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Epidemiological Aspects and Demographic Factors Responsible for Covid-19 Infection at Manikganj District of Bangladesh: A Real Time Data Analysis

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Abstract

Background: COVID-19 disease is a varied epidemiological aspect. **Objectives:** The aim of the study was to assess the epidemiological aspects and demographic factors responsible for COVID-19 Infection at Manikganj district of Bangladesh. **Methodology:** This descriptive cross-sectional study was conducted in the Department of Microbiology at Colonel Malek Medical College, Manikganj, Bangladesh from November 2020 to June 2021 for a period of eight months. The suspected cases of covid-19 patients or patients who had the history of contact with the confirmed cases of Covid-19 cases were advised by the clinician to do the test confirmatory test. RT-PCR for COVID-19 test was performed and results were recorded with their age, gender as well as the details history of the patients. **Results:** A total number of 6678 cases were recruited for this study. The relationship between the urban and rural positivity of COVID-19 cases were statistically significant (p=0.000). Travel history was important factor for positivity among the COVID-19 patients. However, out of 675 cases of having history of travel COVID-19 was positive in 43(6.4%) cases. Again, 6003 patients were without travel history and among these 625(10.4%) cases were COVID-19 RT-PCR positive. The association between the travel history with the positivity of COVID-19 cases were statistically significant different (p=0.001). Among all Upazila Singair was the highest reported COVID-19 cases during the study period which was 356 cases followed by Shibalaya and Saturia which was 277 cases and 265 cases respectively. There was a significant association of COVID-19 positive cases and the different Upazila of Manikganj was found (p=0.000). **Conclusion:** In conclusion few upazila of manikganj district are affected with COVID-19 with the history of travel.

Keywords: Epidemiological aspects; RT-PCR Test; Demographic factors; Covid-19; first wave

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Introduction

Bangladesh is still experiencing daily rise of COVID-19 cases and deaths since its first 3 report on 8 March, 2020[1]. As of 22 June 2020, a total of 115786 confirmed cases, 467554 recovery and 1545 deaths have been recorded[2]. After its first incidence in Wuhan, China 5 in December 2019, COVID-19 spread to most of countries mostly via international 6 travelers. Bangladesh government initially started with 10 day travel ban across the country 7 from 26 March along with office and educational institutional shut down which was further 8 extended[3]. People were advised to stay home and to maintain social distance, however it 9 was difficult for daily wage earners and for the people staying in very dense premises[4]. During official leave and transport ban some unexpected mass gathering took place including back and forth movement of garments workers to Dhaka, large funeral prayer and 12 crowded journey toward rural

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areas[5]. But overall the progression of COVID-19 in 13 Bangladesh seemed to be relatively slow.

Bangladesh is situated in the tropical monsoon region. Since March 8, 2020, when the first confirmed cases of COVID-19 detected, as of May 03, 2020, 9,455 have tested positive for COVID-19 in this country[6]. Going by insights relating to the number of infections, the problem with COVID-19 in Bangladesh seems less severe, despite the size of its population (163 million) and the greater number of cases that other countries are hooking with. Despite the fact that this country has the highest population density and is not capable of doing regular testing, this slower spread of COVID-19, might be an impact of tropical weather characterized by high temperature, heavy rainfall, often excessive humidity[7-9]. With a rising number of cases, the need to screen all patients with respiratory symptoms and travel history has been recognized. One effective strategy is to establish of fever clinics or COVID-19 screening centres. These screening centres are assigned to screen patients based on a standard criterion.

With increasing instances of nosocomial outbreaks of COVID-19, it has become even more important to screen all patients with suspected infectious disease in the hospital setting as well as for control and prevention of infection in the community[3]. During pandemic alert in Bangladesh suspected patient screening in health facilities has been was strongly recommended by the Ministry of Health and Family Welfare (MOHFW), Bangladesh[4]. A guideline has been issued for setting up COVID-19 screening centres in healthcare settings. These screening centres are established for those patients who are presented with influenza-like illness in a separate area from the general outpatient department, to facilitate implementing standard droplet precautions, to triage the patients and collect samples[5]. Based on these principles, healthcare institutions have developed and implemented a hospital-specific systematic process for screening and managing suspected COVID-19 patients[6]. However, till now there is limited published literature regarding the functioning and patient profile of these COVID-19 screening facilities, especially at tertiary care institutions which are significantly involved in both COVID-19 and non-COVID-19 services simultaneously[7]. Hence, this study was undertaken to understand the patient profiles and evaluation of COVID-19 screening centres at a tertiary health care institution outside Dhaka city.

