**Supplemental Materials**

**Supplementary Table 1.** Molecular epidemiology of SARS-CoV-2 circulating in Malaysia from June 2021 to January 2022, n = 6163.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Lineage | Earliest date reported in GISAID | Lineage description\* | WHO nomenclature | Total, n | Percentage (%) |
| AY.23 | 29-07-2020 | Predominant Singapore and Indonesia | Delta | 2289 | 37.14 |
| B.1.617.2 | 11-05-2020 | India | Delta | 1812 | 29.40 |
| AY.59 | 05-12-2020 | Malaysia | Delta | 715 | 11.60 |
| AY.79 | 09-03-2021 | Predominant Malaysia | Delta | 552 | 8.96 |
| AY.4 | 05-11-2020 | United Kingdom (UK) | Delta | 132 | 2.14 |
| AY.76 | 04-05-2021 | Malaysia | Delta | 89 | 1.44 |
| AY.24 | 29-07-2020 | - | Delta | 89 | 1.44 |
| BA.1.1 | 18-09-2021 | - | Omicron | 84 | 1.36 |
| AU.2 | 23-09-2020 | Malaysia | - | 60 | 0.97 |
| BA.1 | 12-09-2021 | - | Omicron | 54 | 0.88 |
| AY.5 | 15-11-2020 | UK | Delta | 20 | 0.32 |
| B.1.351 | 17-03-2020 | South Africa | Beta | 19 | 0.31 |
| AY.44 | 11-05-2020 | USA | Delta | 19 | 0.31 |
| AY.37 | 09-03-2021 | - | Delta | 19 | 0.31 |
| B.1.524 | 20-07-2020 | Malaysia | - | 15 | 0.24 |
| AY.116 | 21-10-2021 | Africa | Delta | 14 | 0.23 |
| AY.68 | 11-02-2021 | European | Delta | 13 | 0.21 |
| B.1.466.2 | 06-08-2020 | Indonesia | - | 10 | 0.16 |
| AY.43 | 11-05-2020 | European | Delta | 10 | 0.16 |
| AY.10 | 25-03-2021 | UK | Delta | 10 | 0.16 |
| AY.47 | 08-01-2021 | USA | Delta | 8 | 0.13 |
| AY.23.1 | 07-08-2021 | Singapore | Delta | 7 | 0.11 |
| B.1.36.16 | 03-05-2020 | Southeast Asia | - | 6 | 0.09 |
| AY.92 | 10-04-2021 | European | Delta | 6 | 0.09 |
| AY.85 | 09-01-2021 | Thailand | Delta | 5 | 0.08 |
| AY.17 | 06-03-2021 | Ireland and Northern Ireland | Delta | 5 | 0.08 |
| AY.95 | 07-01-2021 | Maldives and European | Delta | 4 | 0.06 |
| AY.70 | 10-03-2021 | European | Delta | 4 | 0.06 |
| AY.6 | 16-03-2021 | UK | Delta | 4 | 0.06 |
| AY.39 | 03-01-2021 | - | Delta | 4 | 0.06 |
| AY.26 | 09-01-2021 | USA and Mexico | Delta | 4 | 0.06 |
| AY.122 | 07-09-2020 | European | Delta | 4 | 0.06 |
| AY.122.1/12 | 11-08-2020 | Israel | Delta | 4 | 0.06 |
| BA.2 | 17-11-2021 | - | Omicron | 3 | 0.05 |
