



November 2021

# Novel Coronavirus Host Genomic study - South Africa COVIGen-SA

Michele Ramsay



International 100K Cohort Consortium



# Outline

- COVID-19 globally and in Africa
- COVIGen-SA update
- Challenges & Next steps

WITS  
UNIVERSITY



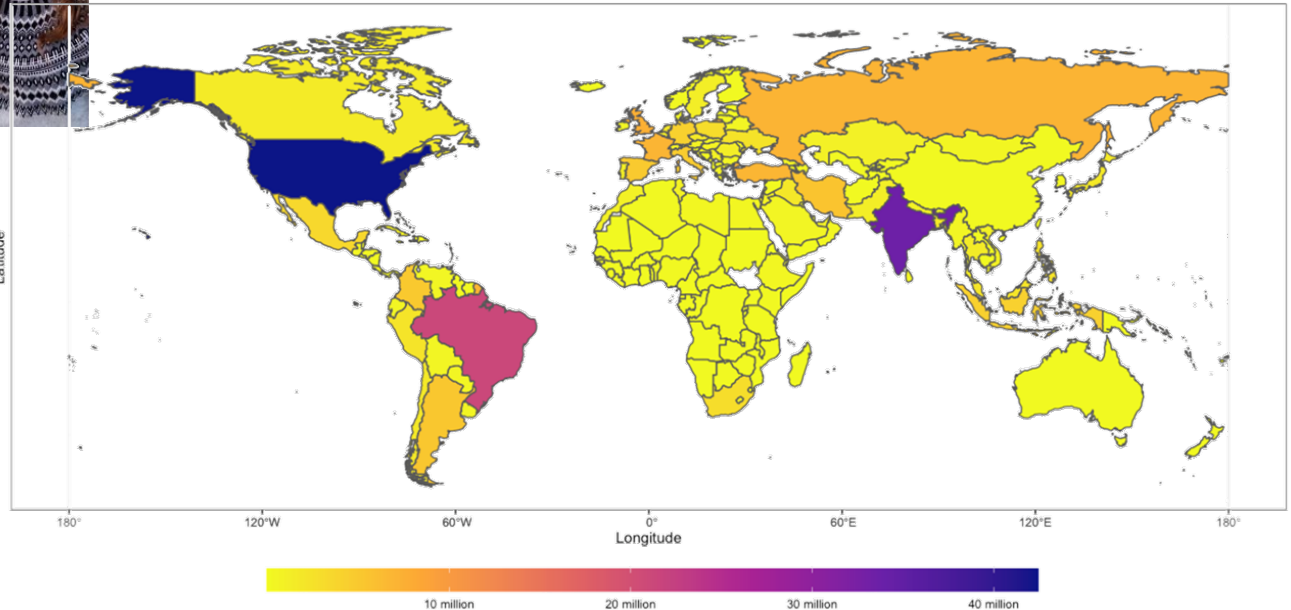
# COVIGEN-SA

## Coronavirus Host Genomics Study – South Africa

Total cases per country (as of 21 September 2021)