Methodology

Study Settings & Population: This cross-sectional study was conducted in the Department of Microbiology at Colonel Malek Medical College, Manikganj, Bangladesh from November 2020 to June 2021 for a period of eight months. The suspected COVID-19 patients who were referred to the laboratory for screening from the OPD of Department of Medicine and other Departments of Colonel Malek Medical College, Manikganj, Bangladesh as well as from the different health centres were selected as study population. Any patient with incomplete or missing data or duplicity were being excluded from the study.

Study Procedure: The samples were collected from November 2020 to April 2021 for a period of six months. The main purpose of the referral of the suspected patients to the laboratory was to segregate COVID-19 and Non-COVID-19 patients through screening before their admission into the hospital or home. The patients were interviewed face to face to collect the details history of demographic as well as epidemiological factors related to COVID-19 disease. Patients were categorized into "Suspect" and "Not-a-suspect" case for COVID-19 based on travel history in the last 14 days, contact history in the last 14 days and relevant symptoms suggestive of COVID-19 like fever, sore throat, cough, dyspnoea and loss of taste/smell. The suspected cases were referred to the sample collection zone and the nasopharyngeal swab samples were collected by the trained laboratory personnel. All the samples were sent to the IEDCR-approved Diagnostic Laboratory of the Department of Microbiology under a proper cold-chain system. All the samples were tested by the reverse transcriptase-polymerase chain reaction (RT-PCR) method. At the time of patient examination, the staffs input the data, such as the presence of COVID-19 symptoms, travel history, and a history of contact with COVID-19 patients, after interviewing the patient.

Statistical Analysis: All the extracted quantitative data were administered in Microsoft Excel 2016 along with the relevant variables mentioned. Data analysis was performed by SPSS version 23.0. The analysis of sociodemographic variables and variables related to COVID-19 screening services was expressed using descriptive statistics like mean, median, proportion and relevant graphical presentation. Personal identifiers for the patients were removed from the dataset after data extraction to maintain privacy and confidentiality. Logistic regression analysis was performed to measure the independent predictors of COVID-19 positive.

Ethical Consideration: All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the local ethics committee. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and analyzed using the coding system.

Results

A total number of 6678 cases were recruited for this study. Majority positive patients were in the age group of 20 to 40 years which was 270(9.9%) cases followed by 40 to 60 years of age group and 60 to 80 years age group which were 231(11.2%) cases and 95(9.8%) cases respectively. The mean age with SD of positive

Table 1: Distribution of Uropathogens Isolated in the Study

Variables	Covid-19 Results		Total	P value
	Positive	Negative		
Age Group				
Less Than 20 Years	61(7.5%)	755(92.5%)	816(100.0%)	
20 to 40 Years	270(9.9%)	2469(90.1%)	2739(100.0%)	0.004*
40 to 60 Years	231(11.2%)	1826 (88.8%)	2057 (100.0%)	
60 to 80 Years	95(9.8%)	879 (90.2%)	974 (100.0%)	
More Than 80 Years	11(12.0%)	81(88.0%)	85(100.0%)	
Total	**668(10.0%)**	**6010(90.0%)**	**6678 (100.0%)**	
Mean±SD	42.6±17.32	40.98±18.778	41.15±18.64	0.023**
Gender				
Male	461(10.8%)	3808 (89.2%)	4269 (100.0%)	
Female	207(8.6%)	2202 (91.4%)	2409 (100.0%)	0.004*
Total	**668(10.0%)**	**6010(90.0%)**	**6678 (100.0%)**	

*Chi-square test was performed to see the level of significance; Student t test was performed to see the level of significance.