| B.1.1.529 | - | - | Omicron | 3 | 0.05 |
| AY.7.1 | 09-02-2021 | Denmark | Delta | 3 | 0.05 |
| AY.33 | 14-10-2020 | - | Delta | 3 | 0.05 |
| AY.119 | 29-10-2020 | USA | Delta | 3 | 0.05 |
| AY.110 | 14-04-2021 | USA | Delta | 3 | 0.05 |
| AY.106 | 09-02-2021 | - | Delta | 3 | 0.05 |
| AY.98 | 07-01-2021 | UK | Delta | 2 | 0.03 |
| AY.86 | 06-02-2021 | Canada & USA | Delta | 2 | 0.03 |
| AY.75 | 06-01-2021 | USA & European | Delta | 2 | 0.03 |
| AY.54 | 09-02-2021 | USA | Delta | 2 | 0.03 |
| AY.46.1 | 18-05-2021 | USA | Delta | 2 | 0.03 |
| AY.46 | 09-01-2021 | Africa | Delta | 2 | 0.03 |
| AY.42 | 11-09-2020 | European | Delta | 2 | 0.03 |
| AY.20 | 14-01-2021 | USA and Mexico | Delta | 2 | 0.03 |
| AY.13 | 26-01-2021 | USA | Delta | 2 | 0.03 |
| AY.121 | 24-01-2021 | European | Delta | 2 | 0.03 |
| AY.120 | 04-02-2021 | UK | Delta | 2 | 0.03 |
| AY.111 | 05-02-2021 | UK | Delta | 2 | 0.03 |
| AY.100 | 22-09-2020 | USA | Delta | 2 | 0.03 |
| B.1.1.519 | 28-08-2020 | USA/Mexico | - | 1 | 0.02 |
| B.1 | 01-01-2020 | European | - | 1 | 0.02 |
| AY.99.2 | 30-10-2021 | Brazil | Delta | 1 | 0.02 |
| AY.93 | 10-04-2021 | Canada | Delta | 1 | 0.02 |
| AY.88 | 12-04-2021 | - | Delta | 1 | 0.02 |
| AY.71 | 09-03-2021 | European | Delta | 1 | 0.02 |
| AY.61 | 07-01-2021 | Italy | Delta | 1 | 0.02 |
| AY.49 | 10-04-2021 | USA | Delta | 1 | 0.02 |
| AY.4.5 | 31-12-2020 | - | Delta | 1 | 0.02 |
| AY.4.2.2 | 12-04-2021 | UK | Delta | 1 | 0.02 |
| AY.4.2 | 01-01-2021 | - | Delta | 1 | 0.02 |
| AY.36 | 16-09-2020 | - | Delta | 1 | 0.02 |
| AY.34.2 | 13-07-2021 | - | Delta | 1 | 0.02 |
| AY.32 | 16-04-2021 | South Africa | Delta | 1 | 0.02 |
| AY.29.1 | 09-02-2021 | Japan | Delta | 1 | 0.02 |
| AY.29 | 09-02-2021 | Japan | Delta | 1 | 0.02 |
| AY.22 | 28-05-2021 | - | Delta | 1 | 0.02 |
| AY.18 | 11-05-2021 | Canada | Delta | 1 | 0.02 |
| AY.127 | 10-12-2020 | - | Delta | 1 | 0.02 |
| AY.120.2 | 04-05-2021 | South Africa | Delta | 1 | 0.02 |
| AY.11 | 03-04-2021 | UK | Delta | 1 | 0.02 |
| AY.103 | 01-01-2021 | USA | Delta | 1 | 0.02 |
| AY.102 | 11-08-2020 | Peru and Chile | Delta | 1 | 0.02 |

\*The lineage description was based on the Cov-Lineages.org Lineage report (O’Toole et. al., 2021).

