Public Health Alliance for Genomic Epidemiology

PHA4GE Newsletter

May 2021

Editorial

Since our last newsletter there have been repeated calls in the scientific community to foster a trust relationship among scientists and the public to enhance data sharing in general and specifically in response to sharing of SARS-COV-2 data. Some of these debates have made their way to social media and have at times portrayed inaccurate information about global efforts aimed at supporting genomic epidemiology in response to the COVID-19 pandemic. The need for accuracy in news media is heightened by the fact that inaccurate material becomes mainstream when left unchallenged. The PHA4GE consortium has certainly been at the center of the data sharing debate, and it is hoped that this newsletter provides additional information to shift the "data imperialism" perception among some folks to what PHA4GE stands for and that is a community that fosters an ecosystem to support international data standards, improved computing infrastructure, and accelerated human capital development that would assist Public Health interventions. Any suggestion to the contrary would derail a pan-African effort to strengthen our continent in the midst of a pandemic.

In this newsletter you will see updates on global projects aimed at strengthening the Public Health sector to utilize bioinformatics tools. And develop computing infrastructure that would improve turn-around response times for informing a public health response to disease outbreaks. You are encouraged to explore the Ethics and Data Sharing working group space. Our future newsletters will include a public awareness article on a current topic. This newsletter sheds light on "Vaccines". We look forward to your continued engagement in an effort to strengthen public health laboratories in

general, and particularly in resource-limited countries.

Alan Christoffels

The PHA4GE Ethics and Data Sharing Platform has launched!

The **Ethics and Data-Sharing Working Group** is delighted to announce that the **PHA4GE Ethics and Data Sharing Platform** went live at the **PHA4GE Open Meeting** on 30 March 2021. During the PHA4GE meeting, we were able to introduce the aims and functionality of the platform, as well as launch the **call for applications for small grants to fund ethics and data sharing projects**. Since then, we have added more than 70 new user accounts and more than 2 700 page views, with a variety of projects and new discussion threads started.

If you haven't visited yet, we do invite you to **join** and also have a look at our funding opportunity for small grants which might be suitable to support your ethics and data sharing projects. We will be accepting applications until the 26th May 2021, but please be sure to read the application requirements and ensure you fulfil them all before submitting. You can find all this information on the PHA4GE Ethics and Data Sharing Platform, in the Funding section. We are looking forward to hearing all about your ideas to promote ethics and data sharing research!

Nicki Tiffin

Ethics & Data Sharing Working Group Chair

Secretariat News

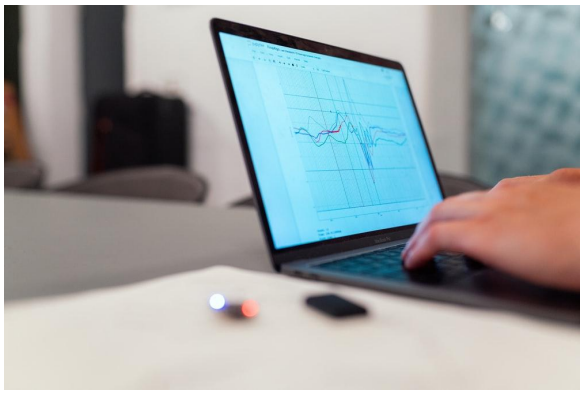
We have a call for **sub-grants** to promote sustainable development in Ethics and Data Sharing to support Public Health.

We also successfully hosted our first ever Open Meeting on the 30th of March 2021. A summary report, video and presentation slides can be found here.

Stay posted on these events and other news on our **Website**, **Twitter**, **Facebook** and **LinkedIn** pages

---

PHA4GE Pipelines and Visualization Working Group - May 2021 Update



It's been a while since our last update but during that time the Pipelines and Visualization Working has made substantial progress. First and foremost, I would like to acknowledge the contribution of the previous chairs Prof. Torsten Seemann and Sam Minot who were instrumental in establishing the working group remit and the initial landscape review. There are many bioinformatics challenges facing Public Health in light of the COVID-19 global pandemic, some of which include: Generating consensus assemblies, raw sequence submission to internationally-accessible databases; screening samples for variants of concern; performing phylogenetic analysis to track the global transmission and variance of samples and to support local outbreak investigations to make real time public health decisions. The cumulative impact of community defined solutions has undoubtedly been a factor in improving support in resources and training over the last year.

