COVID-19 weekly update

17th October 2022

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**clinical management**

**title:** Covid-19: Antiviral purchased by UK government does not lower risk of hospital admission, trial shows

BMJ | 11th october 2022  
  
Molnupiravir, a covid-19 antiviral drug bought by the UK government in the amount of 2.23 million doses, is no better than placebo at lowering the risks of death and hospital admission, a pivotal UK trial has found.

Preliminary results released from the Panoramic trial of 25 783 people who were randomly assigned to open label treatment with molnupiravir plus usual care or to usual care alone found no significant difference between the two groups for the primary endpoint of death or hospital admission.1 The study has been published as a preprint and has not yet been peer reviewed.

The UK was the first country to authorise Merck Sharp and Dohme’s molnupiravir (Lagevrio) for the treatment of mild to moderate covid-19 in adults with at least one risk factor for severe illness, in November 2021.2 The European Medicines Agency has still not approved the drug.  
<https://www.bmj.com/content/379/bmj.o2441>

**title:** Outcomes of COVID-19 and Vaccination in Patients With Moderate to Severe Atopic Dermatitis Treated With Tralokinumab

JAMA dermatology |12th october 2022  
  
Atopic dermatitis (AD) is an inflammatory skin disorder mainly caused by Th2 cytokines, especially interleukin (IL) 13. Tralokinumab, an IgG4 monoclonal antibody that neutralizes IL-13, has demonstrated safety and efficacy in clinical trials for treatment of adults with moderate to severe AD.1,2 Concerns arose during the COVID-19 pandemic that immunomodulatory drugs may increase disease susceptibility or severity or interfere with SARS-CoV-2 vaccination. The aim of the study was to assess outcomes of COVID-19 and SARS-CoV-2 vaccination among adult patients with AD treated with tralokinumab in the ECZTEND trial…  
  
…In this case series of adults with moderate to severe AD enrolled in the ECZTEND trial, confirmed COVID-19 infections were predominantly mild or moderate (97%), and all but 1 occurred in unvaccinated patients. No new safety signals or evidence for reduced effectiveness of SARS-CoV-2 vaccines administered during tralokinumab treatment were reported, in accordance with previous work that reported that non-live vaccines could be safely administered during tralokinumab treatment and elicit normal immune responses…  
<https://jamanetwork.com/journals/jamadermatology/fullarticle/2797296>

**title:** Sensitivity and Diagnostic Yield of the First SARS-CoV-2 Nucleic Acid Amplification Test Performed for Patients Presenting to the Hospital  
  
jama |12th october 2022  
  
Question What is the diagnostic sensitivity of the SARS-CoV-2 nucleic acid amplification test (NAAT) by date of symptom onset among patients presenting to the hospital?

Findings In this diagnostic study, the sensitivity of the first SARS-CoV-2 NAAT performed in the hospital was high within 14 days of symptom onset. Diagnostic yield was highest among patients presenting on day 10 of illness.

Meaning The high diagnostic sensitivity of the NAAT in this study suggests that 1 negative test result can rule out SARS-CoV-2 infection among patients in the emergency department; only patients with high clinical pretest probability of disease should undergo repeated testing.  
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797202>

**long term effects**

**title:** Post-acute sequelae of covid-19 six to 12 months after infection: population based study

BMJ | 13th october 2022  
  
Objectives To describe symptoms and symptom clusters of post-covid syndrome six to 12 months after acute infection, describe risk factors, and examine the association of symptom clusters with general health and working capacity…  
  
…Conclusions Despite the limitation of a low response rate and possible selection and recall biases, this study suggests a considerable burden of self-reported post-acute symptom clusters and possible sequelae, notably fatigue and neurocognitive impairment, six to 12 months after acute SARS-CoV-2 infection, even among young and middle aged adults after mild infection, with a substantial impact on general health and working capacity.  
<https://www.bmj.com/content/379/bmj-2022-071050>

**title:** Estimated Global Proportions of Individuals With Persistent Fatigue, Cognitive, and Respiratory Symptom Clusters Following Symptomatic COVID-19 in 2020 and 2021

JAMA |10th october 2022  
  
Question Among individuals who had symptomatic SARS-CoV-2 infection in 2020 and 2021, what proportion experienced common self-reported Long COVID symptom clusters 3 months after initial infection?