**Supplementary Table 2**. Molecular epidemiology of the top 10 most prevalent circulating SARS-CoV-2 lineages in Malaysia from June 2021 to January 2022 categorized by month, n = 6163.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Month | AY.23,  n (%) | B.1.617.2,  n (%) | AY.59,  n (%) | AY.79,  n (%) | AY.4  n (%) | AY.24  n (%) | AY.76,  n (%) | BA.1.1,  n (%) | AU.2,  n (%) | BA.1  n (%) | Others,  n (%) | **Total,**  **n (%)** |
| June 2021 | 6 (7.59) | 41 (51.90) | 4 (5.06) | 5 (6.33) | 2 (2.53) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 7 (8.86) | 0 (0.00) | 14 (17.72) | **79 (100)** |
| July 2021 | 28 (6.44) | 326 (74.94) | 37 (8.51) | 8 (1.84) | 5 (1.15) | 4 (0.92) | 1 (0.23) | 0 (0.00) | 8 (1.84) | 0 (0.00) | 19 (4.37) | **435 (100)** |
| August 2021 | 513 (36.18) | 543 (38.29) | 102 (7.19) | 51 (3.60) | 79 (5.57) | 31 (2.19) | 6 (0.42) | 0 (0.00) | 43 (3.03) | 0 (0.00) | 50 (3.53) | **1418 (100)** |
| September 2021 | 817 (50.94) | 580 (36.16) | 20 (1.25) | 43 (2.68) | 37 (2.31) | 40 (2.49) | 7 (0.44) | 0 (0.00) | 2 (0.12) | 0 (0.00) | 58 (3.62) | **1604 (100)** |
| October 2021 | 463 (46.16) | 226 (22.53) | 158 (15.75) | 72 (7.18) | 7 (0.70) | 5 (0.50) | 31 (3.09) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 41 (4.09) | **1003 (100)** |
| November 2021 | 303 (35.99) | 71 (8.43) | 215 (25.53) | 177 (21.02) | 0 (0.00) | 6 (0.71) | 26 (3.09) | 1 (0.12) | 0 (0.00) | 0 (0.00) | 43 (5.11) | **842 (100)** |
| December 2021 | 153 (23.76) | 22 (3.42) | 175 (27.17) | 188 (29.19) | 2 (0.31) | 3 (0.47) | 16 (2.48) | 11 (1.71) | 0 (0.00) | 18 (2.80) | 56 (8.70) | **644 (100)** |
| January 2021 | 6 (4.35) | 3 (2.17) | 4 (2.90) | 8 (5.80) | 0 (0.00) | 0 (0.00) | 2 (1.45) | 72 (52.17) | 0 (0.00) | 36 (26.09) | 7 (5.07) | **138 (100)** |

**Supplementary Table 3.** Molecular epidemiology of the top 10 most prevalent circulating SARS-CoV-2 lineages in Malaysia from June 2021 to January 2022 categorized by state, n = 6163.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | AY.23,  n (%) | B.1.617.2,  n (%) | AY.59,  n (%) | AY.79,  n (%) | AY.4  n (%) | AY.24,  n (%) | AY.76,  n (%) | BA.1.1,  n (%) | AU.2  n (%) | BA.1,  n (%) | Others,  n (%) | **Total,**  **n (%)** |
| Johor | 52 (14.57) | 200 (56.02) | 24 (6.72) | 26 (7.28) | 32 (8.96) | 0 (0.00) | 2 (0.56) | 1 (0.28) | 0 (0.00) | 0 (0.00) | 20 (5.60) | **357 (100)** |
| Kedah | 1 (0.73) | 78 (56.93) | 33 (24.09) | 11 (8.03) | 4 (2.92) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 10 (7.30) | **137 (100)** |
| Kelantan | 4 (2.19) | 78 (42.62) | 34 (18.58) | 47 (25.68) | 1 (0.55) | 0 (0.00) | 4 (2.18) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 15 (8.20) | **183 (100)** |
