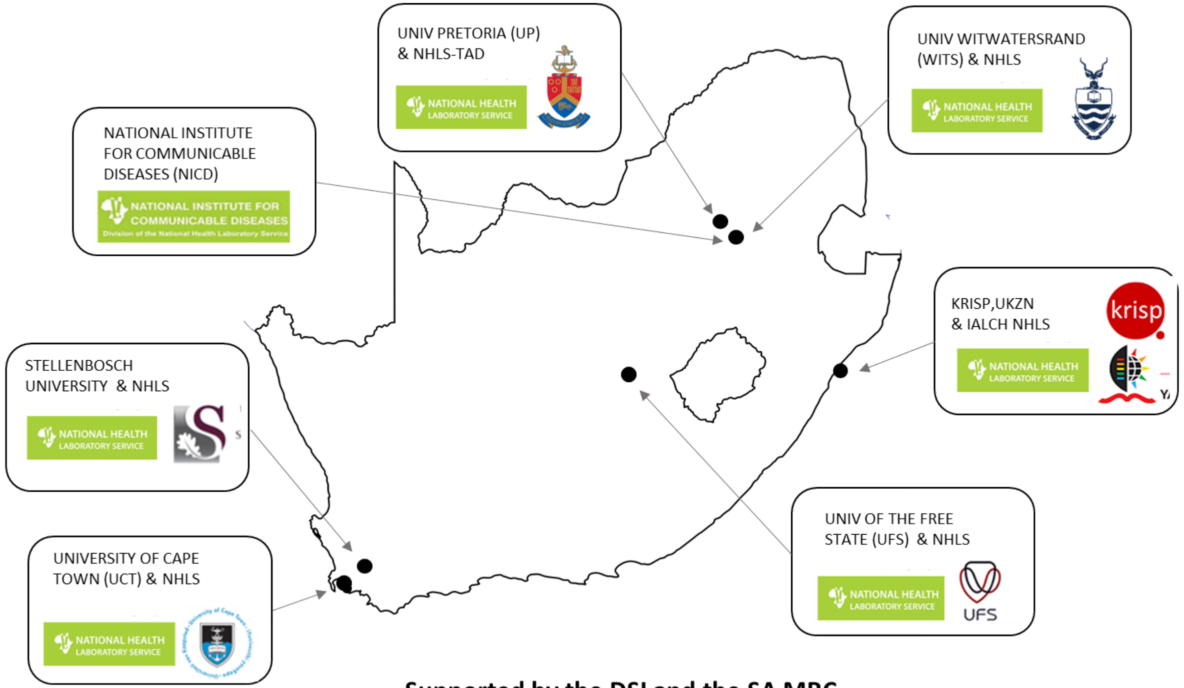
Network for Genomic Surveillance South Africa (NGS-SA)

SARS-CoV-2 Sequencing Update
1 September 2021



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Supported by the DSI and the SA MRC

Msomi N, Mlisana K, et al. Lancet Microbe 2020

Prepared by the National Institute for Communicable Diseases (NICD) of the National Health Laboratory (NHLS) on behalf of the Network for Genomics Surveillance in South Africa (NGS-SA)

The genomic data presented here are based on South African SARS-CoV-2 sequence data downloaded from GISAID (www.gisaid.org) on 1 September at 20h05

Data license: https://www.gisaid.org/registration/terms-of-use/

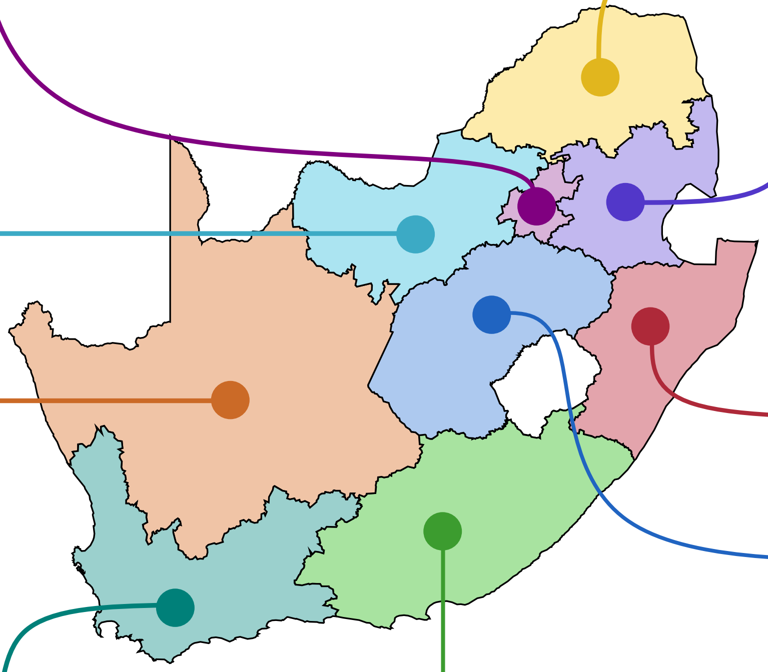
Elbe, S., and Buckland-Merrett, G. (2017) Data, disease and diplomacy: GISAID's innovative contribution to global health. Global Challenges, 1:33-46. DOI: 10.1002/gch2.1018 PMCID: 31565258

Shu, Y., McCauley, J. (2017) GISAID: Global initiative on sharing all influenza data – from vision to reality. EuroSurveillance, 22(13) DOI: 10.2807/1560-7917.ES.2017.22.13.30494 PMCID: PMC5388101

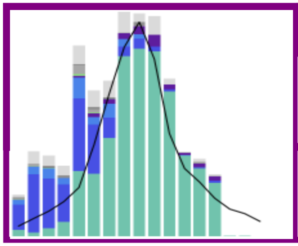
Case data is based on collection date. Case from https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/surveillance-reports/weekly-epidemiological-brief/

GENOMIC SURVEILLANCE IN THE THIRD WAVE

epiweeks 18 - 35



Gauteng

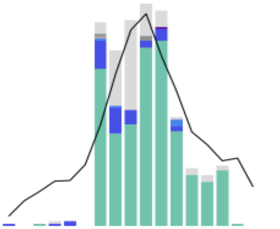


Genomes	Cases
2 530 (32.9%)	479 766 (40.7%)

Genomes deposited in the last week

🟦 4 🟦 19 🟩 363 🟪 16 ⬛ 2 ⬛ 2 ⬜ 5

North West

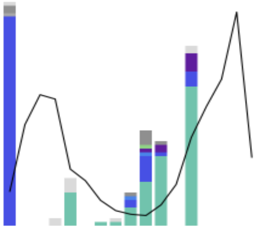


Genomes	Cases
569 (7.4%)	74 807 (6.3%)

Genomes deposited in the last week

🟦 3 🟦 3 🟩 47 ⬛ 1 ⬜ 3

Northern Cape

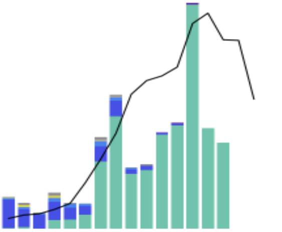


Genomes	Cases
186 (2.4%)	40 080 (3.4%)

Genomes deposited in the last week

🟦 4 🟩 47 🟪 6 ⬜ 7

Western Cape

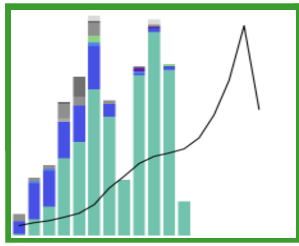


Genomes	Cases
1 559 (20.3%)	195 977 (16.6%)

Genomes deposited in the last week

🟦 1 🟦 1 🟩 340 🟪 1 ⬛ 1

Eastern Cape

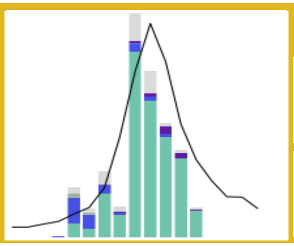


Genomes	Cases
801 (10.4%)	70 188 (6.0%)

Genomes deposited in the last week

🟦 3 🟩 47 🟩 1 🟪 1

Limpopo

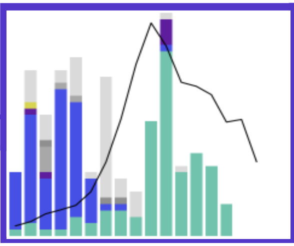


Genomes	Cases
749 (9.7%)	55 696 (4.7%)

Genomes deposited in the last week

🟦 1 🟦 2 🟩 52 🟪 2 ⬜ 11

Mpumalanga

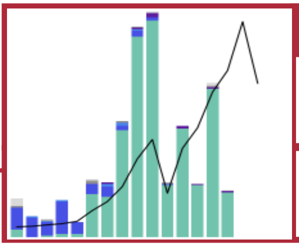


Genomes	Cases
253 (3.3%)	65 648 (5.6%)

Genomes deposited in the last week

🟩 17

KwaZulu-Natal

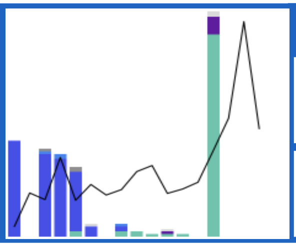


Genomes	Cases
819 (10.6%)	139 337 (11.8%)

Genomes deposited in the last week

🟩 158 🟪 3 ⬛ 2

Free State



Genomes	Cases
234 (3.0%)	57 683 (4.9%)

Genomes deposited in the last week

🟩 79 🟪 8 ⬜ 2

🟦 Alpha (20I, V1)
🟦 Beta (20H, V2)
🟩 Delta (21A)
🟩 Kappa (21B)
🟨 Eta (21D)
🟪 C.1.2 (20D)
⬛ 20A
⬛ 20B
⬛ 20C
⬛ 20D
⬜ Unassigned
— Cases

Bar graphs represent genomes sequenced per epiweek, line represents cases by collection date (weeks 18 – 35)
Genomes and cases presented as provincial total (percentage of national total) for epiweeks 18 - 35

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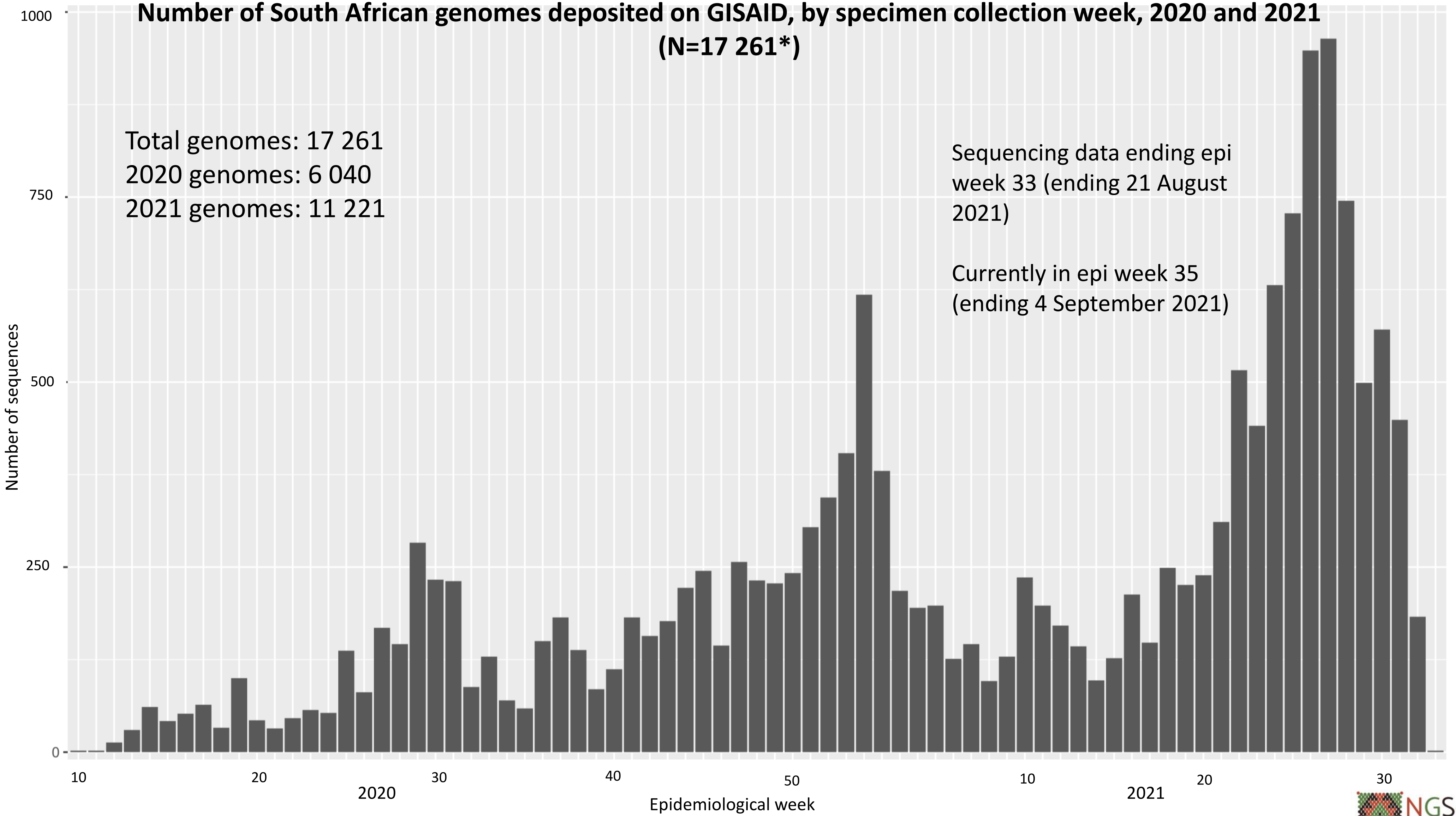
Number of South African genomes deposited on GISAID, by specimen collection week, 2020 and 2021 (N=17 261*)



