SACIDS FOUNDATION FOR ONE HEALTH

TERMINAL REPORT

STRENGHTHENING SACIDS AND REGIONAL COVID-19 EMERGENCY PREPAREDNESS IN EASTERN AND SOUTHERN AFRICA

(SACIDS COVID-19 PROJECT)

REPORTING PERIOD
SACIDS: March 2020 - June 2022

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ABSTRACT

The coronavirus disease 2019 (COVID-19) outbreak was first reported in a cluster of patients with fever and respiratory symptoms in Wuhan, China on 31 December 2019. The World Health Organization (WHO) declared the disease a Public Health Emergency of International Concern (PHEIC) on 31 January 2020 (WHO, 2020a) and designated COVID-19 a pandemic on 11 March 2020. By 11 March 2020, 116 countries had reported cases of COVID-19. Globally, as of 6 February 2023, there had been 754,367,807 confirmed cases of COVID-19, including 6,825,461 deaths, reported to WHO. The first reported case of COVID-19 was reported by Egypt on 14 February 2020.

The Skoll Foundation $4million grant to Sokoine University of Agriculture to support the activities of the SACIDS Foundation for One Health (SACIDS) and the East African Integrated Disease Surveillance Network (EAIDSNet), in providing expertise provision to the national public health authorities in their preparedness and response to the COVID-19 pandemic, which was then about to reach East and Southern Africa. This grant was linked to a separate grant by the Skoll Foundation to the Africa Centres for Disease Control and Prevention (Africa CDC) to facilitate collaboration and coordination of actions within the framework of the "African Continental Strategic Plan for COVID-19 Pandemic", which included promoting evidence-based public health practice for surveillance, prevention, diagnosis, case management, and control of COVID-19 in Africa.

1.0 BACKGROUND

The coronavirus disease 2019 (COVID-19) outbreak was first reported in a cluster of patients with fever and respiratory symptoms in Wuhan, China on 31 December 2019. The World Health Organization (WHO) declared the disease a Public Health Emergency of International Concern (PHEIC) on 31 January 2020 (WHO, 2020a) and designated COVID-19 a pandemic on 11 March 2020. By 11 March 2020, 116 countries had reported cases of COVID-19. Globally, as of 6 February 2023, there have been 754,367,807 confirmed cases of COVID-19, including 6,825,461 deaths, reported to WHO.

COVID-19 is caused by a novel betacoronavirus, the 2019 novel coronavirus (2019-nCoV (Huang et al., 2020), later named as severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2). Coronaviruses are enveloped non-segmented positive-sense RNA viruses belonging to the family *Coronaviridae* and the order *Nidovirales* which broadly infect humans and other mammals (Erles et al., 2003; Richman et al., 2016). Although some coronaviruses had been associated with severe disease in animals (Erles et al., 2003; Salajegheh Tazerji et al., 2020), human coronavirus infections were regarded as mild until 2003, when the epidemics of the two betacoronaviruses, severe acute respiratory syndrome coronavirus (SARS-CoV) (Ksiazek et al., 2003; Kuiken et al., 2003; Drosten et al., 2003) and Middle East respiratory syndrome coronavirus (MERS-CoV) (de Groot et al., 2013; Zaki et al., 2012) were reported to cause mortality rates of about 10 and 37%, respectively (Ramadan & Shaib, 2019). The causative virus for COVID-19, SARS-CoV-2, is the third coronavirus associated with severe disease in humans and has been responsible

for a global pandemic. Clinically, COVID-19 is characterized by fever, cough and myalgia or fatigue (Huang et al., 2020). Severe COVID-19 is associated with cytokine storm, a life-threatening systemic inflammatory syndrome involving elevated levels of circulating cytokines and immune-cell hyperactivation triggered by SARS-CoV-2 infection (Fajgenbaum and June, 2020). Some complications may develop in COVID-19 and may include acute respiratory syndrome, acute cardiac injury and secondary infections.

The increasing economic interaction between Africa and China led to African health authorities to regard the threat of COVID-19 spread posed by these interactions to be high. China's investment in Africa in recent years has led to an increasing number of direct and indirect flight connections to the African continent from China (Brautigam et al., 2018; Wang et al., 2019). An estimated 2 million Chinese live and work in Africa. On the other hand, numerous Africans are increasingly travelling to China for study, business or leisure. On average, prior to the outbreak of COVID-19, eight flights a day operated between China and African cities (Kapata et al., 2020). Analysis conducted before COVID-19 introduction to Africa indicated that 13 nations with close links with China, including Nigeria, South Africa, Kenya and DRC, were at high-risk and were priority zones for proactive surveillance, detection and containing the spread of COVID-19 (Kapata et al., 2020). Seven African countries (Algeria, Cameroon, Egypt, Morocco, Nigeria, Senegal and South Africa) reported a case of COVID-19 by March 9, 2020. Concerted efforts needed to be made to prepare the region to deal with a potential outbreak of COVID-19. The first COVID-19 in Africa in February 2020 was reported in Egypt. The index cases in Tanzania, Democratic Republic of the Congo (DRC), Zambia and Mozambique, in March 2020, were linked to outbreaks in Europe, the Middle East and South Africa, rather than directly from China.

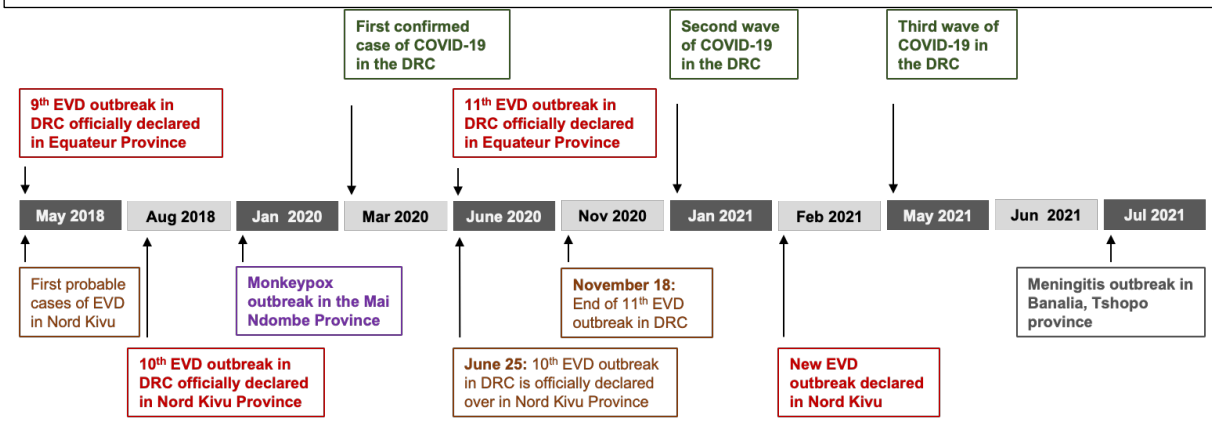
All index cases of COVID-19 reported in the WHO African Region were linked to travel history. Following the introduction of COVID-19, most African countries were characterized by high levels of vulnerability and there were increasing reports of community transmission. As COVID-19 spread grew exponentially in the African region, surveillance and risk assessment were critical for informed decision-making process to manage the pandemic.

Based on the movement network structure between African countries and other countries of the world, the risk of COVID-19 introduction to Africa remained high. Before and after the introduction of COVID-19 to Africa, SACIDS Foundation for One Health (SACIDS) (with its headquarters at Sokoine University of Agriculture in Morogoro, Tanzania) was on the frontline in the provision of technical expertise to countries to enhance the disease surveillance and risk assessment at different risk-points. The areas of focus included enhancing COVID-19 surveillance at the Port of Entry (PoE), sentinel surveillance, communities of high-risk cross-border ecosystems and self-reporting in the region. The SACIDS initiative was driven by its core conceptual strategy, focusing on addressing disease outbreaks at the source for Community-level One Health Security to progressively influence National, Regional and Global Health Security Agenda.

The Skoll Foundation linked grants to SACIDS, the East African Integrated Disease Surveillance Network (EAIDSNet) and Africa Centres for Disease Control and Prevention (Africa CDC) were timely and enabled us to collaborate and coordinate actions within the framework of the "African Continental Strategic Plan for COVID-19

Pandemic", which includes promoting evidence-based public health practice for surveillance, prevention, diagnosis, case management, and control of COVID-19. To meet the surveillance objectives, high priority is given to (a) ensuring high-quality screening at ports of entry, among contacts of cases, and other high-risk settings, (b) enhancing existing influenza-like illness (ILI), severe acute respiratory infection (SARI), and event-based surveillance systems, (c) supporting the complete and prompt investigation of cases and tracing of contacts; (d) adapting health information systems for managing case and contact data; (e) monitoring and reporting numbers, characteristics, and outcomes of cases that are both clinically diagnosed and laboratory confirmed, and (f) investigating rumours and supporting prompt communication to debunk false stories.

