

Real world analysis of Omicron outbreak in South Africa including vaccine effectiveness

December 2021



Preface



SA scientists from Network for Genomic Surveillance first to announce the identification of Omicron variant.

SA is first to experience Omicron-driven outbreak commencing about 3 weeks ago.



Discovery Health has continuously shared data throughout the pandemic.

Discovery Health is in an unusual position to avail early insights given the dominance of the Omicron variant in SA, and the availability of member data spanning demographic details, clinical and pathology records and vaccination records.

The National DoH has created considerable capacity to vaccinate the South African population at scale. The insights herein support the priority of vaccination and the NDoH's existing approval of third dose Pfizer-BioNTech boosters.

Discovery Health's insights have been shared with the SA NDoH, the SA National Institute for Communicable Diseases (NICD), the US CDC, leading SA and UK scientists and others

Dataset is derived for the early period of the Omicron outbreak. Consequently these preliminary insights may change as this Covid-19 wave extends



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1. Epidemiological tracking shows steep trajectory of new Covid-19 infections indicating rapid Omicron spread, but with a flatter trajectory of hospital admissions, indicating likely lower severity
2. Anecdotal observations demonstrate nuanced differences in the clinical features of Omicron both out of hospital and in hospital
3. Data indicates that the severity of Omicron is 29% lower than D614G (first) wave of Covid-19 infections in South Africa
4. Vaccine effectiveness of the double dose Pfizer-BioNTech regime:
 - Has reduced from 80% in Delta wave to 33% in Omicron wave against Covid-19 infection; and
 - Has reduced from 93% in Delta wave to 70% in Omicron wave against severe complications of Covid-19 (hospital admission)
5. The protective effect of prior infection has reduced over time, and Omicron has eroded that protective effect further
6. Children experiencing very low test-positivity rate relative to adults, and low Covid-19 admissions in absolute terms, but appear to be at 20% greater risk of hospitalisation during Omicron wave relative to D614G wave



Background



Clinical and epidemiological observations



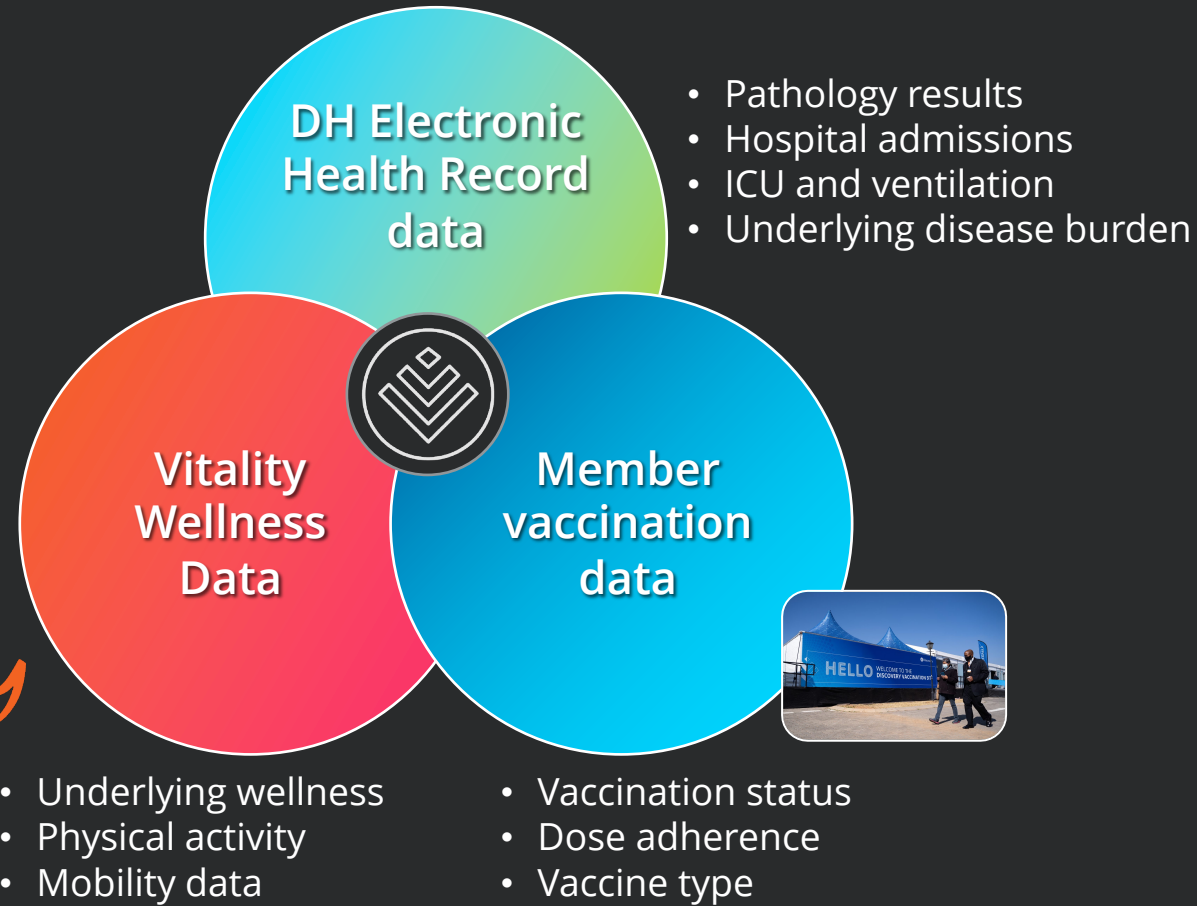
Real-world insights into vaccine effectiveness

Discovery Health (DH) is uniquely positioned to derive powerful COVID-19 insights



>3.7 million health insurance lives administered by Discovery Health

Vitality



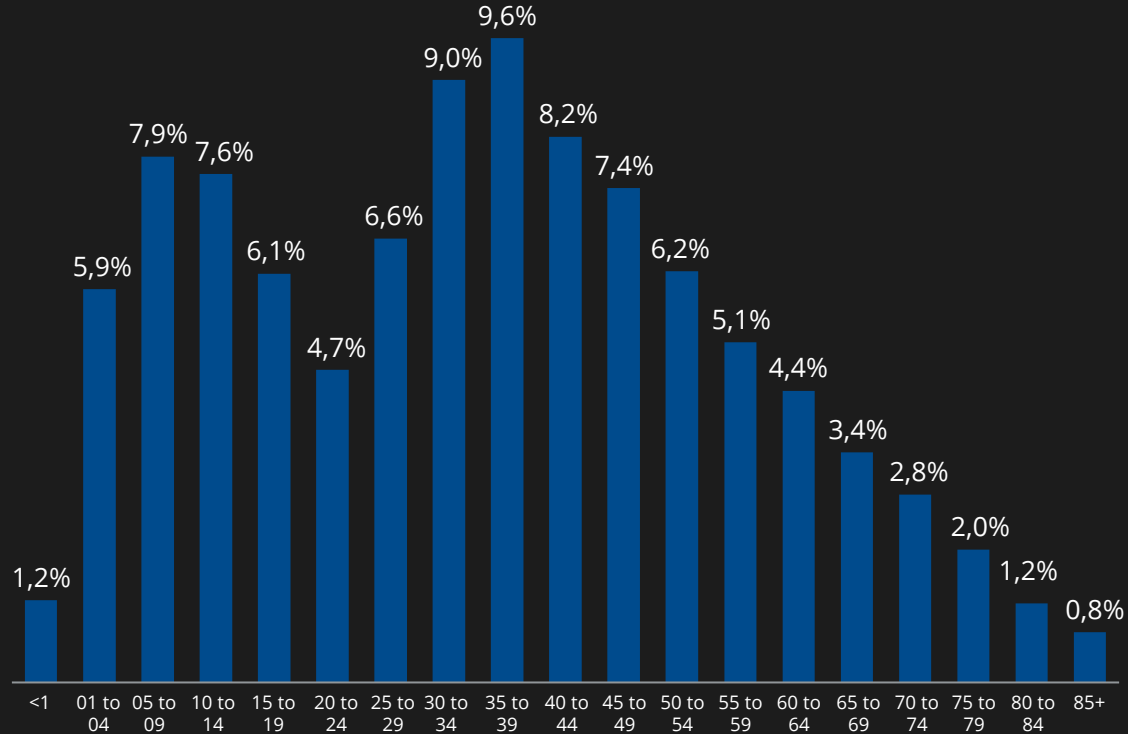
Unique, real-world Covid-19 insights

Epidemiological tracking & modelling,, resilience against severe disease, Vaccine effectiveness safety and side effects

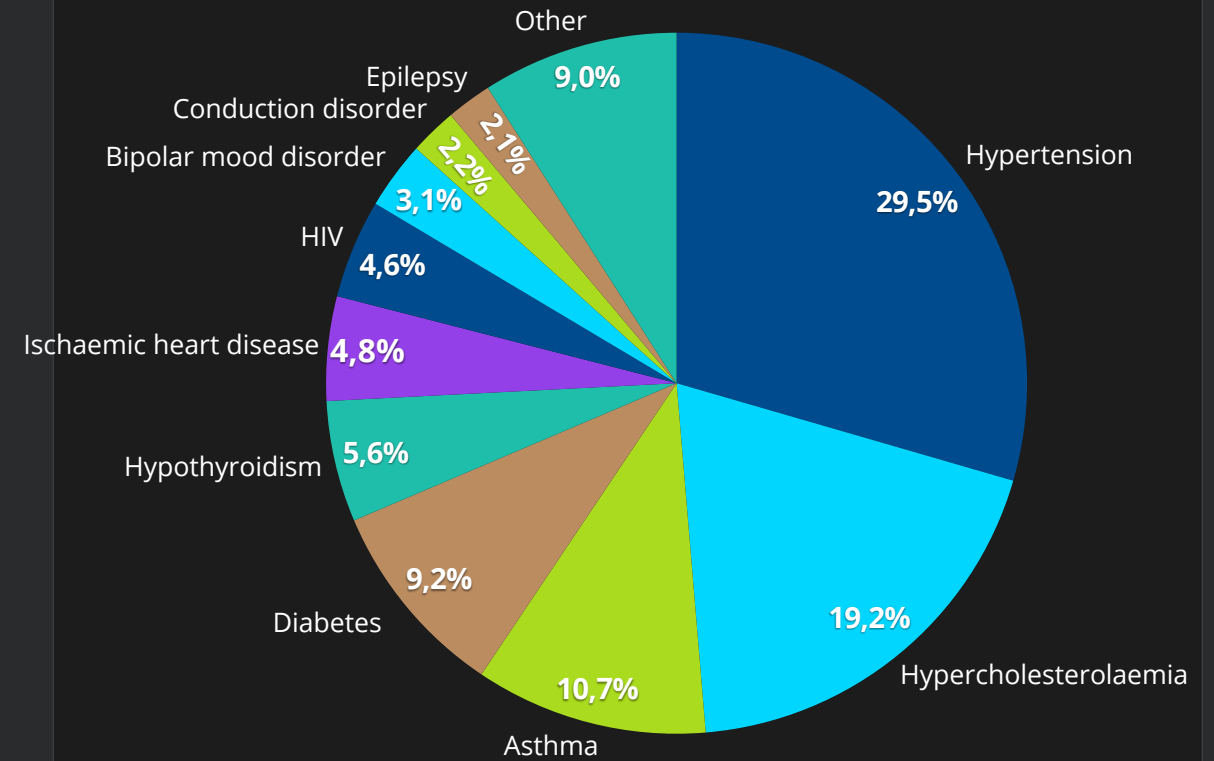
Discovery Health beneficiaries are diverse, allowing for relevant real world insights to be derived