Findings This observational analysis involved bayesian meta-regression and pooling of 54 studies and 2 medical record databases with data for 1.2 million individuals (from 22 countries) who had symptomatic SARS-CoV-2 infection. The modeled estimated proportion with at least 1 of the 3 self-reported Long COVID symptom clusters 3 months after symptomatic SARS-CoV-2 infection was 6.2%, including 3.7% for ongoing respiratory problems, 3.2% for persistent fatigue with bodily pain or mood swings, and 2.2% for cognitive problems after adjusting for health status before COVID-19.

Meaning This study presents modeled estimates of the proportion of individuals with at least 1 of the 3 self-reported Long COVID symptom clusters (persistent fatigue with bodily pain or mood swings; cognitive problems; or ongoing respiratory problems) 3 months after symptomatic SARS-CoV-2 infection.  
<https://jamanetwork.com/journals/jama/fullarticle/2797443>

**title:** Use of Cardiopulmonary Exercise Testing to Evaluate Long COVID-19 Symptoms in Adults - A Systematic Review and Meta-analysis

JAMA | 12th october 2022  
  
Question Is exercise capacity reduced more than 3 months after SARS-CoV-2 infection among those with long COVID-19 (LC) symptoms compared with recovered individuals without symptoms, and what patterns of limitations on cardiopulmonary exercise testing (CPET) are common?

Findings In this systematic review and meta-analysis of 38 studies comprising 2160 participants, exercise capacity was reduced by 4.9 mL/kg/min among individuals with symptoms consistent with LC compared with individuals without symptoms more than 3 months after SARS-CoV-2 infection. Findings among individuals with exertional intolerance suggest that deconditioning, dysfunctional breathing, chronotropic incompetence, and abnormal peripheral oxygen extraction and/or use may contribute to reduced exercise capacity.

Meaning These findings suggest that CPET may provide insight into the mechanisms for reduced exercise capacity among individuals with LC.  
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797203>

**rates & variants**

**title:** Omicron sublineage BA.2.75.2 exhibits extensive escape from neutralising antibodies

the lancet infectious diseases | 13th OCTOBER 2022  
  
SARS-CoV-2 omicron sublineage BA.2.75 expanded rapidly in parts of the world, but it has so far not outcompeted BA.5 globally. Despite similar geometric mean neutralising titres (GMT) to BA.5, BA.2.75 remained sensitive to classes of antibodies that BA.5 had escaped,1, 2 suggesting scope for antibody evasion. The emergence of a sublineage of BA.2.75 carrying additional mutations R346T, F486S, and D1199N (BA.2.75.2; figure A; appendix p 1), growing rapidly (appendix p 2), suggested more extensive escape from neutralising antibodies.  
<https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(22)00663-6/fulltext>

**infection control**

**title:** Covid-19: Booster vaccines rolled out as hospital admissions rise

BMJ | 14th OCTOBER 2022  
  
Why is another covid-19 booster vaccine being rolled out?

Booster doses are being given to enhance the immunity of people who have a higher risk of developing severe covid-19. While many people will already have had three or four vaccine doses over the past couple of years, the protection these provide decreases over time. Data suggest the protection from covid-19 vaccines could wane within around six months,1 and fall even more rapidly for clinically vulnerable groups like patients with cancer.2

In a statement on the booster programme, the Joint Committee on Vaccination and Immunisation (JCVI) said, “Although there are uncertainties regarding the size and timing of potential future waves of covid-19, winter remains the season when the threat is greatest…  
<https://www.bmj.com/content/379/bmj.o2484>

**title:** Severe COVID-19 outcomes after full vaccination of primary schedule and initial boosters: pooled analysis of national prospective cohort studies of 30 million individuals in England, Northern Ireland, Scotland, and Wales - The Lancet

the lancet | 15th OCTOBER 2022  
  
Current UK vaccination policy is to offer future COVID-19 booster doses to individuals at high risk of serious illness from COVID-19, but it is still uncertain which groups of the population could benefit most. In response to an urgent request from the UK Joint Committee on Vaccination and Immunisation, we aimed to identify risk factors for severe COVID-19 outcomes (ie, COVID-19-related hospitalisation or death) in individuals who had completed their primary COVID-19 vaccination schedule and had received the first booster vaccine…  
  
