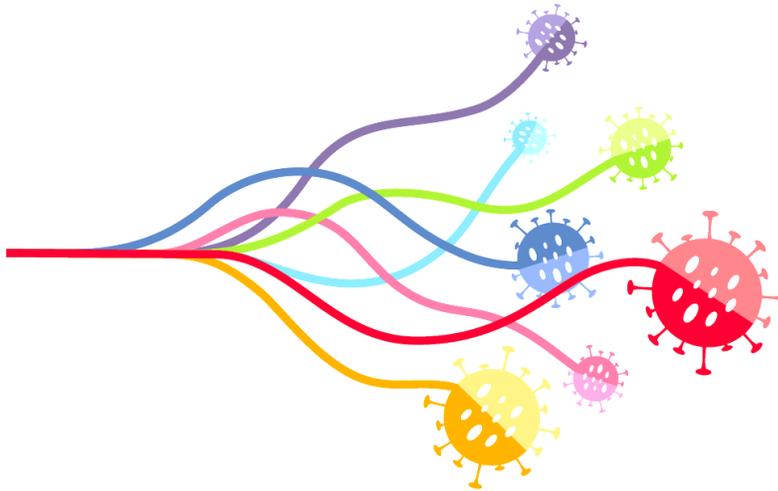


SARS-CoV-2 Variants in Bangladesh

Technical briefing 1

October 2021

This briefing provides an update on previous briefings 1 to 31 October 2021



BILL & MELINDA
GATES foundation

SUMMARY

According to WHO, 5 current variants of concern (VOC) and 6 variants under investigation (VUI) are circulating globally. Recently, the Omicron variant has been designated as VOC because of its transmissibility, immune system evasion, and vaccine resistance. Travel restrictions were introduced by several countries to limit or slow its international spread. This report has been published to share detailed SARS-CoV-2 variant surveillance in Bangladesh during October 2021. The cumulative data since July 2021 have been included at the end of this report.

Principal findings are:

- The Delta variant accounted for 100% from 1 to 31 October 2021.
- We have identified different lineages of Delta variants.
- Delta B.1.617.2-like (16%) and Delta AY.39 (20%) were the most prominent lineages.
- Delta AY.102 emerged in October 2021 and became one of the leading Delta lineage (20%).
- No variant unique to Bangladesh has been detected.
- **No delta plus or omicron had been identified.**

1. Variants under surveillance worldwide

SARS-CoV-2, the virus that causes COVID-19, has many variants of particular importance due to their potential for increased transmissibility, increased virulence, or reduced effectiveness of vaccines against them. Notably, the Alpha, Beta, Gamma, Delta and Omicron variants are more transmissible than the original virus identified around Wuhan in China. Viruses generally acquire mutations over time, giving rise to new variants. When a new variant appears to be growing in a population, it can be labeled as an "emerging variant". A brief description of an emerging variant circulating recently in Bangladesh is given below.

The Delta variant also known as B.1.617.2, is now the most common worldwide. It was first discovered in India in October 2020 and has since spread internationally. In June 2021, reports began to appear of a variant of Delta with the K417N mutation. It has been nicknamed "Delta plus" from "Delta plus K417N". The name of the mutation, K417N, refers to an exchange whereby lysine (K) is replaced by asparagine (N) at position 417.

Recently, the Omicron variant (PANGO lineage B.1.1.529) was quickly designated as being "of concern", and travel restrictions were introduced by several countries to limit or slow its international spread. The variant was first reported to the WHO from South Africa on 24 November 2021. The variant has an unusually large number of mutations in spike protein, several of which are novel and several of which could affect the structure of spike protein used for most vaccine targeting at the time of its discovery. The variant is characterised by 30 amino acid changes, three small deletions and one small insertion in the spike protein compared with the original virus, of which 15 are located in the receptor binding domain (residues 319-541). It also carries a number of changes and deletions in other genomic regions. Additionally, the variant has three mutations at the furin cleavage site. The furin cleavage site increases SARS-CoV-2 infectivity.

2. Variants in Bangladesh: October 2021

The consortium has sequenced 148 samples collected between 1 to 31 October 2021. These samples were collected from all 8 divisions of Bangladesh. Table 1 shows the total number of variants sequenced by region.

