

Meeting Report

Strengthening Bioinformatics and Genomics Analysis Skills in Africa for Attainment of the Sustainable Development Goals: Report of the 2nd Conference of the Nigerian Bioinformatics and Genomics Network

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Abstract. The second conference of the Nigerian Bioinformatics and Genomics Network (NBGN21) was held from October 11 to October 13, 2021. The event was organized by the Nigerian Bioinformatics and Genomics Network. A 1-day genomic analysis workshop on genome-wide association study and polygenic risk score analysis was organized as part of the conference. It was organized primarily as a research capacity building initiative to empower Nigerian researchers to take a leading role in this cutting-edge field of genomic data science. The theme of the conference was “Leveraging Bioinformatics and Genomics for the attainments of the Sustainable Development Goals.” The conference used a hybrid approach—virtual and in-person. It served as a platform to bring together 235 registered participants mainly from Nigeria and virtually, from all over the world. NBGN21 had four keynote speakers and four leading Nigerian scientists received awards for their contributions to genomics and bioinformatics development in Nigeria. A total of 100 travel fellowships were awarded to delegates within Nigeria. A major topic of discussion was the application of bioinformatics and genomics in the achievement of the Sustainable Development Goals (SDG3—Good Health and Well-Being, SDG4—Quality Education, and SDG 15—Life on Land [Biodiversity]). In closing, most of the NBGN21 conference participants were interviewed and interestingly they agreed that bioinformatics and genomic analysis of African genomes are vital in identifying population-specific genetic variants that confer susceptibility to different diseases that are endemic in Africa. The knowledge of this can empower African healthcare systems and governments for timely intervention, thereby enhancing good health and well-being.

INTRODUCTION

Over the years, Nigeria has organized several bioinformatics trainings and workshops.¹ The Nigerian Bioinformatics and Genomics Network (NBGN) in collaboration with Landmark University, Omu-Aran, Kwara State organized the second conference of the Nigerian Bioinformatics and Genomics Network (NBGN21) from October 11 to October 13, 2021 (<https://nbgcn21conference.org/>). Nigerian Bioinformatics and Genomics Network which was inaugurated on June 26, 2019, at the Nigerian Institute of Medical Research (NIMR), Lagos, Nigeria, aims to advance and sustain the fields of genomics and bioinformatics in Nigeria.² The network, in collaboration with NIMR, Lagos, Nigeria, organized the First Nigerian Bioinformatics Conference (FNBC) in June 2019 with the theme: “Bioinformatics in the era of Genomics in Africa.”³ First Nigerian Bioinformatics Conference 19 was successful as it achieved its aim by enhancing research and training collaborations among the Nigerian bioinformatics community, for

example, a few students got internship placements in the laboratories of some keynote speakers during the conference.

The NBGN is a national initiative to facilitate collaborative activities among Nigerian bioinformatics and genomics investigators (or Nigerian-related projects) in the fields of genomics, genetics, bioinformatics, and computational biology in Nigeria, continental Africa, and abroad (<http://nbgcnetwork.org/>). Since its inception, the network has succeeded in connecting almost 3,000 registered members through conferences, workshops, webinars, hackathons, mentorship series, internship placements, regional students group activities, active engagement via its social media platforms (e.g., job postings, upcoming events, fellowships announcements, funding opportunity announcements, and support in finding laboratory hosts).

Satellite event—workshop. A 1-day Genomic Analysis Workshop was run by Dr. Segun Fatumo, Dr. Tinashe Chikowore, and Dr. Opeyemi Soremekun on October 11, 2021, at the Department of Computer Science, Landmark University. The teaching Assistants were Mr. Christopher Kintu and Mrs. Brenda Udosen. Dr. Colm O’Dushlaine, a data scientist at 54gene, made a presentation on the careers and opportunities in genomics and bioinformatics. The workshop on the introduction to genome-wide association study (GWAS) and polygenic risk score (PRS) analyses was instrumental in exposing the participants to statistical genomics methods,

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data analyses, and their interpretation. It was organized primarily as a research capacity building initiative to empower Nigerian researchers to take a leading role in this cutting-edge field of genomic data science, thereby contributing to the attainment of sustainable development goal (SDG) 4—Quality Education.

Opening ceremony. The theme for NBGN21 was “Leveraging Bioinformatics and Genomics for the attainment of the Sustainable Development Goals.” Segun Fatumo, the conference chair for NBGN21 welcomed the delegates from different countries. Dr. Marion Adebisi highlighted the benefits of bioinformatics and genomics to humankind and society. Dr. Charles Adetunji, the president of NBGN, emphasized the vision and the mission of the network. On behalf of the Chancellor, Professor Charity Aremu commended the leadership of NBGN for their pledge and proof of technical support to Landmark in driving medical scientific knowledge. The Governor of Kwara State H.E AbdulRahman AbdulRazaq, welcomed the delegates to Omu-Aran in Kwara State. Table 1 shows the details of the keynote and invited speakers.