…Older people, those with multimorbidity, and those with specific underlying health conditions remain at increased risk of COVID-19 hospitalisation and death after the initial vaccine booster and should, therefore, be prioritised for additional boosters, including novel optimised versions, and the increasing array of COVID-19 therapeutics.  
<https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01656-7/fulltext>   
Linked commetary: [Prioritisation of COVID-19 boosters in the omicron era - The Lancet](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01971-7/fulltext#:~:text=Vaccines%20are%20a%20primary%20component,of%20SARS%2DCoV%2D2.)

**title:** Omicron-adapted vaccines might require longer follow-up to reveal true benefits

the lancet microbe | 13th october 2022  
  
…Omicron-adapted booster vaccination might extend the duration of immune protection by compensating immune decay. A previous study showed that, although antibody levels gradually declined after infection, neutralisation titres against Wuhan-Hu-1 and variants remained stable up to 1-year after infection thanks to the compensatory increase in neutralisation potency and breadth.10 A longer affinity maturation process since first exposure in Wuhan-Hu-1 booster recipients might also contribute to more durable neutralisation activity against omicron subvariants than in primary vaccination recipients.11 We expect more long-term than immediate benefits after omicron-adapted booster vaccination, which, given sufficient time, might better protect against current and emerging omicron subvariants than Wuhan-Hu-1 boosters.  
<https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(22)00292-0/fulltext>

**title:** Tolerability and immunogenicity of an intranasally-administered adenovirus-vectored COVID-19 vaccine: An open-label partially-randomised ascending dose phase I trial

the lancet ebio-medicine |10th OCTOBER 2022  
  
Intranasal vaccination may induce protective local and systemic immune responses against respiratory pathogens. A number of intranasal SARS-CoV-2 vaccine candidates have achieved protection in pre-clinical challenge models, including ChAdOx1 nCoV-19 (AZD1222, University of Oxford / AstraZeneca). We performed a single-centre open-label Phase I clinical trial of intranasal vaccination with ChAdOx1 nCoV-19 in healthy adults, using the existing formulation produced for intramuscular administration.

…This formulation of intranasal ChAdOx1 nCoV-19 showed an acceptable tolerability profile but induced neither a consistent mucosal antibody response nor a strong systemic response.  
<https://www.thelancet.com/journals/ebiom/article/PIIS2352-3964(22)00480-7/fulltext>

**title:** Vaccine effectiveness of primary series and booster doses against covid-19 associated hospital admissions in the United States: living test negative design study

BMJ | 11th OCTOBER 2022  
  
To compare the effectiveness of a primary covid-19 vaccine series plus booster doses with a primary series alone for the prevention of hospital admission with omicron related covid-19 in the United States…  
  
…During the first six months of 2022 in the US, booster doses of a covid-19 vaccine provided additional benefit beyond a primary vaccine series alone for preventing hospital admissions with omicron related covid-19.  
<https://www.bmj.com/content/379/bmj-2022-072065>

**title:** Analysis of Severe Illness After Postvaccination COVID-19 Breakthrough Among Adults With and Without HIV in the US

JAMA | 13th OCTOBER 2022  
  
Question In 2021, among fully vaccinated people with breakthrough COVID-19 illness, was the risk of severe illness higher for people with HIV (PWH) compared with people without HIV (PWoH)?

Findings In this cohort study of 3649 patients with breakthrough COVID-19, there was no overall difference in risk of severe disease between PWH and PWoH. PWH with CD4 cell count less than 350 cells/μL had a 59% increased risk of severe breakthrough illness compared with PWoH.

