AWI-Gen

Africa Wits INDEPTH Partnership for genomic research to understand cardiometabolic diseases risk

In the Field: Challenges and Progress

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Presented by

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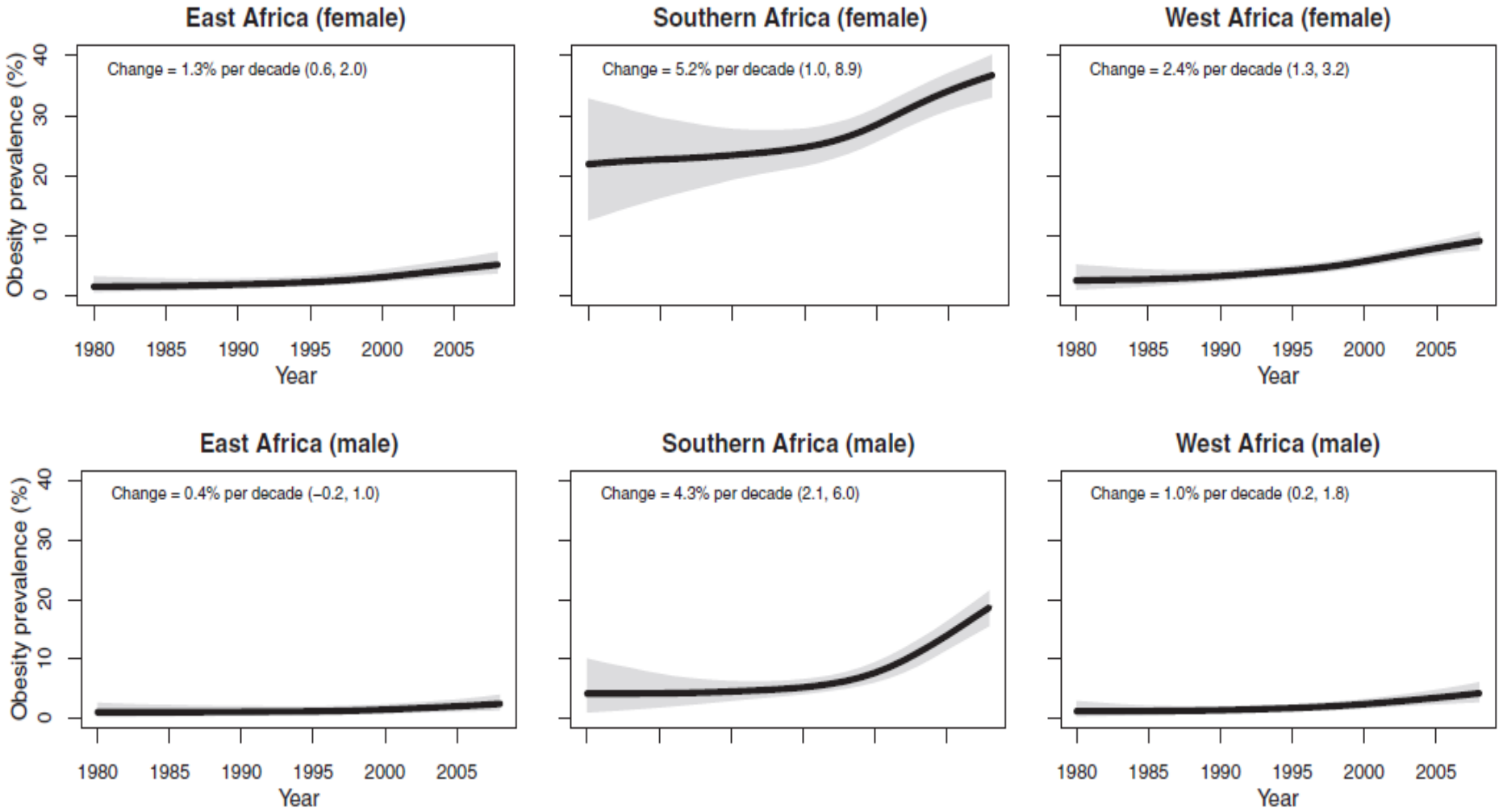
AWI-Gen, H3Africa Project , 2012-2017

SBIMB, WHC

University of Witwatersrand, South Africa

Change in obesity (1980 to 2008)



Stevens et al. Population Health Metrics 2012, 10:22
http://www.pophealthmetrics.com/content/10/1/22

GLOBAL STATUS REPORT
on noncommunicable diseases
2014

"Attaining the nine global noncommunicable diseases targets; a shared responsibility"

World Health Organization

Probability of dying from four main NCDs* (%)

- <15
- 15–19
- 20–24
- ≥ 25
- Data not available
- Not applicable

* Cardiovascular diseases, cancer, chronic respiratory diseases and diabetes

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

World Health Organization

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization

0 850 1'700 3'400 kilometers

Probability of dying from 4 Main NCDs (CVD, cancer, chronic respiratory disease and diabetes) between the ages of 30 and 70 years, comparable estimates, 2012

