CSIGN
COVID Surveillance Intensification Ghana Network
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Rationale and objectives

• Alongside traditional surveillance, most high-income countries routinely utilise modelling and whole genome-sequencing as part of surveillance.
• There is traditionally less capacity in these elements in LMIC settings.
• We aim to build the Ghana COVID-19 surveillance and response system by:
  – Expansion of COVID-19 testing across the existing National Influenza Surveillance Network
  – Integration of whole-genome sequencing into surveillance
  – Country specific mathematical modelling
Study design

• Multi-component observational study to enhance COVID-19 surveillance in Ghana
  – COVID-19 Surveillance across all National Influenza Surveillance Network sites
    • Individuals with ILI/SARI will be tested at Noguchi Memorial Institute for Medical Research
  – Integrate WGS into analysis pipeline
Study design

- Multi-component observational study to enhance COVID-19 surveillance in Ghana
  - Utilise line-list, mobile phone & other data sources to develop country specific modelling
  - Analyse the uptake of ‘COVID-Hotlines’ established in Ghana
  - Developing a prediction market for COVID-19 in Ghana
Surveillance and Response

Key Questions

• Can we utilise existing ILI platforms for surveillance
  – Has flu gone away?

• What SARS-CoV-2 strains are circulating in Ghana

• What impact have public health measures had on COVID-19 transmission?
Preliminary findings: Situation overview
Preliminary findings: Influenza Surveillance
Preliminary findings: Influenza Surveillance
Preliminary findings: Sequencing
Preliminary findings: Sequencing

The diagram shows the number of genomes sequenced over weeks in 2020 and 2021. Each lineage is represented by a different color, with labels like A, B.1.1.10, B.1.1.29, B.1.1.31, Other, R.1, VOC/B.1.351, and VUI/B.1.525. The x-axis represents weeks, and the y-axis represents the number of genomes. The data suggests a significant increase in sequences in 2021 compared to 2020.
Preliminary Findings: Modelling
• The reproduction number gives an indication of growing or shrinking epidemic.
• Early estimates are very subject to changes in case reporting, so we are working to refine methods to account for these changes.
Preliminary findings: Modelling

- Age-stratified transmission (published) model calibrated to the observed epidemic.
- Age-varying susceptibility and probability of showing symptoms.
- Gives matching time-varying reproduction number while altering different components of the mixing matrix (e.g. school, work, home, and other contacts) to represent non-pharmaceutical interventions.
- Allows for underreporting and estimates the fraction of the population infected so far.
- Currently developing this framework and using it to make projections with and without vaccination.
Preliminary findings: Modelling

- Figure shows cumulative averted cases and deaths in forward projections including a vaccination campaign starting 1 April of 4000 doses per day, distributed evenly to 15+ population.
- In the presence of current NPIs in place during wave 2.
- Uncertainty envelope shown in grey.
- Relatively large benefit in cases.
- No net benefit in deaths and a large amount of stochastic noise.
- This is very early work to demonstrate the planned outputs, and we are actively working on refining vaccine assumptions and improving fitting given the new variants.
Expected impact

• Improved national real-time data collection will allow
  – Targeted enhanced surveillance in response to localised outbreaks
  – Real-time assessment of interventions by government

• Project is delivered in conjunction with the Ghana Health Service
  – Direct link through to policy & implementation informed by our results
Acknowledgements