Table 2: Relationship of Residence with the Covid-19 Positivity among Study Population (n=6678)

Variables	Covid-19 Results		Total	P value
	Negative	Positive		
Residence				
Urban	4653 (90.9%)	464(9.1%)	5117 (100.0%)	
Rural	1357 (86.9%)	204(13.1%)	1561 (100.0%)	
Total	**6010 (90.0%)**	**668(10.0%)**	**6678 (100.0%)**	0.000
History of Travel				
No	5378 (89.6%)	625(10.4%)	6003 (100.0%)	
Yes	632 (93.6%)	43(6.4%)	675 (100.0%)	
Total	**6010 (90.0%)**	**668 (10.0%)**	**6678 (100.0%)**	
Different Upazila		464(9.1%)		0.001
Sadar Hospital	4653(90.9%)		5117(100.0%)	
Medical College	36(85.7%)	6(14.3%)	42(100.0%)	
UHC, Ghior	240(90.9%)	24(9.1%)	264(100.0%)	
UHC, Saturia	261(94.2%)	16(5.8%)	277(100.0%)	0.000
UHC, Singair	273(76.7%)	83(23.3%)	356(100.0%)	
UHC, Sadar	41(77.4%)	12(22.6%)	53(100.0%)	
UHC, Harirampur	157(94.0%)	10(6.0%)	167(100.0%)	
UHC, Shibalaya	269(87.3%)	39(12.7%)	308(100.0%)	
UHC, Doulatpur	80(85.1%)	14(14.9%)	94(100.0%)	

Chi-square test was performed to see the level of significance; UHC=Upazila (Sub-distrct).

and negative were 42.6±17.32 years and 40.98±18.78 years respectively (p=0.023). In this study positive was found more in male than female which was 461(10.8%) cases and 207(8.6%) cases respectively. The male and female ratio was 1.8:1. The gender with the rate of positivity of Covid-19 cases between male and female were statistically significant (p=0.004) (Table 1).

Majority of the suspected cases of Covid-19 cases were dwellers of urban area. However, out of 668 positive cases of Covid-19 patients most of them were from urban area which was 464(9.1%) cases and the rest of 204(13.1%) cases were from rural area during this pandemic. The relationship between the urban and rural positivity of Covid-19 cases were statistically significant (p=0.000). Travel history was important factor for positivity among the Covid-19 patients. However, out of 675 cases of having history of travel Covid-19 was positive in 43(6.4%) cases. Again, 6003 patients were without travel history and among these 625(10.4%) cases were Covid-19 RT-PCR positive. The association between the travel history with the positivity of Covid-19 cases were statistically significant different (p=0.001). Among all Upazila Singair was the highest reported COVID-19 cases durng the study period which was 356 cases followed by Shibalaya and Saturia which was 277 cases and 265 cases respectively (Figure I). There was a significant association of COVID-19 positive cases and the different Upazila of Manikganj was found (p=0.000) (Table 2).

Logistic regression was performed to determine the independent predictors of COVID-19 cases in Manikganj district. Different age group of the study population were shown as an independent predictors of COVID-19 cases. However, age group of 20 to 40 years and 40 to 60 years had shown significant before and after adjusted with the other factors which were 1.35(95% CI 1.01-1.81, p=0.040) and 1.57(95% CI 1.17-2.10, p=0.003) during unadjusted and 1.348(95% CI 1.01-1.81; p=0.047) and 1.55(95% CI 1.15-2.09; p=0.004) after adjusted by multivariate logistic regression. Male gender was significantly become independent predictors for COVID-19 positive patients which was 1.29(95% CI 1.08-1.53; p=0.004) and 1.28(95% CI 1.07-1.52; p=0.006) in unadjusted and