COVID-19 Pandemic concomitant with outbreaks of other epidemics – e.g. in DRC 2018 - 2021: Ebola, Monkey-pox, COVID-19 and Meningitis



2.0 OBJECTIVES

The specific objectives of the Skoll Foundation's grant to SACIDS for the Regional COVID-19 Emergency Preparedness in Eastern and Southern Africa (SACIDS COVID-19) project were:

a. Deploying affordable pathogen sequencing capability in field-deployable or national laboratories,

b. Harmonising the adoption or development/modification of new genomics-based diagnostics across the regional networks through coordinated activities of the associated laboratories in Tanzania and Zambia with the associated laboratory in Uganda before the new methods roll out to the national laboratories in the region,

c. Real-time monitoring of trends and patterns of severe acute respiratory infections (SARI),

d. Improving risk communication for COVID-19 in the region (Southern, Eastern and Central),

e. Upgrading the *AfyaData* platform for the capture of disease events at individual and community levels that can promptly fed into the national disease surveillance database,

f. Developing a One Health decision support platform for risk management of epidemics,

g. Improving biosafety and biosecurity of national and SACIDS/EAIDSNET laboratories in Tanzania and Mozambique and elsewhere in the region as appropriate, and

h. Harmonising PCR-based diagnostic procedures across participating national laboratories to conform to the Africa CDC framework and recommendations of the World Health Organization (WHO).

3.0 SUMMARY OF ACHIEVEMENTS

SACIDS provided expert support to the COVID-19 responses in the Democratic Republic of the Congo, Mozambique, Tanzania and Zambia, including provision for testing, diagnostics, genomic sequencing and in-country and points-of-entry (PoE) surveillance.

3.1. Surveillance

3.1.1. Mozambique

The following were achieved at the National Institute of Health (INS):

- Strengthening surveillance system through sentinel site and event-based/community-based surveillance using *AfyaData,*

- Sero-epidemiological survey in all major cities of Mozambique, which allowed identification of new transmission chains in addition to those carried out during the contact tracing,

- In each sentinel site, visits were conducted to give refreshment training to technicians on case definition, sample collection, packaging and storage across country, and

- In general, 73 sentinel sites were created for acute respiratory illnesses which allowed the increase in the number of COVID-19 cases reported.

3.1.2. Tanzania

The following were achieved at the SACIDS Foundation for One Health at the Sokoine University of Agriculture:

- Worked jointly with the Ministry of Health, in designing and developing of Port of Entry (PoE) surveillance platform, that collects, analyze syndromic data from travellers at PoE upon entry, and

- SACIDS in collaboration with INS spearheaded the implementation of the *AfyaData* as a community-based surveillance and deployed it in Mozambique.

3.2. Diagnostics

3.2.1. Democratic Republic of the Congo

The following were achieved at the National Institute for Biomedical Research (IRNB):

- Over 805 SARS-CoV-2 positive samples were sequenced generating 523 genomes with over 85% coverage. A total of 416 high-quality genomes have been published to the Global Initiative on Sharing All Influenza Data (GISAID) public platform to contribute to the global response to the COVID-19 pandemic.

- Many samples were sequenced in DRC at the start of the pandemic with the first SARS-CoV-2 genome from Africa shared publicly on the GISAID platform in March 2020. Five African countries shared 35 genomes in March 2020 (Nigeria 1, South Africa 1, DRC 19, Algeria 2 and Senegal 12).

3.2.2. Mozambique

The following were achieved at the National Institute of Health:

- Acquisition and distribution of sample collection kits for each sentinel site which allowed the increase of the capacity to include more cases. biosecurity and biosafety training of trainers (TOT) packages were carried out at different levels,

- Under the National Institute of Health (*Institut National de Saud*, INS) coordination, the testing capacity was increased from 300 samples per day across the country to 3500 and introduced GeneXpert®, Abbott®, Cobbas® and other real-time reverse transcription polymerase chain reaction (RT-qPCR) equipment into the testing line, and

- Facilitated the development of standard operating procedures (SOPs) and calibration of equipment, training of personnel to operationalize sentinel sites.

In addition, the Director of the INS was appointed as Scientific Advisor on COVID-19 Pandemic to the President of Mozambique.

3.2.3. Tanzania

The following were achieved at the SACIDS of the Sokoine University of Agriculture:

- procured sampling supplies (oropharyngeal and nasopharyngeal swabs, full personal protective equipment, viral transport media), laboratory reagents for SARS-CoV-2 RT-qPCR (RNA extraction kits, primers, probes and enzymes) and laboratory consumables for RT-qPCR (pipettes, pipette tips, RT-qPCR plates and sealers) sufficient for testing the first 2,000 COVID-19 suspected samples at the National Public Health Laboratory.

- laboratory personnel at the National Public Health Laboratory were trained in laboratory biosafety, standard operating procedures (SOPs) for COVID-19 testing were developed and optimization for COVID-19 testing was conducted. As a result, the National Public Health Laboratory had capacity for COVID-19 diagnosis well in advance of COVID-19 introduction in the country. Thanks to this, the index case on 16 March 2020 was tested using this capability.

- the SACIDS Molecular Biology Laboratory at the Sokoine University of Agriculture oversaw the operations and quality checks of COVID-19 testing at the National Public Health Laboratory and served as an official reserve laboratory for official diagnostic responsibilities. Then assumed responsibility for genomic sequencing of SARS-CoV-2 on behalf of the National Public Health Laboratory until when this capacity was installed at the National Public Health Laboratory in October 2021.

- Genomic sequencing of SARS-CoV-2 was conducted in the field using a mobile genomics laboratory mounted on a 4x4 vehicle equipped with BentoLabs and Oxford nanopore MinION sequencers. The mobile genomics laboratory was deployed during the outbreak of unknown hemorrhagic disease in Lindi (Tanzania) in July 2022 and next-generation sequencing revealed that the disease was leptospirosis.

3.2.4. Zambia

The following were achieved at the University of Zambia:

- The University of Zambia, School of Veterinary Medicine was and still remains the single major diagnostic facility for COVID-19 in Zambia. Both RT-qPCR and rapid antigen tests for COVID-19 are used.

- A limited number of isolates are sequenced to identify variants of concern. For example, the 2nd wave was driven by the beta variant while the third one was driven by the delta variant.

3.3. Control

In the DRC, the preventive measures put in place included the quarantine of the city of Kinshasa, with total containment of the commune of Gombe, the closure of national borders, social distancing measures, etc. These measures are variously monitored in the country and investigations were conducted to measure the degree of their application.

In Zambia, non-pharmacological intervention (NPI) to try to mitigate the spread of the disease includes the closure of schools and other public places such as churches, bars and restraints; social distancing; use of face masks and hand washing among others. The country complimented these NPI with vaccines. However, the vaccine coverage was low due to non-availability of vaccines and reluctance by members of the public to get vaccinated. By 18th August 2021, the country had vaccinated a total of 536,479 people of which just over 42% (227,875) were fully vaccinated. In total, the country had recorded 203,553 cases by 18 August 2021, with 3,564 deaths, 197,478 recoveries and 2,511 active cases. Most of these cases and deaths were recorded during the third wave of the disease.

In Tanzania, no lockdown was implemented to minimize the COVID-19 effect to the economy. To control the spread of COVID-19, emphasis was put on compliance with physical distancing coupled with other personal behavioural measures, self-quarantine, self-isolation, physical distancing, and limited travel. Effective surveillance countrywide and at the ports of entry including genomic surveillance of SARS-CoV-2 variants was reinforced. COVID-19 vaccines were introduced on 28 July 2021 following a recommendation by the Special COVID-19 Committee for Tanzania to join the COVAX Facility. NB; This committee of national experts included a SACIDS scientist at Sokoine University.

3.4. Communication

3.4.1. Democratic Republic of Congo

- In response to COVID-19, the country's National Institute for Biomedical Research (INRB) - in its role in the surveillance and interdisciplinary-One Health research - organised a capacity-building workshop for the COVID-19 response teams in three health zones of the Provincial Health Division (PHD) of Kongo Central, i.e Kimpese, Mbanza Ngungu and Kisantu

- In the third wave of COVID-19, there has been an increase in cases and a significant increase in hospitalisations and intensive care admissions, particularly in Kinshasa.

- Sequence results demonstrate the DELTA variant of SARS-CoVi2 to have become the dominant variant in the current phase of the COVID-19 pandemic in the DRC.

3.4.2. Zambia

The strategy of the response to COVID-19 in Zambia done by the Zambia National Public Health Institute (ZNPHI), is based on identifying suspected cases, isolating them, testing and contact tracing. This includes surveillance, diagnosis and laboratory testing and risk communication. COVID-19 vaccine uptake at vaccination centres is on the decline, despite a high uptake during the peak of the third wave.

