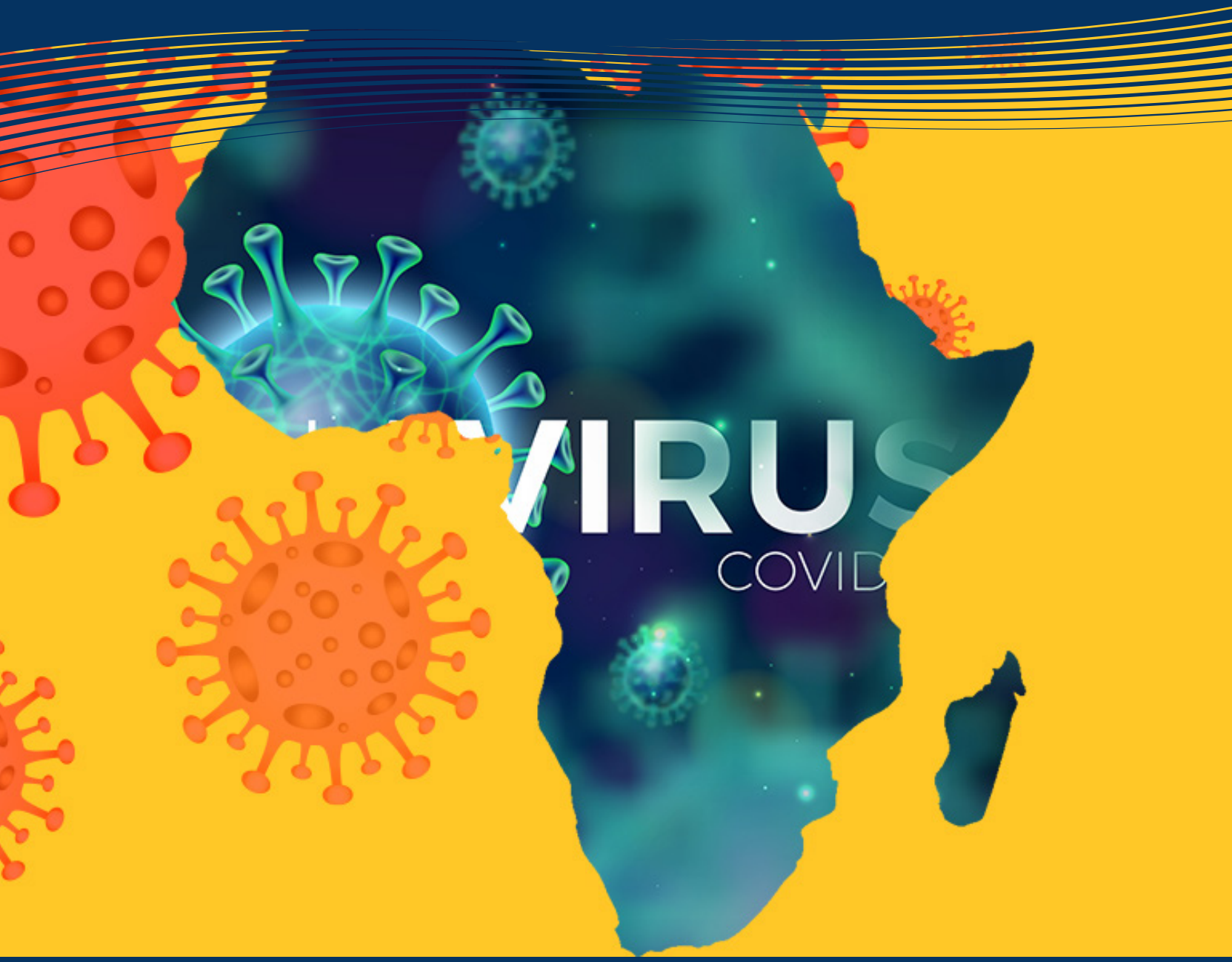
The African Academy of Sciences



Research and Development goals for COVID-19 in Africa

The African Academy of Sciences Priority Setting Exercise

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Introduction

On 11th 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. *By the morning[1] of 24th April 2020, 52 countries in Africa had officially reported cases with a total of >23,500 confirmed cases, >1,100 deaths, and >5800 full recoveries.* The epicentre of the epidemic has shifted from Asia to Europe and has been accompanied by an increase in reported cases in Africa. African scientists need to be adequately prepared to inform interventions to prevent and mitigate the possible impacts of this pandemic on the continent.

In Africa, the initiatives against this disease are spearheaded by the Africa CDC, African Union, and the WHO. The Africa Centres for Disease Control and Prevention (Africa CDC) has established the Africa Task Force for Novel Coronavirus (AFCOR), to oversee preparedness and response to the global epidemic of the 2019 Novel Coronavirus (2019-nCoV) disease. The African Academy of Sciences supports these organizations in delivering their mandate.

The African Academy of Sciences recognizes the speed and urgency that is required to build a scientific body of knowledge required to inform current outbreak mitigation policies. Bearing in mind the limited time and resources available, the AAS must develop a credible research and development advisory that informs a coherent response backed by robust priorities for the continent to be ahead of the Covid-19 pandemic.

The AAS utilized open source methods and scientific community engagement to capture the ideas of thought leaders and experts on the continent. Using the World Health Organization – Global Research Collaboration for Infectious Disease Preparedness and Response (GLOPID-R) report as a base, (see the link to the report here - https://www.glopid-r.org/wp-content/uploads/2020/03/who-2019-novel-coronavirus-global-research-roadmap.pdf) we held a consultative webinar followed by open receipt of ideas through a survey from African scientists.

This document provides a summary of the primary priorities identified from the webinar attended by **275 scientists** including their comments and emails and the scoring of these from **844 respondants during a subsequent survey** and proposes a prioritization list for research and development for the Covid-19 outbreak in Africa.

1. https://coronavirus.jhu.edu/map.html

Methodology

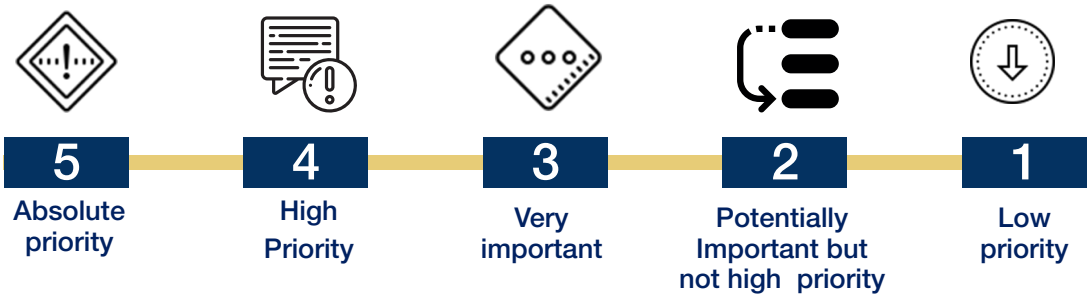
The survey was forwarded to all registered attendees from the Webinar of March 26 and to all grantees of the AAS, In addition it was widely publicized though social media.