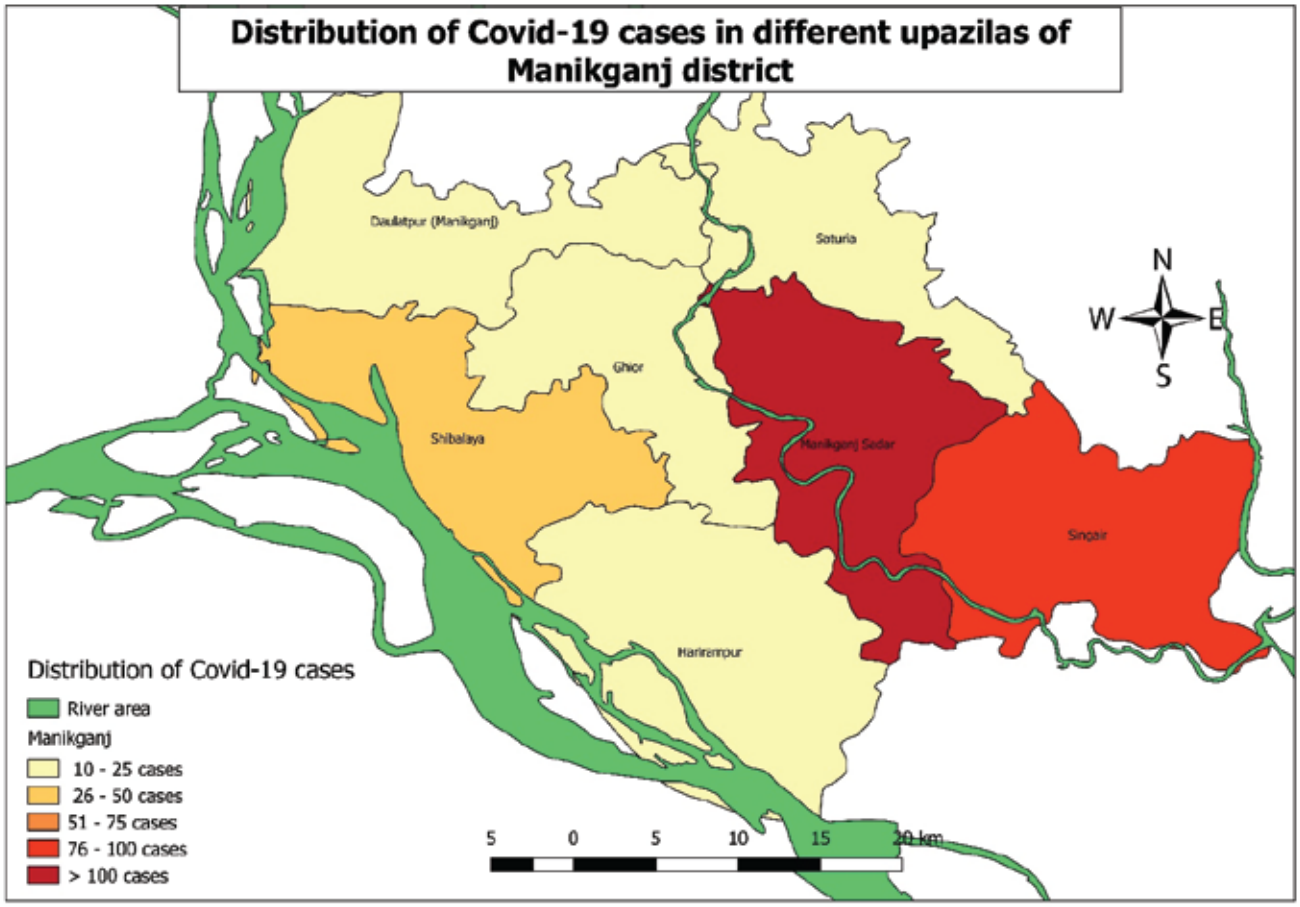

Figure I: Map of Manikganj District showing the COVID-19 Cases

Table 3: Independent Predictors of COVID-19 Cases at Manikganj District

Variables	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Age Group			Age Group	
Less Than 20 Years	Ref		Ref	
20 to 40 Years	1.35(1.01-1.81)	0.040	1.348(1.01-1.81)	0.047
40 to 60 Years	1.57(1.17-2.10)	0.003	1.55(1.15-2.09)	0.004
60 to 80 Years	1.34(0.96-1.87)	0.090	1.399(0.99-1.97)	0.056
More Than 80 Years	1.68(0.85-3.32)	0.135	1.847(0.92-3.70)	0.083
Gender				
Female	Ref		Ref	
Male	1.29(1.08-1.53)	0.004	1.28(1.07-1.52)	0.006
History of Travel				
No	Ref		Ref	
Yes	0.59(0.42-0.81)	0.001	0.66(0.47-0.91)	0.012
Residence				
Rural	Ref		Ref	
Urban	0.66(0.57-0.79)	0.000	0.57(0.32-1.02)	0.059
Referral			Referral	
Sadar Hospital	Ref		Ref	
UHC, Ghior	0.6(0.23-1.57)	0.297	0.54(0.20-1.41)	0.208
UHC, Saturia	0.37(0.14-1.00)	0.050	0.34(0.12-0.92)	0.034
UHC, Singair	1.82(0.74-4.48)	0.190	1.80(0.72-4.46)	0.206
UHC, Sadar	1.76(0.60-5.16)	0.306	2.82(0.94-8.43)	0.064
UHC, Harirampur	0.21(0.04-1.12)	0.068	0.26(0.05-1.38)	0.113
UHC, Shibalaya	0.87(0.34-2.20)	0.768	0.79(0.31- 2.03)	0.628
UHC, Harirampur	0.47(0.15-1.46)	0.195	0.45(0.15-1.41)	0.171
UHC, Doulatpur	1.05(0.37-2.95)	0.926	1.04(0.37-2.96)	0.94
Months	1.23(1.17-1.29)	0.000	1.26(1.19-1.32)	0.000