3.4.3. Tanzania/HQ

- the diagnostic component leader of the SACIDS COVID-19 Project, Professor Gerald Misinzo, was a member of the Special COVID-19 Committee appointed by Her Excellency Samia Suluhu Hassan, the President of the United Republic

of Tanzania. The Committee led to the introduction of COVID-19 vaccines into the country. Professor Misinzo was additionally appointed by the Minister of Health to the Tanzania National Immunization Technical Advisory Group (NITAG) and the Vigilance Technical Advisory Committee (VTAC) until 2025.

Presentation of the COVID-19 report to the President of the United Republic of Tanzania, H.E. Dr Samia Suluhu Hassan, by the Chair of the Special COVID-19 Committee (Professor Said Aboud).

- Nominated to the National Laboratory Sub-Committee of the National Task Force.

- Nominated to the National Emerging Infectious Diseases Professional Dialogue of the Tanzanian Commission for Science and Technology (COSTECH).

- Undertook a communications audit of SACIDS in June 2021 and is in the process of developing a SACIDS Communications Strategic Plan 2021 – 2026.

- Participated in the African Union/ Africa CDC's Call for Proposals for 'COVID-19 Risk Communication and Community Engagement in Africa' in July 2021.

- Published related project results in Open Access Government and on SACIDS's website: "Health research in Africa: Infectious diseases of humans and animals", Open Access Government, July 2020 ISSN 2516-3817 (pages 52-55). https://www.openaccessgovernment.org/health-research-in-africa-infectious-diseases-of-humans-and-animals/88899/

- E-book "COVID-19 and Africa's volatile changing epidemics landscape: Lessons from the SACIDS Foundation for One Health", Open Access Government, November 3, 2020 https://www.openaccessgovernment.org/changing-epidemics-landscape/96422/.

- Enhancing community-based disease surveillance using Afyadata in Mozambique https://www.openaccessgovernment.org/article/community-based-disease-surveillance-using-afyadata-mozambique-sacids/149881/

- Africa: Strengthening public health surveillance systems https://www.openaccessgovernment.org/africa-strengthening-public-health-surveillance-systems/107243/

- SACIDS: A decade of experience developing One Health capacity in Africa. https://www.openaccessgovernment.org/one-health/126410/

- Oliver R Tambo Africa Research Chair at SACIDS Foundation for One Health, Open Access Government, June 4, 2021. https://www.openaccessgovernment.org/oliver-r-tambo-africa-research-chair-at-sacids-foundation-for-one-health/112112/

- Genomic sequencing in the D.R. Congo https://www.openaccessgovernment.org/infectious-disease-epidemics/120205/

- Undertook four analyses to generate knowledge, research and evidence-based strategies and tools:

    - Situational analysis of response to COVID-19: What works and does not work?

    - Risk Analysis of the Health System Resilience to COVID-19 Pandemic in Mozambique, Tanzania and Zambia.

- Response of the social systems to COVID-19 in Mozambique, Tanzania and Zambia: challenges and opportunities.

- Analysis of similarities and differences in information about COVID-19 published through the health authorities' websites in 16 Southern African countries.

4.0 COUNTRY SPECIFIC REPORTS

4.1. Activities in the Democratic Republic of the Congo

The SACIDS COVID-19 project supported the National Public Health Institute (*Institut National de Recherche Biomedicale*, INRB) of the Democratic Republic of the Congo (DRC), which is the national institute mandated to diagnose and investigate new epidemics in the human population (emerging or conventional), building on its long-standing experience with Ebolavirus disease. The DRC has been the only country to experience concurrent epidemics of Ebolavirus disease and COVID-19.

A full report is found in Annex 1.

4.2. Activities in Mozambique

The SACIDS COVID-19 project supported the Instituto Nacional de Saúde (INS – Mozambique), which is the National Public Health Institute that belongs to the Ministry of Health in Mozambique. The main mandate of the institution is to generate evidence for public decision and planning. The main activities conducted by the INS are biomedical and sociological research, epidemiological surveillance, laboratory reference services and training and communication. Within the National Institute of Health facilities, there are 8 reference laboratories. INS is one of the members of SACIDS.

A full report is found in Annex 2.

4.3. Activities in Zambia

The SACIDS COVID-19 project supported the University of Zambia's Africa Centre of Excellence for Infectious Diseases of Humans and Animals (ACEIDHA), which is anchored in the School of Veterinary Medicine and links this School with the Schools of Medicine and Public Health. This team has worked closely with the Zambia National Public Health Institute in staff training but undertaking most of the testing in the well-equipped BSL-3 laboratory and genomics diagnostic facilities, on behalf of the National Institute of Public Health.

A full report is found in Annex 3.

4.4. Activities in Tanzania and by SACIDS Regional Programme

The SACIDS-COVID-19 project supported Sokoine University through the SACIDS Foundation for One Health to provide expertise support to national authorities in their preparedness and response to the COVID-19 pandemic. The project-associated institutions in Tanzania were the Sokoine University of Agriculture, Muhimbili University of Health and Allied Sciences (MUHAS - Schools of Medicine and Public Health), the National Medical Research Institute (NIMR) and the National Health Laboratory (NHL). The SACIDS activities were divided into (i) provision of expertise to enable national authorities; (ii) provision of backstopping expertise to the SACIDS-COVID-19 project activities in the DRC, Mozambique and Zambia; (iii) liaison with EAIDSNet; (iv) collaboration with and provision of expertise to the African Centres for Disease Control and Prevention (Africa CDC).

4.4.1. Component 1: Strengthening of the surveillance systems

Recent multinational COVID-19 outbreaks have demonstrated the risk of the disease spreading globally. Because of increased rates and volumes of international and in-country travel, airports and other major ports of entry (PoE) are considered potential frontiers of surveillance and response in the fight against CoVID-19. To ensure community and national health security with a progressive impact on regional and global health security, the countries need robust strengthening of the public health systems to enhance risk-based screening at different strategic areas including the PoE and community level for early detection and response to imported or domestic diseases. Early detection of disease signals and events are important to contain outbreaks at the source with cost-effective measures. Engagement of the frontline workforce and the general public with technology-driven approaches are anticipated to increase the sensitivity and efficiency of the surveillance systems.

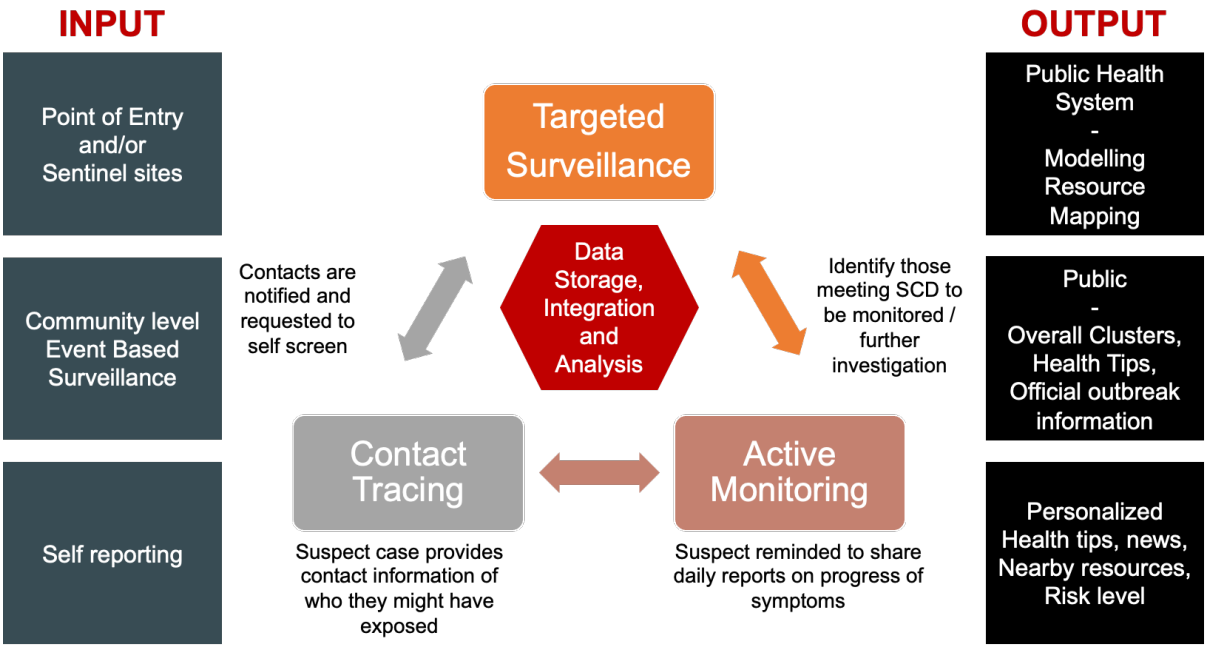


Figure 1: COVID-19 surveillance framework

the SACIDS Foundation for One Health's focus is on the designing and deployment of African-specific technology-driven solutions to enhance early detection and prompt response to health events suggestive of COVID-19 at the PoE and community levels. The specific objectives are to (i) develop digital tools for event-based surveillance at the PoE and community level; (ii) develop training modules for community-level COVID-19 surveillance' (iii) develop training materials for guided utilization of developed modules; (iv) establish a digital platform for delivery of different training modules, data capture, analysis and presentation; (v) conduct training on the use of digital tools and training modules; (vi) utilize surveillance data for epidemiological and socioecological risk modelling; and (vii) provide technical expertise to the national authorities in Africa for guided risk-based surveillance, data analytics and visualization, and communication of analysis outputs to the relevant audiences. The following have so far been implemented and achieved:

Digital tools for event-based surveillance at the Port of Entry: Baseline assessment was conducted with the Ministry of Health, Community Development, Gender, Elderly and Children (MoH) and port of entry (PoE) staff in Tanzania to understand the functionality of the surveillance, identify gaps, user requirements and existing potentials to strengthen it in the context of COVID-19. During the baseline assessment, the major challenge identified in the PoE surveillance system included over-dependency on the paper-based manual filling of surveillance forms, delayed data analysis, information sharing and trigger of response actions. The priority was highlighted on the need to transform it to a digital system to ease the data collection process, analysis, presentation and feedback/response. Based on the gaps observed at the PoE, SACIDS Foundation for One Health in collaboration with MoH developed a conceptual framework (Figure 1) to guide the development of a simple and easy-deployable digital platform for targeted surveillance, active monitoring and contact tracing of COVID-19 suspected cases. Furthermore, we developed screening, testing and self-quarantine follow-up workflows as an integral part of the digital platform.

Digital tools powered with a COVID-19 knowledge repository to enhance active surveillance of COVID-19 suggestive clinical manifestations for both the national and international travellers have been developed (Figure 5). The PoE health surveillance forms have been digitized to facilitate their completion by the travellers using smartphones, tablets or computers at their points of origin and therefore enhancing the preparedness and decision support at the point of the traveller destinations. The data that is collected from all incoming travellers entering the country through airports and ground-border crossings include basic demographics, travel and illness history, and the potential disease risk factors to facilitate the effective screening of the disease and follow-up of suspected individuals. All arriving travellers are scanned for body temperature and the parameters are uploaded onto the digital system to match with pre-entered specific traveller data. The scoring matrix of the variables, automated data analysis and aggregation platform have been developed to help trigger specific actions including responses and decisions once the pre-set threshold has been reached.

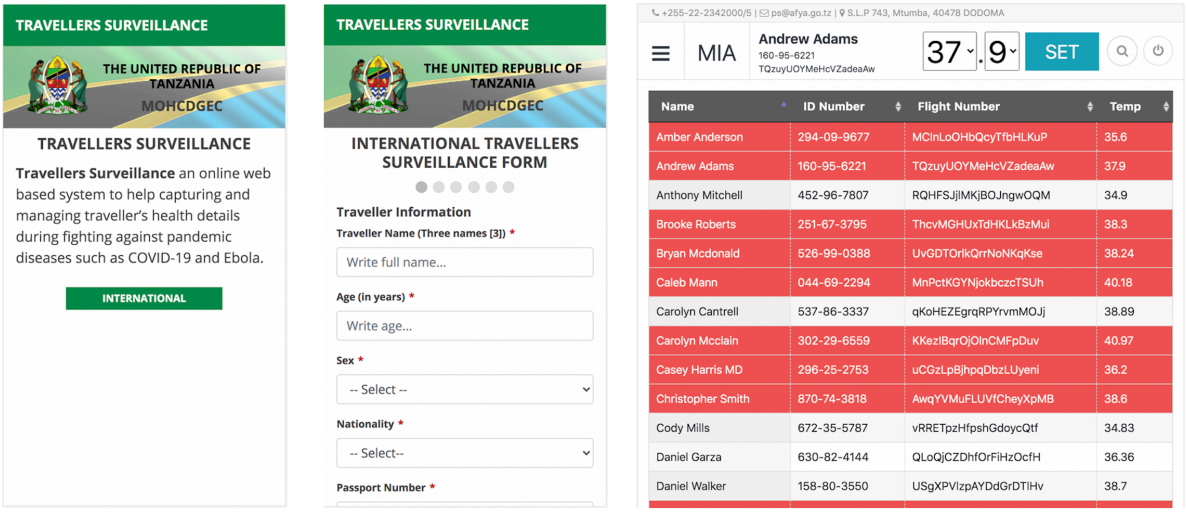


Figure 2: Screenshots of the Port of Entry Surveillance System.

Besides, the PoE surveillance forms for other targeted diseases including Ebola Virus Disease and Yellow fever have been digitized. Equipment including a data repository server (1), desktop computers (8) and thermo-scanners (20) were purchased to enhance the functionality of the digital surveillance system. The server was installed at the MoH to serve as the national repository of the collected data. We have also developed the user and facilitators guide to help with the utilization of the system. The developed digital tools have been demonstrated to the MoH and PoE officials and necessary amendments have been made. The MoH has identified a total of 20 strategic (high-risk) PoE sites (including major airports and ground crossings) for the initial deployment of the developed digital system. A total of 80 trainers of trainers (ToTs) have been identified including PoE staff, immigration officers and security officers.

Training module for community COVID-19 surveillance: Recognizing the role of the Community Health Workers (CHWs) in the African context as early signal sensors and responders to disease outbreaks, SACIDS in collaboration with the African CDC developed a training module for COVID-19 surveillance (including contact tracing) in the community level. The module was approved by the Africa CDC and translated into the major African Union languages (English, French, Portuguese and Arabic). The purpose of this training module is to give CHWs a rapid orientation to work in the COVID-19 response. It focuses particularly on CHW tasks in the trace component of the Africa CDC Partnership to Accelerate COVID-19 Testing (PACT) Initiative as well as supporting the test and treat components. The module includes the following: about CHWs and their roles in disease surveillance and response, a basic understanding of COVID-19 and its spread, prevention and control, community-based surveillance and identification of suspected cases, and how to conduct contact tracing activities effectively. Others include supporting community members in quarantine, support suspect cases in the homes or community facility isolation, operating safely in the community and community engagement and managing psychosocial issues.

Supporting Mozambique to adopt digital technology for community-based surveillance: *AfyaData* was introduced to the health officials in Mozambique and internal discussions were carried out in Mozambique to define the strategy of deployment. In the aftermath of the authorization by the Mozambican Directorate of the National Institute of Health to implement *AfyaData* in the country to support community-based surveillance; SACIDS in collaboration with the Mozambican National Institute of Health (INS - Instituto Nacional de Saũde, https://ins.gov.mz/) started to form a technical team to spearhead the implementation of the *AfyaData* project. SACIDS-NIH team organized several planning virtual meetings with the main goal of planning the entire implementation cycle in Mozambique.

From 21st April to 3rd May 2021, SACIDS Foundation for one health conducted a training of trainers to the INS *AfyaData* implementation team, provided implementation guidance and discussed on the way forward. After the ToT training, Community Health Workers were also trained. The training of trainers took place in Mozambique at the INS aiming at building skills to INS officials (*Epidemiologist, Sociologist, Economist, Data Manager and IT*) to become trainers of community health workers (CHW) at the district level using *AfyaData* in disease surveillance

https://www.openaccessgovernment.org/article/community-based-disease-surveillance-using-afyadata-mozambique-sacids/149881/

Ten INS implementation team members received training that was officially opened by Dr Inocencio Chongo (One Health Coordinator) and *AfyaData* project focal person to Mozambique. SACIDS team also had a chance to present and discuss on how *AfyaData* works with Dr. Eduardo Samo Gudo, Deputy Director at *Instituto Nacional de Saúde*. He suggested that due to terrorist events in Cabo Delgado province, the surveillance team were looking for a tool to help in early detection of health events from the communities at refugee camps. He suggested the implementation team to explore the opportunity of using *AfyaData* in such case, as most of the requirements are available in *AfyaData.* Also, the INS was open to start using *AfyaData* in other activities such as is in research as data collection tool.

INS created a short video covering the 1st and 2nd day of the training. The video is available at https://www.youtube.com/watch?v=yUMM99Gqbfc&t=41s

The training was conducted in Chokwe district, Gaza province from 23rd April to 1st May,2021 at Chokwe district offices. The training was officiated by the District Director for the Health Services, Dr. Marcelo de Almeida who appreciated efforts of INS and SACIDS in recognizing the value of community-based surveillance.

Twenty-six community health workers (CHWs) and five district health officials received the training on how to use *AfyaData* in disease surveillance. The CHW training package included data flow for the existing official reporting systems of diseases and event, clinical signs of respiratory diseases, including COVID-19 and protective measures, interview techniques, smart phone and A*fyaData* usage in disease surveillance.

At the field, the CHWs training also included the field visit practices, aiming to monitor how CHW performs from engagement process, interview, health precautions and recording events in *AfyaData* and submission. Areas and issues needed more emphasize were noted and discussed during field trip feedback and other's scheduled for the next day.