| Melaka | 5 (3.85) | 76 (58.46) | 17 (13.08) | 10 (7.69) | 15 (11.54) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 7 (5.38) | **130 (100)** |
| Negeri Sembilan | 12 (4.94) | 106 (43.62) | 42 (17.28) | 35 (14.40) | 32 (13.17) | 0 (0.00) | 4 (1.65) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 12 (4.94) | **243 (100)** |
| Pahang | 1 (0.43) | 130 (56.52) | 33 (14.35) | 28 (12.17) | 21 (9.13) | 1 (0.43) | 3 (1.30) | 5 (2.17) | 0 (0.00) | 1 (0.43) | 7 (3.04) | **230 (100)** |
| Perak | 1 (0.42) | 114 (48.31) | 78 (33.05) | 22 (9.32) | 1 (0.42) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 20 (8.47) | **236 (100)** |
| Perlis | 0 (0.00) | 24 (64.86) | 6 (16.21) | 4 (10.81) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 3 (8.11) | **37 (100)** |
| Penang | 16 (2.88) | 219 (39.39) | 160 (28.78) | 109 (19.60) | 8 (1.44) | 0 (0.00) | 2 (0.36) | 5 (0.90) | 0 (0.00) | 1 (0.18) | 36 (6.47) | **556 (100)** |
| Sabah | 105 (32.92) | 115 (36.05) | 10 (3.13) | 4 (1.25) | 1 (0.31) | 20 (6.27) | 42 (13.17) | 0 (0.00) | 2 (0.63) | 2 (0.63) | 18 (5.64) | **319 (100)** |
| Sarawak | 2058 (78.34) | 37 (1.41) | 82 (3.12) | 149 (5.67) | 1 (0.04) | 64 (2.44) | 8 (0.30) | 72 (2.74) | 58 (2.21) | 41 (1.56) | 57 (2.17) | **2627 (100)** |
| Selangor | 20 (3.16) | 331 (52.29) | 125 (19.75) | 80 (12.64) | 13 (2.05) | 2 (0.32) | 12 (1.90) | 1 (0.16) | 0 (0.00) | 4 (0.63) | 45 (7.11) | **633 (100)** |
| Terengganu | 2 (2.60) | 51 (66.23) | 6 (7.79) | 5 (6.49) | 1 (1.30) | 0 (0.00) | 3 (3.90) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 9 (11.69) | **77 (100)** |
| Kuala Lumpur | 3 (0.86) | 239 (68.68) | 59 (16.95) | 19 (5.46) | 2 (0.57) | 1 (0.29) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 1 (0.29) | 24 (6.90) | **348 (100)** |
| Labuan | 8 (24.24) | 4 (12.12) | 4 (12.12) | 2 (6.06) | 0 (0.00) | 1 (3.03) | 9 (27.27) | 0 (0.00) | 0 (0.00) | 4 (12.12) | 1 (3.03) | **33 (100)** |
| Putrajaya | 1 (5.88) | 10 (58.82) | 2 (11.76) | 1 (5.88) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 3 (17.65) | **17 (100)** |

**Supplementary Table 4.** Molecular epidemiology of the top 10 most prevalent circulating SARS-CoV-2 lineages in Peninsular (West) Malaysia from June to December 2021 categorized by month, n = 3184.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | B.1.617.2,  n (%) | AY.59,  n (%) | AY.79,  n (%) | AY.4  n (%) | AY.23  n (%) | AY.76,  n (%) | AY.5  n (%) | AY.37,  n (%) | AY.44  n (%) | B.1.524  n (%) | Others,  n (%) | **Total,**  **n (%)** |
| June 21 | 40 (76.92) | 1 (1.92) | 1 (1.92) | 2 (3.85) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 1 (1.92) | 1 (1.92) | 6 (11.54) | **52 (100)** |
