Covid-19 Pathogen Genomic Sequencing (PGS) in Africa
Request for Proposals

Applications due no later than Thursday May 13th, 2021 12:00pm, U.S. Pacific Time

Background

The COVID-19 pandemic has brought unprecedented challenges for Africa, with every country potentially at risk for unmitigated spread of SARS-CoV-2. Like most health systems in the world, there is a significant risk for current levels of care to be overwhelmed by sheer volume of patients requiring intensive care and ventilatory support. In addition, health care workers are at risk of acquiring SARS-CoV-2 and given limited infection control practices in many settings, there is also risk of nosocomial transmission of SARS-CoV-2 among patients.

The emergence of new SARS-CoV-2 variants is further raising concerns of the possibility of re-infection among those previously infected with the 'wild type' virus. A recent survey conducted by the African Academy of Sciences Scientific Priority setting initiative found that the most important questions that African scientists, health care workers and public health officials should study included the detailed epidemiology and transmission dynamics in African settings, as well as infection prevention and control for health care workers. These are questions that are widely applicable across the continent yet require local context and expertise to address in a timely and effective manner.

Pathogen genomic sequencing (PGS) has been increasingly used in wealthy countries to help respond to outbreaks of infectious diseases, from MDR bacteria to Ebola to Yellow Fever, Measles, and Polio. Already, PGS has been shown to be important in understanding the transmission dynamics and epidemiology of SARS-CoV-2 in the US, Europe, and China. PGS has been used for outbreak size estimation based on phylodynamic analyses and to identify and characterize new variants.

The emergence of new SARS-CoV-2 variants in multiple locations across the world, including in Africa, has highlighted the need for genomic sequencing in surveillance and epidemiology. PGS has enabled the identification of emergent strains and provided the ability to monitor their spread. Genomic data has allowed for characterization of mutations, providing insights into possible mechanistic changes and biological implications. These insights provide the first clue of potential impact on the effectiveness of therapeutics, such as monoclonal antibodies, and vaccines that may warrant further investigation. Furthermore, the ability for genomic sequencing to differentiate which SARS-CoV-2 variant someone has been infected with, makes PGS an important tool for aiding in the investigation of changes to transmissibility and impact on clinical outcomes of new variants.

Genomic sequencing of SARS-CoV-2 can also help in effectively managing and controlling the epidemic in the continent by providing information to allow a precise identification of transmission clusters and of mutations of the virus. The information obtained can also help in tailoring new vaccine and/or treatment efforts within Africa by for example combining genetic, clinical, and epidemiological data.

Contrary to initial models and forecasts, the reported number of cases and mortality rates reflect a markedly less severe epidemiologic picture of COVID-19 in Africa. Consequently, SARS-CoV-2 sequencing (COVID-19 genomics) may also shed some light on the underlying factors possibly explaining these differences between Africa and those other parts of the world. It is important to note that human genomics will not be covered by this call. Furthermore, sequencing can help to monitor

and characterize the changes to the genetic epidemiology of the COVID-19 pandemic after vaccine introduction. Unfortunately, PGS is not in widespread use in Africa. A rapid introduction of PGS in Africa will help in the fight to control SARS-CoV-2 and help prepare the continent for the next epidemic not yet identified.

Over the past three years, the Africa CDC has established expertise in PGS. In 2020 along with partners, Africa CDC launched the Africa Pathogen Genomics Initiative, which will include many activities to strengthen the capacity for and public health use of PGS in Africa. One such activity is the development of a continental laboratory network that will eventually have advanced sequencing capacity at national public health institutes across at least 20 African countries. Africa CDC has the mandate and vision to bring together African thought leaders in PGS in a coherent and sustainable peer network through the pan-continent Africa Pathogen Genomics Initiative. The challenge will support the parallel development of a cadre of African scientists and public laboratories who can contribute substantively to this initiative.

