

## Development of a South-South Clinical Research Capacity Strengthening: Institutional Partnership Platform between Cameroon and South Africa

George Mondinde Ikomey<sup>1</sup>, Yayah Emerencia Ngah<sup>2\*</sup>, Mispa Yivala Mbanyamsig<sup>3</sup>, Martha Mesembe<sup>1</sup>, Lyonga Emilia<sup>1</sup>, Marie-Claire Okomou<sup>1</sup>, Charles Fokunang<sup>4</sup>, Ikomey Gregory Mwambo<sup>5</sup>

<sup>1</sup>*Center for the Study and Control for Communicable Diseases (CSCCD), Faculty of Medicine and Biological Sciences (FMBS), University of Yaoundé, Cameroon*

<sup>2</sup>*Department of Public Health, Faculty of Medicine, Texila American University, Zambia*

<sup>3</sup>*Systems Biology Research Centre, University of Skövde, Skövde, Sweden*

<sup>4</sup>*Immunology, Biochemistry and Biotechnology Laboratory, Faculty of Medicine and Biomedical Sciences (FMBS), University of Yaoundé 1, Cameroon*

<sup>5</sup>*United Nations University for Peace, San Jose, Costa Rico*

### Abstract

*Collaborative partnerships are key components to reinforce biomedical and clinical research capacity and are characterized by enormous challenges though important in promoting the institutional exchange of ideas and capacities that potentially fill knowledge and research gaps. An observational analysis was conducted from 2014 to 2022 between the Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa, and the Centre for the Study of Communicable Diseases (CSCCD), Faculty of Medicine and Biomedical Science, University of Yaoundé I, Cameroon. Despite constraints, affiliations with institutes from developed economies are often established within the framework of North-South collaborations. Since 2014, a strong bilateral South-South research partnership between the two institutions has been developed and consolidated for sustainable coexistence. In this paper, we report on qualitative research within our leading collaborative scientists involved in major institutional research, our views on South-South collaboration, and the factors that consolidate our decision-making about joining and participating actively in research networks.*

**Keywords** *South-South collaboration, Stellenbosch University, South Africa, University of Yaoundé I, Cameroon.*

### Introduction

A large proportion of the global disease burden resides in Africa, with Human Immunodeficiency Virus (HIV) / acquired immunodeficiency syndrome (AIDS), malaria and tuberculosis (TB) known as poverty related disease (PRD) being the most noteworthy among the communicable diseases [1]. Overcoming these health challenges rely on evidence-based biomedical research and

partnerships between institutes across borders and to initiate the translation of research findings that ultimately culminate in clinical use [2]. No man is an island as Donne and collaborators explained in 1624 [3], and indeed, the most influential research outputs and findings often result from working in interdisciplinary collaboration. Partnerships aid in facilitating knowledge and skills transfers and build on the quality and creativity of research projects [4]. Partnerships are needed to

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**\*Corresponding Author: bisonglb@gmail.com**

keep our research interests fresh and give us new impetus for approaching studies. Working with others outside of our academic comfort zone can provide us with novel skills, theories and methods that enrich our research and make us more unique, innovative, and marketable professionals. A collaborative approach brings more experience to bear, increasing the chances of solving problems more efficiently and widening the access to a greater array of techniques and equipment used for research [5]. The absence of good laboratory facilities, equipment, qualified staff and management systems in most African countries and research institutes hinders the advancement of research in low-medium income countries (LMIC). Most institutions in Africa opt to partner with institutes in the Northern hemisphere, such as the United States of America (USA) or within Europe to overcome financial and infrastructure disadvantages. Many qualified African scientists choose to leave their home countries for better advancement opportunities. There is a strong need to enhance African clinical research capacity and develop the sustainable partnership between countries, academic institutions and research groups [6, 7, 8]. Herewith, we highlight our own experience in establishing and maintaining an African bilateral partnership, with a research focus in the field of Medical and Health Sciences.

In order to establish a sustainable South-South collaboration, we had to have an overview of the good and bad collaboration from past documented experience, which can inspire and motivate our institutional partnership.