| July 21 | 301 (83.84) | 29 (8.08) | 4 (1.11) | 5 (1.39) | 7 (1.95) | 0 (0.00) | 0 (0.00) | 3 (0.84) | 0 (0.00) | 0 (0.00) | 10 (2.79) | **359 (100)** |
| August 21 | 505 (66.45) | 98 (12.89) | 27 (3.55) | 78 (10.26) | 21 (2.76) | 4 (0.53) | 1 (0.13) | 5 (0.66) | 3 (0.39) | 0 (0.00) | 18 (2.37) | **760 (100)** |
| September 21 | 512 (77.46) | 13 (1.97) | 15 (2.27) | 37 (5.60) | 36 (5.45) | 1 (0.15) | 2 (0.30) | 5 (0.76) | 4 (0.61) | 0 (0.00) | 36 (5.47) | **661 (100)** |
| October 21 | 214 (47.35) | 144 (31.86) | 38 (8.41) | 7 (1.55) | 12 (2.65) | 0 (0.00) | 2 (0.44) | 2 (0.44) | 7 (1.55) | 4 (0.88) | 22 (4.87) | **452 (100)** |
| November 21 | 67 (13.45) | 203 (40.76) | 148 (29.72) | 0 (0.00) | 24 (4.82) | 17 (3.41) | 7 (1.41) | 1 (0.20) | 0 (0.00) | 0 (0.00) | 31 (6.22) | **498 (100)** |
| December 21 | 17 (4.23) | 131 (32.59) | 164 (40.80) | 1 (0.25) | 18 (4.48) | 8 (1.99) | 8 (1.99) | 0 (0.00) | 0 (0.00) | 9 (1.99) | 46 (11.44) | **402 (100)** |

**Supplementary Table 5**. Molecular epidemiology of the top 10 most prevalent circulating SARS-CoV-2 lineages in East Malaysia from June 2021 to January 2022 categorized by month, n = 2979.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | AY.23,  n (%) | B.1.617.2,  n (%) | AY.79,  n (%) | AY.59,  n (%) | AY.24  n (%) | BA.1.1  n (%) | AU.2  n (%) | AY.76  n (%) | BA.1  n (%) | AY.116  n (%) | Others,  n (%) | **Total,**  **n (%)** |
| June 21 | 6 (22.22) | 1 (3.70) | 4 (14.81) | 3 (11.11) | 0 (0.00) | 0 (0.00) | 7 (25.93) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 6 (22.22) | **27 (100)** |
| July 21 | 21 (27.63) | 25 (32.89) | 4 (5.26) | 8 (10.53) | 0 (0.00) | 0 (0.00) | 8 (10.53) | 1 (1.32) | 0 (0.00) | 0 (0.00) | 9 (11.84) | **76 (100)** |
| August 21 | 492 (74.77) | 38 (5.78) | 24 (3.65) | 4 (0.61) | 3 (0.46) | 0 (0.00) | 43 (6.53) | 2 (0.30) | 0 (0.00) | 3 (0.30) | 49 (7.45) | **658 (100)** |
| September 21 | 781 (82.82) | 68 (7.21) | 28 (2.97) | 7 (0.74) | 31 (3.29) | 0 (0.00) | 2 (0.21) | 6 (0.64) | 0 (0.00) | 6 (0.64) | 14 (1.48) | **943 (100)** |
| October 21 | 451 (81.85) | 12 (2.18) | 34 (6.17) | 14 (2.54) | 4 (0.73) | 0 (0.00) | 0 (0.00) | 31 (5.63) | 0 (0.00) | 2 (0.36) | 3 (0.54) | **551 (100)** |
| November 21 | 279 (81.10) | 4 (1.16) | 29 (8.43) | 12 (3.49) | 4 (1.16) | 0 (0.00) | 0 (0.00) | 9 (2.62) | 0 (0.00) | 1 (0.29) | 6 (1.74) | **344 (100)** |
| December 21 | 135 (55.79) | 5 (2.07) | 24 (9.92) | 44 (18.18) | 6 (2.48) | 0 (0.00) | 0 (0.00) | 8 (3.31) | 11 (4.55) | 0 (0.00) | 9 (3.72) | **242 (100)** |
| January 2022 | 6 (4.35) | 3 (2.17) | 8 (5.80) | 4 (2.90) | 3 (2.17) | 72 (52.17) | 0 (0.00) | 2 (1.44) | 36 (26.08) | 0 (0.00) | 4 (2.89) | **138 (100)** |

