Electronic Supplementary Material

COVID-19 hospital admissions: Brazil's first and second waves compared waves compared

Bastos LSL, Ranzani OT, Souza TML, Hamacher S, Bozza FA.

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Data sources

Data from hospital admissions were obtained from the Influenza Epidemiological Surveillance Information System, SIVEP-Gripe (*Sistema de Informação de Vigilância Epidemiológica da Gripe*), a nationwide surveillance database used to monitor severe acute respiratory infections in Brazil. A detailed description of data definition was provided previously.[1]

Briefly, we included patients with COVID-19 diagnosed by RT-qPCR or other criteria, aged over 20 years, an admitted to the hospital between February 16, 2020 to May 24, 2021.

In our analysis, we compared first, and second waves defined by the lowest value per week of hospitalized cases in Brazil (Epidemiological week 43). [2] Within the second wave, we compared the periods before and after the dominance (when genomic data point towards 50% of the sample carrying the mutation, epidemiological week 53).

In eFigure 1, we also considered data of prevalence for the P.1[3] and B.1.1.7[4] variants of concern.

1 Ranzani OT, Bastos LSL, Gelli JGM, et al. Characterisation of the first 250 000 hospital admissions for COVID-19 in Brazil: a retrospective analysis of nationwide data. The Lancet Respiratory Medicine 2021; S2213260020305609.

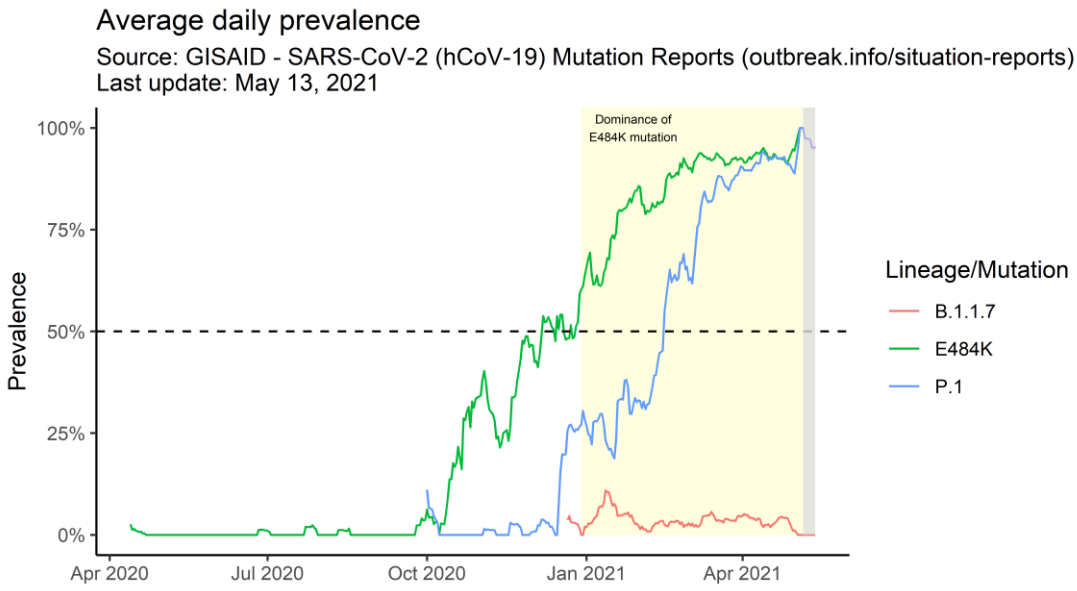
2 Latif AA, Mullen JL, Alkuzweny M, *et al.* S:E484K Mutation Report. 2020 https://outbreak.info/situation-reports?muts=S%3AE484K (accessed May 26, 2021).

3 Latif AA, Mullen JL, Alkuzweny M, *et al.* P.1 Mutation Report. 2020 https://outbreak.info/situation-reports?pango=P.1&selected=BRA&loc=BRA&loc=USA&loc=USA_US-CA (accessed May 26, 2021).

