GECO Philippines SARS-CoV-2 Situation Report - 2022 June

Highlights

- BA.5, first identified in May, accounted for >40% (5/12) available Omicron sequences in June

SARS-CoV-2 variants detected in the Philippines

WHO label	Pango lineage	Classification	New submission	Isolated in 3 months	Total
Alpha	B.1.1.7/Q.x	VOC	0	1 (0.3)	2794
Beta	B.1.351	VOC	0	0	3284
Delta	B.1.617.2/AY.x	VOC	22 (0.4)	6 (1.8)	3465
Gamma	P.1	VOC	0	0	3
Omicron	B.1.1.529/BA.x	VOC	5378 (98.6)	284 (85.8)	6993
Eta	B.1.525	VUM	0	0	8
Theta	P.3	VUM	0	0	527

Table 1. Number of available sequences by variant in the Philippines as of 21 June 2022. The variants (VOC/VUM) here only include sequences that present in the GISAID or GECO data base and fulfill the definitions of WHO at the time the report is prepared. *New submission*, new sequences submitted from the last report. *Isolated in 3 months*, sequences isolated from 1 April 2022 to 21 June 2022. Numbers in the parentheses are percentage of the category (%).

- **VOC (Variant of Concern):** A SARS-CoV-2 variant that meets the definition of a VOI (see below) and, through a comparative assessment, has been demonstrated to be associated with (a) increase in transmissibility, (b) increase in clinical disease presentation or (c) decrease in effectiveness of public health measures including diagnostics, vaccines, therapeutics.
- **VOI (Variant of Interest):** A SARS-CoV-2 variant: (a) with genetic changes that are predicted or known to affect virus characteristics such as transmissibility, disease severity, immune escape, diagnostic or therapeutic escape; AND (b) identified to cause significant community transmission or multiple COVID-19 clusters, in multiple countries with increasing relative prevalence alongside increasing number of cases over time.
- **VUM (Variant Under monitoring):** A SARS-CoV-2 variant with genetic changes that are suspected to affect virus characteristics with some indication that it may pose a future risk, but evidence of phenotypic or epidemiological impact is currently unclear, requiring enhanced monitoring and repeat assessment pending new evidence.
- **Pango lineage:** A dynamic SARS-CoV-2 naming system that uses a phylogenetic framework (methods that involve a tree-like structure inferred based on genetic information of viruses) to identify actively

spreading lineages. The Pango system is designed to track the transmission and spread of SARS-CoV-2, but does not attempt to identify or define VOCs or VOIs.

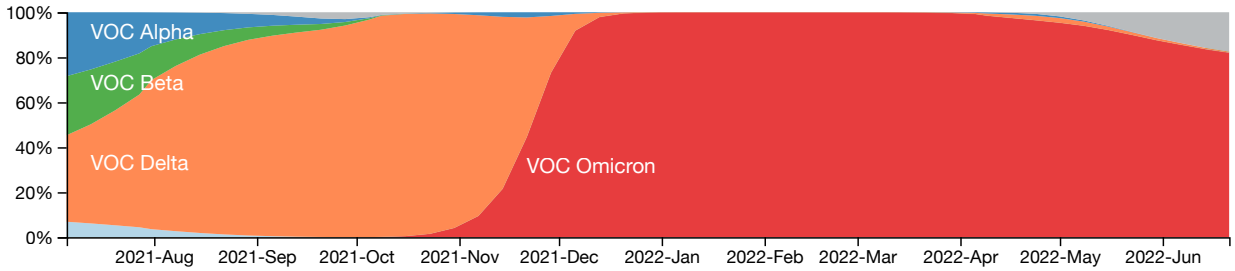

Figure 1. Temporal frequencies of SARS-CoV-2 variants in the Philippines. The figure is constructed with a subsampled genomic data set from all available sequences (methods). A more detailed illustration of SARS-CoV-2 lineages isolated in the country can be visualised by selecting Pango Lineage as the option for coloring in the control panel (icon on top left/right). **Note** that the latest available Philippine sequences were isolated on 3 June, 2022, thus the frequencies after the time point could harbor great uncertainty.

Diversity within the Omicron variant

The two main sublineages of the Omicron variant, denoted as BA.1 and BA.2, have been identified in the Philippines since November 2021. Based on the available data, BA.2 had more sustained transmission in the country compared with BA.1. Results from the grapevine-anywhere pipeline also show large BA.2 clusters. Phylogenetic relationship of the sublineages of Omicron variant is available here. Note that the BA.2 viruses do not have 69-70 deletions in the S protein, and therefore the SGTF (S-gene target failure) may not be used to detect the lineage (see *mutations of interest* section).