Data on the characteristics of the respondents are presented in Appendix A. The survey instrument was arranged under the same nine headings of the WHO Roadmap and included 41 priorities from the roadmap (sometimes slightly modified to be more concise) and a further 17 priorities which arose from the webinar and subsequent correspondence with participants and which were felt to be sufficiently distinct from those in the WHO road map. In addition, respondents were invited to submit free text suggestions for additional priorities.

The survey was launched on April 4th 2020 and closed at 1700 hrs East African time on April 8th

Respondents were presented with the following request:

Please rank the following suggestions for a Covid 19 research agenda according to your view of their priority for Africa. All the suggestions may be important but not all can be supported to the same degree. For each question (some of which may overlap) please rank your view of their priority for funding as follows:



Results

Eight Hundred and forty four (844) researchers completed the survey. The characteristics of the respondents are given in Appendix A. in brief, 57% were male, 69% fell in the age range 30-49 and 61 % were at career stage of postdoctoral researcher or reseach leader. Seventy nine percent were based in an African institution and a further 12% were at an institution outside Africa but currently working in Africa. There were a wide range of disciplines represented (Biomedical sciences 32%, Clinical and epidemiological 25%, Social sciences 17%, policy making and management sciences 8% and 19% other disciplines). 36% percent of the respondents self-described as having an expert professional interest in infectious diseases, and 53% as having a general professional interest.

Analysis

There were two types of analysis conducted and used to assess the priorities;

1. A quantitative analysis where the participants scored the priorities between 1-5 (lowest to highest).
2. A qualitative analysis of the comments (free text) with the emerging themes summarized in in Section 6 below

For the quantitative analysis we ranked the suggested priorities in order of the percentage of participants who gave a score of either five (absolute priority for funding) or four (High Priority for funding). We conducted separate analyses for three different groups (All respondents, Infectious disease experts, and post-doctoral researcher/ reseach leaders- For the latter two groups we also specifically examined the responses of those based in African institutions). However, perhaps surprisingly, there was remarkable consistency, with no significant differences for any group on any question. We also ran the analysis using only those who scored a priority as five (Absolute priority for funding) but although the absolute percentages were obviously lower in each case, there as again no difference in rank order or apparent relative importance for any question.

Given the consistency of findings and for simplicity, the summary results are presented for all 844 participants as a single group in terms of those who scored either four or five for any question.

The free text suggestions derived from the survey were grouped by themes and retained if they were felt to be sufficiently distinct from the priorities included in the main survey. Because they derive from variable numbers of individual suggestions and have not been assessed by a larger group in a standardised way they cannot be presented within the main analysis. We are currently undertaking further assessment and this report will be updated accordingly but for now they are presented as a supplementary list of possible additional priorities in section 6.

Themes emerging from the analysis

The main aim of the process we undertook was to examine support by African researchers for the priorities in the WHO Roadmap and to identify potential additional Africa priorities for Covid-19 research on the continent. The main value of the exercise is in the summary figures presented below. However a few emerging points may be noted.

- There was a very high response to the survey and the results were remarkably consistent between all sub groups analyses. The results therefore provide a reliable indication of priorities for Covid research as seen by a broad spectrum of researchers in Africa.

- Generally the WHO Road map broad groupings of priorities were supported by respondents, though as might be expected some areas were seen as relatively less important. For example, animal and human research on virus origins and management measures at the human – animal interface were ranked as absolutely or high priority by 61% of respondents as compared with 85% for Infection prevention and control.

- The exercise generated 17 potential additional Africa specific priorities which were incorporated into the survey and an additional 15 which remain to be formally assessed (section 6).

- Of the additional priorities, some may be seen as refinements of existing priorities-(for instance performing rapid cross sectional surveys using a standardized sampling framework may be seen as adding specificity to the general priority of describing covid-19 transmission dynamics.

- Other additional priorities are genuinely new and distinct- for instance developing protocols for the management of severe disease in the absence of intensive care facilities or examining optimal ways of communicating about potential interventions in high-density low socioeconomic status urban settings.

- It is not surprising that in an unprecedented emergency many of the suggestions were considered of absolute or high priory and further work will be needed to contextualize some of the results, for instance around which are short and medium term as opposed to longer tem priorities. It would be a mistake to over interpret exact percentages, rather it is hoped that these data provide additional guidance for policy makes and funders to those provided by the WHO Road Map.

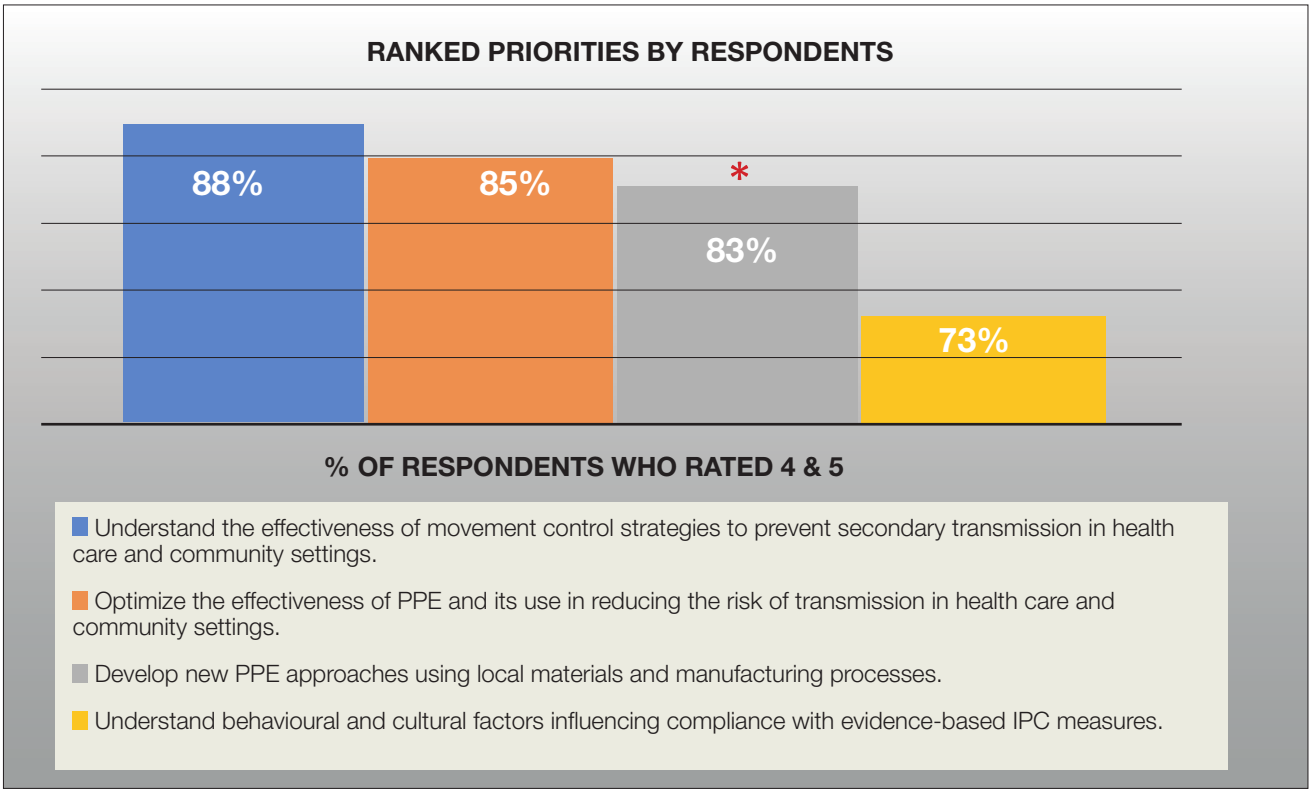
- There is a possibility that these priorities will change as African scientists build their experience with the virus, its infection pattern and pathogenesis, and its effects on the fabric of society on the basis of new and emerging validated interventions.