http://apps.who.int/iris/bitstream/10665/148114/1/9789241564854_eng.pdf

Goals of AWI-Gen project

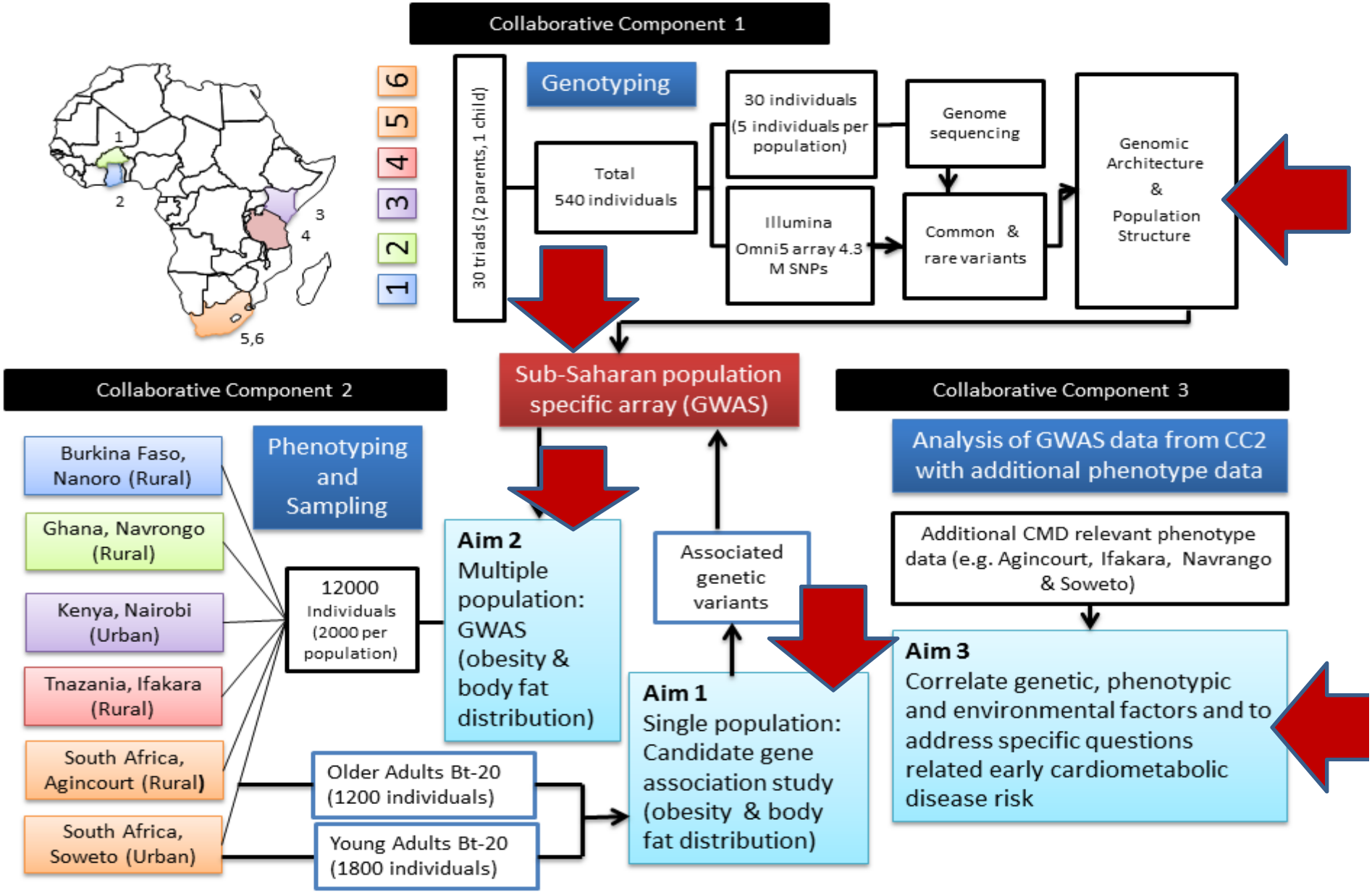
i. Understanding the genomic architecture of sub-Saharan populations to guide genomic studies

ii. Examining the interplay between genome, environmental and social contexts as contributions to body composition in African populations

iii. Establishing the consequences of body composition (obesity) on the risk of developing cardiometabolic diseases

iv. Building sustainable infrastructure (laboratories/biobanks) and capabilities for Genomics/Bioinformatics research on the African continent

AWI-Gen collaborating components



An Enabling Partnership

Wits

Wits Health Consortium

SBIMB

- Wits Bioinformatics
- School of Pathology
- School of Public Health
- DPHRU, Soweto

AWI-Gen
Wits-INDEPTH Partnership

INDEPTH Network

- Agincourt, South Africa
- Dikgale, South Africa
- Navrongo, Ghana
- Nairobi , Kenya
- Nanoro, Burkina Faso

- Training and empowerment in Genomic, Genetic and Bioinformatics
- Resource and Infrastructure development
- Focus on disease and population health
- Leading Healthier Lifestyle Changes
- High Impact Science – Tangible Benefits

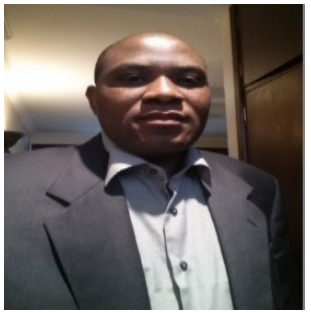
Wits-INDEPTH Strategic Partnership

Wits

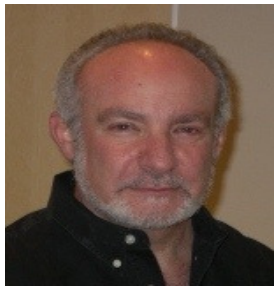



PI, Michèle Ramsay

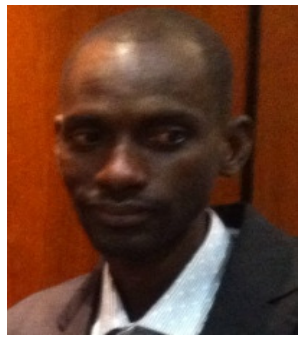
Co-PI, Osman Sankoh





INDEPTH Network

AWI-Gen at glance

AWI-Gen Study
Ethics Review
Community Engagement

Participant enrolment
Informed Consent

Participants
40-60yrs
M:F
Unrelated
Non-migr

RESOURCES

Samples	Data	Collaboration
SBIMB, H3Africa	RedCap, Wits, EGA	INDEPTH, HAALSI, SAGE

- Participant
  - Questionnaire
  - Anthropometry
  - Ultrasound
  - Samples
    - Blood
    - Urine

- **DATA & DATA MANAGEMENT**
  - **Demography**
  - **Medical History**
  - **Biomarkers**
    - **Lipid profile**
    - **Glucose & Insulin**
    - **Other**
  - **Genetics & Genomics**
    - **Population variation**
    - **Association studies**
    - **Aging markers**

Knowledge generation
High impact publications

Benchmark Progress and Achievements

Ethics Approvals

Community engagement & recruitment

- Staff training & Field Roll out (participant recruitment)
- Data and sample collection, management and shipping

DNA extraction

- Submission to H3A Biorepository (process started)

Genomic data generation

- Flagship project (Soweto) – publication in progress
- Submission to H3ABioNet (successful pilot submission)

Capacity development

- Postgraduate students and postdocs
- AWI-Gen workshops (planning epidemiology publications)