4 Latif AA, Mullen JL, Alkuzweny M, *et al.* B.1.1.7 Mutation Report. 2020 https://outbreak.info/situation-reports?pango=B.1.1.7&loc=GBR&loc=USA&loc=USA_US-CA&selected=GBR (accessed May 26, 2021).

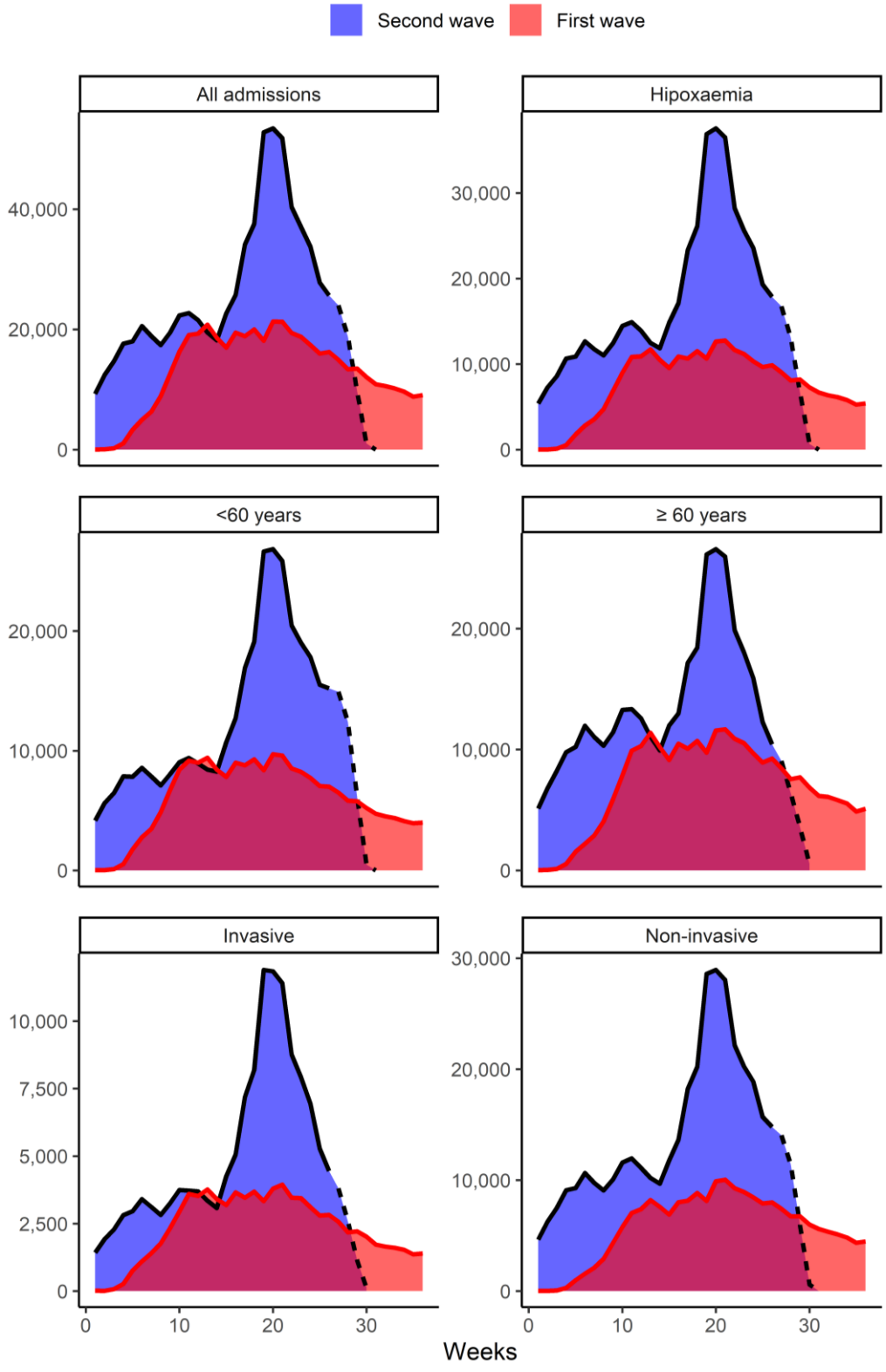
eFigure 1 – Average daily prevalence of Variants of Concern in Brazil