The proportion of respondents who scored Priorities as Absolute or Very High

The proportion of all respondents rating any suggested research question as an absolute or high priority for funding are shown under the headings provided by the WHO Road Map , in the order that they appear in the WHO report.

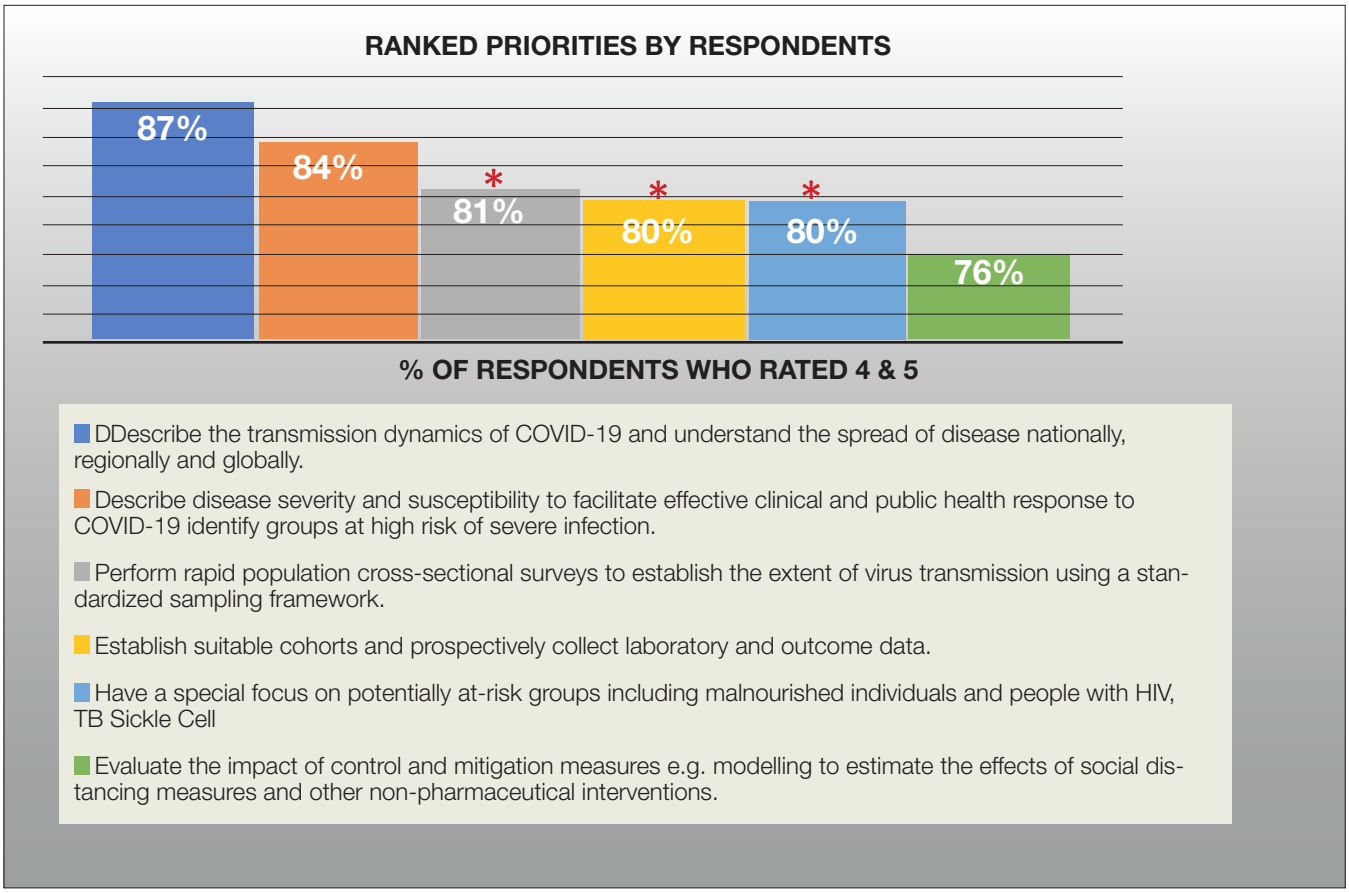
In each table the newly suggested priorities from the Africa research community are shown in Green. Within each bar graph the same priorities have a red star indicating how the African scientists scored them against other global priorities.