- BA.1 and BA.2

As of 21 June 2022, **592** BA.1.x and **6371** BA.2.x sequences have been isolated in the Philippines. BA.2 lineage has accounted for most of the Omicron isolates since December 2021 (Frequencies). Among BA.2 sublineages, BA.2.3 is the dominant (n=5934) strain followed by BA.2.12.x lineages (BA.2.12.1, n=37). The BA.2.12.1 lineage (22C in Nextstrain clade system) is an emerging lineage circulating in the North Americas possess a L452Q antigenic mutation in the S gene.

- BA.4 and BA.5

The BA.4 and BA.5 infections have increased since March 2022 in South Africa. The two lineages, especially BA.5, are leading to another wave of global transmission, and are expected to replace BA.2 as dominant strains in June-July 2022 (ref. covSpectrum). Both BA.4 and BA.5 have been isolated since May in the Philippines; so far 21 BA.5 and 2 BA.4 sequences have been identified (BA.4 was detected by Nextstrain clade system). Note that more than one BA.5 PH lineages were detected (*PH specific lineage* section), suggesting multiple entry events before June and possible community spread at the moment. One of the genetic markers differing BA.4 from BA.5 is the deletions in ORF1a (141-143Del)(Tree).

Diversity within the Delta variants

More than 70 Pango lineages have been found among Delta variants isolated in the Philippines, with >40 sublineages that have more than 2 isolated sequences as of March 2022. Phylogenetic relationship of the sublineages of Delta variant is available here.

SARS-CoV-2 variants detected by administrative region

Region	New submission	Dominant variant in 3 months	Isolated in 3 months	Total
NCR	790 (14.5)	Omicron (92.2)	115 (34.7)	5645
Ilocos	201 (3.7)	Omicron (75)	12 (3.6)	623
CAR	418 (7.7)	Omicron (81.8)	22 (6.6)	1278
Cagayan Valley	430 (7.9)	Omicron (87.5)	24 (7.3)	1491
Central Luzon	460 (8.4)	Omicron (80)	15 (4.5)	1587
Calabarzon	442 (8.1)	Omicron (86.4)	22 (6.6)	2899
Mimaropa	42 (0.8)	Omicron (92.6)	27 (8.2)	450
Bicol	285 (5.2)	Omicron (87.5)	8 (2.4)	542
Western Visayas	600 (11)	Omicron (86.2)	29 (8.8)	1195
Central Visayas	447 (8.2)	Omicron (71.4)	14 (4.2)	1117
Eastern Visayas	53 (1)	Omicron (100)	2 (0.6)	229
Zamboanga Peninsula	323 (5.9)	Omicron (55.6)	9 (2.7)	759
Northern Mindanao	149 (2.7)	Omicron (50)	2 (0.6)	511
Davao	458 (8.4)	Omicron (81.8)	22 (6.6)	1384
Soccsksargen	140 (2.6)	Omicron (83.3)	6 (1.8)	370
Caraga	204 (3.7)	-	0	498
BARMM	12 (0.2)	-	1 (0.3)	115

Table 2. Number of available sequences by administrative region in the Philippines as of 21 June 2022. The variant definition is identical to Table 1 based on the WHO website. *New submission*, new sequences submitted from the last report. *Dominant variant in 3 months*, the major variant isolated from 1 April 2022 to 21 June 2022. A dash indicates no sequence isolated. *Isolated in 3 months*, sequences isolated from 1 April 2022 to 21 June 2022. Numbers next to the dominant variant indicate percentage of the variant in the region, whereas other numbers in the parentheses are percentage of the category.

NCR, National Capital Region; CAR, Cordillera Administrative Region; BARMM, Bangsamoro Autonomous Region in Muslim Mindanao.