## **Methods**

An observational study was conducted from 2016- 2022 of the collaboration between the University of Yaounde 1 and Stellenbosch University, South Africa. Collaborations noted include; joint publications, joint conference presentations, exchange visits, collaborative

grants submission, infrastructure support, and capacity-building seminars and symposia.

## **Overview of an Effective and Sustainable Research Collaboration**

The scientific community has witnessed a significant rise in the interest and scope of global health research collaboration [8]. A number of structural and scientific factors have been used to explain this growth, with much discussion developed in data mining of these in the literature. On the other hand, not much interest has been paid to the factors that drive successful research collaboration by scientists and other research actors [9, 10]. This is paradoxical; it is noteworthy given that these factors are likely to play a key role in the sustainability and effectiveness of global health research initiatives. We have attempted in our writeup to identify and discuss eight factors that researchers see as essential in judging the merits of active participation in global health research partnerships: opportunities for active involvement in multicentered corporate interesting science; effective leadership; competence of potential partners in and commitment to good scientific practice; capacity building; respect for the needs, interests and agenda of partners; opportunities for discussion and disagreement; trust and confidence; and justice and fairness in collaboration. Lastly, we took an interest in ethics and deontology in a collaborative partnership for scientists in a developing economy. It was important for us to understand from others experiences that the sustainability and effectiveness of global health research collaborations have an important ethical or moral dimension for the research actors involved.

Collaboration has increased the scale and scope of global health research with more efficient and collaborative knowledge development [10-12]. From the late 1990s and early 2000s, significant progress has been made on global health research collaborations [12, 13,

14]. Global health research collaboration has led to innovations in scientific development funded by agencies such as the Wellcome Trust and the National Institute of Health (NIH) [15, 16].

The rapid growth in global clinical health research collaboration has been on the progress of data mining, addressing the ethical issues arising from global health research [17]. The ethical issues include; valid concern, the standard of care, acceptable levels of risk, data sharing and material transfer agreement [12, 18]. Not only ethical issues, sociological and political aspects of such research collaborations which mainly used an understanding of macro level collaboration functions are emerging [13, 19]. Collaboration growth provides insight into quality and fairness [20]. Research collaborations produce relationships and conditions favorable to high-income countries and institutions [12, 21]. Inequalities that undermine partnership in collaboration include publication authorship, principal investigators, grant holders, staff remuneration policies, tax exemption for foreign researchers, and the ownership of samples [14, 22, 23]. Collaboration can sometimes mask or exacerbate inequality in partnership. Examination of publications show that the most frequent role for African is to provide samples and conduct fieldwork does not research design [18, 19, 24]. These debates have been accompanied by a growing literature on the role of ‘ethics governance’ in ensuring high ethical standards in global health research collaborations [20, 25].

## The Partnership

In 2014, we formalized a bilateral partnership agreement between the Division of

Medical Virology in the Faculty of Medicine and Health Sciences at Stellenbosch University in South Africa and the Centre for Study and Control of Communicable Diseases (CSCCD) in the Faculty of Medicine and Biomedical Sciences at the University of Yaoundé I in Cameroon [5]. This included the signing of a joint partnership agreement, Memorandum of Understanding (MoU) and obtaining ethical clearance in both Cameroon and South Africa for ongoing joint research projects. Our first pilot study investigated the influence of diverse HIV subtypes and resistance-associated mutations in an infant population in Yaoundé, Cameroon [6].

The HIV/AIDS epidemic in Cameroon is unique, as a multiple of diverse viral subtypes are found in this region, with high genetic diversity. It is interesting and challenging to extrapolate our findings, with such a high genetic variety. Our main interests remain in the field of HIV/AIDS [1]. With a noticeable growing research interests from other partnerships, especially within our faculties, we have since expanded our projects to include research in Human Papillomavirus (HPV) [3], Chronic Obstructive Pulmonary Disease (COPD) [4], as well as projects in the field of TB and viral hepatitis. We are highly motivated and enthusiastic to see the partnership grow from strength to strength. We are eager to recruit Principle Investigators in other research domains to enable us to expand our influence and research niche. Our South-South partnership can be summarized by the highlights of collaboration achievements shown in Table 1. Together the institutional activities increased many fold, and institutional visibility was quite evident in the partnership institutions.