I am pleased to highlight progress made since the last working group update was published last year. The Working Group has collaborated on a technical project highlighting Bioinformatics Solutions for SARS-CoV-2 Genomic Epidemiology. The project has been widely discussed in our fortnightly meetings and has raised key perspectives to reconcile in the

community such as infrastructure, cloud based solutions and training users to understand and apply bioinformatics techniques for analysis. Further discussions have revealed a need for increased communication and collaboration between pipeline and software developers and end users. These ideas represent important building blocks in expanding the Pipelines and Visualization community.

In the coming months, we're expecting to work strategically with the PHA4GE Sub-grant awardees in developing and promoting sustainable development in bioinformatics to support Public Health in Antimicrobial resistance and SARS-CoV-2 sequencing. In our collaboration efforts, we wish to jointly identify key best practices to build capacity in sequence data analysis and data sharing that is both interoperable and reproducible.

If any of the topics mentioned in this update may be of particular interest, please feel free to **join the Pipelines and Visualization Working Group** to participate in our discussions at our meetings or on the PHA4GE Slack Channel. Fresh contributions are especially welcome.

Last but not least, I wish to welcome and congratulate Kevin Libuit on his appointment as Working Group co-chair, and we wish him every success in his new position and look forward to collaborating on many future projects at PHA4GE and elsewhere.

Jamie Southgate

Pipelines & Visualization Working Group Chair

Data Structures: Major updates hot off the presses!

On March 30th, 2021, PHA4GE hosted the **PHA4GE Open Day**, during which members of different working groups showcased various aspects of PHA4GE's work. Data Structures Working Group lead Emma Griffiths discussed the rationale for adopting a metadata standard for SARS-CoV-2 and presented the metadata specification developed by the Data Structures Working Group

(slides and presentation links **here**). While originally published as a **preprint** in the summer of 2020, Emma presented further updates to the specification which have been added as epidemiologists expand the different types of data we would like to collect and standardize as part of our response to COVID-19. In particular, the updated specification now has consistent fields and formats for capturing information pertaining to sampling strategy, exposures that may have led to transmission events, vaccination status, whether a case represents a reinfection event, and variant information about the infecting virus. These types of data can help epidemiologists and public health professionals monitor for the emergence of variants of interest, evaluate whether particular lineages of the virus might be evading immunity, and better understand SARS-CoV-2's epidemiology and respond to outbreaks. Even broader benefits are realized when these data are collected in standardized ways, which can help to ensure data completeness and accuracy of datasets internally, or facilitate data sharing across multiple agencies. Importantly, through a collaboration with the National Center for Biotechnology Information (NCBI), the PHA4GE metadata specification for SARS-CoV-2 and the **NCBI SARS-CoV-2 submission template** have been aligned to facilitate easier tracking and submission of structured metadata and genomic data to NCBI's public repositories.

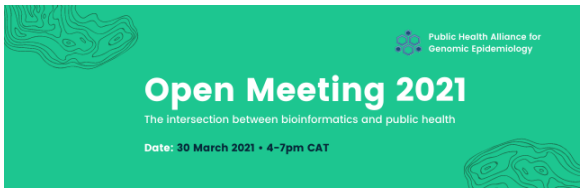
Beyond COVID-19, the Data Structures Working Group has also been focusing on data consistency within the field of monitoring antimicrobial resistance. Members of the working group developed hAMRonization, a tool that harmonizes the outputs from different AMR detection tools to improve AMR genomic surveillance comparisons and communication. Working group member Ines Mendes presented the hAMRonization tool on May 5, 2021 at the Applied Bioinformatics and Public Health Microbiology conference, which occurred virtually this year. Furthermore, we have begun piloting the tool in AMR surveillance networks such as PAHO Latin American Network for AMR Surveillance (**ReLAVRA**) and **PulseNet Latin America and the Caribbean**. If you'd like to learn more about this work, you can find Data Structures Working Group member Josefina Campos and Marcelo Galas'

presentation at the PHA4GE Open Day here (**https://pha4ge.org/open-meeting-2021/**).

