African Union

AFRICA CDC
Centres for Disease Control and Prevention
Safeguarding Africa's Health

World Health Organization

The African Academy of Sciences

Policy Paper:

Research and Development Priorities for COVID-19 in Africa

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February 2021

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1. Introduction

On 11 March 2020, the World Health Organisation (WHO) declared the outbreak of a new type of Coronavirus, SARS-CoV-2, that causes COVID-19 respiratory disease, a global pandemic. The outbreak has devastated parts of Asia, Europe, and the United States of America with the world reporting more that one million deaths by 26 September 2020. Emerging data from Africa shows remarkably low numbers of reported COVID-19 deaths despite high levels of disease transmission with the projected trend of the pandemic remaining unknown. However, the long term impacts of the pandemic on health and development are likely to be major not just to African countries but to the world. Research and development investments, therefore need to be focused, timely, and unique to various geographies.

Improving our response to the ongoing COVID-19 pandemic in Africa requires regularly updated information, constant innovation, and considerable support towards research and development (R&D) for priorities that respond to the African realities. Shaping the research agenda and stimulating the generation, translation, and dissemination of valuable knowledge is one of the core functions of the African Academy of Sciences (AAS), African Centre for Disease Control (Africa CDC), and WHO-AFRO. We need answers to a list of critical research questions that respond to the current realities on the African continent to guide the COVID-19 outbreak control efforts.

2. Research Priorities from the Perspective of African Researchers

The AAS, together with various partners including AUDA-NEPAD, conducted a series of priority setting engagements for R&D for COVID-19 with over 1400 African scientists contributing to a consolidated list of priorities. This qualitative and quantitative exercise started with a webinar attended by over 275 scientists on 26 March 2020. They built on the original WHO/GLOPID-R research roadmap with emphasis on the needs of the African continent. The webinar was followed by two surveys, in April and June 2020, with over 1,400 scientists and practitioners participating with 80% of whom self-identified as working on the continent. See the results of the second survey found here: AAS TGHN UKCDR AUDA NEPAD R&D goals for COVID-19 in Africa. The Science Standards and Regulatory Technical Working Group of the Africa Task Force for Coronavirus (AFTCOR) in collaboration with experts from other organizations discussed the shortlisted priorities identifying six key priority areas where in-depth scientific knowledge is needed for Africa to be ahead of the outbreak. These are listed below:

- Transmission dynamics of COVID-19, epidemiology and surveillance
- Diagnostics
- Clinical characterization of cases
- Drug and vaccine clinical trials
- Modelling impact of COVID-19 on the health systems
- Social science and policy research

The research priority areas identified through the surveys are broad and had the potential to pose a challenge to limited resources towards R&D for COVID-19 during these difficult times. The TWG, therefore instituted further work on the list of priorities with a view of creating actionable policy items that it will forward to member states, continental bodies, and other funders for investment or promoting the proposed interventions to ensure response needs are addressed. The TWG convened experts in the above six areas to consider the identified priorities and propose a limited number of actionable policy statements. The TWG received recommendations from experts from African research and training institutes, frontline COVID-19 practitioners, and policy experts.

3. Actionable Policy Items

The Africa CDC/WHO-AFRO/AAS-AESA held expert consultative meetings with advice received from over 60 experts. See the participation list in **Appendix 1.**

The summary of the recommendation can be found in Box 1.