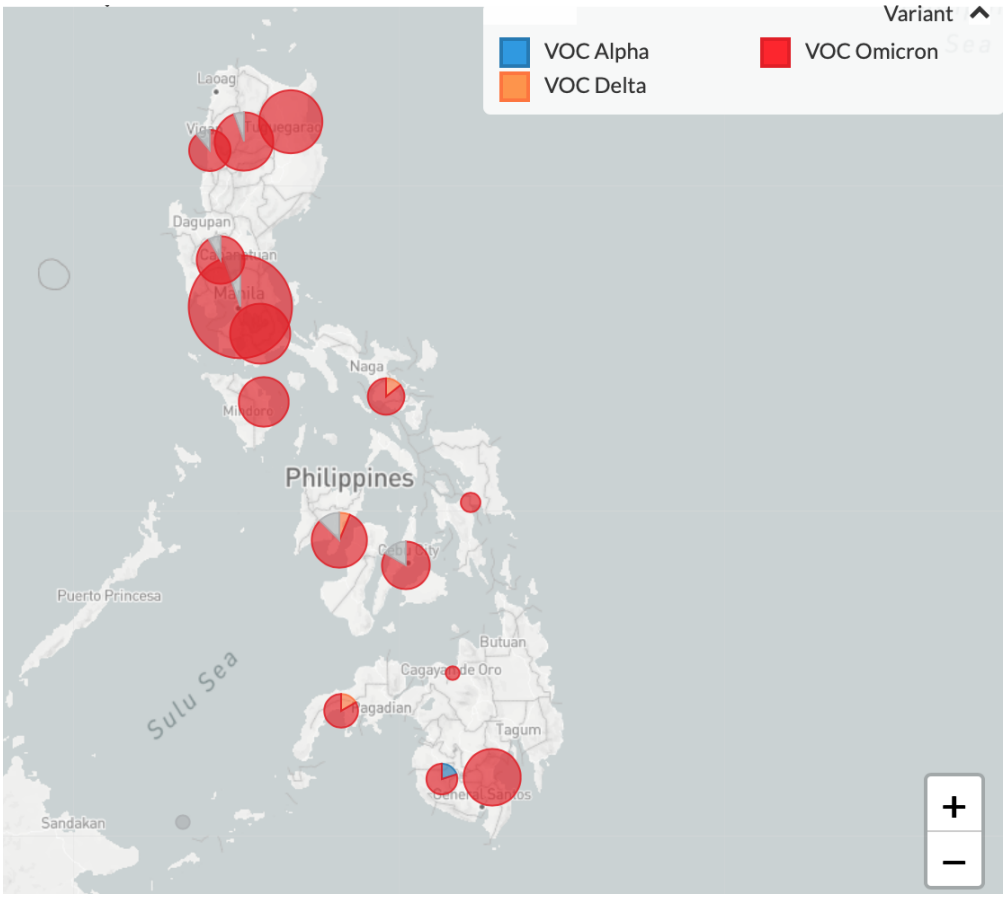

Figure 2. Frequencies of SARS-CoV-2 variants by administrative region in the Philippines since April 2022. The figure is constructed with a subsampled genomic data set from all available sequences as Figure 1. Frequencies of isolates in a particular time frame and frequencies classified with the Pango linage can be adjusted with the control panel (icon on top left/right).

Philippines specific SARS-CoV-2 lineages

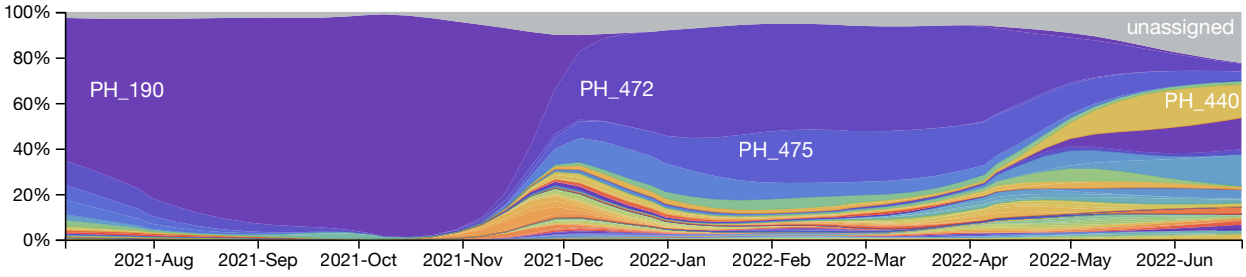

Figure 3. Temporal frequencies of Philippine lineages (clusters) identified by Grapevine-anywhere. Each sequence submitted to GECO database would undergo *Grapevine-anywhere* pipeline to detect sustain local transmission. A cluster is defined based on multiple sequences isolated in the Philippines that appeared to descend from the same introductory event on a phylogenetic tree. Phylogenetic relationships of these lineages can be found here.