Total genomes: 17 261
2020 genomes: 6 040
2021 genomes: 11 221

Sequencing data ending epi week 33 (ending 21 August 2021)

Currently in epi week 35 (ending 4 September 2021)

*This represents the cleaned, de-duplicated dataset of unique sequences. This dataset will be used for all further figures.

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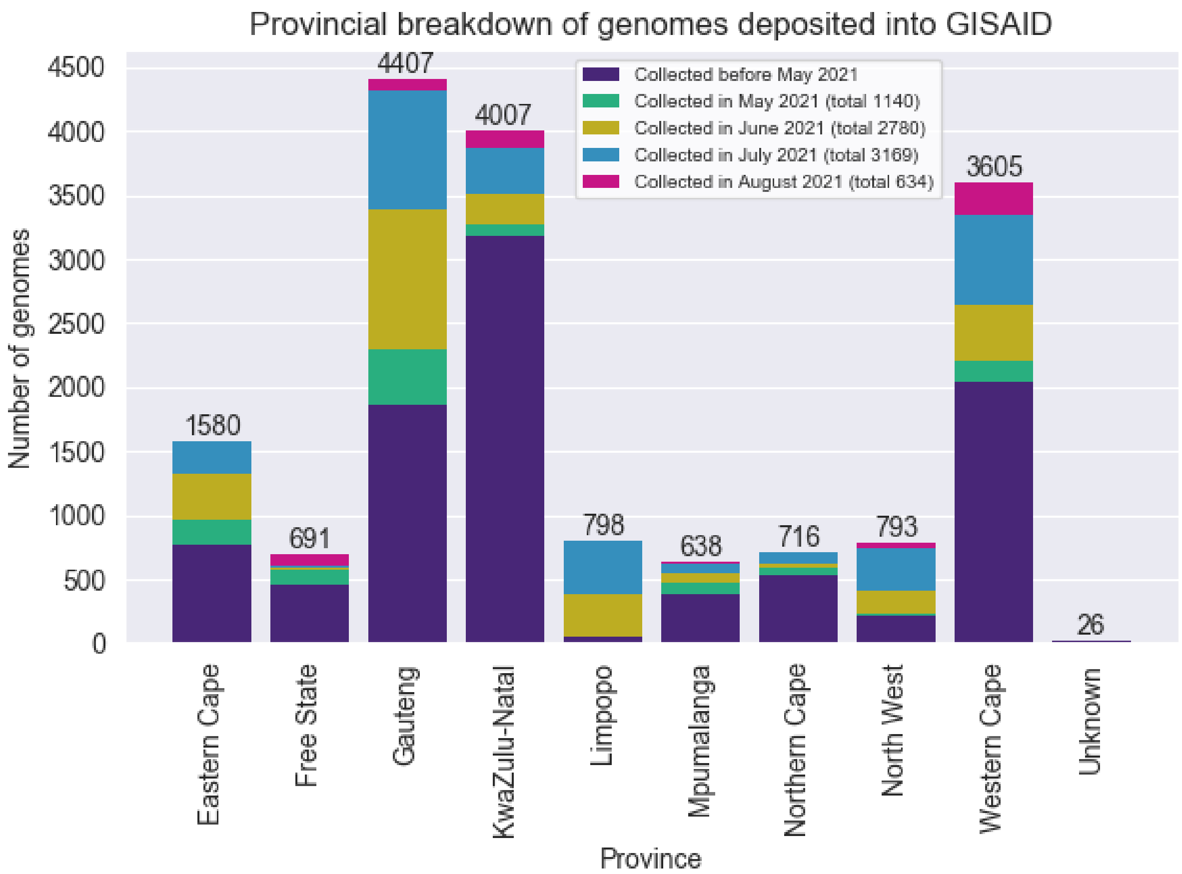
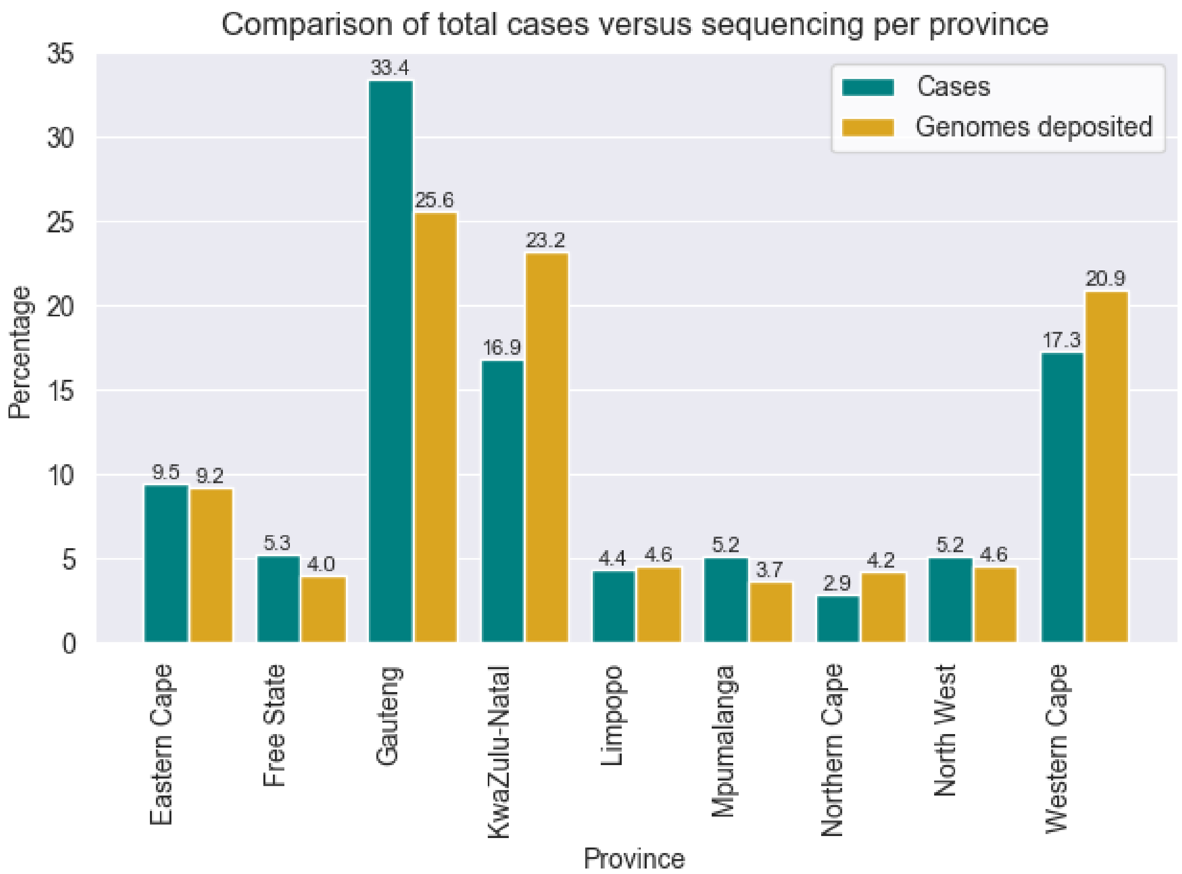
GISAID genomes vs total cases, 2020 and 2021 (N=16 067)





All provinces, apart from GP and KZN, have comparable percentage of overall cases and overall sequenced genomes

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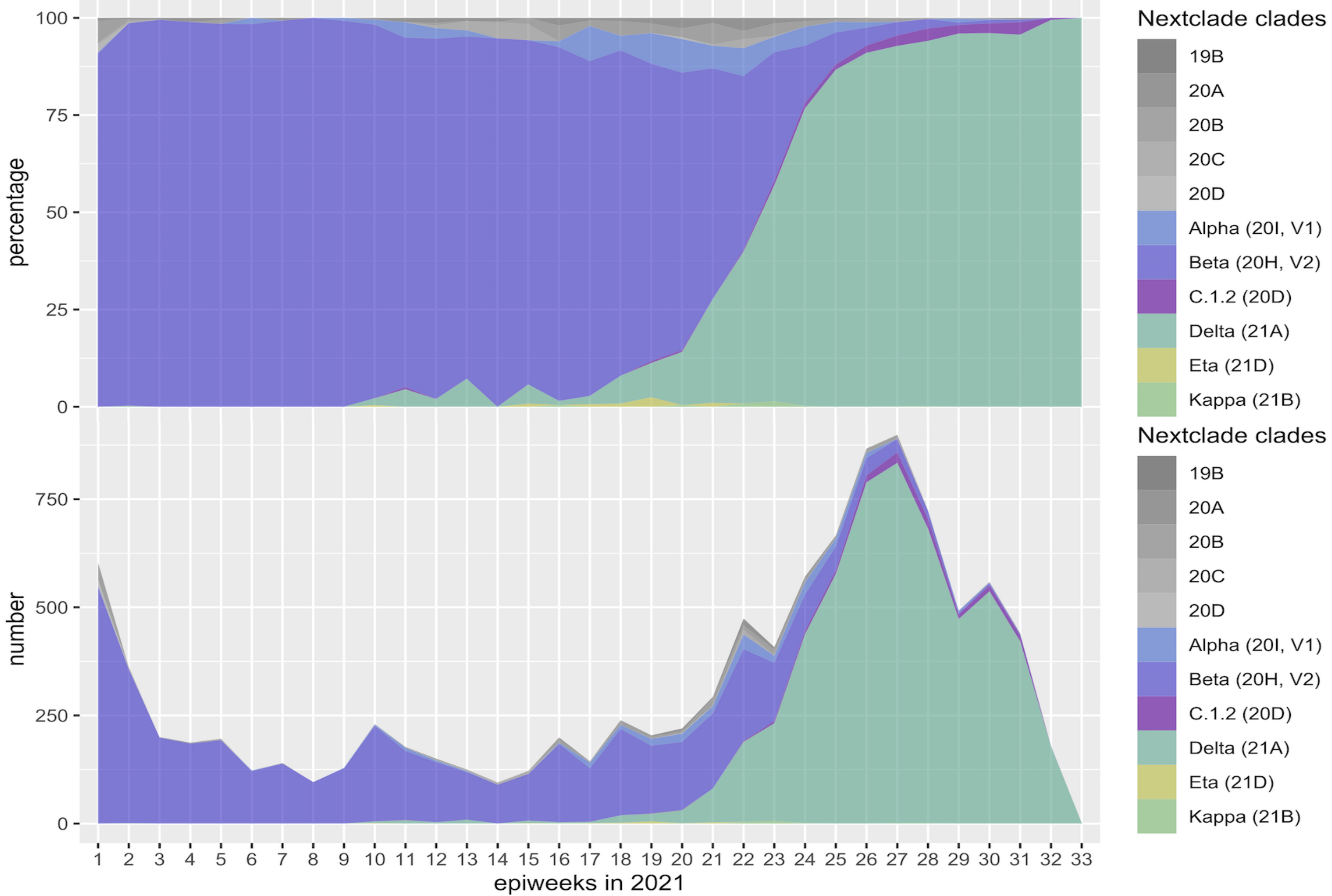
Distribution and number of clades in South Africa, 2021 (N= 11 221)