Table 1. Total number of confirmed cases by variant and region, October 2021

Variant	Dhaka	Chattogram	Sylhet	Rajshahi	Khulna	Barishal	Rangpur	Mymensingh	TOTAL
Delta-like	5			13	5		1		24
AY.4.4	9		1	1	3	1			15
AY.5		1		1					2
AY.5.2	2								2
AY.9.2				1					1
AY.16	1								1
AY.17			1						1
AY.20	1								1
AY.25	2								2
AY.27	1								1
AY.34	1	1	1	1					4
AY.39	30								30
AY.42	1								1
AY.43	4		1	1		1			7
AY.46			1			1			2
AY.58	1			1					2
AY.59		3							3
AY.61		1							1
AY.65	1								1
AY.74	1								1
AY.98.1					1				1
AY.102	3	9		8	5	2		2	29
AY.106	1								1
AY.111	1								1
AY.113					2				2
AY.122		3		3	6				12
TOTAL	65	18	5	30	22	5	1	2	148

National SARS-CoV-2 Variant Surveillance in Bangladesh

All 148 samples were Delta (100%). Among those, Delta B.1.617.2-like (16%), Delta AY.39 (20%) and Delta AY.102 (20%) were the most prominent lineages. We have also identified other lineages of Delta variants such as Delta AY.4.4, AY.5, AY.5.2, AY.9.2, AY.16, AY.17, AY.20, AY.25, AY.27, AY.34, AY.42, AY.43, AY.46, AY.58, AY.59, AY.61, AY.65, AY.74, AY.98.1, AY.106, AY.111, AY.113 and AY.122. Figure 1 shows the percentage of the geographical distribution of different SARS-CoV-2 variants between 1 to 31 October 2021.

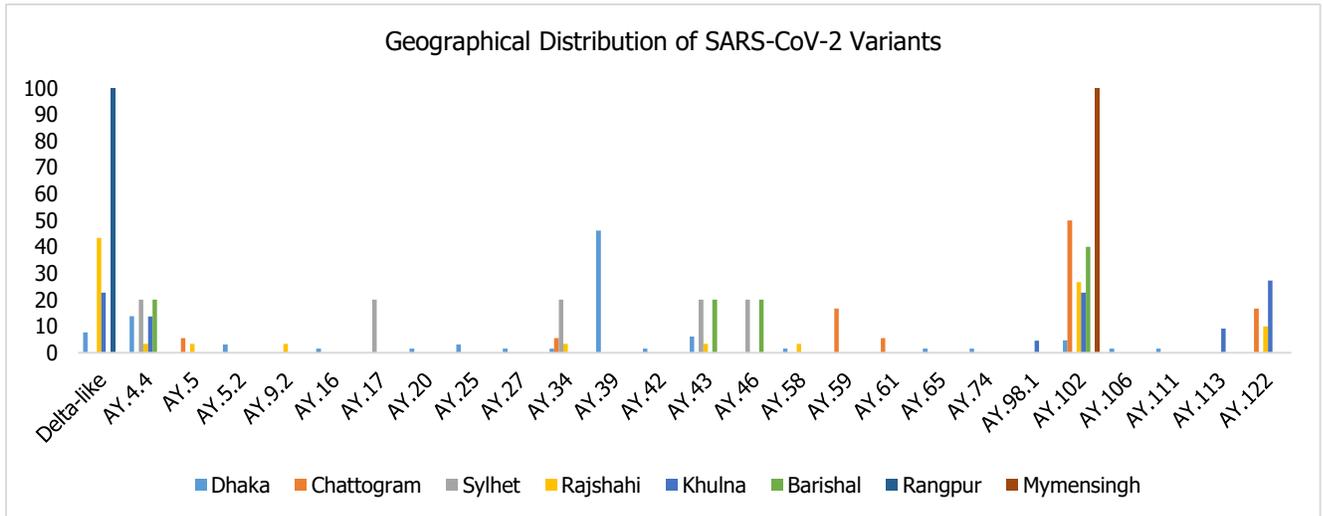


Figure 1. Geographical distribution percentage of SARS-CoV-2 variants in Bangladesh, October 2021

3. Metadata Analysis: October 2021

We have analyzed 112 metadata available by specific variables e.g. age, sex, blood group, comorbidity, vaccination, hospitalization, and death (Table 2). Out of 112, 64% of the patients were between 36-64 years, and 29% were between 18-35 years. Out of 94 patients, 99% reported positive blood groups: notably 22% A+, 33% B+ and 38% O+. 36% of patients were co-morbid, 4% smokers, 66% 1st dose vaccinated, 60% full vaccinated, 11% hospitalized, and 0.9% deceased. One unvaccinated patients had died of COVID-19. When compared metadata with sequencing data, no specific Delta lineage was found to be responsible for hospitalization or death.