Shaded area: Noisy data due to small samples reported, according to outbreak.info



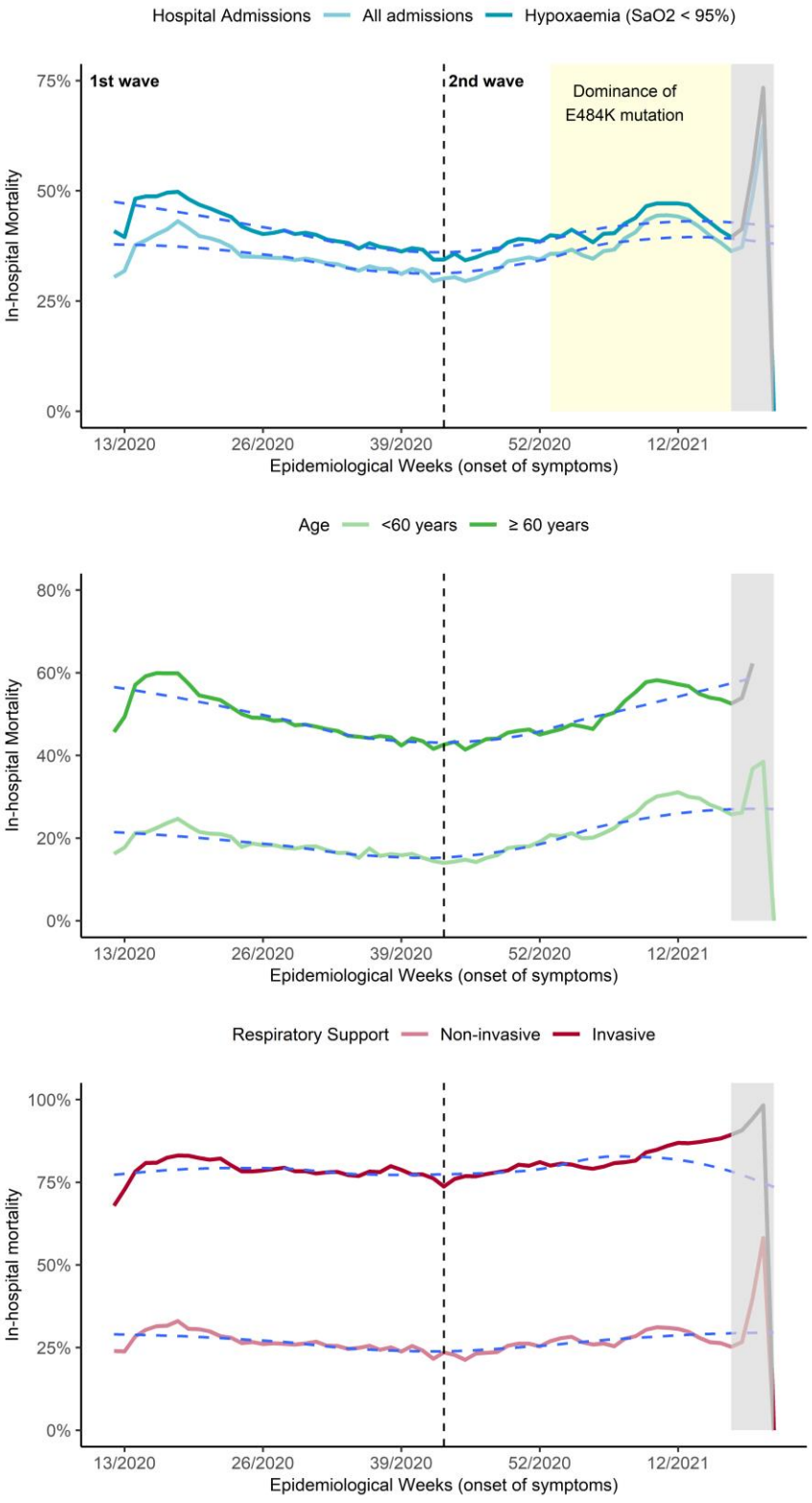
eFigure 2. Comparison of first and second waves of COVID-19 hospital admissions in Brazil.

