AFRO Weekly COVID-19 Literature Update

2022/11/19-2022/11/25

Prepared by AFRO COVID-19 IMST through its information management cell, together with DAK team of the ARD’s office

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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, Oxford University Press, Taylor & Francis, Springer, the BMJ.

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, Oxford University Press, Taylor & Francis, Springer, the BMJ.
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, Oxford University Press, Taylor & Francis, Springer, the BMJ.
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:** Causes of death and post-mortem testing for SARS-CoV-2 in a tertiary hospital during the COVID-19 pandemic in Ghana  
**Journal:** African Journal of Laboratory Medicine  
**Publish Date:** November 23, 2022  
**URL:** https://doi.org/10.4102/ajlm.v11i1.1766  
**Abstract:**
**Background:** Causes of death during the coronavirus disease 2019 (COVID-19) pandemic ranhttp://crossmark.crossref.org/dialog/?doi=10.4102/ajlm.v11i1.1766=pdf&date_stamp=2022-11-23ge from direct consequences of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection to deaths unrelated to SARS-CoV-2. Another feature of the pandemic is the post-mortem testing for SARS-CoV-2. Understanding these aspects of COVID-19 are essential in planning and limiting the impact of SARS-CoV-2 virus on healthcare systems.  
**Objective:** This study investigated the underlying causes of death and the presence of SARS-CoV-2 in bodies received at the 37 Military Hospital, Accra, Ghana, during the COVID-19 pandemic.  
**Methods:** The study was conducted from 4–27 May 2020. Deceased patients that met the inclusion criteria were prospectively selected during the expanded surveillance period for SARS-CoV-2 testing, autopsy and determination of underlying and immediate cause of death.  
**Results:** A total of 161 deceased patients were analysed with 53 autopsies. The overall positive test rate for SARS-CoV-2 was 14.9% (24/161 patients), with a positive rate of 5.0% (8/161 patients) for nasopharyngeal samples and 30.2% (16/161 patients) for bronchopulmonary samples. The underlying causes of death were not related to SARS-CoV-2 infection in 85.1% (137/161) of patients, SARS-CoV-2-associated 12.4% (20/161) and SARS-CoV-2-induced in 2.5% (4/161). Cardiovascular complications formed the most common cause of death in patients with or without SARS-CoV-2.  
**Conclusion:** There was a high positive rate of SARS-CoV-2 in post-mortem cases. However, most deaths were not caused by SARS-CoV-2 but by cardiovascular complications. The high rate of bronchopulmonary positive results for SARS-CoV-2 requires that autopsies be done in suspicious cases with negative nasopharyngeal sampling.  

**Title:** One-year temporal changes in long COVID prevalence and characteristics: a systematic review and meta-analysis  
**Journal:** Value in Health  
**Publish Date:** November 18, 2022  
**URL:** https://doi.org/10.1016/j.jval.2022.11.011  
**Abstract:**
Objectives
This study aimed to explore the 1-year temporal change in prevalence, variety, and potential risk factors of long COVID symptoms, and to further predict the prognostic trends of long COVID.

Methods
We searched electronic databases for related studies published from January 2020 to February 2022, and conducted one group meta-analysis and locally weighted regression explore the monthly temporal change in the prevalence of each long COVID symptom in 1-year follow-up period.

Results
A total of 137 studies were included in meta-analysis, including 134,093 participants. The temporal change of any long COVID symptom showed a steep decrease initially (from 92% at acute phase to 55% at 1-month follow-up), followed by stabilization at approximately 50% during 1-year follow-up. Six months or more after the acute phase, the odds ratio (OR) of population characteristic factors increased, such as female gender (from 1.62 to 1.82), while the OR value of acute phase-related factors (severe/critical and hospitalization) decreased. As for specific symptoms, about two-thirds of the symptoms did not significantly reduce during the 1-year follow-up, and the neuropsychiatric symptoms showed a higher long-term prevalence (approximately 25%) and longer persistence than physical-symptoms.

Conclusions
The temporal changes in the prevalence and characteristics speculate that long COVID may persist longer than expected. In particular, we should pay more attention to neuropsychiatric symptoms and other symptoms for which there is no significant downward trend in prevalence. The influence of acute phase-related factors for long COVID gradually decreases over time, while the influence of population characteristic-related gradually increases.

Title: Dynamics of SARS-CoV-2 variants characterized during different COVID-19 waves in Mali
Journal: IJID Regions
Publish Date: November 25, 2022
URL: https://doi.org/10.1016/j.ijregi.2022.11.009

Abstract:
Background
Emergence of Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variants may contribute to prolonging the pandemic and increasing morbidity, and mortality related to coronavirus disease 2019 (COVID-19). We describe the dynamics of circulating SARS-CoV-2 variants identified during the different COVID-19 waves that occurred in Mali between April 2021 and October 2021.

Methods
We sequenced respiratory SARS-CoV-2 complete spike (S) gene from positive samples. Generated sequences were aligned by Variant Reporter v3.0 using Wuhan-1 strain as a reference. Mutations were noted using the GISAID and Nextclade platforms.

Results
Of 16,797 nasopharyngeal swab samples tested, 6.0% (1008/16,797) were RT-qPCR positive for SARS-CoV-2. Of these, 16.07% (162/1008) had a Ct value ≤ 28 and were amplified and sequenced. We recovered complete S-gene sequence from 80 of 162 [49.8%] samples. We identified seven distinct variants including Delta [62.5%], Alpha [1.2%], Beta [1.2%], Eta [30.0%], 20B [2.5%], 19B and 20A [1.2% each].

**Conclusion and perspectives**

Our results show the presence of several SARS-CoV-2 variants during COVID-19 waves in Mali between April and October 2021. The continued emergence of new variants highlights the need to strengthen local real-time sequencing capacity, and genomic surveillance for better and coordinated national responses to SARS-CoV-2.