Table 2. Metadata for specific variables (n=112 available), October 2021

Variables	Delta variants (%)
Age groups (years)	
=>65	9 (8%)
36-64	64 (58%)
18-35	33 (29%)
<18	6 (5%)
Male	57 (51%)
Blood group (n=94)	
A+	21 (22%)
B+	31 (33%)
AB+	5 (5%)
O+	36 (38%)
AB-	1 (1%)
Co-morbidity present	40 (36%)
Asthma	6 (5%)
Hypertension	20 (18%)
Diabetes	27 (24%)
Smoker	5 (4%)
1 st dose vaccinated	74 (66%)
Fully vaccinated	68 (60%)
Hospitalized	12 (11%)
Vaccinated and hospitalized	8 (7%)
Deaths	1 (0.9%)
Comorbidity present and deceased	1 (0.9%)
Vaccinated and deceased	0 (0%)
Hospitalized and deceased	1 (0.9%)

4. NextStrain build of SARS-CoV-2 variant distribution in Bangladesh (1-31 October 2021)

A phylogenetic tree of the 148 complete genomes of Bangladesh variants (collected between 1-31 October 2021) sequenced by the consortium was constructed using NextClade (clades.nextstrain.org). Phylogenetic analysis reveals that there have been multiple introductions of Delta variants (clade 21A, 21J, and 21I) across the country (Figure 2). Till 31 October 2021, no variant unique to Bangladesh has been detected.

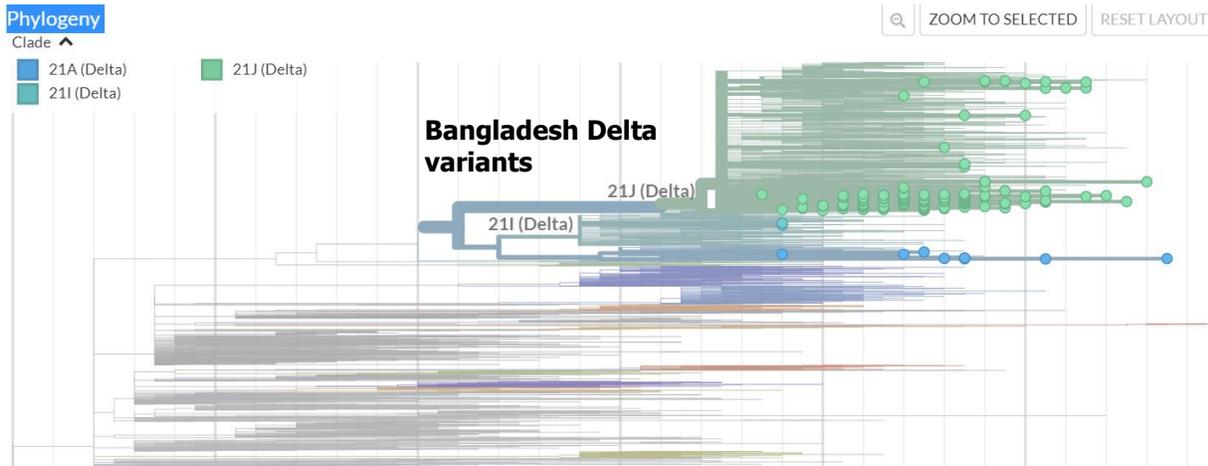


Figure 2. Phylogenetic tree of the 148 SARS-CoV-2 Bangladeshi variants in closed circles (collected 1-31 October 2021) sequenced by the consortium.

5. Cumulative Variants in Bangladesh: July-October 2021

The consortium has sequenced 687 samples collected between 1 July to 31 October 2021. These samples were collected from all 8 divisions of Bangladesh. Table 3 shows the total number of variants sequenced by region.