**Table1.** Highlights of Collaboration Achievements

Joint publications	17
Joint conference abstracts presented	24
Students graduated – Yaoundé	10
Students graduated – Stellenbosch	15

Current students – Yaoundé	07
Current students - Stellenbosch	14
Exchange visits to Yaoundé	09
Exchange visits to Stellenbosch	20
Collaborative grants submissions	07
Capacity building training-seminars, symposia, colloquia	20
Infrastructural support	07
Extended collaboration with other Institutions out of the two countries	05

We pride ourselves in searching for criteria used in measuring the sustainability of collaborative partnerships by researchers. It is important to say that we have adopted the following characteristics.

1. Active involvement in cutting-edge impact research.
2. Effective leadership management, Competence and commitment to scientifically valid research and good scientific practice, good platform for capacity strengthening.
3. Respect for the needs, interests and agendas, and portfolios of all partners.
4. Trust and confidence, justice, and fairness in collaboration.

### **Effective Leadership**

Effective leadership is important for a strong and effective partnership and active personal involvement in the setting of scientific agenda for the collaborative project or network. A good leader is someone highly respected in their field and someone with an impressive scientific vision [3, 26]. The involvement of an effective leader was considered a good rationale for accepting an invitation to be involved in the collaboration.

### **Competence in and Commitment to Good Scientific Practice**

Given the importance placed on scientific value and good leadership, and their close connection to the concept of a person or institution that is able to ‘deliver’, it is perhaps unsurprising that researchers also emphasized the scientific competence of potential collaborators and their perceived commitment

to good scientific practice as key factors in judging whether a collaboration or collaborator would be likely to be a good or bad one. We considered that assessment of competence and commitment to scientific practice we emphasized on ‘deliverability’ and ‘timeliness’ as signs of a good collaborator and collaboration. We considered that good collaborations were likely to be, able to deliver data, samples, and analysis in a timely way to enable research to proceed smoothly. In situations where samples have not been delivered according to procedure or are late, there can be external mitigating factors which have meant that compromises have had to be made between timeliness and orderliness.

### **Capacity Building**

Capacity building was considered crucial, and its absence in collaborations viewed very negatively indeed. The term ‘capacity building’ was employed in different ways to refer to activities, including training courses or fellowship roles for early-career researchers, studentship funding opportunities for Ph.D. students, and the provision of scientific equipment that might have uses beyond the project itself. Broadly speaking, capacity building was understood as the potential for opportunities to increase the scientific competence and expertise of both experienced and younger scientists to gain locally important added value more generally from participating in research. In this quote, a PI describes the anticipated benefits of an imminent collaboration.

For us, capacity building was understood to include both training opportunities for

individual researchers and wider anticipated educational benefits for their research centre. Indeed, capacity building was often viewed as a cluster of benefits. The capacity building might include both the achievement of internationally

recognised standards and access to new technologies: Our partnership developed capacity-building training models that are well illustrated in Table 2.

**Table 2.** Capacity Building Training Models

No	Models' status	Training duration	Target groups
1	Research ethics in health research	1-2 weeks	Postgraduate (PG) students, researchers, lecturers
2	Pharmacovigilance in drug development	1-7 days	PG students, researchers, lecturers
3	Biosecurity and Biosafety in Health, Agriculture and environment	2-7 days	PG students, researchers, lecturers
4	Drug development of Phytomedicines in Low middle income countries	1-7 days	PG students, researchers, lecturers
5	Biotechnology in drug development	1.5 days	PG students, researchers, lecturers
6	Bioinformatics and genetic engineering in molecular medicine	1-4 days	PG students, researchers, lecturers
7	Bioinformatics and contribution to drug development and clinical research	1-5 days	PG students and researchers
8	Introduction to Basic Pharmacokinetics and Pharmacodynamics	1-5 days	Pharmacy students, PG students and young researchers
9	Health Information system management	1-5 days	Graduate students and Clinical Researchers
10	Health administration management for public health actors	2 weeks	Public health staff