Meaning Although vaccinations effectively reduce the risk of severe COVID-19 illness in both PWH and PWoH, these findings suggest that PWH with moderate or severe immune suppression (CD4 cell count <350 cells/μL) could be at higher risk of severe breakthrough infection compared with PWoH, and PWH with moderate immune suppression should be considered for additional vaccine dosages and other risk-reduction measures.  
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797255>

**title:** COVID-19 Symptoms and Duration of Rapid Antigen Test Positivity at a Community Testing and Surveillance Site During Pre-Delta, Delta, and Omicron BA.1 Periods

JAMA | 10th OCTOBER 2022  
  
…These data help to resolve the dilemma between vaccination and no vaccination: health-care   
Questions During the Omicron BA.1 period, were there differences with the pre-Delta and Delta periods in reported COVID-19 symptoms, and what was the duration of rapid antigen test positivity during the Omicron BA.1 period?

Findings In this cross-sectional study of 63 277 participants conducted at a walk-up community testing site, patients more commonly reported COVID-19 upper respiratory tract symptoms during the Omicron BA.1 period than the pre-Delta and Delta periods, with differences by vaccination status and age. During the Omicron BA.1 period, 5 days after symptom onset, 80% of participants remained positive via a rapid antigen test.

Meaning These findings indicate differences in symptoms in the BA.1 Omicron period vs the pre-Delta and Delta periods, which may be associated with rising population immunity as well as different SARS-CoV-2 variants, and positivity remained high 5 days after symptom onset in the BA.1 Omicron period.  
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797070>

**title:** Estimated Protection of Prior SARS-CoV-2 Infection Against Reinfection With the Omicron Variant Among Messenger RNA–Vaccinated and Nonvaccinated Individuals in Quebec, Canada

JAMA| 14th OCTOBER 2022  
  
…These data help to resolve the dilemma between vaccination and no vaccination: health-care   
Question How much does prior heterologous non-Omicron SARS-CoV-2 infection, with and without messenger RNA (mRNA) vaccination, reduce Omicron reinfection risk?

Findings In this test-negative case-control study with 696 439 participants aged 12 years and older, prior non-Omicron SARS-CoV-2 infection was associated with 44% and 81% reductions in the risk of Omicron infection and associated hospitalization, respectively. Protection against Omicron-associated hospitalization was sustained and improved among individuals who received 1 (86%), 2 (94%), or 3 (97%) mRNA vaccine doses.

Meaning These findings suggest that for twice-vaccinated individuals with prior non-Omicron SARS-CoV-2 infection, a third mRNA vaccine dose may add limited protection against Omicron-associated hospitalization.  
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797311>

**title:** Immune Imprinting and Protection against Repeat Reinfection with SARS-CoV-2

the lancet infectious diseases| 28th OCTOBER 2022  
  
Evidence at the level of binding and neutralizing antibodies and B-cell and T-cell immunity suggests that a history of infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can have a negative effect on subsequent protective immunity.1 In particular, the immune response to B.1.1.529 (omicron) subvariants could be compromised by differential immune imprinting in persons who have had a previous infection with the original virus or the B.1.1.7 (alpha) variant.1

… Omicron infection induces strong protection against a subsequent omicron infection.2,4 In the present cohort study, an additional, earlier infection with non-omicron SARS-CoV-2 was found to strengthen this protection against a subsequent omicron infection. The earlier pre-omicron infection may have broadened the immune response against a future reinfection challenge.  
<https://www.nejm.org/doi/full/10.1056/NEJMc2211055>

**public health & health inequalities**

**title:** Key lessons from the COVID-19 public health response in Australia

the lancet regional health western pacific | 10th OCTOBER 2022  
  
Australia avoided the worst effects of the COVID-19 pandemic, but still experienced many negative impacts. Reflecting on lessons from Australia's public health response, an Australian expert panel composed of relevant discipline experts identified the following key lessons: 1) movement restrictions were effective, but their implementation requires careful consideration of adverse impacts, 2) disease modelling was valuable, but its limitations should be acknowledged, 3) the absence of timely national data requires re-assessment of national surveillance structures, 4) the utility of advanced pathogen genomics and novel vaccine technology was clearly demonstrated, 5) decision-making that is evidence informed and consultative is essential to maintain trust, 6) major system weaknesses in the residential aged-care sector require fixing, 7) adequate infection prevention and control frameworks are critically important, 8) the interests and needs of young people should not be compromised, 9) epidemics should be recognised as a ‘standing threat’, 10) regional and global solidarity is important. It should be acknowledged that we were unable to capture all relevant nuances and context specific differences. However, the intent of this review of Australia's public health response is to critically reflect on key lessons learnt and to encourage constructive national discussion in countries across the Western Pacific Region.  
<https://www.thelancet.com/journals/lanwpc/article/PIIS2666-6065(22)00231-0/fulltext>