adjusted logistic regression. History of travel shown that COVID-19 was less positive among the people who had the history of travel and it was the independent predictor in both univariate and multivariate regression analysis which were 0.59(95% CI 0.42-0.81; p=0.001) and 0.66(95% CI 0.47-0.91; p=0.012) respectively. Residence was not an independent risk factor for the COVID-19 positive case. All Upazilas (Sub-district) were not found as independent risk factors for the COVID-19 positive case; however, after multivariate logistic regression analysis it had found that the UHC, Saturia was and independent predictors which was 0.37(95% CI 0.14-1.00; p=0.050) and 0.34(95% CI 0.12-0.92; p=0.034) in unadjusted and adjusted analysis (Table 3).

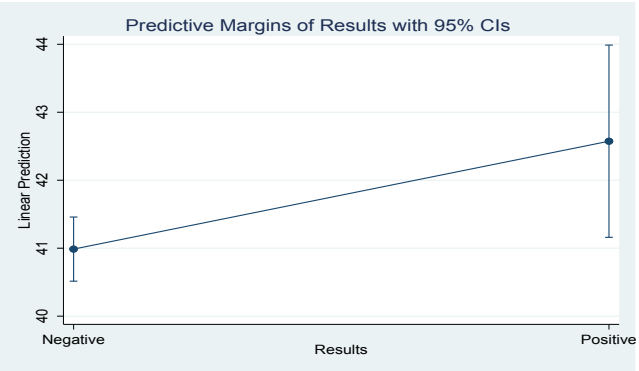

Figure II: Margins Plot showing the COVID-19 Positivity Results in relation with Age of the study population

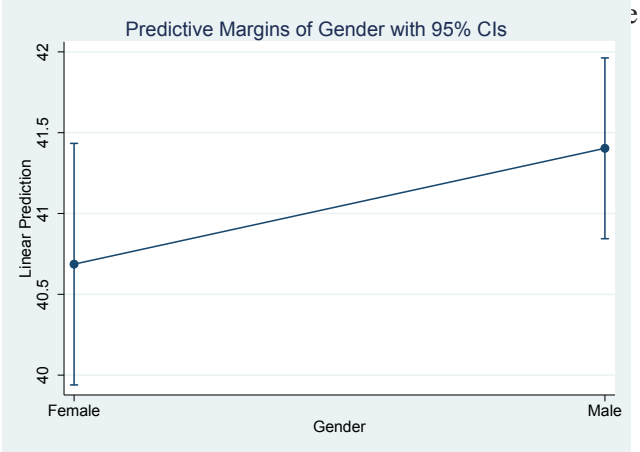

Figure III: Margin Plot showing the COVID-19 Positivity Results in relation with Gender of the study population

the positive and negative lines of margins plot had shown a clear visualization in the positivity results (Figure II).

Male had shown more chance to develop COVID-19 disease than female. The age group of female was less than the male patients. Predictive margins of the study population had shown the higher chance in male (Figure III).

Discussion

Coronavirus disease 2019 (COVID-19) is caused by the novel coronavirus and it has become a serious public health problem globally. As of May 03, 2020, more than 3.5 million confirmed cases and over 0.25 million deaths have been reported worldwide[1]. COVID-19 is rapidly spreading in many of the western and temperate countries like Italy, France, Germany, Spain, USA, and the UK, where the range of temperature are between 3^{o}C and 17^{o}C, most similar to Wuhan China[8-10]. However, the growth rate of conformed cases is apparently slower in Asian tropical countries such as Indonesia, Malaysia, Vietnam, Singapore, Thailand , most of which are low- and middle-income countries (LMICs) with weaker detection and response capacity and have not implemented drastic quarantine measures[11].

