AFRO Weekly COVID-19 Literature Update

2022/04/23-2022/04/29

Due to the abundance of information and literature produced on COVID-19 in the world in general and in Africa in particular, the WHO Regional Office for Africa is publishing a weekly "Weekly COVID Literature Update" to highlight the most important literature. Each week we will select some articles per topic as well as reports and grey literature when available.

The aim is to provide an easy-to-read summary of each publication. This Bulletin is organised according to several categories of interest.

The publications shared are the result of a bibliographic research work carried out regularly on several online information sources with a major search strategy "COVID-19 AND Africa" in combination with the following keywords: epidemiology (response activities OR hygiene practices OR social distancing OR case management), vaccination, public perceptions, other diseases and other sectors. For this issue, the list of information sources is as follows: WHO Covid-19 database, PubMed, BioMed Central, Lancet (including sister journals), One library, African Index Medicus, Nature (including sister journals), Science (including sister journals), PLOS, Google scholar, the BMJ, Oxford University Press, Taylor & Francis, Springer, AJOL.
The list is subject to change and kindly note that the choice of the publications to be included in this update is subjective.

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En raison de l’abondance d’informations et de littérature produites sur la COVID-19 dans le monde en général et en Afrique en particulier, le Bureau régional de l’OMS pour l’Afrique publie chaque semaine "Weekly COVID Literature Update" pour mettre en évidence la littérature la plus importante. Chaque semaine, nous sélectionnerons quelques articles par sujet ainsi que les rapports et la littérature grise quand c’est disponible.

L’objectif est de fournir un résumé facile à lire de chaque publication. Ce bulletin est organisé suivant plusieurs catégories d’intérêt.
Les publications partagées sont le résultat d’un travail de recherche bibliographique effectué régulièrement sur plusieurs sources d’information en ligne avec une comme
stratégie de recherche majeure "COVID-19 ET Afrique" combinés aux mots clés suivants : epidemiology (response activities OR hygiene practices OR social distancing OR case management), vaccination, public perceptions, other diseases and other sectors. Pour ce numéro, la liste des sources d'information utilisées est la suivante : WHO Covid-19 database, PubMed, BioMed Central, Lancet (including sister journals), One library, African Index Medicus, Nature (including sister journals), Science (including sister journals), PLOS, Google scholar, the BMJ, Oxford University Press, Taylor & Francis, Springer, AJOL.
Cette liste est susceptible d’être modifiée. Veuillez noter que le choix des publications à inclure dans cette mise à jour est subjectif.

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Devido à abundância de informação e literatura produzida sobre a COVID-19 no mundo em geral e em África em particular, o Escritório Regional da OMS para África está a publicar semanalmente uma "Weekly COVID Literature Update" para destacar a literatura mais importante. Cada semana iremos selecionar alguns artigos por tópico, bem como relatórios e literatura cinzenta, quando disponível.

O objectivo é fornecer um resumo de fácil leitura de cada publicação. Este boletim está organizado de acordo com várias categorias de interesse.

As publicações partilhadas são o resultado de um trabalho de pesquisa bibliográfica realizado regularmente em várias fontes de informação em linha com uma grande estratégia de pesquisa "COVID-19 e África" em combinação com as seguintes palavras-chave: epidemiology (response activities OR hygiene practices OR social distancing OR case management), vaccination, public perceptions, other diseases and other sectors. Para esta edição, a lista de fontes de informação é a seguinte: WHO Covid-19 database, PubMed, BioMed Central, Lancet (including sister journals), One library, African Index Medicus, Nature (including sister journals), Science (including sister journals), PLOS, Google scholar, the BMJ, Oxford University Press, Taylor & Francis, Springer, AJOL.
A lista está sujeita a alterações e note-se que a escolha das publicações a serem incluídas nesta actualização é subjectiva.
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A. COVID-19 EPIDEMIOLOGY/ SURVEILLANCE (trends/ distribution)

**Title:** Reduction in the infection fatality rate of Omicron variant compared to previous variants in South Africa  
**Journal:** International Journal of Infectious Diseases  
**Publish date:** April 21, 2022  
**URL:** [https://doi.org/10.1016/j.ijid.2022.04.029](https://doi.org/10.1016/j.ijid.2022.04.029)  
**Abstract:**  
**Objective**  
Omicron (B.1.1.529) variant has caused global concern. Previous studies have shown that the variant has enhanced immune evasion ability and transmissibility, and reduced severity.  
**Methods**  
In this work, we develop a mathematical model with time-varying transmission rate, vaccination and immune evasion. We fit model to reported case and death data, up to Feb 6, 2022 to estimate the transmissibility and infection fatality ratio of Omicron variant in South Africa.  
**Results**  
We found that the high relative transmissibility of Omicron variant is mainly due to its immune evasion ability while the infection fatality rate is substantially decreased. The reduction in the infection fatality rate is about 78.7% (95% confidence interval: 66.9%, 85%).  
**Conclusion**  
Based on data in South Africa and mathematical modelling, we found that the Omicron variant is highly transmissible but with significantly lower infection fatality rate compared to previous variant of SARS-COV-2.

**Title:** SARS-CoV-2 in children and their accompanying caregivers: implications for testing strategies in resource limited hospitals  
**Journal:** African Journal of Emergency Medicine  
**Publish Date:** April 26, 2022  
**URL:** [https://dx.doi.org/10.1016%2Fj.afjem.2022.04.007](https://dx.doi.org/10.1016%2Fj.afjem.2022.04.007)  
**Abstract:**  
**Background**  
Identification of SARS-CoV-2 infected individuals is imperative to prevent hospital transmission, but symptom-based screening may fail to identify asymptomatic/mildly symptomatic infectious children and their caregivers.  
**Methods**  
A COVID-19 period prevalence study was conducted between 13-26 August 2020 at Tygerberg Hospital, testing all children and their accompanying asymptomatic caregivers after initial symptom screening. One nasopharyngeal swab was submitted for SARS-CoV-2 using real-time reverse-transcription polymerase chain reaction (rRT-PCR). An additional
Respiratory Viral 16-multiplex rRT-PCR test was simultaneously done in children presenting with symptoms compatible with possible SARS-CoV-2 infection.