National and Institutional Ethics Approval/clearance

Ethical Approval/clearance	Conditions	Status
Wits University	5 Year approval	Annual renewal for NIH
Soweto, South Africa (Pilot site)	5 Year approval	Site enrolment completed
Nairobi, Kenya	Valid 1 year	Renewal date 14 July 2015
Digkale, South Africa	Valid 1 year	Renewal date 5 June 2015
Nanoro, Burkina Faso	Valid 1 year	Renewal date 6 August 2015
Navrongo, Ghana	Valid 1 year	Renewal date 30 July, 2015
Agincourt, South Africa	Valid 1 year	Renewal date 27 March, 2016
MTA, export and import permits		
All AWI-Gen sites	All sites have secured their Institutional and National Material transfer Agreement and Permits	OK

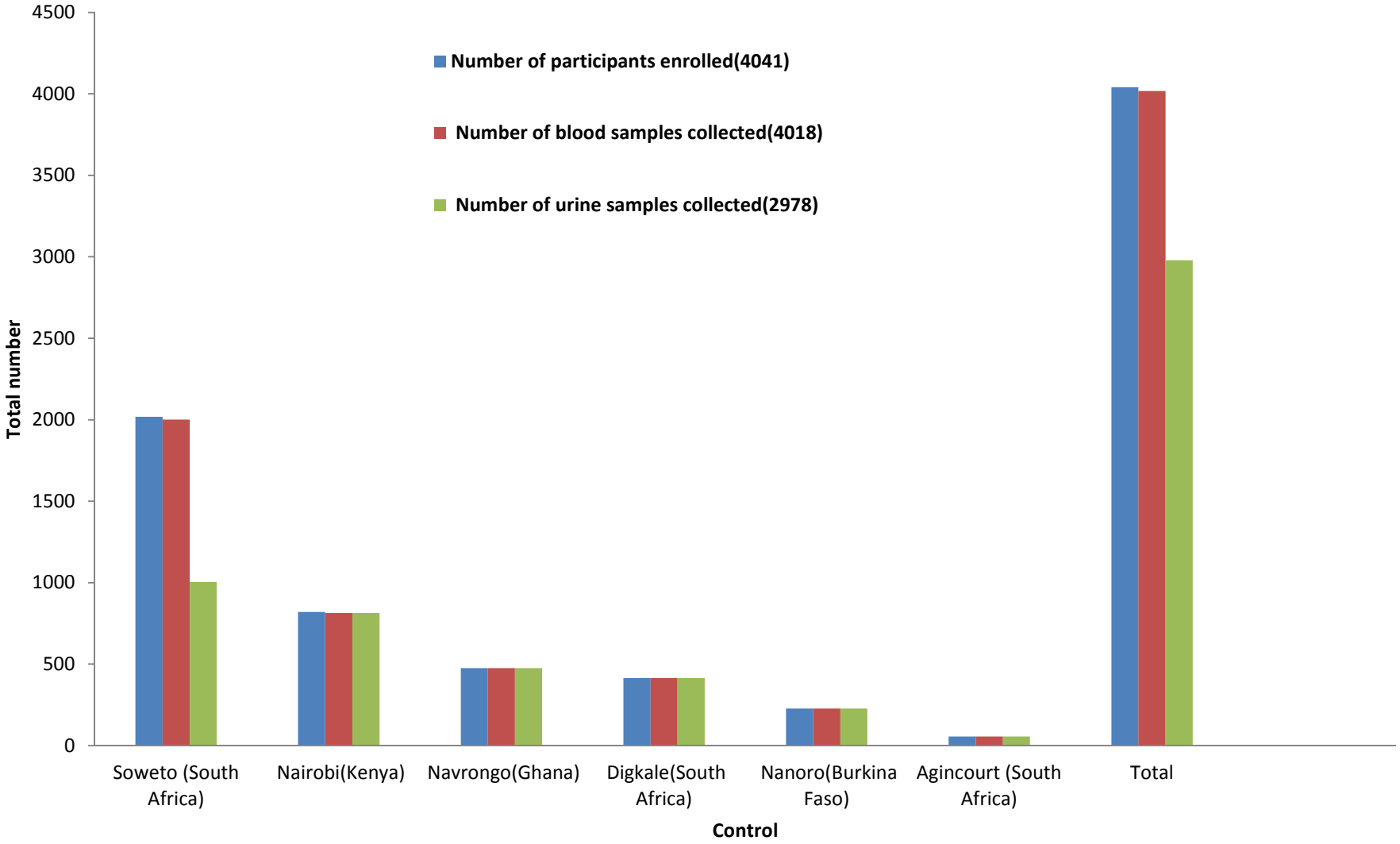
AWI-Gen Training in each Center

Community engagement and field work

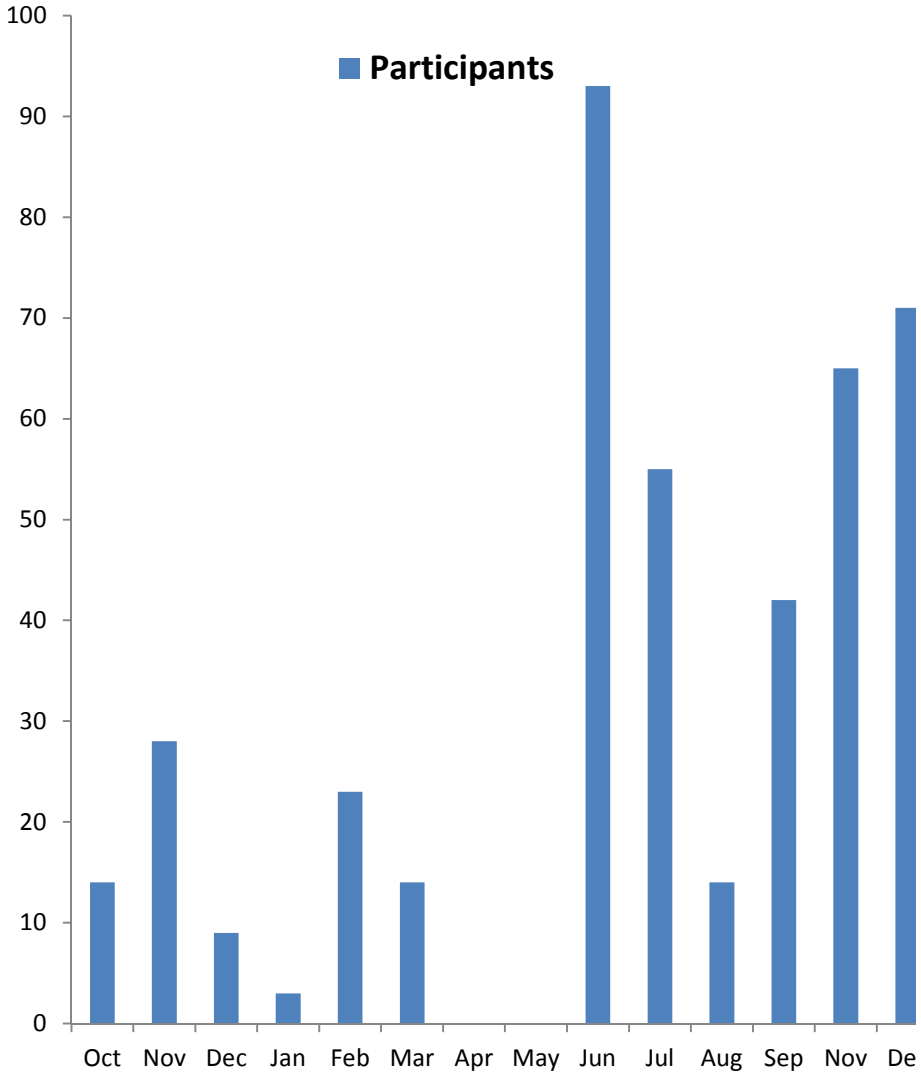
Adapting to the local contexts and realities