Sequencing data ending epi week 33 (ending 21 August 2021)

Currently in epi week 35 (ending 4 September 2021)

While Alpha, Delta and Eta variant frequency increased from the beginning of May, Delta came to dominate by end June at >75% , in July at >85% and in August at >90%

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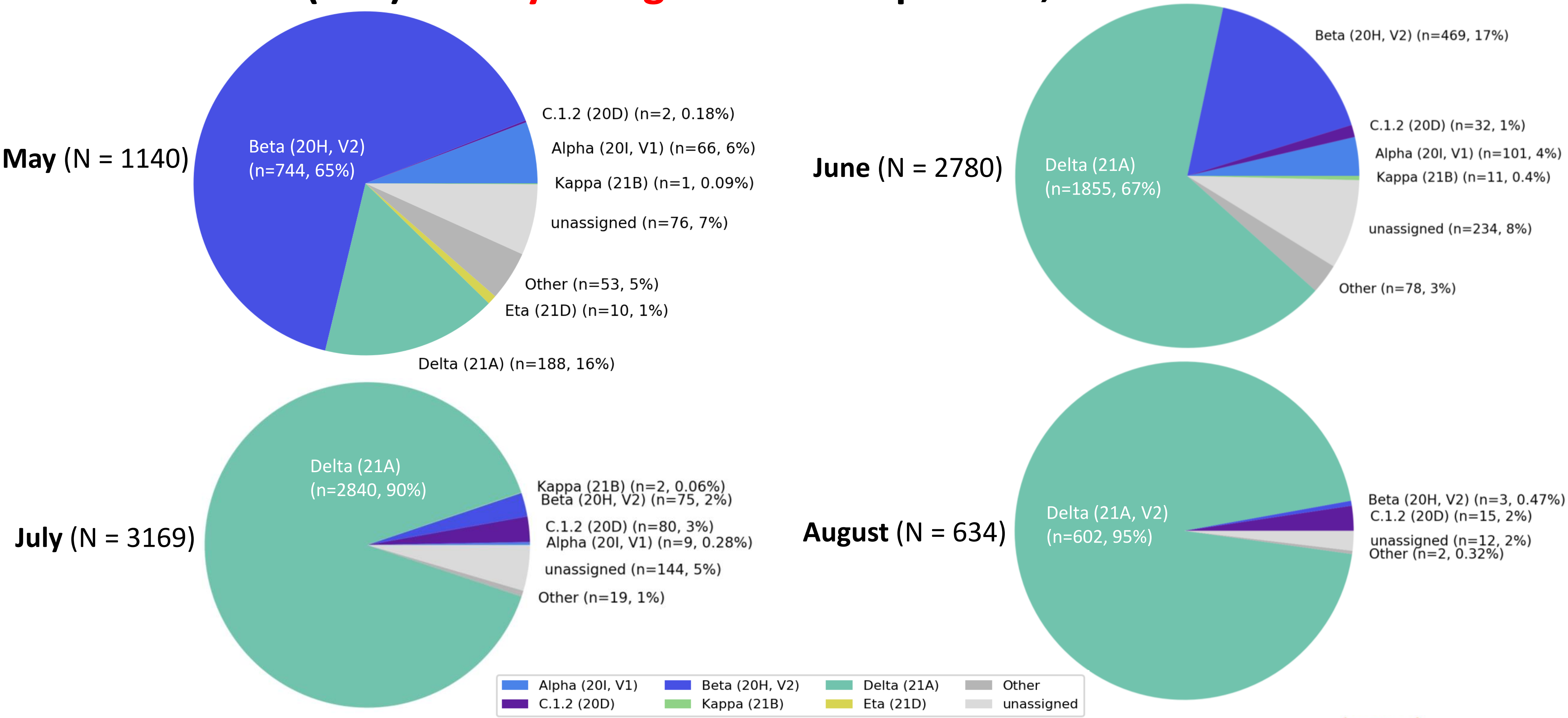
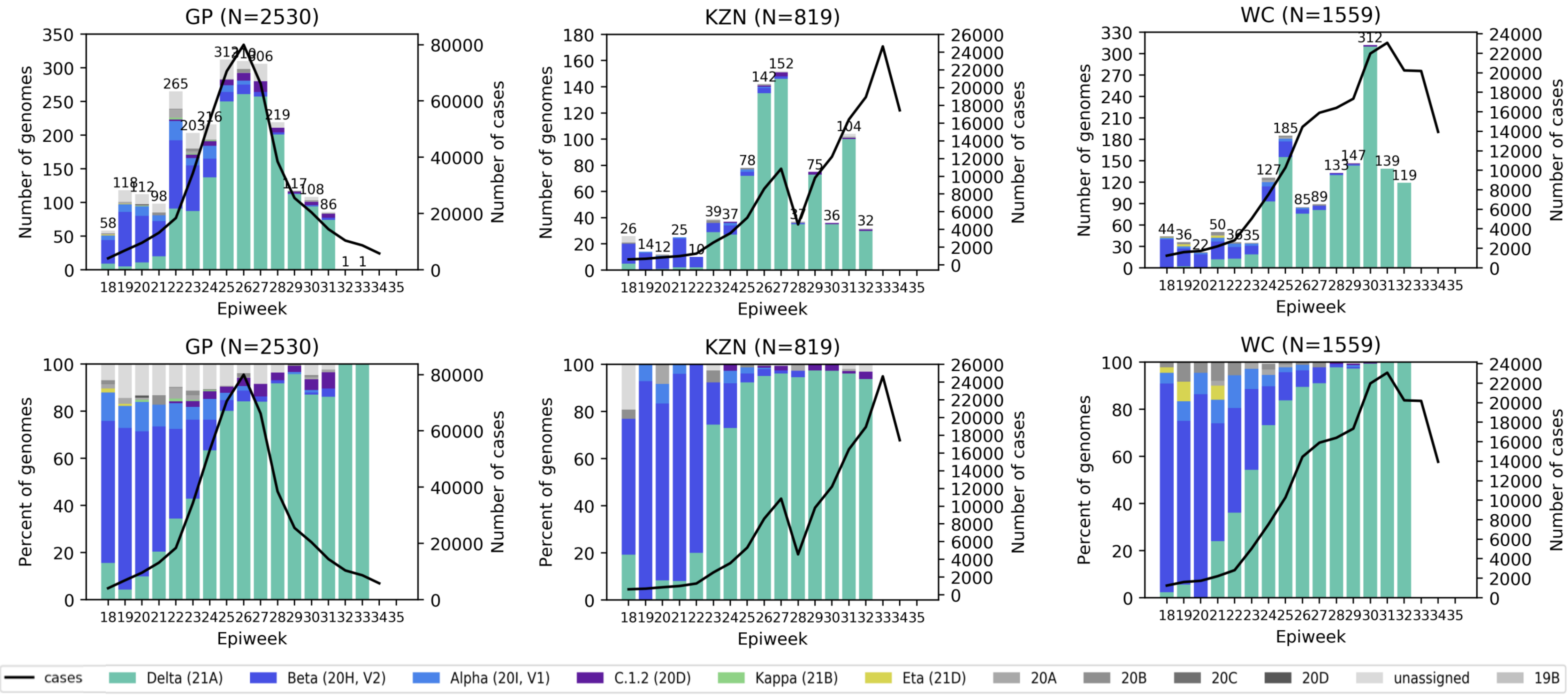
Prevalence of Variants of Concern (VOC) and Variants of Interest (VOI) in May – August 2021 sequences, South Africa



Beta variant dominated in May, while the Delta variant dominated in June-August in South Africa

Genomes sequenced from specimens collected in May – mid-August 2021 (epiweeks 18 – 35) from KwaZulu-Natal, Gauteng, Western Cape Provinces



Beta dominates in all provinces in May, however following its detection in week 18, Delta rapidly begins to dominate in all three provinces by mid-June and continues to dominate in July and August

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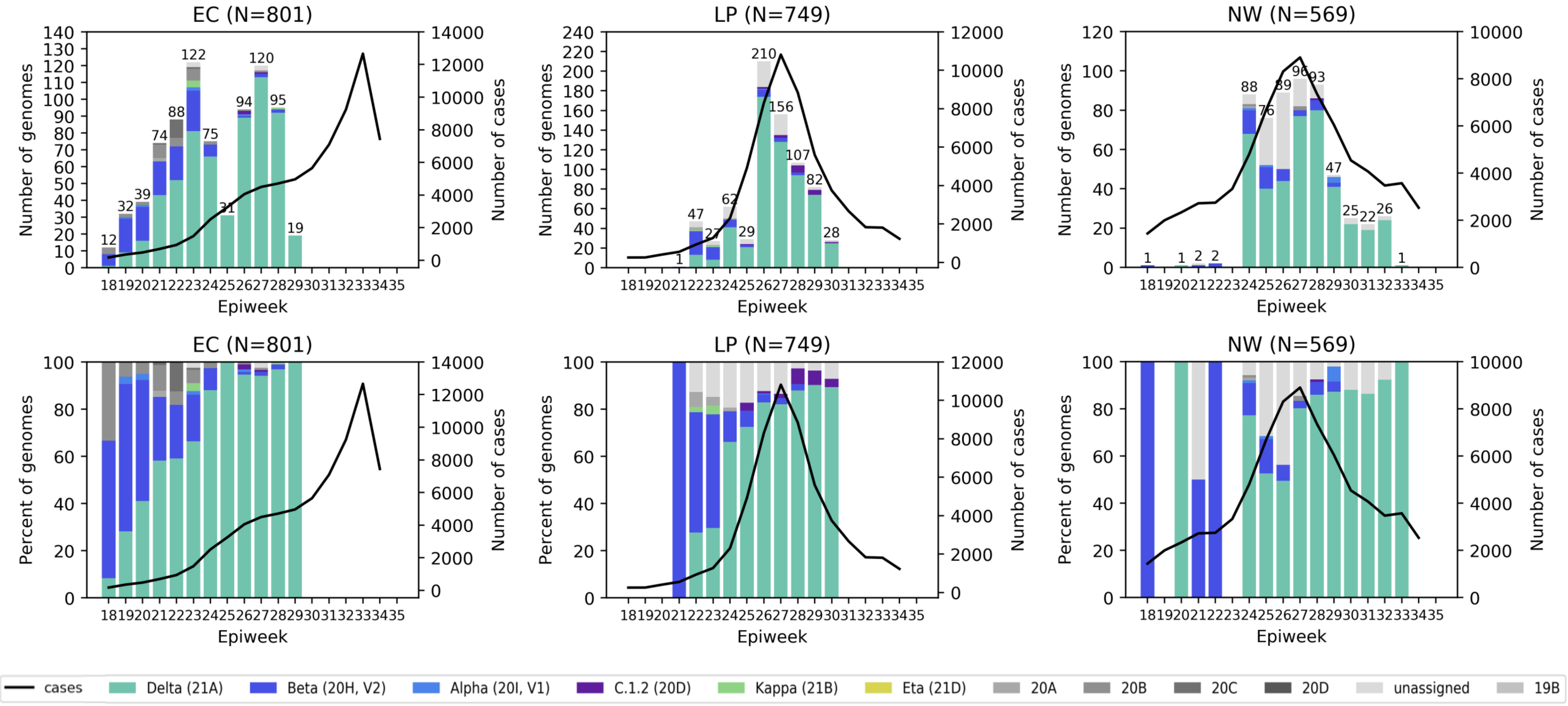
Genomes sequenced from specimens collected in May – mid-August 2021 (epiweeks 18 – 35) from Eastern Cape, Limpopo and North-West Provinces



