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TRENDS IN SARS-COV-2 CASES AND ADMISSION TRENDS IN THE OMICRON-DOMINATED FOURTH WAVE FROM THE GOVERNMENT EMPLOYEES MEDICAL SCHEME (GEMS)

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BACKGROUND

The Government Employees Medical Scheme (GEMS) is the largest closed medical scheme in South Africa. GEMS now represents more than 2 million medical scheme beneficiaries. GEMS beneficiaries have been heavily impacted by the COVID-19 pandemic. As of the 15th of December 2021, 260,307 beneficiaries have tested positive for COVID-19. There have been 56,164 COVID-19-related admissions and 11,043 COVID-19-related deaths.

GEMS has carefully monitored the experience of its beneficiaries throughout the pandemic and has amassed an extensive dataset. This dataset highlights both the clinical and financial impact of the pandemic. The article below provides (highly summarised) insights into the recent trajectory of the pandemic since the emergence of the Omicron variant, as it affects GEMS members. Whilst predominately female, GEMS member population generally has a similar geographical distribution as the South African population.

It is widely held that the Omicron variant has been responsible for most infections in South Africa since the 15th of November 2021. [1] To assess the impact which Omicron has had, experience prior to the 15th of November 2021 (when other variants were dominant) is contrasted with experience thereafter.

Experience up to the 30th of September 2020 is referred to the original wave given that the originally identified strain was believed to be dominant, based on genomic testing. Experience between the 1st of October 2020 and the 30th of April 2021 is similarly referred to as the Beta-dominated wave. Experience between the 1st of May 2021 and the 14th of November 2021 is similarly referred to as the Delta-dominated wave.

The clinical and demographic profile of persons testing positive and the case-admission rate[2] are considered for each variant dominated wave. It is too early to consider the Omicron case-fatality rate,[3] because there is typically a significant lag between infection and death, and only limited time has elapsed since the emergence of Omicron.

Data analysis by vaccination status will be considered in future studies.

[1] https://www.krisp.org.za/manuscripts/25Nov2021_B.1.1.529_Media.pdf

[2] The proportion of persons who are admitted after testing positive. This differs from the infection-admission rate which would be the proportion of persons infected admitted (irrespective of whether those persons tested positive). The number of infections cannot be determined with any degree of accuracy and hence the case-admission rate rather than the infection-admission rate is considered.

[3] The proportion of persons who pass away after testing positive. This differs from the infection fatality rate.

PERSONS TESTING POSITIVE

Younger persons have become responsible for an increasingly large proportion of the persons testing positive for COVID-19 since the emergence of the Delta variant. This is even more evident since the emergence of the Omicron variant.

In the original-dominated period, 8.9% of those testing positive were under the age of 18 and 19.0% were under 30. The average age was 43.0. In the Beta-dominated period, 7.6% of those testing positive were under the age of 18 and 17.6% were under 30. The average age was 45.6. By contrast, in the Delta-dominated period, 16.2% of those testing positive were under the age of 18 and 28.9% were under 30. The average age was 40.8. In the Omicron-dominated period, 13.4% of those testing positive were under the age of 18 and 29.5% were under 30 (Figure 1). The average age was 38.5

This may suggest that the Delta and the Omicron variants are of a greater threat to the young than previous variants. This may be the manifestation of other factors, particularly age-related vaccination status. Vaccination rates are significantly higher amongst the elderly than the young.[4] Given the efficacy of vaccines, elderly persons are likely to be responsible for a smaller proportion of infections in successive waves. Further research is ongoing in this respect.