**Results**

SARS-CoV-2 RT-PCR tests from 196 children and 116 caregivers were included in the analysis. The SARS-CoV-2 period prevalence in children was 5.6% (11/196) versus 15.5% (18/116) in asymptomatic caregivers (p<0.01). Presenting symptoms did not correlate with SARS-CoV-2 test positivity; children without typical symptoms of SARS-CoV-2 were more likely to be positive than those with typical symptoms (10.2% [10/99] vs 1% [1/97]; p<0.01). Children with typical symptoms (97/196; 49.5%) mainly presented with acute respiratory (68/97; 70.1%), fever (17/97; 17.5%), or gastro-intestinal complaints (12/97; 12.4%); Human Rhinovirus (23/81; 28.4%) and Respiratory Syncytial Virus (18/81; 22.2%) were frequently identified in this group. Children-caregiver pairs’ SARS-CoV-2 tests were discordant in 83.3%; 15/18 infected caregivers’ children tested negative. Symptom-based COVID-19 screening alone would have missed 90% of the positive children and 100% of asymptomatic but positive caregivers.

**Conclusion**

Given the poor correlation between SARS-CoV-2 symptoms and RT-PCR test positivity, universal testing of children and their accompanying caregivers should be considered for emergency and inpatient paediatric admissions during high COVID-19 community transmission periods. Universal PPE and optimising ventilation is likely the most effective way to control transmission of respiratory viral infections, including SARS-CoV-2, where universal testing is not feasible. In these settings, repeated point prevalence studies may be useful to inform local testing and cohorting strategies.

**Title:** Demographic, Clinical, and Co-Morbidity Characteristics of COVID-19 Patients: A Retrospective Cohort from a Tertiary Hospital in Kenya

**Journal:** International Journal of General Medicine

**Publish Date:**

**URL:** [https://doi.org/10.2147/IJGM.S361176](https://doi.org/10.2147/IJGM.S361176)

**Abstract:**

**Introduction:** The first documented case of COVID-19 in Kenya was recorded March of 2020. Co-morbidities including hypertension and diabetes have been associated with increased morbidity, hospitalization, and mortality among COVID-19 patients. This retrospective study describes the clinical characteristics, disease severity, and outcomes among the patient population at a tertiary hospital in Kenya.

**Methods:** This was a retrospective descriptive study of COVID-19 patients who were admitted between March 2020 and December 2020 at the Aga Khan University Hospital in Nairobi, Kenya. Data collected include patient demographic and baseline characteristics. Differences between patients who were known to have diabetes and hypertension during admission were compared for statistical significance. Difference between those who survived and those who died were also compared for statistical significance.

**Results:** A total of 913 records of patients were studied with a mean age of 51.2 years (SD = 16.7). 66.5% were male and 80.8% were of African origin. History of diabetes, hypertension, and HIV status were at 27.3%, 33.1%, and 2.3%, respectively. At presentation, 33.1% (302/913) of patients had known hypertension by history, and following admission, this proportion increased to 37.7% (344/913). At presentation, 27.3%
(249/913) of patients had known diabetes. During hospital stay, 20.8% (190) more patients were found to have diabetes, raising the overall percent to 48.1% (439/913). When comparing diabetes and hypertension at baseline versus at the end of admission, diabetes increased by 20.8% (p < 0.001) and hypertension by 4.6% (p = 0.049). HIV co-infection was 2.3%, and no patient had tuberculosis.

**Conclusion:** This study showed a high incidence of co-morbidities in patients infected with COVID-19. Diabetes was most common, followed by hypertension. All patients admitted with COVID-19 infection should routinely be tested for diabetes with HbA1c and have regular blood pressure monitoring in order to diagnose occult diabetes and hypertension. Adverse outcomes were found in patients with these co-morbidities and should be monitored and treated appropriately.

**Title:** COVID-19 death: A novel method of improving its identification when a patient has multiple diagnoses  
**Journal:** Southern African Journal of Infectious Diseases  
**Date Publish:** April 26, 2022  
**URL:** [https://doi.org/10.4102/sajid.v37i1.349](https://doi.org/10.4102/sajid.v37i1.349)

**Abstract**
Assigning a primary cause of death to a deceased patient who had multiple principal diagnoses including coronavirus disease 2019 (COVID-19) is challenging because of the difficulty in selecting the most appropriate cause. To proffer a solution, the authors reviewed the literature on assigning a primary cause of death. In 2015, the Nnabuiki-Jagidesa (NJ) model II was devised to improve the International Classification of Diseases and related health problems, 10th revision (ICD-10) guideline on how to assign a primary cause of death. The NJ model II stipulates that when there are multiple diagnoses with no plausible explanation that one of the illnesses could have resulted in the other clinical conditions, the single most appropriate primary cause of death is the condition with the highest case fatality ratio in that setting. In the index report, the authors opine that if the case fatality ratios are similar, the following objective criteria (listed in the order of priority) should be used to assign a primary cause of death: condition with the highest infection fatality ratio, condition that was the main indication for the last acute surgical or invasive procedure performed (during the course of the same ill-health) before the death and the disease that theoretically affects the highest number of body organs. Additionally, a clinical descriptor should be used when none of the objective criteria are satisfied. This novel approach, termed the *modified NJ model II*, is expected to improve the objectivity and reproducibility of the assigned primary cause of death in a deceased who had multiple diagnoses, which may include COVID-19.

**Title:** A Model for the Lifespan Loss Due to a Viral Disease: Example of the COVID-19 Outbreak  
**Journal:** Infectious Disease Report  
**Publish Date:** April 25, 2022  
**URL:** [https://doi.org/10.3390/idr14030038](https://doi.org/10.3390/idr14030038)

**Abstract:**
The end of the acute phase of the COVID-19 pandemic is near in some countries as declared by World Health Organization (WHO) in January 2022 based on some studies in
Europe and South Africa despite unequal distribution of vaccines to combat the disease spread globally. The heterogeneity in individual age and the reaction to biological and environmental changes that has been observed in COVID-19 dynamics in terms of different reaction to vaccination by age group, severity of infection per age group, hospitalization and Intensive Care Unit (ICU) records show different patterns, and hence, it is important to improve mathematical models for COVID-19 pandemic prediction to account for different proportions of ages in the population, which is a major factor in epidemic history. We aim in this paper to estimate, using the Usher model, the lifespan loss due to viral infection and ageing which could result in pathological events such as infectious diseases. Exploiting epidemiology and demographic data firstly from Cameroon and then from some other countries, we described the ageing in the COVID-19 outbreak in human populations and performed a graphical representation of the proportion of sensitivity of some of the model parameters which we varied. The result shows a coherence between the orders of magnitude of the calculated and observed incidence numbers during the epidemic wave, which constitutes a semi-quantitative validation of the mathematical modelling approach at the population level. To conclude, the age heterogeneity of the populations involved in the COVID-19 outbreak needs the consideration of models in age groups with specific susceptibilities to infection.