We compared the caseload of hospital admissions since the beginning of each wave: first wave – week 8, second wave – week 43. Dashed line represents expected delay in notification of hospital admissions to the SIVEP-Gripe database



eFigure3. In-hospital mortality stratified by hypoxaemia, age, and respiratory support.

Data refers to adult COVID-19 hospital admissions with an outcome. The x-axis denotes the epidemiological week when symptom onset occurred for hospital admissions. The grey-shaded area represents a period of uncertainty, particularly for deaths, due to the expected notification delay from the SIVEP-Gripe (Data exported on May 26, 2021). First and second waves are defined by the lowest value per week of hospitalized cases in Brazil (dashed line, epidemiological week 43/2020),3 whereas the yellow-shaded area in the period of the mutation's domination (epidemiological week 53/2020).



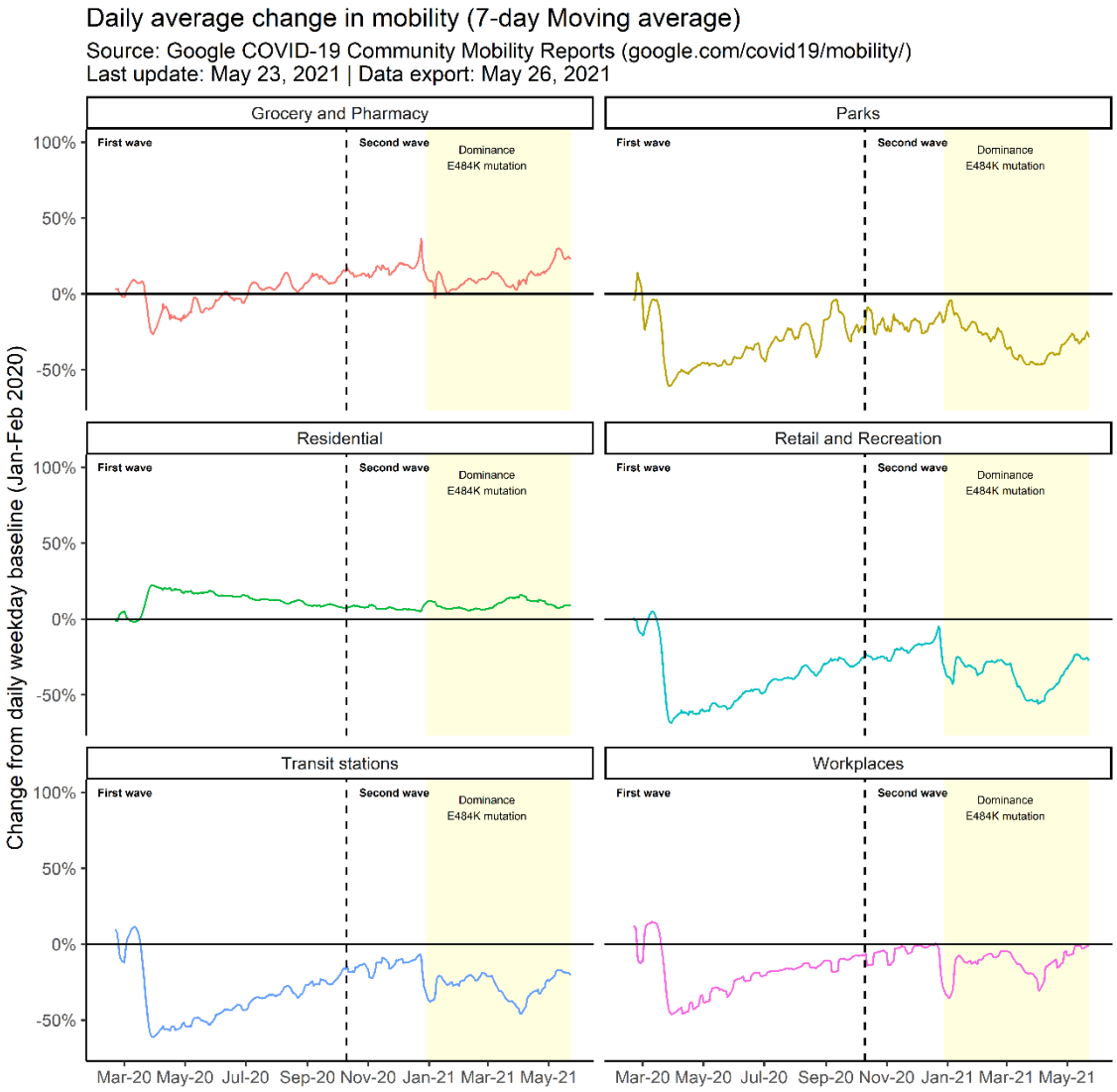
eFigure 4. Changes in Mobility in Brazil