1. Infection prevention and control including health care workers' protection



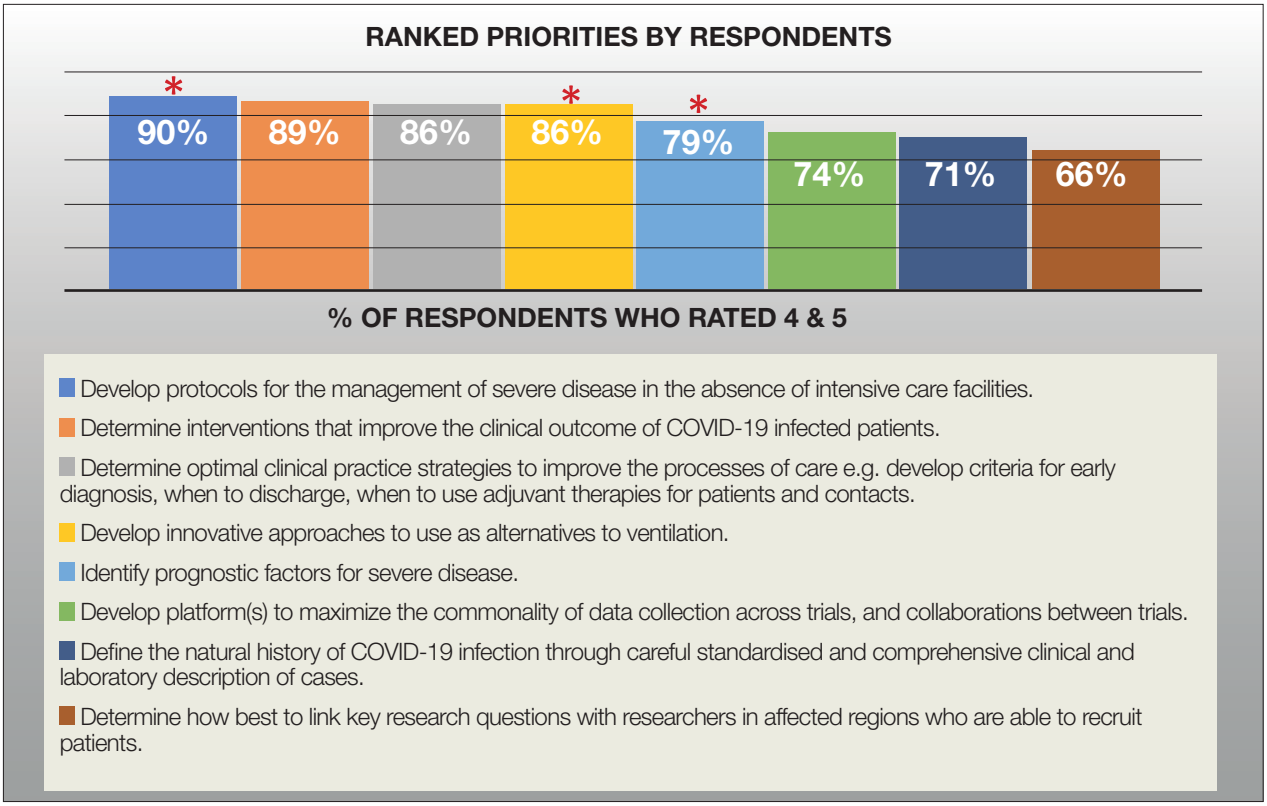
Question	% of Respondents who rated 4&5
Understand the effectiveness of movement control strategies to prevent secondary transmission in health care and community settings.	88%
Optimize the effectiveness of PPE and its use in reducing the risk of transmission in health care and community settings.	85%
Develop new PPE approaches using local materials and manufacturing processes.	83%
Understand behavioural and cultural factors influencing compliance with evidence-based IPC measures.	73%

2. Epidemiological studies



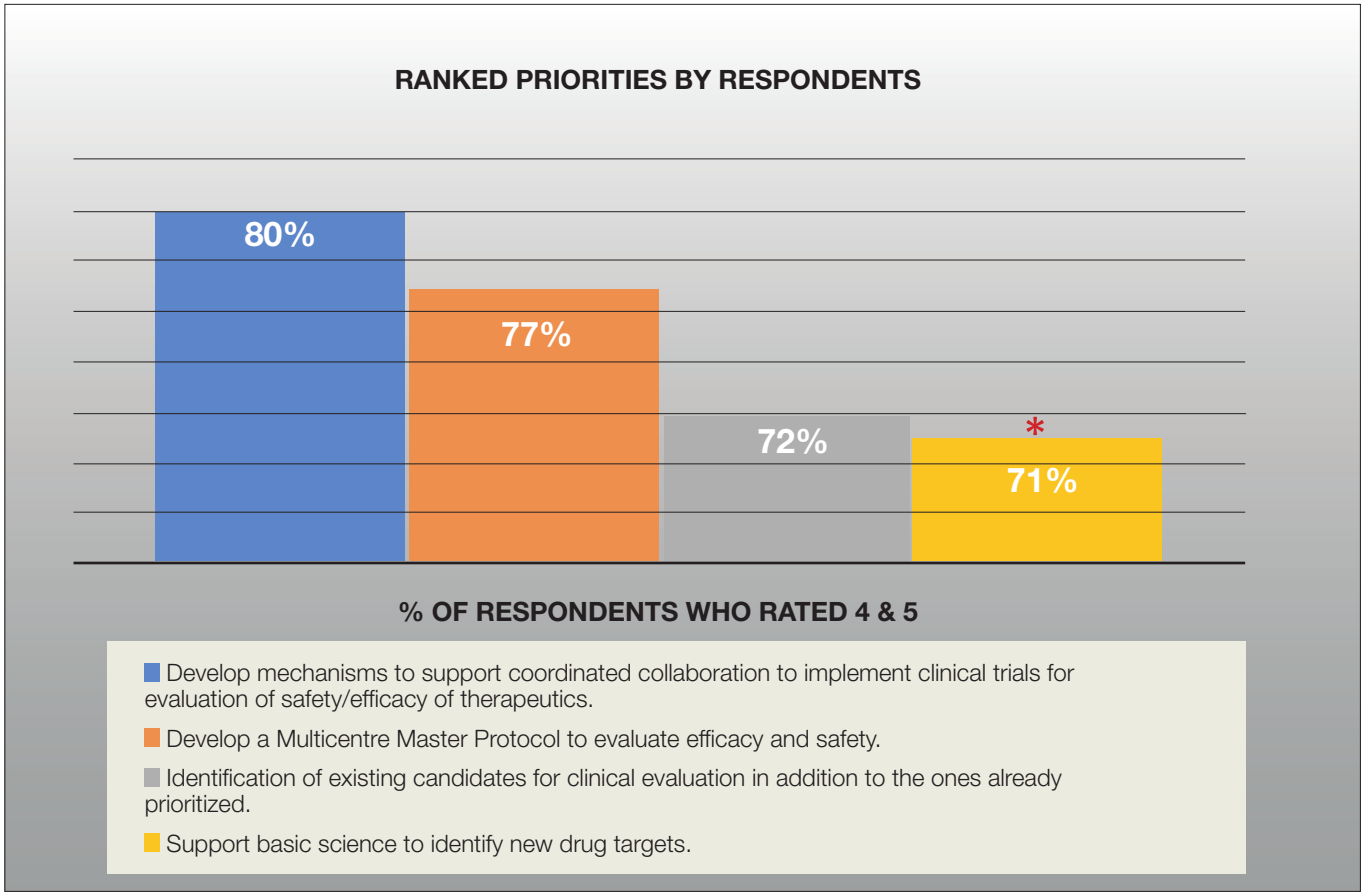
Question	% of Respondents who rated 4&5
Describe the transmission dynamics of COVID-19 and understand the spread of disease nationally, regionally and globally.	87%
Describe disease severity and susceptibility to facilitate effective clinical and public health response to COVID-19 identify groups at high risk of severe infection.	84%
Perform rapid population cross-sectional surveys to establish the extent of virus transmission using a standardized sampling framework.	81%
Establish suitable cohorts and prospectively collect laboratory and outcome data.	80%
Have a special focus on potentially at-risk groups including malnourished individuals and people with HIV, TB Sickle Cell	80%
Evaluate the impact of control and mitigation measures e.g. modelling to estimate the effects of social distancing measures and other non-pharmaceutical interventions.	76%