Data distributed widely across age groups



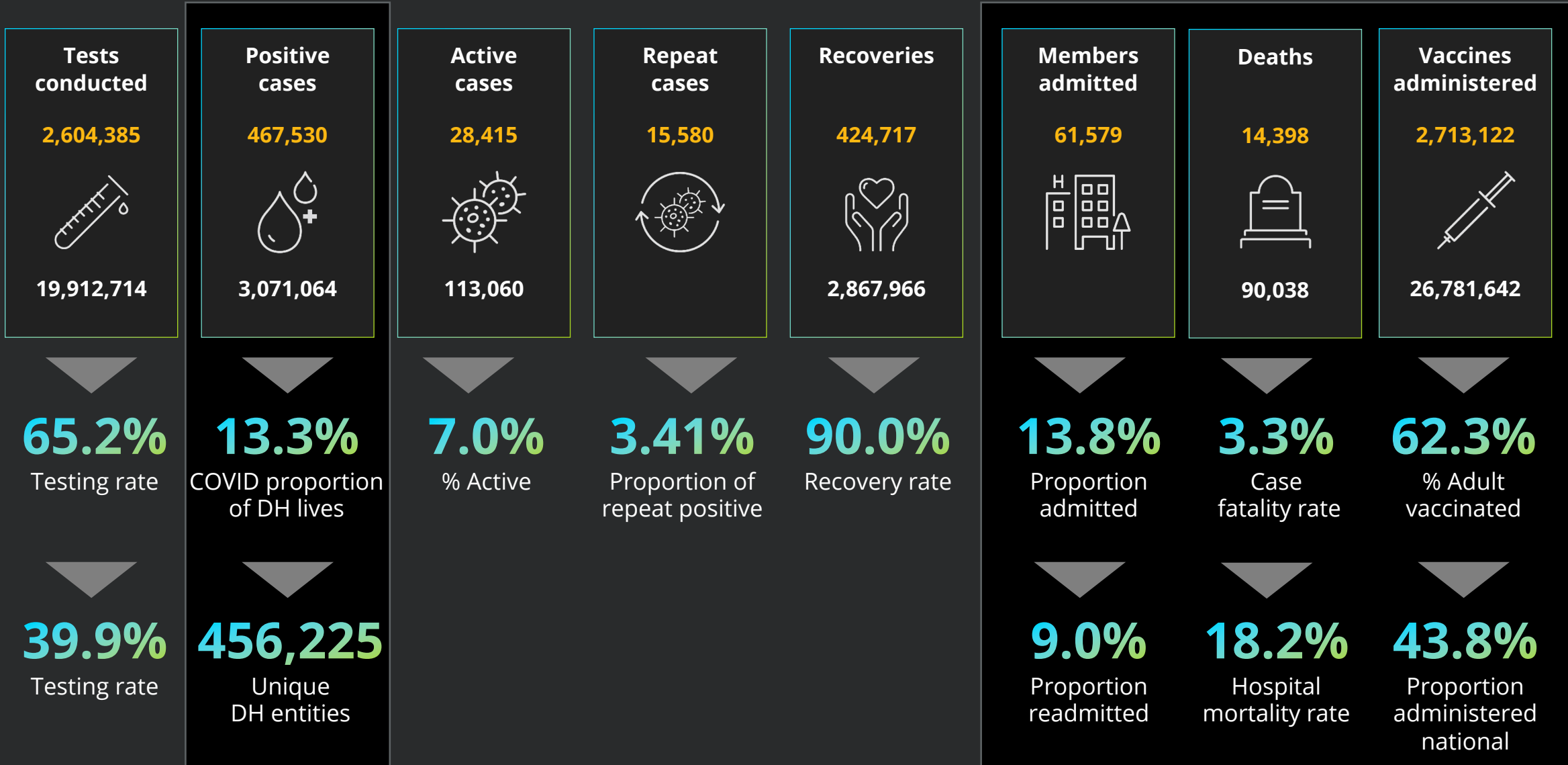
26% of all individuals are living with chronic illness



Discovery Health has extensive South Africa-specific, real-world data 10 Dec 2021



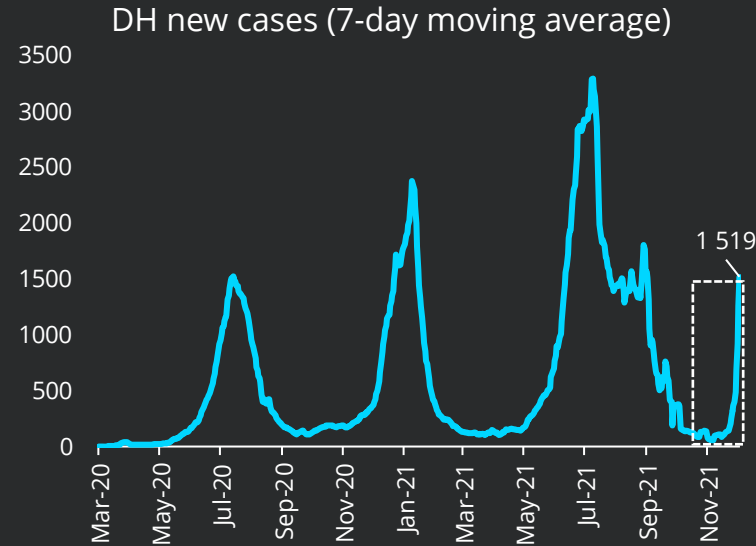
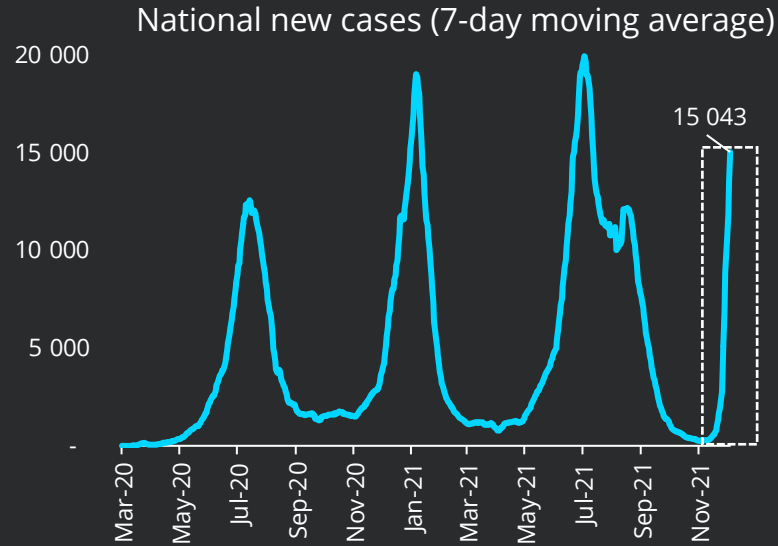
We have been tracking and codifying unique member data since the start of the pandemic



Pfizer vaccine 14 days – 99 days after second dose. Excludes data on members vaccinated in the public sector post September 2021.
 Source: Discovery Health Insights <https://discv.co/DiscoveryHealthInsights>

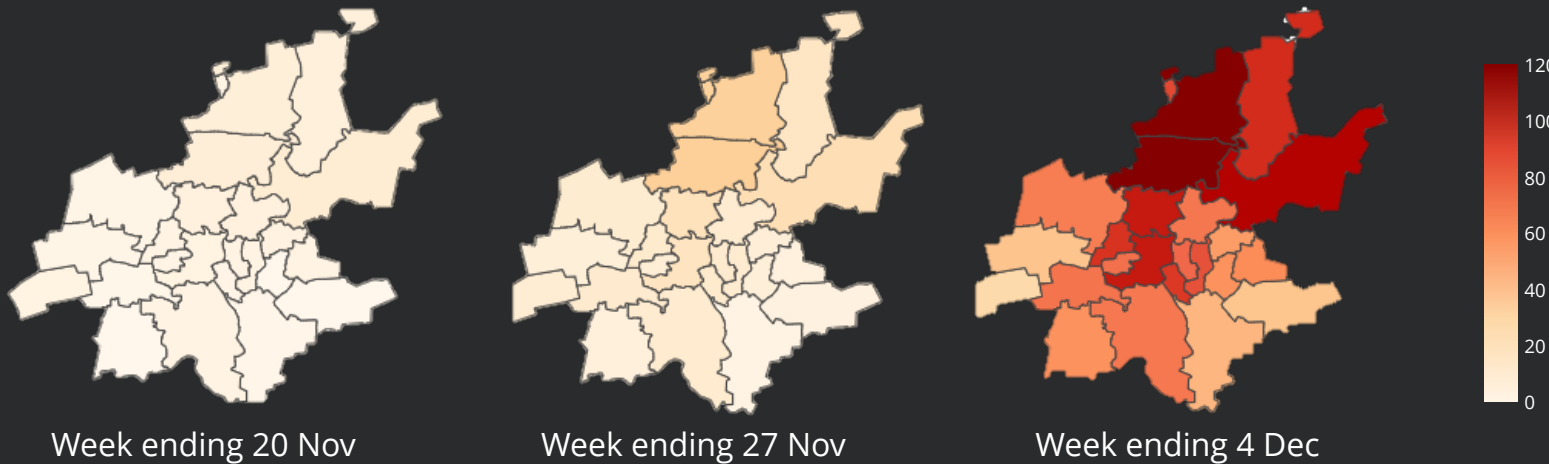


SA has experienced 3 prior waves of COVID-19 and now entering a fourth wave with rapid rise in cases driven by Omicron variant



*Gauteng Province accounts for **63%** of current COVID-19 cases nationally, and **67%** of Discovery Health cases in fourth wave*

Average weekly new DH cases per 100,000 lives for Gauteng (7-day moving average)



***26%** of the national population resides in Gauteng Province. Upcoming mobility due to high migrant worker base and holiday period pose a risk of imminent spread to other provinces across South Africa*