Without students, trained researchers, and teaching staff, the collaboration would not have achieved the success we have seen this far. Senior researchers involved in the partnership have expertise in Medical Virology, Molecular Biology, Immunology, and other areas of Infectious Diseases, as well as Bioinformatics and Phylogenetics. Through the active supervision and training of postgraduate students, in most cases at the master's level, the collaboration and research program aids in much-needed scarce skills and knowledge development and transfer on the continent. Between the Institutions, we have jointly supervised 11 master's 2 Ph.D. Students to completion, with active supervision of more,

Masters, PhD, and Medical (MBCHB) students in progress. We have managed to host several short-term interns between the Faculties and Institutes. The students benefit by not only expanding their scientific knowledge but also by gaining cultural knowledge. Many of the students become close friends, and we have created a unique family bond amongst ourselves to promote socio-cultural diversity between the collaborating institutions.

### **Our Strengths**

#### **Ensuring Community Benefits with Our Research**

We have created a model for other bilateral partnerships in Africa, showing that

collaboration between African countries can work. Successful collaboration takes dedication and perseverance but has its own rewards. HIV research has been one of our key areas of research. In Cameroon, the participants involved in our studies receive free CD4+ count results, as well as their viral loads, ensuring that they benefit from partaking in our research studies. Newly diagnosed patients are pre and post-counseled by well-trained staff of the CSCCD and is properly orientated to meet the clinicians with regard to the administration of combination antiretroviral therapy. With regard to our HPV-related research, we have organized free screening for Cervical Cancer in rural communities in Cameroon. The CSCCD is one

of the few laboratories in Cameroon well equipped to genotype HPV as well as HLA typing [3]. Our work on Chronic Obstructive Pulmonary Disease (COPD) is focused on levels of inflammation amongst smoking and non-smoking patients post-TB treatment and searching for signature markers to use for screening of COPD in resource-limited settings. We also investigated the role of hepatitis B in patients with liver disease, particularly those with liver cirrhosis. This in particular, is geared towards enhancing the management of patients infected with viral hepatitis. Our enriched research expertise in the collaboration is illustrated in Table 3.

**Table 3.** Research Expertise Included in the Collaboration

No	Principal Investigators/Research team	Field of expertise
1	Dr. Graeme Jacobs (PhD)	Institutional Principal Investigator in Molecular Biology and Medical Virology research.
2	Dr. George Ikomey (PhD)	Immunology/Vaccinologist
3	Dr. Fokam Joseph (PhD)	Medical Virology and Research Ethics
4	Dr. Emilia Lyonga (PhD)	Medical Microbiology
5	Dr. Jacky Bikio (PhD)	Immunology/ Microbiology
6	Prof. Charles Fokunang (PhD)	Toxico-pharmacogenomics/ molecular biology and Clinical trials/Bioethics
7	Prof Estella Achick Tembe (PhD)	Clinical pharmacology/pharmacokinetics
8	Prof. Marie-Claire Okomo (PhD)	Immunology/infectious diseases
9	Dr Bayaga Herve (PharmD)	Pharmacists
10	Dr Eustace Beringyuy (PhD)	Medical Biochemistry
11	Mr Njinkio Nono Borgia (DEA)	Biochemist
12	Dr Tabi Yves (Pharm D, DEA)	Pharmacist/Toxicologist
13	Prof Mbopi Keou (PhD)	Medical Virologist/Infectious Diseases
14	Dr Essomba Rene	Medical Immunologist
15	Ms Mogue Ingrid	Biochemistry
16	Prof Ngameni Bathelemy (PhD)	Pharmaceutical Chemistry
17	Mr Doh Gilbert (DEA)	Medical Virologist/Infectiology

### **Benefitting Research at Stellenbosch University**

Stellenbosch University strives towards research excellence in Africa. Our partnership has given us access to unique research

specimens from communities in Cameroon, specimens we would not have obtained otherwise. This, in turn, drives quality research, scientific contributions, and outputs, especially in the form of research publications and international scientific conference

contributions. Our students and staff are eager to compare and share their findings with other networks and researchers across Africa.