**Supplementary Table 6.** COVID-19 imported cases in Malaysia from June 2021 to January 2022, n = 2276.

|  |  |  |
| --- | --- | --- |
| Country | Total number of cases, n | Percentage (%) |
| Saudi Arabia  Unknown/Not Available | 1105  628 | 48.55  27.59 |
| United Arab of Emirates | 96 | 4.22 |
| Turkey | 63 | 2.77 |
| Singapore | 63 | 2.77 |
| United Kingdom | 47 | 2.06 |
| India | 43 | 1.89 |
| Pakistan | 29 | 1.27 |
| Qatar | 24 | 1.05 |
| Indonesia | 23 | 1.01 |
| Philippine | 12 | 0.53 |
| United States of America | 12 | 0.53 |
| Egypt | 11 | 0.48 |
| Myanmar | 11 | 0.48 |
| Nigeria | 10 | 0.44 |
| Bangladesh | 8 | 0.35 |
| Sudan | 7 | 0.31 |
| Australia | 6 | 0.26 |
| Japan | 6 | 0.26 |
| China | 5 | 0.22 |
| Netherland | 5 | 0.22 |
| France | 4 | 0.18 |
| Switzerland | 4 | 0.18 |
| Thailand | 4 | 0.18 |
| Brunei | 3 | 0.13 |
| Oman | 3 | 0.13 |
| Russia | 3 | 0.13 |
| Spain | 3 | 0.13 |
| Sri Lanka | 3 | 0.13 |
| Germany | 2 | 0.09 |
| Iraq | 2 | 0.09 |
| Ireland | 2 | 0.09 |
| Libya | 2 | 0.09 |
| Mexico | 2 | 0.09 |
| South Africa | 2 | 0.09 |
| South Korea | 2 | 0.09 |
| Taiwan | 2 | 0.09 |
| Vietnam | 2 | 0.09 |
| Yemen | 2 | 0.09 |
| Austria | 1 | 0.04 |
| Yemen | 1 | 0.04 |
| Belgium | 1 | 0.04 |
| Brazil | 1 | 0.04 |
| Canada | 1 | 0.04 |
| Jordan | 1 | 0.04 |
| Mauritius | 1 | 0.04 |
| Nepal | 1 | 0.04 |
| Palestine | 1 | 0.04 |
| Poland | 1 | 0.04 |
| Slovakia | 1 | 0.04 |
| Somalia | 1 | 0.04 |
| Ukraine | 1 | 0.04 |
| Uzbekistan | 1 | 0.04 |
|  |  |  |

**Supplementary Table 7**. Molecular epidemiology of the top 10 most prevalent SARS-CoV-2 lineages in COVID-19 imported cases in Malaysia from June 2021 to January 2022 categorized by month, n = 379.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | BA.1,  n (%) | BA.1.1,  n (%) | B.1.617.2,  n (%) | AY.59,  n (%) | AY.23  n (%) | AY.79  n (%) | AY.5  n (%) | AY.114  n (%) | AY.43  n (%) | AY.4  n (%) | Others,  n (%) | **Total,**  **n (%)** |
| August 21 | 0 (0.00) | 0 (0.00) | 1 (100.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | **1** |
| September 21 | 0 (0.00) | 0 (0.00) | 0 (0.00) | 2 (40.00) | 3 (60.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | **5** |
| October 21 | 0 (0.00) | 0 (0.00) | 1 (12.50) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 1 (12.50) | 6 (75.00) | **8** |
| November 21 | 2 (2.89) | 0 (0.00) | 16 (23.18) | 6 (8.69) | 3 (4.34) | 3 (4.34) | 8 (11.59) | 7 (10.14) | 5 (7.24) | 3 (4.34) | 16 (23.18) | **69** |
| December 21 | 217 (73.81) | 48 (16.33) | 3 (1.02) | 3 (1.02) | 4 (1.36) | 7 (2.38) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 12 (4.08) | **294** |
| January 2022 | 0 (0.00) | 2 (100.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) | **2** |

**Supplementary Table 8.** Molecular epidemiology of the imported COVID-19 cases in Malaysia from June 2021 to January 2022, n = 379.