Delta variant dominating in Eastern Cape, Limpopo and North-West Provinces

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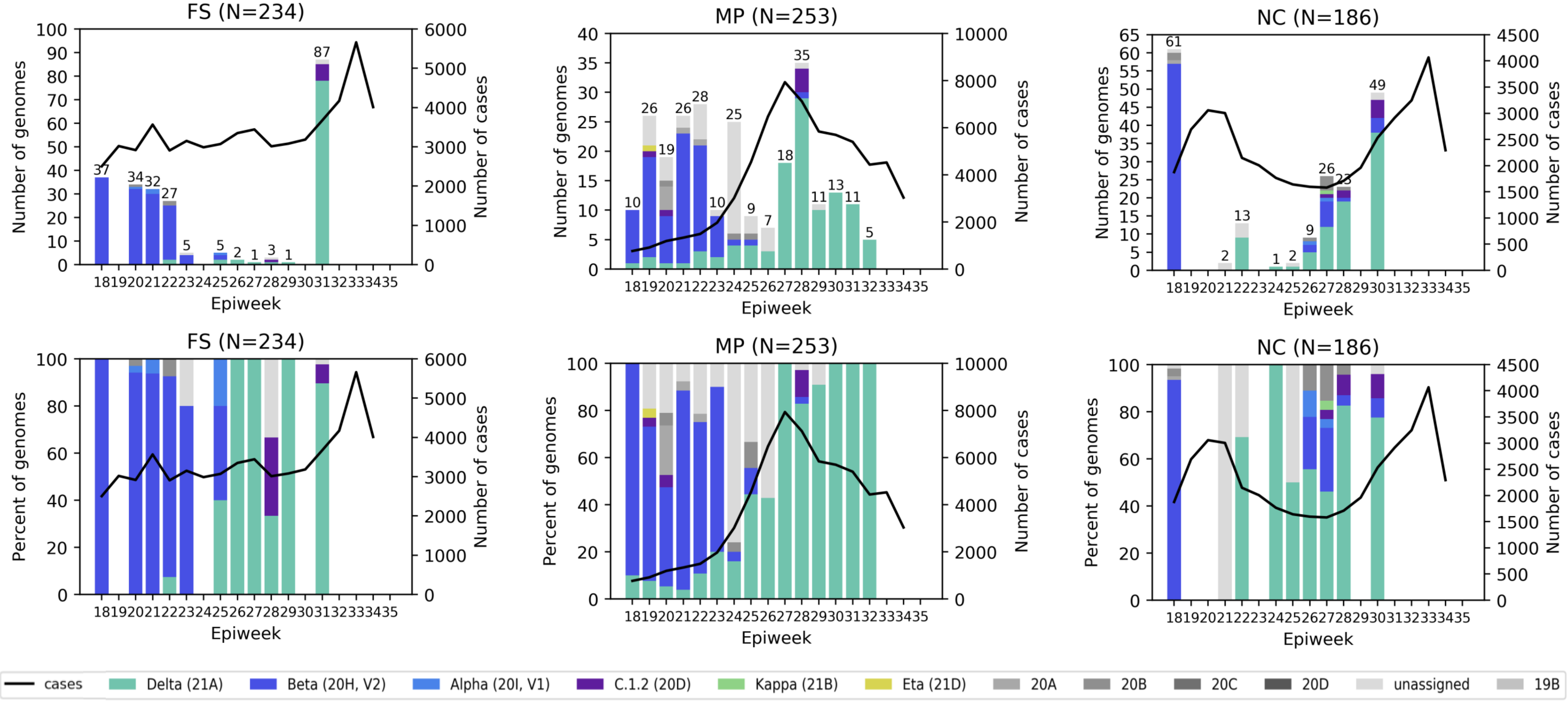
Genomes sequenced from specimens collected in May – mid-August 2021 (epiweeks 18 – 34) from Free State, Mpumalanga and Northern Cape Provinces



Despite less frequent or low level sequencing data, Delta dominating in FS, MP and NC provinces

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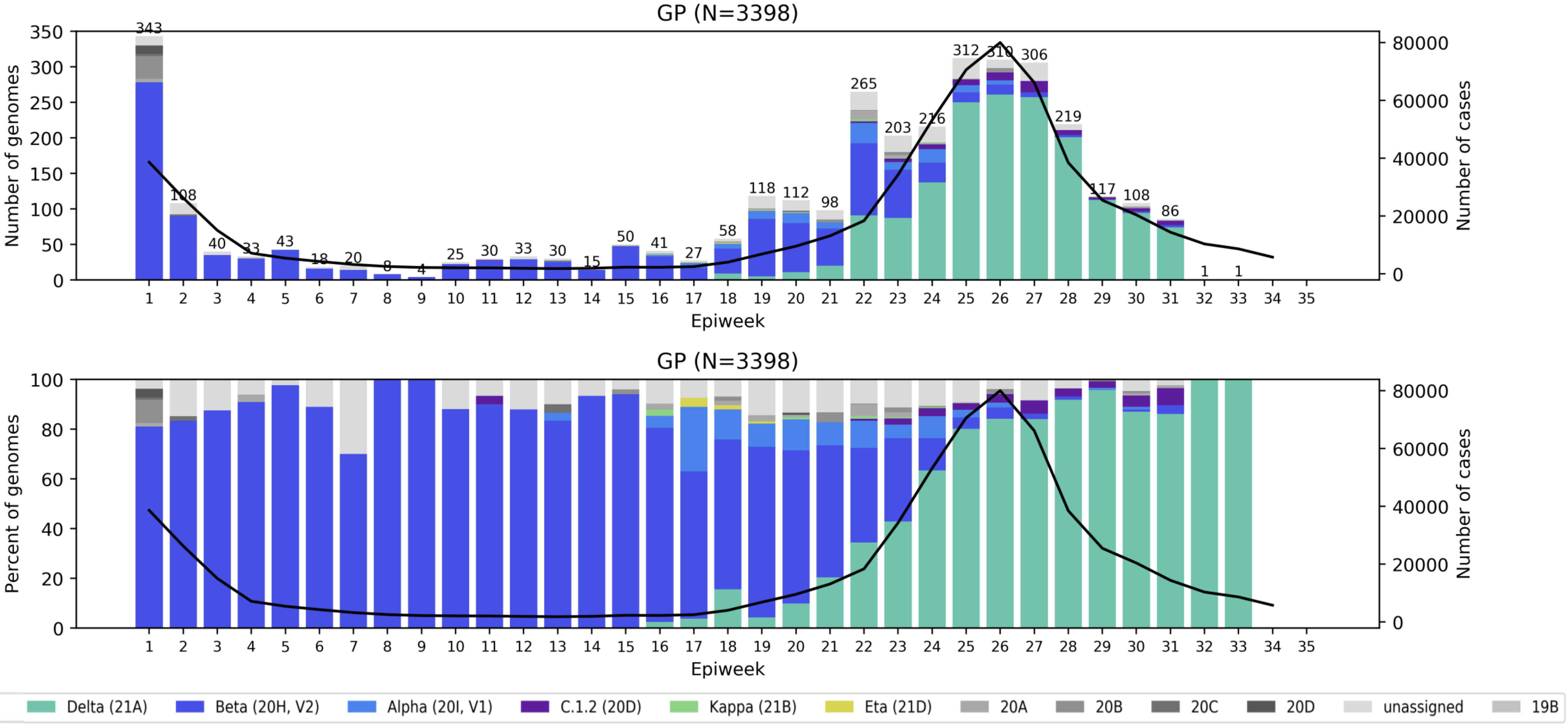
Gauteng Province, 2021, n = 3398



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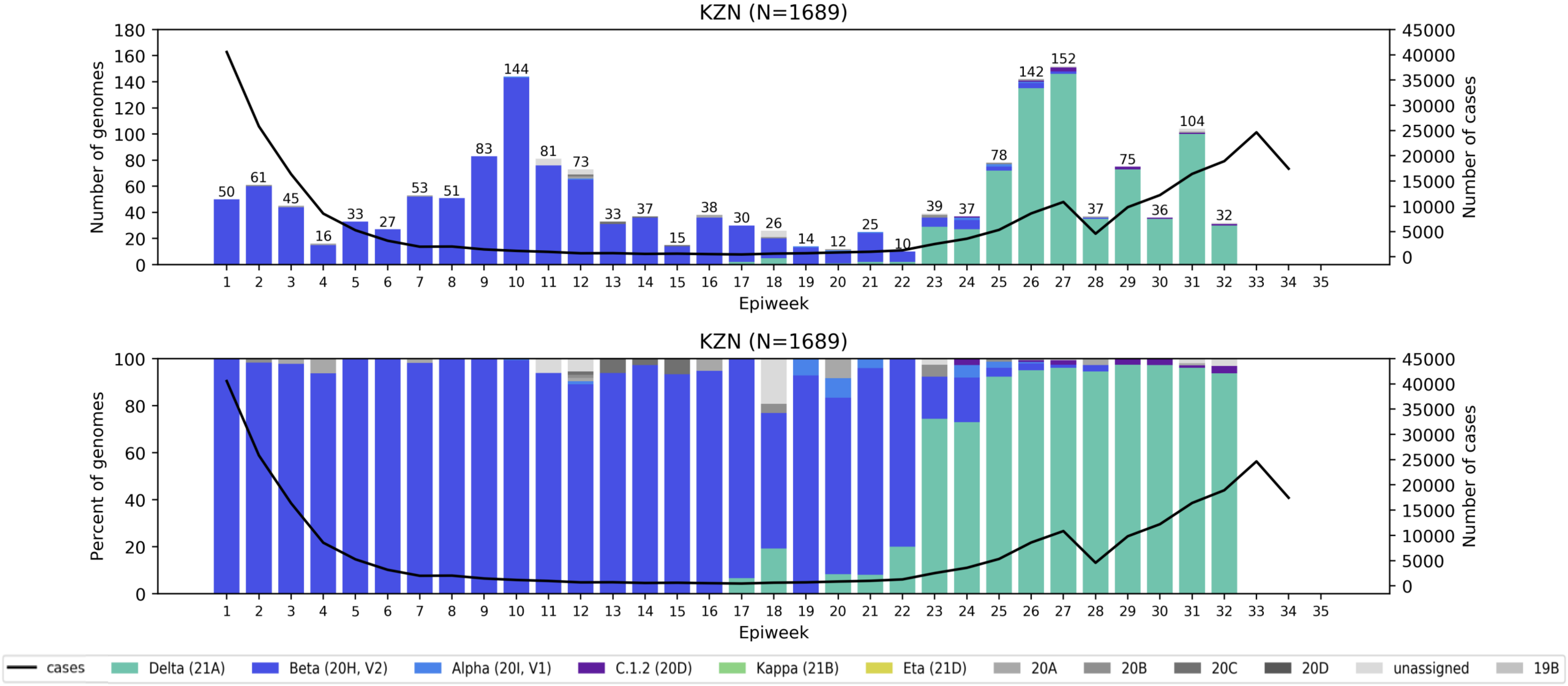
KwaZulu-Natal Province, 2021, n = 1689



