

## Meeting report

### Workshop report: building biostatistics capacity in Sub-saharan Africa-taking action

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#### Abstract

To address the need for capacity development in biostatistics in the Sub-Saharan African region and to move recommendations from previous workshops into action, we brought together biostatisticians from the region to provide an opportunity to brainstorm biostatistics capacity development in Africa, how to enhance what is being done and establish collaborative links to work together. In order to move key recommendations forward working groups were established to focus on the structure and content of a MSc Biostatistics and on the development of a concept paper for an Africa Centre for Biostatistics Excellence.

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## Introduction

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The universal shortage of biostatisticians has been documented in many countries including the US [1] and Canada [2]. In particular, there remains a critical shortage of biostatistics expertise in the developing world including Sub Saharan Africa (SSA). This has resulted in an overreliance on inputs from biostatisticians sourced from economically developed countries or the pharmaceutical industry for writing competitive grants, leading the design of trials, executing statistical procedures, conducting advanced data analysis, publishing in high profile journals and teaching biostatistics at the postgraduate level. The few biostatisticians based at universities or research institutions in SSA are generally overburdened and unable to cope with the demand for their expertise. Furthermore, important emerging fields, such as genetic/genomic research, machine/statistical learning including systematic reviews for evidence synthesis and guideline development, require the application of new statistical methods experience that is often lacking in Africa. Given the paradigm of Evidence Based Health Care that involves the review, synthesis and appraisal of evidence from various research studies to guide policy formulation and practice decisions, biostatistics is a core skill [3,4]. The need for capacity development in biostatistics in the SSA region has been recognized [5,6]. Good statistics departments do exist at SSA universities, however, they focus almost exclusively on training students for careers in the business and financial sectors, as well as for careers at research and academic institutions, rather than for careers in the biomedical field. Those statistics departments offering teaching in biostatistics generally do not link up with health sciences faculties, which mean that students do not develop a practical understanding of the clinical context, or worse, never have the opportunity to fully appreciate the value of statistics in health and medical research. What is urgently required is a sustained response to the need for biostatistics strengthening in SSA. A cadre of professional/academic biostatisticians is needed to play a leadership role in developing the academic discipline of biostatistics, contribute to multidisciplinary, collaborative research in the health sciences and train the next generation of biostatisticians.

The National Institutes of Allergy and Infectious Diseases (NIAID) demonstrated interest in strengthening biostatistics capacity in SSA by sponsoring two workshops: one in 2009 in the United States and another in 2011 in Gaborone, Botswana [5]. Researchers from both the United States and SSA attended the workshop whose principal

aim was to redefine the approach to capacity building of this key area to research and development in Africa. Participants at the workshop noted that there were large gaps in biostatistics and appropriate data management skills, hence the need for project biostatisticians based at the same institution as researchers. But it was also noted that these few biostatisticians are only available to the project and not others who also have needs for such skills. This has resulted in a lack of experience sharing with the wider health research community. The workshop also noted that the project biostatisticians are either sponsored by the developed world or they are students from the same developed world who are gaining experience from SSA where there are rich resources of data. Just as with many other industries, capacity in SSA needs to be improved to provide value-added to the research data produced in the region. The workshops concluded that training programs aimed at building both long-term and short-term capacity were needed. The key recommendation from the workshops was that SSA universities should educate and retain in-country biostatisticians at both the masters and doctoral level. Based on the deliberations of these previous workshops, the focus of the workshop discussed in this paper, was to move the recommendations from the previous Gaborone workshop [5] into action and, importantly, to establish collaborations between biostatisticians in the region as well as share experiences in building biostatistics capacity. This report details the workshop activities.

## Workshop report

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### Location and participants

From the 8-10 July 2014, the Biostatistics Unit, Centre for Evidence-based Health Care, Faculty of Medicine and Health Sciences, Stellenbosch University, hosted the workshop Building Biostatistics Capacity in sub Saharan Africa: Taking Action in Cape Town, South Africa. This brought together a group of experienced biostatisticians from the region (**Table 1, Figure 1**). Using the participant list of the NIH Botswana workshop, networks in South Africa and the Medical Education Partnership Initiative (MEPI) schools we specifically identified and invited biostatisticians working within the African region. Twenty nine participants representing Universities of KwaZulu Natal, Witwatersrand (WITS), Nairobi, Botswana, Zimbabwe, Ghana, Zambia, Kilimanjaro Christian Medical and Stellenbosch (with representation from South African Centre for

Epidemiological Modelling and Analysis (SACEMA), Department of Statistics and Actuarial Science, and Faculty of Medicine and Health Sciences) as well as the Kenya Medical Research Institute (KEMRI) joined and others sent apologies and indicated that they are interested in continuing the conversations outside of the meeting.