Cluster name	Date first identified	Pango lineage	Distribution	New sub-mission	Isolated in 3 months	Total
PH_472	2021-12-02	BA.2.3	>3 regions	2548	48	2981
PH_422	2022-04-29	BA.2.12.1	>3 regions	16	28	28
PH_475	2021-12-19	BA.2.3	>3 regions	707	26	1037
PH_440	2021-12-31	BA.2	>3 regions	25	21	29
PH_449	2022-05-12	BA.5	>3 regions	17	17	17
PH_437	2022-04-26	BA.2	NCR	10	10	10
PH_448	2022-05-22	BA.5	>3 regions	8	8	8
PH_574	2022-05-04	BA.2	Cagayan Valley; NCR	5	7	7
PH_528	2022-01-02	BA.2.3	>3 regions	13	7	14
PH_190	2021-01-31	B.1.351	>3 regions	18	6	6254
PH_559	2021-12-28	BA.2	>3 regions	56	5	64
PH_430	2022-03-02	BA.2.9	NCR; Central Luzon; CAR	3	4	5
PH_436	2022-02-08	BA.2	>3 regions	4	4	5
PH_469	2022-01-30	BA.2.10	>3 regions	7	4	7
PH_556	2021-12-23	BA.2.3	>3 regions	452	3	636
PH_454	2021-12-29	BA.2	>3 regions	20	2	23
PH_81	2021-02-12	B.1.1.7	>3 regions	1	2	74
PH_555	2022-01-23	BA.2.3.2	NCR; Western Visayas; Zamboanga Peninsula	9	1	9
PH_426	2022-01-16	BA.2	>3 regions	10	1	10
PH_464	2021-12-31	BA.2	Central Visayas; NCR; Mimaropa	5	1	6
PH_530	2021-12-22	BA.2.3	>3 regions	160	1	205
PH_36	2021-01-20	B.1.1.7	>3 regions	0	1	1371
PH_274	2021-01-06	B.1.1.28	>3 regions	1	1	45
PH_577	2022-02-13	BA.2	NCR; Cagayan Valley	5	0	5
PH_509	2022-02-05	BA.2.3	Zamboanga Peninsula; Davao	5	0	5
PH_566	2022-01-29	BA.2	NCR; Central Visayas	6	0	6
PH_416	2022-01-27	BA.1.1	NCR; Davao	6	0	6
PH_325	2022-01-08	BA.1.1	Central Visayas; NCR	8	0	8
PH_374	2022-01-07	BA.1.17.2	Central Visayas	6	0	6
PH_535	2022-01-04	BA.2.3	>3 regions	9	0	12
PH_568	2022-01-04	BA.2.3	>3 regions	10	0	14
PH_516	2022-01-03	BA.2.3	>3 regions	13	0	14
PH_521	2022-01-02	BA.2.3	>3 regions	10	0	13
PH_548	2022-01-01	BA.2.3	>3 regions	6	0	9
PH_546	2021-12-31	BA.2.3	>3 regions	6	0	7
PH_298	2021-12-30	BA.1.1	Central Visayas; Central Luzon; NCR	8	0	9
PH_367	2021-12-30	BA.1.17.2	Central Visayas; NCR; Calabarzon	14	0	15
PH_543	2021-12-29	BA.2.3	>3 regions	4	0	6
PH_563	2021-12-29	BA.2	Central Visayas; Central Luzon; NCR	4	0	7
PH_573	2021-12-29	BA.2	Central Luzon; NCR	0	0	6
PH_322	2021-12-28	BA.1	>3 regions	4	0	6
PH_339	2021-12-28	BA.1	Central Visayas; NCR	4	0	5
PH_368	2021-12-28	BA.1	>3 regions	8	0	9
PH_505	2021-12-28	BA.2.3	>3 regions	24	0	26