**Title:** Outcomes of laboratory-confirmed SARS-CoV-2 infection during resurgence driven by Omicron lineages BA.4 and BA.5 compared with previous waves in the Western Cape Province, South Africa

**Journal:** International Journal of Infectious Diseases

**Publish Date:** November 24, 2022

**URL:** [https://doi.org/10.1016/j.ijid.2022.11.024](https://doi.org/10.1016/j.ijid.2022.11.024)

**Abstract:**

**Objective**

We aimed to compare clinical severity of Omicron BA.4/BA.5 infection with BA.1 and earlier variant infections among laboratory-confirmed SARS-CoV-2 cases in the Western Cape, South Africa, using timing of infection to infer the lineage/variant causing infection.

**Methods**

We included public sector patients aged ≥20 years with laboratory-confirmed COVID-19 between 1-21 May 2022 (BA.4/BA.5 wave) and equivalent prior wave periods. We compared the risk between waves of (i) death and (ii) severe hospitalization/death (all within 21 days of diagnosis) using Cox regression adjusted for demographics, comorbidities, admission pressure, vaccination and prior infection.

**Results**

Among 3,793 patients from the BA.4/BA.5 wave and 190,836 patients from previous waves the risk of severe hospitalization/death was similar in the BA.4/BA.5 and BA.1 waves (adjusted hazard ratio (aHR) 1.12; 95% confidence interval (CI) 0.93; 1.34). Both Omicron waves had lower risk of severe outcomes than previous waves. Prior infection (aHR 0.29, 95% CI 0.24; 0.36) and vaccination (aHR 0.17; 95% CI 0.07; 0.40 for at least 3 doses vs. no vaccine) were protective.

**Conclusion**

Disease severity was similar amongst diagnosed COVID-19 cases in the BA.4/BA.5 and BA.1 periods in the context of growing immunity against SARS-CoV-2 due to prior infection and vaccination, both of which were strongly protective.

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**B. COVID-19 RESPONSE ACTIVITIES**

(hygiene practices, social distancing, case management)

**Title:** High-resolution estimates of social distancing feasibility, mapped for urban areas in sub-Saharan Africa

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Journal: Nature  
Publish Date: November 18, 2022  
URL: https://www.nature.com/articles/s41597-022-01799-0.pdf  

Abstract:  
Social distancing has been widely-implemented as a public health measure during the COVID-19 pandemic. Despite widespread application of social distancing guidance, the feasibility of people adhering to such guidance varies in different settings, influenced by population density, the built environment and a range of socio-economic factors. Social distancing constraints however have only been identified and mapped for limited areas. Here, we present an ease of social distancing index, integrating metrics on urban form and population density derived from new multi-country building footprint datasets and gridded population estimates. The index dataset provides estimates of social distancing feasibility, mapped at high-resolution for urban areas across 50 countries in sub-Saharan Africa.

Title: National COVID-19 lockdown and trends in help-seeking for violence against children in Zimbabwe: an interrupted time-series analysis  
Journal: BMC Public Health  
Publish Date: November 18, 2022  

Abstract:  
Background  
An estimated 1.8 billion children live in countries where COVID-19 disrupted violence prevention and response. It is important to understand how government policies to contain COVID-19 impacted children’s ability to seek help, especially in contexts where there was limited formal help-seeking prior to the pandemic. We aimed to quantify how the national lockdown in Zimbabwe affected helpline calls for violence against children, estimated the number of calls that would have been received had the lockdown not occurred and described characteristics of types of calls and callers before and after the national lockdown.  
Methods  
We used an interrupted time series design to analyse the proportion of violence related calls (17,913 calls out of 57,050) to Childline Zimbabwe’s national child helpline between 2017 to 2021. We applied autoregressive integrated moving average regression (ARIMA) models to test possible changes in call trends before and after the March 2020 lockdown and forecasted how many calls would have been received in the absence of lockdown. In addition, we examined call characteristics before and after lockdown descriptively.  
Results  
The proportion of violence related calls decreased in the 90 days after the lockdown and subsequently returned to pre-COVID-19 levels. We estimate that 10.3% (95% confidence interval [CI] 6.0–14.6%) more violence related calls would have occurred in this period had there not been a lockdown. Violence was increasingly reported as occurring in children’s households, with fewer reports from children and formal child protection actors.  
Conclusions  
Lockdowns dramatically change everyday life and strain populations, which is unlikely to reduce violence prevalence but may reduce help-seeking. The three months after COVID-
19 lockdowns may be key time periods when help-seeking for violence decreases drastically. Policy makers should ensure that in-person and remote services support help-seeking. Interventions and campaigns may additionally want to target adult female family members in encouraging reporting of suspected violence cases when they occur within households and are perpetuated by other family members. We suggest a composite approach of scaling-up remote reporting mechanisms that are accessible and geographically well-distributed, establishing non-traditional sites for help seeking within communities and continuing limited in-person home visitation for known cases of violence.

**Title:** CNN-LSTM deep learning based forecasting model for COVID-19 infection cases in Nigeria, South Africa and Botswana

**Journal:** Health and Technology

**Publish Date:** November 15, 2022

**URL:** [https://link.springer.com/content/pdf/10.1007/s12553-022-00711-5.pdf](https://link.springer.com/content/pdf/10.1007/s12553-022-00711-5.pdf)

**Abstract:**

**Background**

COVID-19 pandemic has indeed plunged the global community especially African countries into an alarming difficult situation culminating into a great deal amounts of catastrophes such as economic recession, political instability and loss of jobs. The pandemic spreads exponentially and causes loss of lives. Following the outbreak of the omicron new variant of concern, forecasting and identification of the COVID-19 infection cases is very vital for government at various levels. Hence, having knowledge of the spread at a particular point in time, swift actions can be taken by government at various levels with a view to accordingly formulate new policies and modalities towards minimizing the trajectory of the consequences of COVID-19 pandemic to both public health and economic sectors.