#### Aim and objectives

The purpose of the workshop was to establish collaborations between biostatisticians in the region as well as to share experiences in building biostatistics capacity. Specific objectives of the workshop were to 1) discuss the structure of a Master's program in biostatistics 2) establish available human resources to facilitate such a program 3) discuss potential areas of collaboration in building biostatistics capacity 4) identify other potential biostatistics training models 5) learn and share experiences from colleagues involved in Biostatistics training 6) discuss other issues affecting biostatisticians within the region e.g. enhancing methodological research productivity, mentorship, and promoting the role of the biostatistician in collaborative research 7) discuss capacity building in meta-analysis and 8) discuss the potential for an Africa Center for Biostatistical Excellence and regional units. The focus was on building consensus and capacity across the region rather than concentrate expertise in one place.

#### Facilitators

Workshop facilitators brought a wealth of multidisciplinary experience. Facilitators included a professor in biostatistics, from Lesotho and now working at McMaster University; the head of the Department of Interdisciplinary Health Sciences at the Faculty of Medicine and Health Sciences, Stellenbosch University; the head of the Department of Statistics and Actuarial Science, Stellenbosch University; and staff from the Centre for Evidence-based Health Care and South African Cochrane Centre. Participants from regional universities shared their experiences in programmatic offering through formal presentations and discussion.

#### Programme

Over 3 days participants engaged to discuss and share experiences. **Table 2** outlines the 3 day programme. It provided an opportunity to brainstorm biostatistics capacity development in Africa and how to enhance what is being done and establish and further collaborative links to work together. After considering the

key role of biostatisticians in the design, conduct, analysis and reporting of research; the limited number of biostatisticians in the region and the paucity of masters programmes in the region, participants were very supportive of working together to increase and enhance the number of such programmes in the region. Time was spent on discussing the structure of a Master's program in biostatistics, lessons learnt from other similar programmes, the proposed competencies (**Table 3**), and collaboration in building biostatistics capacity. Graduates of these programmes should be empowered to play leading roles with respect to consulting, methodological research, management, entrepreneurship and mentorship in the field of Biostatistics. Another important related point was to improve the Biostatistics literacy among researchers, medical personnel, non-statisticians and the public through good teaching and dissemination. Underpinning all discussions and planning were the shared mission that it is now time for action and that by working together, both within country and across countries in the region, we will achieve much more. Role players from different institutions in the Cape Town area realised that collaboration between them to build Biostatistics capacity is of the utmost importance. It was also encouraging to observe that these institutions accepted the challenge to work together in structuring a jointly offered Masters Programme in Biostatistics and that the other participants in the workshop sanctioned this vision. A half-day session was spent on meta-analysis. It commenced with a presentation and discussion on Reducing waste in research: role of systematic reviews [7] followed by a presentation on Uses and misuses of meta-analysis. We then reflected on current training initiatives in meta-analysis. These include formal training, mentoring, online tutorials, learning by doing reviews and meta-analysis, and peer review. In building capacity in meta-analysis, participants raised the need for collaboration, sharing expertise in the region, mentorship, linking authors of systematic reviews with Biostatisticians, training, resources and for getting involved in doing reviews.

#### Recommendations for action

To move key recommendations forward working groups were established. One is focusing on the structure and content of a MSc Biostatistics. This group is mapping existing programmes (experiences, structure), engaging with other stakeholders (academic institutions, research institutions, those who could not attend the workshop, etc.), and thinking through programmatic offering. Another group is working on the development of a concept

paper for an Africa Centre for Biostatistics Excellence. The group also worked together to apply for a Wellcome Trust DELTAS grant which has consolidated the experience and enabled us to build confidence that we can make this happen. The two working groups hold monthly teleconferences to provide updates on their progress and discuss ways to foster collaborations and partnerships in biostatistical capacity across institutions in SSA region.

## Evaluation

Participants liked the multidisciplinary approach and geographical distribution of workshop participants. They particularly liked the networking and sharing similar experiences, openness, opportunity for sharing ideas and having discussions, the rich interaction, and the chance to meet a range of people with similar interests. Some participants wanted their role to be more explicitly clarified prior to the workshop and wanted more content on meta-analysis. **Table 4** summarises evaluation feedback. Overall the responses from participants' evaluation of the workshop suggests that participants rated the workshop as excellent and felt that the set objectives were met. Given that not all regional biostatisticians could join the workshop there is a need to continue the engagement on biostatistics capacity development.