Background



Clinical and
epidemiological
observations



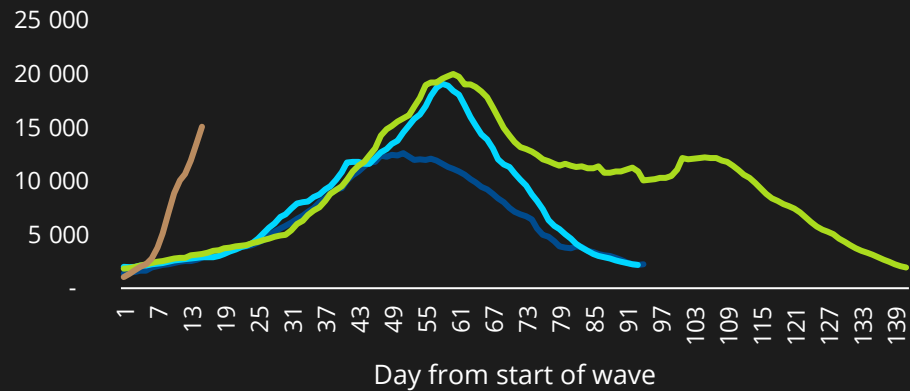
Real-world insights
into vaccine
effectiveness

Omicron-driven fourth wave is developing at a steeper trajectory of new infections relative to prior waves

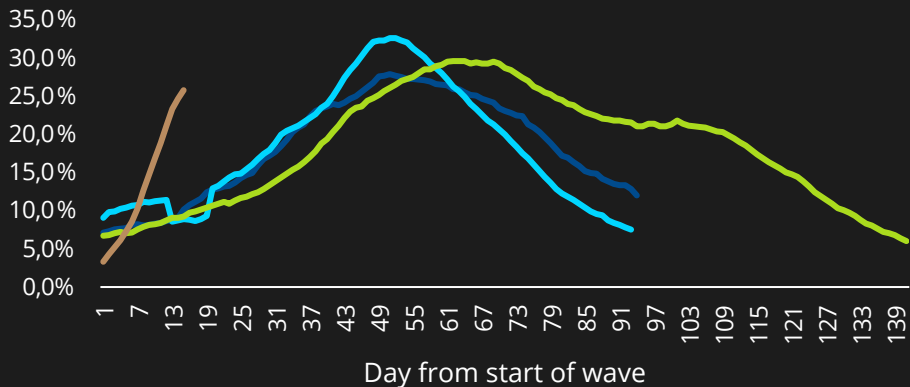


National data

SA daily cases (7-day average) by wave

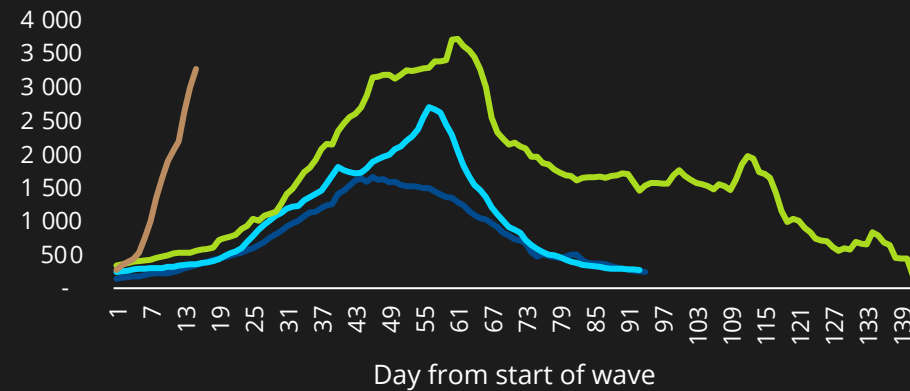


SA weekly test positivity rate by wave

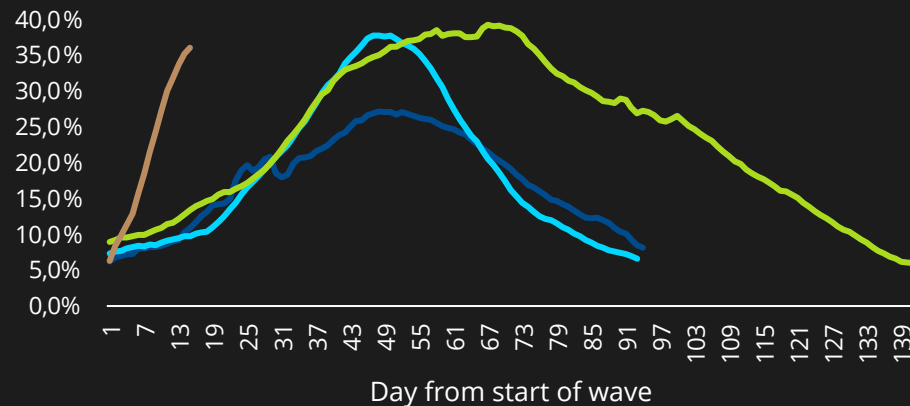


Discovery Health data

DH daily cases (7-day average) by wave



DH weekly test positivity rate by wave

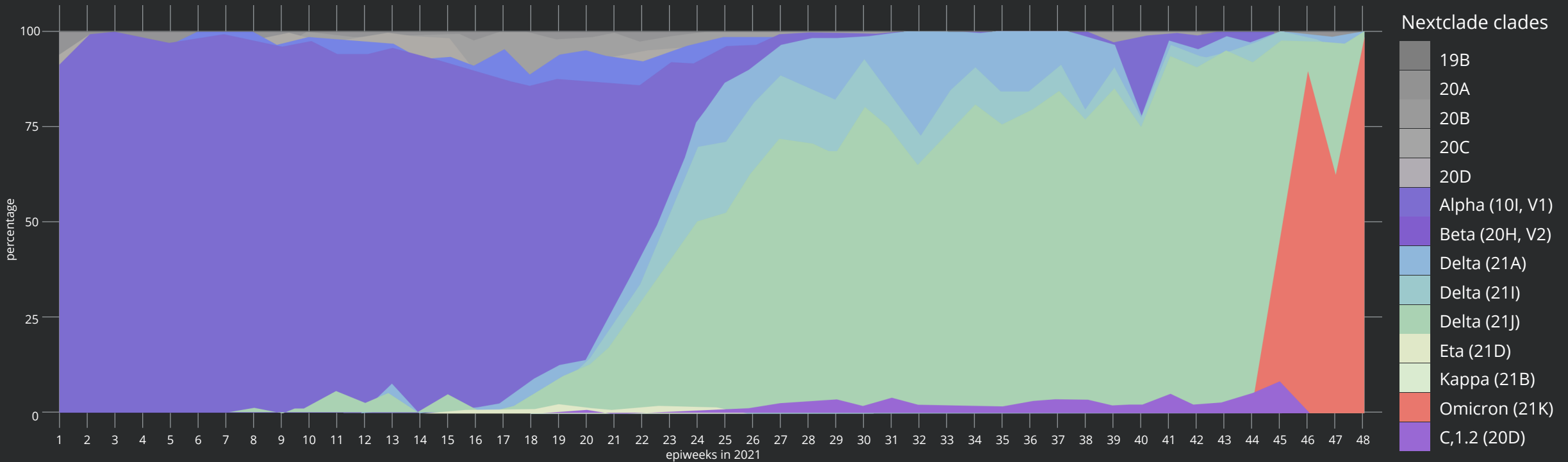


Steeper increase in new infections and test positivity rate during the first three weeks of the fourth wave indicating highly transmissible variant with rapid community spread

- D614G wave
- Beta wave
- Delta wave
- Omicron wave

Omicron variant has displaced Delta and now dominates new infections in SA

04 Dec 2021



- Network of virology and genomic laboratories, scientists and academic institutions across South Africa
- Genomic data produced at five sequencing facilities under the guidance of more than 50 investigators and scientists
- Launched in June 2020 with support of the Department of Science and Innovation and South African Medical Research Council

Anecdotal evidence demonstrates nuanced differences in the clinical presentation



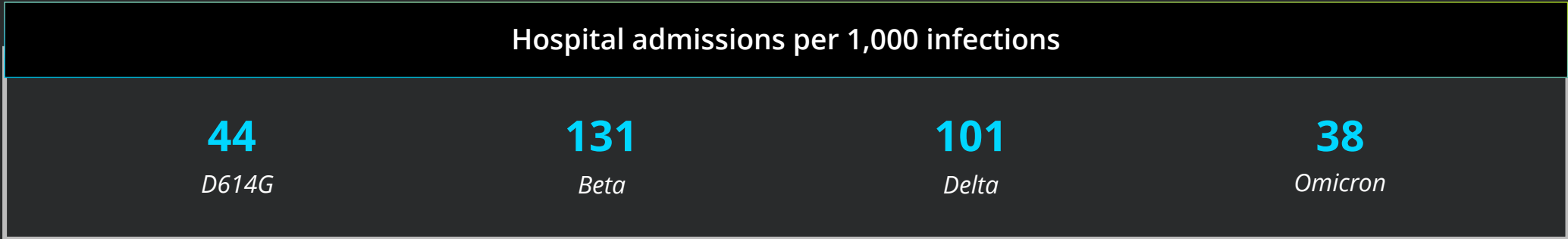
Out-of-hospital acute care

- **Higher reinfections and breakthrough infections** than other waves, including vaccinated
- **Shorter incubation period** of 3-4 days
- **Milder illness** with reported **recoveries within 3 days**
- **Scratchy/sore throat** most common early symptom, like other waves
- Typical features include **nasal congestion, dry cough and myalgia, especially lower back pain**