R&D category: transmission dynamics, epidemiology and surveillance	
Priority questions/initiatives	**Supporting comments**
Priority 1 What is the population-based seroprevalence of COVID-19 in multi-country studies (or regional studies) to determine dynamics of COVID-19 transmission?	It is important that we undertake large scale population-based studies that will provide us the opportunities to establish the transmission dynamics of the disease. The primary objectives of seroprevalence studies are: 1. To measure the prevalence of antibodies to SARS-CoV-2 in the general population by specified demographic characteristics (age, sex, co-morbidities profiles, health workers, co-morbidities, etc.); and 2. To estimate the fraction of asymptomatic, pre-symptomatic, or subclinical infections in the overall population.
Priority 2 Population studies on asymptomatic subjects: 1. What is the status of herd immunity in Africa? 2. What is the extent of cross protection from other coronavirus?	With a high percentage of asymptomatic subjects that have been reported in Africa, we need to understand: 1. Role of asymptomatic cases in the transmission of the COVID-19; and 2. Explore the role of circulating common coronaviruses in protection against COVID-19 and cross-immunity with SARS-Cov-2.
Priority 3 How do we improve surveillance and outbreak investigations?	Limited research has been done in elucidating the relative risk of transmission in different settings, therefore we need to: 1. Track the impact of school reopening on COVID-19 transmission and other possible high risk settings; and 2. Develop new and innovative methods/ techniques for an effective response. 3. Establish national and continent-wide genomic sequencing capaciity to detect the emergence of new variants.

R&D category: diagnostics	
Priority questions/initiatives	**Supporting comments**
Priority 1 Develop, validate, and scale up simple, affordable, and reliable rapid antigen tests for COVID-19 diagnosis in resource-limited settings in Africa.	Improve testing capacity to identify active infections and facilitate contact tracing in resource-limited conditions. Important considerations will include: 1. Ideally, the readouts should be lateral flow tests. 2. There is a need to combine high specificity (close to 100 % to avoid false positives) and sensitivity; the latter will depend on the stage of disease, timing after exposure, timing after onset of symptoms. 3. Is there concordance between the results of antigen detection and RNA detection? 4. Are there SARS-CoV2 antigens that persist after viral clearance leading to false positives? 5. Saliva sampling is noninvasive and less risky because it can be “self-collected;” saliva provides more consistent RT-PCR results than nasopharyngeal samples. 6. The performance of blood samples relative to saliva and nasopharyngeal samples needs to be assessed. 7. There is the need to consider the potential impact of mutations or genetic polymorphism in target antigens (e.g. D614G mutation in the S1 domain) on the performance of diagnostics. 8. Identify SARS-CoV2 antigens whose detection correspond to distinct disease stages (early versus late versus convalescent, etc.). 9. Can a semi-quantitative antigen detection assay (e.g. intensity of the test line in LFA) predict viral load, disease progression, and viral clearance?

Priority 2

1. Establish large scale standardised surveillance.
2. Develop, validate, and scale up rapid simple, affordable, and reliable COVID-19 antibody tests for use under resource-limited settings in Africa.

Improve antibody testing capacity to identify individuals with asymptomatic infections and improve estimates of the prevalence of infections using LFA and ELISA for blood, saliva, and dried blood spots. Importance of this is for:

1. determination of seroprevalence and level of population immunity,
2. screening convalescent sera for neutralizing antibodies,
3. assessing immunogenicity in vaccine trials,
4. prediction of protection against reinfections,
5. correlation with pseudovirus neutralizing antibody titres,
6. studies of immune correlates of protection or antibody, dependent enhancement, and
7. disease staging.

Also take the following into consideration:

- Persistence (duration of seroconversion) and decay of antibodies (disappearance of antibodies) will affect the sensitivity of the test; persistence and decay different for different isotypes.
- Determine the timing of seroreversion (disappearance of antibodies) with respect to the time after onset of symptoms.
- Type of antigen target will determine the purpose of the antibody test: NP for seroprevalence, S1 and S1 RBD for neutralizing antibodies and prediction of reinfection.
- Combining IgA, IgM, and IgG antibodies to improve sensitivity.
- Staging of the disease (e.g., recent infections versus long duration after exposure).
- Aim at 100 % specificity (close to 100 % to avoid false positives).
- No cross-reactivity with other HCoV (HKU1, 229E, OC43, NL63)
- Sensitivity will depend on the time of testing (stage of disease, timing after exposure, timing after onset of symptoms), viral antigen epitope used, and antibody isotype detected.