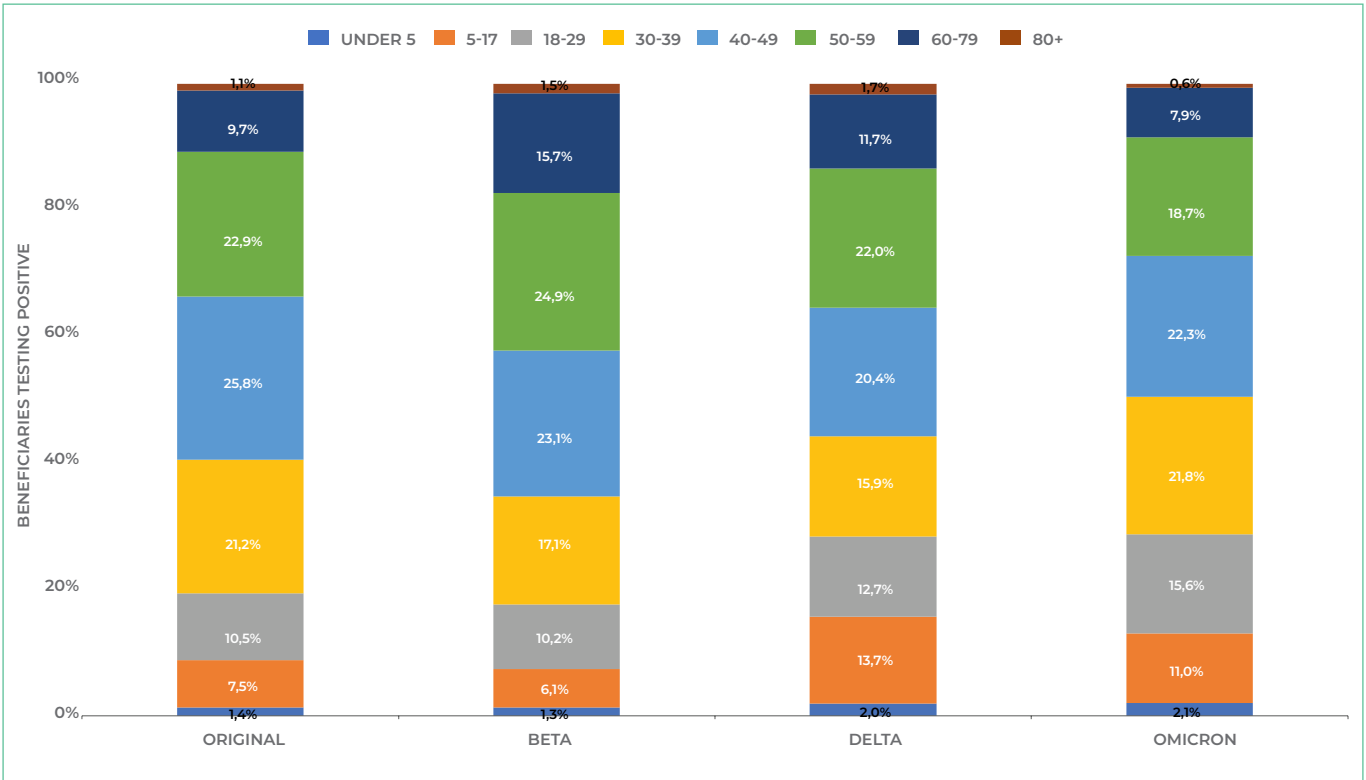

Figure 1. Proportion of GEMS beneficiaries testing positive by age

[4] https://sacoronavirus.co.za/latest-vaccine-statistics/a

CASE-ADMISSION RATES

1. Premise

Case-admission rates are indicative of the severity of infections. A higher case-admission rate indicates more severe infections, whilst a lower case-admission rate indicates fewer severe infections.

Case-admission rates are influenced by the clinical and demographic profile of persons diagnosed. For example, if more elderly and persons with chronic health problems are diagnosed, a higher case-admission rate will ensue. If more young and healthy persons are diagnosed, a lower case-admission rate will ensue.

Variations in the clinical and demographic profile of persons infected are adjusted for via a statistical risk-adjustment process. The process accounts for the age of beneficiaries, key chronic conditions which have been shown to significantly influence case-admission rates, [5] and gender.

Persons infected after the 30th of November are not considered in this analysis. This is because there is commonly a lag between diagnosis and admission, and these persons may still be admitted in the days to come.

Case-admission rates may be influenced by other factors. For example, increased testing capacity may result in more mildly ill persons presenting for testing which will in turn deflate the case-admission rate. By implication, all results should be carefully interpreted.