**Title**: COVID rises in Africa and the Americas, Moderna submits EUA for use in young kids  
**Source**: Center for Infectious Disease Research and Policy  
**Publish Date**: April 28, 2022  
**URL**: COVID rises in Africa and the Americas, Moderna submits EUA for use in young kids | CIDRAP (umn.edu)  
**Abstract**:  

**Title**: Factors Associated With Mortality Among the COVID-19 Patients Treated at Gulu Regional Referral Hospital: A Retrospective Study  
**Journal**: Frontiers in Public Health  
**Publish Date**: April 2022  
**URL**: https://doi.org/10.3389/fpubh.2022.841906  
**Abstract**:  

**Background**: The advent of the novel coronavirus disease 2019 (COVID-19) has caused millions of deaths worldwide. As of December 2021, there is inadequate data on the outcome of hospitalized patients suffering from COVID-19 in Africa. This study aimed at identifying factors associated with hospital mortality in patients who suffered from COVID-19 at Gulu Regional Referral Hospital in Northern Uganda from March 2020 to October 2021.  
**Methods**: This was a single-center, retrospective cohort study in patients hospitalized with confirmed SARS-CoV-2 at Gulu Regional Referral Hospital in Northern Uganda. Socio-demographic characteristics, clinical presentations, co-morbidities, duration of hospital stay, and treatments were analyzed, and factors associated with the odds of mortality were determined.  
**Results**: Of the 664 patients treated, 661 (99.5%) were unvaccinated, 632 (95.2%) recovered and 32 (4.8%) died. Mortality was highest in diabetics 11 (34.4%),
cardiovascular diseases 12 (37.5%), hypertensives 10 (31.3%), females 18 (56.3%), ≥50-year-olds 19 (59.4%), no formal education 14 (43.8%), peasant farmers 12 (37.5%) and those who presented with difficulty in breathing/shortness of breath and chest pain 32 (100.0%), oxygen saturation (SpO₂) at admission <80 4 (12.5%), general body aches and pains 31 (96.9%), tiredness 30 (93.8%) and loss of speech and movements 11 (34.4%). The independent factors associated with mortality among the COVID-19 patients were females AOR = 0.220, 95%CI: 0.059–0.827; p = 0.030; Diabetes mellitus AOR = 9.014, 95%CI: 1.726–47.067; p = 0.010; Ages of 50 years and above AOR = 2.725, 95%CI: 1.187–6.258; p = 0.018; tiredness AOR = 0.059, 95%CI: 0.009–0.371; p < 0.001; general body aches and pains AOR = 0.066, 95%CI: 0.007–0.605; p = 0.020; loss of speech and movement AOR = 0.134, 95%CI: 0.270–0.660; p = 0.010 and other co-morbidities AOR = 6.860, 95%CI: 1.309–35.957; p = 0.020.

Conclusion: The overall Gulu Regional Hospital mortality was 32/664 (4.8%). Older age, people with diabetics, females, other comorbidities, severe forms of the disease, and those admitted to HDU were significant risk factors associated with hospital mortality. More efforts should be made to provide “additional social protection” to the most vulnerable population to avoid preventable morbidity and mortality of COVID-19 in Northern Uganda.

B. COVID-19 RESPONSE ACTIVITIES
(hygiene practices, social distancing, case management)

Title: Clinical Management of COVID-19 in Hospitals and the Community: A Snapshot from a Medical Insurance Database in South Africa
Journal: International Journal of Infectious Diseases
Publish date: April 22, 2022
URL: https://dx.doi.org/10.1016%2Fj.ijid.2022.04.032
Abstract:
Background
Little is known about the clinical care, utilisation of medicines and risk factors associated with mortality amongst the private health insured population with COVID-19 in South Africa.

Methods
This was a retrospective cross-sectional study using claims data of patients with confirmed COVID-19. Socio-demographics, comorbidities, severity, concurrent/progressive comorbidity, drug treatment, and outcomes were extracted from administrative data. Univariate and multivariate logistic regression models were used to explore the risk factors associated with in-hospital death.

Results
This study included 154,519 patients with COVID-19, only 24% were categorised as severe as they received in-hospital care. Antibiotics (42.8%) and steroids (30%) use was high in this population. After adjusting for known comorbidities, concurrent/progressive diagnosis, of the following conditions was associated with higher in-hospital death odds: ARDS [aOR=1.55; 95% CI=1.44–1.68], septic shock [aOR=1.55 95% CI=2.00–4.12], pneumonia [aOR=1.35; 95% CI=1.24–1.47], acute renal failure [aOR=; 95% CI=2.09–2.5] and stroke [aOR=2.09; 95% CI=1.75–2.49]).
Use of antivirals (aOR=0.47; 95% CI= 0.40-0.54),) and/or steroids [aOR=0.46; 95% CI=0.43-0.50] was associated with decreased death odds. The use of antibiotic in-hospital was not associated with increased survival [aOR=0.97; 95% CI=0.91-1.04].

**Conclusion**

Comorbidities remain significant risk factors of death mediated by organ failure. The use of antibiotics did not change the odds of death, suggesting inappropriate use.

**Title:** Challenges and complexities in evaluating severe acute respiratory syndrome coronavirus 2 molecular diagnostics during the COVID-19 pandemic  
**Journal:** African Journal of Laboratory Medicine  
**Publish date:** April 26, 2022  
**URL:** [https://doi.org/10.4102/ajlm.v11i1.1429](https://doi.org/10.4102/ajlm.v11i1.1429)

**Title:** Everyday mobility practices and the ethics of care: young women’s reflections on social responsibility in the time of COVID-19 in three African cities  
**Journal:** Mobilities  
**Publish date:** April 25, 2022  
**URL:** [https://doi.org/10.1080/17450101.2022.2039561](https://doi.org/10.1080/17450101.2022.2039561)

**Abstract:**
This paper draws principally from COVID-19 diaries written by young women whom we had previously trained as peer researchers in a mobility study of low-income neighbourhoods in Abuja, Cape Town and Tunis. Some live with parents or older extended family members, others have children in their care, but concerns around avoiding contagion have forced all peer researchers to reflect on their everyday socio-spatial mobility practices. This includes whether/how much they need to travel or can substitute virtual for physical travel; which transport mode to take and when; what precautions they must take on the move; what strategies of engagement are required to cope with externally imposed rules and contingencies – and the potential impact of their negotiations, decisions and experiences on the health of those dear to them at home. Reflections on these pandemic-induced responsibilities range from social distancing and mask wearing to issues around handling cash, modes of greeting and travel to funerals. The personal interpretations of responsibility that are reported in individual diaries point to the complexity of entanglements between everyday mobility practices on city streets and negotiated relations of care within the household (and other relational settings) that have emerged and deepened as the COVID story unfolds.