Priority 3 Develop and validate simple affordable rapid point of care COVID-19 diagnostics for early identification of patients likely to progress to severe disease so that they are properly managed from the outset.	• Simple bedside or admission tests which improve survival of patients in ICU. These tests are to include LFA, automatic analyzers, LC-MS, algorithms (Artificial Intelligence). • Blood tests are to focus on the following: ❖ Identifying immune and metabolomic markers of disease severity or progression in patients in different geographic regions of Africa. ❖ Determining the performance of combinations of these markers in different African settings in improving patient management.
R&D category: clinical characterization of cases	
Priority questions/initiatives	**Supporting comments**
Priority 1 What kind of systems need to be developed to allow collection of clinical data for COVID-19 to be incorporated into routine clinical care/health service delivery?	• Especially in the absence of laboratory services in peripheral facilities, patients will need to be identified in a timely fashion for clinical data collection at various levels, including at home (home-based care). • An example of a system that could be developed would be deploying an affordable rapid antigen-based test (validated by AfCDC or WHO AFRO) within national health systems. This test would be applied to all persons presenting for any reason at health facilities. • Apart from the immediate benefits of identification and treatment of SARS-CoV-2 infected persons, over time a significant database would evolve to offer a less biased source of information towards the clinical characterization of SARS-CoV-2 infection.
Priority 2 How can existing tools for COVID-19 clinical data collection best be optimized and harmonized to allow for sharing, comparability, and meta-analysis?	• This is critical for avoiding fragmentation of clinical data collection in-country and to continually inform treatment policy and guidelines in-country and regionally. • Also needed for comparing data within Africa and also with data from other parts of the world.

Priority 3 What role can decision science play in: 1. the clinical characterisation and management of persons infected with SARS-CoV-2 (asymptomatic, mild, moderate, severe, with co-morbidities, etc.); 2. determining both short- and long-term effects of SARS-CoV-2 infection; and 3. considerations of potential antiviral agents and therapeutics and their side effects and impact on disease control?	• Considerations for special populations (children, pregnant women, health workers, etc.). • Develop clinical management protocols that could be used to guide COVID-19 clinical management in primary and secondary health care facilities. • Develop short- and long-term protocols/ guidelines to follow-up COVID-19 related sequalae. • Assess the safety and immunogenicity of new COVID-19 therapeutics. • Considerations for co-morbidities including but not limited to HIV, malaria, TB, diabetes, hypertension, obesity, COPD which may affect clinical presentation, disease severity, and response to treatment. • Considerations for existing seasonal variations in incidence of endemic diseases like malaria.
R&D category: drug and vaccine clinical trials	
Priority questions/initiatives	**Supporting comments**
Priority 1 Develop a coordination mechanism for a Pan-African clinical trials platform.	• The aim is: 1. To establish a coordinating mechanism that breaks down barriers to south-south cooperation in order to facilitate design, planning, and implementation for large scale clinical trials for COVID-19 across all age groups and the most vulnerable populations on the African continent. 2. To map out the existing clinical trials platforms that can be leveraged at short notice to execute large trials. • This coordination mechanism will facilitate/ support studies evaluating key research questions aimed at the establishment of: 1. COVID-19 drug feasibility, safety and efficacy in Africa, for repurposed drugs, novel drugs and monoclonal antibodies, for all stages of the disease, including herbal remedies

	1. COVID-19 vaccine feasibility, safety and efficacy in Africa. This coordination should also aim at sharing rare capacities such as biobanks and centres specialised in techniques like genomics.
Priority 2 Establish large scale observational data plaftorms.	The aim is to capture practice and rapidly identify outcomes and potential problems in the treatment of COVID-19 to answer the following research questions: 1. What are the current practices, outcomes, and obstacles to health facility-based treatment of COVID-19? 2. What are the current practices, outcomes, and obstacles to community-based treatment of COVID-19? 3. What are the current of side effects of medicines and vaccines used for COVID-19 prevention and traetment
R&D category: modelling impact of COVID-19 on health systems	
Priority questions/initiatives	**Supporting comments**
Priority 1 Establish channels to enhance data availability, accessibility, and sharing.	• Establish information flow between the Ministry of Health, governmental agencies, and institutional partners; • Data clean up to ensure its reliability and accuracy; and • Set up data security and protections.
Priority 2 Epidemiological modelling of the direct and indirect effects of COVID-19.	Direct effects: • Tracking the virus transmission dynamics within the population; • Measuring the impact of mitigation measures and forecasting scenarios over the near and far future; and • Guiding policy makers in data-based decision making.