**Methods**

Here, a potent combination of Convolutional Neural Network (CNN) learning algorithm along with Long Short Term Memory (LSTM) learning algorithm has been proposed in this work in order to produce a hybrid of a deep learning algorithm Convolutional Neural Network - Long Short Term Memory (CNN-LSTM) for forecasting COVID-19 infection cases particularly in Nigeria, South Africa and Botswana. Forecasting models for COVID-19 infection cases in Nigeria, South Africa and Botswana, were developed for 10 days using deep learning-based approaches namely CNN, LSTM and CNN-LSTM deep learning algorithm respectively.

**Results**

The models were evaluated on the basis of four standard performance evaluation metrics which include accuracy, MSE, MAE and RMSE respectively. However, the CNN-LSTM deep learning-based forecasting model achieved the best accuracy of 98.30%, 97.60%, and 97.74% for Nigeria, South Africa and Botswana respectively; and in the same manner, achieved lesser MSE, MAE and RMSE values compared to models developed with CNN and LSTM respectively.

**Conclusions**

Taken together, the CNN-LSTM deep learning-based forecasting model for COVID-19 infection cases in Nigeria, South Africa and Botswana dramatically surpasses the two other DL based forecasting models (CNN and LSTM) for COVID-19 infection cases in Nigeria,
South Africa and Botswana in terms of not only the best accuracy of with 98.30%, 97.60%, and 97.74% but also in terms of lesser MSE, MAE and RMSE.

**Title:** International air travel-related control measures to contain the Covid-19 pandemic: A companion review to a Cochrane rapid review  
**Journal:** New Microbes and New Infections  
**Publish Date:** November 25, 2022  
**URL:** [https://doi.org/10.1016/j.nmni.2022.101054](https://doi.org/10.1016/j.nmni.2022.101054)  
**Abstract:**  
**Background**  
COVID-19 has proven to be challenging to manage for many reasons, including its high infection rate. One of the potential ways to limit its spread is by limiting international travel. The objective of this systematic review was to identify, critically appraise and summarise evidence on international air travel-related control measures for COVID-19.  
**Methods**  
This review is based on the Cochrane review: *International travel-related control measures to contain the COVID-19 pandemic* and followed the same methods. In brief, we searched for clinical and modelling studies in general health and COVID-19-specific bibliographic databases. The primary outcome categories were (i) cases avoided, (ii) a shift in epidemic development and, (iii) cases detected.  
**Results**  
From 6,202 citations identified by the search strategy, we included 22 new studies (modelling = 9, observational = 13) in addition to the 62 studies identified in the Cochrane review. Studies suggest that quarantine or microbial detection or a combination may avoid further cases. Similarly, these interventions may produce a positive shift in epidemic development and case detection may improve. Most studies were evaluated as having a moderate to critical risk of bias. The studies did not change the main conclusions of the Cochrane review nor the quality of the evidence (very low certainty); however, they added to the evidence base for most outcomes.  
**Conclusions**  
Weak evidence supports the use of international air travel-related control measures to limit the spread of COVID-19 via air travel. More real-world studies are required to support these conclusions.

**Title:** A tale of two waves: Characteristics and outcomes of COVID-19 admissions during the omicron-driven 4th wave in Cape Town, South Africa and implications for the future  
**Journal:** IJID Regions  
**Publish Date:** November 24, 2022  
**URL:** [https://doi.org/10.1016/j.ijpregi.2022.11.008](https://doi.org/10.1016/j.ijpregi.2022.11.008)  
**Abstract:**  
**Objectives**  
We aimed to describe the pattern of admissions during the fourth wave of COVID-19 to inform future public health policies.  
**Methods**  
This was a retrospective descriptive study of an early cohort of all adult patients admitted to a tertiary hospital in Cape Town, South Africa, with SARS-CoV-2 infection at the start of
the country's fourth wave. This was compared to an early cohort from the first wave at the same institution.

**Results**
We included 121 SARS-CoV-2 positive admissions from the fourth wave. Thirty-one (25.6%) patients had COVID-19 pneumonia, while 90 (74.4%) had incidental SARS-CoV-2 infection. In the first wave all 116 patients had COVID-19 pneumonia. Thirty-two (26.4%) patients self-reported complete or partial COVID-19 vaccination, of whom 12 (37.5%) were admitted with COVID-19 pneumonia. Compared to the first wave, there were fewer intensive or high care admissions (18/121 [14.9%] vs 42/116 [36.2%], p<0.001) and lower mortality (12/121 [9.9%] vs 31/116 [26.7%], p=0.001).

**Conclusion**
Admissions to the COVID-19 wards during the fourth wave primarily included patients with incidental SARS-CoV-2 infection. There was a reduction in the need for critical care and in-hospital mortality. This changing epidemiology of COVID-19 admissions may be attributed to a combination of natural and/or vaccination-acquired immunity.