Cluster name	Date first identified	Pango lineage	Distribution	New submission	Isolated in 3 months	Total
PH_539	2021-12-27	BA.2.3	>3 regions	112	0	148
PH_544	2021-12-27	BA.2.3	>3 regions	28	0	36
PH_550	2021-12-27	BA.2.3	>3 regions	12	0	19
PH_551	2021-12-27	BA.2.3	>3 regions	3	0	12
PH_540	2021-12-26	BA.2.3	>3 regions	18	0	36
PH_319	2021-12-25	BA.1	NCR; Central Visayas; Davao	4	0	5
PH_318	2021-12-24	BA.1.1	Central Visayas; NCR	3	0	5
PH_499	2021-12-23	BA.2.3	>3 regions	15	0	16
PH_545	2021-12-23	BA.2.3	>3 regions	2	0	14
PH_323	2021-12-22	BA.1.1	>3 regions	58	0	66
PH_396	2021-12-21	BA.1.1	>3 regions	26	0	35
PH_286	2021-12-19	BA.1.15	Central Luzon; NCR	2	0	9
PH_399	2021-12-18	BA.1.1	>3 regions	13	0	37
PH_392	2021-12-16	BA.1	>3 regions	10	0	17
PH_377	2021-12-14	BA.1.17.2	Central Visayas; NCR	8	0	9
PH_337	2021-12-06	BA.1	NCR; Central Luzon; Central Visayas	3	0	6
PH_382	2021-11-20	BA.1	>3 regions	17	0	24
PH_137	2021-05-06	B.1.1.7	>3 regions	0	0	7
PH_140	2021-04-30	B.1.1.7	Davao; Caraga; NCR	0	0	19
PH_147	2021-04-19	B.1.1.7	Davao; Soccsksargen	0	0	18
PH_155	2021-04-19	B.1.1.7	>3 regions	0	0	16
PH_133	2021-04-14	B.1.1.7	>3 regions	0	0	21
PH_139	2021-04-13	B.1.1.7	Davao; Caraga; Central Luzon	0	0	13
PH_28	2021-04-12	B.1	>3 regions	0	0	8
PH_260	2021-04-02	B.1.1.519	NCR	0	0	5
PH_144	2021-03-25	B.1.1.7	>3 regions	0	0	29
PH_148	2021-03-22	B.1.1.7	>3 regions	0	0	31
PH_153	2021-03-19	B.1.1.7	>3 regions	0	0	12
PH_154	2021-03-15	B.1.1.7	Bicol; NCR; Calabarzon	0	0	13
PH_135	2021-03-06	B.1.1.7	>3 regions	0	0	32
PH_100	2021-03-05	B.1.1.7	>3 regions	0	0	32
PH_136	2021-03-05	B.1.1.7	>3 regions	0	0	26
PH_146	2021-03-05	B.1.1.7	>3 regions	0	0	32
PH_158	2021-03-05	B.1.1.7	>3 regions	0	0	24
PH_27	2021-03-05	B.1.1.7	Calabarzon; Mimaropa; NCR	0	0	6
PH_141	2021-03-04	B.1.1.7	>3 regions	0	0	46
PH_149	2021-02-22	B.1.1.7	NCR; Calabarzon; Central Luzon	0	0	13
PH_79	2021-02-15	B.1.1.7	>3 regions	0	0	55
PH_99	2021-02-11	B.1.1.7	>3 regions	0	0	14
PH_238	2021-02-05	B.1.1.63	NCR; Calabarzon	0	0	6
PH_203	2021-01-27	B.1.1.63	NCR; Calabarzon	0	0	7
PH_74	2021-01-26	B.1.1.7	>3 regions	0	0	48
PH_230	2021-01-25	B.1.1.63	Calabarzon	0	0	5
PH_38	2021-01-21	B.1.466.1	Calabarzon; NCR	0	0	21
PH_173	2021-01-19	B.1.1	>3 regions	0	0	29
PH_266	2021-01-15	B.1.1.28	Davao; NCR; Soccsksargen	0	0	9

