



# LAB CULTURE

ADVANCING THE LABORATORY PROFESSION AND NETWORKS IN AFRICA



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**Laboratory informatics in resource-limited settings**

**Assessing specimen referral systems Nigeria's HIV laboratory at UCH**

**A dialogue with Senegalese microbiologist, Prof Souleymane Mboup**



# **LAB CULTURE**

November 2018 | Issue 20

ADVANCING THE LABORATORY PROFESSION AND NETWORKS IN AFRICA

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### Contribute to *Lab Culture*

ASLM is currently accepting article and photo submissions for upcoming issues of *Lab Culture*. We publish timely, informative, inspirational articles relevant to the unique challenges faced by laboratories in resource-limited settings. We are interested in articles on the critical aspects of laboratory medicine, best practices, success stories, leaders in the field, industry news, etc.

To submit articles, proposals, photos, etc., please contact the Editor at [newsletter@aslm.org](mailto:newsletter@aslm.org).

*Lab Culture*. Established along with ASLM in 2011 as a member newsletter, *Lab Culture* relaunched in 2017 as ASLM's magazine for laboratory medicine in Africa. Dedicated to bringing timely, informative articles relevant to the unique challenges faced by African laboratories, *Lab Culture* seeks to be Africa's premiere resource for laboratory professionals and other stakeholders working on with the continent. Published six times a year as a digital edition, *Lab Culture* includes features on critical aspects of laboratory medicine and best practices in resource-limited settings, success stories from the continent, industry news, and more.

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*Lab Culture* is produced in partnership with *Medical Laboratory Observer*.



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# ASLM2018 – See you in Abuja!

As we hope you are already aware, the biennial ASLM conference will be held in a new location for the first time – Abuja, Nigeria – from 10-13 December 2018.

The Conference Co-Chairs, Prof **Alash'le Abimiku** (Institute for Human Virology Nigeria) and Prof **Souleymane Mboup** (IRESSEF; *Institut de Recherche en Santé, de Surveillance Epidémiologique et de Formation*) have organized the conference around three major themes – Pandemic Threats, Laboratory Response and Synergizing Partnerships. Conference attendees will find plenary sessions, oral and poster presentations, symposia, round tables and special sessions devoted to each of these important topics.

The first plenary session on Pandemic Threats will be chaired by **Chewe Luo** (West Africa Health Organisation) and **Stanley Okolo**, (West Africa Health Organisation), and will focus on the current state of affairs with the most frightening of global public health issues: disease outbreaks that could spread across the world. Speakers will include **Ibrahima-Soce Fall** (World Health Organization), **Chikwe Ihekweazu** (Nigeria Centre for Disease Control) and **Caroline Jehu-Appiah** (Radboud University). These eminent orators will provide the latest updates and perspectives on the pathogens that could cause the next pandemic, the social and economic inequities that foster the spread of epidemic-prone diseases and what is required to ensure that Africa is prepared for such health threats.

The Laboratory Response plenary session will be chaired by **Rosanna Peeling** (London School of Hygiene and Tropical Medicine) and **Tomori Oyewole** (Nigerian Academy of Science / University of Lagos). In that session, **Trevor Peter** (Clinton Health Access Initiative), **Chikwe Ihekweazu** (Nigeria Centre for Disease Control) and **Wafaa El-Sadr** (ICAP at Columbia University) will discuss roles, strategies and initiatives undertaken to ensure that laboratories in Africa adequately contribute to the prevention, detection and response to all medical conditions burdening the

continent, including those that can lead to infectious disease outbreaks, as well as the role of innovations and significance of all-encompassing health systems and multisectorial approaches.

The final plenary session on Synergizing Partnerships will explore ways to achieve the capacity required for an effective response through leveraging of current resources and policies. Session chairs **Wafaa El-Sadr** and **Trevor Peter** will be joined by speakers **John Simon** (Global Fund to Fight HIV, AIDS, Tuberculosis and Malaria), **Coumba Toure Kane** (IRESSEF) and **Rebecca Martin** (US Centers for Disease Control and Prevention). Discussion will highlight the costs, investment needed and potential financial strategies required at national and global levels, in order to achieve Universal Health Coverage and the International Health Regulations, as well as other successful strategies to advance laboratory networks and systems.