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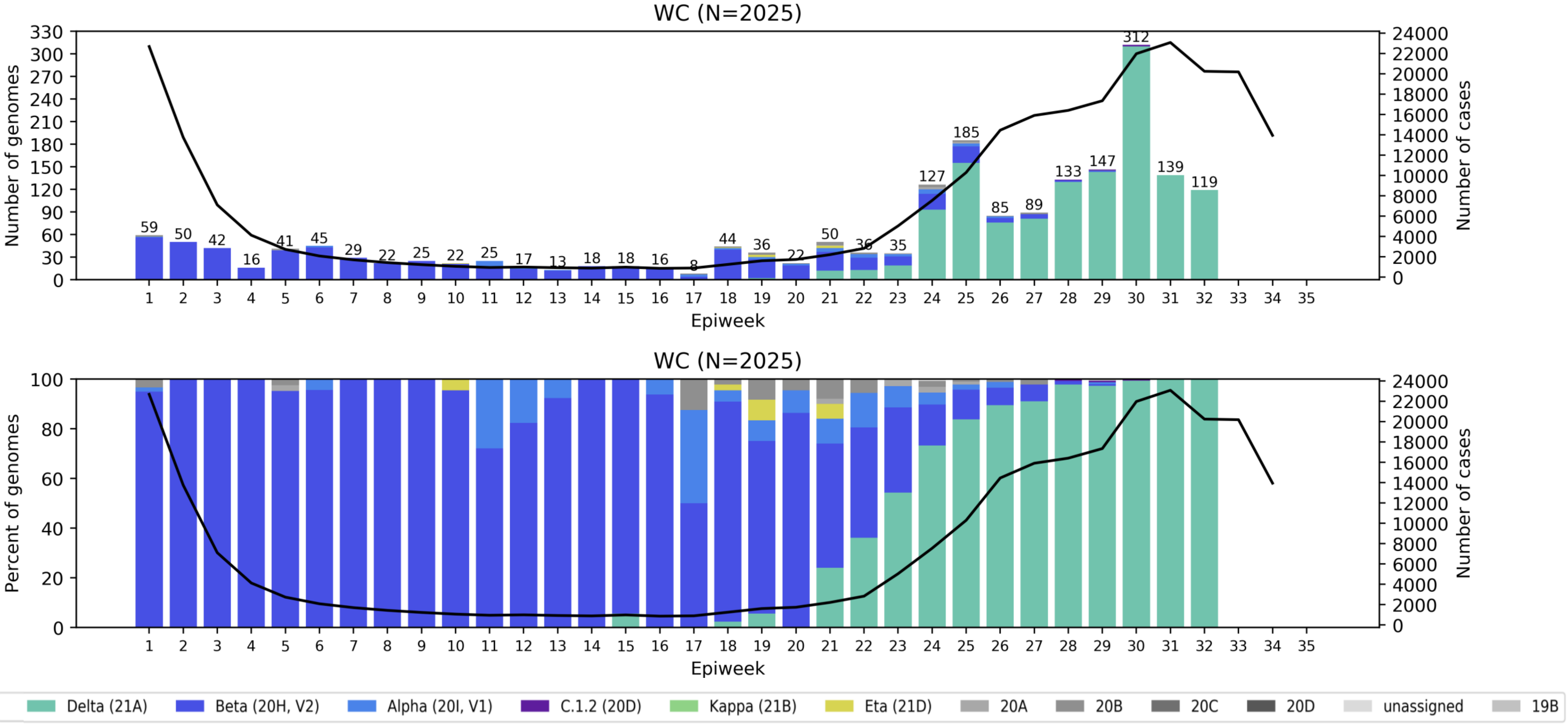
Western Cape Province, 2021, n = 2025



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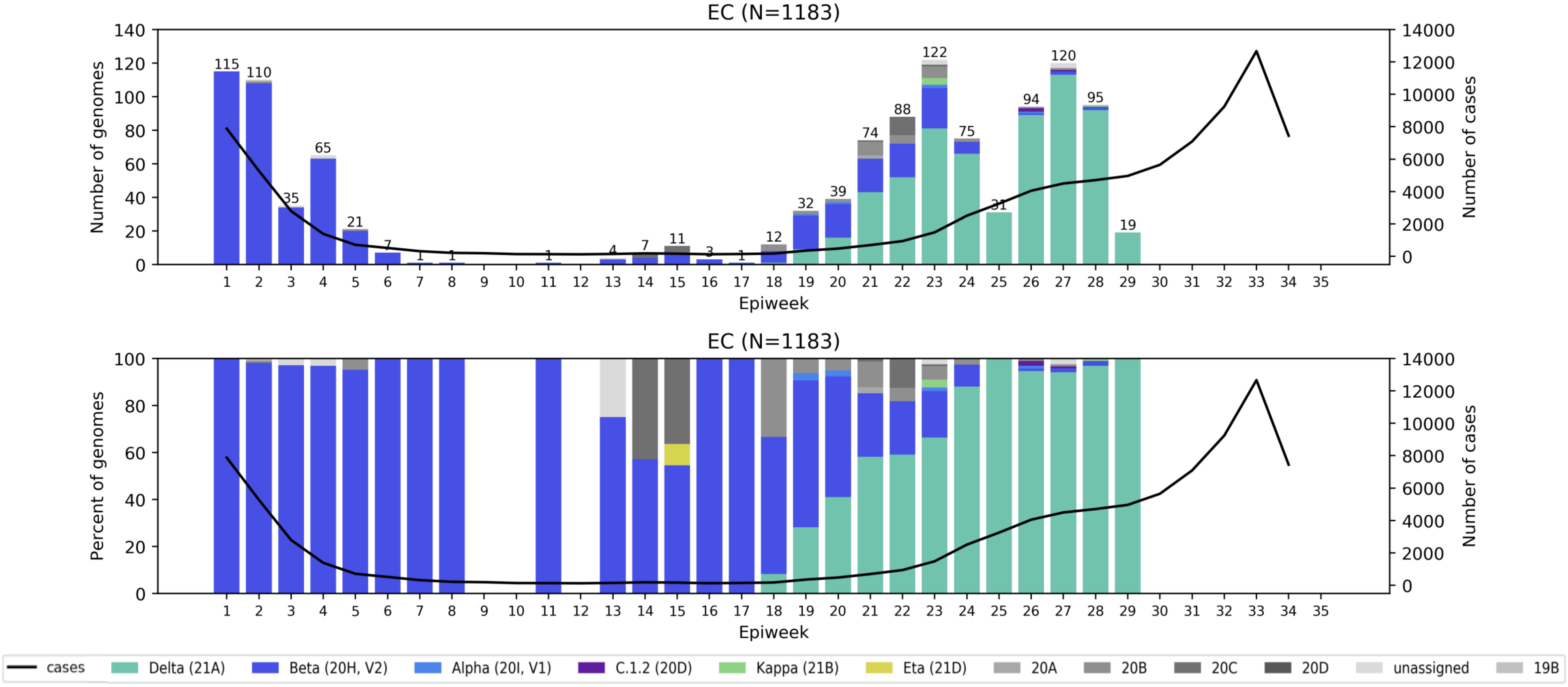
Eastern Cape Province, 2021, n = 1183



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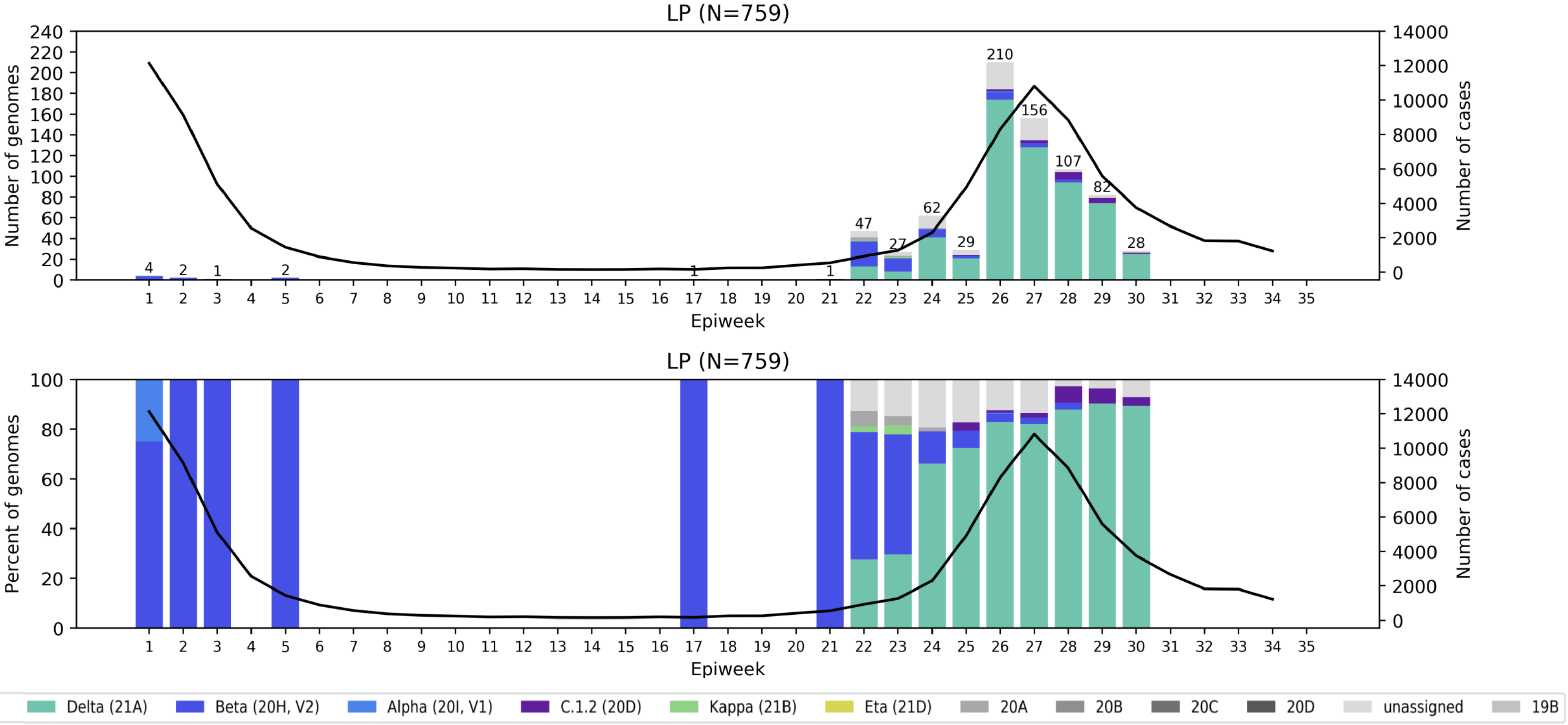
Limpopo Province, 2021, n = 759



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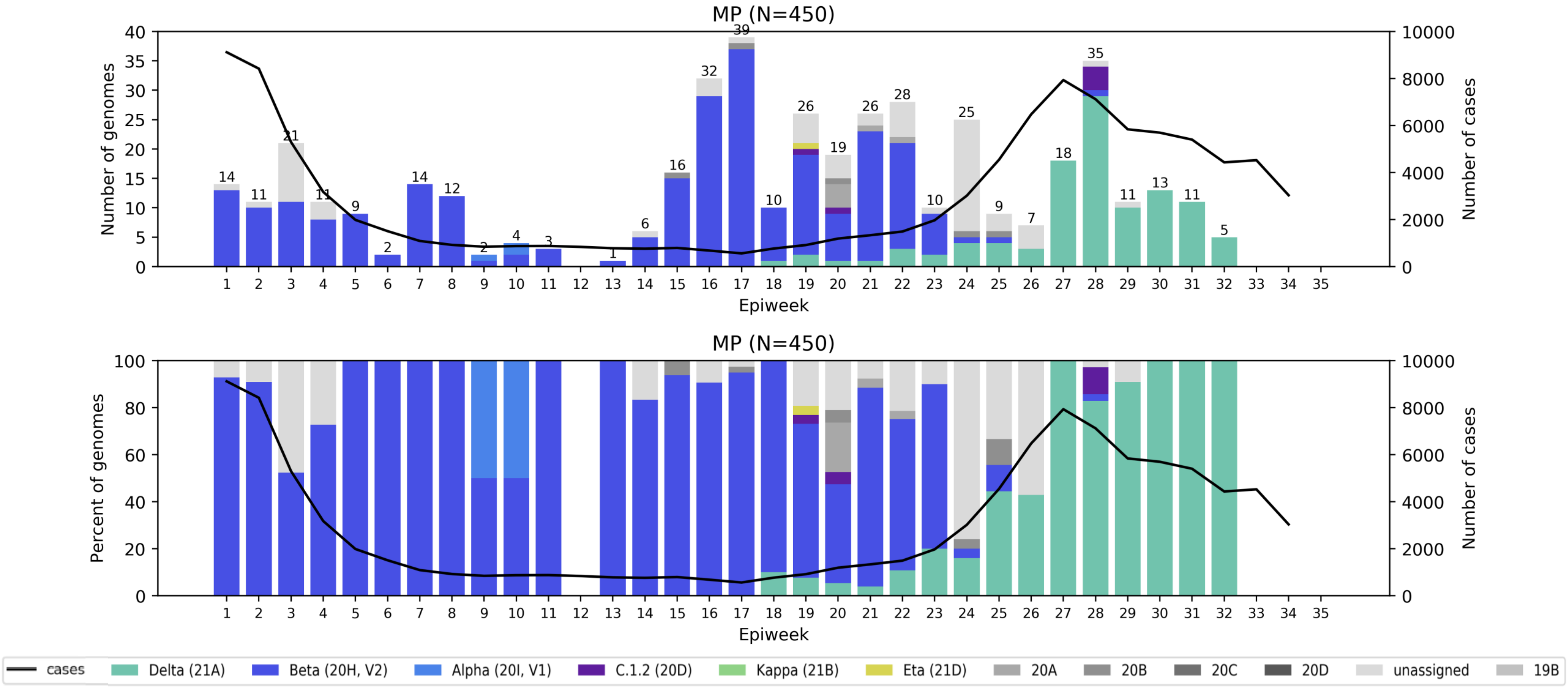
Mpumalanga Province, 2021, n = 450