**Title:** Personal protective equipment (PPE) disposal during COVID-19: An emerging source of microplastic and microfiber pollution in the environment  
**Journal:** Science of The Total Environment  
**Publish Date:** November 19, 2022  
**URL:** [https://doi.org/10.1016/j.scitotenv.2022.160322](https://doi.org/10.1016/j.scitotenv.2022.160322)  
**Abstract:**
Waste generated by healthcare facilities during the COVID-19 pandemic has become a new source of pollution, particularly with the widespread use of single-use personal protective equipment (PPE). Releasing microplastics (MPs) and microfibers (MFs) from discarded PPE becomes an emerging threat to environmental sustainability. MPs/MFs have recently been reported in a variety of aquatic and terrestrial ecosystems, including water, deep-sea sediments, air, and soil. As COVID-19 spreads, the use of plastic-made PPE in healthcare facilities has increased significantly worldwide, resulting in massive amounts of plastic waste entering the terrestrial and marine environments. High loads of MPs/MFs emitted into the environment due to excessive PPE consumption are easily consumed by aquatic organisms, disrupting the food chain, and potentially causing chronic health problems in humans. Thus, proper management of PPE waste is critical for ensuring a post-COVID sustainable environment, which has recently attracted the attention of the scientific community. The current study aims to review the global consumption and sustainable management of discarded PPE in the context of COVID-19. The severe impacts of PPE-emitted MPs/MFs on human health and other environmental segments are briefly addressed. Despite extensive research progress in the area, many questions about MP/MF contamination in the context of COVID-19 remain unanswered. Therefore, in response to the post-COVID environmental remediation concerns, future research directions and recommendations are highlighted considering the current MP/MF research progress from COVID-related PPE waste.

**Title:** Handwashing adherence during the COVID-19 pandemic: A longitudinal study based on protection motivation theory  
**Journal:** Social Science & Medicine
Abstract:
Rationale
The associations between the number of COVID-19 cases/deaths and subsequent uptake of protective behaviors may reflect cognitive and behavioral responses to threat-relevant information.

Objective
Applying protection motivation theory (PMT), this study explored whether the number of total COVID-19 cases/deaths and general anxiety were associated with cross-situational handwashing adherence and whether these associations were mediated by PMT-specific self-regulatory cognitions (threat appraisal: perceived vulnerability, perceived illness severity; coping appraisal: self-efficacy, response efficacy, response costs).

Method
The study (#NCT04367337) was conducted in March–September 2020 among 1256 adults residing in 14 countries. Self-reports on baseline general anxiety levels, handwashing adherence across 12 situations, and PMT-related constructs were collected using an online survey at two points in time, four weeks apart. Values of COVID-19 cases and deaths were retrieved twice for each country (one week prior to the individual data collection).

Results
Across countries and time, levels of adherence to handwashing guidelines were high. Path analysis indicated that smaller numbers of COVID-19 cases/deaths (Time 0; T0) were related to stronger self-efficacy (T1), which in turn was associated with higher handwashing adherence (T3). Lower general anxiety (T1) was related to better adherence (T3), with this effect mediated by higher response efficacy (T1, T3) and lower response cost (T3). However, higher general anxiety (T1) was related to better adherence via higher illness severity (T1, T3). General anxiety was unrelated to COVID-19 indicators.

Conclusions
We found a complex pattern of associations between the numbers of COVID-19 cases/deaths, general anxiety, PMT variables, and handwashing adherence at the early stages of the pandemic. Higher general anxiety may enable threat appraisal (perceived illness severity), but it may hinder coping appraisal (response efficacy and response costs). The indicators of the trajectory of the pandemic (i.e., the smaller number of COVID-19 cases) may be indirectly associated with higher handwashing adherence via stronger self-efficacy.
Bacterial infections are a common complication in patients with seasonal viral respiratory tract infections and are associated with poor prognosis, increased risk of intensive care unit admission and 29–55% mortality. Yet, there is limited data on the burden of bacterial infections among COVID-19 patients in Africa, where underdeveloped healthcare systems are likely to play a pertinent role in the epidemiology of the COVID-19 pandemic. Here, we evaluated the etiologies, antimicrobial resistance profiles, risk factors, and outcomes of bacterial infections in severely ill COVID-19 patients.

**Methods**

A descriptive cross-sectional study design was adopted in severely ill COVID-19 patients at Kenyatta National Hospital, Kenya, from October to December 2021. We used a structured questionnaire and case report forms to collect sociodemographics, clinical presentation, and hospitalization outcome data. Blood, nasal/oropharyngeal swabs and tracheal aspirate samples were collected based on the patient's clinical presentation and transported to the Kenyatta National Hospital microbiology laboratory for immediate processing following the standard bacteriological procedures.

**Results**

We found at least one bacterial infection in 44.2% (53/120) of the patients sampled, with a 31.7% mortality rate. Pathogens were mainly from the upper respiratory tract (62.7%, 42/67), with gram-negative bacteria dominating (73.1%, 49/67). Males were about three times more likely to acquire bacterial infection ($p = 0.015$). Those aged 25 to 44 years ($p = 0.009$), immunized against SARS-CoV-2 ($p = 0.027$), and admitted to the infectious disease unit ward ($p = 0.031$) for a short length of stay (0–5 days, $p < 0.001$) were more likely to have a positive outcome. Multidrug-resistant isolates were the majority (64.3%, 46/67), mainly gram-negative bacteria (69.6%, 32/46). The predominant multidrug-resistant phenotypes were in *Enterococcus cloacae* (42.9%, 3/7), *Klebsiella pneumonia* (25%, 4/16), and *Escherichia coli* (40%, 2/5).

**Conclusion**

Our findings highlight a high prevalence of multidrug-resistant bacterial infections in severely ill COVID-19 patients, with male gender as a risk factor for bacterial infection. Elderly Patients, non-SARS-CoV-2 vaccination, intensive care unit admission, and long length of hospital stay were associated with poor outcomes. There is a need to emphasize strict adherence to infection and prevention at KNH-IDU and antimicrobial stewardship in line with local and global AMR control action plans.