Informative special sessions, symposia and round tables will complement the plenary discussions for each of the three themes. In addition, a number of satellite sessions will take place before the conference, and morning and evening workshops and seminars will also be available. Stay posted on all of these offerings by checking the [ASLM2018 Programme webpage](#). Finally, be sure to check out Abuja itself! As the capital city of Nigeria, there is much to discover from its famous monoliths to its parks and arboretum, as well as museums, golf courses and shopping centres. We look forward to seeing you there!



Bethanie Rammer

## Access to emergency care

### People across Africa have to travel far to get to a hospital.

Nearly half of all deaths and about a third of disabilities in low- and middle-income countries could be avoided if people had access to emergency care. In Africa the main causes of emergencies are road accidents, obstetric complications, severe illnesses, and non-communicable diseases.

Over the past 18 years the African Federation for Emergency Medicine, an advocacy group, has been encouraging the development of emergency care systems on the continent. The gaps it has identified include decent transport and hospital services.

But to address these challenges data is needed on the number of hospitals, their locations, as well as the population marginalised. Most countries in Africa do not have this information. They lack basic inventories of healthcare service providers, including the number of hospitals.

A recent study, conducted by Paul Ouma and Emelda Okiro of Kenya Medical Research Institute and reported in *The Lancet Global Health* set out to address this problem by producing the first ever assessment of hospital services in sub-Saharan Africa, and used it to work out peoples' access to care.

The results—including how long it takes to get to a hospital—show where investment is needed in improving access. Various interventions are necessary. These should include building new hospitals, improving ambulatory care, building new roads and fixing existing ones.

However, the most urgent action is that countries must update their hospital lists, including assessment of capacity, capability to provide emergency care, and updating of the private sector. The results of this study may help to start this process as a database has been built which can be accessed for free and used for assessing service availability at national levels.

The hospital list covers 48 countries and islands of sub-Saharan Africa. To develop the list numerous data sources were used, including ministries of health, health information systems, as well as national and international organisations from all the countries and islands. In most cases, the sources were available online but the study also relied on the authors' contacts to obtain hospital data in some countries.

Close to 50% of the hospitals on the list had no GPS coordinates to aid in precisely locating them. To overcome the problem unique location attributes were assigned using online mapping tools. This audit located 4908 public sector hospitals which were precisely assigned location attributes.

Nigeria, which accounts for close to a fifth of sub-Saharan Africa's population, had the highest number of hospitals at 879. Other countries with high numbers of public hospitals were the Democratic Republic of Congo (435), Kenya (399), and South Africa (337).

Smaller countries such as Cape Verde, Zanzibar, and São Tomé and Príncipe had the lowest numbers of hospitals. This information was used as a starting point to calculate the geographic access to the hospital services.

Geographic accessibility by travel time was measured to the nearest public hospital. This was calculated by how long it would take to travel by road based on the major means of transport in the region.

Road networks were assembled from Google Earth and OpenStreet-Maps and assigned travel speeds along the roads. A model was developed that calculated the time it would take for a patient to travel from any 100m by 100m square grid of location to the nearest hospital.

Results revealed that less than a third (29%) of the total population and 28% of women of child bearing age lived more than two hours from the nearest hospitals. The two-hour

threshold is a widely used recommendation by the World Health Organization (WHO) and the *Lancet* Commission on Global Surgery for defining access to emergency obstetric and surgical care, respectively. In addition, international benchmarks set by the *Lancet* Commission on Global Surgery recommend that having 80% of any given population within two hours of a hospital as critical in ensuring universal health coverage by 2030.

The most surprising outcome was the huge differences between countries. For example, more than 75% of the population in South Sudan lived outside the two-hour threshold. Other poorly served countries included Central African Republic, Chad and Eritrea. More than half of their populations lived outside the two-hour threshold.

The best served countries were mostly islands like Zanzibar, Comoros and São Tomé and Príncipe. More than 95% of their populations were within two hours of a hospital. Large countries such as Kenya, South Africa and Nigeria also had good access indices, with more than 90% within the two-hour band.

All 48 countries in the survey have signed up to the United Nation's (UN) Sustainable Development Goal of delivering universal health coverage by 2030, part of which involves access to hospitals. The results of this study can help countries work out what they need to do to make this a reality when it comes to emergency care. There is still a long way to go. Only 16 countries in the survey achieved 80% coverage in access to a hospital within two hours.