Alli Black

Data Structures Working Group Member

Secretariat News



PHA4GE hosted its first Open Meeting that was a full virtual experience on the 30th of March 2021. The event had more than one hundred participants that connected globally from the fields of genomic epidemiology and public health.

Five talks and one panel discussion were on the line-up with speakers from Canada, South Africa, Argentina, United States of America, United Kingdom, Zambia and Ethiopia. These talks and panel discussion showcased real examples and responses towards pertinent global health topics that included coronavirus disease 2019 (COVID-19), anti-microbial resistance (AMR), training and workforce development in bioinformatics; and ethics and data sharing in health.

The summary report and presentations' slides and video recordings can be found **here**.

Community Profile - Peter van Heusden

Select public health laboratories across the world are harnessing their efforts in SARS-CoV-2 sequencing to manage the

COVID-19 pandemic. In the African context, South African National Bioinformatics Institute (SANBI) is one of the three specialized genomics and bioinformatics centres endorsed by the Africa CDC and WHO Africa region sequencing network to lead SARS-CoV-2 sequencing in Africa. We asked Mr. Peter van Heusden, a bioinformatician and research software engineer (RSE) at SANBI, with close to 25 years of experience, to share with us briefly on his work and the collaboration with Africa CDC.

Please describe some of the activities that you and your team focus on.

Our core team consists of three people: Shadley Wentzel, a Laboratory Systems Administrator; Ziphozakhe Mashologu (Zipho), a core research software engineer; and myself. We keep SANBI infrastructure running and induct new students to use our infrastructure. We also teach and support students on programming languages like Python and a bit of general "Bioinformatics Helpdesk". We develop new scientific workflows for *Mycobacterium tuberculosis* and SARS-CoV-2 analysis. So, our software platforms are focused on public health pathogen-oriented bioinformatics. We also network with and support bioinformatics in public health in Africa. Key relationships include Africa CDC and various labs on the continent in South Africa, Nigeria, The Gambia, Zambia, DRC and more.

How does your role at SANBI fit in the fight against COVID-19?

I've had to learn a lot about viral bioinformatics rather fast and then use that knowledge to support labs in Africa either directly or by connecting them with relevant communities of practice. We develop tools and workflows for analysing SARS-CoV-2 using Galaxy. We have the COMBAT-TB project and Zipho and myself have adapted our COMBAT-TB Workbench to analyse SARS-CoV-2. This provides an easy-to-use and easy-to-install bioinformatics workbench for labs needing to analyse samples of this virus.

As one of the three specialized genomics and bioinformatics centres endorsed by Africa CDC and WHO to lead SARS-CoV-2 sequencing in Africa, please describe your support efforts among regional COVID-19 sequencing laboratories.

We have largely been working on the Africa CDC level, and helping them develop the Pathogen Genomics Initiative that supports their SARS-CoV-2 analysis plans. There are nine regional COVID-19 sequencing laboratories across Africa and we are involved with three of these on Africa CDC initiatives and other projects - Nigeria CDC, NICD South Africa and also have recently started working with INRB in Democratic Republic of Congo. Our support is generally in terms of answering bioinformatics questions and doing bioinformatics analysis. For example, gap filling; but we are moving towards providing our (open source) Workbench and training for labs in the Africa CDC network and beyond.

What are the achievements/ challenges so far?

A major challenge is the lack of both human and computational resources in African public health settings. We need workforce development to ensure that software and systems engineers and bioinformaticians either work in or with public health labs. And we need to understand the demands bioinformatics places on computing, both in terms of the kinds of computers required and also in terms of how information technology (IT) is managed. Public health bioinformatics requires managing a relationship between research and routine analysis that is much more fluid than typically experienced by IT divisions.