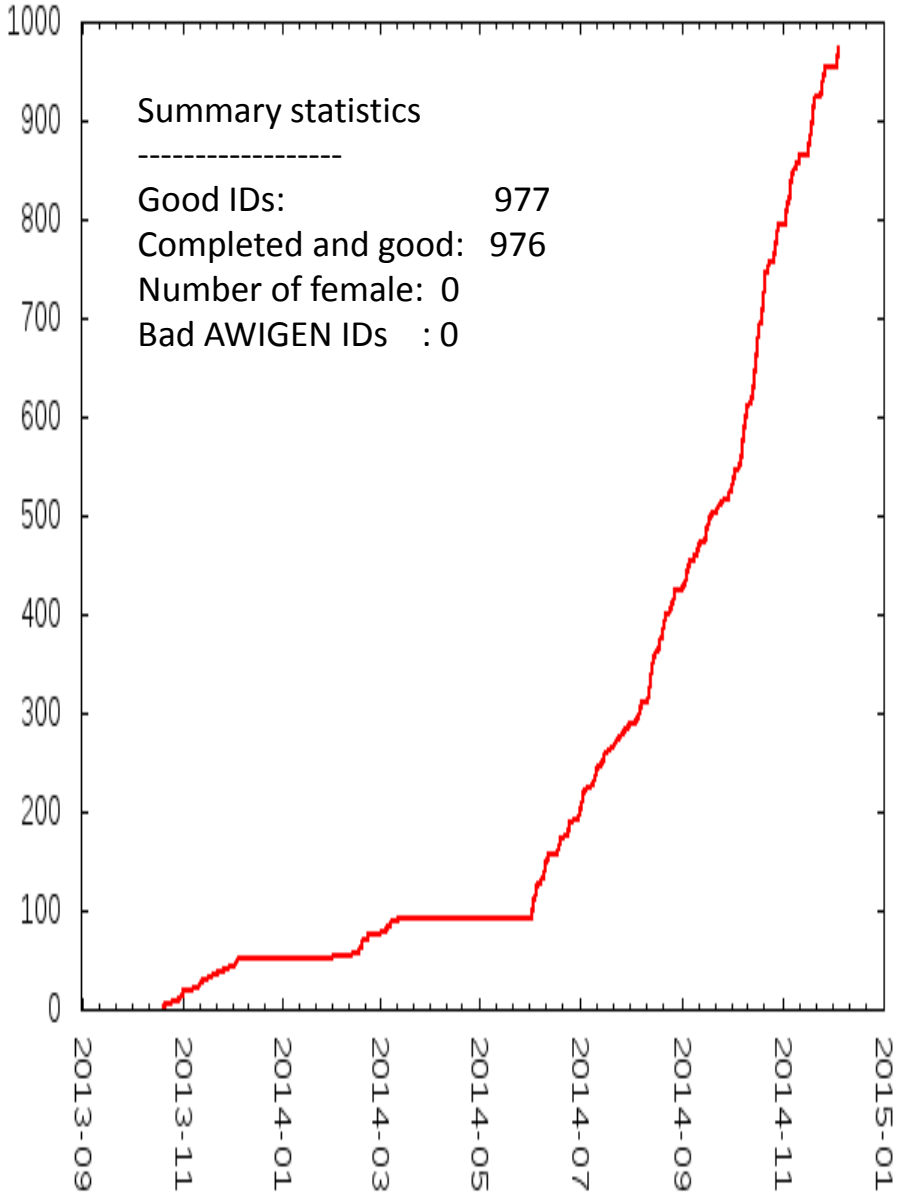
Sample collection and laboratory processing