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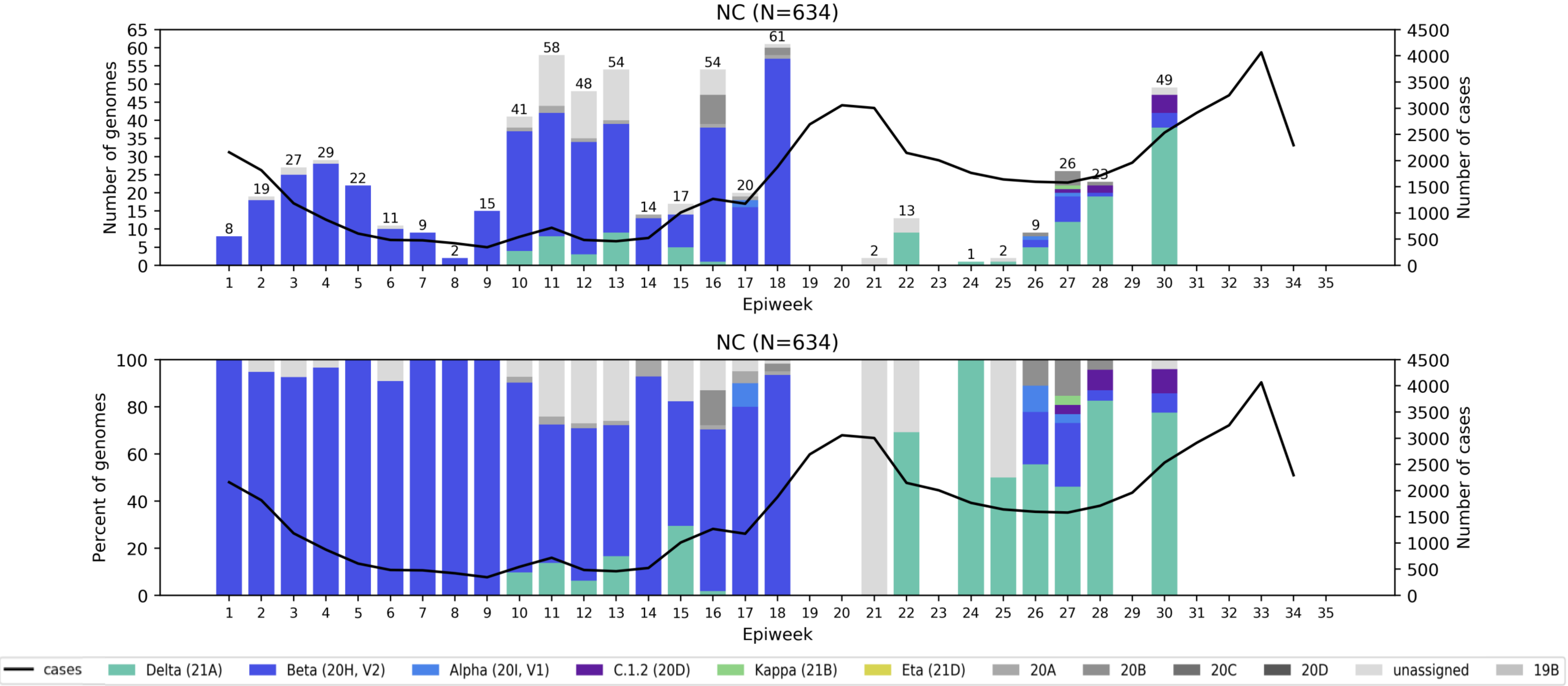
Northern Cape Province, 2021, n = 634



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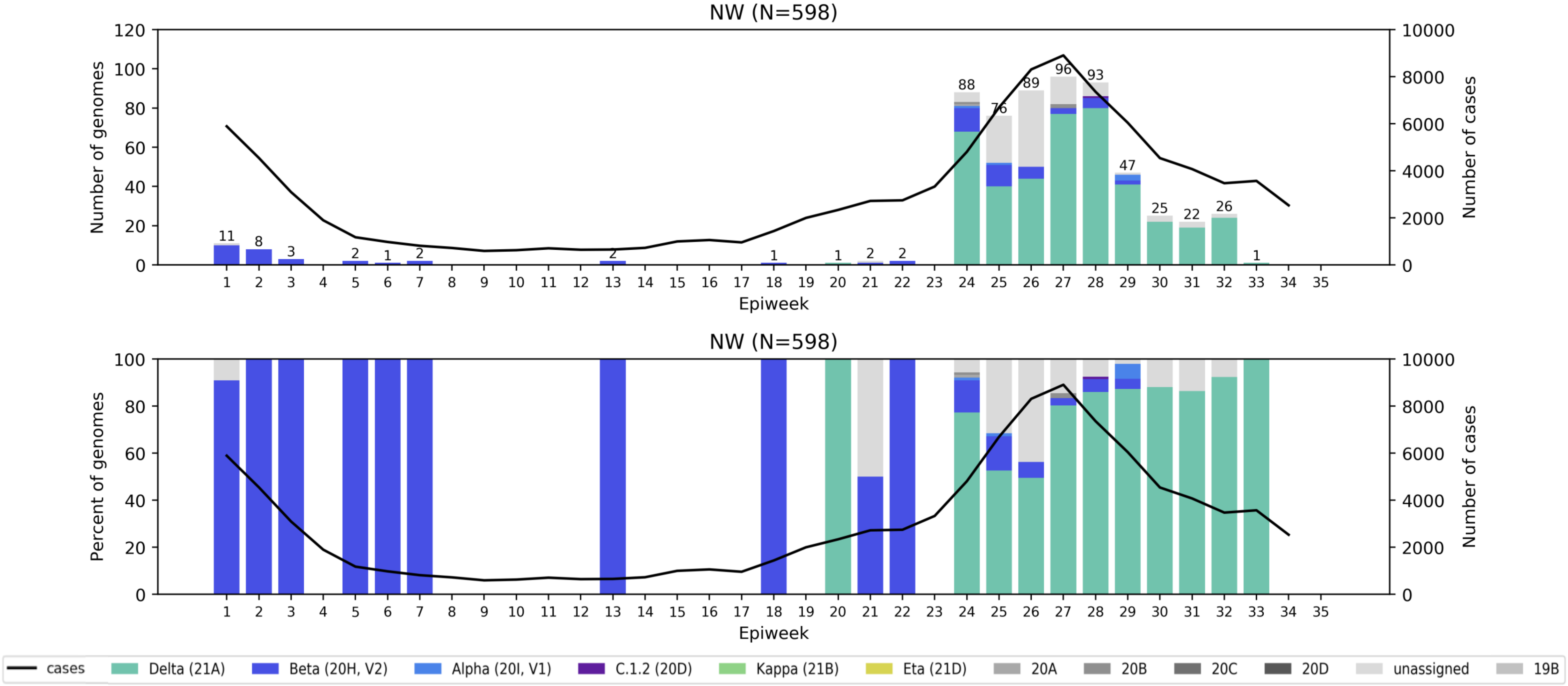
North West Province, 2021, n = 598



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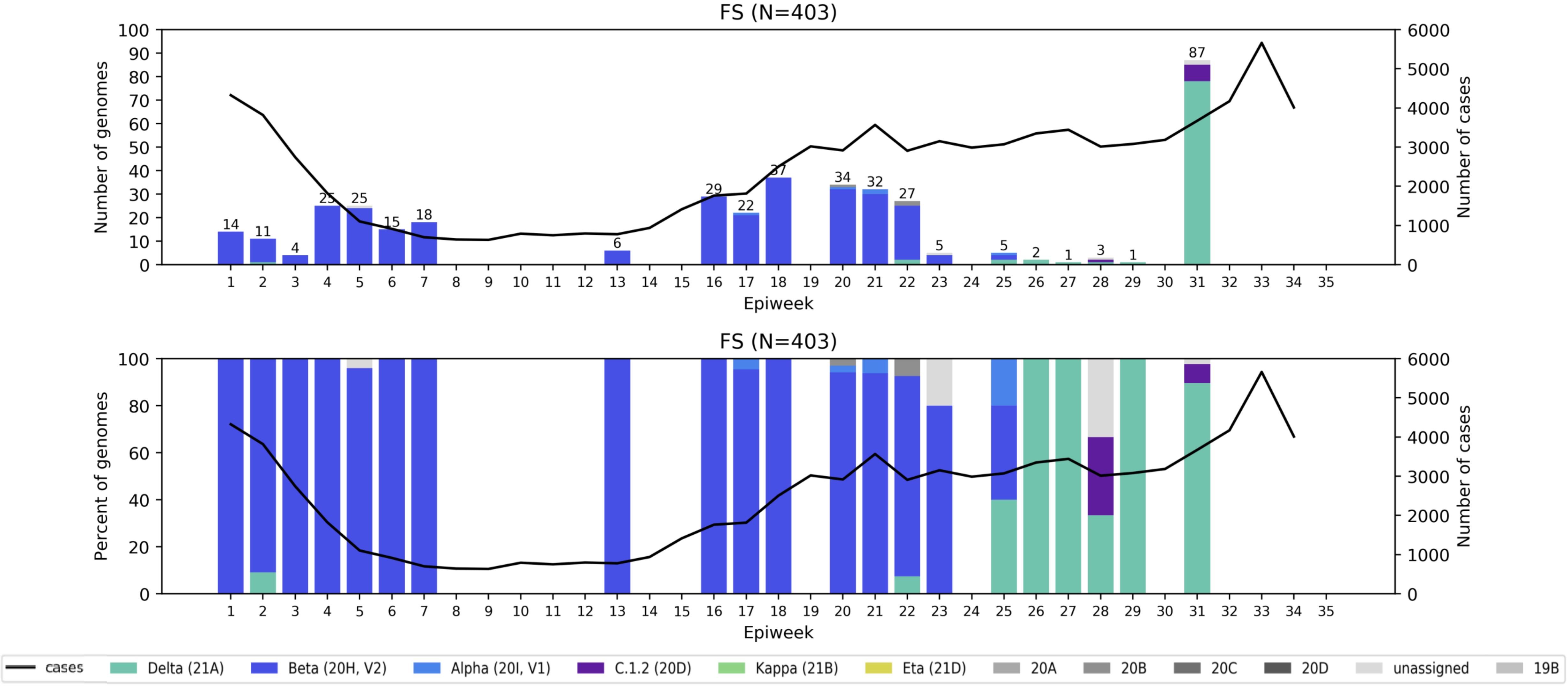
Free State Province, 2021, n = 403