Cluster name	Date first identified	Pango lineage	Distribution	New sub-mission	Isolated in 3 months	Total
PH_118	2021-01-14	B.1.1.7	NCR; Central Visayas; CAR	0	0	5
PH_39	2021-01-12	B.1.441	NCR; Central Visayas	0	0	5
PH_73	2021-01-12	B.1.1.7	>3 regions	0	0	9
PH_273	2021-01-11	B.1.1.28	Davao	0	0	14
PH_265	2021-01-09	B.1.1.28	Soccsksargen; Davao; Calabarzon	0	0	16
PH_183	2021-01-08	B.1.1	Calabarzon; Central Visayas; NCR	0	0	5
PH_279	2021-01-08	P.3	>3 regions	0	0	457
PH_123	2021-01-07	B.1.1.7	NCR; Central Luzon; Central Visayas	0	0	5
PH_129	2021-01-07	B.1.1.7	NCR	0	0	7
PH_165	2021-01-07	B.1.1.7	>3 regions	0	0	342
PH_78	2021-01-05	B.1.1.7	>3 regions	0	0	133
PH_275	2021-01-03	B.1.1.28	Davao; Soccsksargen	0	0	17
PH_130	2020-12-29	B.1.1.7	>3 regions	0	0	8
PH_55	2020-12-28	B.1.524	>3 regions	0	0	10
PH_218	2020-12-18	B.1.1.63	Cagayan Valley; NCR	0	0	7
PH_255	2020-12-17	B.1.1.263	CAR; Cagayan Valley; Central Luzon	0	0	65
PH_227	2020-12-15	B.1.1.63	NCR; Calabarzon; CAR	0	0	11
PH_224	2020-12-10	B.1.1.63	Calabarzon; NCR	0	0	5
PH_97	2020-12-10	B.1.1.7	NCR; Calabarzon; Central Visayas	0	0	5
PH_181	2020-12-09	B.1.1	>3 regions	0	0	93
PH_245	2020-12-04	B.1.1.63	NCR; Central Luzon	0	0	10
PH_269	2020-12-02	B.1.1.28	>3 regions	0	0	36
PH_270	2020-12-02	B.1.1.28	NCR; Calabarzon; Caraga	0	0	20
PH_177	2020-11-25	B.1.1	Calabarzon; NCR	0	0	11
PH_209	2020-11-22	B.1.1.63	Calabarzon; NCR	0	0	9
PH_250	2020-11-15	B.1.1.263	CAR; Cagayan Valley; Calabarzon	0	0	9
PH_12	2020-11-10	B.6	NCR; Calabarzon	0	0	5
PH_268	2020-11-07	B.1.1.28	Calabarzon; NCR; Central Luzon	0	0	6
PH_41	2020-11-06	B.1.36	Calabarzon; NCR	0	0	10
PH_208	2020-11-03	B.1.1.63	Calabarzon	0	0	6
PH_212	2020-11-02	B.1.1.63	>3 regions	0	0	35
PH_237	2020-11-01	B.1.1.63	>3 regions	0	0	14
PH_257	2020-10-11	B.1.1.263	>3 regions	0	0	67
PH_272	2020-08-24	B.1.1.28	>3 regions	0	0	15
PH_56	2020-08-22	B.1.524	NCR; Calabarzon; Davao	0	0	12
PH_205	2020-08-13	B.1.1.63	>3 regions	0	0	189
PH_175	2020-08-07	B.1.1	NCR	0	0	5
PH_246	2020-08-07	B.1.1.63	>3 regions	0	0	20
PH_13	2020-08-06	B.6	>3 regions	0	0	40
PH_178	2020-08-05	B.1.1	Calabarzon; NCR	0	0	5
PH_264	2020-08-05	B.1.1.28	>3 regions	0	0	226
PH_180	2020-08-04	B.1.1	>3 regions	0	0	102
PH_92	2020-07-22	B.1.1.63	>3 regions	0	0	127

Cluster name	Date first identified	Pango lineage	Distribution	New submission	Isolated in 3 months	Total
PH_204	2020-07-19	B.1.1.63	Calabarzon; NCR; Western Visayas	0	0	24
PH_24	2020-07-15	B.1	>3 regions	0	0	34
PH_171	2020-07-12	B.1.1	NCR; Calabarzon; Mimaropa	0	0	12
PH_217	2020-07-09	B.1.1.63	>3 regions	0	0	121
PH_172	2020-07-08	B.1.1	>3 regions	0	0	65
PH_233	2020-07-08	B.1.1.63	>3 regions	0	0	78
PH_57	2020-07-08	B.1	Mimaropa; NCR; Central Visayas	0	0	9
PH_216	2020-07-07	B.1.1.63	>3 regions	0	0	29
PH_243	2020-07-07	B.1.1.63	NCR; Calabarzon; Cagayan Valley	0	0	12
PH_271	2020-07-05	B.1.1.28	>3 regions	0	0	6
PH_213	2020-07-01	B.1.1.63	Calabarzon; NCR; CAR	0	0	9
PH_229	2020-07-01	B.1.1.63	>3 regions	0	0	234
PH_222	2020-06-29	B.1.1.63	>3 regions	0	0	133
PH_234	2020-06-23	B.1.1.63	NCR	0	0	5
PH_248	2020-06-16	B.1.1.263	>3 regions	0	0	142
PH_58	2020-06-11	B.1	NCR; Western Visayas	0	0	9
PH_11	2020-03-11	B.6	NCR; Cagayan Valley	0	0	6
PH_2	2020-03-10	B.6	>3 regions	0	0	20

Table 3. Number of sequences by cluster identified with the Grapevine-anywhere as of 21 June 2022. A cluster is defined based on multiple sequences isolated in the Philippines that appeared to descend from the same introductory event on a phylogenetic tree. *Date first identified*, the isolation date of the first identified sequence. *Pango lineage*, the major Pango lineage of the sequences that belong to the same cluster. *New submission*, new sequences submitted from the last report. *Isolated in 3 months*, sequences isolated from 1 April 2022 to 21 June 2022.