**Title:** Study protocol for developing a novel approach for improving supply chain management for SARS-CoV-2 point of care diagnostic services in resource-limited settings: a case study of Mopani District in Limpopo province, South Africa

**Journal:** BMJ Open

**Publish Date:** November 24, 2022

**URL:** [https://doi.org/10.1136/bmjopen-2022-062509](https://doi.org/10.1136/bmjopen-2022-062509)

**Abstract**

**Introduction:** Recent evidence shows that point-of-care (POC) testing is a more feasible alternative for diagnosis of COVID-19 in settings that have poor access to laboratory diagnostic services. Equitable access to POC testing can be optimised through well-established supply chain management (SCM) systems. The proposed study aims to develop a novel approach for improving SCM for COVID-19 POC diagnostic services in
resource-limited settings with poor access to laboratory diagnostic services, using Mopani District in Limpopo Province, South Africa as a study setting.

**Methods and analysis:** This study was guided by results of the scoping review. Following the scoping review, we propose a mixed-methods study, which will be implemented in three phases. First, we will perform a geospatial analysis to investigate the spatial distribution of COVID-19 testing services. Second, we will perform an audit of POC diagnostic services including its supply chain to evaluate the effect of SCM on accessibility of COVID-19 POC diagnostic services and reveal SCM barriers and enablers of accessibility of COVID-19 POC diagnostic services. Third, we will perform a nominal group technique to collaborate with key stakeholders in co-creation of a novel approach for improving SCM systems for COVID-19 POC diagnostic services. For the geospatial analysis, we will employ the ArcGIS Software. For the analysis of quantitative and qualitative data that will be generated from the audit and nominal group discussion, we will employ Stata software and NVivo software, respectively.

**Ethics and dissemination:** This study has been ethically reviewed and approved by two institutional review boards: University of Pretoria Faculty of Health Sciences Research Ethics Committee (approval number 655/2021) and Limpopo Department of Health Research Ethics Committee (approval number LP-2021-12-007). The results of this study will be disseminated through national and international presentations and peer-reviewed publications.

**C. COVID-19 VACCINATION**

**Title:** Determinants of COVID-19 vaccine hesitancy and uptake in sub-Saharan Africa: a scoping review

**Journal:** BMJ Open

**Publish Date:** November 18, 2022

**URL:** [http://dx.doi.org/10.1136/bmjopen-2022-066615](http://dx.doi.org/10.1136/bmjopen-2022-066615)

**Abstract:**

**Objective:** To identify, describe and map the research tools used to measure COVID-19 vaccine hesitancy, refusal, acceptance and access in sub-Saharan Africa (SSA).

**Design** Scoping review.

**Methods** In March 2022, we searched PubMed, Scopus, Web of Science, Cochrane, Academic Search Premier, MEDLINE, Cumulative Index to Nursing and Allied Health Literature, Health Source Nursing, Africa Wide and APA PsychInfo for peer-reviewed literature in English related to COVID-19 vaccine hesitancy, refusal, acceptance and access in SSA. We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews to guide evidence gathering and as a template to present the evidence retrieval process.

**Results** In the studies selected for review (n=72), several measurement tools were used to measure COVID-19 vaccine hesitancy, acceptance and refusal. These measurements were willingness and intent to vaccinate from the perspectives of the general population, special population groups such as mothers, students and staff in academic institutions and healthcare workers and uptake as a proxy for measuring assumed COVID-19 vaccine acceptance. Measurements of access to COVID-19 vaccination were cost and affordability, convenience, distance and time to travel or time waiting for a vaccine and (dis)comfort.
Although all studies measured COVID-19 vaccine hesitancy, acceptance and refusal, relatively few studies (n=16, 22.2%) included explicit measurements of access to COVID-19 vaccination.

**Conclusions** Based on the gaps identified in the scoping review, we propose that future research on determinants of COVID-19 vaccination in SSA should further prioritise the inclusion of access-related variables. We recommend the development and use of standardised research tools that can operationalise, measure and disentangle the complex determinants of vaccine uptake in future studies throughout SSA and other low- and middle-income country (LMIC) settings.

**Title**: Factors associated with COVID-19 vaccine intention in Benin in 2021: A cross-sectional study  
**Journal**: Vaccine  
**Publish Date**: December 2022  
**URL**: [https://doi.org/10.1016/j.jvacx.2022.100237](https://doi.org/10.1016/j.jvacx.2022.100237)

**Abstract**

**Introduction**  
The development of COVID-19 vaccines has brought considerable hope for the control of the pandemic. With a view to promoting good vaccine coverage, this study aimed to measure vaccine intention against COVID-19 and to understand the factors that promote it.

**Method**  
In April 2021, we conducted a cross-sectional and analytical study at the national level through a telephone survey of Beninese aged 18 years or older. We used a marginal quota sampling method (n = 865) according to age, gender, and department. We constructed the questionnaire using a theoretical framework of health intention. We determined the factors associated with intention to vaccinate against COVID-19 in Benin using a multinomial logistic regression at the 5% significance level.

**Results**  
The intention to vaccinate was 64.7%; 10.9% of the population were hesitant, and 24.4% did not want to vaccinate. Thinking that it was important to get vaccinated (AOR = 0.274; CI = 0.118–0.638) or that getting vaccinated will help protect loved ones from the virus (AOR = 0.399; CI = 0.205–0.775) increased the intention to vaccinate. Having a high level of education (AOR = 1.988; CI = 1.134–3.484), thinking that the vaccine could put one’s health at risk (AOR = 2.259; CI = 1.114–4.578), and hearing something negative about the vaccine (AOR = 1.765; CI = 1.059–2.941) reduced intention to vaccinate. In addition, believing that the creators of the vaccine had ensured its safety (AOR = 0.209; CI = 0.101–0.430), and believing that it was unlikely to be infected after vaccination (AOR = 0.359; CI = 0.183–0.703) decreased hesitancy in favour of the intention to vaccinate.