The CHW were provided with training printed packages and some equipment as surveillance packages which included smartphone with cover (Samsung A21), bag, sanitizers, rain jacket, gum boots, solar light and charger as well as power bank.

During that period, the SACIDS team together with INS ICT team were working to improve the system, which is being hosted at INS (https://afyadata.ins.gov.mz/). The changes made included (i) colour and layout to the INS colours (ii) some modules have been changed based on the INS requirements, (iii) One Health knowledge repository (OHKR) - modified the interface for managing diseases and clinical signs, (iv) user management – modified the interface for managing users and functionalities, (v) project management, and (vi) presentation of submitted data in terms of data visualization, mapping phone number and names in one column.

4.4.2. Component 2: Provision of diagnostic support and molecular epidemiology of COVID-19

The SACIDS COVID-19 Project enabled the set-up for the diagnosis of COVID-19 by the provision of expertise and materials to Government public health laboratories in the Democratic Republic of the Congo, Mozambique and Tanzania, and University laboratories at the University of Zambia in Zambia (UNZA) and Sokoine University of Agriculture (SUA) in Tanzania. In DRC and Mozambique, the National Institute for Biomedical Research and the National Institute of Health, respectively, served as national COVID-19 diagnostic laboratories. The UNZA Laboratory conducted extensive testing of SARS CoV-2 for the country as a node of the Zambia Public Health Laboratory and the SACIDS Molecular Biology Laboratory served as a backup laboratory for the National Public Health Laboratory in Tanzania. The SACIDS Molecular Biology Laboratory assumed the primary responsibility for genomic sequencing of SARS-CoV-2 on behalf of the National Public Health Laboratory until when this capacity was installed at the National Public Health Laboratory in October 2021. Genomic sequencing of SARS-CoV-2 was conducted in the field using a mobile genomics laboratory mounted on a 4x4 vehicle equipped with BentoLabs and Oxford nanopore MinION sequencers.

After the identification of the ninth epidemic of Ebola virus disease in the Equateur Province, the DRC set up a sequencing laboratory at the National Institute of Biomedical Research in Kinshasa in July 2018. This is thanks to the collaboration of several partners in particular: Institute of Research for Development (IRD) in France, Institut Pasteur in Dakar in Senegal, the US Army Medical Institute of Infectious Diseases and the University of Nebraska Medical Centre. This laboratory made it possible to better characterize the strain of the Ebola virus responsible for the ninth epidemic, to quickly identify the occurrence of the tenth epidemic of the Ebola virus disease in Nord Kivu Province and to assess the various response measures to these epidemics (vaccines, treatment and diagnostic tools).

While we were trying to control this Ebola epidemic, on March 10, 2020, we identified the first case of COVID-19 in Kinshasa, DRC. During the same period, we were able to characterize the SARS-Cov-2 lineages circulating in the DRC by analysing the first 127 genome sequences that we submitted in GISAID (https://gisaid.org) (https: // virological .org / t / phylogenetic-analysis-of-sars-cov-2-in-drc / 528). Currently, we are following the concomitant evolution of two epidemics (i) COVID-19, which has already affected 8,534 people in 14 provinces with 196 deaths and 4,528 people healed, and (ii) 11th epidemic of Ebola disease that has already affected to date 60 people in 6 different health zones in the province of Equateur with 24 deaths and 19 people recovered. This work was supported by various partners including SACIDS Foundation for One Health, Africa CDC, Gates Foundation, US Centres for Disease Control and Prevention, World Health Organization, ARTIC Network, IRD and Institut Pasteur de Dakar.

In Tanzania, the SACIDS Molecular Biology Laboratory at the Sokoine University of Agriculture (SUA) served as a back-up to the Tanzania National Public Health Laboratory by providing expert support and diagnostic testing of SARS-CoV-2 (Figure 3). The initial set-up of COVID-19 testing at Tanzania Public Health Laboratory was supported by the SACIDS COVID-19 Project by the purchase of testing reagents, primers, PPEs, optimisation of COVID-19 testing by RT-qPCR (Figure 4) and training

of technical staff. The Inter-laboratory proficiency testing between the National Public Health Laboratory and the University Laboratory was successfully undertaken. SACIDS supported the Tanzania National Health Laboratory in SARS CoV-2 sequencing and bioinformatics. Capability for on-site real-time genomic surveillance has been built through the support from Skoll by a mobile genomics laboratory equipped with mobile thermocyclers (BentoLabs) and Oxford nanopore MinION sequencers (Figure 5).

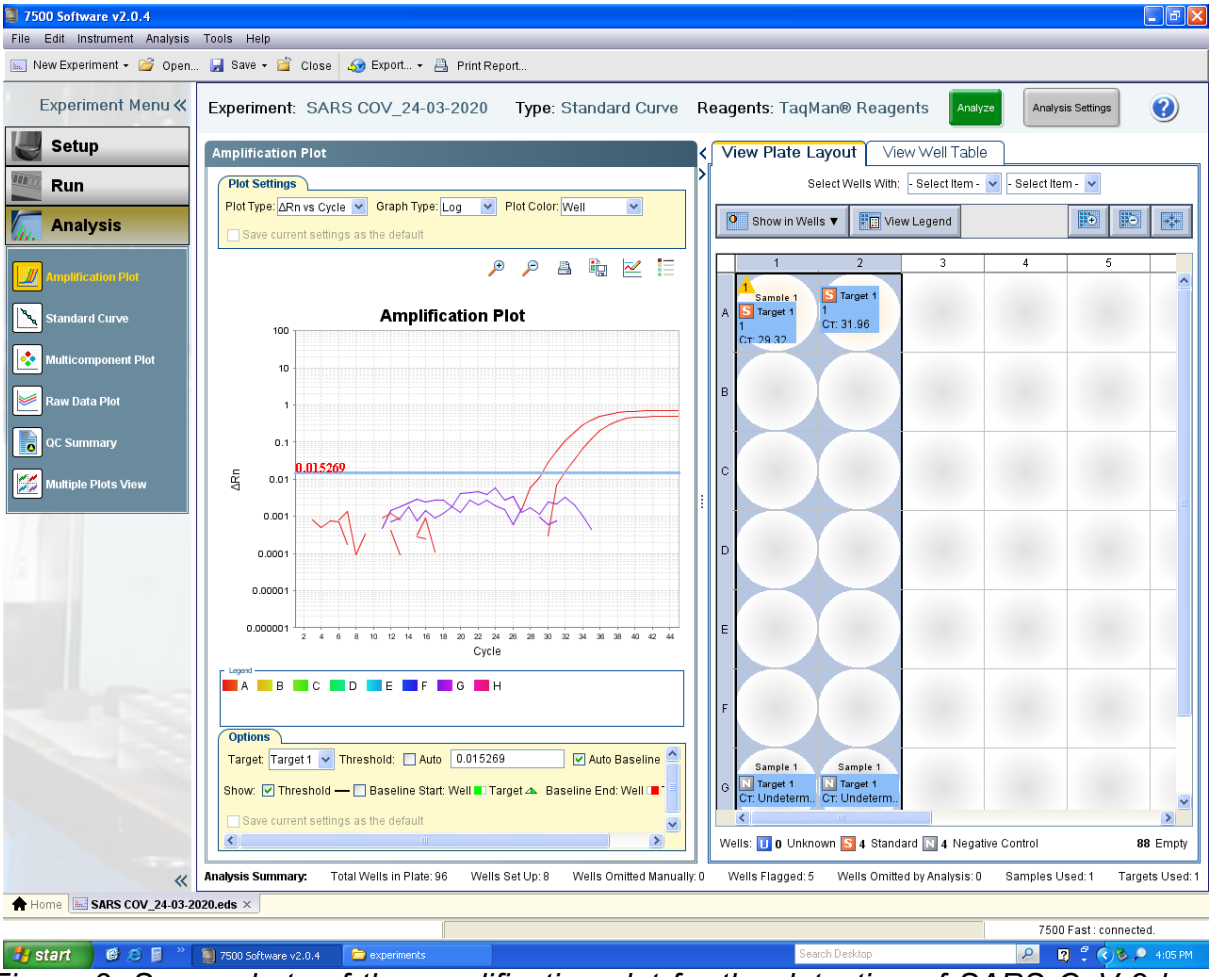


Figure 3: Screenshots of the amplification plot for the detection of SARS CoV-2 by qRT-PCR on a Thermo Fisher ABI 7500 Fast during COVID-19 testing optimisation before COVID-19 introduction in Tanzania.

Figure 4: The role of SACIDS-ACE in expert support to the Ministry of Health during COVID-19 pandemic. The SACIDS-ACE provided primers for the detection of SARS CoV-2 and is conducting whole genome sequencing of SARS CoV-2 using Oxford nanopore sequencing technology

Figure 5: SACIDS-ACE mobile genomics laboratory for real-time genomics of pathogens and antimicrobial resistance – NB: This genomics mobile laboratory and its instrumentation was procured through the Skoll Foundation grant to SACIDS.