|  |  |  |  |
| --- | --- | --- | --- |
| Lineage | WHO nomenclature | Originating countries | Total,  n (%) |
| BA.1 | Omicron | Qatar, United Arab Emirates, United Kingdom, Maldives, Netherlands, Saudi Arabia, Singapore, Turkey, Unknown | 219 (57.78) |
| BA.1.1 | Omicron | Saudi Arabia, Turkey, United Kingdom, United States of America | 50 (13.19) |
| B.1.617.2 | Delta | India, Qatar, Russia, Turkey, United Arab Emirates, United Kingdom, | 21 (5.54) |
| AY.59 | Delta | India, Indonesia, Japan, Laos, New Zealand, Saudi Arabia, Singapore, United States of America | 11 (2.90) |
| AY.23 | Delta | Japan, Singapore, Turkey | 10 (2.64) |
| AY.79 | Delta | Saudi Arabia, Singapore, | 10 (2.64) |
| AY.5 | Delta | United Arab Emirates | 8 (2.11) |
| AY.114 | Delta | Sri Lanka, Turkey, United States of America, | 7 (1.85) |
| AY.43 | Delta | Turkey, Qatar | 5 (1.32) |
| AY.4 | Delta | Singapore, United Arab Emirates, United Kingdom | 4 (1.06) |
| AY.103 | Delta | Singapore | 3 (0.79) |
| AY.23.1 | Delta | Singapore | 3 (0.79) |
| AY.109 | Delta | India, Qatar | 2 (0.53) |
| AY.122 | Delta | United Arab Emirates | 2 (0.53) |
| AY.4.2 | Delta | United Kingdom | 2 (0.53) |
| AY.44 | Delta | Qatar | 2 (0.53) |
| AY.76 | Delta | - | 2 (0.53) |
| AY.85 | Delta | Laos | 2 (0.53) |
| BA.2 | Omicron | - | 2 (0.53) |
| AY.102 | Delta | Palestine | 1(0.26) |
| AY.106 | Delta | Saudi Arabia | 1 (0.26) |
| AY.116 | Delta | - | 1 (0.26) |
| AY.119 | Delta | Turkey | 1 (0.26) |
| AY.124 | Delta | United Arab Emirates | 1 (0.26) |
| AY.125 | Delta | Turkey | 1 (0.26) |
| AY.24 | Delta | Indonesia | 1 (0.26) |
| AY.29 | Delta | Bangladesh | 1 (0.26) |
| AY.33 | Delta | - | 1 (0.26) |
| AY.39 | Delta | Qatar | 1 (0.26) |
| AY.4.8 | Delta | - | 1 (0.26) |
| AY.42 | Delta | - | 1 (0.26) |
| AY.70 | Delta | Singapore | 1 (0.26) |
| B.1.1 | - | - | 1 (0.26) |

**Supplementary Table 9**. Top 20 mutations in isolates from Peninsular Malaysia based on GISAID submission from June 2021 to January 2022, n = 3107.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Nucleotide mutation | Protein mutation | Gene | Mutation type | Annotation | Numbers of isolates, n (%) |
| C14408T | P323L | NSP12b | Non-synonymous SNP | RNA-dependent RNA polymerase, post-ribosomal frameshift | 3098 (99.71) |
| A23403G | D614G | S | Non-synonymous SNP | Spike | 3062 (98.55) |
| C22995A | T478K | S | Non-synonymous SNP | Spike | 3029 (97.49) |
| C3037T | F106F | NSP3 | Synonymous mutation | Predicted phosphoesterase papain-like proteinase | 2919 (93.95) |
| T26767C | I82T | M | Non-synonymous SNP | Membrane glycoprotein | 2854 (91.86) |
| G15415A | G662S | NSP12b | Non-synonymous SNP | RNA-dependent RNA polymerase, post-ribosomal frameshift | 2850 (91.73) |
| C23604G | P681R | S | Non-synonymous SNP | Spike | 2849 (91.70) |
| A28461G | D63G | N | Non-synonymous SNP | Spike | 2847 (91.63) |