The present experience with COVID-19 has reinforced the role of separate OPD under various names like “fever clinic”, “screening OPD”, “screening clinic” which can prevent the spread of nosocomial infection[10-12]. In a resource-constrained setting like Bangladesh, these facilities have played a significant role in both screening and triage during the pandemic[13]. Mahesh et al[14] have conducted a similar study in a tertiary care hospital in western India. They concluded that early diagnosis, quick initiation of treatment, infection control measures and reasonable care at the hospital effectively reduced the morbidity and mortality during the pandemic. With the limited resources this laboratory is working with its full pace to diagnose the Covid-19 cases. Currently as this laboratory is only one in this district the pressure of doing tests is also enormous.

A total number of 6678 cases were recruited for this study. Majority positive patients were in the age group of 20 to 40 years which was 270(9.9%) cases followed by 40 to 60 years of age group and 60 to 80 years age group which were 231(11.2%) cases and 95(9.8%) cases respectively. The mean age with SD of positive and negative were 42.6±17.32 years and 40.98±18.78 years respectively (p=0.023). This results reflect the more movements of this young adults group during pandemic lead to become Cvoid-19 positive. In this regards a study conducted by Kwon et al and have reported that COVID-19 screening clinics are effective in maintaining the non-COVID-19 treatment facilities by reducing the incidence of nosocomial infection in the hospital. In addition Covid-19 dedicated laboratory might have played a crucial role in the prevention of possible nosocomial infection by early diagnosis and thus segregation of COVID-19 positive patients as well as healthcare workers at Majority of the suspected cases of Covid-19 cases were dwellers of urban area. However, out of 668 positive cases of Covid-19 patients most of them were from urban area which was 464(9.1%) cases and the rest of 204(13.1%) cases were from rural area during this pandemic. The relationship between the urban and rural positivity of Covid-19 cases were statistically significant (p=0.000). Travel history was important factor for positivity among the Covid-19 patients. However, out of 675 cases of having history of travel Covid-19 was positive in 43(6.4%) cases. Again, 6003 patients were without travel history and among these 625(10.4%) cases were Covid-19 RT-PCR positive. The association between the travel history with the positivity of Covid-19 cases were statistically significant different (p=0.001). Among all Upazila Singair was the highest reported COVID-19 cases durng the study period which was 356 cases followed by Shibalaya and Saturia which was 277 cases and 265 cases respectively. There was a significant association of COVID-19 positive cases and the different Upazila of Manikganj was found (p=0.000). Manikgonj district of Bangladesh. Although this laboratory has been planned and designed according to the existing health facility infrastructure and local environment, some of the improvements based on evidence from other studies can be incorporated into its functioning. Modifications like a separate passage for patient staff waste and sample collection in a negative pressure chamber can further strengthen the infection prevention and control measures which is also applied in the laboratory[10,15].

In this study positive was found more in male than female which was 461(10.8%) cases and 207(8.6%) cases respectively. The male and female ratio was 1.8:1. The gender with the rate of positivity of Covid-19 cases between male and female were statistically significant (p=0.004). From this results it is clear that the male gender is suffering from Covid-19 more than female. Similar results are also reported by another study and have mentioned that as

far as the patient profile is concerned, the maximum proportion of patient belongs to the male gender. In another study Khan et al[15] have found similar results and this may be due to the lesser tendency among the female and elderly population to seek proactive COVID-19 related care because of social and inadequate health-seeking behaviour issues. However, there is no definitive cause regarding this predominance.

Majority of the suspected cases of Covid-19 cases were dwellers of urban area. However, out of 668 positive cases of Covid-19 patients most of them were from urban area which was 464(9.1%) cases and the rest of 204(13.1%) cases were from rural area during this pandemic. The relationship between the urban and rural positivity of Covid-19 cases were statistically significant (p=0.000). This indicates that the urban dwellers are more closely living in comparison with rural dwellers. This leads to less infection rate among the rural people. Again, the urban people are wandering as asymptomatic population visiting highly congested OPD for follow up visits and these patient attendants, healthcare workers and individuals with travel history make this urban area as hotspot areas at that point of time[16].