**title:** Prediction of upcoming global infection burden of influenza seasons after relaxation of public health and social measures during the COVID-19 pandemic: a modelling study

the lancet GLOBAL HEALTH| november 2022  
  
The transmission dynamics of influenza were affected by public health and social measures (PHSMs) implemented globally since early 2020 to mitigate the COVID-19 pandemic. We aimed to assess the effect of COVID-19 PHSMs on the transmissibility of influenza viruses and to predict upcoming influenza epidemics.  
  
For this modelling study, we used surveillance data on influenza virus activity for 11 different locations and countries in 2017–22. We implemented a data-driven mechanistic predictive modelling framework to predict future influenza seasons on the basis of pre-COVID-19 dynamics and the effect of PHSMs during the COVID-19 pandemic. We simulated the potential excess burden of upcoming influenza epidemics in terms of fold rise in peak magnitude and epidemic size compared with pre-COVID-19 levels. We also examined how a proactive influenza vaccination programme could mitigate this effect.  
  
…Our results suggest the potential for substantial increases in infection burden in upcoming influenza seasons across the globe. Strengthening influenza vaccination programmes is the best preventive measure to reduce the effect of influenza virus infections in the community.  
<https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(22)00358-8/fulltext>

**title:** Misrepresentation and Nonadherence Regarding COVID-19 Public Health Measures  
  
JAMA| 10th OCTOBER 2022  
  
Question What are the prevalence of and reasons for misrepresentation and nonadherence regarding public health measures against COVID-19?

Findings In this national survey study of 1733 US adults, nearly half of participants reported misrepresentation and/or nonadherence regarding COVID-19 public health measures. The most common reasons included wanting life to feel normal and wanting to exercise personal freedom.

Meaning These findings suggest that misrepresentation and nonadherence regarding COVID-19 public health measures constitute a serious public health challenge.  
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797071>

**title:** Resistance to COVID-19 controls in an anthropologist's home town

the lancet | 15th october 2022  
  
As the COVID-19 pandemic reached the US Midwest, Okoboji, a small rural community in Iowa, decided not to follow public health guidance on masking and eschewed physical distancing. When medical anthropologist Emily Mendenhall visited her home town, the spectacle of unmasked people flocking to restaurants and bars alarmed, perplexed, and intrigued her. Why had Okoboji rejected public health advice even as its COVID-19 case counts rose, and deaths followed?

Mendenhall's Unmasked: COVID, Community, and the Case of Okoboji begins in 2020, before COVID-19 vaccines were available, and mostly concerns the controversy around the use of masks.  
<https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01939-0/fulltext>

**title:** The upcoming flu seasons: how worried should we be?

the lancet global health | november 2022  
  
The simple answer to the title question is very. As the COVID-19 pandemic raged through 2020–21, little to no influenza activity was detected.1 It was hypothesised that interventions imposed to curb COVID-19 had a positive effect on influenza transmission. This, coupled with the focus on producing and distributing SARS-CoV-2 vaccines might have reduced the levels of influenza immunity in the population that are raised through natural infection or vaccination. Consequently, this has prompted a gut-feeling among the influenza public health and research communities that the influenza seasons post-COVID-19 are going to be severe. This worry is exacerbated by the exhaustion of national public health systems that were relentlessly fighting COVID-19 and continue to be preoccupied by surges of patients with the emergence of new strains. National public health laboratories have been mainly focused on SARS-CoV-2 diagnostics, hence global influenza surveillance might be low.  
<https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(22)00391-6/fulltext>

**title:** Lowest US Life Expectancy Since 1996 Linked to COVID-19

JAMA | 11th OCTOBER 2022  
  
Life expectancy dropped by 3 years for US men and 2.3 years for US women between 2019 and 2021, according to provisional life expectancy data from the National Center for Health Statistics.  
  