**Conclusion**  
In April 2021, vaccine intention was high, but maintaining this high rate requires building confidence in the vaccine and combating misinformation about the vaccine.

**Title**: Major considerations in vaccinating children in Africa against COVID-19  
**Journal**: Vaccine  
**Publish Date**: December 2022
URL: https://doi.org/10.1016/j.jvacx.2022.100199

Abstract:
Africa has about 41% of its population below the age of 15. The continent also comprises mostly low and middle income countries. As the developed countries worldwide begin to vaccinate children against COVID-19, we highlight the prerequisites, necessities and consequences of vaccinating or failing to vaccinate children in Africa.

Title: COVID-19 vaccination in Africa: A case of unsatisfied expectation and ill-preparedness
Journal: Vaccine
Publish Date: December 2022
URL: https://doi.org/10.1016/j.jvacx.2022.100234

Abstract:
With a population of 1.3 billion people, of which 56% reside in rural settings, Africa seemed ill-prepared to handle the distribution of a COVID-19 vaccine. In addition, the capacity needed for a successful COVID-19 vaccination campaign in Africa surpassed the available resources in local and state health agencies. As a result, African governments were advised to coordinate resources, health officials, and vaccinators, including local health practitioners, medical technicians, and pharmacists for the largest-ever vaccination campaign in Africa. Although the rolling out of the SARS-COV-2 vaccine was, as expected, slow in many African countries, and not yet enough to cover the entire population in Africa, the mass vaccination campaign in Africa must continue to ensure that priority for vaccination is extended beyond front-liners (healthcare workers) and specific high-risk populations, which has largely been the case in some African countries. This article highlights the overarching areas that we believe need to be prioritized to enhance Africa’s effectiveness and coverage in the mass COVID-19 vaccination program.

Title: Acceptance of COVID-19 vaccine among healthcare workers in Africa, systematic review and meta-analysis
Journal: Public Health in Practice
Publish Date: November 23, 2022
URL: https://doi.org/10.1016/j.puhip.2022.100343

Abstract:
Objectives
This study is intended to assess healthcare workers’ acceptance of the COVID-19 vaccine in Africa.

Study design
Systematic review and meta-analysis.

Method
The search was done using: PubMed, HINARI and Web of Science, African OnLine, and other gray and online repositories of Universities in Africa. All included articles were extracted and appraised using the standard data extraction sheet format of JOANNA Briggs Institute. Cochran Q test and I2 statistics test were used to test the heterogeneity of the studies. A Funnel plot and Egger's test were used to detect the publication bias of included studies. A Forest plot was used to present the pooled prevalence acceptance of the COVID-19 vaccine.
Result
In this systematic review and meta-analysis thirteen cross-sectional studies and one nationwide survey with a total population of 23,739 were included. The pooled estimated prevalence of healthcare workers’ acceptance of the COVID-19 vaccine in Africa was 56.59 (95%CI; 46.26–66.92; I² = 99.6%, p = 0.000). Subgroup analysis was done using the regions in Africa, willingness to accept the COVID-19 vaccine was highest in the South African region accounting for 74.64 (95%CI; 44.16–105.11) followed by the North African region at 66.68 (95% CI; 50.74–82.62).

Conclusion
The overall acceptance of the COVID-19 vaccine among healthcare workers in Africa was low. Thus, further duties should be unwavering to improve the COVID-19 vaccine acceptance by healthcare workers, through consistent and committed efforts in improving political commitment, amending strategies, improving awareness, and disclosing information about the safety, side effects, and effectiveness of the COVID-19 vaccine.

Title: “I won’t be a guinea pig”: Rethinking public health communication and vaccine hesitancy in the context of COVID-19
Journal: Vaccine
Publish Date: November 26, 2022
URL: https://doi.org/10.1016/j.vaccine.2022.11.056
Abstract:
At the beginning of 2021, when Canada started distribution of COVID-19 vaccines, the unprecedented scope and severity of the pandemic led to very high levels of public awareness and attention, with Canadians actively seeking information. We argue that while there was continuous public health communication about COVID-19 and the newly available vaccines, these messages did not address the specific anxieties elicited by the novel vaccines, even as vaccination guidelines changed. Instead, public health messages about COVID-19 vaccines resembled those aimed at reducing vaccine hesitancy for routine immunization and did not sufficiently address the constant changes to COVID-19 vaccine recommendations. In a context of heightened public concern and significant public attention, it is crucial for communicators to acknowledge that hesitancy is vaccine-specific, and that novel diseases and new vaccines produce specific concerns. Long-term strategies should address the novelty of the technology and of the risk, thoroughly explain the reasons for shifting vaccination guidelines, and leverage trusted sources, such as community leaders. Further, as COVID-19 vaccines become less effective against some of the more recent variants of the virus, vaccine messaging needs to be tailored to evolve with shifting realities to not lose productive gains in the COVID-19 vaccination campaign to date.