I think the continental response in terms of standing up sequencing is something to be applauded. We have to go so much further but we're building from very little. I hope that we never forget the lessons about how important pathogen DNA sequencing is.

Besides COVID-19, what other pathogens of concern are you working on; and why are these important?

Mycobacterium tuberculosis still is a major concern and focus of my work. In a sense TB is multiple overlapping epidemics: many SA TB patients also have HIV, and within the TB epidemic drug resistant TB is a special concern:

hard to diagnose correctly, difficult to treat. South Africa has both a high TB burden and also an excellent cohort of TB researchers. We have fewer people working in *M. tuberculosis* bioinformatics, especially in the public health sector. I hope to spend more time filling gaps in this terrain in future.

OPINION: Attract or repel? The case of COVID-19 vaccines

Vaccine development is a lengthy process that could take **10-15 years**. Efforts to develop the corona virus disease 2019 (COVID-19) vaccine have turned out to be faster. **On 30 January 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern (PHEIC) giving scientists and academics the green light to start developing COVID-19 vaccines**.

In just over a year, between 11 December 2020 and 30 April 2021, five COVID-19 vaccines were authorised by the European Union (EU), U.S. Food and Drug Administration (FDA) and WHO for emergency use. These include the **Pfizer-BioNTech Comirnaty vaccine**, two **Oxford AstraZeneca vaccines**, **Johnson & Johnson Janssen vaccine** and the **Moderna COVID-19 vaccine**. On the **7th of May 2021, WHO granted emergency approval of another vaccine, Sinopharm**. However, the **Johnson & Johnson Janssen vaccine was temporarily paused due to adverse events** such as blood clots and death after the vaccination.

Within five months since the first authorisation of COVID-19 vaccines, **3.5% of the world's population was fully vaccinated for COVID-19 as of 1 May 2021**. The quick availability of vaccines and the rollout of vaccinations

deserve commendation; but some key questions linger. Is the COVID-19 vaccination rate low? Are the vaccines safe? What are the vaccine acceptance rates globally? Various answers, with some cutting across the three questions, can be derived from different publications relating to COVID-19. These reasons are largely an interplay of socio-political and socio-economic factors where individuals (un)intentionally fall on different points on two continuums: *the "vaccine eligible" to "vaccine ineligible" continuum*; and *the "pro-vaccine" to "anti-vaccine" continuum*.

Vaccine eligible - vaccine ineligible continuum

Not everyone is eligible for COVID-19 vaccination. The vaccines are not developed for children as the minimum age is either 16 years or 18years. The absence of child vaccines is a growing concern especially where there is an increase in COVID-19 **new cases** and **fatalities** among children. Amongst adults, doses are limited resulting in prioritization of high-risk groups. **Healthcare workers at high to very high risk of acquiring COVID-19, the elderly, and people with co-morbidities are some of the priority groups recommended to vaccinate**. For healthcare workers, this is largely due to them being on the frontline assisting suspected or known COVID-19 cases; and the elderly and people with comorbidities having weakened immune systems.

Safety of the COVID-19 vaccines is a concern among certain chronic conditions, pregnant and lactating women and people with certain allergies. There is little knowledge on the safety of the vaccines among people living with HIV as Phase III clinical trials of most of the authorised vaccines largely included other chronic conditions that are not HIV. Similarly, little data are available on the safety of the vaccines among pregnant and lactating mothers. The use of the Pfizer-BioNTech vaccine is not recommended for people with severe allergies. In December 2020, **initial doses of Pfizer-BioNTech COVID-19 vaccine were recommended for healthcare personnel and long-term care facility residents and Moderna COVID-19 vaccine was recommended for Emergency Use Authorization (EUA)** in the United States of America. Within

two weeks, 0,2% and 0.03% adverse events, respectively, were reported after the inoculation.