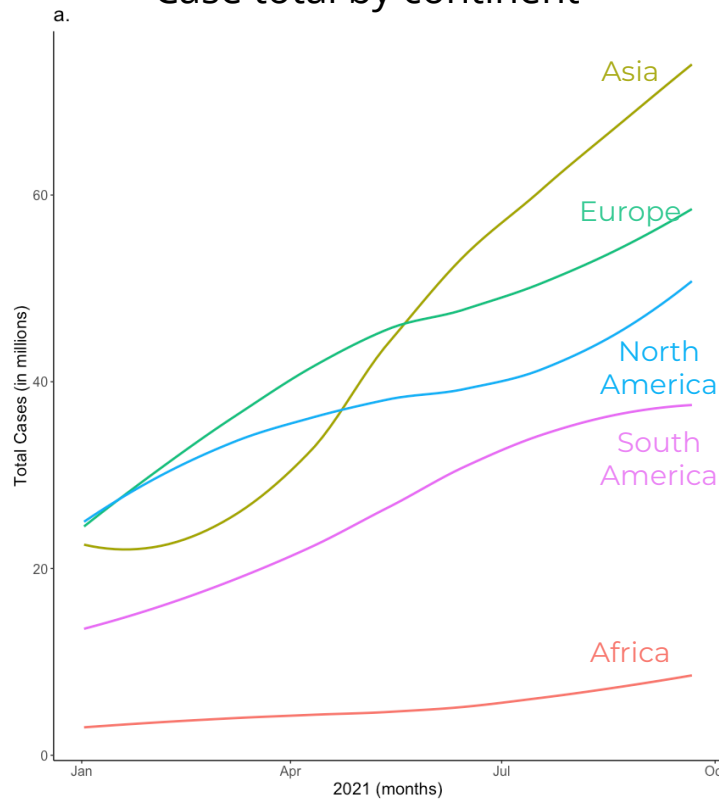


South Africa (28 October 2021)  
2,921,114 cases  
89,104 deaths

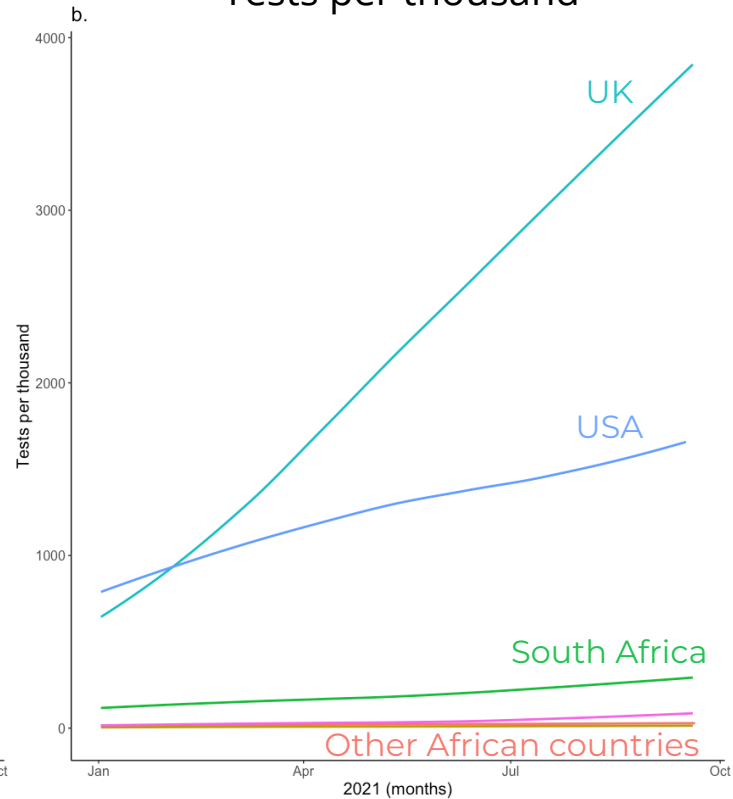




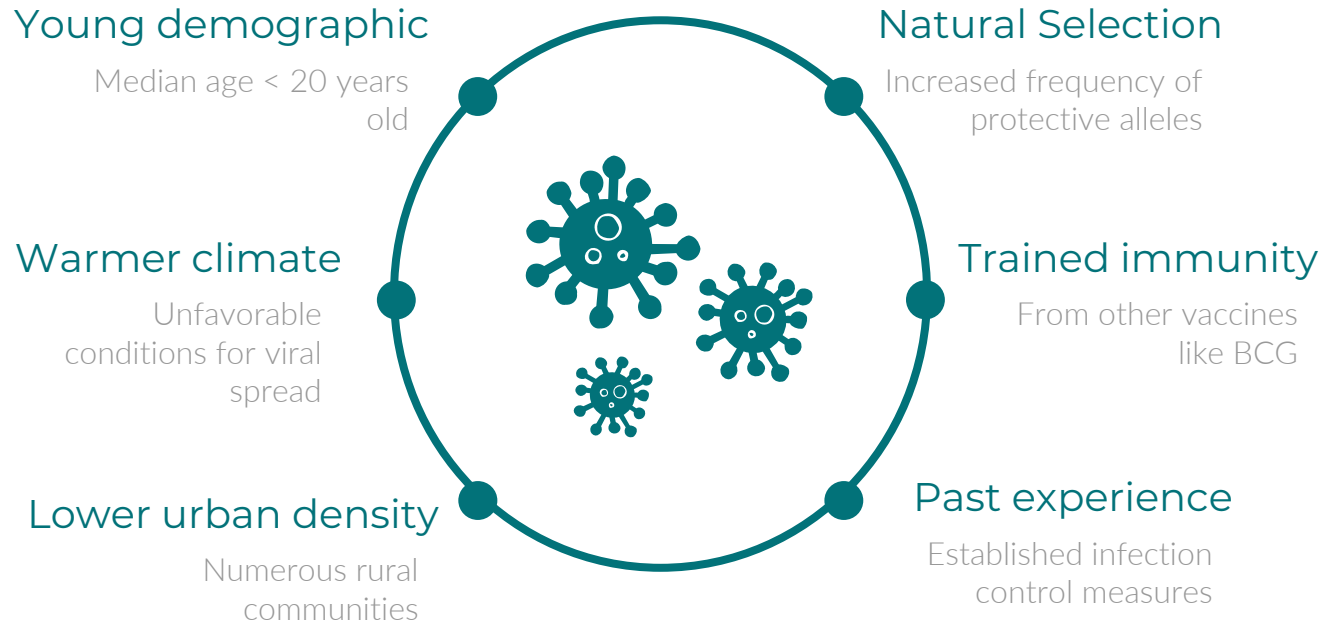
Case total by continent



Tests per thousand



