vs recovered, death of people by COVID-19 in Table 4. The test vs infested was significant at 0.00 where the mean was 12478.66, the standard deviation was 8602.25, the standard error mean was 264.47, and the t was 47.18. The test vs recovered was significant at 0.01 where the mean was 12517.66, the standard deviation was 9008.45, the standard error mean was 276.95 and the t was 45.20. The test vs death was significant at 0.00 where the mean was 14383.63, the standard deviation was 10787.93, the standard error mean was 331.66, and the t was 43.37. The infested vs recovered was

significant at 0.05 where the mean was 39.01, the standard deviation was 2208.35, the standard error mean was 67.89, and the t was 0.58. The infested vs death was significant at 0.00 where the mean was 1904.98, the standard deviation was 2912.42, the standard error mean was 89.54, and the t was 21.28. The recovered vs death was significant at 0.00 where the mean was 1865.97, the standard deviation was 2829.22, the standard error mean was 86.98, and the t was 21.45. Khan AU, et al. [11] observed the number of infections during the COVID-19 outbreak in Bangladesh indicates the spread of the infection. The government takes the necessary steps to develop appropriate policies, such as absolute social isolation. People should avoid going to public places as much as possible in this scenario. It would be inappropriate to go out unless there is an urgent necessity [19].

Items	Paired Differences					t	df	Significance
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Test-Infested	12478.66	8602.25	264.47	11959.72	12997.59	47.18	1061	0
Test-Recovered	12517.66	9008.45	276.95	11974.22	13061.11	45.2		0.01
Test-Death	14383.63	10787.93	331.66	13732.84	15034.42	43.37		0
Infested-Recovered	39.01	2208.35	67.89	-94.21	172.23	0.58		0.05
Infested-Death	1904.98	2912.42	89.54	1729.28	2080.67	21.28		0
Recovered-Death	1865.97	2829.22	86.98	1695.29	2036.64	21.45		0

**Table 4:** The Paired Test among test, infested, recovered, and death of COVID-19 people in Bangladesh.

## Conclusion

Within a very short time, SARS-CoV-2 spread across Bangladesh and affected sixty-four districts. With the ongoing SARS-CoV-2 infection, the government has taken necessary measures to know the exact results. The governing body of Bangladesh has developed one hundred and eighteen laboratory diagnoses to limit the spread of the disease and effectively treat infected persons. People of Bangladesh have avoided traveling to public places. It was unacceptable to leave the house unless absolutely necessary. To control COVID-19, the government established new megaprojects to help the poor.

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