| C25469T | S26L | ORF3a | Non-synonymous SNP | ORF3a protein | 2824 (90.89) |
| C16466T | P77L | NSP13 | Non-synonymous SNP | Helicase | 2817 (90.67) |
| T22917G | L452R | N | Non-synonymous SNP | Nucleocapsid protein | 2806 (90.31) |
| G28881T | R203M | N | Non-synonymous SNP | Nucleocapsid protein | 2803 (90.22) |
| C21618G | T19R | S | Non-synonymous SNP | Spike | 2799 (90.09) |
| C27752T | T120I | ORF7a | Non-synonymous SNP | ORF7a protein | 2797 (90.02) |
| G29402T | D377Y | N | Non-synonymous SNP | Nucleocapsid protein | 2789 (89.77) |
| T27638C | V82A | ORF7a | Non-synonymous SNP | ORF7a protein | 2784 (89.60) |
| G24410A | D950N | S | Non-synonymous SNP | Spike | 2780 (89.48) |
| G21987A | G142D | S | Non-synonymous SNP | Spike | 1819 (58.55) |
| T11418C | V149A | ORF1ab/nsp6 | Non-synonymous SNP | Transmembrane protein | 1797 (57.84) |
| C5184T | P822L | ORF1ab/nsp3 | Non-synonymous SNP | Transmembrane protein | 1787 (57.52) |

**Supplementary Table 10**. Top 20 mutations in isolates from East Malaysia based on GISAID submission from July 2021 to January 2022, n = 3014.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Nucleotide mutation | Protein mutation | Gene | Mutation type | Annotation | Numbers of isolates, n, (%) |
| C14408T | P323L | NSP 12b | Non-synonymous SNP | RNA-dependent RNA polymerase post-ribosomal frameshift | 3013 (99.97) |
| A23403G | D614G | S | Non-synonymous SNP | Spike | 3011 (99.90) |
| C3037T | F106F | NSP3 | Synonymous mutation | Predicted phosphoesterase papain-like proteinase | 2999 (99.50) |
| C22995A | T478K | S | Non-synonymous SNP | Spike | 2920 (96.88) |
| C23604G | P681R | S | Non-synonymous SNP | Spike | 2872 (95.29) |
| A28461G | D63G | N | Non-synonymous SNP | Spike | 2793 (92.67) |
| C16466T | P77L | ORF1ab/nsp13 | Non-synonymous SNP | Helicase | 2793 (92.67) |
| G29402T | D377Y | N | Non-synonymous SNP | Spike | 2793 (92.67) |
| T22917G | L452R | S | Non-synonymous SNP | Nucleocapsid protein | 2793 (92.67) |
| C21618G | T19R | S | Non-synonymous SNP | Spike | 2792 (92.63) |
| G15451A | G671S | ORF1ab/nsp12 | Non-synonymous SNP | RNA-dependent RNA polymerase post-ribosomal frameshift | 2792 (92.63) |
| G24410A | D950N | S | Non-synonymous SNP | Spike | 2792 (92.63) |
| T26767C | I82T | M | Non-synonymous SNP | Spike | 2792 (92.63) |
| C25469T | S26L | ORF3a | Non-synonymous SNP | ORF3a protein | 2790 (92.57) |
| G28881T | R203M | N | Non-synonymous SNP | Nucleocapsid protein | 2790 (92.57) |
| C27752T | T120I | ORF7a | Non-synonymous SNP | ORF7a protein | 2786 (92.44) |
| T27638C | V28A | ORF7a | Non-synonymous SNP | ORF7a protein | 2766 (91.77) |
| C10029T | T492I | ORF1ab/nsp4 | Non-synonymous SNP | Transmembrane protein | 2705 (89.75) |
| G21987A | G142D | S | Non-synonymous SNP | Spike | 2656 (88.12) |
| A11201G | T77A | ORF1ab/nsp6 | Non-synonymous SNP | Transmembrane protein | 2588 (85.87) |