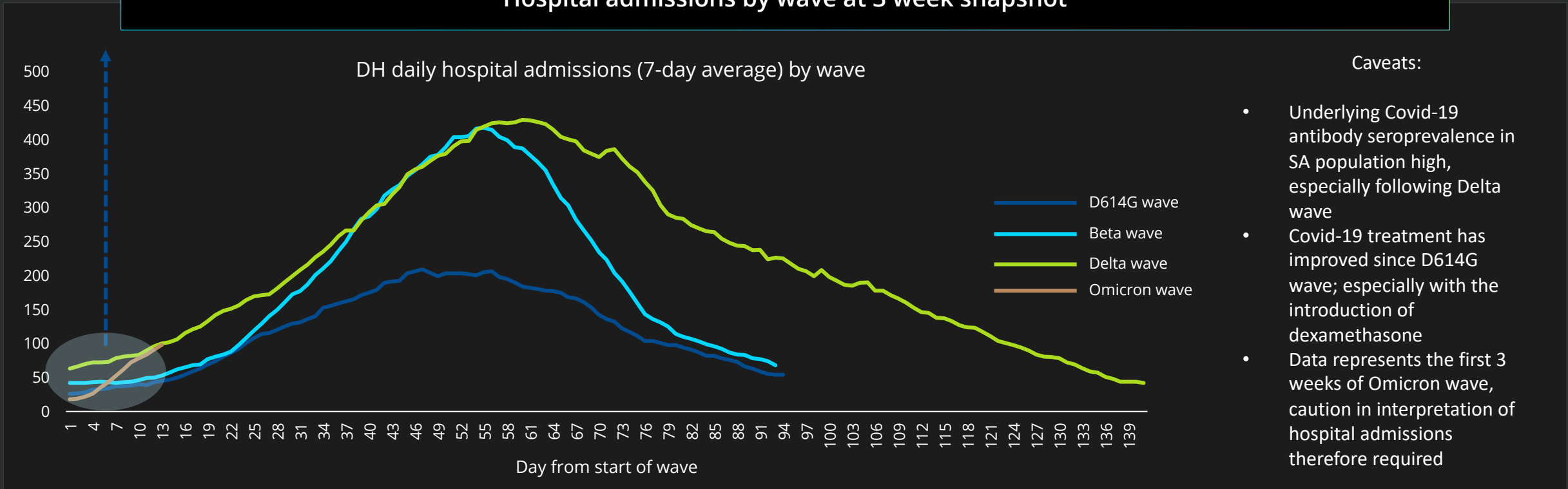
Admissions

- Most **hospitalised patients** for Covid-19 related disease are **unvaccinated**
- High number of hospitalisations in Gauteng for non-Covid care, present with Covid as an **incidental finding on admission**
- **Less respiratory distress** on presentation
- Proportion of **High care and ICU admissions lower** compared to previous waves
- Significantly lower proportion of admitted patients requiring oxygen support
- Most hypoxic **patients requiring oxygenation are unvaccinated**
- **16% of ICU admissions are vaccinated** (raw data)

Flatter trajectory of hospital admissions, indicating lower severity



Hospital admissions by wave at 3 week snapshot

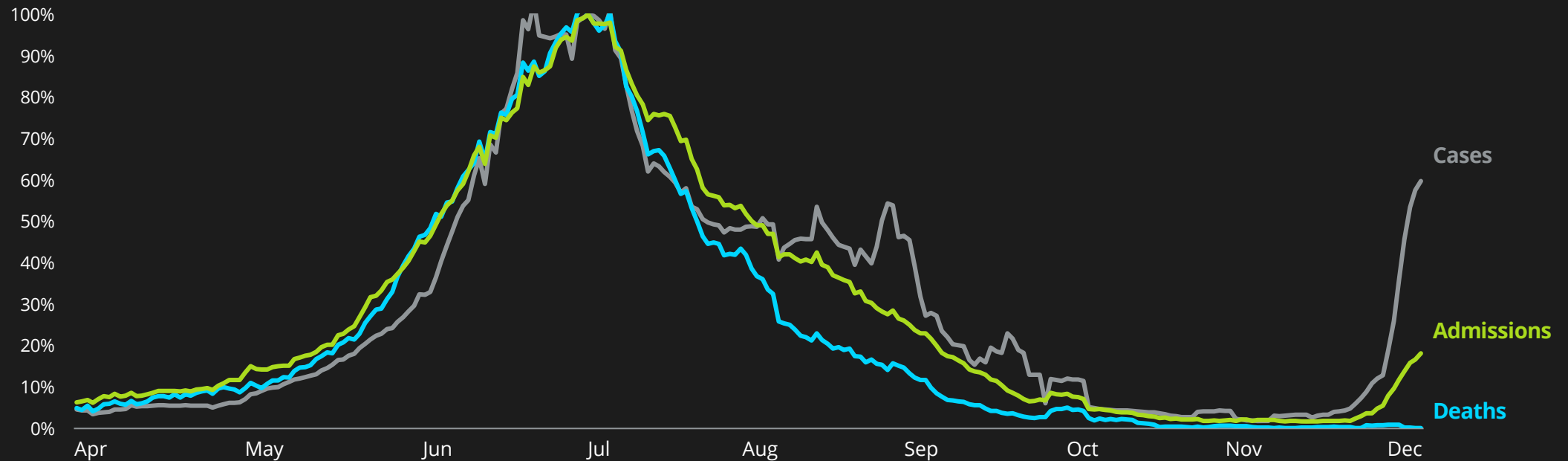


Apparent de-linking of infection curve from admission curve



Much steeper increase in new cases **during the first three weeks of the Omicron wave** compared to the Delta variant driven third wave. However, **admissions and deaths are not increasing as rapidly.**

Cases, admissions and deaths indexed to the Delta wave, each as a share of Delta peak (%)



Paediatric cases and admissions appear more prevalent than prior waves, but typically present as mild cases

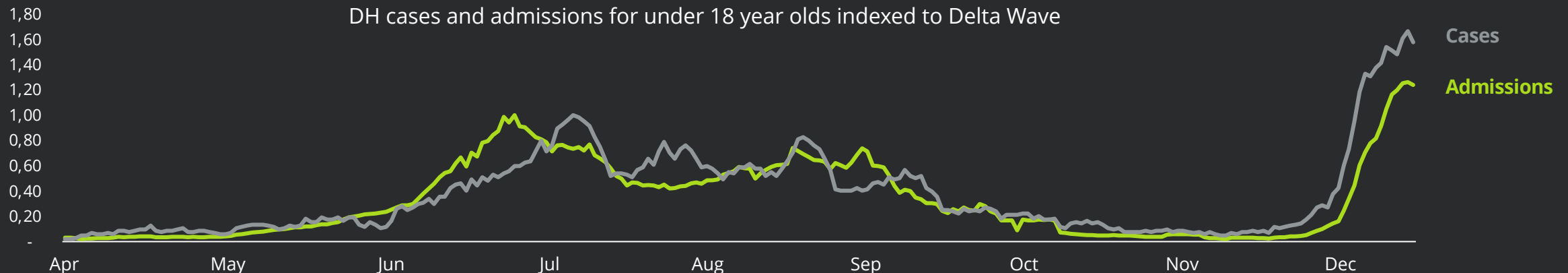


Paediatric out-of-hospital cases

- **Higher number of paediatric cases** testing positive relative to prior waves
- Children present with a **sore throat, nasal congestion and fever for 2-3 days**, and tend to complain of a headache
- Seems to resolve quickly with **recovery after 3 days**

Paediatric admissions

- Primary diagnoses in children on admission for Covid-19 related disease in Omicron wave are **bronchiolitis and pneumonia**
- Often with associated diarrhoea and vomiting, and dehydration
- Incidental Covid-19 diagnosis for multiple paediatric admissions, exceeding Covid-19 specific admissions

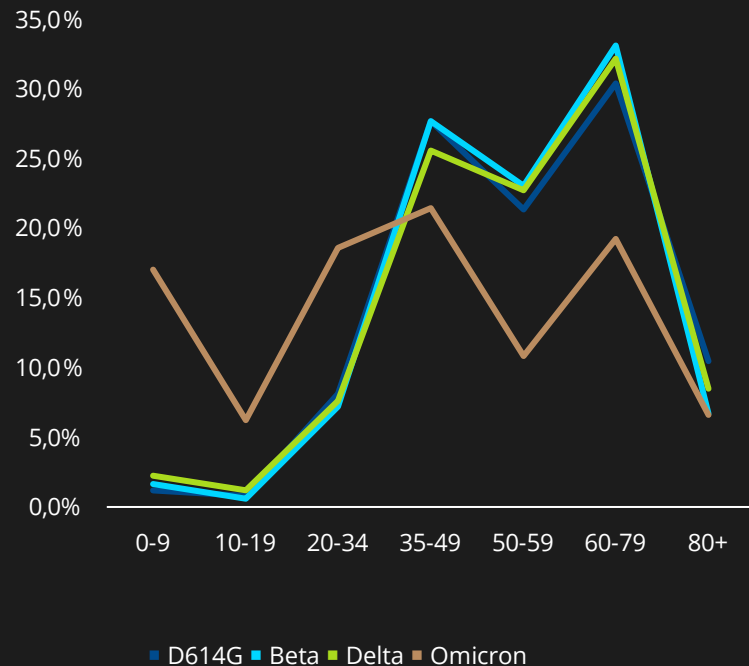


Increase in paediatric admissions, with high number of incidental Covid-19 diagnoses for unrelated admissions

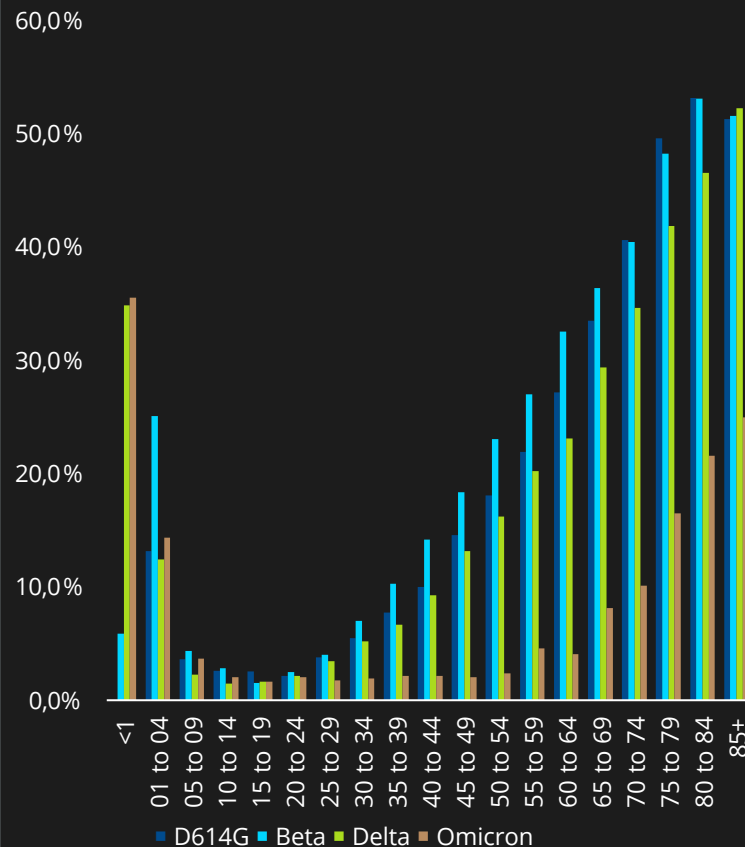


Admission proportion by age band

Increase in proportion of paediatric admissions in the Omicron wave, **possibly driven by incidental Covid-19 diagnosis** on admission