Table 3. Total number of confirmed cases by variant and region, Jul-Oct 2021

Variant	Dhaka	Chattogram	Sylhet	Rajshahi	Khulna	Barishal	Rangpur	Mymensingh	TOTAL
Beta								1	1
Delta-like	144	65	21	97	88	22	11	22	470
AY.4.4	9		1	1	3	1			15
AY.5	1	2	1	2	1				7
AY.5.2	2								2
AY.9.2				1					1
AY.10	1	3		2		1	1		8
AY.11	2	1		2					5
AY.15		1							1
AY.16	5								5
AY.17			1						1
AY.19				1					1
AY.20	2	4			2				8
AY.23.1					1				1
AY.25	2								2
AY.26	8	5			4	1	4		22
AY.27	1								1
AY.33		1		2			1	1	5
AY.34	2	2	1	1					6
AY.35						1			1
AY.37		1			1				2
AY.38		1							1
AY.39	38	8	1	2	4	1		1	55
AY.41	1				1				2
AY.42	1								1
AY.43	4		1	1		1			7
AY.46			1			1			2
AY.58	1			1					2
AY.59		3							3
AY.61		1							1
AY.65	1								1
AY.74	1								1
AY.98.1					1				1
AY.102	3	9		8	5	2		2	29
AY.106	1								1
AY.111	1								1
AY.113					2				2
AY.122		3		3	6				12
TOTAL	231	110	28	124	119	31	17	27	687

National SARS-CoV-2 Variant Surveillance in Bangladesh

All SARS-CoV-2 strains were Delta variants except one Beta variant (identified in July). The most predominant was Delta B.1.617.2-like (68%) (Figure 3).

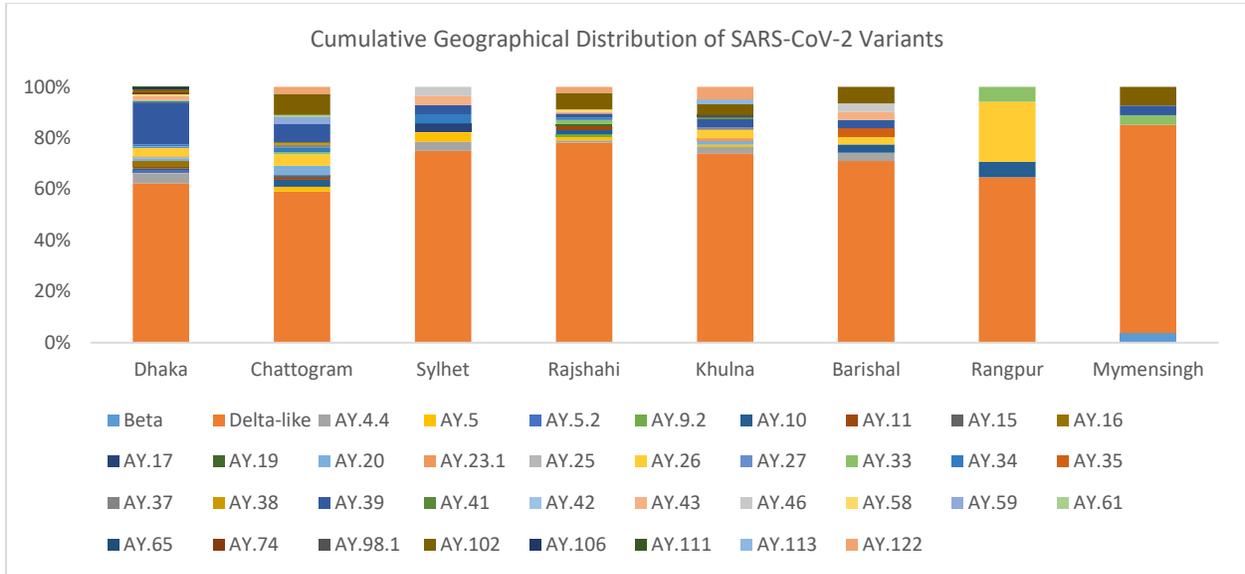


Figure 3. Geographical distribution percentage of SARS-CoV-2 variants in Bangladesh, Jul-Oct 2021

6. Metadata Analysis: July-October 2021

We have analyzed 470 metadata available by specific variables e.g. age, sex, blood group, comorbidity, vaccination, hospitalization, and death (Table 4). Out of 470, 51% of patients were between 36-64 years, and 33% were between 18-35 years. Out of 385 patients, 96% reported positive blood groups: notably 36% B+ and 31% O+. 36% of patients were co-morbid, 58% 1st dose vaccinated, 44% fully vaccinated, 15% hospitalized, and 4% deceased. One vaccinated and 17 unvaccinated patients had died of COVID-19. When compared metadata with sequencing data, no specific Delta lineage was found to be responsible for hospitalization or death. Only 1 vaccinated patient (0.2%) died.