# Africa's low burden





# COVIGen - SA

## **Aim**

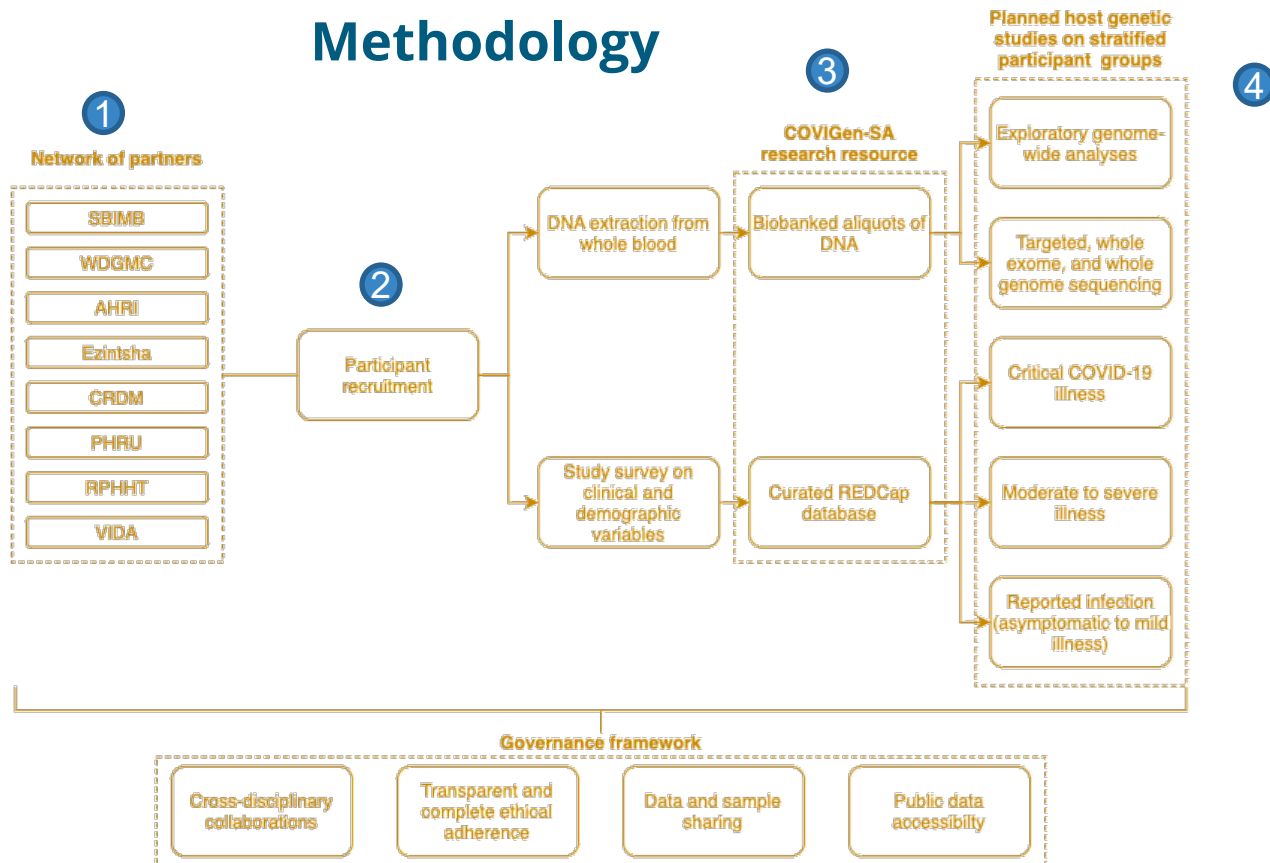
*A platform for COVID-19 research that accounts for individual variability in the genetics and health backgrounds of Black South Africans, in line with a precision medicine approach.*