1.2. Results

1.2.1. Without adjustments for hospital capacity

Omicron is associated with the lowest case-admission rate for any of the variants at 15.4%. This is 28.2% lower than the case-admission rate associated with the original variant (21.4%), 45.9% lower than Beta (28.4%) and 20.1% lower than Delta (19.3%). These results are prior to risk adjustment and are influenced by the profile of subjects that test positive.

After adjusting for the profile of persons testing positive, Omicron is associated a risk-adjusted case admission rate of 20.4%. This is 5.5% lower than the risk-adjusted case admission rate associated with the original variant (21.6%), 21.7% lower than Beta (26.1%) but almost precisely consistent with Omicron (20.4%) (Figure 2).

[5] Asthma, COPD, chronic renal failure, diabetes type I, diabetes type 2, heart failure, HIV, hypertension and rheumatoid arthritis have been shown to significantly influence case-admission rates in previously analyses performed by GEMS.

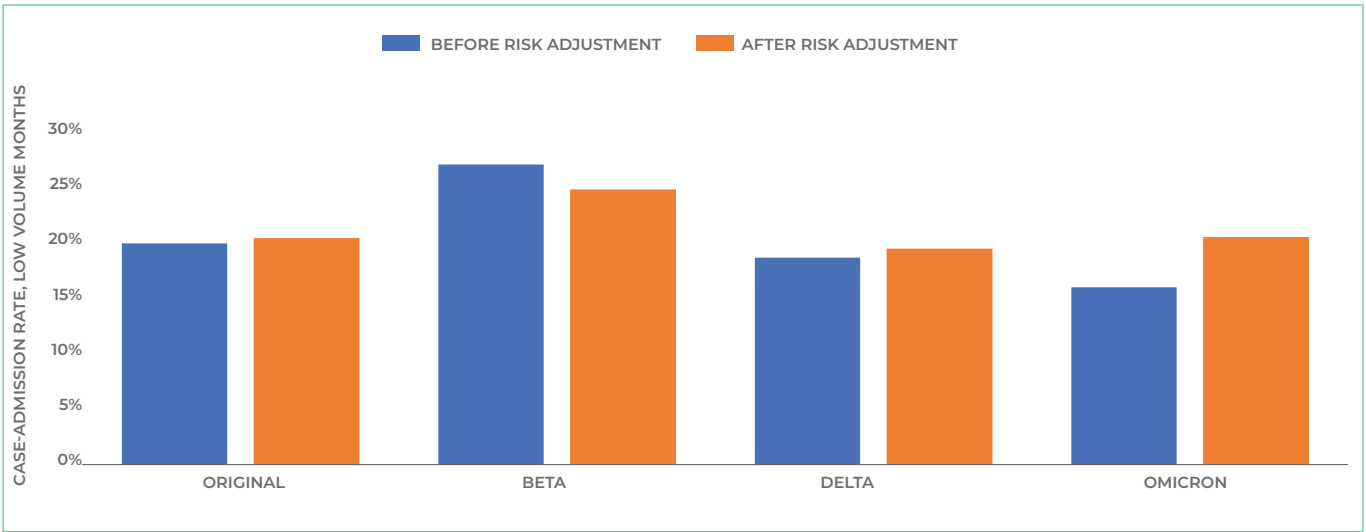

Figure 2. Case admission rates

1.2.2. Adjustments for hospital capacity

Case admission rates are heavily influenced by hospital capacity. When the absolute number of admissions is low, admission rates tend to be higher as bed capacity is plentiful and rationing is limited. When the absolute number of admissions is high, admission rates tend to be lower as bed capacity is limited and rationing is essential.

The correlation coefficient between the case admission rate and the number of admissions is -58.6%. The inverse relation between admission volumes and case-admission rates is shown in Figure 3.