**Title:** Variability and Strictness in COVID-19 Government Response: A Macro-Regional Assessment  
**Journal:** Journal of Government and Economics  
**Publish date:** April 24, 2022  
**URL:** [https://dx.doi.org/10.1016%2Fj.jge.2022.100039](https://dx.doi.org/10.1016%2Fj.jge.2022.100039)

**Abstract:** We examine the effectiveness of non-pharmaceutical government interventions (NPIs) against COVID-19. In particular, we focus on the impact of strictness and variability in government interventions on the reproduction rate ($R_t$) and the number of new deaths (per million of inhabitants) in five different world regions (G7, G20, EU28, Central America
and Asia). In line with existing evidence, we observe that more stringent and frequent NPIs contributed to slow down contagion. Unfortunately, no benefits in terms of mortality are found. In fact, with few exceptions, both strictness and variability in NPIs are associated with a rise in the number of new deaths. This evidence is observed to be stronger among advanced economies and over the second pandemic wave. Take together, our research findings advocate early and decisive implementation of NPIs, but gradual and staggered relaxation of NPIs when the pandemic appears to recede.

**Title:** West African medicinal plants and their constituent compounds as treatments for viral infections, including SARS-CoV-2/COVID-19  
**Journal:** DARU: Journal of Faculty of Pharmacy, Tehran University of Medical Sciences  
**Publish Date:** April 27, 2022  
**URL:** https://doi.org/10.1007/s40199-022-00437-9

**Abstract:**

**Objectives:** The recent emergence of the COVID-19 pandemic (caused by SARS-CoV-2) and the experience of its unprecedented alarming toll on humanity have shone a fresh spotlight on the weakness of global preparedness for pandemics, significant health inequalities, and the fragility of healthcare systems in certain regions of the world. It is imperative to identify effective drug treatments for COVID-19. Therefore, the objective of this review is to present a unique and contextualised collection of antiviral natural plants or remedies from the West African sub-region as existing or potential treatments for viral infections, including COVID-19, with emphasis on their mechanisms of action.

**Evidence acquisition:** Evidence was synthesised from the literature using appropriate keywords as search terms within scientific databases such as Scopus, PubMed, Web of Science and Google Scholar.

**Results:** While some vaccines and small-molecule drugs are now available to combat COVID-19, access to these therapeutic entities in many countries is still quite limited. In addition, significant aspects of the symptomatology, pathophysiology and long-term prognosis of the infection yet remain unknown. The existing therapeutic armamentarium, therefore, requires significant expansion. There is evidence that natural products with antiviral effects have been used in successfully managing COVID-19 symptoms and could be developed as anti-COVID-19 agents which act through host- and virus-based molecular targets.

**Conclusion:** Natural products could be successfully exploited for treating viral infections/diseases, including COVID-19. Strengthening natural products research capacity in developing countries is, therefore, a key strategy for reducing health inequalities, improving global health, and enhancing preparedness for future pandemics.

**Title:** Global sharing of COVID-19 therapies during a “New Normal”  
**Journal:** Bioethics  
**Publish Date:** April 25, 2022  
**URL:** https://doi.org/10.1111/bioe.13028

**Abstract:** This paper argues for global sharing of COVID-19 treatments during the COVID-19 pandemic and beyond based on principles of global solidarity. It starts by distinguishing two types of COVID-19 treatments and models sharing strategies for each in small-group
scenarios, contrasting groups that are solidaristic with those composed of self-interest maximizers to show the appeal of solidaristic reasoning. It then extends the analysis, arguing that a similar logic should apply within and between nations. To further elaborate global solidarity, the paper distinguishes morally voluntary, sliding-scale, and mandatory versions. It argues for an all-hands-on-deck approach and gives examples to illustrate. The paper concludes that during the COVID-19 crisis, global solidarity is a core value, and global sharing of COVID-19 treatments should be considered a duty of justice, not of charity.

C. COVID-19 VACCINATION

Title: Acceptance of COVID-19 Vaccine and Its Associated Factors Among Ethiopian Population: A Systematic Review
Journal: Patient Preference and Adherence
Publish date: April 24, 2022
URL: https://doi.org/10.2147/PPA.S360174

Abstract:
Introduction: Coronavirus disease 2019 (COVID-19) is a global health threat. Millions of lives were lost to COVID-19 and it has caused a substantial economic crisis throughout the world. The development of coronavirus vaccines has pinned a new hope in combating the pandemic. The success of vaccination and development of herd immunity highly depend on the willingness to be vaccinated, not merely on the availability of a vaccine. This review aims to provide comprehensive evidence on acceptance of COVID-19 vaccine and its associated factors in Ethiopia.

Methods: Literature searching was done using PubMed, Google scholar and Science direct databases. Studies conducted in Ethiopia, published in English language from inception until January 9, 2022 were included. Retrieved articles were screened based on titles, abstracts and full text reading to identify studies that met the inclusion criteria. About 21 eligible studies were included in this systematic review. The data were extracted using a data extraction checklist.

Results: A total of 2058 records were retrieved, of which 21 were eligible for this systematic review. All of the articles were cross-sectional studies published in 2021. In Ethiopia, the level of COVID-19 vaccine acceptance ranged from 31.4% to 92.33%. The vaccine acceptance level was significantly associated with age groups, sex, educational status, perceived susceptibility, perceived benefit, knowledge about COVID-19 vaccine, and other socio-demographic factors.

Conclusion: A significant portion of the studies revealed vaccine acceptance level was low. Variation of vaccine acceptance was associated with socio-demographic factors (age, sex, educational status, etc.), information-related factors, and other health-related behaviors. Dissemination of clear and adequate information concerning the vaccine might be the required prior activity to increase acceptance of the vaccine. Hence, there should be a coordinated effort to halt the pandemic through increasing the acceptance of COVID-19 vaccine.

Title: Perspectives of healthcare workers in South Africa on COVID-19 vaccination passports
Background: Following the rollout of several effective vaccines against coronavirus disease 2019 (COVID-19), many countries have introduced vaccination passports or certificates as a means of certifying that an individual has been vaccinated against, is immune to, or is presently uninfected with COVID-19. An extensive ethical debate has ensued.