SARS-CoV-2 sequencing in the Philippines

Total available SARS-CoV-2 sequences in the Philippines: 20712

SARS-CoV-2 sequences from GECO project: 1715

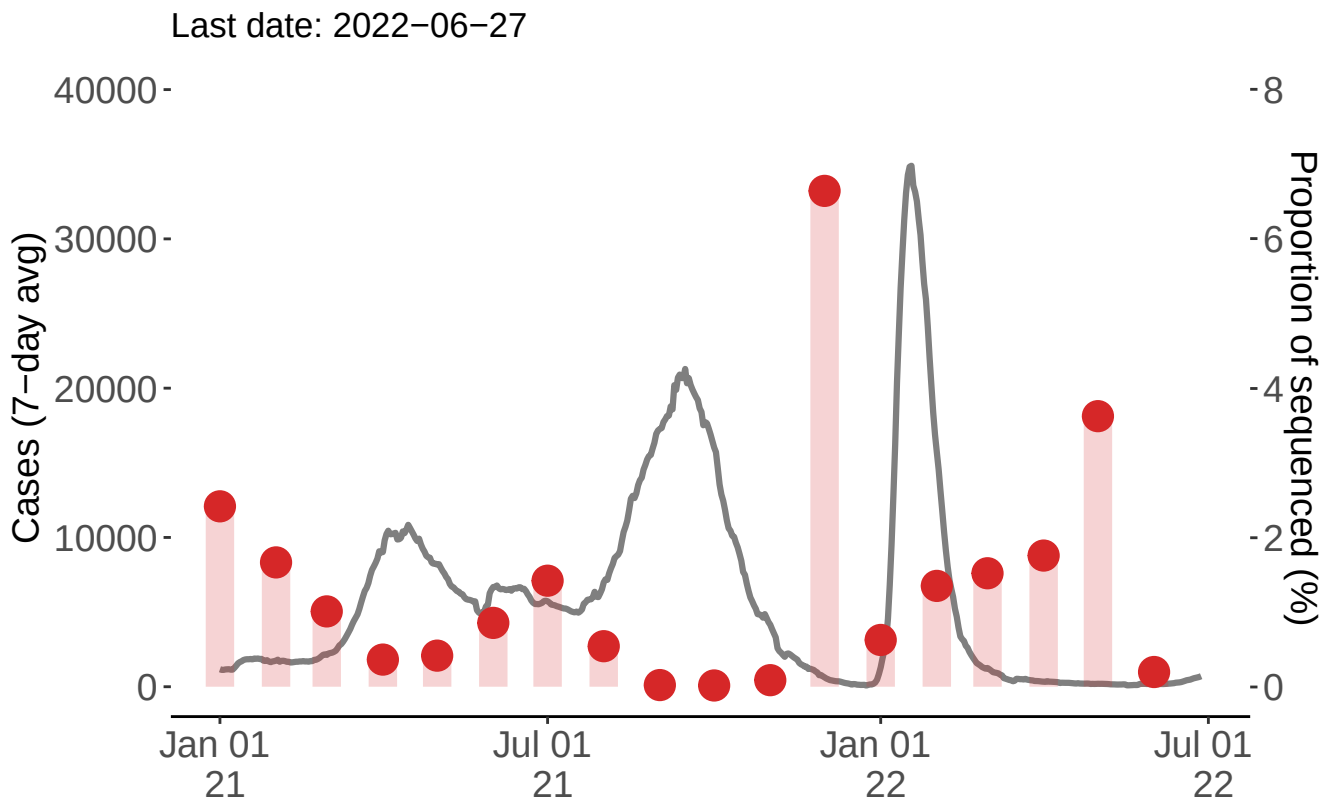

Figure 4. Number of COVID-19 cases and the proportion of sequenced samples in the Philippines from January 2021. The gray line indicates the mean cases in a 7 days window based on the JHU data base, whereas the red bars indicate the estimated percentage of sequenced samples among cases in a month.