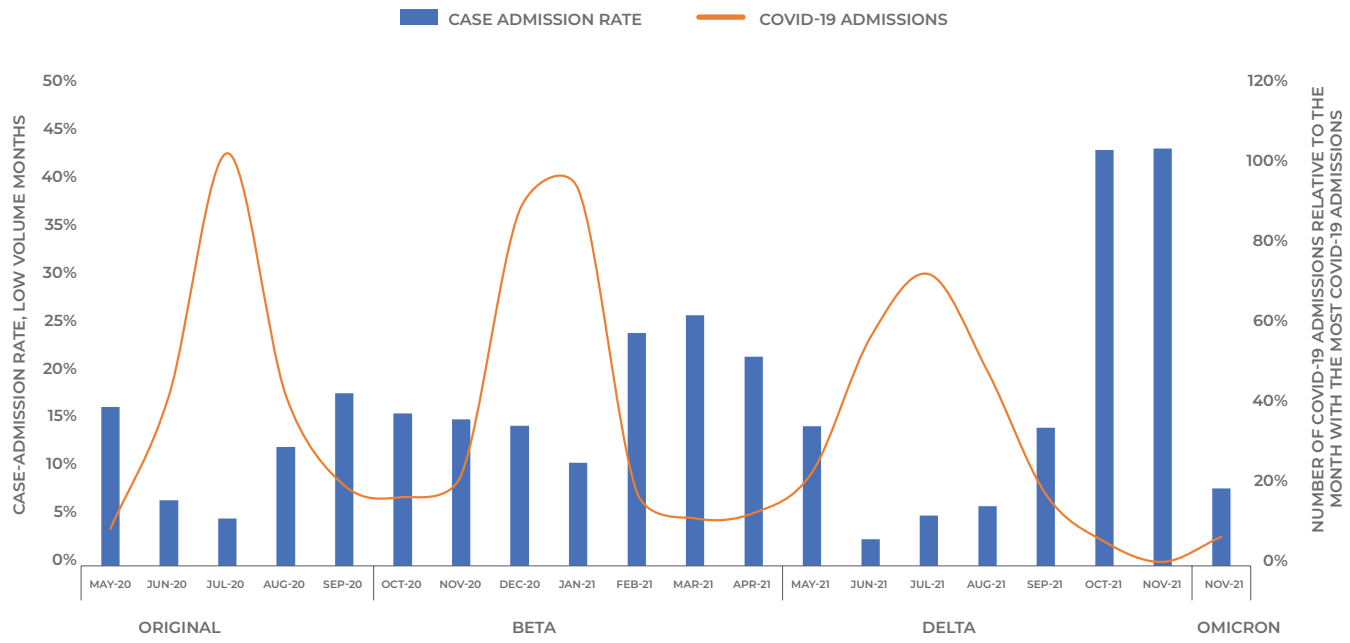

Figure 3. Relationship between case admission rate and number of admissions

To arrive at a more meaningful comparisons to the Omicron variant (where admission volumes have thus far been low), results are limited to those months where admission volumes have been low. [6]

1.2.3. With adjustments for hospital capacity

Omicron is associated with the lowest risk adjusted case-admission rate for any of the variants at 15.4%. This is 30.7% lower than the risk-adjusted case-admission rate for low-volume months associated with the original variant (29.5%), 30.2% lower than Beta (29.2%) and 27.2% lower than Delta (28.0%) (Figure 4).

[6] In this context, months with low admission volumes are here defined as months with less than 30.0% of the maximum number of admissions in a month. In July 2020, there were 7,392 admissions and low admission months are thus defined as months with less than 2,248 admissions.