Logistic regression was performed to determine the independent predictors of COVID-19 cases in Manikganj district. Different age group of the study population were shown as an independent predictors of COVID-19 cases. However, age group of 20 to 40 years and 40 to 60 years had shown significant before and after adjusted with the other factors which were 1.35(95% CI 1.01-1.81, p=0.040) and 1.57(95% CI 1.17-2.10, p=0.003) during unadjusted and 1.348(95% CI 1.01-1.81; p=0.047) and 1.55(95% CI 1.15-2.09; p=0.004) after adjusted by multivariate logistic regression. Male gender was significantly become independent predictors for COVID-19 positive patients which was 1.29(95% CI 1.08-1.53; p=0.004) and 1.28(95% CI 1.07-1.52; p=0.006) in unadjusted and adjusted logistic regression. History of travel shown that COVID-19 was less positive among the people who had the history of travel and it was the independent predictor in both univariate and multivariate regression analysis which were 0.59(95% CI 0.42-0.81; p=0.001) and 0.66(95% CI 0.47-0.91; p=0.012) respectively. Residence was not an independent risk factor for the COVID-19 positive case. All Upazilas (Sub-district) were not found as independent risk factors for the COVID-19 positive case; however, after multivariate logistic regression analysis it had found that the UHC, Saturia was and independent predictors which was 0.37(95% CI 0.14-1.00; p=0.050) and 0.34(95% CI 0.12-0.92; p=0.034) in unadjusted and adjusted analysis. Travel history was important factor for positivity among the Covid-19 patients. However, out of 675 cases of having history of travel Covid-19 was positive in 43(6.4%) cases. Again, 6003 patients were without travel history and among these 625(10.4%) cases were Covid-19 RT-PCR positive. The association between the travel history with the positivity of Covid-19 cases were statistically significant different (p=0.001). It is an important issue of history of travelling among the COVID-19 positive patients. It is well said that virus can't move from one place to another but the people move the virus. Therefore, people with lack of knowledge and ignorance leads to increase more chance to infect. Similar results have been reported by another author[15] and have added that on further analysis of the profiles of patients with respect to time, the number of patients visiting OPD with travel history and contact history. This may be due to the initiation of unlock after a nationwide lockdown[17].

The COVID-19 was positive in more commonly at the higher age that the negative people. The prediction of the positive and negative lines of margins plot had shown a clear visualization in the positivity results. Male had shown more chance to develop COVID-19 disease than female. The age group of female was less than the male patients. Predictive margins of the study population had shown the higher chance in male. Evolution in pandemic response strategies like rapid antigen test, improvement in health care infrastructure and emergency transportation services can facilitate the functioning of CS-OPDs at the primary care institutions if planned adequately[14]. This present study gives an overview of the functioning of a COVID-19 screening test.

Conclusion

In conclusion young adult age group are most commonly suffering from COVID-19 among the study population and male is the independent predictors of COVID-19 positivity. Furthermore, male patients are most commonly suffering with COVID-19 infection than female which is statistically significant. However, the urban dwellers are reported significantly more RT-PCR positive to SARS CoV2 than the rural people. The travel history is important by getting this present study results which shows that Covid-19 is significantly positive those people who have the

history of travelling. This COVID-19 screening in the laboratory has been effective in providing screening as well as for diagnostic services to patients. Inclusion of point-of-care testing services and broadening the ambit of suspected criteria at screening OPDs can help us to detect more COVID-19 positive cases. As the pandemic continues, it is evident that no single strategy is sufficiently effective. Therefore, the health system must adhere to a holistic approach in dealing with this pandemic for which COVID-19 screening OPDs remains a critical component as well as the laboratory diagnosis.

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None

Conflict Of Interest
The authors have no conflicts of interest to disclose.

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Authors' contributions
Ahmed I, Samad K conceived and designed the study, analyzed the data, interpreted the results, and wrote up the draft manuscript. Samad K, Ahmed R contributed to the analysis of the data, interpretation of the results and critically reviewing the manuscript. Ahmed R, Boby F involved in the manuscript review and editing. All authors read and approved the final manuscript.

Data Availability
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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