The Challenge

Grand Challenges Africa, in partnership with the Bill & Melinda Gates Foundation ("Gates Foundation") and the Swedish International Development Cooperation Agency (SIDA) invites proposals that will primarily support public-health-use cases of PGS in African settings to respond to the Covid-19 pandemic. Grand Challenges Africa (GC Africa) is a program that seeks to promote Africa-led scientific innovations to help countries better achieve the Sustainable Development Goals by awarding seed and full grants to the continent's most impressive solutions and has covered topics such as Data Science Approaches to Improve Maternal and Child Health in Africa, Innovation for WASH (Water, Sanitation, and Hygiene) in Urban Settings, & Drug Discovery. Through this partnership, we seek to make awards that will support increased understanding of SARS-CoV-2 in Africa for use in public health decision making.

Specifically, the **objectives** of the challenge will be:
1. Use of PGS to establish routine genomic surveillance and understand the epidemiology and transmission of SARS-CoV-2
2. Use of PGS in public health field epidemiology response for SARS-CoV-2 to investigate new virus variants and their impact on the epidemiology of Covid-19
3. Use of PGS to monitor the impact of vaccine introduction on the epidemiology of SARS-CoV-2 in terms of transmission dynamics and/or incidence of virus variants.
4. Use PGS to inform the development of diagnostics and/or therapeutics and/or monitor the impact of new product introduction.

Projects addressing more than one challenge (e.g. clinical and field epidemiology) are encouraged. In some geographies many of these challenges exist simultaneously, at different times for different populations; in other geographies only one or two of these challenges predominate. Applications should clearly state which of these challenges is being targeted and provide clear rationale for why the project is likely to address the challenge.

Applications should also state how the knowledge generated from their proposal would be produced in a timely manner in order to inform public health decision making. We expect that PGS data on SARS-CoV-2 will be shared immediately with local government health officials as well as uploaded to a standard repository for genetic data such as GISAID, NCBI or ENA, all in compliance with applicable data protection laws. Such sharing is important for the public health response locally but also globally.

Responding to the above challenges requires a multidisciplinary approach. Thus, collaborative work is highly encouraged.

What We Are Looking For:
We will highly preference funding for projects in national public health institutes or other public laboratories with links to the public health systems that focus on pathogen genomic sequencing.

All applications should:
- Describe how laboratory and staff can immediately put to use PGS technology at your site to respond to at least one of the challenges listed above.
- Describe how the data generated from your project will be used to inform public health decision making in your country and/or region in a timely manner. How will you communicate your findings and engage with stakeholders to ensure uptake and use of your findings for these public health purposes?
- Given the fast-moving nature of the research field into SARS-CoV-2, how will you ensure that the results that your work produces are timely, and the question being addressed is still relevant at the time when the results are available.
- Describe the sampling approach for obtaining specimens for genomic sequencing and how the sampling approach will be optimized to answer at least one of the challenges outlined above. In addition, describe how metadata and clinical, epidemiological or other data will be collected and combined with the PGS data to answer at least one of the challenges listed above.
- Articulate how the capacity built through the proposed project will strengthen your institute's approach to using PGS for surveillance beyond the covid-19 pandemic.

A few of the many options we will consider include (but are not limited to) support for:
- Laboratory equipment, supplies and reagents needed for next generation pathogen genomic sequencing (PGS). Centres with Sanger sequencing capabilities can also apply.
- Field supplies for sample collection, transportation, storage and preparation.
- Collection of linked epidemiological data and meta-data.
- Laptop or computer with appropriate software for the analysis; high speed internet access and cloud compute time, if not provided through the Africa CDC lab network.
- Salary for personnel (including for example laboratory personnel, epidemiologist, field staff to collect samples).
- Training specific for PGS technology or bioinformatics, either online or in person.
- Travel to Africa CDC to support network development or to present findings at an international conference.
- Costs for high performance computing, where applicable.

We will not consider funding for projects that do not primarily respond to SARS-CoV-2 public health response. Human genomics will not be covered by this call.