## Conclusion

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By working together, and by supporting each other, regional institutions and biostatisticians can address the need for biostatistics strengthening in Sub-Saharan Africa. "If you want to go fast, go alone. If you want to go far, go together. African Proverb"

## Competing interests

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Authors declare no competing interest.

## Authors' contributions

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All authors have read and agreed to the final version of this manuscript and have equally contributed to its content and to the management of the case.

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## Tables and figures

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**Table 1:** Workshop participants

**Table 2:** Workshop outline

**Table 3:** Defining Biostatistics competencies

**Table 4:** Evaluation feedback (n=15)

**Figure 1:** Geographic distribution of workshop participants (number) from the sub-saharan African region

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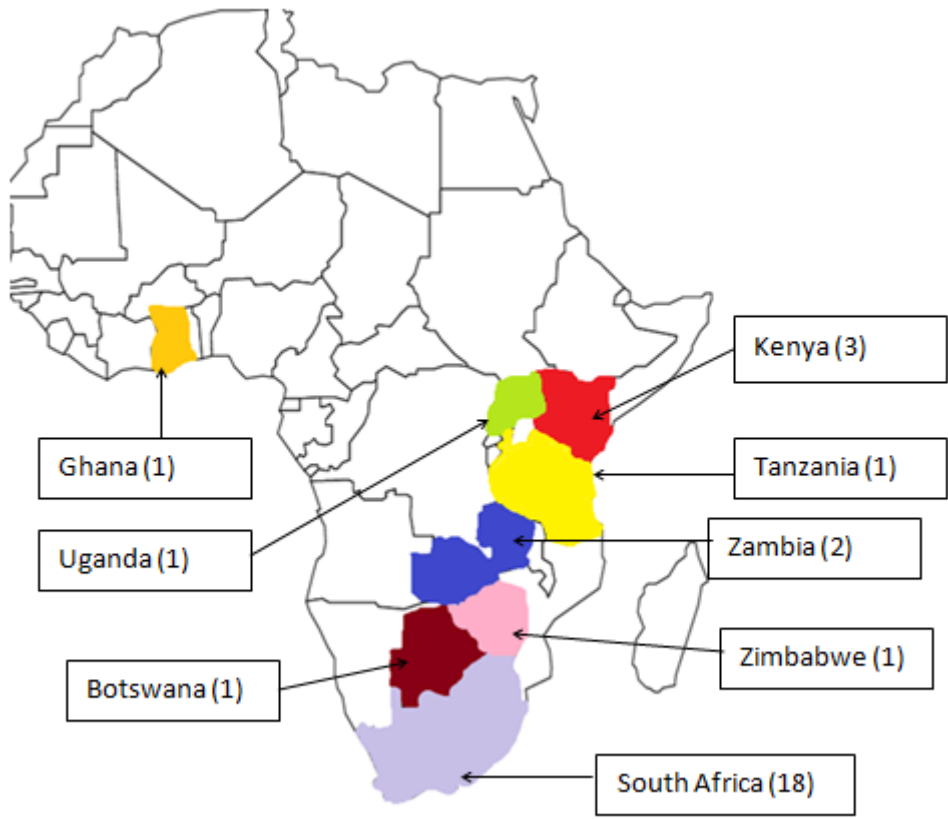
<b>Table 1: Workshop participants</b>			
<b>No.</b>	<b>Surname</b>	<b>Name</b>	<b>Representing</b>
1	Achia	Thomas	University of Witwatersrand (WITS), South Africa
2	Blay	Samuel	Kwame Nkrumah University of Science and Technology (KNUST), Ghana
3	Bukirwa	Victoria	African Centre for Global Health and Social Transformation (ACHEST), Uganda
4	Chikte	Usuf	University of Stellenbosch, South Africa
5	Conradie	Willie	University of Stellenbosch, South Africa
6	Delva	Wim	South African Centre for Epidemiological Modelling and Analysis (SACEMA), South Africa
7	Esterhuizen	Tonya	University of Stellenbosch, South Africa
8	Fegan	Greg	Kenya Medical Research Institute & University of Oxford
9	Fish	Therese	University of Stellenbosch, South Africa
10	Grobler	Anneke	Center for the AIDS Programme of Research in South Africa (CAPRISA), University of KwaZulu Natal, South Africa
11	Machekano	Rhoderick	University of Stellenbosch, South Africa
12	Mccaul	Michael	University of Stellenbosch, South Africa
13	Michelo	Charles	University of Zambia, Zambia
14	Muller	Chris	University of Stellenbosch, South Africa
15	Musenge	Eustasius	University of Witwatersrand (WITS), South Africa
16	Musonda	Patrick	University of Zambia, Zambia
17	Muzigaba	Moize	University of KwaZulu Natal Medical Education Partnership Initiative (MEPI), South Africa
18	Nieuwoudt	Martin	South African Centre for Epidemiological Modelling and Analysis (SACEMA), South Africa
19	Njiri	Francis	University of Nairobi, Kenya
20	Ola Ama	Njoku	University of Botswana, Botswana
21	Osanjo	George	University of Nairobi, Kenya
22	Rusakaniko	Simba	University of Zimbabwe, Zimbabwe
23	Sartorius	Benn	University of KwaZulu Natal Medical Education Partnership Initiative (MEPI), South Africa
24	Thabane	Lehana	McMaster University, Canada
25	Todd	Jim	London School of Hygiene and Tropical Medicine, UK and Kilimanjaro Christian Medical College Tanzania
26	Van Schalkwyk	Cari	South African Centre for Epidemiological Modelling and Analysis (SACEMA), South Africa
27	Welte	Alex	South African Centre for Epidemiological Modelling and Analysis (SACEMA), South Africa
28	Young	Taryn	University of Stellenbosch, South Africa
29	Zunza	Moleen	University of Stellenbosch, South Africa