Data extracted from the Google COVID-19 Community Mobility Reports on May 23, 2021. Last update was May 26, 2021.

Mobility is evaluated as the percent change from baseline values of length of stay and visits to different places. Baselines are the median values of each day of the week from January 03, 2020 to February 06, 2020. [5]

We calculated the 7-day moving average of change from daily baseline to reduce noisy data.

5 Google LLC. Reports. 2020. https://www.google.com/covid19/mobility/ (accessed in May 22, 2020)



eTable 1. Comparison of hospital admissions and in-hospital mortality between first and second COVID-19 waves in Brazil (n = 1,187,840)

Characteristics	First wave [n = 468,561]	Second wave [n = 719,279]	Second wave**	
			Before E484K mutation dominance [n = 170,718]	After E484K mutation dominance [n = 548,561]
Admissions per week, median (IQR)	14220 (9041-18792)	22703 (18533-33914)	17838 (15392-19331)	27791 (22732-37556)
Highest number of admissions in a week	21294	53424	22319	53424
Female n (%) [n = 1,187,650]	205,555 (43.9%)	321,797 (44.7%)	76,025 (44.5%)	245,772 (44.8%)
Age (years), median (IQR) [n = 1,187,840]	62 (48, 74)	60 (48, 71)	63 (50, 74)	59 (47, 70)
20-39	61,510 (13.1%)	92,387 (12.8%)	18,663 (10.9%)	73,724 (13.4%)
40-59	153,331 (32.7%)	256,940 (35.7%)	53,846 (31.5%)	203,094 (37.0%)
>=60	253,720 (54.1%)	369,952 (51.4%)	98,209 (57.5%)	271,743 (49.5%)
Self-reported race, n (%) [n = 954,247]				
Black/Brown	184,000 (51.3%)	261,503 (43.9%)	59,037 (42.0%)	202,466 (44.5%)
White	168,168 (46.9%)	326,382 (54.8%)	79,712 (56.7%)	246,670 (54.2%)
Asian	5,168 (1.4%)	6,622 (1.1%)	1,649 (1.2%)	4,973 (1.1%)
Indigenous	1,416 (0.4%)	988 (0.2%)	311 (0.2%)	677 (0.1%)
Self-reported level of education, n (%) [n = 423,165]				
Illiterate	12,458 (7.5%)	14,450 (5.6%)	3,507 (5.7%)	10,943 (5.6%)
Up to high school	76,441 (45.9%)	117,398 (45.7%)	27,186 (44.0%)	90,212 (46.3%)
High school	52,009 (31.2%)	82,929 (32.3%)	19,279 (31.2%)	63,650 (32.6%)
College/University	25,581 (15.4%)	41,899 (16.3%)	11,747 (19.0%)	30,152 (15.5%)
Residing in State capitals, n (%) [n = 1,187,840]	226,026 (48.2%)	269,881 (37.5%)	71,277 (41.8%)	198,604 (36.2%)
Area of residence, n (%) [n = 1,052,457]				
Urban	397,420 (95.5%)	604,041 (94.9%)	144,464 (95.6%)	459,577 (94.7%)