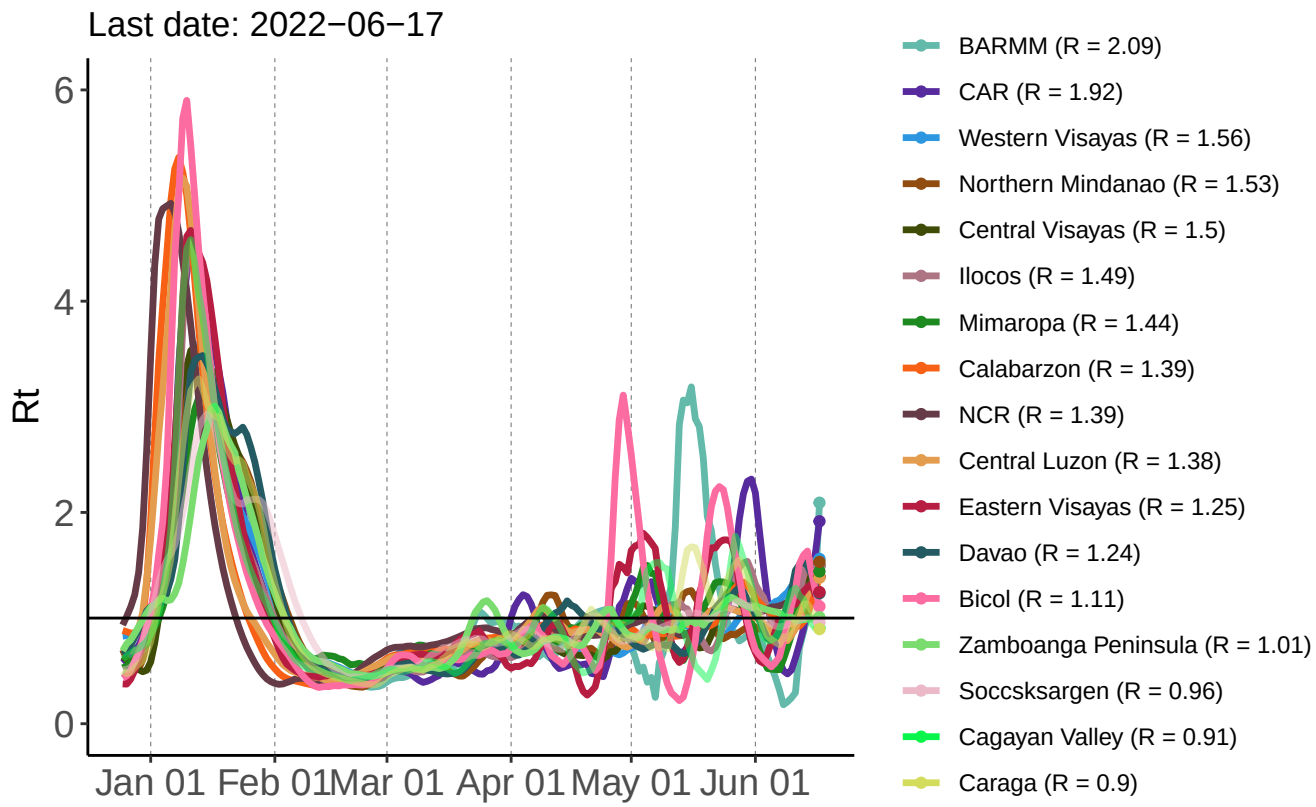

Figure 5. Mean effective reproductive number (Rt) of COVID-19 in the Philippines by region from December 2021 to June 2022. The reproductive number (R) is defined as the number of new infections that one infected patient can cause in a susceptible population. Here, *the mean effective reproductive number* (Rt) was inferred by daily number of cases reported in MOH, Philippines in a window of seven days. The horizontal line indicates one. If Rt is greater than 1, the case number in the region will likely continue to grow. If the Rt is below 1, the new cases may continue to appear at a slower rate. The R values denoted with the region name represent the most recent estimates. More regional epidemiological statistics can be found here.

SARS-CoV-2 mutations of interest

Spike protein

- **69-70Del** (Alpha, Omicron): Distribution on the Philippine isolates
- **T95I** (Mu, Omicron): Distribution on the Philippine isolates
- **144-** (Alpha, Eta, Omicron): Distribution on the Philippine isolates
- **K417N** (Beta, Omicron): Distribution on the Philippine isolates
- **L452R*** (Delta, BA.4/BA.5): Distribution on the Philippine isolates

- **T478K** (Delta, Omicron): Distribution on the Philippine isolates
- **E484K** (Beta, Gamma, Eta, Mu): Distribution on the Philippine isolates
- **F486V*** (BA.4/BA.5): Distribution on the Philippine isolates
- **N501Y** (Alpha, Beta, Gamma, Mu, Omicron): Distribution on the Philippine isolates
- **H655Y** (Gamma, Omicron): Distribution on the Philippine isolates

Relevant functions including antibody escape (S 69-70Del, S 144, S 417, S 484) and receptor binding (S 417, S 484, S 501). 69-70Del, deletions at positions 69-70. *: mutations relevant to emerging lineages (S 452, S 486).

Data sources and references

Data

- GECO website
- DOH Data drop
- GISAID (EPI-SET: EPI_SET_20220629ca)
- JHU COVID data

Methods

- Analyses in this report
- Nextstrain (build for GECO project)
- Grapevine-anywhere

References

- WHO
- Pango lineage list

Online version and previous reports

GECO Monthly Report

2022-05 pdf

Genomic Epidemiology of COVID in the Philippines (GECO PH)