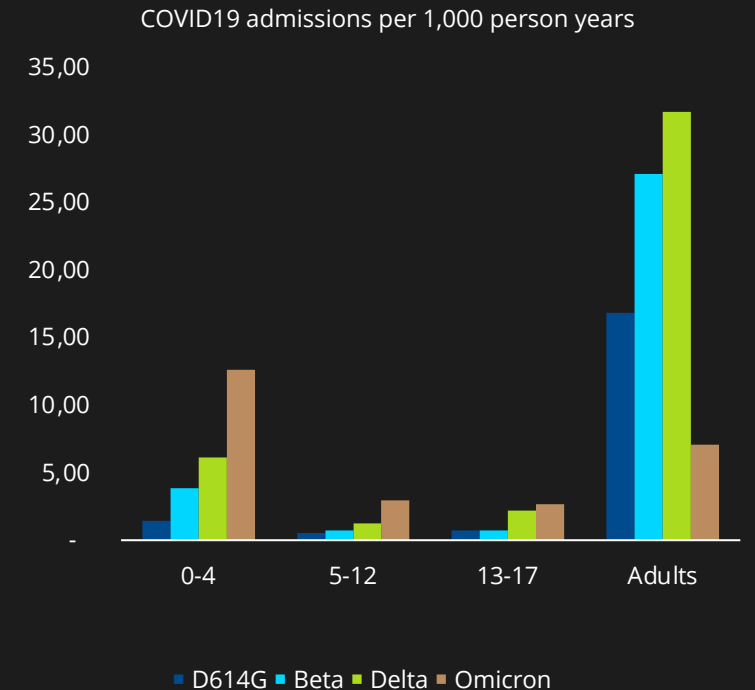


Admission rate by age band



Admission risk by age band

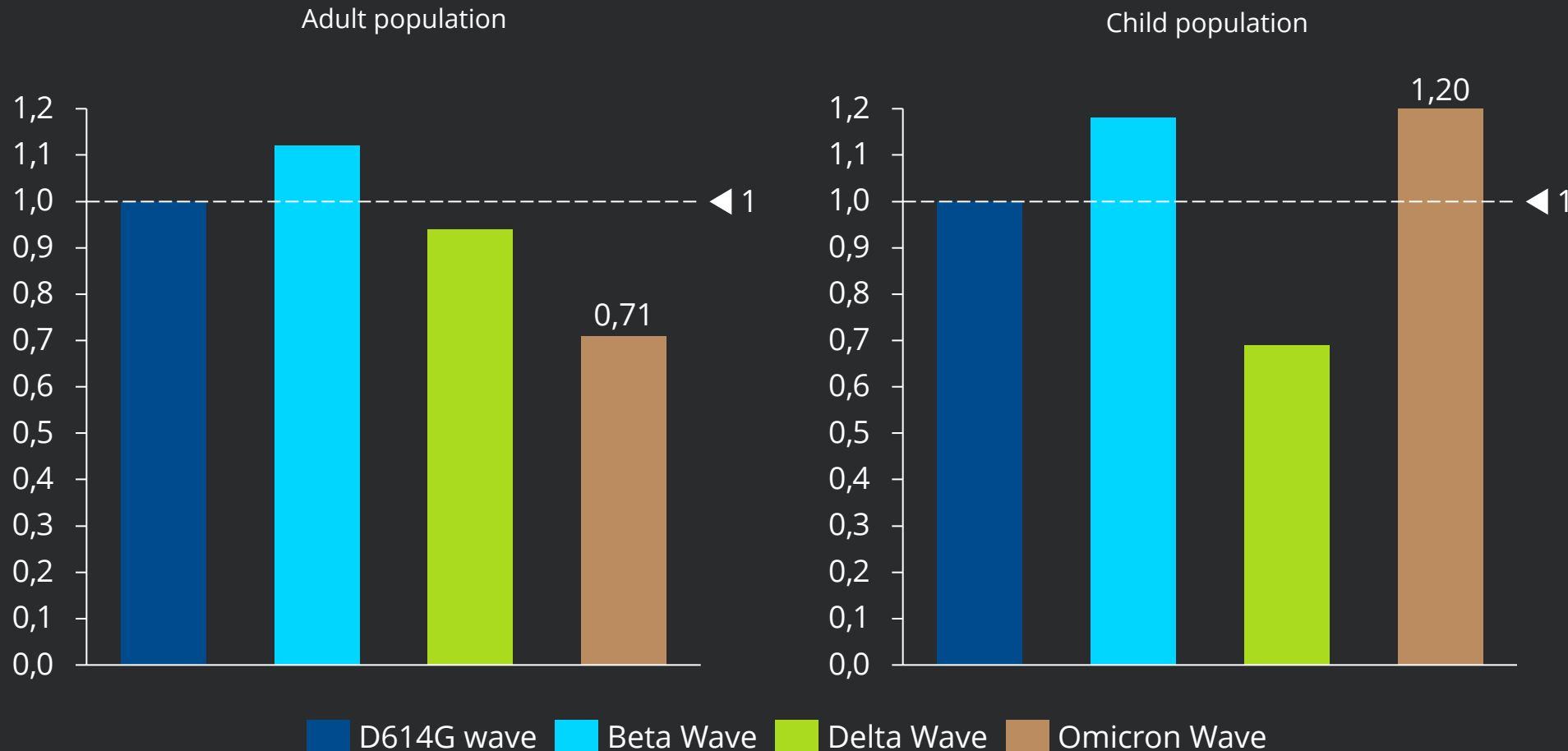
To date, **children under age 5** have experienced **higher admission risk** than adults





Risk-adjusted, Omicron may pose risk of increased severity to children under 18 years of age; very early data which should be carefully followed; low risk in absolute terms

Risk of admission relative to South Africa's first wave (fully risk-adjusted)



29% average lower admission risk relative to D614G wave. Children, to date, have had a 20% higher risk of admission

Assessed using a Cox proportional hazard model allowing for days since PCR collection date, age, sex, number of documented risk factors, vaccination status and documented prior infection*

To be submitted for peer review and publication

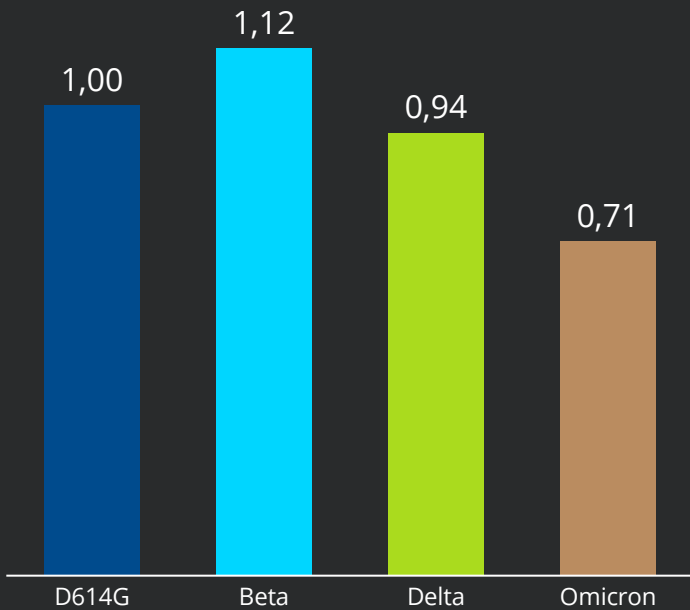
Source: Discovery Health Insights <https://discv.co/DiscoveryHealthInsights>

Risk-adjusted data correlates with anecdotal evidence demonstrating lower severity in current Omicron wave than previous waves

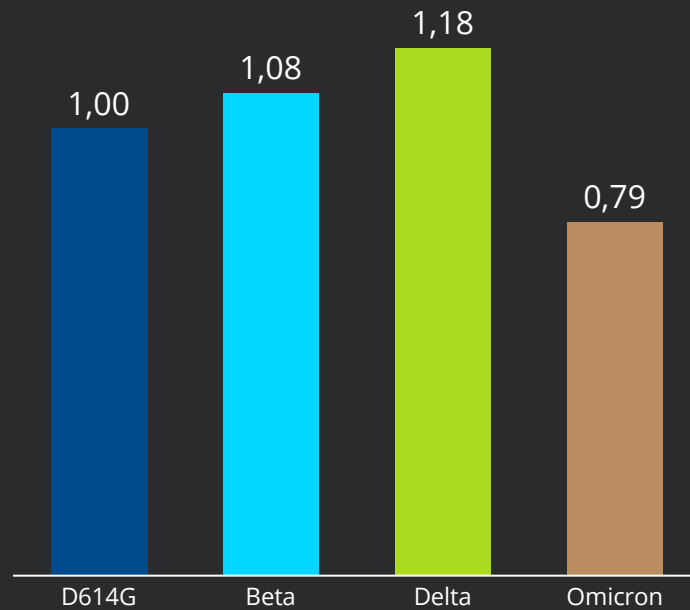


Adults are experiencing **29% lower admission risk of Covid-19 admissions** relative to the **D614G** wave. Those who are hospitalised also have a **lower admission acuity** and a **lower propensity to be admitted to ICU**, relative to prior waves

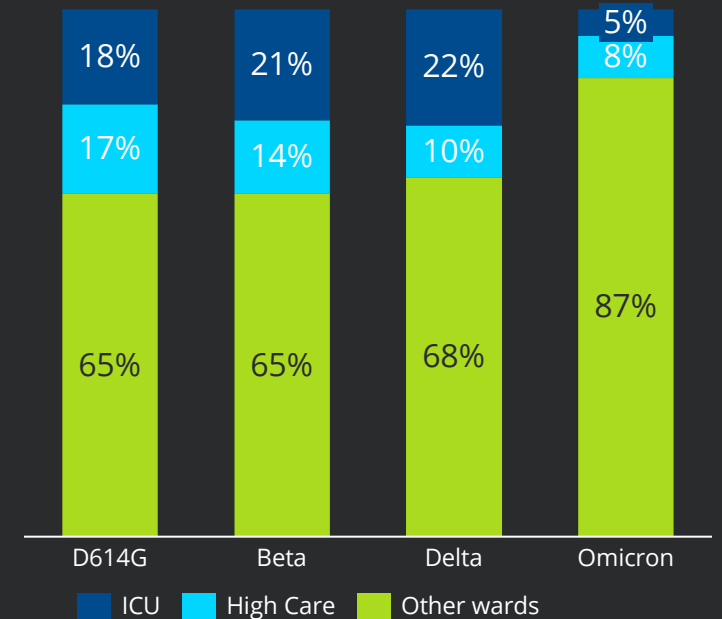
Admission risk indexed to the first wave