Title: Persisting Vaccine Hesitancy in Africa: The Whys, Global Public Health Consequences and Ways-Out-COVID-19 Vaccination Acceptance Rates as Case-in-Point
Journal: Vaccines
Publish Date: November 15, 2022
URL: https://doi.org/10.3390/vaccines10111934
Abstract
Vaccine hesitancy (VH) is the seventh among the WHO's top 10 threats to global public health, which has continued to perpetuate the transmission of vaccine preventable
diseases (VPDs) in Africa. Consequently, this paper systematically reviewed COVID-19 vaccine acceptance rates (VARs)-including the vaccine uptake and vaccination intention-in Africa from 2020 to 2022, compared the rates within the five African regions and determined the context-specific causes of VH in Africa. Generally, COVID-19 VARs ranged from 21.0% to 97.9% and 8.2% to 92.0% with mean rates of 59.8 ± 3.8% and 58.0 ± 2.4% in 2021 and 2022, respectively. Southern and eastern African regions had the top two VARs of 83.5 ± 6.3% and 68.9 ± 6.6% in 2021, and 64.2 ± 4.6% and 61.2 ± 5.1% in 2022, respectively. Based on population types, healthcare workers had a marginal increase in their mean COVID-19 VARs from 55.5 ± 5.6% in 2021 to 60.8 ± 5.3% in 2022. In other populations, the mean VARs decreased from 62.7 ± 5.2% in 2021 to 54.5 ± 4% in 2022. As of 25 October 2022, Africa lags behind the world with only 24% full COVID-19 vaccinations compared to 84%, 79% and 63% reported, respectively, in the Australian continent, upper-middle-income countries and globally. Apart from the problems of confidence, complacency, convenience, communications and context, the context-specific factors driving COVID-19 VH in Africa are global COVID-19 vaccine inequality, lack of vaccine production/maintenance facilities, insecurity, high illiteracy level, endemic corruption, mistrust in some political leaders, the spreading of unconfirmed anti-vaccination rumors and political instability. With an overall mean COVID-19 acceptance rate of 58%, VH still subsists in Africa. The low VARs in Africa have detrimental global public health implications, as it could facilitate the emergence of immune invading SARS-CoV-2 variants of concern, which may spread globally. Consequently, there is a need to confront these challenges frontally and engage traditional and religious leaders in the fight against VH in Africa, to restore public trust in the safety and efficacy of vaccines generally. As the availability of COVID-19 vaccines improves, the vaccination of pets and zoo-animals from which reverse zoonotic transmission of SARS-CoV-2 have been reported is recommended, to limit the evolution and spread of new variants of concern and avert possible SARS-CoV-2 epizootic or panzootic diseases in susceptible animal species.

**D. COVID-19 PUBLIC PERCEPTIONS AND EFFECTS**

**Title:** Fear of contagion, emotional stress and coping strategies used by adults during the first wave of the COVID-19 pandemic in Nigeria  
**Journal:** BMC Psychiatry  
**Publish Date:** November 24, 2022  
**Abstract:**  
**Background**  
The COVID-19 pandemic has induced high levels of stress. The aim of the study was to assess the relationship between emotional stress (COVID-19 related fear, anger, frustration, and loneliness) and the use of coping strategies among adults in Nigeria during the COVID-19 pandemic.  
**Methods**  
Data from adults aged 18 years and above were collected through an online survey from July to December 2020. The dependent variables were COVID-19 related fear (fear of
infection and infecting others with COVID-19), anger, frustration, and loneliness. The independent variables were coping strategies (use of phones to communicate with family and others, video conferencing, indoor exercises, outdoor exercises, meditation/mindfulness practices, engaging in creative activities, learning a new skill, following media coverage related to COVID-19) and alcohol consumption. Five logistic regression models were developed to identify the factors associated with each dependent variables. All models were adjusted for sociodemographic variables (age, sex at birth, and the highest level of education).

**Results**
Respondents who consumed alcohol, followed media coverage for COVID-19 related information, and who spoke with friends or family on the phone had higher odds of having fear of contracting COVID-19 or transmitting infection to others, and of feeling angry, frustrated, or lonely ($p<0.05$). Respondents who exercised outdoors (AOR: 0.69) or learned a new skill (AOR: 0.79) had significantly lower odds of having fear of contracting COVID-19. Respondents who practiced meditation or mindfulness (AOR: 1.47) had significantly higher odds of feeling angry. Those who spoke with friends and family on the phone (AOR: 1.32) and exercised indoors (AOR: 1.23) had significantly higher odds of feeling frustrated. Those who did video conferencing (AOR: 1.41), exercised outdoors (AOR: 1.32) and engaged with creative activities (AOR: 1.25) had higher odds of feeling lonely.

**Conclusion**
Despite the significant association between emotional stress and use of coping strategies among adults in Nigeria during the COVID-19 pandemic, it appears that coping strategies were used to ameliorate rather than prevent emotional stress. Learning new skills and exercising outdoors were used to ameliorate the fear of contracting COVID-19 in older respondents.

**E. COVID-19 EFFECTS ON OTHER DISEASES AND SECTORS**

**Title:** Online teaching and learning: Experiences of students in a nursing college during the onset of COVID-19  
**Journal:** Curationis  
**Publish Date:** 22 November 2022  
**URL:** https://doi.org/10.4102/curationis.v45i1.2372  
**Abstract:**  
**Background:** The world has entered the Fourth Industrial Revolution. Utilisation of technology is inevitable. For the past years, the coronavirus disease 2019 (COVID-19) pandemic has halted normal operations, including in the physical classroom for nursing students. Students and facilitators had to move to a remote way of teaching and learning, utilising online teaching and learning. However, students and facilitators were not ready to use online teaching and learning. This not only resulted in numerous challenges, but also became an eye-opener for best practices and intervening strategies.  
**Objectives:** To explore and describe experiences of students in a nursing college with regard to online teaching and learning during the onset of the COVID-19 pandemic.
Method: A qualitative, exploratory, descriptive and contextual research design was adopted. A purposive, nonprobability sampling approach was used to select participants from second year, third year and fourth year. First-year student nurses were excluded because they did not commence with classrooms at that time.

Results: Seven themes emerged, namely knowledge, confidence, training, equipment, clinical exposure, course extension and flexibility, and all themes had subthemes.

Conclusion: It is evident that students had more negative experiences during online teaching and learning than positive experiences.

Contribution: The study contributed enormously to teaching and learning of student nurses in nursing colleges as its results can be used to improve nursing colleges with regard to online teaching and learning.