Figure 6: Dr Katendi Changula of the University of Zambia conducting the diagnosis of COVID-19 in a BSL-3 Laboratory

Figure 7: Dr. Katendi Changula TEDx Talk Announcement at Mulungushi International Conference Centre

4.4.3. Component 3: Assessing the COVID-19 risk and mitigation strategies that are context specific for Africa

Different activities implemented under this component are summarized as follows:

4.4.3.1. Situational analysis of response to COVID-19: What works and does not work?

This article aimed to provide detailed analyses of the responses to COVID-19 by different countries outside Africa, with an objective of understanding strengths, gaps, and lessons for Africa. Literature search was done to document country' specific responses to COVID-19 pandemic in 9 countries. These countries included China, South Korea, Vietnam, Singapore, Italy, Brazil, United States of America, Germany, United Kingdom and Sweden. We particularly highlight responses taken by the governments and other key stakeholders including non-government organizations and the community as well as the lessons that African countries can learn from these countries. The analysis shows that the government has a critical role in containment of the pandemic. Successful emergency management requires inter-governmental, multi-organizational and inter-sectoral cooperation. Harmony between central and local government authorities is crucial in order to avoid antagonism in fighting the pandemic, as exemplified by the responses in Brazil. The review has shown that success in containment of the pandemic require serious enforcement of socio-behavioural control measures as experiences from Vietnam and Singapore indicate. The review has revealed that targeted testing and contact tracing are keys to containing the pandemic. This has been evidenced in Singapore, South Korea, and Vietnam. In conclusion, the analysis highlighted a wide variety of approaches across the world. Some countries like China, Vietnam, South Korea, Singapore are commended for implementing responses that paid off, resulting into containment of the pandemic. However, countries like Italy, UK, and the US are being criticized for not taking bold pre-emptive measures in the early stages of the outbreak. These countries and others that have been devastated by the pandemic seem not to have acknowledged seriousness of the disease during early days of the outbreak until it was far too late. This situational analysis shows there are key lessons that have surfaced across the successful countries.

4.4.3.2. *Risk Analysis of the Health System Resilience to COVID-19 Pandemic in Mozambique, Tanzania and Zambia*

This analysis was carried out to assess the existing health system to inform context specific strategies against the pandemic in Mozambique, Tanzania and Zambia. A search for eligible articles was done through advanced Google Scholar database. Key search terms including COVID 19 with a combination of either governance/leadership, human resources for health, health care financing, medical products and technologies, health information systems or service delivery, Mozambique, Tanzania, Zambia. The findings indicate that the three countries, have a well-established system of governance starting from the national through regional/province, district to the community level. They implement decentralized local governance structures where the development activities including healthcare delivery system. Except for Mozambique, in Zambia and Tanzania, the Presidents took charge and commanded formation of multi-sectoral committees to oversee mobilization of resources and implementation of strategies against COVID-19 pandemic. In terms of human

resources for health, the three countries face serious human resource for health crisis. The greatest shortage of qualified human resource for health is experienced at the primary health care facility level in rural settings. In all the three countries, the government budgets for health sector are still below the recommended 15%. Though, the three countries have well established supply chain systems for medicines, and medical devices, they experience shortage of essential medicines and medical supplies. The Health Management Information System (HMIS) is the major source of epidemiological and service information in Tanzania, Zambia, and Mozambique. However, the generated data is characterized by incompleteness of reporting, data inaccuracy, and lack of timeliness and insufficient analysis and use. The health service delivery systems in the study countries are weak with a high burden of both infectious and non-infectious diseases. In conclusion, the synthesis identifies several health system enablers such as well-defined governance and leadership structures, trained human resource for health, established health information systems. However, the health system is faced by low capacities of the diagnostic and clinical services, weak surveillance systems, inadequate infrastructure and limited human resources for effective responses to COVID 19 pandemic. There is a need to strengthen all health system blocks to eliminate identified risks.

4.4.3.3. *Response of the social systems to COVID-19 in Mozambique, Tanzania and Zambia: challenges and opportunities*

This analysis aimed to assess prevailing social systems and behaviours to identify challenges and opportunities towards COVID-19 responses in Mozambique, Tanzania and Zambia. We searched information using set of broad topic-related terms to include articles and documents reporting country specific information on the identified factions of the social systems. The sources included country specific websites, Pub-Med, Google and Google scholar, with full text documents retrieved from HINARI. The challenges identified include media's overemphasis of contagious nature of the disease leading into resentment of the infected people in the community; the cultural practices such as greetings by shaking hands and large gatherings in weddings and funerals which are likely to increase risks of transmission of COVID-19; limited access to water challenging hand washing practices; and unreliable income sources to majority of the community members leading to reliance on daily informal activities to earn a living. All such activities make physical distancing less practical. The opportunities included involvement of religious institutions in provision of health education; enhancing risk communication with the public through different digital and traditional media channels; and the extended family living arrangements as protection to vulnerable elderly population. In conclusion, the synthesis has identified several challenges and opportunities of the social system in COVID-19 response in Mozambique, Tanzania and Zambia. The opportunities should be capitalized upon to inform context specific preventive measures and challenges be addressed for prompt prevention of infection transmissions.

4.4.3.4. *Analysis of similarities and differences in information about COVID-19 published through the health authorities' websites in 16 Southern African countries*

The objective of this article is to assess the similarities and differences in information about COVID-19 published through the health authorities' websites in southern African countries. The analysis involved 16 member states of the SADC, namely Angola,

Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia and Zimbabwe. A thorough review of the Health Authorities' websites of each of the SADC member state was undertaken. The analysis of the websites was made in July 2020, focusing on the information contained regarding COVID-19. The findings indicate that Madagascar, Malawi, Seychelles and Tanzania are the countries with the least information on COVID-19 published on the website of the respective Ministry of Health, representing 4%. Angola is the country that more information related to COVID-19 presents on health authorities' websites, having covered all 13 predicted variables, which corresponds to 10%. The remaining countries are in the intermediate stage. The placement of information on COVID-19 does not support the same pattern, either by variables or in the form of access. In some countries, one may find from the main page most of the current information, when others created a link that allows you to enter a complementary page which presents all the detailed information about COVID-19. It was observed that all 16 countries in the SADC region present some information on COVID-19 on their health authorities' main webpage, corresponding to 13% in relation to the overall of the 13 analysed variables. The publication of information on the preventive measures was found in 15 countries, data update on last 5 days in 14 countries, information easy access in 14 countries and the publication of the guidelines was found in 14 countries, corresponding to 11%. The variable referring to the publication of information on research and development was less considerable in most countries, having been observed in only 2 (2%) countries. Although with recognized contextual similarities between SADC countries, the data reveal a discrepancy in the use of digital platforms in providing critical information as regards to COVID-19 pandemic. Considering the actual times marked by an unprecedented flow of information that facilitates the spread of infodemics, the use of health authorities' official pages may minimize the possibilities of misinformation, misunderstandings and mistrust flourish, serving as a source for confronting the information conveyed in the different social networks. We recommend that essential information about COVID-19 and other health emergencies, be disseminated on the websites of health authorities.

This article has been published by Metta Emmy, Mahumane, S. F, Sitali Doreen Chilolo, Nyamhanga, T. , Mboera, L.E.G. 2 , Gasto Frumence and Rweyemamu M. (2021). Response of the Social Systems to COVID-19 in Mozambique, Tanzania and Zambia: A Synthesis of the Challenges and Opportunities. International Journal of Innovation Scientific Research and Review Vol. 03, Issue, 01, pp.625-631, January, 2021 Available online at http://www.journalijisr.com Research Article ISSN: 2582-6131

4.4.3.5. *Mitigating lockdown challenges in the response to COVID-19 in Sub-Saharan Africa*

The COVID-19 pandemic is a global health crisis of grave and growing concern. Since February 2020 most countries in sub-Saharan Africa have been reporting an increasing number of cases, both imported and acquired locally. In the absence of effective drug or vaccines, the World Health Organization recommends the promotion of non-pharmaceutical interventions. The region has had to contend with the same features of COVID-19 that have made this an extremely difficult pandemic to deal with elsewhere. While case detection, contact tracing, social distancing, hand hygiene,