Case mix of Covid 19 admissions indexed to the first wave



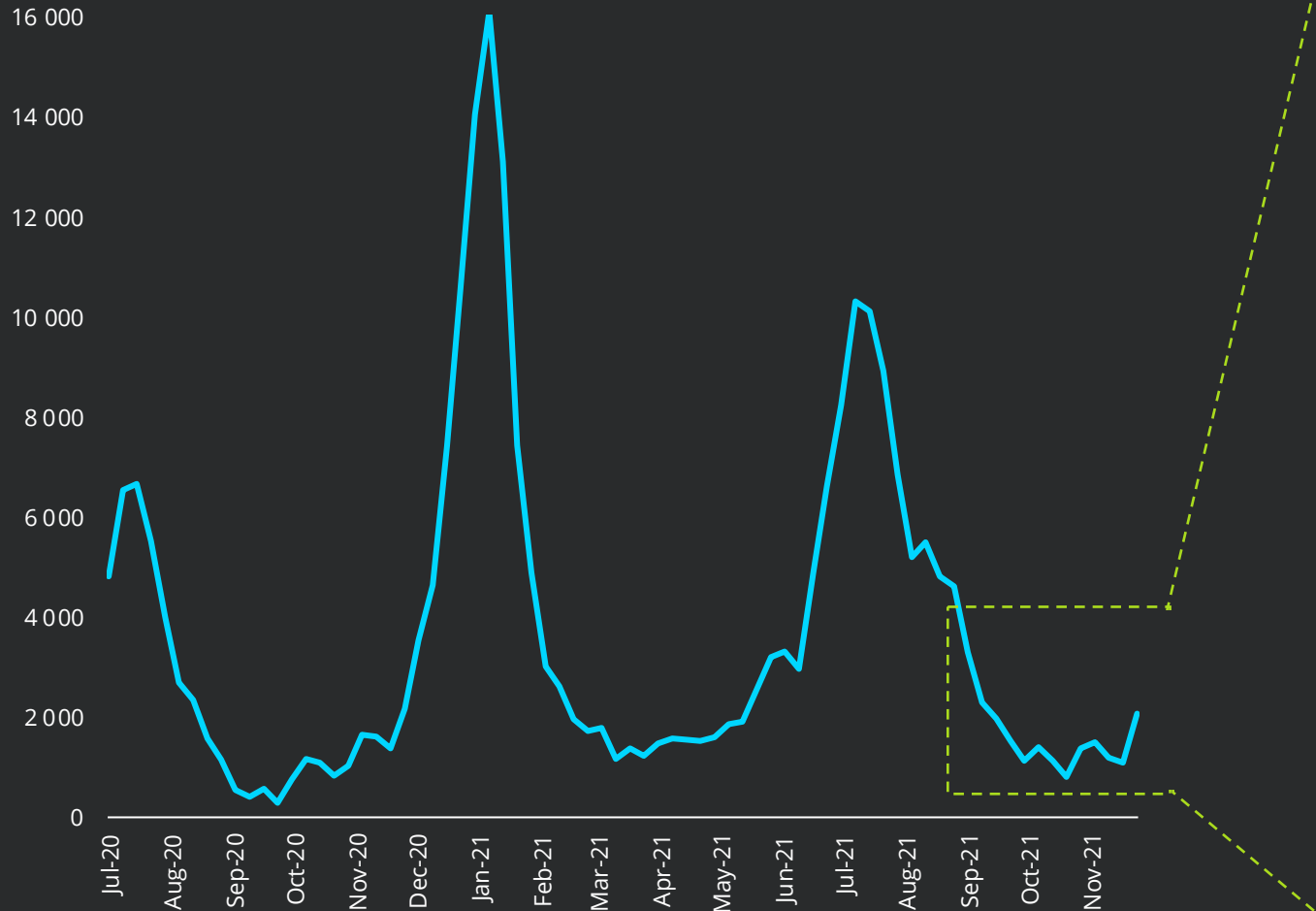
Proportion of admissions in High care and ICU by wave



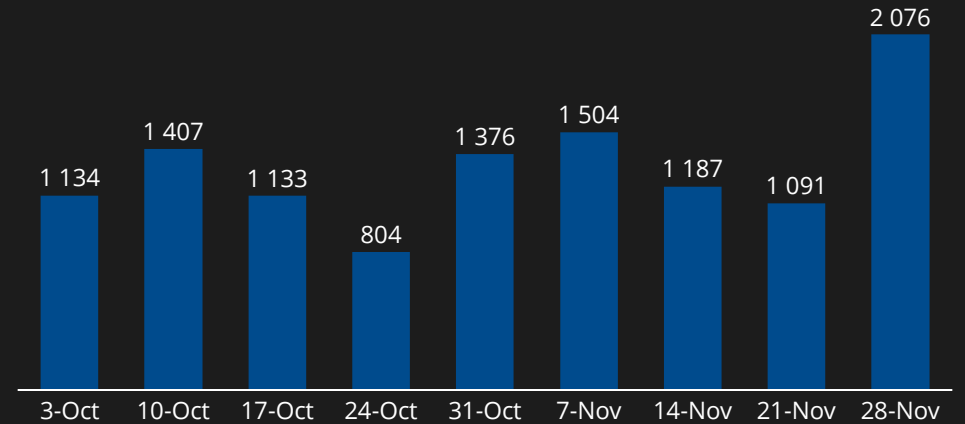
Although national excess natural deaths increased in the last week of Nov, excess natural deaths are still significantly lower than previous waves



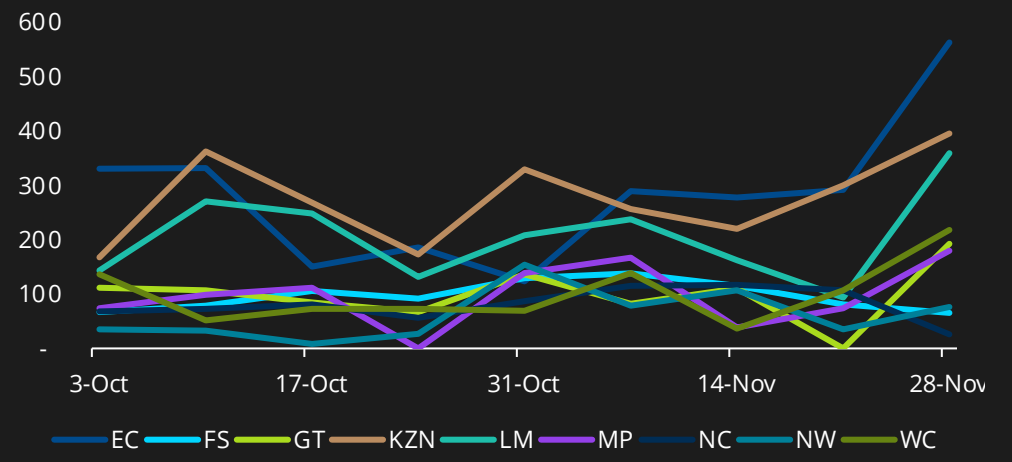
South Africa weekly natural cause excess deaths



National weekly excess deaths Oct – Nov 2021



Provincial weekly excess deaths Oct – Nov 2021





Background



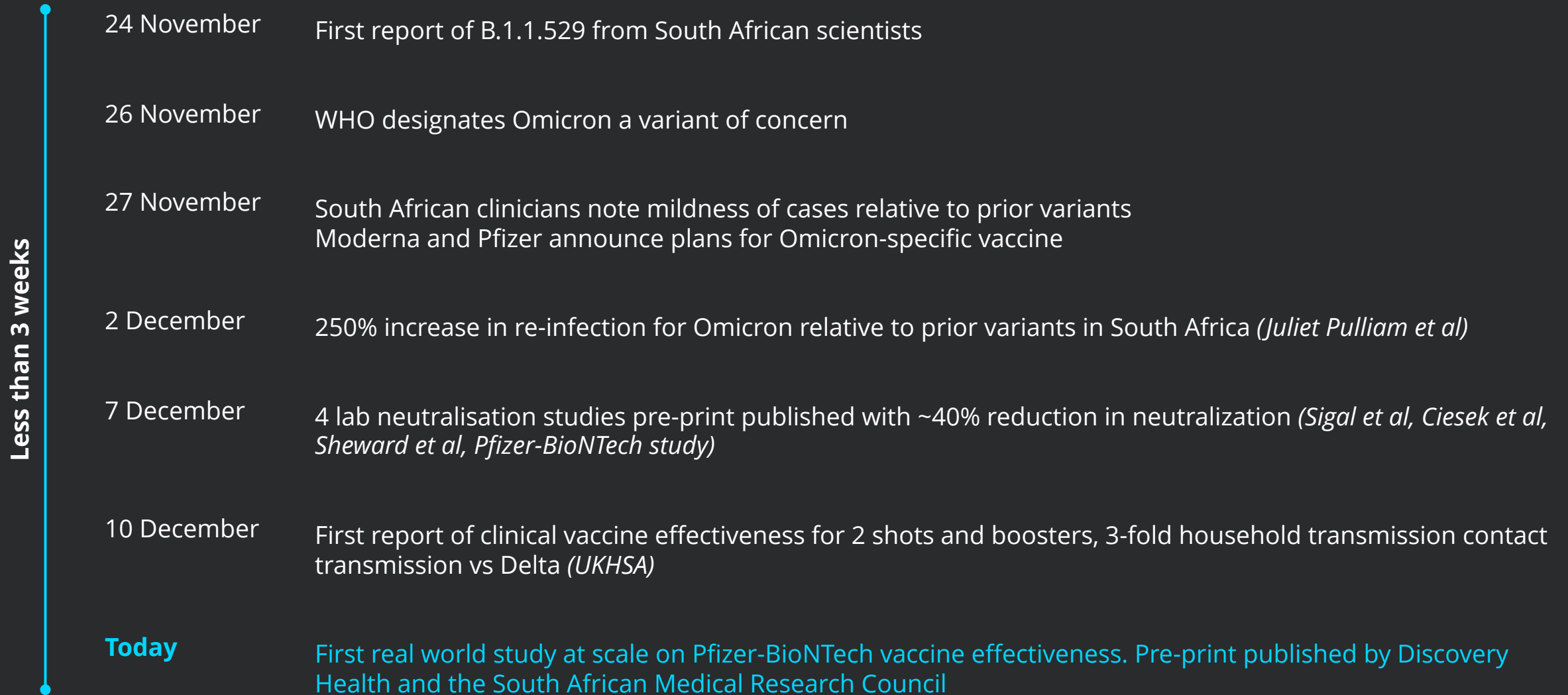
Clinical and
epidemiological
observations



Real-world insights
into vaccine
effectiveness



Rapid timeline of Omicron research following identification by SA scientists; accelerated severity & vaccine effectiveness insights through DH collaboration with SAMRC