3. Clinical management



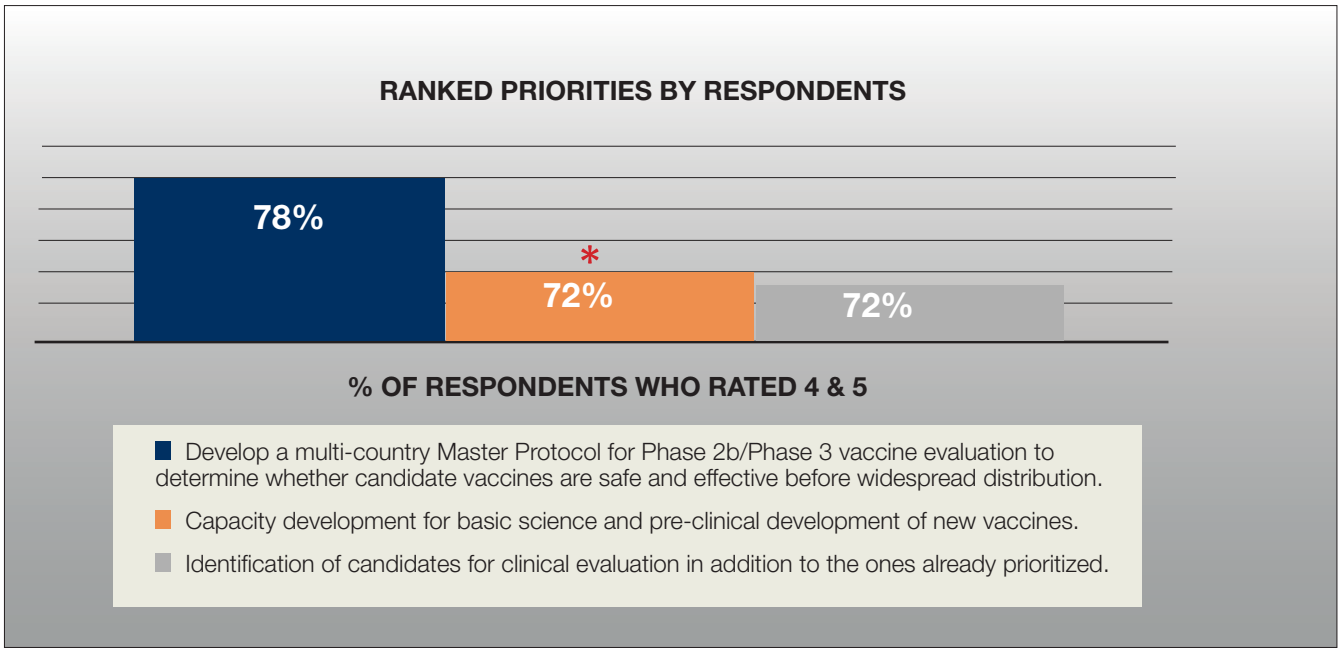
Question	% of Respondents who rated 4&5
Develop protocols for the management of severe disease in the absence of intensive care facilities.	90%
Determine interventions that improve the clinical outcome of COVID-19 infected patients.	89%
Determine optimal clinical practice strategies to improve the processes of care e.g. develop criteria for early diagnosis, when to discharge, when to use adjuvant therapies for patients and contacts.	86%
Develop innovative approaches to use as alternatives to ventilation.	86%
Identify prognostic factors for severe disease.	79%
Develop platform(s) to maximize the commonality of data collection across trials, and collaborations between trials.	74%
Define the natural history of COVID-19 infection through careful standardised and comprehensive clinical and laboratory description of cases.	71%
Determine how best to link key research questions with researchers in affected regions who are able to recruit patients.	66%