## **Objectives**

1. Establish a research resource of harmonised clinical and genetic data for a large sample of SARS-CoV-2 positive Black South Africans
2. Conduct a multi-approach investigation into host genetic factors affecting COVID-19 susceptibility and severity



# Methodology




# Corona Virus Host Genomics Study - South Africa (COVIGen-SA)

Ethics: M200642  
Biobank: M200469, BEC20200401

## Partners


**Sydney Brenner Institute for Molecular Bioscience**  
University of the Witwatersrand

 **Professor Michèle Ramsay**  
Principal Investigator


 **Dr Andrew May**  
Postdoctoral Fellow

 **Heather Seymour**  
PhD candidate


**Wits Donald Gordon Medical Centre**  
University of the Witwatersrand


 **Dr June Fabian**  
Principal Investigator


 **Dr Harriet Etheredge**  
Medical Bioethicist

 **Sr. Heather Maher**  
Research Nurse


**Ezintsha**  
Wits Reproductive Health & HIV unit  
Ethics: M200974

 **Professor Francois Venter**  
Head of Clinical Research

 **Dr Simiso Sokhela**  
Head of Clinical Research

 **Nkuli Mashabane**  
Research Operations Strategy


**Vaccines and Infectious Diseases Analytics (VIDA) research unit**  
Chris Hani Baragwanath Hospital

 **Professor Shabir Madhi**  
Director


 **Dr Marta Nunes**  
Senior Scientist

 **Dr Sibongile Walaza**  
Medical Epidemiologist


**Centre for Respiratory Diseases and Meningitis (CRDM)**  
National Institute for Communicable Diseases


 **Professor Cheryl Cohen**  
Centre Head

 **Dr Jocelyn Moyes**  
Medical Epidemiologist

 **Dr Sibongile Walaza**  
Medical Epidemiologist


**MRC/Wits Rural Public Health and Health Transitions Research Unit**  
University of the Witwatersrand

 **Professor Stephen Tollman**  
Centre Head

 **Professor Kathleen Kahn**  
Centre Head

 **Firdaus Nabeemeeah**  
Medical Doctor

**Perinatal HIV Research Unit**  
Chris Hani Baragwanath Hospital

 **Professor Neil Martinson**  
Chief Executive Director

 **Firdaus Nabeemeeah**  
Medical Doctor

 **Firdaus Nabeemeeah**  
Medical Doctor

## Studies

### ADORE

A single-arm, phase 3, pilot study investigating the efficacy of Doravirine in adults living with HIV experiencing virological failure on first-line Efavirenz-based antiretroviral therapy with non-nucleoside reverse transcriptase inhibitor resistance