Summary of Enrolment

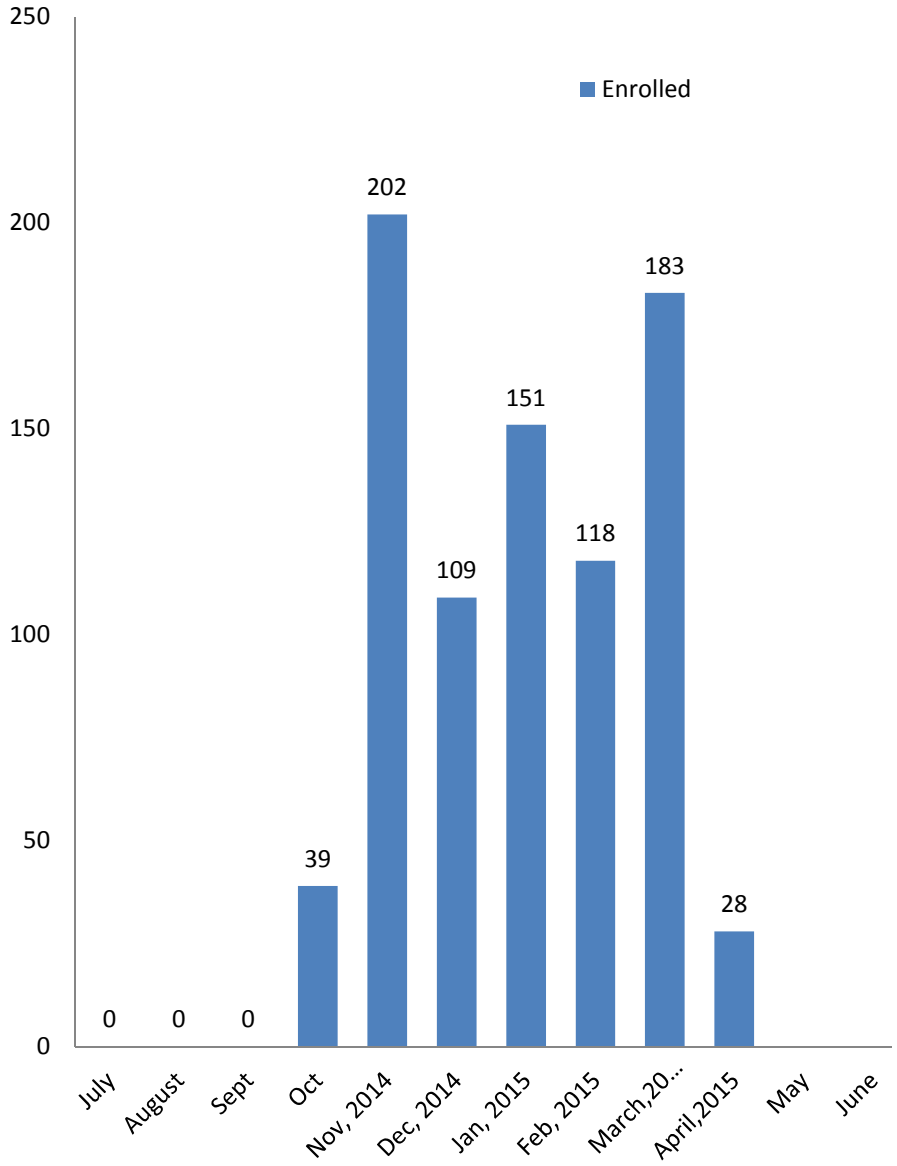


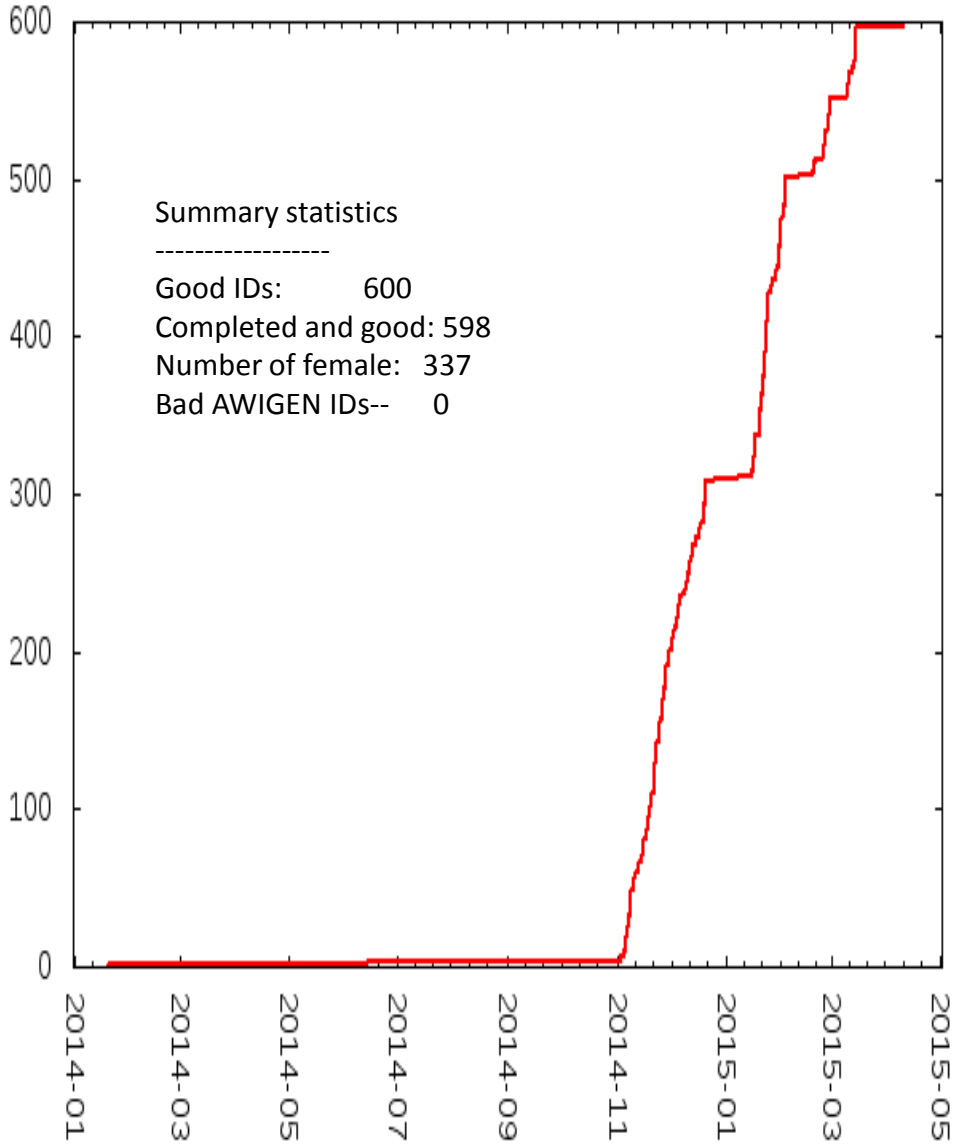
SOWETO Enrolment & Automated RedCap Report