4. Candidate therapeutics R&D



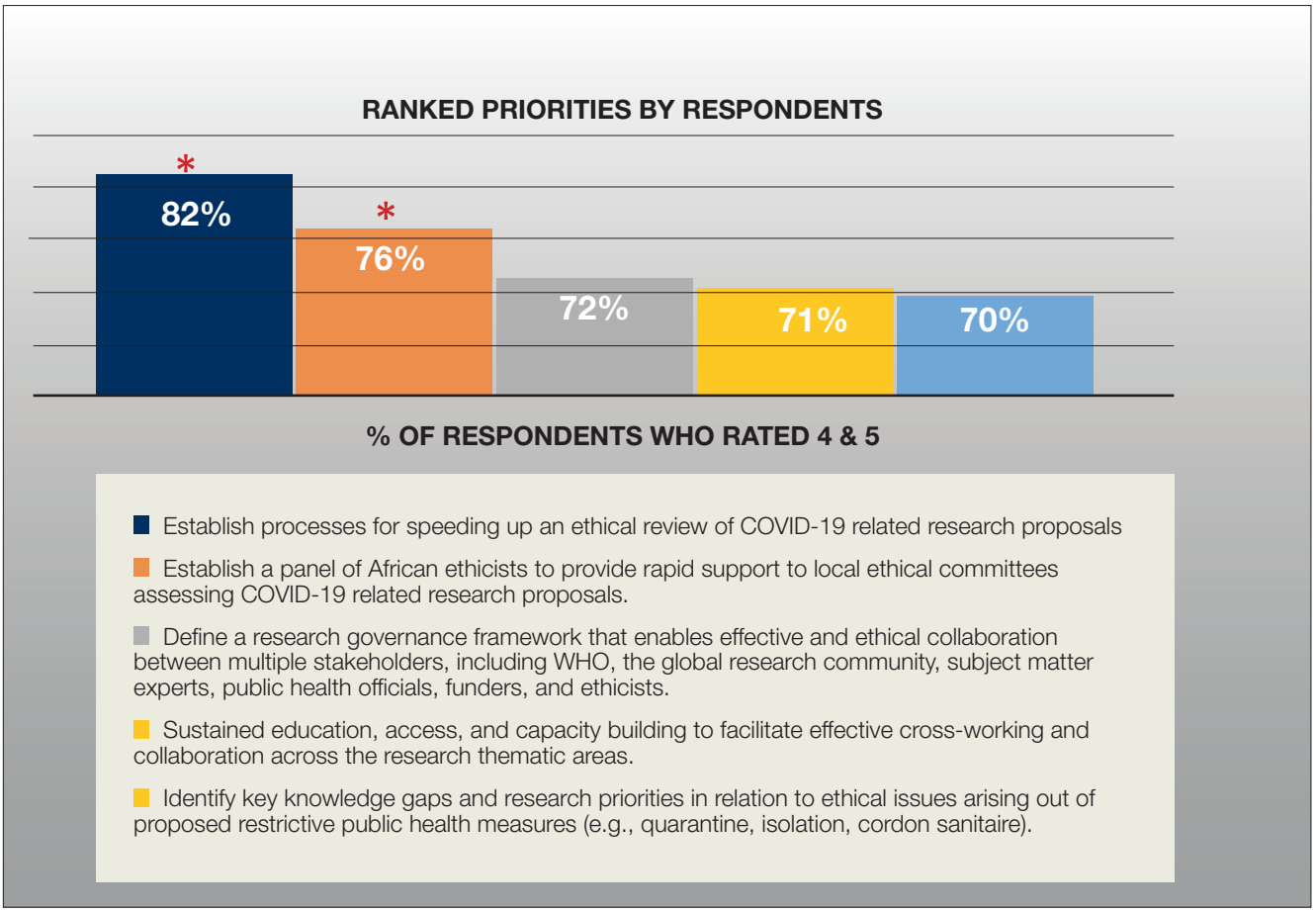
Question	% of Respondents who rated 4&5
Develop mechanisms to support coordinated collaboration to implement clinical trials for evaluation of safety/efficacy of therapeutics.	80%
Develop a Multicentre Master Protocol to evaluate efficacy and safety.	77%
Identification of existing candidates for clinical evaluation in addition to the ones already prioritized.	72%
Support basic science to identify new drug targets.	71%

5. Candidate vaccines R&D



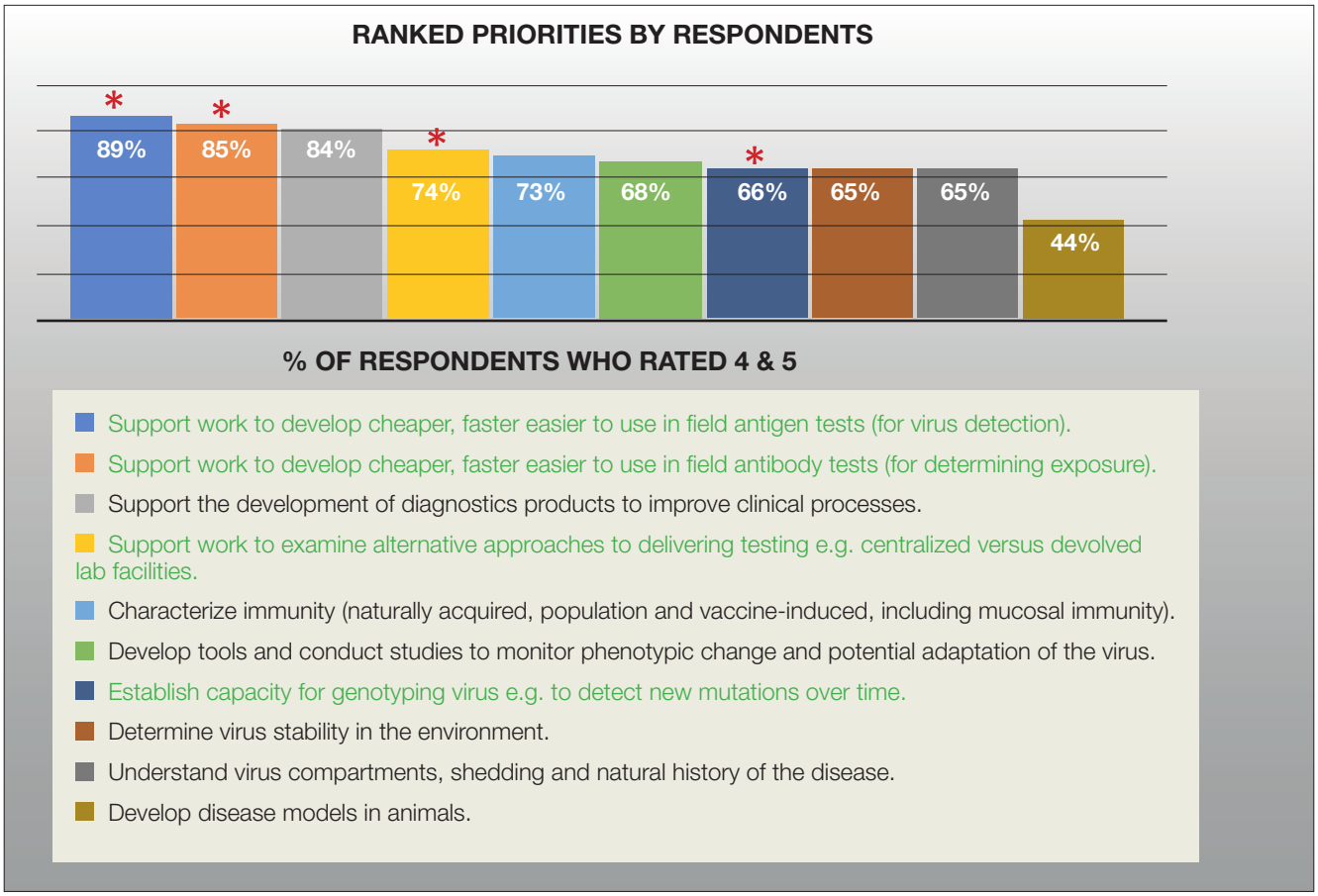
Question	% of Respondents who rated 4&5
Develop a multi-country Master Protocol for Phase 2b/Phase 3 vaccine evaluation to determine whether candidate vaccines are safe and effective before widespread distribution.	78%
Capacity development for basic science and pre-clinical development of new vaccines.	72%
Identification of candidates for clinical evaluation in addition to the ones already prioritized.	72%