	Indirect effects: • Measuring impact of the pandemic on the overall health system, including indirect effects on maternal and child health, other communicable diseases such as HIV, TB, malaria, impact on vaccination programs (e.g. polio vaccination), etc.; and • Guide decision makers on balancing the risk of COVID-19 while maintaining other health services.
Priority 3 Establish an institutional framework for epidemiologic modelling in Africa to harmonize scientific output and the sharing of best practices across the continent.	• Consortium of institutions that together make up multidisciplinary modelling research groups; • Consortium could fall under the guidance of the Africa CDC; • A harmonized ecosystem for data sharing and modelling would allow peer review to check each other's inputs, outputs, and assumptions; and • The consortium should outlast the ongoing COVID-19 pandemic with the capacity to mobilize and respond to future public health emergencies.
R&D Category: Social Science and Policy Research	
Priority questions/initiatives	**Supporting comments**
Priority 1 What are the short- and long-term impacts of COVID -19 in Africa?	• Comparative analysis of ICGLR Member States government strategies and responses to curb COVID-19. • What are the long-term impacts of different government responses in terms of the pandemic and economic crisis? • Impact of government measures to curb the spread of COVID-19 on human rights, democracy, and governance. • What is the impact of COVID-19 on populations in special settings (informal settlements, IDP/ refugee settlements, rural and urban, gender considerations, and others)? • What are the gendered impacts of COVID-19? • Post COVID-19 policy shift. • What are the environmental impacts of COVID-19?

Priority 2 The socioeconomic, cultural, and contextual factors that impact on adherence to COVID-19 Public Health initiatives.	• The socioeconomic, cultural, and contextual factors that impact on adherence to COVID-19 Public Health initiatives.
Priority 3 What are effective communication and community engagement interventions for COVID-19 prevention and response?	• What are the public's perceptions of COVID-19 vaccine efficacy? • What is the current COVID-19 vaccine acceptability level? • How can community trust in public health be enhanced (especially in the context of widespread misinformation and disinformation)? ❖ What are effective ways of forming strong partnerships with communities to build trust, ownership, and participation during disease outbreaks response? ❖ What is the contribution of local leaders to COVID-19 pandemic response? ❖ What are community perceptions of COVID-19? • The role of communities in COVID-19 response. • COVID-19 and Cross-border dynamics. • What is the community feedback telling us about COVID-19? • Fear mongering and COVID-19. • Impact of initial government measures on long-term compliance and adherence to prevention behaviors.

4. Conclusion

STISA 2024 clearly states that "the AU and its Member States must prioritise establishing greater coordination both among health stakeholders as well as with other related sectors contributing to the development of science and technology and building governance structures to promote ethics and research integrity, thus increasing public trust in research." The Africa CDC/WHO-AFRO/AAS-AESA are proposing in this document research and development priorities in Africa for the COVID-19 pandemic. These research and development priorities are developed using rigorous methods and validated by experts living and working on the African continent. They represent the professional views of the continent's experts and propose critical focus areas.

The priorities in this document are not meant to be static. The outbreak is quickly evolving in a dynamic chaotic environment that requires realtime principle-based activity. We believe that the list provides an adequate starting point for action. It should be a living document that is constantly primed and updated as we achieve access to the deliverables that are relevant for patients needs and public health.

We call upon the Member States, national and pan-continental bodies, and funders to support the implementation of these R&D priorities.

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