Rural	17,348 (4.2%)	30,114 (4.7%)	6,060 (4.0%)	24,054 (5.0%)
Peri-urban	1,443 (0.3%)	2,091 (0.3%)	536 (0.4%)	1,555 (0.3%)
Hypoxaemia, n (%) [n = 1,005,396]	273,071 (69.5%)	481,971 (78.7%)	105,168 (72.9%)	376,803 (80.5%)
ICU admission, n (%) [n = 1,060,462]	156,747 (37.6%)	241,371 (37.5%)	59,806 (38.6%)	181,565 (37.1%)
Respiratory Support, n (%) [n = 1,027,116]	291,463 (73.2%)	524,788 (83.4%)	115,693 (77.6%)	409,095 (85.2%)
NIV, n (%) [n = 1,027,116]	207,526 (52.1%)	386,160 (61.4%)	87,939 (59.0%)	298,221 (62.1%)
IMV, n (%) [n = 1,027,116]	83,937 (21.1%)	138,628 (22.0%)	27,754 (18.6%)	110,874 (23.1%)
IMV inside ICU, n(%) [n = 217,376]	70,764 (86.5%)	116,457 (85.9%)	23,925 (87.9%)	92,532 (85.4%)
IMV outside ICU, n(%) [n = 217,376]	11,065 (13.5%)	19,090 (14.1%)	3,287 (12.1%)	15,803 (14.6%)
Admissions with an outcome, n (%) [n = 1,187,840]	436,653 (93.2%)	613,980 (85.4%)	154,088 (90.3%)	459,892 (83.8%)
In-hospital mortality, n (%) [n = 1,050,633] (admissions with an outcome)*	155,644 (35.6%)	237,767 (38.7%)	50,960 (33.1%)	186,807 (40.6%)
20-39 years [n = 132,946]	6,547 (11.6%)	12,953 (16.9%)	1,865 (11.2%)	11,088 (18.5%)
40-59 years [n = 356,306]	30,924 (21.8%)	58,824 (27.5%)	9,193 (19.1%)	49,631 (29.9%)
>= 60 years [n = 561,381]	118,173 (49.6%)	165,990 (51.4%)	39,902 (44.7%)	126,088 (53.9%)
ICU admission, n (%) [n = 361,842]	85,818 (57.8%)	138,052 (64.7%)	30,713 (56.0%)	107,339 (67.7%)
NIV, n (%) [n = 518,072]	52,014 (26.9%)	89,796 (27.7%)	19,604 (24.8%)	70,192 (28.6%)
IMV, n (%) [n = 208,560]	64,260 (79.2%)	105,785 (83.0%)	20,823 (78.8%)	84,962 (84.1%)

ICU – intensive care unit; NIV – Non-invasive ventilation; IMV – Invasive Mechanical Ventilation
*All in-hospital mortality estimates were calculated using only admissions with an outcome.
First wave - Epidemiological weeks 8/2020 to 43/2020 (February 16, 2020 to October 24, 2020)
Second wave - Epidemiological weeks 44/2020 to 17/2021* (October 25, 2020 to May 01, 2021)
**We included data until week 16/2021 (May 01, 2021) to reduce potential effects from the notification delay on estimates.
Before E484K mutation dominance - Epidemiological weeks 44/2020 to 53/2020 (October 25, 2020 to January 02, 2021)
After E484K mutation dominance - Epidemiological weeks 01/2021 to 16/2021