



Expanding Biobanking Infrastructure for AD Research Capacity in African Countries: Lessons from the AfDC - DAWN-ADSP Biobank

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Background:

Biobanking is gaining grounds in Africa. The DAWN - ADSP Study has established a biobanking infrastructure for Alzheimer’s disease and related dementias (ADRD) research in Africa through the African Dementia Consortium (AfDC). International best practices and standard guidelines were followed while innovations were introduced to mitigate challenges faced in the establishment of the biobank. Here, we document our experiences highlighting the facilitators and barriers to expanding such biobanking network for ADRD research in infrastructurally challenged, low-resource settings in Africa.

Methods:

The AfDC - DAWN-ADSP biobanking network was developed in collaboration with John P. Hussmann Institute for Human Genomics, University of Miami (HIHG-UM). SOPs were jointly developed to guide sample collection, processing, storage, and shipment. Biobanking infrastructure was enhanced with additional –30°C and –80°C freezers, solar-powered backup systems, and advanced DNA extraction equipment. A Biobanking Working Group was formed to coordinate activities across sites, supported by regular training, quality assurance measures, and data management systems. Processed samples are shipped from the AfDC sites to the African Coordinating Centre (University of Ibadan, Nigeria) for DNA extraction and long-term storage before final shipment to HIHG-UM for genotyping, whole genome sequencing, and biomarker analysis (Figure 1).

Results:

The AfDC - DAWN-ADSP Biobank has been able to store 64,080 whole blood and plasma aliquots from 4,272 participants, while 26, 690 plasma aliquots and 2,533 extracted DNA samples from 2669 participants have been shipped to HIHG-UM as at December 2025. Facilitators include: the development of SOPs for all sites. Infrastructural enhancements, training and retraining, quality assurance and data management systems, and the introduction of continuous quality improvement (CQI) measures. Major barriers include: ethical and regulatory challenges, infrastructural limitations, logistics issues, material and equipment constraints, lack of adherence to SOPs and training and competency gaps (Table 1).

Table 1: Experienced Barriers and Facilitators for the AfDC - DAWN-ADSP Biobank Infrastructure

Barriers	Facilitators
Ethical and Regulatory Challenges: Variations in requirements for ethics and approvals across countries caused delays in recruitment and biobanking activities. Additional export permits and ethical reviews were required in some countries before initiating international shipments.	Collaborative Efforts: Formation of the Biobanking Working Group, including biorepository leads and site principal investigators, facilitated regular communication and coordination across sites. Monthly video conferences and WhatsApp groups enabled efficient sharing of experiences, challenges, and solutions.
Infrastructural Limitations: Limited availability of –80°C freezers at some sites for long-term storage. Short-term storage facilities required early shipment to avoid sample degradation.	Development of SOPs: Jointly developed SOPs for sample collection, processing, storage, and shipment ensured uniformity and adherence to global best practices.
Logistical Issues: Delayed delivery of cold-chain biological samples due to shipping challenges. Expensive courier services for intra-African shipment of biological samples	Infrastructure Enhancements: Procurement of additional –30°C and –80°C freezers and solar-powered backup systems at sites. Acquisition of advanced equipment, such as the QIA Symphony Automated Nucleic Acid Extractor, improved DNA extraction efficiency and quality.
Material and Equipment Constraints: Short expiry dates of sample collection materials. Sample tube breakage at ultra-low temperatures due to the use of polypropylene tubes.	Training and Retraining: Regular training and retraining of biorepository personnel ensured competency and adherence to protocols. On-the-job assessments and retraining addressed areas of deficiency.
Adherence to Standard Operating Procedures (SOPs): Some sites did not fully adhere to SOPs, leading to inconsistencies in sample processing and shipment at commencement of the project	Quality Assurance Measures: Monthly video conferences for quality assurance and process harmonization. Pre-shipment meetings with checklists reduced errors and ensured compliance with IATA standards.
Training and Competency Gaps: Initial variability in DNA extraction yields due to unoptimized protocols and lack of standardized training.	Data Management Systems: Use of the “Sample Kiosk” software and REDCap database for tracking and linking phenotypic data to biobanked samples. Continuous Quality Improvement (CQI): Implementation of CQI frameworks to monitor and improve processes across all sites. Adoption of ISBER best practices for biobanking operations, personnel training, risk management, and quality assurance.