Aim: To determine the perspectives of South African healthcare workers (HCWs) on the implementation of COVID-19 vaccination passports (C19VPs) in South Africa (SA).

Setting: Healthcare workers working in various fields and practice settings throughout SA were invited to complete an online questionnaire.

Methods: An online questionnaire was distributed using convenience sampling via social media platforms to HCWs over a 1-month period, collecting demographic details and responses to 8 Likert-type items regarding agreement with C19VPs, ethical issues and feasibility. Each item was graded from 1 (strongly disagree) to 5 (strongly agree), with grouping of 4 of the 8 items exploring a common theme of C19VPs being a good idea, constituting a score out of 20. Non-parametric tests were performed to determine differences in responses between groups.

Results: One thousand HCWs responded to the survey and fulfilled inclusion criteria. The majority (83.2%) of respondents were medical practitioners (MPs). Overall, most (73.5%) respondents agreed that C19VPs are a good idea. Older respondents agreed more strongly than younger respondents (medians 18 and 17, respectively, \( p = 0.001 \)), and respondents in private practice agreed more strongly than those in state practice (medians 18 and 16, respectively, \( p = 0.042 \)). The median response was neutral (3) in response to the ethics of C19VPs considering variations in vaccine access and tending towards disagreement (2.5) in disadvantaging poorer people. Most respondents disagreed that vaccine hesitancy would make C19VPs unethical, and responses from provinces with the highest vaccination proportions disagreed more than others with lower vaccination proportion (median 2 compared with 3, \( p < 0.001 \)). There was uncertainty about the feasibility of C19VPs in SA, with older HCWs, non-students, senior MPs and those who thought C19VPs are a good idea being more likely to consider them feasible.

Title: Characterisation of Omicron Variant during COVID-19 Pandemic and the Impact of Vaccination, Transmission Rate, Mortality, and Reinfection in South Africa, Germany, and Brazil

Journal: Biotech
Publish date: April 26, 2022
URL: https://doi.org/10.3390/biotech11020012

Abstract:
Several variants of SARS-CoV-2 have been identified in different parts of the world, including Gamma, detected in Brazil, Delta, detected in India, and the recent Omicron variant, detected in South Africa. The emergence of a new variant is a cause of great concern. This work considers an extended version of an SIRD model capable of incorporating the effects of vaccination, time-dependent transmissibility rates, mortality,
and even potential reinfections during the pandemic. We use this model to characterise the Omicron wave in Brazil, South Africa, and Germany. During Omicron, the transmissibility increased by five for Brazil and Germany and eight for South Africa, whereas the estimated mortality was reduced by three-fold. We estimated that the reported cases accounted for less than 25% of the actual cases during Omicron. The mortality among the nonvaccinated population in these countries is, on average, three to four times higher than the mortality among the fully vaccinated. Finally, we could only reproduce the observed dynamics after introducing a new parameter that accounts for the percentage of the population that can be reinfected. Reinfection was as high as 40% in South Africa, which has only 29% of its population fully vaccinated and as low as 13% in Brazil, which has over 70% and 80% of its population fully vaccinated and with at least one dose, respectively. The calibrated models were able to estimate essential features of the complex virus and vaccination dynamics and stand as valuable tools for quantifying the impact of protocols and decisions in different populations.

**Title:** Vaccine anxieties, vaccine preparedness: Perspectives from Africa in a Covid-19 era  
**Journal:** Social Science & Medicine  
**Publish Date:** April 2022  
**URL:** [https://doi.org/10.1016/j.socscimed.2022.114826](https://doi.org/10.1016/j.socscimed.2022.114826)  
**Abstract:**  
Global debates about vaccines as a key element of pandemic response and future preparedness in the era of Covid-19 currently focus on questions of supply, with attention to global injustice in vaccine distribution and African countries as rightful beneficiaries of international de-regulation and financing initiatives such as COVAX. At the same time, vaccine demand and uptake are seen to be threatened by hesitancy, often attributed to an increasingly globalised anti-vaxx movement and its propagation of misinformation and conspiracy, now reaching African populations through a social media ‘infodemic’. Underplayed in these debates are the socio-political contexts through which vaccine technologies enter and are interpreted within African settings, and the crucial intersections between supply and demand. We explore these through a ‘vaccine anxieties’ framework attending to both desires for and worries about vaccines, as shaped by bodily, societal and wider political understandings and experiences. This provides an analytical lens to organise and interpret ethnographic and narrative accounts in local and national settings in Uganda and Sierra Leone, and their (dis)connections with global debates and geopolitics. In considering the socially-embedded reasons why people want or do not want Covid-19 vaccines, and how this intersects with the dynamics of vaccine supply, access and distribution in rapidly-unfolding epidemic situations, we bring new, expanded insights into debates about vaccine confidence and vaccine preparedness.

**Title:** Covax, des dons de vaccins anti-Covid-19 pour les pays africains  
**Journal:** Revue Francophone des Laboratoires  
**Publish Date:** April 2022  
**URL:** [https://doi.org/10.1016/S1773-035X(22)00117-4](https://doi.org/10.1016/S1773-035X(22)00117-4)  
**Abstract:**  

**Title:** Africa CDC warns COVID-19 vaccine production could cease

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Title: Epidemiological impact and cost-effectiveness analysis of COVID-19 vaccination in Kenya
Source: medrxiv
Publish Date: April 22, 2022
URL: https://doi.org/10.1101/2022.04.21.22274150

Abstract:
Background Few studies have assessed the benefits of COVID-19 vaccines in settings where most of the population had been exposed to SARS-CoV-2 infection.
Methods We conducted a cost-effectiveness analysis of COVID-19 vaccine in Kenya from a societal perspective over a 1.5-year time frame. An age-structured transmission model assumed at least 80% of the population to have prior natural immunity when an immune escape variant was introduced. We examine the effect of slow (18 months) or rapid (6 months) vaccine roll-out with vaccine coverage of 30%, 50% or 70% of the adult (> 18 years) population prioritizing roll-out in over 50-year olds (80% uptake in all scenarios). Cost data were obtained from primary analyses. We assumed vaccine procurement at $7 per dose and vaccine delivery costs of $3.90-$6.11 per dose. The cost-effectiveness threshold was USD 919.
Findings Slow roll-out at 30% coverage largely targets over 50-year-olds and resulted in 54% fewer deaths (8,132(7,914 to 8,373)) than no vaccination and was cost-saving (ICER=US$-1,343 (-1,345 to -1,341) per DALY averted). Increasing coverage to 50% and 70%, further reduced deaths by 12% (810 (757 to 872) and 5% (282 (251 to 317) but was not cost-effective, using Kenya’s cost-effectiveness threshold ($ 919.11). Rapid roll-out with 30% coverage averted 63% more deaths and was more cost-saving (ICER=$-1,607 (-1,609 to -1,604) per DALY averted) compared to slow roll-out at the same coverage level, but 50% and 70% coverage scenarios were not cost-effective.
Interpretation With prior exposure partially protecting much of the Kenyan population, vaccination of young adults may no longer be cost-effective.