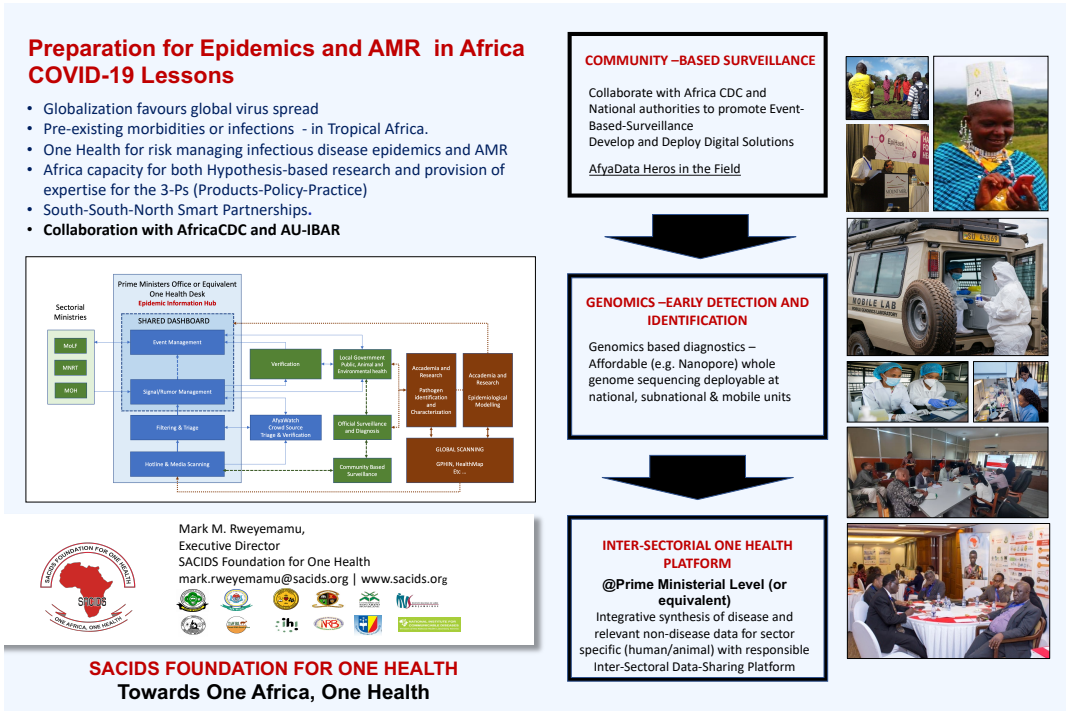
masks and selective isolation and quarantine may reduce transmission, many countries had resorted to the so-called 'lockdown' measures. However, there is lack of a conventional definition and clarity. Moreover, there is a lot of variation in how lockdown is implemented. We have therefore constructed a definition of lockdown, and related this to other communicable disease control measures. This paper examines and discusses the feasibility, effectiveness and appropriateness of implementing lockdown in SSA. We note that total lockdown was unlikely to be accepted voluntarily by a majority of the populations in SSA, owing to its highly disruptive nature. This is made worse by the fact that some of the countries, which have implemented lockdown have not put forward any clear strategy to support their populations, particularly the (most) vulnerable segments. We conclude that for an effective COVID-19 epidemic response, country-specific risk assessments need to be undertaken to provide evidence for decision-making.

This paper defines lockdown as: a set of measures to reduce community transmission of COVID-19 that are compulsory and which are applied indiscriminately to the general population. This definition excludes measures that are compulsory but which are targeted at individuals or segments of the population that are deemed at high risk. By this definition, one can isolate three lockdown measures that are relevant to COVID-19: (i) geographical containment; (ii) home confinement; and (iii) the closure of social, educational and economic activities, and prohibition of mass gatherings. Although separate, there is a degree to which these measures overlap and operate in synergy with each other. The authors envisage a risk-based approach to surveillance and interventions a cost-effective approach to the covid-19 mitigation in Africa - – see Mboera, L.E.G., Akipede, G.O., Banerjee, A., Cueva, L.E., Czypionka, T., Khan, M., Kock, R., McCoy, D., Mmbaga, B.T., Misinzo, G., Shayo, E.H., Sheel, M., Sindato, C. & Urassa, M. (2020) Mitigating lockdown challenges in the response to COVID-19 in Sub-Saharan Africa. *International Journal of Infectious Diseases* 96(2020): 308-310. https://doi.org/10.1016/j.ijid.2020.05.018

Finally, we note that, unlike in previous major epidemics, SACIDS academic and research expertise was available, *in situ*, in all 4 countries to support national authorities with their appropriate early response right from the point of index cases. This was also true for the 5 EAIDSNet countries. There was also ready Africa continental coordination by the AfricaCDC. All this early detection, early response and coordination was possible thanks to the prompt early support by the Skoll Foundation, that helped to facilitate an enabling environment for subsequent traditional major international emergency support to governments and NGOs.

5.0 INFLUENCE ON THE SACIDS CONCEPTUAL FRAMEWORK FOR EPIDEMIC DISEASE IN AFRICA

5.1 : - A Poster at *ICEID-August2022*



5.2 : - A SACIDS-CORDS Webinar on COVID-19 (SARS-CoV-2) Genomics Surveillance – Oct2021

https://www.youtube.com/watch?v=OYBbxKX6DBA.

5.3: - MULTI-AGENT PATHOGEN GENOMIC SCANNING – identification of Leptospira haemorrhagic fever, allaying anxiety of a possible first Ebolavirus outbreak in Tanzania and so far away from the risk areas of DRC or Uganda where there was an ongoing EBV epidemic (to be published). This was after the National Public Health Laboratory had excluded Ebolavirus and other common haemorrhagic fever viruses and the National Government Chemist Laboratory Agency had ruled out poisoning.

5.4: - CORDS – JULY 2022 Newsletter

Preparing for the Next Pandemic in Africa: The Need for Developing Capability in Africa to Distinguish Hypothesis Research from the 3 P's: Product Policy-Practice.

https://www.cordsnetwork.org/wp-content/uploads/2022/07/CORDS-July-2022-Newsletter.pdf

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7.0 SACIDS FINANCIAL REPORT

7.1 Introduction

On 20th March 2020, Skoll Foundation awarded Sokoine University of Agriculture (SUA) a total of USD4,000,000 through agreement number 20-45012 for strengthening SACIDS and regional COVID-19 emergency preparedness in eastern and southern Africa.

SUA received a total of USD3,999,910 of which USD1,800,000 was allocated to the Uganda Virus Research Institute (UVRI) on behalf of EAIDSNet, USD1,836,282 was allocated to SACIDS and USD363,628 was charged as SUA institutional overhead.

Table 1: Fund allocation

	Budget USD
SACIDS Foundation	1,836,282
Sub-award to UVRI for EAIDSNet	1,800,000
Total Direct Cost	3,636,282
Institutional overhead 10%	363,628
Total	**3,999,910**

7.2 SACIDS Budget and Expenditure

SACIDS allocated USD218,488 to Democratic Republic of Congo, USD329,812 to Mozambique and USD214,900 to Zambia to support surveillance and diagnostics for COVID-19 Pandemic. USD144,220 was allocated to support the Tanzania Ministry of Health for surveillance and contact tracing, USD216,491 to support surveillance through customizing *AfyaData* and risk assessment, USD502,754 to regional support for rapid diagnostics, genomics and bioinformatics and transfer technology for COVID-19 testing to the network laboratories, USD194,154 to support the Tanzanian National Health Laboratory for diagnostics supplies, reagents and cryopreservation and USD18,082 for miscellaneous charges was used for personal protective equipment.

The spending is 100% in all allocations, as shown in Table 2 and Chart 1 below.