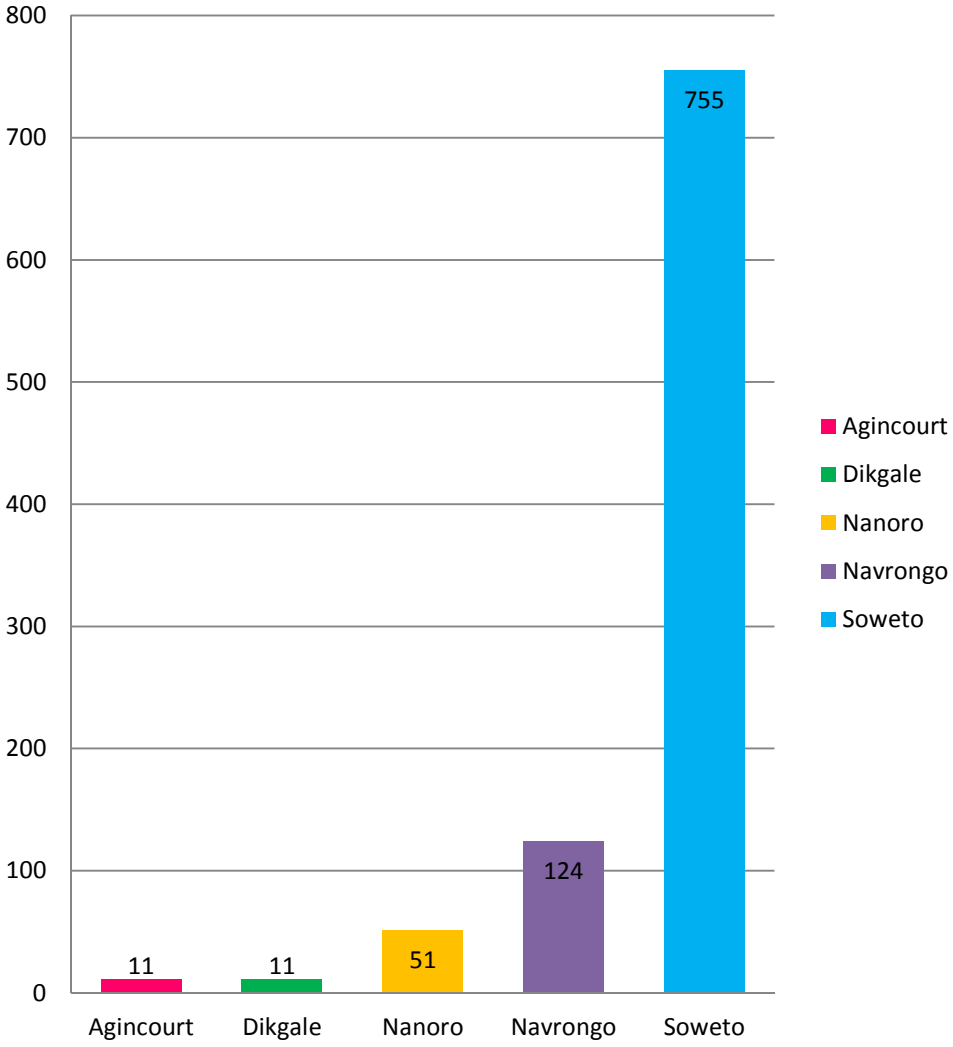
Nairobi, Kenya enrolment & Automated RedCap Report