### **Other Collaborative Platforms Networking due to our Partnership**

Through our sustainable collaborative partnership, we benefitted from other network

platforms developed by our partnership with other organizations. From these network systems, we benefited in their training programs, common grant submission, travel mobilization, and students exchanges. Some of these extended partnership institutions are listed in Table 4 below.

**Table 4.** Other Collaborative Platform Networking from our Partnership

No	Institutions	Status/collaborations
1	University of Pennsylvania, USA	North-South
2	Utah State University (USU), USA	N-S
3	University of Utah, USA	N-S
4	New York Medical Centre, NYU, USA	N-S
5	Council for Scientific and International Research	S-S
6	Kenyatta University, Uganda	S-S
7	Kwame Nkrumah University of Science and Technology – Kumasi, Ghana	S-S
8	Athlone Instituted of Science and Technology, Ireland	S-S
9	Madonna University, Nigeria	S-S
10	University of Ibadan, Nigeria	S-S
11	University of Nairobi - Kenya	S-S
12	Anambra State University of Science and Technology (ASUTECH), Nigeria	S-S

### **Challenges Faced**

#### **Funding**

Funding remains a limiting factor in scientific research, especially in low and middle-income countries. Without adequate financial support, sound, innovative scientific research studies cannot come to fruition. Grant applications are very competitive and are often scarce and meager, with notoriously low success rates. We have been fortunate to receive funding from various South African funders (acknowledged below) and are grateful for the awards received. We continue to search for national and international research grants to further our research efforts.

#### **Research Scientist's Mobility**

In-person research visits between institutions in Africa need to be planned carefully and well in advance. Besides securing mobility funding

– aided in our case by the International Office at Stellenbosch University – time and effort are needed to ensure that visa documents are submitted and hence issued on time. The duration of the visit should not be less than a week to maximize fruitful exchange visits. Monitoring one's mental health is vital, as most of us need to leave family and friends behind for extended periods of time, for study and work purposes. Thus, many of our researchers also need to be mentally prepared to leave families behind for a lengthy time abroad when proceeding with collaborative research projects.

#### **Exchange of Sample Material**

In the Medical Science research field, medical samples or research material often need to be shipped from one location to another. This is supported by a Material Transfer Agreement (MTA) usually put in place between the research Institutes, agreeing to exactly what

needs to be transported. In addition, as samples are transported across the border, both an export and import permit is required. This can be costly (especially transport services) as materials need to be shipped in specific manners (with dry ice for example). If proper procedures and channels are not followed, this can delay the onset of research projects.

### **Maintaining Qualified Students and Staff**

Most students look for greener pastures once they have received their academic qualifications, leading to a magnitude of able, well-qualified research scientists leaving for more affluent opportunities in the private sector or abroad. This academic exodus confirms the increasing quality of academics being produced through our collaboration. We are proud of our students when their qualifications help them secure a better future and job guarantee for themselves and their families. This creates new avenues of collaboration, with previous students and / or staff members at their new institutions.

At most institutions, research staff and academics are often not permanently employed, and their employment conditions are frequently reliant on the research awards they hold. This is by far not ideal, as these dedicated senior academics are much needed to train younger scientists. Thus, temporary academic staff are always looking for career advancement opportunities which, in order for them to be triumphant, require continuous time and effort. There are career progression obligations to spend time writing research proposals, grants and articles, with other academic duty demands. Hence, commitment and enthusiasm are needed to maintain a stable collaborative partnership within a transitory environment.

### **Lessons Learned**

#### **Justice and Fairness in Collaboration**

Justice and fairness play a vital role in the assessment of collaborations. Fairness includes recognition of expertise and scientific roles of

less visible partners. Emphasis was on recognizing the interdependence of all partners. Each side of the partnership recognized the importance of the other. However, the performance levels of laboratories in the partnership may be, without the quality of the data collected in the south, nothing could be achieved. The idea of justice and fairness has been seen as vital factors in gaining and maintaining trust in collaborations.