6. Ethical considerations for research



Question	% of Respondents who rated 4&5
Establish processes for speeding up an ethical review of COVID-19 related research proposals.	82%
Establish a panel of African ethicists to provide rapid support to local ethical committees assessing COVID-19 related research proposals.	76%
Define a research governance framework that enables effective and ethical collaboration between multiple stakeholders, including WHO, the global research community, subject matter experts, public health officials, funders, and ethicists.	72%
Sustained education, access, and capacity building to facilitate effective cross-working and collaboration across the research thematic areas.	71%
Identify key knowledge gaps and research priorities in relation to ethical issues arising out of proposed restrictive public health measures (e.g., quarantine, isolation, cordon sanitaire).	70%

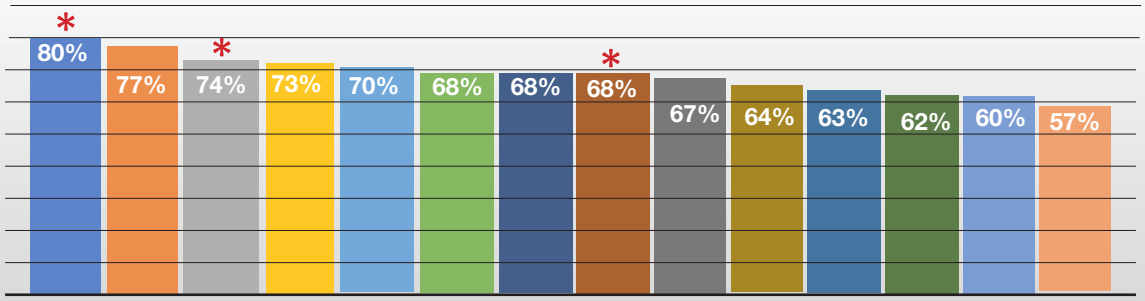
7. Virus natural history, transmission and diagnostics



Question	% of Respondents who rated 4&5
Support work to develop cheaper, faster easier to use in field antigen tests (for virus detection).	89%
Support work to develop cheaper, faster easier to use in field antibody tests (for determining exposure).	85%
Support the development of diagnostics products to improve clinical processes.	84%
Support work to examine alternative approaches to delivering testing e.g. centralized versus devolved lab facilities.	74%
Characterize immunity (naturally acquired, population and vaccine-induced, including mucosal immunity).	73%
Develop tools and conduct studies to monitor phenotypic change and potential adaptation of the virus.	68%
Establish capacity for genotyping virus e.g. to detect new mutations over time.	66%
Determine virus stability in the environment.	65%
Understand virus compartments, shedding and natural history of the disease.	65%
Develop disease models in animals.	44%

8. Social sciences in the outbreak response

RANKED PRIORITIES BY RESPONDENTS

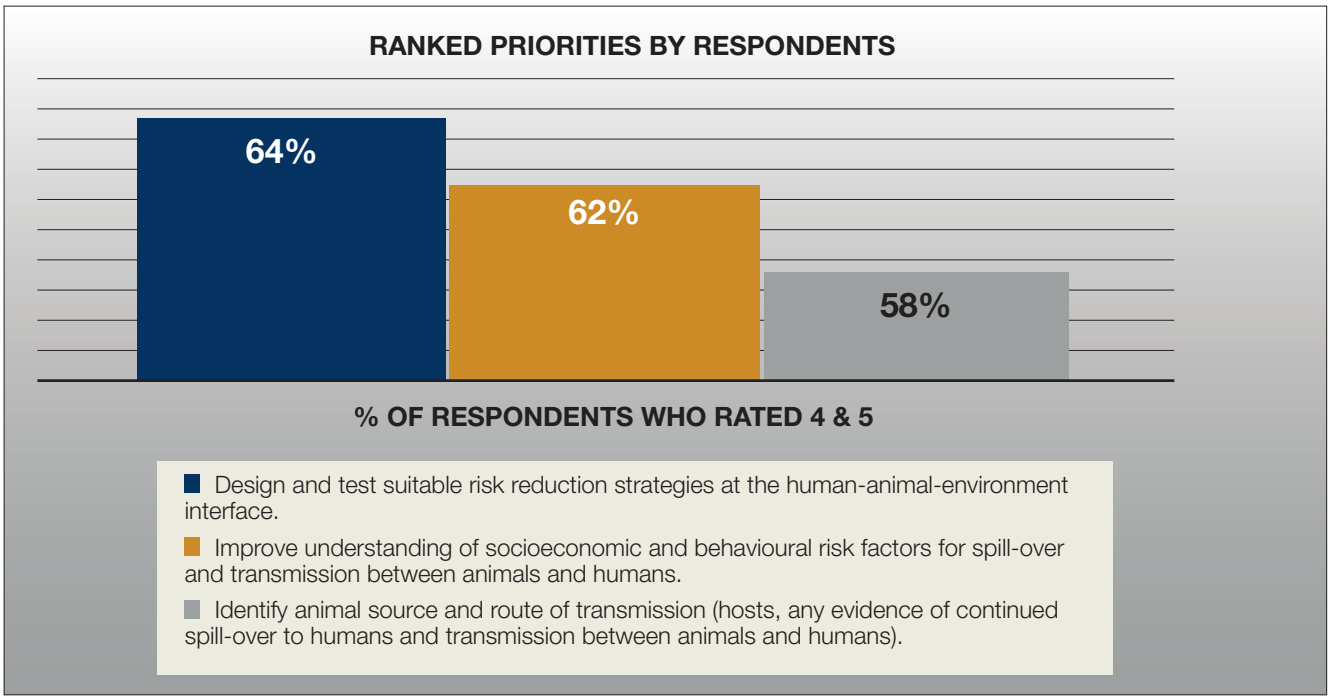


% OF RESPONDENTS WHO RATED 4 & 5

- Examine optimal ways of communicating about potential interventions in high-density low socioeconomic status urban settings.
- Ensure that knowledge is produced according to local, national and regional needs.
- Investigate ways of ensuring transparency of information flow and mitigating false information spread by various mechanisms.
- Develop guidelines and Standard Operating Procedures (SOPs) to operationalize epidemic mitigation mechanisms.
- Engage with communities to bring their voices to decision-making processes.
- Develop and connect global research networks with response partners.
- Understand how social and economic impacts need to be mitigated.
- Investigate innovative approaches to short-term economic support of vulnerable populations such as cash transfer by mobile money mechanisms.
- Promote the prioritization of knowledge needs according to epidemic dynamics.
- Develop innovative interdisciplinary science.
- Ensure that non-social scientists easily understand knowledge outputs and methodological limitations.
- Support work to understand the non-intended consequences of epidemic-control decisions.
- Support work to understand contextual vulnerability.
- Understand how decisions in the field may inadvertently undermine response goals.