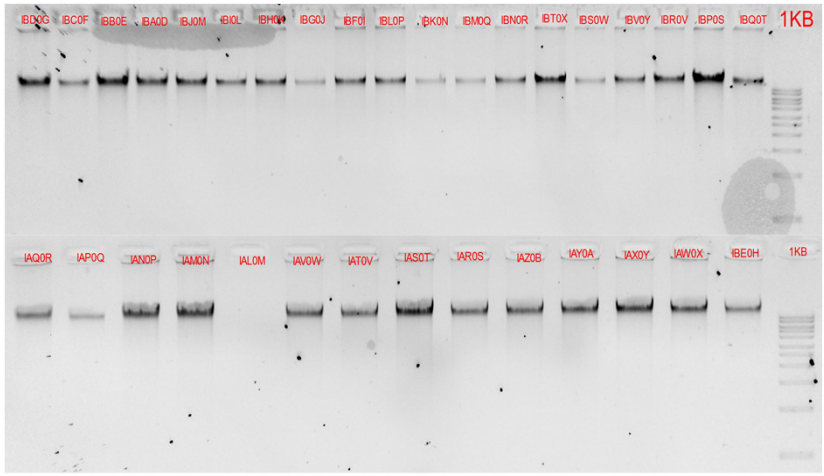


DNA Extraction & Quality Checks

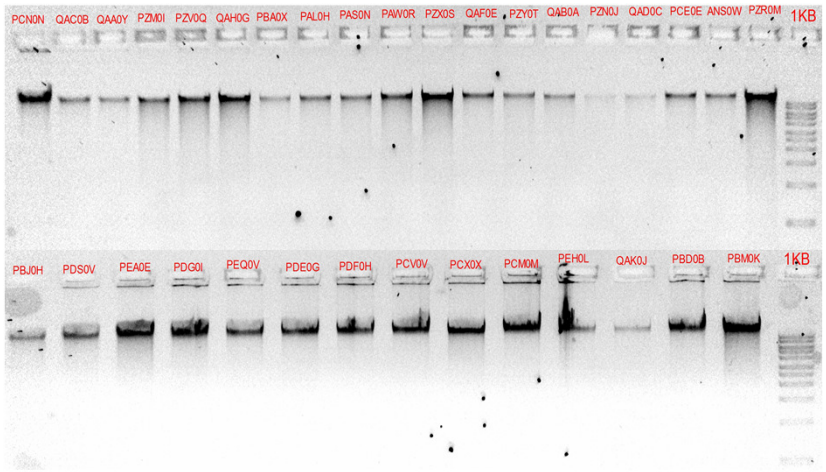
Total Number of Samples Extracted



Gel quality



NANORO



NAVRONGO

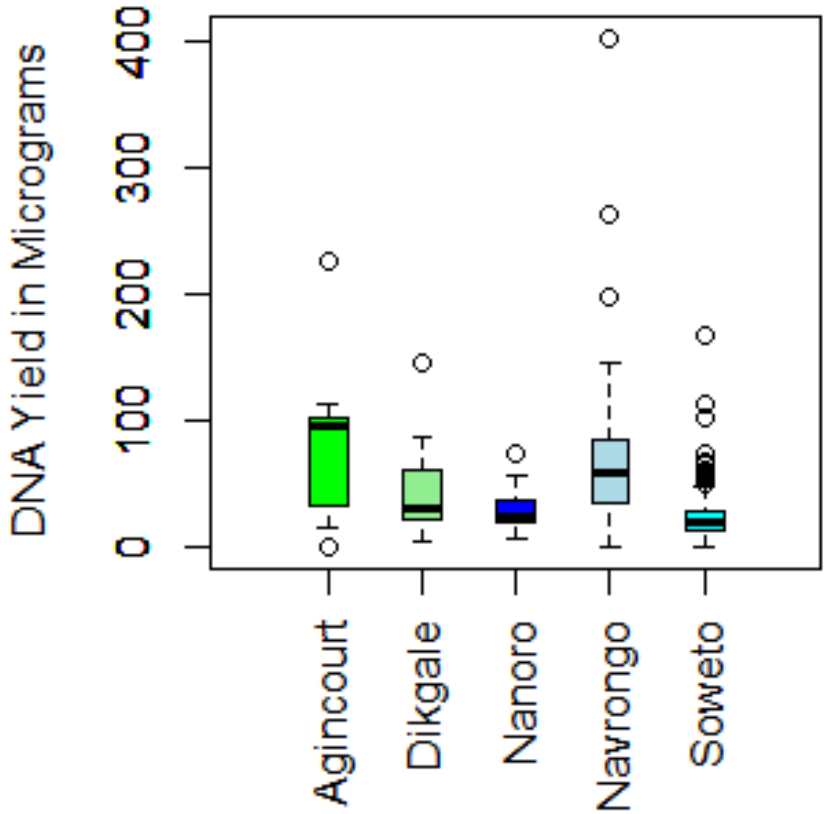
Comparison of DNA Yield

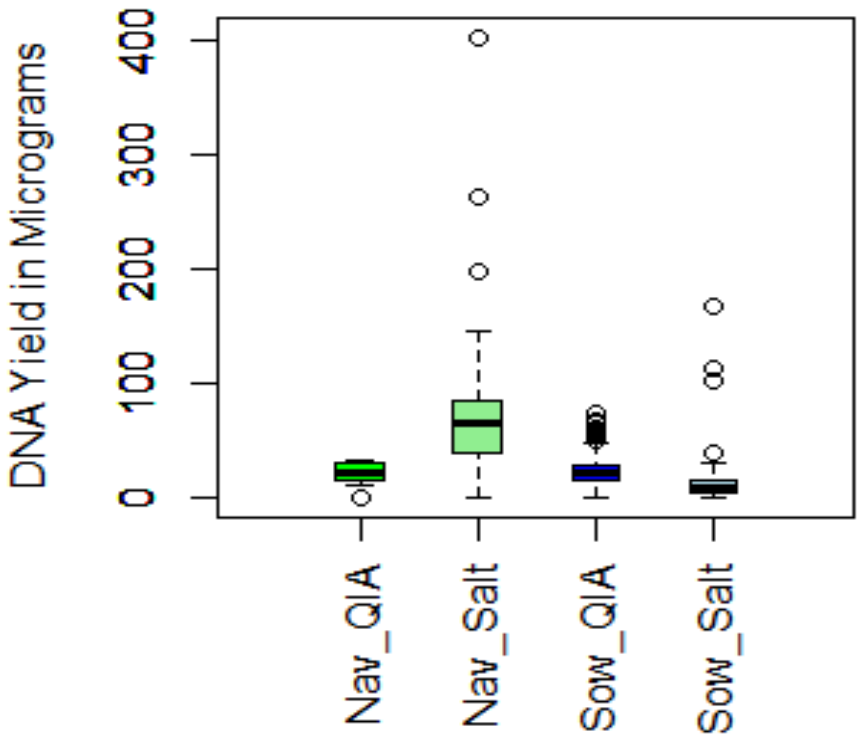
Yield comparisons:

Automated - QIAsymphony (QIA)

Manual - Salting out (Salt)

Yield per Centre





Capacity Development

Studentship

Dr Annayo Choudhury- AWI-Gen postdoc (2014 – 2016)
Venesa Pillay – PhD student (2012 – 2015)
Liesl Hendry – PhD student (2014 – 2016)
Richard Muthali – PhD student (2014 – 2016)-Malawi
Godfred Agongo- PhD student (2015-2017)-Ghana

H3Africa AWI-Gen Fellows and attendees:

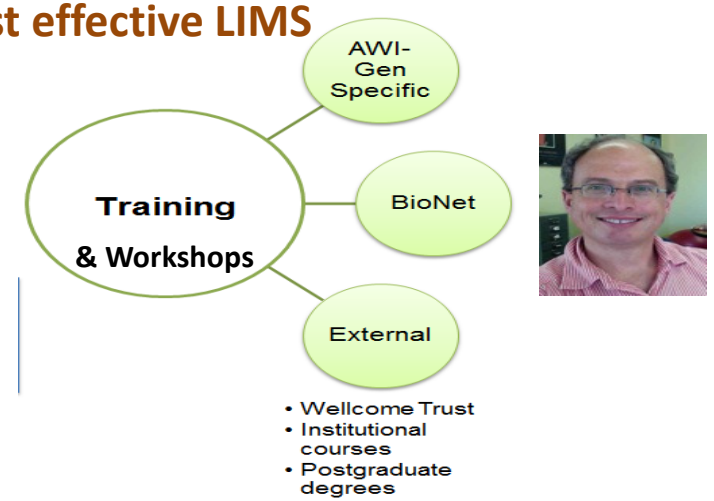
***Venesa Pillay * Rhian Twine * Pedro Pisa * Yusuf Ismail**
***Tindana Paulina, * Zane Lombard, * Scott Hazelhurst**
*** Audrey Xhosa, * Thunesh Padiachee**

Core AWI-Gen Staff

- Cassandra Soo, Freedom Mukomana, Yusuf Ismail, Zodwa Mthembu, Nathalie, Ernest Tambo

Infrastructure & Facilities development

- **Accreditation of Wits BioNet node**
- **IT & Redcap in each Center**
- **SBIMB biorepository and laboratories**
- **Nairobi Laboratory equipment**
- **Data management**
- **Cost effective LIMS**



AWI-Gen POSTER presentations

Characterizing the genetic risk for obesity/body composition in a black South African cohort.
Venesa Pillay[1,2], LM Hendry[1], A Choudhury[1], NJ Crowther[3], H Soodyall[2], M Ramsay[1], SA Norris[4] & Z Lombard[1,5] *as members of AWI-Gen and the H3Africa Consortium).*

Obesity epidemiological and anthropometric indices in a black South African cohort
Pedro Pisa[1,2], NJ Crowther[3], M Ramsay[1], SA Norris[4] as members of AWI-Gen and the H3Africa Consortium).