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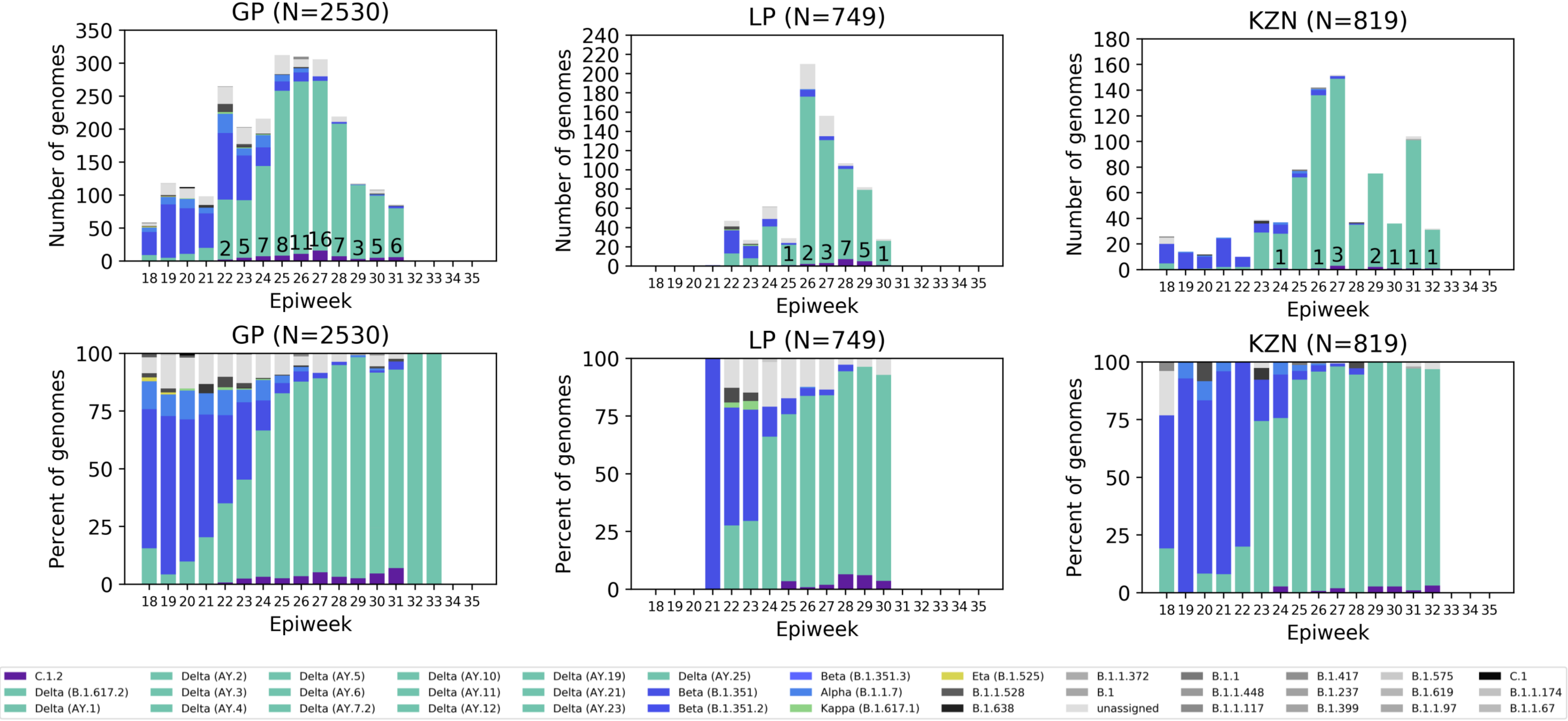
C.1.2 (n=129 in SA) in May – August 2021 by epiweek

Number of C.1.2 samples indicated above bar



C.1.2 has now been detected in all provinces. The majority of samples have been detected in Gauteng (n=70), followed by Limpopo (n=19) and KwaZulu-Natal (n=10).

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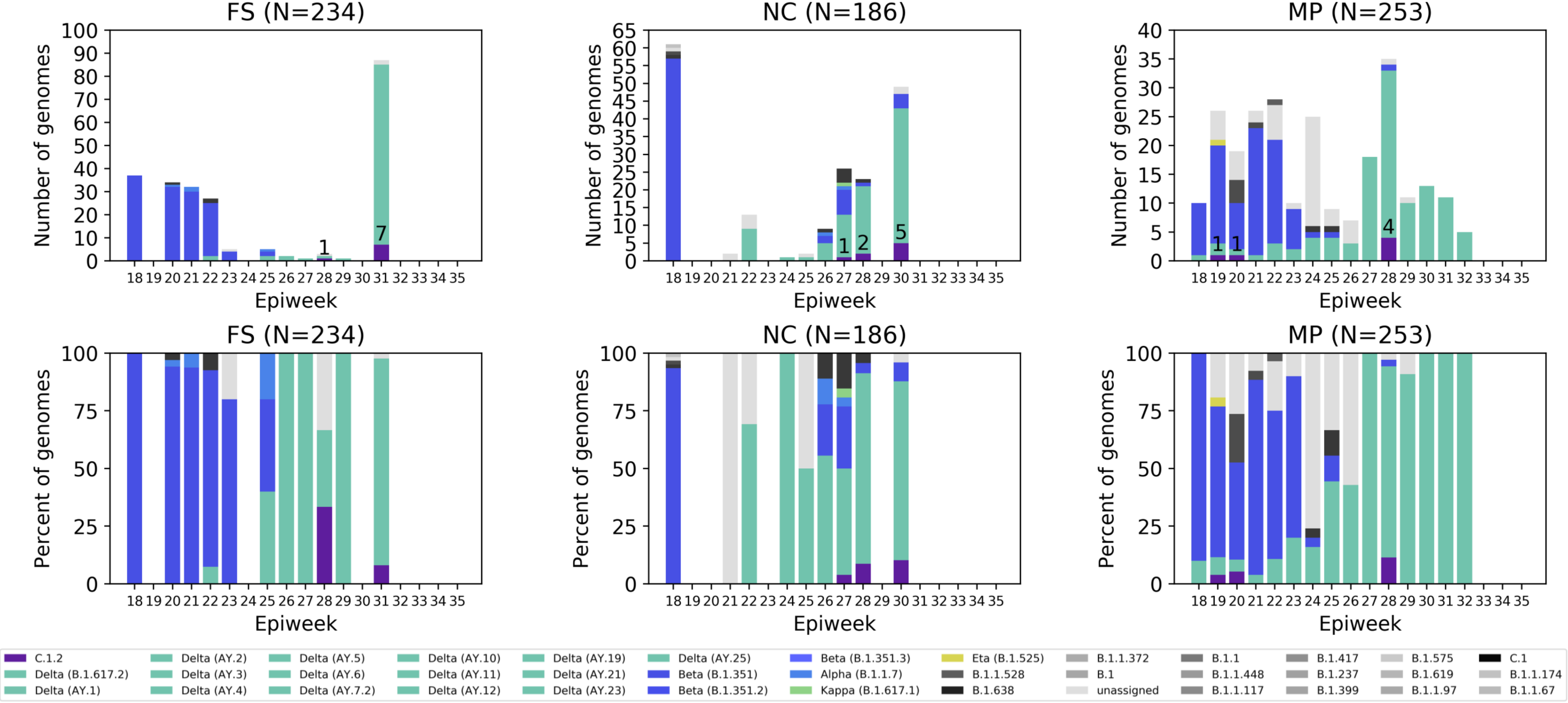
C.1.2 (n=129 in SA) in May – August 2021 by epiweek

Number of C.1.2 samples indicated above bar



C.1.2 has now been detected in all provinces. This is the first detection in the Free State (n=8) The Northern Cape has 8 sequences, and Mpumalanga has 6.

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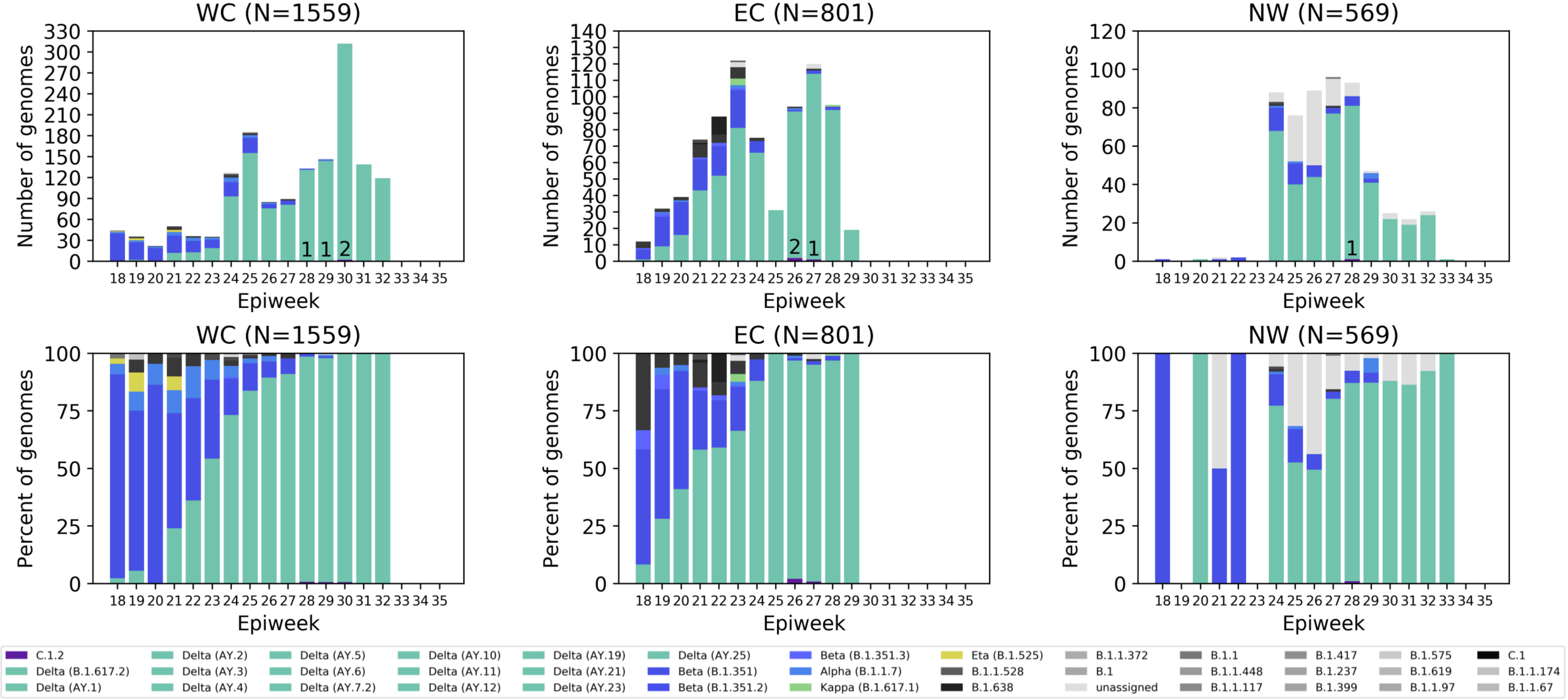
C.1.2 (n=129 in SA) in May – August 2021 by epiweek

Number of C.1.2 samples indicated above bar



The Western Cape has 4 sequences, the Eastern Cape has 3, and the North West has only 1 detection of C.1.2.