Title: Price, Priorities, Pace: Three Factors that Drive Cost-Effectiveness of COVID-19 Vaccination Strategies in Kenya, Nigeria, and Ethiopia
Source: Center for Global Development
Publish date: April 28, 2022
URL: Price, Priorities, Pace: Three Factors that Drive Cost-Effectiveness of COVID-19 Vaccination Strategies in Kenya, Nigeria, and Ethiopia | Center for Global Development | Ideas to Action (cgdev.org)

Abstract:

Title: Understanding the Cost-Effectiveness of COVID-19 Vaccination in Ethiopia
Source: Center for Global Development
Publish Date: April 28, 2022
URL: Understanding the Cost-Effectiveness of COVID-19 Vaccination in Ethiopia | Center for Global Development | Ideas to Action (cgdev.org)
Title: World Bank speeds Africa’s COVID vaccination
Journal: Nature
Publish Date: April 26, 2022
URL: https://www.nature.com/articles/d41586-022-01107-1

Abstract:

COVID-19 PUBLIC PERCEPTIONS AND EFFECTS

Title: The Health-Sustaining, Moderating, and Mediating Roles of Sense of Coherence in the Relationship between Fear of COVID-19 and Burnout among South African Teachers
Journal: International Journal of Environmental Research and Public Health
Publish date: April 24, 2022
URL: https://doi.org/10.3390/ijerph19095160

Abstract:
The current study focuses on the interrelationship between fear of COVID-19, sense of coherence, and burnout. Participants (n = 355) were school teachers from across all provinces in South Africa who completed the Fear of COVID-19 Scale, the Sense of Coherence Scale, and the Maslach Burnout Inventory. It was hypothesized that the dimensions of sense of coherence would be directly associated with burnout and would also mediate or moderate the relationship between fear of COVID-19 and burnout. The results of the path and moderation analyses conducted confirmed this hypothesis. In particular, the health-sustaining role of sense of coherence was demonstrated through the significant direct associations between comprehensibility and manageability on one hand and emotional exhaustion, as well as depersonalization, on the other hand. In addition, meaningfulness had significant direct associations with emotional exhaustion, depersonalization, and personal accomplishment. Meaningfulness mediated the relationship between fear of COVID-19 and all burnout subscales, while comprehensibility and manageability only mediated the relationship between fear of COVID-19 and both emotional exhaustion and depersonalization. However, comprehensibility and manageability played a moderating role in the relationship between fear of COVID-19 and personal accomplishment. These findings confirm the crucial role of protective factors, such as sense of coherence, and highlights the need for interventions that could strengthen these resources within teachers

Title: Why are COVID-19 effects less severe in Sub-Saharan Africa? Moving more and sitting less may be a primary reason
Journal: Progress in Cardiovascular Diseases
Publish Date: April 2022
URL: https://doi.org/10.1016/j.pcad.2022.04.012

Abstract:

D. COVID-19 EFFECTS ON OTHER DISEASES AND SECTORS

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Title: Comparison of Anxiety and Depression Among HIV-Positive and HIV-Negative Pregnant Women During COVID-19 Pandemic in Ekiti State, Southwest Nigeria
Journal: International Journal of General Medicine
Publish Date: April 16, 2022
URL: https://www.dovepress.com/getfile.php?fileID=79995
Abstract:
Purpose: Coronavirus disease 2019 (COVID-19) pandemic is the significant public health crisis of the 21st century that has disrupted personal, local, and international territorial relationships. Earlier studies have shown that people with HIV were at least twice at risk of dying from COVID-19 than the general population. There are also deep concerns about the indirect impact of COVID-19 on women within the reproductive age group in Sub-Saharan Africa who were already struggling to access reproductive healthcare services. In addition, pregnant HIV-positive women have an increased rate of anxiety and depression. This study, therefore, examined depression and anxiety disorders in pregnant HIV-positive women in response to the COVID-19 pandemic. Patients and Methods: This cross-sectional study used a structured questionnaire containing sociodemographic information, Patient Health Questionnaire-9 (PHQ-9), and General Anxiety Disorder-7 (GAD-7) assessment tools. Data obtained were analyzed using Statistical Package for Social Science version 26. Results: Ninety-nine (99) representing 78% of 127 pregnant HIV-positive women enrolled in the PMTCT program were eligible for this study. This number matched 99 randomly selected pregnant HIV-negative in the study areas as controls. Major depressive disorder (MDD) and severe anxiety disorder were significantly higher among the HIV-positive group than in the HIV-negative group (PHQ-9 Mean ± SD 8.0 ± 5.4 vs 2.3 ± 2.9; p = 0.000) and (GAD-7 Mean ± SD 5.9 ± 4.6 vs 1.2 ± 2.2; p = 0.000). Conclusion: Given the high prevalence of major depressive disorder and severe anxiety disorder among pregnant HIV-positive women, mental health care should be incorporated into the prevention with positive interventions and strategies to reduce the indirect consequences of the COVID-19 pandemic.