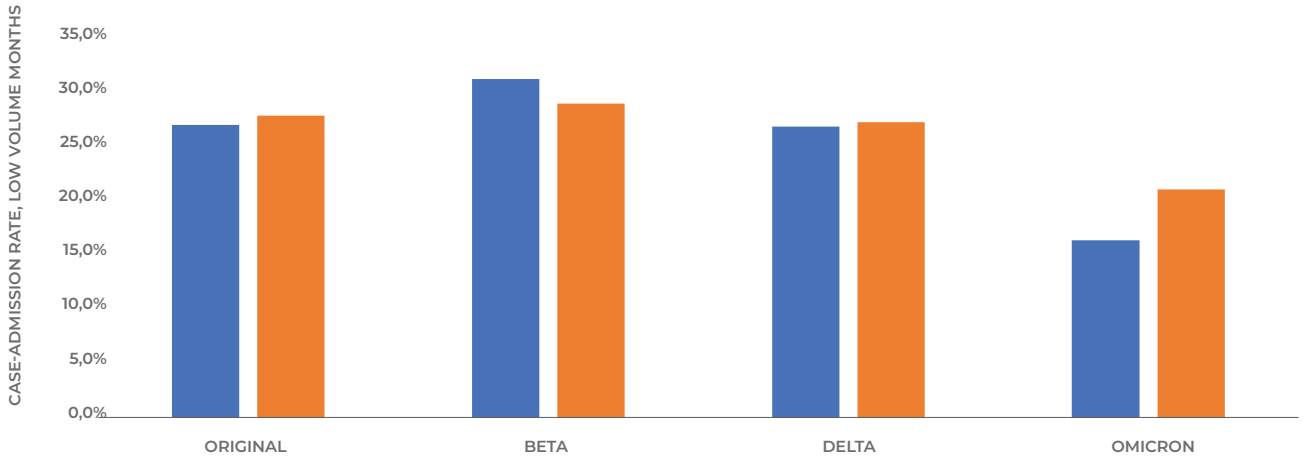

Figure 4. Case-admission rates, low-volume months

This suggests that Omicron is associated with less severe disease than the preceding variants. Whether this is due to the characteristics of the variant or increased vaccination rates requires further investigation and will be the focus of subsequent studies.

1.2.4. With adjustments for hospitals capacity, by age

Lower case-admission rates are evident amongst persons over the age of 18. Most notably, the Omicron case-admission rate is 13.4% for persons between the ages of 50 and 59. This is 59.7% lower than the Delta case-admission rate for persons aged between 50 and 59 of 33.3%. After risk adjustment, the decrease declines to 57.2%. For persons between the ages of 18 and 29, the risk-adjusted decrease in the case-admission rate is 11.0%, 30 to 39 is 26.6%, 40 to 49 is 46.9%, 60 to 79 is 41.5% and greater than 80 is 33.4% (Table 1, Figure 5).

Higher case-admission rates are evident amongst persons under the age of 18. For persons between the ages of 0 and 4, the risk-adjusted increase in the case-admission rate is 48,9% and 5 to 17 is 25.4% (Table 1, Figure 5). This suggests that children, unlike adults, may be more severely affected by Omicron than by preceding variants.

Table 1. Case-admission rates, low-volume months, by age

					Before risk adjustment	After risk adjustment
	Original	Beta	Delta	Omicron	Omicron relative to Delta	
0 - 4	31.3%	43.5%	38.3%	56.7%	48.2%	48.9%
5 - 17	11.4%	12.6%	9.8%	12.3%	25.7%	25.4%
18 - 29	19.7%	16.4%	13.2%	12.1%	-8.6%	-11.0%
30 - 39	19.4%	21.3%	19.3%	13.7%	-28.7%	-26.6%
40 - 49	26.6%	27.5%	23.7%	12.0%	-49.3%	-46.9%
50 - 59	35.5%	34.9%	33.3%	13.4%	-59.7%	-57.2%
60 - 79	54.9%	51.2%	51.1%	29.6%	-42.0%	-41.5%
>=80	68.4%	72.0%	69.0%	45.5%	-34.1%	-33.4%
Total	**29.6%**	**31.3%**	**27.2%**	**15.4%**	**-43.5%**	**-27.2%**