### **Communication**

Modern means of communication have been vital in maintaining our productivity. Students and staff are continuously in contact with each other. In the age of technology, this has become essential. We have prolifically used our WhatsApp and mobile phone communications applications for example, sometimes just to touch base with each other, and often to reflect on interesting findings or new avenues of research. This is of course aided by the more formal, at least once a week, emails, on official updates. We encourage each other to talk about our work and the state of progress. This is how valuable knowledge is shared among us. More formal communication is also essential for a more corporate network. We have now published seven peer-reviewed articles, with the hope of significantly increasing this number as our team grows and we explore new work packages as well as make progress with ongoing research projects. We motivate ourselves by publishing occasional newsletters and presenting our work at local and international conferences.

### **Respect**

Cameroon and South Africa are vastly different countries, each with their unique cultural backgrounds. South Africa has left behind painful segregation (Apartheid) and racially divided background to face the new world order. Cameroon in itself has disputes between the English and French Regions but finding a better model of living together in their



vast diversity. We thus cannot ignore working in highly sensitive political environments. However, our love for science and with the strong objective of doing Research to foster African knowledge systems, we have been determined to stay focused on our research and teaching goals whilst talking and informing each other on the unique surroundings we find ourselves in at times. The fundamental human rights principles of respect is key, respect for each other's struggles, beliefs and cultures can never be underestimated. Thus, we are not only eager to advance our scientific research efforts, but we seek cultural, social, and political factors that contribute to strengthening our daily work conditions as we have been put in a position to mentor students and staff from vastly different backgrounds.

### **Patience**

Nothing good in life comes easy, patience is a virtue. There are certainly times that we had to fight to show our projects and ideas are feasible. Starting a new endeavor and research project takes time, with input needed from many key stakeholders. The main stumbling blocks are obtaining research funding and ethics, when working with patient samples, both of which are equally important. Even among ourselves, we can be very critical about the feasibility of certain research projects. Having patience, and staying motivated, to obtain our goals is certainly needed.

### **Results and Discussion**

Development in scientific methods, funding, and policy had led to a rapid growth in the number of international collaborative networks which bring together researchers from high and low-income countries to address scientific questions in global health. This growth has led to the emergence of a number of complex ethical problems [27]. Substantial bioethics and social science literature have grown around issues including informed consent; social value and benefit sharing; community engagement;

data-sharing; the collection and export of biological samples. Despite the growth, little attention has been paid to the relations between research collaborators in different locations and between globally distributed research institutions and funders [28]. Attempts Have been made at the policy level to map out the requirements for 'fair research collaborations' [15, 16, 29], but little has been done to explore the experiences of research actors about collaboration, the difference between a good or bad collaboration or collaborator, factors that influence decisions to join collaborative research networks, and who to invite to join research collaborations they initiate. To address this issue, it is important to involve a number of actors with significant experience of participation in high-profile collaborative global health research networks [30]. Our group is made of a young scientist, post-doctoral researchers, post graduate students, mid-career research associates and principal investigators many of whom are internationally recognised in global health research.

Multiple relations have emerged from our collaborative networks and practices characterized by activities and concerns beyond the 'scientific' as commonly understood [31]. One of our main findings, therefore, is that the day-to-day conduct of collaborative research is, for experienced scientific researchers themselves, a complex interweaving of scientific, social, political, and ethical concerns.

At several points in our partnership analysis, we were expected to tease apart concerns relating to scientific practice from those to do with collaborative relationships and ethical practice, but this proved difficult. It is also apparent that addressing of our concerns is seen by scientists as part of the day-to-day work required for collaborative global health research to be both successful and sustainable. This suggests that the successful functioning of global health research networks and the production of scientific knowledge require a great deal of what might be described as 'moral

work'. The conditions required for successful scientific collaboration and the production of useful, relevant scientific knowledge involve a complex interweaving of scientific, practical, and moral practices, such as building and maintaining of trust, paying careful attention to fairness in recognition of efforts, ensuring that scientists in low-income settings are able to meet their obligations to local communities, and the promotion of mutual respect [31, 32].