During this period, US life expectancy dropped to about 73 years for men and to about 79 years for women, the lowest levels since 1996. Three-quarters of overall life expectancy lost during this period was attributed to COVID-19 deaths, according to a CDC statement. The deaths contributed to a growing gap in life expectancy between US men and women, which increased from 4.8 years in 2010—the lowest ever recorded—to about 6 years in 2021.  
<https://jamanetwork.com/journals/jama/fullarticle/2797214>

**mental health**

**title:** Psychological distress, depression, anxiety, and life satisfaction following COVID-19 infection: evidence from 11 UK longitudinal population studies

the lancet psychiatry | November 2022  
  
Evidence on associations between COVID-19 illness and mental health is mixed. We aimed to examine whether COVID-19 is associated with deterioration in mental health while considering pre-pandemic mental health, time since infection, subgroup differences, and confirmation of infection via self-reported test and serology data…  
  
…Self-reporting COVID-19 was longitudinally associated with deterioration in mental health and life satisfaction. Our findings emphasise the need for greater post-infection mental health service provision, given the substantial prevalence of COVID-19 in the UK and worldwide.  
<https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(22)00307-8/fulltext>

**title:** Association of Major Disease Outbreaks With Adolescent and Youth Mental Health in Low- and Middle-Income Countries: A Systematic Scoping Review

JAMA psychiatry | 12th OCTOBER 2022  
  
Question Are major disease outbreaks from 2009 to 2021 associated with the mental health of adolescents and youth in low- and middle-income countries?

Findings In this systematic scoping review of 6 databases, a total of 57 studies of the influenza A (H1N1) and SARS-CoV-2 infections revealed that these outbreaks were associated with adolescent and youth mental health. Results suggest high rates of anxiety and depressive symptoms, in addition to posttraumatic stress disorder, general stress, and health-related anxiety among adolescents.

Meaning Findings suggest that the H1N1 and SARS-CoV-2 outbreaks were associated with adolescent and youth mental health; future studies with improved measurement tools and the inclusion of a wider range of mental disorders and risk factors will help ascertain how epidemics affect adolescent mental health in low- and middle-income countries.  
<https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2796972>

**international perspectives:**

**title:** SARS CoV-2 Seroprevalence in Selected States of High and Low Disease Burden in Nigeria

JAMA | 11th OCTOBER 2022  
  
Question What is the serologic prevalence of SARS CoV-2 in states with high and low disease burdens in Nigeria?

Findings In this cross-sectional study including 4904 participants, a high seroprevalence of 78.9% was obtained across 12 states in Nigeria. Seropositivity was consistent across the states surveyed, ranging from 69.8% in Lagos to 87.7% in Borno.

Meaning The results from this study suggest that COVID-19 infection is prevalent in Nigeria despite the low hospitalization rate recorded at the time of sampling.  
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797188>

**title:** Reconsidering the COVID-19 vaccine strategy in West and Central Africa

the lancet | 15th OCTOBER 2022  
  
In conclusion, there is an urgent need to reconsider COVID-19 immunisation strategies in West and Central Africa on the basis of discussions and collaborations between researchers and stakeholders that take into consideration multiple disciplines of vaccinology including the social sciences, information sciences, and public health.  
<https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01896-7>

**title:** Underestimated COVID-19 mortality in WHO African region

the lancet global health| november 2022  
  
…Joseph Cabore and colleagues (August, 2022)1 developed a SEIRD model (denoting susceptible, exposed, infected, recovered, and dead) to estimate the number of SARS-CoV-2 infections across 47 countries in the WHO African region between Jan 1, 2020, and Dec 31, 2021. Although the model highlighted large variation across the region, we are concerned about the number of deaths from COVID-19 that was estimated by the model for South Africa.  
<https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(22)00425-9/fulltext>   
Authors’ reply: [Underestimated COVID-19 mortality in WHO African region – Authors' reply - The Lancet Global Health](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(22)00415-6/fulltext)

We

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