Title: Vitamin D status and COVID-19 severity
Journal: Southern African Journal of Infectious Diseases
Date Publish: April 26, 2022
URL: https://doi.org/10.4102/sajid.v37i1.359
Abstract
Background: Age, body mass index (BMI) and pre-existing comorbidities are known risk factors of severe coronavirus disease 2019 (COVID-19). In this study we explore the relationship between vitamin D status and COVID-19 severity.
Methods: We conducted a prospective, cross-sectional descriptive study. We enrolled 100 COVID-19 positive patients admitted to a tertiary level hospital in Johannesburg, South Africa. Fifty had symptomatic disease (COVID-19 pneumonia) and 50 who were asymptomatic (incidental diagnosis). Following written informed consent, patients were interviewed regarding age, gender and sunlight exposure during the past week, disease severity, BMI, calcium, albumin, magnesium and alkaline phosphatase levels. Finally, blood was collected for vitamin D measurement.
Results: We found an 82% prevalence rate of vitamin D deficiency or insufficiency among COVID-19 patients. Vitamin D levels were lower in the symptomatic group (18.1 ng/mL ±
8.1 ng/mL) than the asymptomatic group (25.9 ng/mL ± 7.1 ng/mL) with a 𝑝-value of 0.000. The relative risk of symptomatic COVID-19 was 2.5-fold higher among vitamin D deficient patients than vitamin D non-deficient patients (confidence interval [CI]: 1.14–3.26). Additional predictors of symptomatic disease were older age, hypocalcaemia and hypoalbuminaemia. Using multiple regression, the only independent predictors of COVID-19 severity were age and vitamin D levels. The patients exposed to less sunlight had a 2.39-fold increased risk for symptomatic disease compared to those with more sunlight exposure (CI: 1.32–4.33).

**Conclusion:** We found a high prevalence of vitamin D deficiency and insufficiency among patients admitted to hospital with COVID-19 and an increased risk for symptomatic disease in vitamin D deficient patients.

**Title:** Surgery of COVID-19-infected patients in Africa: A scoping review
**Journal:** Annals of African Surgery
**Publish Date:** April 25, 2022
**URL:** https://doi.org/10.4314/aas.v18i4.3

**Abstract:**

**Objective:** The aim of this scoping review was to highlight the nature and scope of research and publications about surgery in COVID-19-infected patients in Africa in order to inform guidelines applicable in Africa.

**Methods:** We considered peerreviewed and gray literature from PubMed, Google Scholar, and World Health Organization COVID-19 online databases published from February 1, 2020, to February 28, 2021, about surgery for/in COVID-19-infected patients. The review is reported using the Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Reviews.

**Results:** Of 530 studies screened, only 11 (2.08%) were found eligible, including 4 cohort studies, 3 cross-sectional studies, 2 letters to the editor, 1 case series, and 1 review. The key emphasis areas by the eligible studies were vaccination, testing prior to surgery, clinical guidelines to reduce complications related to COVID-19 among infected patients, and protection of the surgical team.

**Conclusion:** There is a dearth of studies on surgery in COVID-19-infected patients in Africa. There is an urgent need for more reports and publications from the African experiences so as to inform contextualized guidelines for surgical care in low-resource settings during the COVID-19 pandemic.

**Title:** Two years after lockdown: reviewing the effects of COVID-19 on health services and support for adolescents living with HIV in South Africa
**Journal:** Journal of the International AIDS Society
**Publish Date:** April 25, 2022
**URL:** https://doi.org/10.1002/jia2.25904

**Abstract:**

**Introduction:** South Africa’s progress towards the 95-95-95 goals has been significantly slower among adolescents living with HIV (ALHIV), among whom antiretroviral therapy (ART) adherence, retention in care and viral suppression remain a concern. After 2 years of living with COVID-19, it is important to examine the direct and indirect effects of the
pandemic on healthcare resources, access to HIV services and availability of support structures, to assess their impact on HIV care for ALHIV.

**Discussion:** The COVID-19 response in South Africa has shifted healthcare resources towards combatting COVID-19, affecting the quality and availability of HIV services—especially for vulnerable populations, such as ALHIV. The healthcare system’s response to COVID-19 has threatened to diminish fragile gains in engaging ALHIV with HIV services, especially as this group relies on overburdened public health facilities for their HIV care. Reallocation of limited health resources utilized by ALHIV disrupted healthcare workers’ capacity to form and maintain therapeutic relationships with ALHIV and monitor ALHIV for ART-related side effects, treatment difficulties and mental health conditions, affecting their ability to retain ALHIV in HIV care. Prevailing declines in HIV surveillance meant missed opportunities to identify and manage opportunistic infections and HIV disease progression in adolescents. "Lockdown" restrictions have limited access to healthcare facilities and healthcare workers for ALHIV by reducing clinic appointments and limiting individual movement. ALHIV have had restricted access to social, psychological and educational support structures, including national feeding schemes. This limited access, coupled with reduced opportunities for routine maternal and sexual and reproductive health services, may place adolescent girls at greater risk of transactional sex, child marriages, unintended pregnancy and mother-to-child HIV transmission.

**Conclusions:** Adolescent HIV care in South Africa is often overlooked; however, ART adherence among ALHIV in South Africa is particularly susceptible to the consequences of a world transformed by COVID-19. The current structures in place to support HIV testing, ART initiation and adherence have been reshaped by disruptions to health structures, new barriers to access health services and the limited available education and psychosocial support systems. Reflecting on these limitations can drive considerations for minimizing these barriers and retaining ALHIV in HIV care.

**Title:** Surveillance of Viral Encephalitis in the Context of COVID-19: A One-Year Observational Study among Hospitalized Patients in Dakar, Senegal

**Journal:** Viruses

**Publish date:** April 22, 2022

**URL:** [https://doi.org/10.3390/v14050871](https://doi.org/10.3390/v14050871)

**Abstract:**
The burden of encephalitis and its associated viral etiology is poorly described in Africa. Moreover, neurological manifestations of COVID-19 are increasingly reported in many countries, but less so in Africa. Our prospective study aimed to characterize the main viral etiologies of patients hospitalized for encephalitis in two hospitals in Dakar. From January to December 2021, all adult patients that met the inclusion criteria for clinical infectious encephalitis were enrolled. Cerebrospinal fluids, blood, and nasopharyngeal swabs were taken and tested for 27 viruses. During the study period, 122 patients were enrolled. Viral etiology was confirmed or probable in 27 patients (22.1%), with SARS-CoV-2 (n = 8), HSV-1 (n = 7), HHV-7 (n = 5), and EBV (n = 4) being the most detected viruses. Age groups 40–49 was more likely to be positive for at least one virus with an odds ratio of 7.7. The mortality was high among infected patients, with 11 (41%) deaths notified during hospitalization. Interestingly, SARS-CoV-2 was the most prevalent virus in hospitalized patients presenting with encephalitis. Our results reveal the crucial need to establish a
country-wide surveillance of encephalitis in Senegal to estimate the burden of this disease in our population and implement strategies to improve care and reduce mortality.