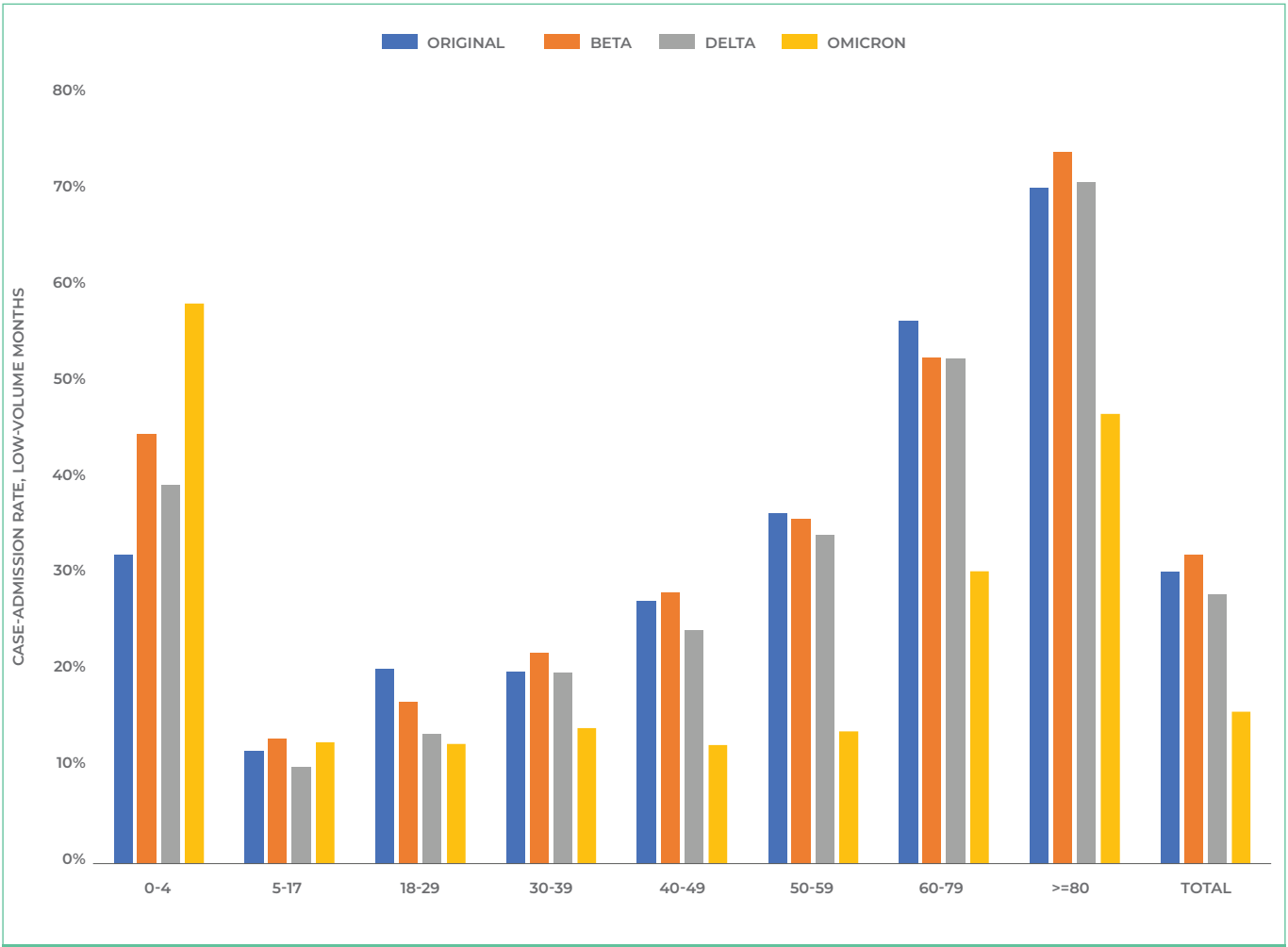

Figure 5. Case-admission rates, low-volume months, by age

SUMMARY AND CONCLUSIONS

In aggregate, for the GEMS membership, the Omicron variant is associated with a significantly lower hospital admission rate than previous variants. This may suggest that the Omicron variant is associated with less severe disease than the previous variants. However, this could also be a manifestation of the fact that Omicron has coincided with increasingly high vaccination rates and possible immunity from previous infections. These possibilities will be disentangled in subsequent studies. Similarly, case-fatality rates will be explored as more data emerge.

Notwithstanding the above, persons under the age of 18 are responsible for an increasingly large proportion of identified COVID-19 infections and are associated with an increasingly high case-admission rate. This may possibly suggest that the young are being more commonly impacted by Omicron in contrast to the adult population. However, further research is required in this regard.