Keynote address. Nicola Mulder shared insights on the role of the H3Africa consortium in attaining the SDGs. She mentioned that the consortium has played a great role in transforming the landscape of African genomics. She added that the H3ABioNet which is the consortium’s Pan-African bioinformatics network, has helped to build capacity and tools to enable analysis of this data on the continent.⁴ Participants were encouraged to also take advantage of these opportunities. Amy Bentley emphasized the relevance of representation of African Ancestry population in genomic research. She mentioned that most of the genomic research conducted used data from individuals with European ancestry. According to her, such approach is limited in terms of clinical translation of genomic findings and health disparities.⁵

Solomon Rotimi shared his findings on cancer genomics and its implication for SDGs in Africa.⁶ He explained that cancer originated in Africa, and Africa has the highest burden of these diseases.⁷ He further provided an overview of the recent advances in breast and prostate cancer studies in Africans where recent evidences suggest that inflammation-driven cancer in Africans is influenced by vitamin D level.⁸ He concluded by emphasizing the need to improve research and

training in cancer genomics across Africa. Abasi Ene-Obong enlightened the audience on how bioinformatics and genomics, which is the core component of 54gene, can power SDGs in Africa. He admonished African researchers to maximize the open access tools and databases for bioinformatics and genomics, to take charge of our health outcomes, both now and in the future.

SCIENTIFIC HIGHLIGHTS OF THE CONFERENCE

African BioGenome Project (AfricaBP). This is a project that aims to sequence over 100,000 species across the African continent (<https://africanbiogenome.org/>). This includes plants, animals, and other eukaryotes that share our environment. The motivation behind this project is that the global biodiversity landscape is a shared heritage and nearly all continents are endowed with a form of biodiversity. The AfricaBP is a major step in protecting the African terrestrial ecosystem and preventing biodiversity loss in Africa, thereby contributing to the attainment of SDG15—Life on Land.

Polygenic risk scores and precision medicine. It has been observed that PRS has poor transferability in Africa.⁹ More African GWAS studies are needed as transferability of the solutions discovered in Africa to other populations has been reported to be significant. An example is the gene of rare effect known as PCSK9, has an allele which results in low cholesterol and low-density lipoprotein level.¹⁰ Summarily, Africa is a treasure box of genetic discoveries, which can be used to help attain the SDGs. There is a need for more genetic studies focusing on noncommunicable diseases (NCDs) in Africa.

Genome-wide association studies of non-communicable diseases. Several young scientists shared their findings on the GWAS of NCDs. Richard Mayanja shared findings from his PhD research. The genes *PDZK1*, *NUDT12*, *HBB*, and *GOLGA8IP* were found to be associated with estimated glomerular filtration rate of serum creatinine (eGFRcrea) in African population. Chisom Soremekun presented her findings showing that some single nucleotide polymorphisms (SNPs) with the nearest genes *RHPN1* and *RGS11* play a role in the liver enzyme biomarker levels in Ugandan population, which were also replicated in the South African population.

TABLE 1
Conference keynote and invited speakers

Speakers	Country	Institution/Affiliation	Title
Prof. Nicola Mulder	South Africa	University of Cape Town	Bioinformatics training and its implication for SDGs in Africa.
Dr. Amy Bentley	United States of America	National Institutes of Health.	The importance of representation of African ancestry populations in genomic research.
Dr. Solomon Rotimi	Nigeria	Covenant University	Cancer genomics and its implication for SDGs in Africa.
Dr. Abasi Ene-Obong	United States of America and Nigeria	54gene	Accelerated achievement: How bioinformatics can power the attainment of SDGs in Africa.
Dr. Manuel Corpas	United Kingdom	Cambridge Precision Medicine	Implementation of individualized polygenic risk score analysis: A test case of a family of four.
Dr. ThankGod Ebenezer	United Kingdom	European Bioinformatics Institute	African BioGenome Project (AfricaBP): Genomics for the future of biological diversity across Africa.
Dr. Angela Eni	Nigeria	Covenant University	Plant virology & its implication for SDGs in Africa.
Dr. Tinashe Chikowore	South Africa	The University of Witwatersrand	Polygenic risk scores and precision medicine.

SDG = sustainable development goals.

Awards. Four leading Nigerian scientists were given the “Outstanding Leadership Award” for their major contributions to genomics and bioinformatics development in Nigeria. A total of 100 travel fellowships were awarded to delegates within Nigeria. The abstracts selected for both oral and poster presentations were presented and the best presenters were also awarded.

CONCLUSION

There is an urgent need to leverage on bioinformatics and genomics to attain SDGs in Nigeria. Therefore, more concerted efforts are needed in research capacity building initiatives to empower Nigerian researchers to take a leading role in genomic data science and precision medicine. Moreso, bioinformatics and genomic analysis of African genomes is vital in identifying population-specific genetic variants that confer susceptibility to different diseases that are endemic in Africa. Knowledge of this can empower African healthcare systems and governments for timely intervention, thereby enhancing good-health and well-being.

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