Conclusion:

The AfDC - DAWN-ADSP Biobank is a testament to establishment of a robust biobanking network for AD research in Africa despite infrastructural and logistical challenges. Key facilitators such as a sustainable international collaboration, standardized procedures and innovative solutions to logistical and ethical barriers, are crucial to expanding biobanking infrastructure for Alzheimer’s disease research in African countries.

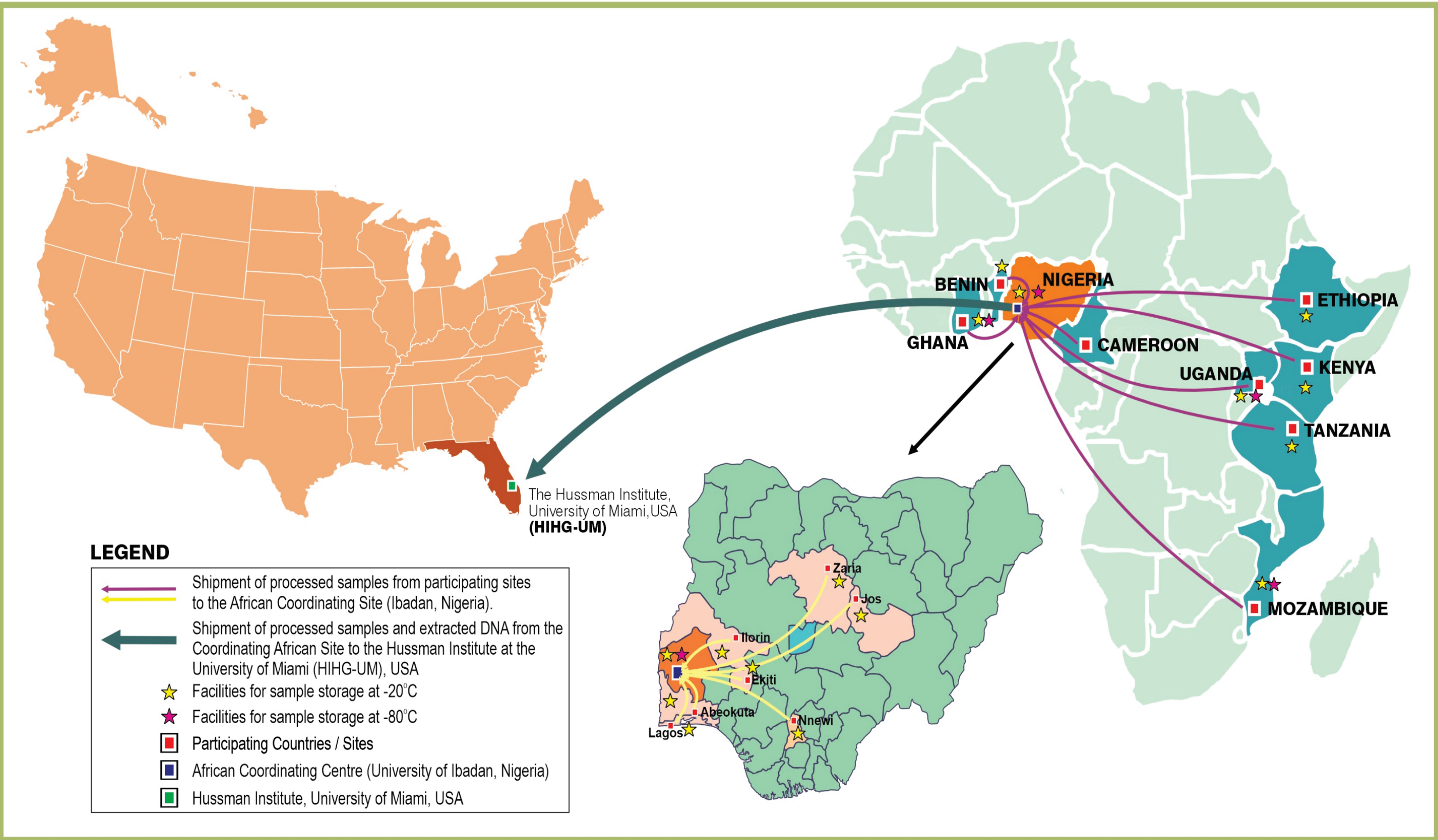


Figure 1: The AfDC – DAWN-ADSP Biobank sample flow