Table 2: Summary of Total Grant Allocation and Expenditure

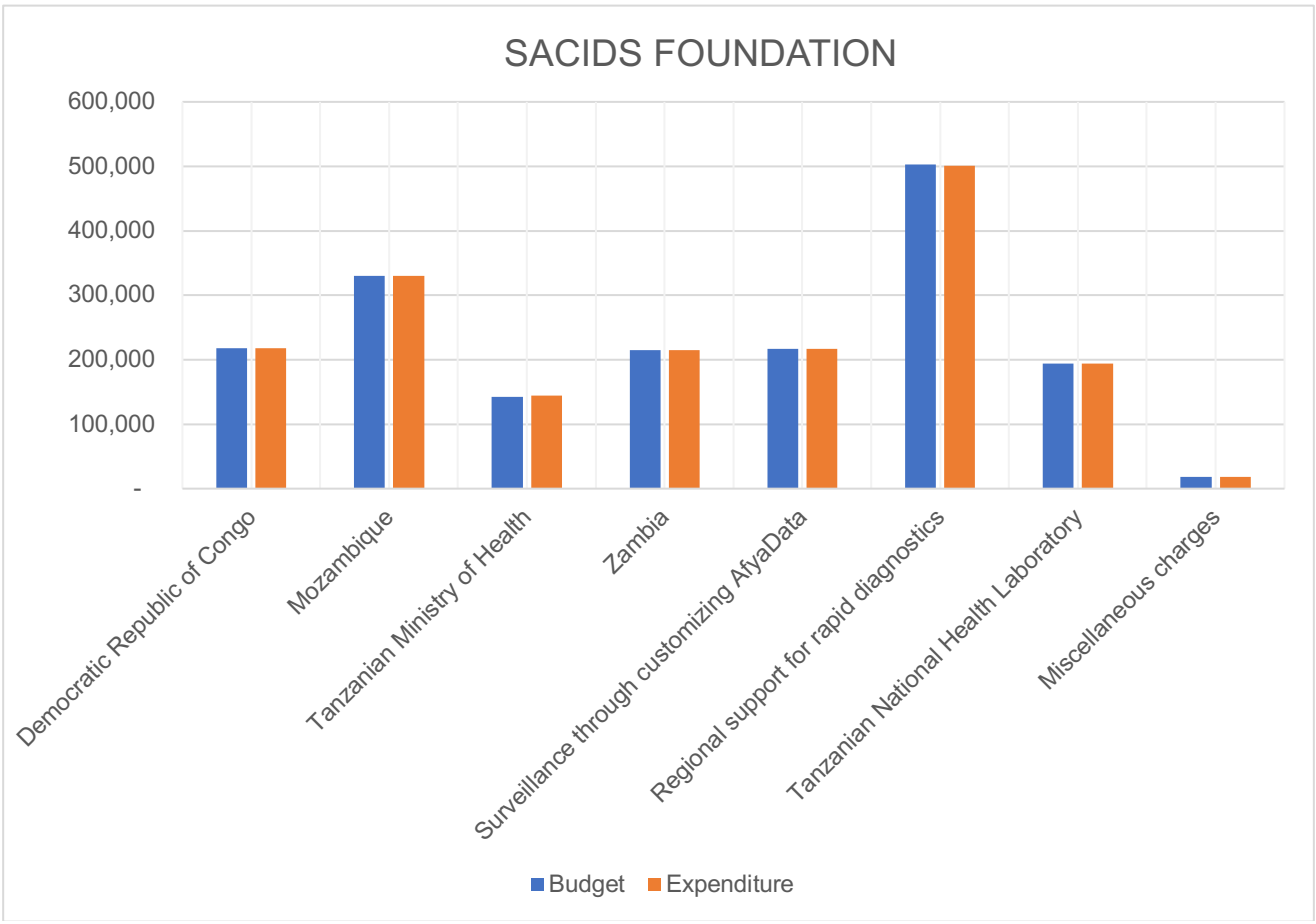
S/No.	Activities	Original Budget USD	Reprofiled Budget USD	Expenditure USD	Commitments USD	Balance USD
1.	Support to Democratic Republic of Congo for surveillance and/or diagnostics	200,000	217,488	217,488		-
2.	Support to Mozambique for surveillance	200,000	329,812	329,823		(11)

S/No.	Activities	Original Budget USD	Reprofiled Budget USD	Expenditure USD	Commitments USD	Balance USD
	and/or diagnostics					
3.	Support to the Tanzanian Ministry of Health for surveillance and contact tracing	92,600	142,600	144,220		(1,620)
4.	Support to Zambia for surveillance and/or diagnostics	200,000	214,900	214,900		-
5.	Support for surveillance through customizing AfyaData and risk assessment through engagement of 3 regional experts (Zambia, Mozambique and Tanzania)	283,000	216,491	216,491		-
6.	Regional support for rapid diagnostics, genomics and bioinformatics and transfer technology for COVID-19 testing to the network laboratories including GM coordination	400,000	502,754	500,997		1,758
7.	Integrating SARI Epi- and Lab-surveillance systems	62,600	-			-
8.	Emergency contingency	180,000				-
9.	Support to the Tanzanian National Health Laboratory for diagnostics supplies,	200,000	194,154	194,154		-

S/No.	Activities	Original Budget USD	Reprofiled Budget USD	Expenditure USD	Commitments USD	Balance USD
	reagents and cryopreservation					
10.	Miscellaneous charges	18,082	18,082	18,082		-
	Total for **SACIDS**	1,836,282	1,836,282	1,836,155		127
	Sub award to UVRI for EAIDSNet*	**1,800,000**	**1,800,000**	**795,539**	**1,004,461**	**-**
	Direct activity cost	3,636,282	3,636,282	2,631,694	1,004,461	127
	Institutional overhead 10%	363,628	363,628	363,628		-
	Total	**3,999,910**	**3,999,910**	**2,995,322**	**1,004,461**	**127**

*NB: *A detailed report for UVRI-EAIDSNet is in a separate report*

Chart 1:



7.3 Auditing

The project receipts and expenditures have been audited by Controller and Auditor General of the United Republic of Tanzania (CAG) in the consolidated Sokoine University auditing reports, consecutively in the financial years 2019/20, 2020/21 and 2021/22, and in all audit reports the auditor issued an unqualified opinion of the statements.

7.4 Procurement and Supplies

The project procured different goods amounting USD 573,413. The purchased items included laboratory equipment, reagents, consumables, software and ICT equipment. All the purchases were to support regional surveillance, Tanzanian National Health Laboratory and Tanzanian Ministry of Health for surveillance and contact tracing. Refer to Tables 3 - 5 for more details.

Table 3: Regional support for rapid diagnostics, genomics and bioinformatics and transfer technology for COVID-19 testing to the network laboratories.

S/No.	Procured Items	Supplier Name	Amount USD	Location
1.	NEB reagents for Nanopore sequencing of COVID-19	Inqaba Biotec EA Ltd	11,173.32	SACIDS Laboratory
2.	NEB reagents for nanopore sequencing of COVID-19	Inqaba Biotec EA Ltd	9,443.68	SACIDS Laboratory
3.	Primestore and swabs for collection of COVID-19 clinical specimens	Lab Equip Ltd	11,350	SACIDS Laboratory
4.	Biosafety for SACIDS Molecular Biology Laboratory	Phomas Diagnostics Ltd	22,216	SACIDS Laboratory
5.	Nanopore reagents for SARS CoV-2 next generation sequencing	Nanopore Technologies Ltd	66,688	SACIDS Laboratory
6.	Virus transport medium and swabs for the SACIDS Laboratory	Phomas Diagnostics Ltd	26,430	SACIDS Laboratory
7.	Thermocycler for the SACIDS Laboratory	Inqaba Biotec EA Africa Ltd	12,256	SACIDS Laboratory
8.	Mobile Genomics Unit	RSA Limited	108,785.56	SACIDS Laboratory
9.	Pipette tips	G&T Medics EA Limited	10,800	SACIDS Laboratory

10.	Personal protective equipment (PPE)	G&T Medics EA Limited	55,400	SACIDS Laboratory
11.	SARS CoV-2 sequencing primers for use in Oxford nanopore	Macrogen	3,701.60	SACIDS Laboratory
12.	Berlin protocol primers	Macrogen	1,411.80	SACIDS Laboratory
13.	Personal protective equipment (PPE) - SUA	Jakovic General Supplies	19,605.09	SUA Hospital
14.	Personal protective equipment (PPE) - SACIDS	Jakovic General Supplies	3,912.95	SACIDS Laboratory
	TOTAL		**363,174**	

Table 4: Support to the Tanzanian National Health Laboratory for diagnostics supplies, reagents and cryopreservation.

S/No.	Procured Items	Supplier Name	Amount	Location
1.	Diagnostic reagents and supplies for COVID-19	Nairo Link Tanzania Limited	10,072.33	National Health Laboratory
2.	Diagnostic reagents and supplies for COVID-19	Nairo Link Tanzania Limited	9,939.60	National Health Laboratory
3.	Diagnostic reagents and supplies for COVID-19	Nairo Link Tanzania Limited	13,723.20	National Health Laboratory
4.	Diagnostic reagents and supplies for COVID-19	Nairo Link Tanzania Limited	18,550.00	National Health Laboratory
5.	Ultralow freezer, racks, cryovials and backup for the National Health Laboratory	Kas Medics Limited	49,279.38	National Health Laboratory
6.	Virus transport medium and swabs for the National Laboratory	Phomas Diagnostics Ltd	33,030.00	National Health Laboratory
7.	Laboratory consumables	Nairo Link Tanzania Limited	31,908.84	National Health Laboratory
	TOTAL		**166,503.35**	

Table 5: Support to the Tanzanian Ministry of Health for surveillance and contact tracing.

S/No.	Procured Items	Supplier Name	Amount USD	Location
1.	Purchase of Microsoft windows license	Gift Electronics and Associates	1,523.06	Ministry of Health
2.	Purchase of ICT Equipment (Desktop computers, Tablets, Thermogun and consumables	Gift Electronics and Associates	18,524.16	Ministry of Health
3.	Purchase of Server Systems	Blue Systems Company Limited	10,819.20	Ministry of Health

4.	Purchase of Booth Wooden	J.R Traders	5,412.37	Ministry of Health
5.	Purchase of Tablets Samsung Galaxy TAB A 7	Everything Electronics Ltd	3,157.21	Ministry of Health
6.	ICT-Equipment laptops	Akala Microsolution Ltd	9,300.44	Ministry of Health
	TOTAL		**48,736.44**	

Annexes - SACIDS Technical Reports:

1. Terminal Technical Report - Democratic Republic of the Congo
2. Terminal Technical Report - Mozambique
3. Terminal Technical Report - Zambia