Ethics: 191109B

### ADVANCE

A randomised, phase 3, non-inferiority study of DTG + TAF + FTC compared with DTG + TDF + FTC and EFV + TDF + FTC in patients infected with HIV-1 starting first-line antiretroviral therapy

Ethics: 160606B

### COVER

A multi-center, randomised, open label study of Nitazoxanide (NTZ), or Sofosbuvir and Daclatasvir (SOF/DCV), compared to no pharmacological intervention for the prevention of COVID-19 disease in healthcare workers at high risk of exposure to SARS-CoV-2

Ethics: 200613B

### DORA

A single arm, phase 3 study, exploring the safety of Doravirine-based first-line antiretroviral therapy for women of reproductive potential living with HIV - a pilot switch study strategy in South Africa

Ethics: 191108

### DUACT

A randomised, double-blind, study comparing the efficacy, safety and tolerability of oral administration of Ribavirin (RBV) and Nitazoxanide (NTZ) versus placebo in SARS-CoV-2 virus infected patients

Ethics: 200903B

**Pregnant women**  
Ethics: 200405

**Healthcare Workers**  
Ethics: 200405

**Hospital Surveillance**  
Ethics: 200405

**National syndromic surveillance for pneumonia in South Africa**

A national surveillance programme aimed at estimating and monitoring syndromic pneumonia and associated pathogen, including SARS-CoV-2  
Ethics:

### PHIRST-C

A Prospective Household observational study of Influenza, Respiratory Syncytial virus and other respiratory pathogens community burden and Transmission dynamics in South Africa - Coronavirus  
Ethics: 150808

### Pot Prev

The Potentially Preventable Burden of Community-acquired Pneumonia in South African adults, in the era of widespread Paediatric PCV13 Immunisation and Antiretroviral Therapy Rollout  
Ethics: 171009

### SAPPHIRE

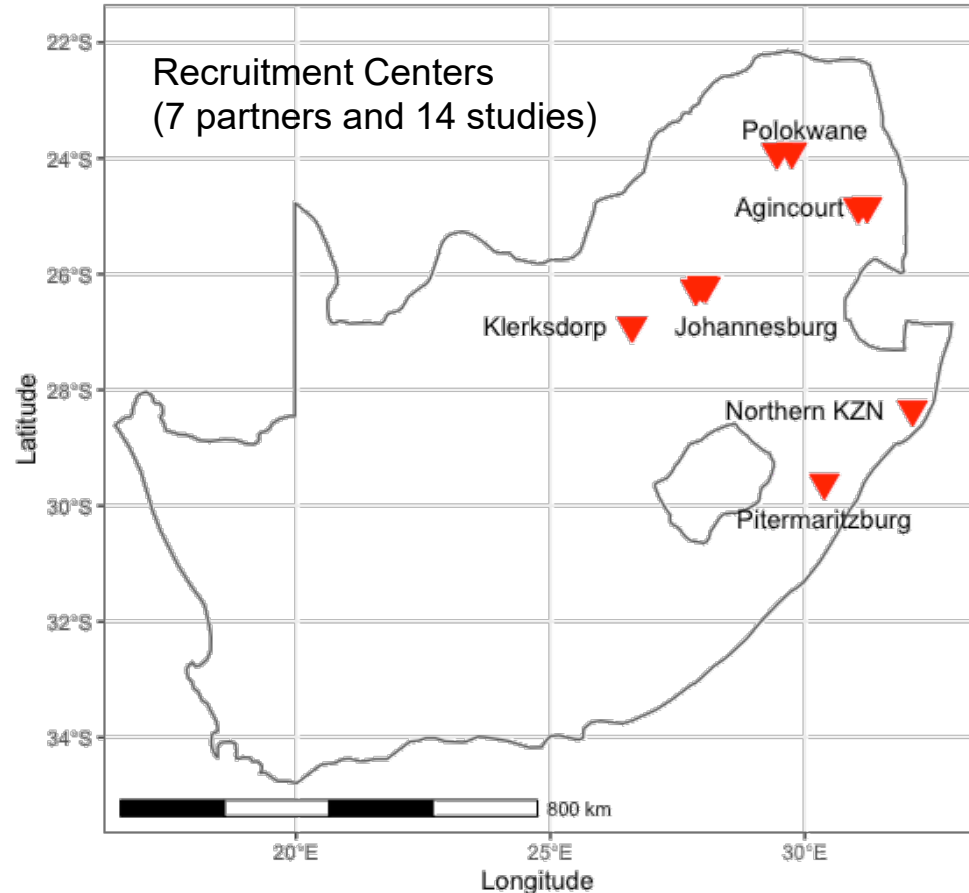
South African Population Infrastructure Network  
Ethics: 191109