Question	% of Respondents who rated 4&5
Examine optimal ways of communicating about potential interventions in high-density low socioeconomic status urban settings.	80%
Ensure that knowledge is produced according to local, national and regional needs.	77%
Investigate ways of ensuring transparency of information flow and mitigating false information spread by various mechanisms.	74%
Develop guidelines and Standard Operating Procedures (SOPs) to operationalize epidemic mitigation mechanisms.	73%
Engage with communities to bring their voices to decision-making processes.	70%
Develop and connect global research networks with response partners.	68%
Understand how social and economic impacts need to be mitigated.	68%
Investigate innovative approaches to short-term economic support of vulnerable populations such as cash transfer by mobile money mechanisms.	68%
Promote the prioritization of knowledge needs according to epidemic dynamics.	67%
Develop innovative interdisciplinary science.	64%
Ensure that non-social scientists easily understand knowledge outputs and methodological limitations.	63%
Support work to understand the non-intended consequences of epidemic-control decisions.	62%
Support work to understand contextual vulnerability.	60%
Understand how decisions in the field may inadvertently undermine response goals.	57%

9. Animal and human research on the virus origin and management measures at the human-animal interface



Question	% of Respondents who rated 4&5
Design and test suitable risk reduction strategies at the human-animal-environment interface.	64%
Improve understanding of socioeconomic and behavioural risk factors for spillover and transmission between animals and humans.	62%
Identify animal source and route of transmission (hosts, any evidence of continued spillover to humans and transmission between animals and humans).	58%

Additional potential research priorities

In addition to scoring priorities, respondents were invited to give free text suggestions for additional priorities for Africa. 419 responses were received. These were grouped thematically and suggestions that mapped onto existing priorities removed. The remainder were reduced to 15 additional potential priorities. At this stage they have not been through the same community assessment as the ones presentd above but are listed below for information.

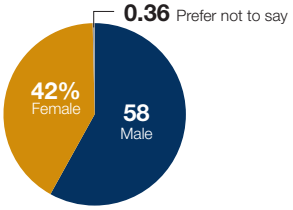
- Investigations on convalescent antiserum potency as a therapeutic option
- Environmental studies of SARS-Cov-2 including waste and sewage management practices
- Use of m-Health technology and GIS mapping to monitor disease spread patterns
- Studies of Leadership and decision strategies in response to the Covid Pandemic
- Health systems strengthening and building resilience post the outbreak
- Clinical management protocols for dual infections e.g. Covid patients with HIV TB
- Research into water sanitation and hygiene practices in communities during the outbreak
- Studies of community led strategies for the prevention of secondary transmission in a range of settings
- Psychosocial issues around discrimination of persons with Covid 19 and their relatives or contact persons
- Develop architectural designs for isolation and quarantine facilities that can be constructed using local materials and expertise within short time periods.
- Mental health support for frontline healthcare workers
- Identification of therapeutic candidates from traditional medicine for clinical evaluation in addition to the ones already prioritized
- Investigate potential protective effects of standard child hood vaccines and other vaccines e.g. BCG
- Identify resilient populations and better understand the protective determinants
- Accelerated dissemination of reseach results through pre-print media
- Investigate models for deferred consent during emergency research
- Determine the full impact of the Covid pandemic on Maternal and Child Health including vertical transmission studies
- Determine the load of Mental health issues arising from the outbreak measures implemented including investigations on gender based violence
- Determine the effect of the Covid-19 on food and nutritional security especially in relation to vulnerable groups

Appendix A

Understanding Our Respondents.

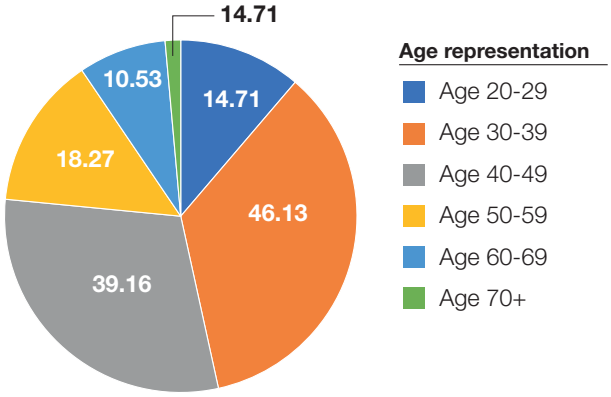
Gender Distribution

There was a higher male to female ratio of **3:2**



Respondents Distribution By Age

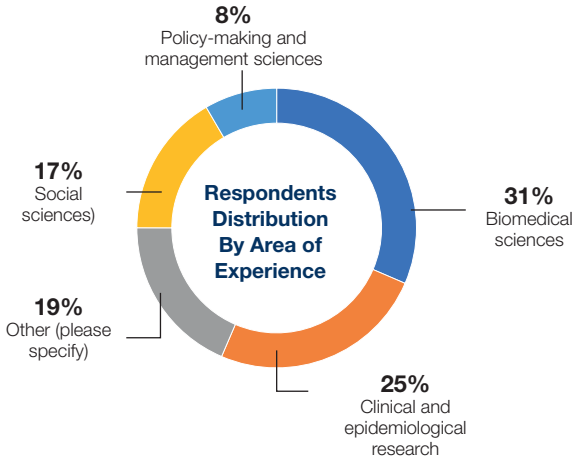
Most of the respondents were between the age brackets of **30-39** and **40-49.**



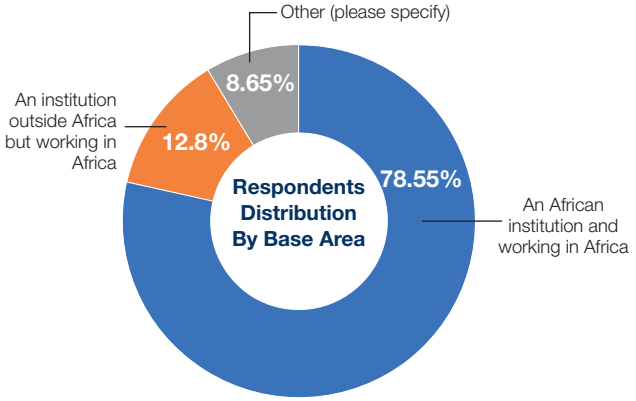
Career Stage

Research leaders and postdoctoral researchers participating in the survey accounted for **60%** of all the participants.

Area of Experience



The area where participants are based



79%

of the participants were from an African institution and working in Africa.

The interests of the participants

Interest

Participants with an expert professional interest in the subject were **37%.**

The African Academy of Sciences

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