<b>Table 2: Workshop outline</b>		
<b>Objectives</b>		
<b>Day 1</b>	<b>Day 2</b>	<b>Day 3</b>
Learn and share experiences from colleagues involved in Biostatistics training	Identify other potential biostatistics training models	Discuss capacity building in meta-analysis
Discuss the structure of a Master's program in biostatistics	Discuss potential areas of collaboration in building biostatistics capacity	
Discuss other issues affecting biostatisticians within the region	Discuss the potential for an Africa Center for Biostatistical Excellence and regional units.	
<b>Content</b>		
<b>Day 1</b>	<b>Day 2</b>	<b>Day 3</b>
Introductions and Workshop overview	Experience with course delivery methods: Models of course delivery and assessment Emerging technology for higher education	Reducing waste in research: role of systematic reviews
Capacity-building in biostatistics for better health and economic development of Sub-Saharan Africa	Building Collaborations: Enhancing teaching collaborations Methodological Research	Uses and misuses of meta-analysis
Experience in Biostatistics capacity building in Sub-Saharan Africa	Proposal for an Africa Centre for Biostatistical Excellence	Current training initiatives in meta-analysis
Masters programme in Biostatistics: defining competencies		Building capacity in meta-analysis

<b>Table 3: Defining Biostatistics competencies</b>	
Biostatistics	Biostatistical reasoning
	Statistical theory and concepts
	Practical Analytical skills
Epidemiology /research methods/ethics	Asking the right questions
	Study design
	Proposal and grant writing
	Systematic reviews
	Research ethics
Computing and data management	Data management
	Quality control
	Advanced statistical programming
Support skills	Collaboration
	Communication – oral and written
	Consulting skills
	Life-long learning
	Project management, time management, people management
	Leadership skills
	Entrepreneurial skills
	Mentorship skills
Methodological research	Statistical methodological research
	Critical analysis
	Innovative thinking



<b>Table 4:</b> Evaluation feedback (n = 15)							
<b>Please RATE these workshop aspects</b>	<b>Poor</b>					<b>Excellent</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
Format / Agenda			2	3	4	4	2
Length of workshop				1	8	5	1
Relevance				1	3	6	5
Opportunity to contribute					3	8	4
Interactions among participants and presenters				1	2	6	6
Workshop site and facilities	1	1	1	1	3	5	3
<b>TO WHAT EXTENT</b>	<b>Not at all</b>					<b>Completely</b>	
<b>Do you think these objectives were met?</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
1. Discuss structure of Master's program in Biostatistics				9	4	2	
2. Establish available human resources	1		4	5	3	1	1
3. Discuss potential areas of collaboration in building Biostatistics Capacity			1	5	5	4	
4. Identify other potential biostatistics training models	1			2	9	3	
5. Learn and share experiences from colleagues				2	8	2	3
6. Discuss issues affecting biostatisticians with the region		1	1	3	7	2	1
7. Discuss potential for an Africa Center for Biostatistical Excellence			2	4	3	5	1
Did the workshop meet your expectations?				4	4	6	1
Would you attend a similar workshop again?			1	2	4	6	2



**Figure 1:** Geographic distribution of workshop participants (number) from the sub-saharan African region