 Principal Investigators



# COVIGen - SA

- Total records: **1707**
- SARS-CoV-2 positive: **1080** (63%)
- Severe COVID-19: **221** (20%)  
(supplemental oxygen, ICU admission and/or ventilation)
- Asymptomatic or mild symptoms: **859**
- Genotyped: **576**
- Additional funded genotyping: **576**

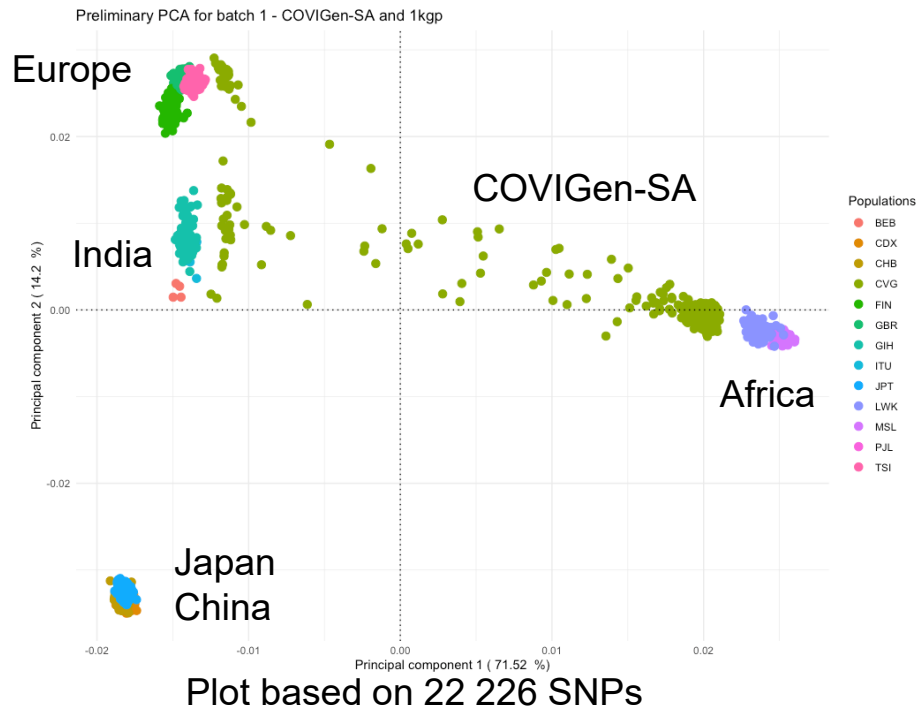


# Genotyping: Principal Component Analysis

## 572 individuals

1 517 137 SNPs following QC cutoffs:

- Missingness per SNP: 0.1
- Missingness per individual: 0.1
- Minor allele frequency: 0.05
- Hardy-Weinberg threshold: 0.0000001
- Autosomal markers only





## Challenges and Next Steps

- Integrating phenotype data
- Increasing number of severe COVID-19 cases
- Resources for further genotyping
- Focus on partnerships and recruitment
- Publish cohort paper
- Analyze preliminary data
- Partner with other host genomics studies



International HundredK+ Cohorts Consortium (IHCC)

Linking cohorts, understanding biology, improving health



AFRICAN LEADERSHIP IN VACCINOLOGY EXPERTISE