**Title:** Remaking academic library services in Zimbabwe in the wake of COVID-19 pandemic  
**Journal:** Journal of academic librarianship  
**Publish Date:** May 2022  
**URL:** [https://doi.org/10.1016/j.acalib.2022.102521](https://doi.org/10.1016/j.acalib.2022.102521)  
**Abstract:**  
The outbreak of the global COVID-19 pandemic has affected all aspects of life, access to higher education has not been out of danger as evidenced by the enforcement of official closures, enforcement lockdown and social distancing rules by governments throughout the world. However, while the COVID-19 pandemic has presented the world with numerous socioeconomic challenges, it has also helped to spur creativity and information as evidenced by the responses of academic libraries that have seen a heightened use of digital platforms to support education, teaching and research. The study sought to establish how librarians in Zimbabwe responded to the outbreak of COVID-19 and the implications of the pandemic on library service delivery. A qualitative research was adopted for the study. Using snowballing, interviews were used to gather data beginning with the library association's branch leadership. The researchers ensured that the questions were aligned to the research objectives. The interview schedule included open and closed questions to enable participants to provide further details relating to the phenomenon under study. The participants were guaranteed their rights to consent, privacy and anonymity in the introduction of the interview schedule. An The study reveals that there has been an increase in the use online platforms for accessing information especially library's webpages, electronic books and journals. The use of library online resources from distance locations also rose following closure of campuses. Library patrons' perceptions towards electronic resources significantly improved as they realized that they were equally useful as the print. Findings from the study provide useful recommendation on how librarians can remodel their services to match new demands presented by the COVID-19 pandemic. The study provides a starting point upon which further research on the effect of COVID-19 or other similar pandemics have on library service delivery.

**Title:** Working in the time of COVID-19: Rehabilitation clinicians’ reflections of working in Gauteng’s public healthcare during the pandemic  
**Journal:** African Journal of Disability  
**Publish Date:** April 28, 2022  
**URL:** [https://doi.org/10.4102/ajod.v11i0.889](https://doi.org/10.4102/ajod.v11i0.889)  
**Abstract:**  
**Background:** When the coronavirus disease 2019 (COVID-19) pandemic manifested in South Africa, rehabilitation services were seriously affected. The consequences of these were wide-ranging: affecting service users, their families and caregivers, rehabilitation practices and practitioners as well as the integrity and sustainability of rehabilitation systems.
Objectives: This study aimed to explore the nature and consequences of disruption caused by the pandemic, based on the experience of rehabilitation clinicians who were working in public healthcare facilities in Gauteng.

Methods: This was a phenomenology study that used critical reflection method. Trained and experienced in reflecting on barriers and enablers that affect their practices, a multidisciplinary group of rehabilitation clinicians captured their experience of working during the time of COVID-19. Data construction extended over 6 months during 2020. An inductive thematic analysis was performed using Taguette: an open-source qualitative data analysis tool.

Results: The main themes captured the disorder and confusion with its resultant impact on rehabilitation services and those offering these services that came about at the beginning of the pandemic. The importance of teamwork and leadership in rehabilitation also emerged as themes. Other themes related to having to approach work differently, working beyond professional scopes of practice and pandemic fatigue.

Conclusion: The COVID-19 pandemic disrupted the way rehabilitation was being performed, creating an opportunity to reconceptualise, strengthen and improve rehabilitation services offered at public healthcare. The presence of effective leadership with clear communication, dependable multidisciplinary teams and clinicians with robust personal resources were strategies that supported rehabilitation clinicians whilst working during COVID-19.

Title: Neurological manifestations of COVID-19: A potential gate to the determinants of a poor prognosis
Journal: Brain and behavior
Publish Date: April 25, 2022
URL: https://doi.org/10.1002/brb3.2587
Abstract:
Background
Several investigations were carried out during the pandemic, demonstrating a number of neurological symptoms linked to coronavirus disease 2019 (COVID-19) infection.

Objectives
The goal of this review is to discuss COVID-19 disease’s neurological signs and squeals.

Methodology
From December 2019 to May 2020, data were retrieved from PubMed, Scopus, and ScienceDirect, as well as a manual search using Google Scholar. COVID-19, neurological symptoms, cranial nerves, motor system were among the key phrases utilized in the search.

Results
The intensity of respiratory involvement increases the likelihood of neurological symptoms and consequences. According to some research, it might range from 34% to 80%. The central and peripheral neural systems are both affected, resulting in cranial nerve palsies and limb paralysis.

Conclusion
COVID-19 neurologic complications are key drivers of patient severity and mortality. Headache, convulsions, mental and psychic disorders, delirium, and insomnia are just some of the symptoms that the virus can cause. The olfactory nerve is the most commonly...
damaged cranial nerve, resulting in anosmia. Stroke (mostly infarction), encephalitis, meningitis, Guillain–Barre syndrome, relapse of multiple sclerosis, and transverse myelitis are all symptoms and squeals.

**Title:** Development of customized inner beauty products and customized cosmetics apps according to the use of NRF2 through DTC genetic testing after the COVID-19 pandemic

**Journal:** Journal of Cosmetic Dermatology

**Publish Date:** April 24, 2022

**URL:** [https://doi.org/10.1111/jocd.14467](https://doi.org/10.1111/jocd.14467)

**Abstract:**

**Background**

After the coronavirus disease-19 (COVID-19) pandemic, the definition of health continuity, well-being, and well-dying is also evolving.

**Objectives**

This review is about the utilization of nuclear factor erythroid 2-related factor 2 (NRF2) for customized inner beauty products and customized cosmetics through Direct-To-Consumer (DTC) genetic testing in the non-face-to-face era that is evolving after the global pandemic.

**Methods**

In May 2021, we proposed a narrative review as a new report and commentary. It was written with reference to keywords such as “Covid DTC Genetic Test,” “Covid 4th industrial revolution,” “Covid NRF2,” and “Antioxidants.” This study was performed by searching on PubMed, Google Scholar, Scopus, and ResearchGate. A total of 432 papers were retrieved, of which 40 were successfully included in this study.

**Results**

With the rapid transition to a non-face-to-face society after COVID-19, the concept of DTC was born, which allows consumers to receive genetic testing directly without visiting a medical institution. Based on the 4th industrial revolution, a convergence medical device is needed to secure the function as an NRF2 regulator of antioxidants in customized inner beauty products and customized cosmetics.

**Conclusion**

Therefore, let us look at the fact that a fusion medical device based on the 4th industrial revolution has emerged in the global DTC genetic test market, which is still insufficient to summarize important research results. This study is expected to be an important data for the development of antioxidants as NRF2 regulators in customized inner beauty products and customized cosmetics. As mobile use increases in the future, additional research focusing on app development is needed, and various follow-up studies are also needed.