We placed a high priority on research into diseases affecting people living in low-income settings. We were able to put up a lot of inconveniences and imperfections to be involved in what could be considered as good, useful science of value to the communities in which we conduct our research. Despite agreement on the factors contributing to successful collaborations, there were also key differences. These included differences of emphasis, for example a greater stress was placed on the importance of capacity building by some researchers than by others. A good example of this was the extent to which researchers viewed context as a factor to be taken into account in the judgement of whether someone was or was not a good collaborator. It was recognised by all that geographical location and limited access to resources, presented significant challenges that could sometimes affect the ability of partners to meet deadlines. However, in discussions about capacity-building and training some researchers argued that all researchers should be measured by the same standard irrespective of their context and that not to do so could be perceived as being condescending and unhelpful. Others argued that levels of training and ability were highly contextualized and that allowances should be made. Such disagreements illustrate the complexities in constructing 'good' collaborations and also the difficulty addressing all the expectations of those involved.

Although our partnership terms of collaboration did not set out to identify stable differences between institutions based on

different characteristics such as gender, role, and geographic location, other themes appeared to be expressed more forcefully by researchers in some roles. One concern was whether or not a potential collaboration was going to provide opportunities to be actively involved in cutting-edge decisions, interesting science were most strongly expressed by researchers from a more opportunity income-setting institution who were often not the leaders of the collaborations in which they were involved. Those who were involved in the management and coordination of collaborations, usually but not always in high-income countries, were those who placed a great deal of emphasis on whether potential partners were competent in and committed to good, efficient scientific practice.

The relatively small scale of our partnership collaboration inevitably has a number of limitations. Attention was paid to ensuring a range of different research roles and experiences and to geographical distribution and diversity of nationality and ethnicity. We were conscious of the fact that successful collaborations in contemporary science require access to efficient broadband connections, sequencing facilities, biorepositories, and skilled data analysts.

### **Impact of Covid-19 on the Research Collaboration?**

The COVID-19 pandemic has brought into the limelight the crucial need for international scientific collaboration in both the public and private sectors to develop sustainable health research platforms in order to address health emergencies. This requires open exchange and rapid access to sharing.

A key question for research partnership collaboration to us was how the coronavirus pandemic will affect our research and collaboration now and in the future. How well will putting in place a virtual communication work and how will the expected financial constraints affect the future of this collaboration?

It has been a challenging period for the collaboration from the onset of the pandemic. We had to put in place a virtual communication platform which has worked so far but with some challenges of power and network connection problems and time differences in organizing virtual conferences. With the COVID-19 pandemic there were health challenges among the scientist to the extent of losing the initiator of the collaboration, Dr Graeme Jacobs, to whom we pay tribute to with this publication. There has been a drop in staff recruitment, laboratory and field work, and a drastic reduction in international student flow. This in one way has reduced the country's skilled workforce. Collaboration lies at the heart of the science, technology, and innovation (STI) response to Covid-19, where national and international collaborative platforms for technology are revolutionizing especially in vaccine design and production. In this collaboration, prospects of funding have become a major challenge. Policy makers should capitalize on the momentum from the international community's response to COVID-19 to re-focus international Science, technology and innovation co-operation on global public health research problems through greater transdisciplinary research, new public-private funding mechanisms, and encourage a stronger collaborative innovation model.

## Conclusion

Global clinical health research partnership is increasingly taking the form of large-scale collaboration. Our interest in the south-south partnership is to widen the scope of research. Due to limited research settings in our context;

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collaboration has led to fulfilment in our research world. For the scientific communities themselves, the day-to-day conduct of collaborative research partnership is a challenging process tied to the interweaving of scientific, social, political, and ethical concerns.

With seven research publications and many more in various stages of completion, our work has most certainly begun to make an impact in the field of health sciences in our respective communities and countries. Maintaining a growing research partnership has its challenges, but the joy of seeing our partnership grow has made it worthwhile. Our partnership is maturing and has gained much respect among our peers. Our strength has been in aiding in capacity building while doing problem-based community driven research projects that is highly relevant in our respective countries. We continue to strive towards quality research outputs, creating a new generation of African scientists and academics and leaving a noticeable footprint behind by leading by example.

## Ethical Approval

Not applicable

## Competing Interest

The authors declare that they have no competing interest.

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