Access to cost-effective COVID-19 vaccines by national governments also plays a pivotal role on the type of vaccines available to their nations. For instance, the **COVAX facility** is described as using an algorithm or "allocation framework" for equitable distribution of the AstraZeneca and Pfizer-BioNTech vaccines largely among low and middle income countries. Of the five vaccines authorised by the regulatory bodies in Europe and United States, AstraZeneca has the **lowest efficacy rate of 60%**, cheapest cost per **dose ranging between 2- 5 US dollars per dose**, and is **"suitable for low- and middle-income countries due to easy storage requirements"**. Other nations such as **China**, **Russia**, **India** and **Kazakhstan** are seeking alternatives by developing their own COVID-19 vaccines that have varied efficacy rates with uptake within their countries and other countries.

Looking at the efficacy of vaccines, the five vaccines authorised by the regulatory bodies in Europe and the United States were determined after running larger clinical trials; but other vaccine alternatives in China, **Russia**, **India** and **Kazakhstan** have dissimilar or little data available. The efficacy rates of the five major vaccines range between 60% -95%. Most types of vaccines that are Europe and United States authorized; differ from the alternative vaccines outside these geographical regions. Some alternative vaccines are being developed using **inactivated vaccines, live attenuated vaccines and subunit vaccines** whilst the major five vaccines are developed using **messenger RNA (mRNA) vaccine** and **viral vector vaccine**. **Pfizer-BioNTech** and **Moderna** are mRNa vaccines whilst **AstraZeneca** and **Johnson & Johnson Janssen** are viral vector vaccines.

Pro-vaccine - anti-vaccine continuum

Research was conducted amongst sub-groups in countries with high COVID-19 incidence rates. **In June 2020, a survey amongst the adult population across 19 countries** indicated that vaccine acceptance rates were over 80% amongst the Asian respondents in China, South Korea and

Singapore; relatively high among middle income countries such as Brazil, India and South Africa; and less than 55% in Russia. In another **survey amongst the adult population in Kuwait**, the willingness to get vaccinated against COVID-19 was moderate to relatively high. Willingness to get vaccinated increased as the self-perceived chances of contracting the infection increased.

Evidence relating to adverse events and other factors, have led to an increase in **vaccine hesitancy, a threat to immunization programs**. For example, vaccine hesitancy amongst **medical students** and **healthcare workers** is due to concerns around adverse effects and ineffectiveness, deficient data regarding the vaccine's adverse effects and insufficient information regarding the vaccine itself. In the United **Kingdom**, vaccine hesitancy was higher in women, younger age groups, those with lower education levels, Black and Pakistani/Bangladeshi ethnic groups. Approximately one third of an adult nationally representative sample in **Ireland and UK** were also hesitant to be vaccinated. In **France**, a survey amongst an adult population revealed that 29% of the respondents would not want to be vaccinated, and of these, the majority were women. In a **Finnish study**, "the strongest predictor of COVID-19 vaccination intentions was trusting the safety of the potential vaccine". To achieve a high vaccine uptake, health information emphasising on the safety of the vaccine by health officials is promulgated.

A systematic search on the 25th of December 2020 indicated low acceptance rates among the Middle East, Russia, Africa and several European countries. Notably, surveys among healthcare workers show that vaccine acceptance rates sat at 27.7% in the Democratic Republic of the Congo and 78.1% in Israel. In other settings such as Hong Kong, low vaccine acceptance rates were noted amongst the **general population** and amongst **nurses**. Over 60% of respondents amongst adults in a survey, preferred to be **vaccinated out of self-will** and not through a compulsory program.

What next?

The complexities around the development, distribution and vaccine

acceptance cannot be negated. Access to correct information on COVID-19 vaccines and transparency on the type of COVID-19 vaccines available remain important for people to be informed on what choice to make on receiving a COVID-19 vaccine. We need to ensure that our efforts to stop the COVID-19 pandemic includes active engagement with the public to build trust. Anything less will be an indictment against our best efforts to find solutions to the COVID-19 pandemic.

-by Rangarirai Matima

Interested in being featured in our newsletter?

Send an email to communications@pha4ge.org

Web edition: bit.ly/3bbnxZm

Website: [pha4ge.org](pha4ge.org)

Twitter: @pha4ge

Facebook: facebook.com/pha4ge