Omicron vaccine effectiveness study parameters



1 Sep – 7 Dec 2021



study duration

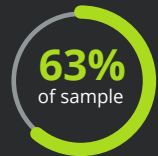
211,610



Covid-19 PCR test results for adult population

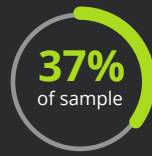
Pre-Omicron Period

1 September
to
31 October 2021



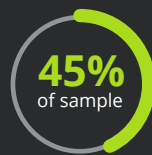
Proxy Omicron Period

15 November
to
7 December 2021



Sensitivity 1

SGTF positive test
results from Lancet
Laboratories



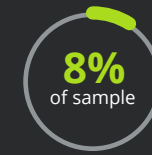
Sensitivity 2

Gauteng PCR tests



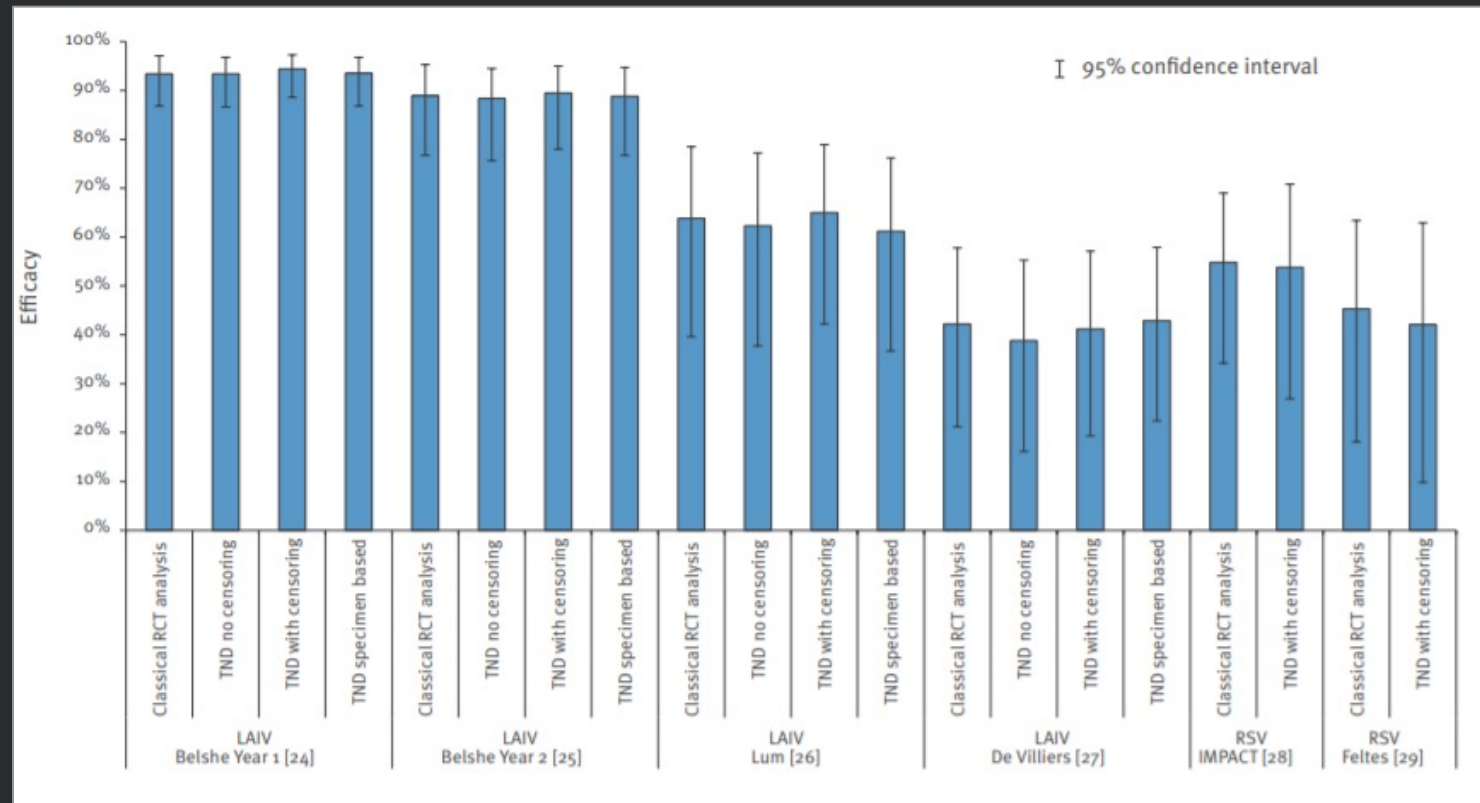
Sensitivity 3

PCR test results
amongst symptomatic
admitted patients



Omicron vaccine effectiveness study methodology: Test negative design

Method used globally on pathology surveillance data to assess annual influenza vaccine effectiveness

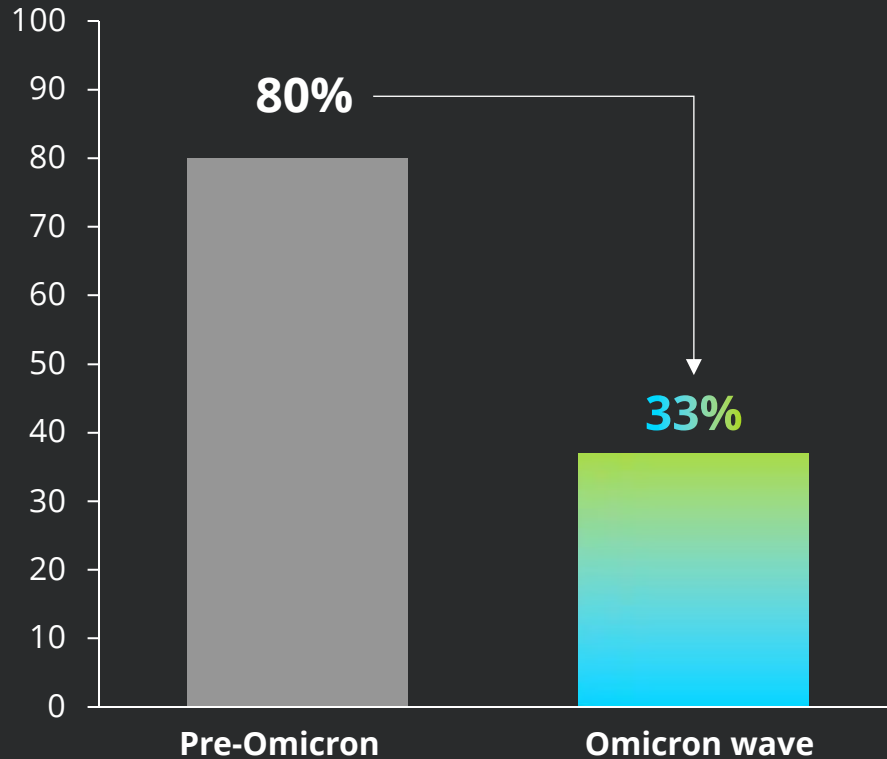


- Method is generalisable to other specific respiratory conditions provided vaccination does not have clinical efficacy for other respiratory conditions
- Methodology implicitly adjusts for biases due to health-seeking behaviour
- Efficacy estimates and associated confidence intervals are consistent with randomized control studies
- A number of publications have used a test-negative design for real world Covid-19 vaccine effectiveness studies

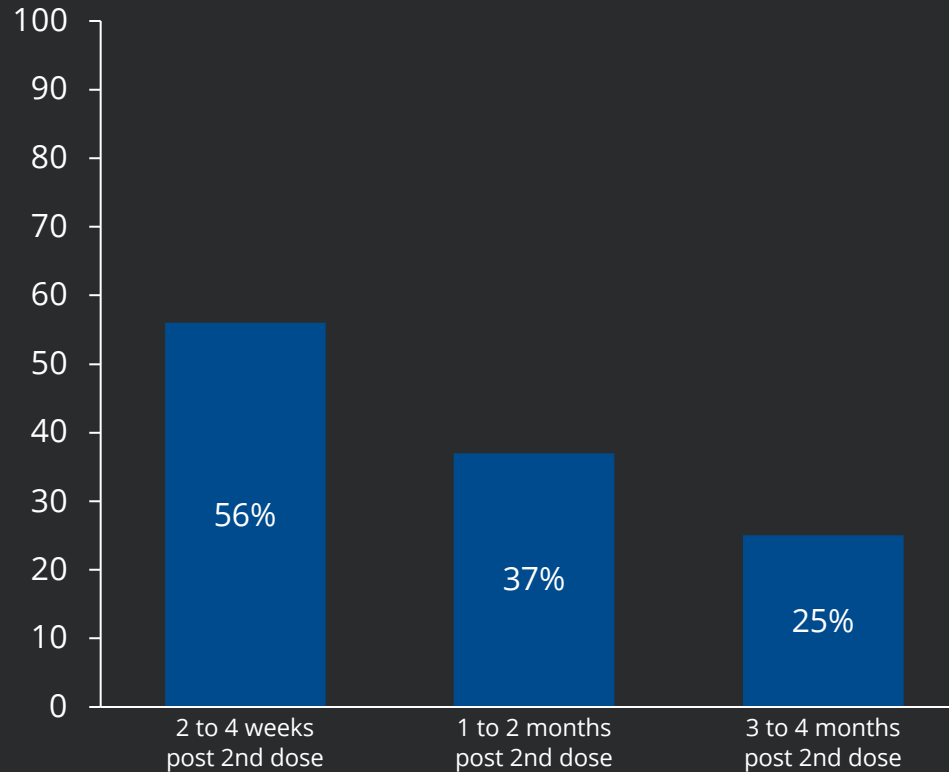
Pfizer-BioNTech vaccine 33% effective in reducing Omicron-related infection



Real-world Pfizer vaccine effectiveness against infection



Waning effectiveness against infection over time



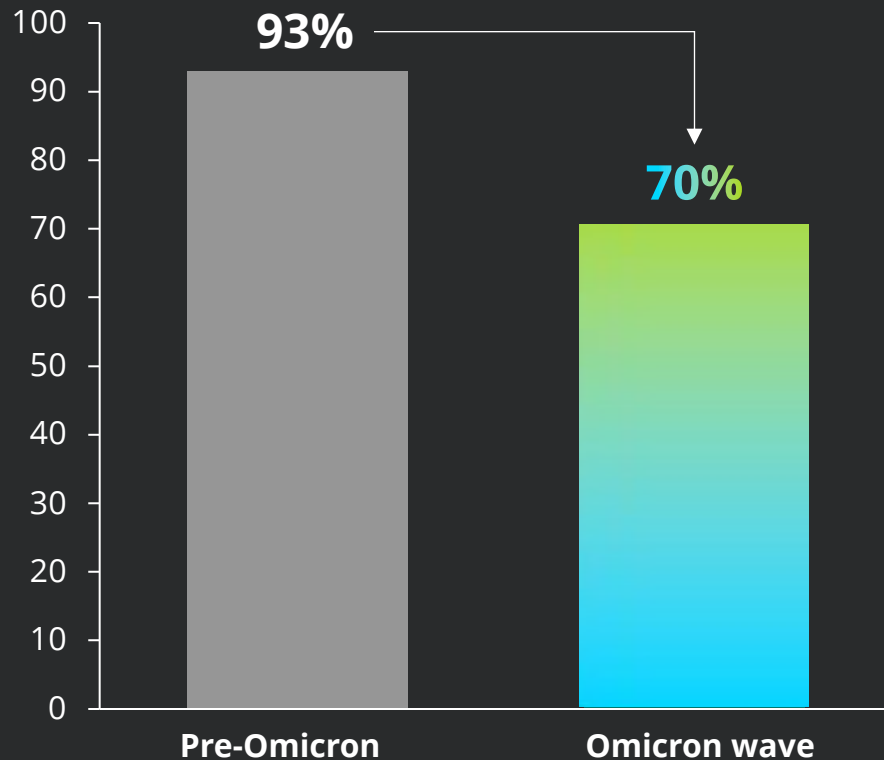
Omicron has materially reduced vaccine effectiveness against new infections, potentially compounded by waning durability