Expected Timeline

Feb 2015 to July 2015

Activity		1 a	1 b	2 a	2 b	3 a	3 b	4 a	4 b	5 a	5 b
Training and capacity development											
Questionnaire, phenotyping, sample collection, shipping	Soweto										
	Navrongo										
	Nanoro										
	Nairobi										
	Dikgale										
	Agincourt										
African population structure											
Flagship project Soweto											
Epidemiology papers											
GWAS study											
Data analysis and publications											

Year 1a – Aug 2012 to Jan 2013
Year 1b – Feb 2013 to July 2013

July 2017

AWI-Gen Strengths

- **Leveraging on long standing INDEPTH demographic health and surveillance network**
- **Diversity within AWI-Gen CC**
  - Different countries and ethnolinguistic groups
  - Different disciplines (epidemiology, genetics, bioinformatics, public health)
  - Expertise across research interests (metabolic diseases, stroke, HIV, health economics, demography and health surveillance, population health, policy, advocacy, ageing, etc.)
- **Prior experience in big research studies and complex collaborations**
- **Nested cohorts (obesity, diabetes, HIV infected, etc)**
- **Additional extended partnerships include**
  - SBIMB-Wits
  - DPHRU
  - Harvard SPH (HAALSI)
  - SAGE (WHO)
  - Others

AWI-Gen Challenges

❖ Country specific considerations

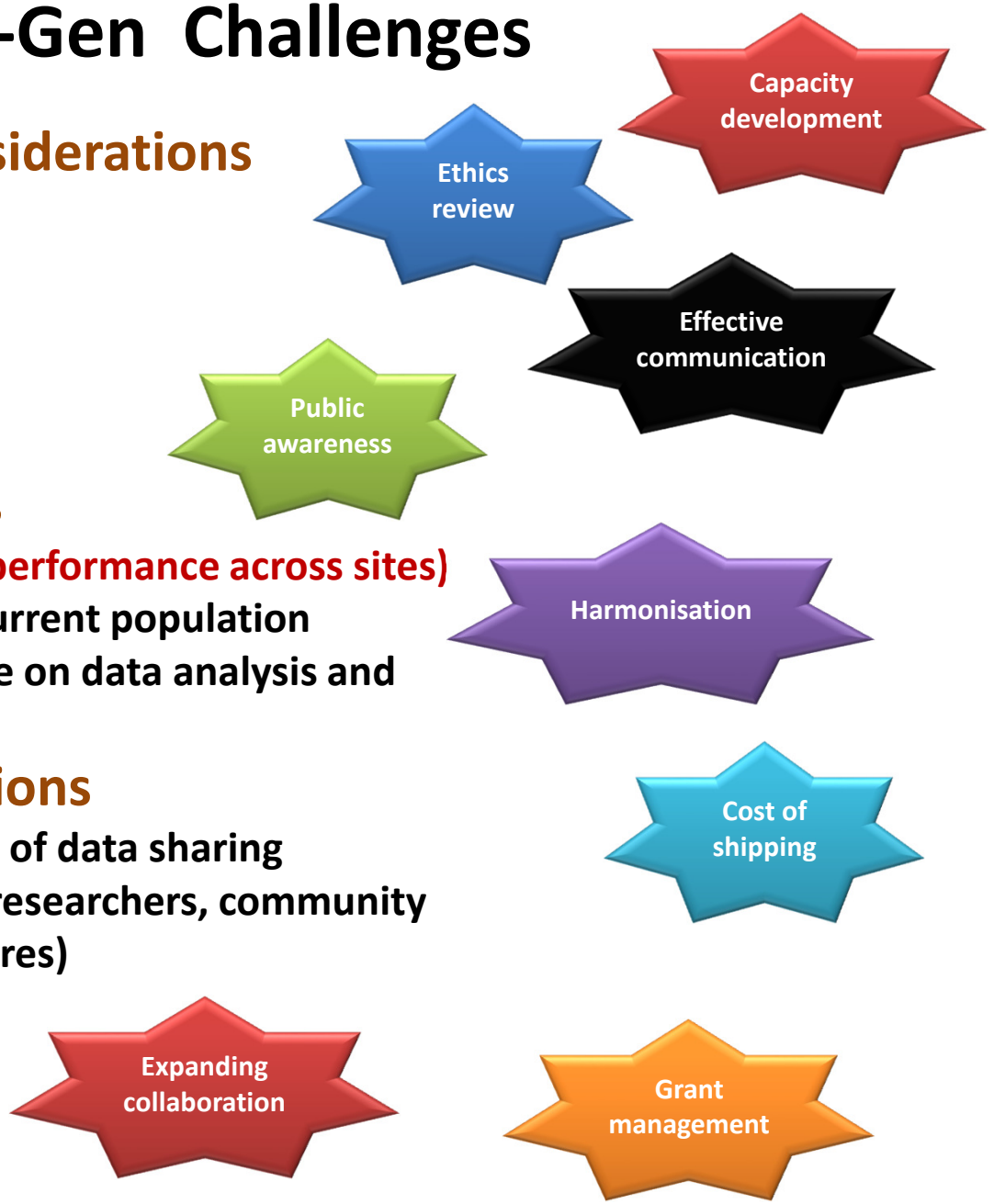
* Ethnicity and language
* Culture
* Infrastructure and Facilities
* Resources
* Burden of NCD
* Health transition

❖ Study considerations

* QC (sample, data, staff performance across sites)
* Impact of historic and current population migration and admixture on data analysis and interpretation

❖ Universal considerations

* Buy in to the philosophy of data sharing
* Knowledge transfer (to researchers, community and government structures)
* Benefit sharing



Impact of AWI-Gen

Short Term

- Active participation in H3Africa WGs (African Array Design; CVS WG)
- H3ABioNet node
- Workshops in bioinformatics, data management and genomics

Medium Term

- Capacity building in genetics, genomics and bioinformatics
- Building an enabling infrastructure and facilities/environment
- Gathering resources and developing skills(financial and human)

Long Term

- Advocacy (medical genetics, genomics in health care)
- Establishment of longitudinal CVD cohorts in Africa/LMIC
- Promoting evidence-based information on lifestyle adaptations
- Informing NCD guidelines and policies

Acknowledgments

science
& technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

wellcome trust

Thanks

In the world of research, teamwork is very important (Christopher from AWI-Gen Kenya)