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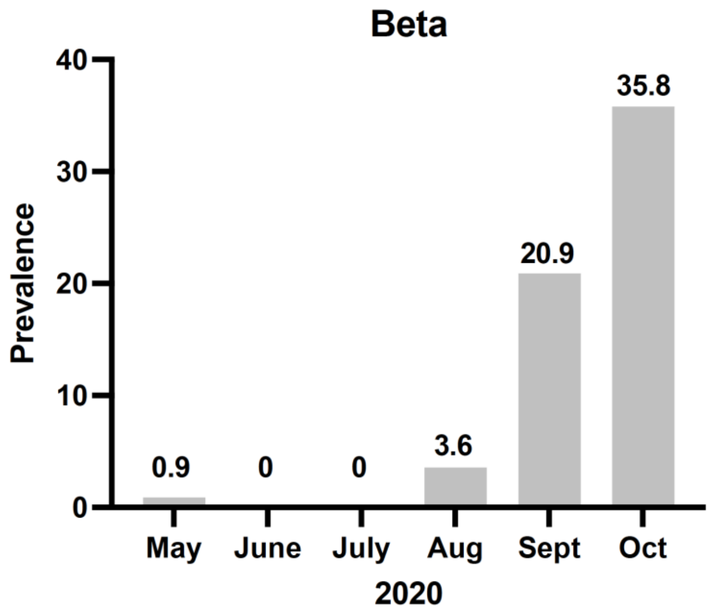
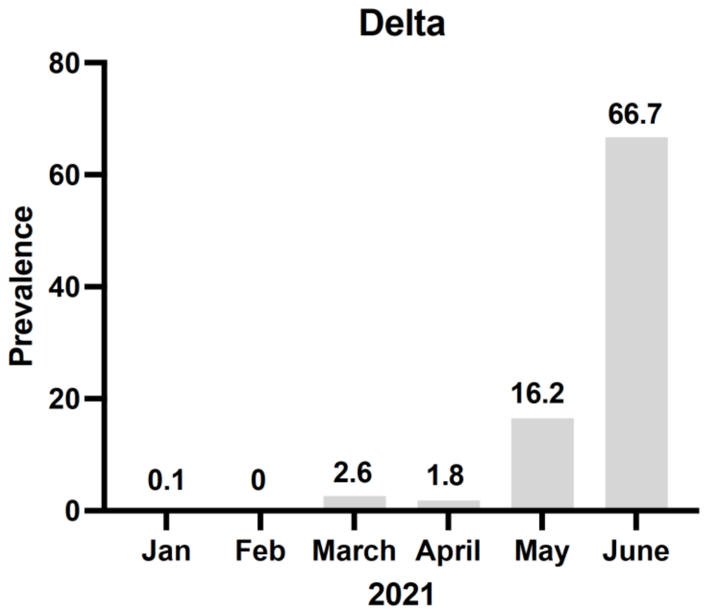
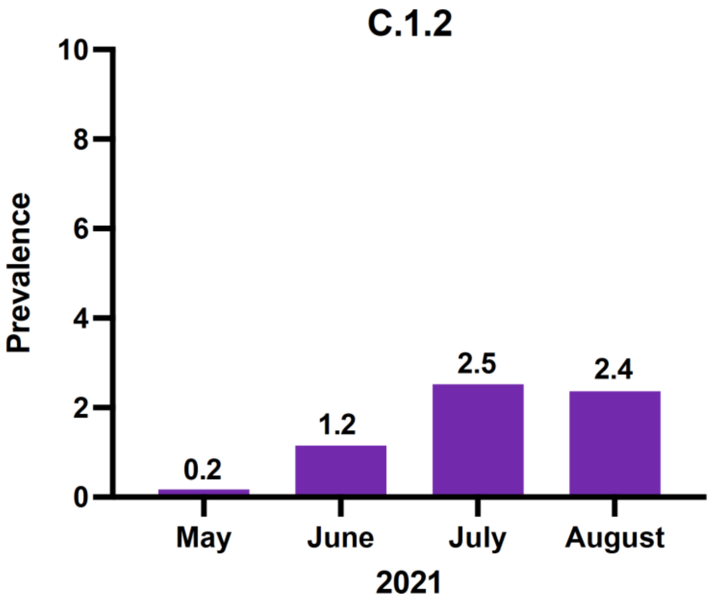
C.1.2 growth compared to Beta and Delta


Beta


Delta


C.1.2

C.1.2 is being continually monitored and is currently only detected at low levels

Summary

- In June, Delta increased to dominated in most provinces with recent data from August showing this continued Delta dominance in all provinces.
- Overall diversity of lineages decreased as Delta became dominant.
- Mutated C.1.2 lineage has now been detected in all provinces of South Africa.
    - While the frequency of C.1.2 has been increasing with each month, its detection remains low at less than 3% of sequences.

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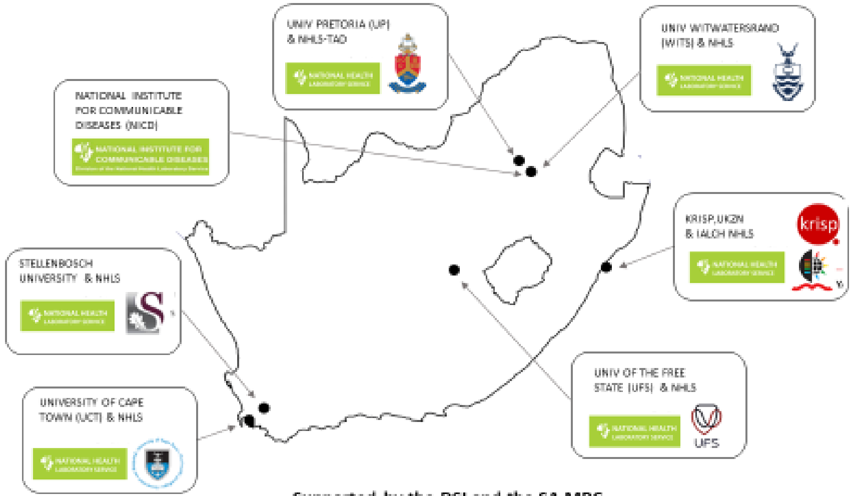

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G7 Global Health fund, Robert Koch Institute, Dr Fabian Leendertz

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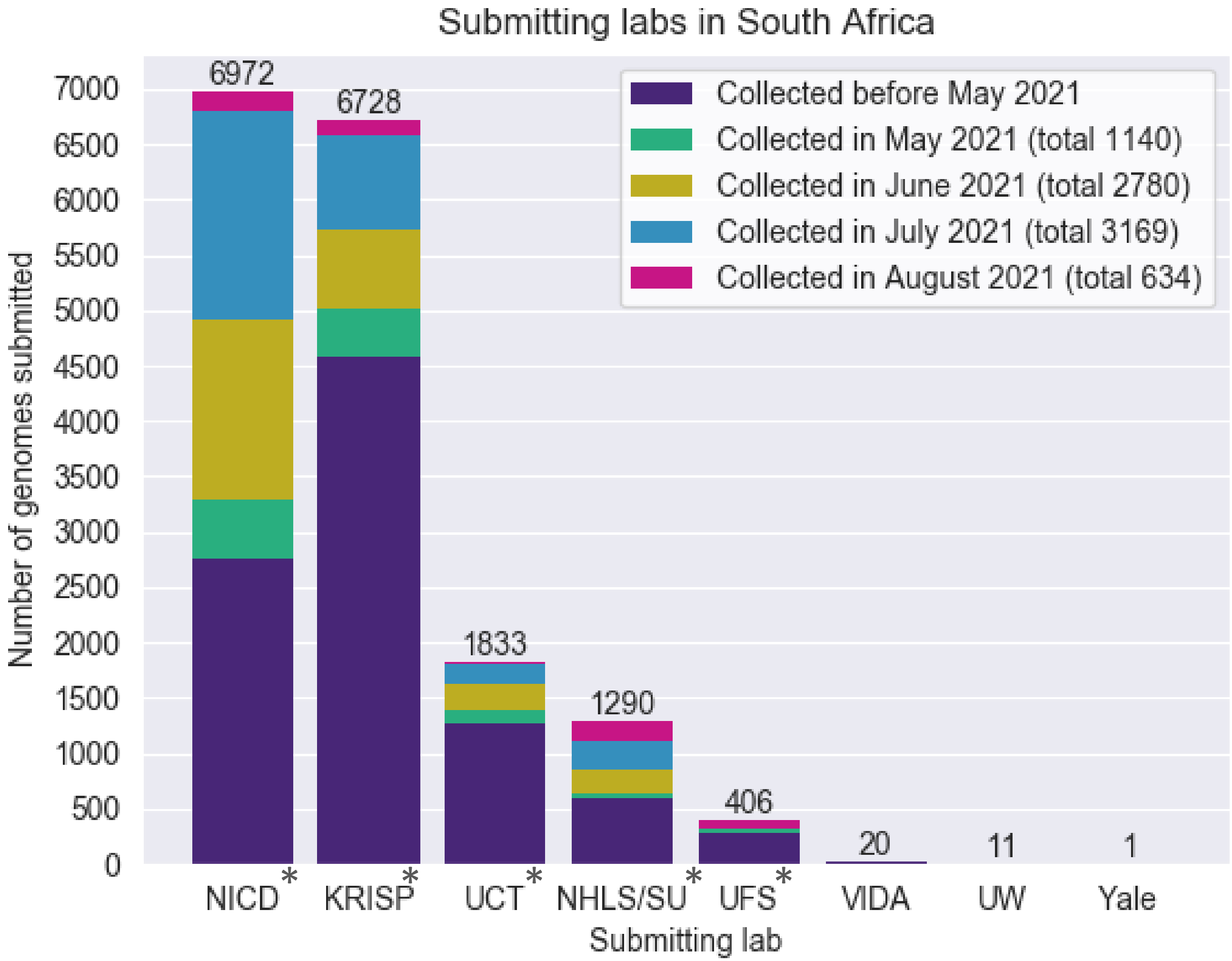
South African genomes submitted per sequencing lab, 2020 and 2021 (N=16 067)



*NGS-SA laboratories

Multiple labs from NGS-SA are contributing to the sequencing effort. Sequencing efforts have increased with the third wave.

NGS-SA
Network for Genomic Surveillance in South Africa

Variants of Concern (VOC)

WHO label	Pango lineages[+]	GISAID clade	Nextstrain clade	Additional amino acid changes monitored*	Earliest documented samples	Date of designation
Alpha	B.1.1.7[#]	GRY	20I (V1)	+S:484K +S:452R	United Kingdom, Sep-2020	18-Dec-2020
Beta	B.1.351	GH/501Y.V2	20H (V2)	+S:L18F	South Africa, May-2020	18-Dec-2020
Gamma	P.1	GR/501Y.V3	20J (V3)	+S:681H	Brazil, Nov-2020	11-Jan-2021
Delta	B.1.617.2[§]	G/478K.V1	21A	+S:417N	India, Oct-2020	VOI: 4-Apr-2021 VOC: 11-May-2021

https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/ accessed 1 September 2021

*Notable spike (S) amino acid changes under monitoring, which are currently reported in a minority of sequenced samples

[+] Includes all descendant lineages.

[#] Includes all Q.* lineages in the PANGO nomenclature system.

[§] Includes all AY.* lineages in the PANGO nomenclature system.

Currently designated Variants of Interest (VOI)

WHO label	Pango* lineages	GISAID clade	Nextstrain clade	Earliest documented samples	Date of designation
Eta	B.1.525	G/484K.V3	21D	Multiple countries, Dec-2020	17-Mar-2021
Iota	B.1.526	GH/253G.V1	21F	United States of America, Nov-2020	24-Mar-2021
Kappa	B.1.617.1	G/452R.V3	21B	India, Oct-2020	4-Apr-2021
Lambda	C.37	GR/452Q.V1	21G	Peru, Dec-2020	14-Jun-2021
Mu	B.1.631	GH	21H	Colombia, Jan-2021	30-Aug-2021

https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/ accessed 1 September 2021

*Includes all descendant lineages.

Submission of routine specimens for sequencing

- representative of multiple geographic regions (provinces/districts/health facilities) from individuals of
  - all ages
  - over as many time periods during the SARS-CoV-2 epidemic in South Africa
- requested that testing laboratories in both the private and public sectors, submit respiratory samples to their closest NGS-SA sequencing laboratory on a routine basis (ideally every week) as follows, depending on the capacity of the testing laboratory:
  - All positives samples should be sent every week (NGS-SA laboratory will perform random sampling as described below) **OR**
  - A weekly selection of approximately 10%-20% of randomly selected positive samples should be sent every week. Number of selected samples will depend on the size of laboratory and how many other laboratories are drained by the submitting laboratory.

Submission of special interest specimens for sequencing

In addition to routine samples mentioned above, please send specimens separately to above and clearly marked if:

- Suspected vaccine breakthrough (≥14 days after vaccine), especially if hospitalised and clinically severe
- Suspected re-infection (≥90 days after previous episode), especially if hospitalised and clinically severe
- Prolonged shedding with high SARS-CoV-2 viral loads (i.e. Ct values less than 30 for more than 1 month post-primary diagnosis) in immunocompromised individuals
- Possible animal-to-human transmission
- Suspected cases of importation from another country, especially countries known to harbour SARS-CoV-2 variants of concern or countries with little available information
- Clusters of “unusual” cases (e.g., in terms of disease presentation, patient groups affected, etc.)