Table 4. Metadata for specific variables (n=470 available), July-October 2021

Variables	Delta variants (%)
Age groups (years)	
=>65	46 (10%)
36-64	239 (51%)
18-35	153 (33%)
<18	32 (7%)
Male	238 (51%)
Blood group (n=385)	
A+	80 (21%)
B+	140 (36%)
AB+	32 (8%)
O+	120 (31%)
A-	3 (0.8%)
B-	2 (0.5%)
O-	6 (2%)
AB-	2 (0.5%)
Co-morbidity present	169 (36%)
Asthma	26 (6%)
Hypertension	81 (17%)
Diabetes	83 (18%)
Smoker	41 (9%)
1 st dose vaccinated	271 (58%)
Fully vaccinated	207 (44%)
Hospitalized	71 (15%)
Vaccinated and hospitalized	15 (3%)
Deaths	18 (4%)
Comorbidity present and deceased	15 (3%)
Vaccinated and deceased	1 (0.2%)
Hospitalized and deceased	14 (3%)

7. NextStrain build of SARS-CoV-2 variant distribution in Bangladesh (1 July-31 October 2021)

A phylogenetic tree of the 687 complete genomes of Bangladesh variants (collected between 1 July-31 October 2021) sequenced by the consortium was constructed using NextClade (clades.nextstrain.org). Phylogenetic analysis reveals that there have been a single Beta (clade 20H) and multiple introductions of Delta variants (clade 21A, 21J and 21I) across the country (Figure 4). From 1 July to 31 October 2021, no variant unique to Bangladesh has been detected. No delta plus was identified.

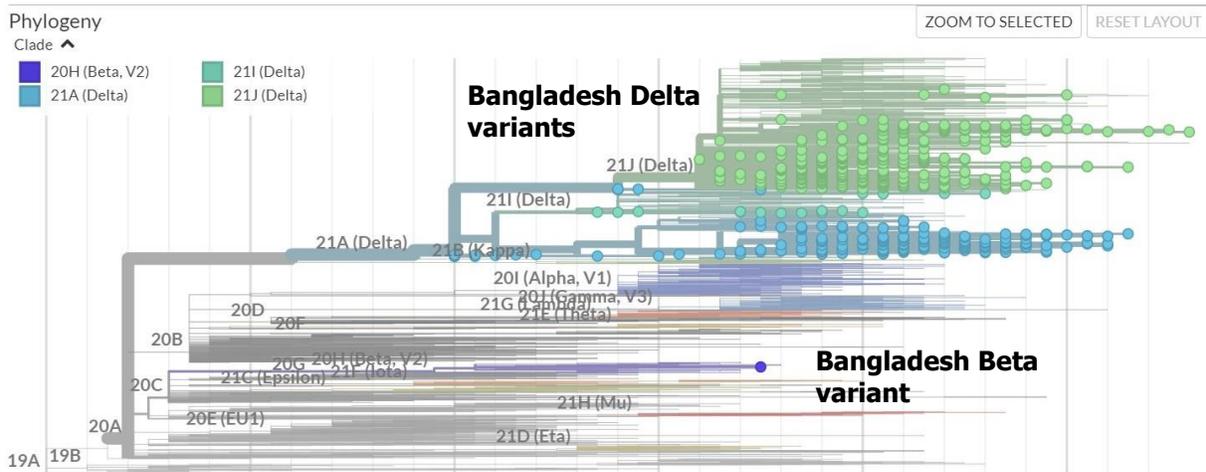


Figure 4. Phylogenetic tree of the 687 SARS-CoV-2 Bangladeshi variants in closed circle (collected 1 July-31 October 2021) sequenced by the consortium.