Title: Epilepsy care delivery during COVID-19 in resource-limited countries: A survey in collaboration with International Epilepsy Equity Group

Journal: Epilepsy & Behavior

Publish Date: January 2023

URL: https://doi.org/10.1016/j.yebeh.2022.108998

Abstract:

Background
The impact of pandemic has had worse effects in countries with already stretched healthcare resources. The study aimed to explore changes in epilepsy care delivery in resource-limited countries during and since the acute phase of the COVID-19 pandemic.

Method
A cross-sectional survey was conducted in 22 countries among healthcare providers (HCPs) caring for persons with epilepsy (PWE), in collaboration with newly formed global collaborators, the International Epilepsy Equity Group. Findings were compared based on the World Bank Ranking (WBR) and HCPs’ practice type. Data were analyzed using Chi-square tests ($\alpha = 0.05$) and pairwise multiple comparisons with $\alpha = 0.017$ (Bonferroni adjustment). Open-ended responses were analyzed using thematic analysis.

Findings
A total of 241 HCPs participated in the study. Of these, 8.30%, 65.98%, and 21.99% were from high-income (HIC), upper-middle-income (UMIC), and lower-middle-income countries (LMICs), respectively. Among HCPs, 31.12% were adult specialists, and 43.98% were pediatric specialists. During the acute phase of the pandemic, HCPs reported that the major barrier for PWE was difficulty reaching physicians/healthcare providers. Except for difficulty reaching physicians/healthcare providers (WBR: $P = 0.01$ HIC < LMIC), no other significant differences in barriers during the acute phase were observed. Since the acute phase of the pandemic, the major concern for PWE was fear of getting infected with the SARS-CoV-2 virus. Significant differences in concerns since the acute phase included lockdowns (WBR: $P = 0.03$ UMIC < LMIC), fiscal difficulties (WBR: $P < 0.001$ UMICs < LMICs, UMICs < HIC; practice type: $P = 0.006$ adult < others, pediatrics < others), clinic closure (WBR: $P = 0.003$ UMIC < HIC; practice type: $P = 0.001$ adult < others, pediatric < others), and long waiting times (WBR: $P = 0.005$, LMIC < UMIC, LMIC < HIC; practice type: $P = 0.006$ pediatric < adults). Diagnostic services, including EEG, MRI, CT (practice type: $P < 0.001$, adult < others; pediatric < others), and lab work (WBR: $P = 0.01$ UMIC < HIC), were restricted. The
telephone was the most reported teleconsultation method used. Except for SMS/texting (WBR \( P = 0.02 \) UMIC < LMIC), there were no significant differences in teleconsultation methods used.

**Discussion**

There is a high probability that the initial wave and consequent reduction of in-person care, restriction of health services, and fiscal difficulties affecting all involved in care delivery, led to the disruption of epilepsy care. Additional support are needed in resource-limited countries to cope with future pandemics.
Aim: To examine the higher education landscape in Africa, discuss the disruptions to education caused by the COVID-19 pandemic outbreak, the key educational processes affected, and strategies to mitigate the situation.

Main concepts covered: Responses to the COVID-19 pandemic and their effect on HEIs; impact on core missions of universities; and the inequalities within faculty and student demographics.

Conclusion/outlook: The article has contributed to the discussion, by recording how the various stakeholders within higher education responded to the pandemic and highlighting the real and estimated effects on higher education institutions, consequences and lessons of the responses.

Title: Uses of technology in navigating the pandemic: the case of African higher education
Publish Date: November 24, 2022
URL: https://doi.org/10.1016/B978-0-12-818630-5.02097-2

Abstract:
This chapter provides an analysis of selected African higher education systems and how they navigated the pandemic with the use of technology. Using the case studies of Egypt, South Africa, Nigeria and Kenya, the chapter highlights several challenges some African higher education systems had in navigating the pandemic. Whereas there are countries that managed to make a successful transition to online learning, there were some that could not make this transition with resultant loss of the academic year. This chapter further reflects on the implications of this pandemic for future plans by African higher education systems and the rest of the globe to mitigate the effects of pandemics. The United Nation's sustainable development goals (SDGs) are proposed as possible development framework to better prepare for future pandemics.

Title: A multi-country study on the impact of sex and age on oral features of COVID-19 infection in adolescents and young adults
Journal: BMC Oral Health
Publish Date: November 19, 2022

Abstract:
Background
Oral diseases are features of COVID-19 infection. There is, however, little known about oral diseases associated with COVID-19 in adolescents and young adults (AYA). Therefore, the aim of this study was to assess oral lesions' association with COVID-19 infection in AYA; and to identify if sex and age will modify these associations.

Methodology
Data was collected for this cross-sectional study between August 2020 and January 2021 from 11-to-23 years old participants in 43-countries using an electronic validated questionnaire developed in five languages. Data collected included information on the dependent variables (the presence of oral conditions- gingival inflammation, dry mouth, change in taste and oral ulcers), independent variable (COVID-19 infection) and
confounders (age, sex, history of medical problems and parents’ educational level). Multilevel binary logistic regression was used for analysis.

**Results**
Complete data were available for 7164 AYA, with 7.5% reporting a history of COVID-19 infection. A significantly higher percentage of participants with a history of COVID-19 infection than those without COVID-19 infection reported having dry mouth (10.6% vs 7.3%, AOR = 1.31) and taste changes (11.1% vs 2.7%, AOR = 4.11). There was a significant effect modification in the association between COVID-19 infection and the presence of dry mouth and change in taste by age and sex (P = 0.02 and < 0.001).

**Conclusion**
COVID-19 infection was associated with dry mouth and change in taste among AYA and the strength of this association differed by age and sex. These oral conditions may help serve as an index for suspicion of COVID-19 infection in AYA.