*To be submitted for peer review and publication
Authors have no conflicts of interest direct or in kind
Source: Discovery Health Insights <https://discv.co/DiscoveryHealthInsights>

Pfizer-BioNTech vaccine 70% effective in reducing Omicron-related hospital admissions



Real-world Pfizer-BioNTech vaccine effectiveness against hospital admission

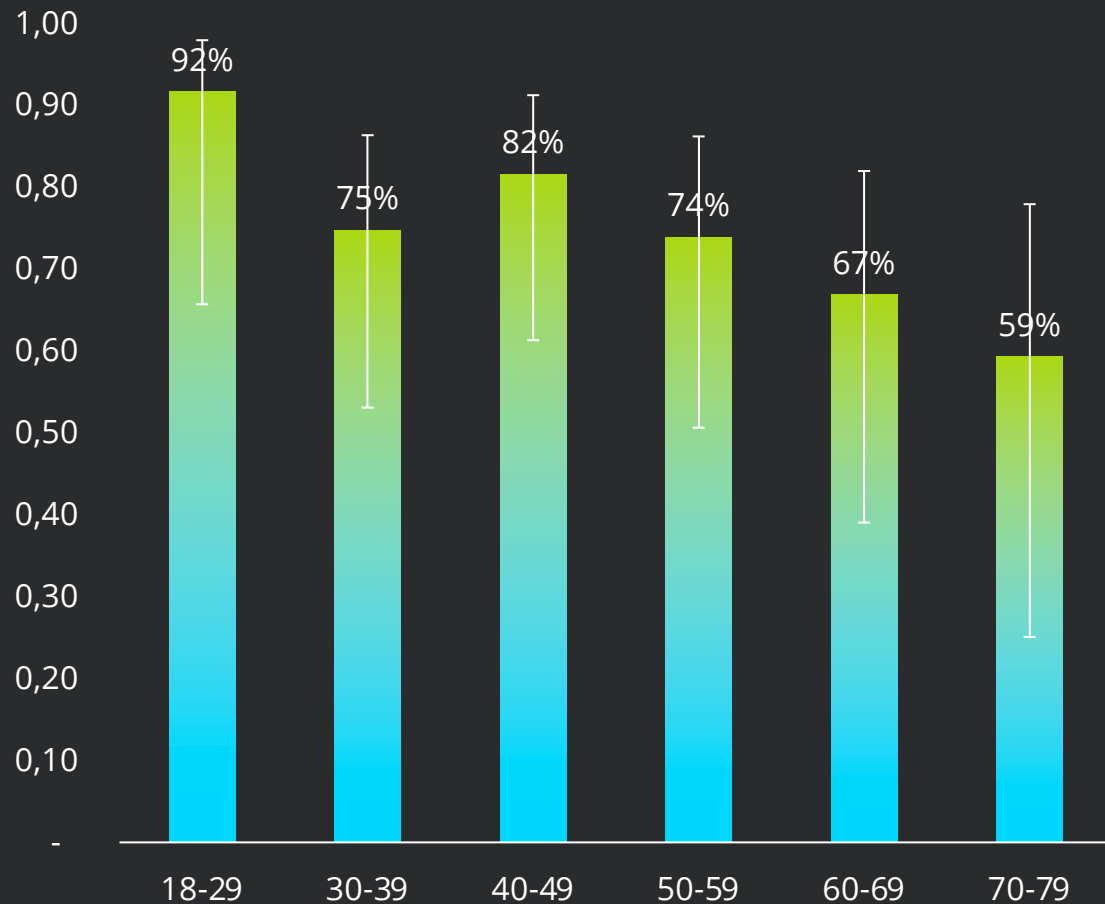


Real world effectiveness of the Pfizer-BioNTech vaccine against hospital admission has reduced from 93% in the Delta (pre-Omicron) wave to 70% in the Omicron wave, continuing to provide substantial protection against hospital admission

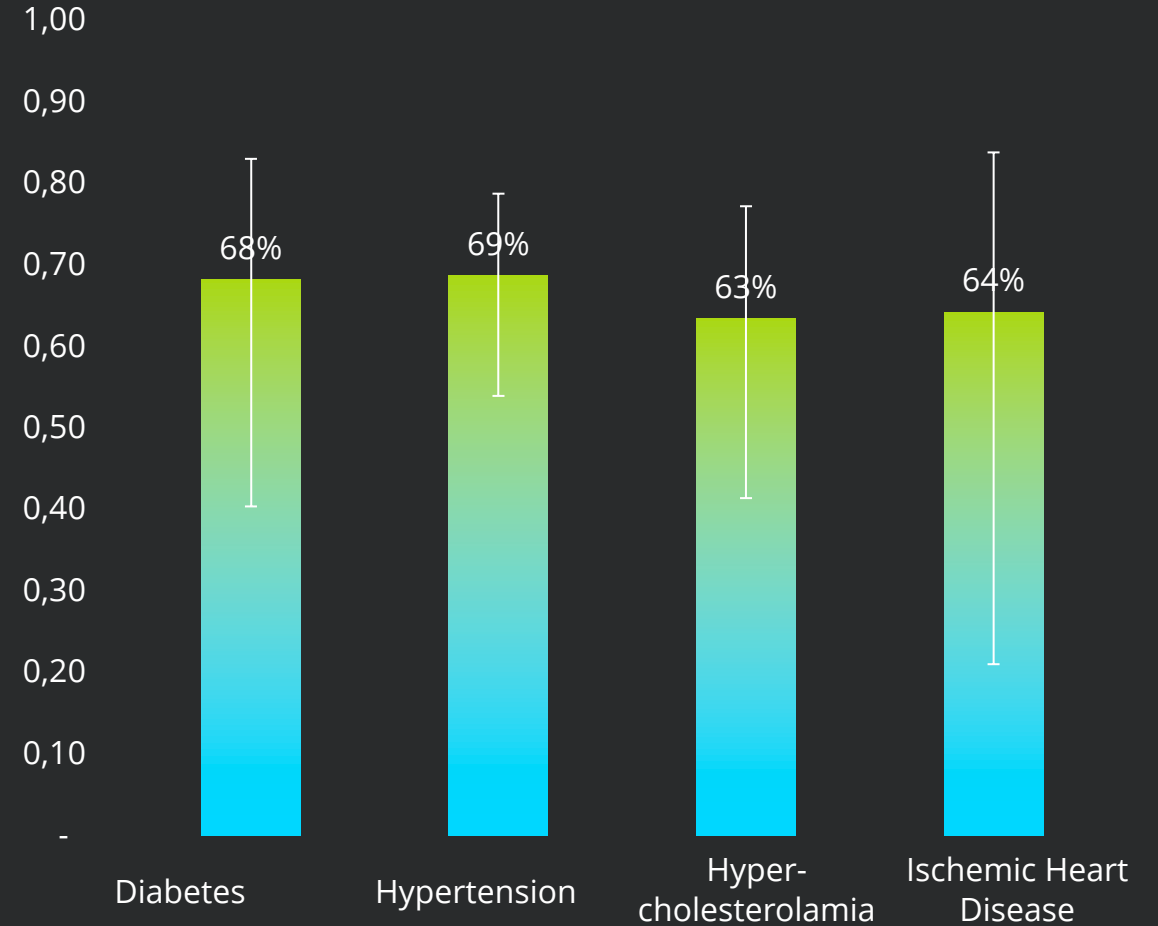
Vaccine effectiveness retracts slightly with increasing age but is maintained across various comorbidities – durability impact confounding



Vaccine effectiveness by age during Omicron period



Vaccine effectiveness by comorbidity during Omicron period

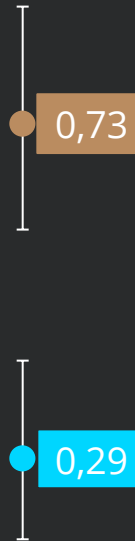


*To be submitted for peer review and publication
Authors have no conflicts of interest direct or in kind
Source: Discovery Health analysis of Pfizer-BioNTech effectiveness



Although prior infection confers reduced risk of re-infection, this is diminished against Omicron re-infection

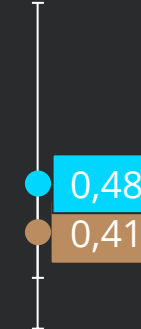
D614G



Beta



Delta



● Odds of reinfection- Omicron period

● Odds of reinfection Sept/Oct 2021

The protective effect of prior infection has reduced over time, and Omicron has eroded that protective effect further

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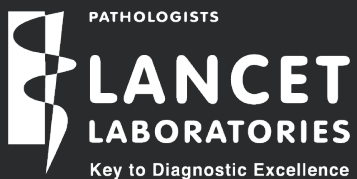
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Prof Cheryl Cohen



Dr Richard Lessels
Tulio de Oliveira



Hendrik van de Venter
John Sole

Conclusion | Omicron Insights



1. Apparent 29% lower severity based on early data (in high seroprevalence population) and supported by anecdotal clinical feedback
2. Vaccination remains single most important intervention to mitigate against severe Covid-19, with double dose of Pfizer-BioNTech vaccine showing 70% effectiveness in reducing risk of hospitalisation
3. Vaccine effectiveness against infection is materially reduced, with high numbers of breakthrough infections in vaccinated individuals
4. The protective effect of prior infection has reduced over time, and Omicron has eroded that protective effect further, with high re-infection rates in previously Covid-19 positive individuals
5. Notwithstanding the lower severity, health systems could still be over-run by the sheer volume of cases, considering Omicron's rapid community spread
6. Children experiencing very low test positivity rate relative to adults, and low Covid-19 admissions in absolute terms, but appear to be at 20% greater risk of hospitalisation during Omicron wave relative to D614G wave

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