Originally appeared in: *The Conversation* - Paul Ouma, Kenya Medical Research Institute and Emelda Okiro, Kenya Medical Research Institute <https://theconversation.com/people-across-africa-have-to-travel-far-to-get-to-a-hospital-we-worked-out-how-far-102585>

## State of health

**New report shines spotlight on state of health in Africa.** The WHO

has ranked Kenya as a country where a good range of essential health services are offered.

In the State of Health in Africa report, which provides an overview of the status of health in the region, the UN health body notes an improvement of health in the region.

However, the report notes that this achievement can only be sustained and expanded if countries significantly improve the way they deliver essential health services to the people who need them most. The report also assesses the performance of health systems and analyses their impact on the health of people in the region.

The report was launched by WHO Regional Director for Africa Dr Matshidiso Moeti in Dakar, Senegal, during the 68th session of the WHO Regional Committee for Africa.

The report comes months after the government declared a commitment to offering affordable healthcare for all Kenyans.

In his State of the Nation address to Parliament in May, President Uhuru Kenyatta outlined the progress Kenya has made in various health indicators such as infant mortality which has dropped from 52 to 39 deaths for every 1000 live births; child mortality which dropped from 74 to 53 deaths per 1000 live births and maternal mortality from 488 to 362 for every 100 000 live births.

These and other aspects have put Kenya on top of the regional mapping. In the report, Algeria was lauded for good coverage of available health services, while Cape Verde was applauded for good community demand for essential services, and resilience of health systems.

Mauritius topped the list in access to health services, Namibia recorded good financial risk protection, Seychelles was commended for good coverage of health-related services and South Africa was praised for good health security.

WHO says identifying countries

with good practices helps others to learn lessons across the different dimensions of universal health coverage and other health targets that are part of the UN Sustainable Development Goals.

In 2015, countries committed to achieving a range of health targets by 2030 to ensure healthy lives and promote wellbeing for all people.

The report suggests that countries should place more focus on the performance of their health systems to achieve crosscutting and sustainable improvements in universal health coverage and other targets influencing health across the 17 Sustainable Development Goals.

'This report is not a country scorecard. Its purpose is to act as a compass to guide progress towards health in the Sustainable Development Goals. The regional office aims to regularly provide such information to countries, so that they can attain their health goals in the most efficient and effective manner', observed the WHO.

There has been a significant improvement in the state of health in Africa with healthy life expectancy—time spent in full health—in the region increasing from 50.9 years to 53.8 years between 2012 and 2015—the most marked increase for any region in the world.

The top killers are still lower respiratory infections, HIV, and diarrhoea. Countries have routinely focused on preventing and treating this trio, often through specialised programmes.

'I'm proud that Africans are now living longer and healthier lives,' said Dr Moeti. 'Nearly three years of extra health is a gift that makes us all proud. Of course, we hope that these gains will continue, and the region will reach global standards.'

However, universal health coverage requires all conditions affecting a population, not only priority conditions, be improved. Chronic diseases like heart disease and cancer are now claiming more lives with people aged 30 to 70 years in the region having a

one in five chance of dying from a non-communicable disease.

Countries are specifically failing to provide essential services to two critical age groups—adolescents and the elderly.

As the population ages in Africa, the elderly need senior care. However, almost a third of respondents surveyed highlighted the absence of any services for the elderly in their countries.

'Health services must keep up with the evolving health trends in the region', said Dr Moeti.

'In the past we focused on specific diseases as these were causing a disproportionately high number of deaths. We have been highly successful at stopping these threats and people's health is now being challenged by a broad range of conditions. We need to develop a new and more holistic approach to health.'

Originally appeared in: Daily Nation <https://www.nation.co.ke/health/New-report-shines-spotlight-on-state-of-health-in-Africa/3476990-4753794-hvauos/index.html>

## Infectious disease

### African Health Ministers commit to ending cholera outbreaks by 2030.

African Health Ministers have pledged to implement key strategies for ending cholera outbreaks in the African region by 2030.

Forty-seven African countries adopted the Regional Framework for the Implementation of the Global Strategy for Cholera Prevention and Control on 28 August 2018 at the 68th session of the WHO's Regional Committee for Africa, which took place in Dakar, Senegal.

'Cholera is a symbol of inequity', said Dr Matshidiso Moeti, the WHO Regional Director for Africa. 'It's an ancient disease, which has been eliminated in many parts of the world. Every death from cholera is preventable. We have the know-how and today countries have shown that they have the will to do whatever it takes to end cholera outbreaks by 2030.'

Cholera is a major global public health problem, but the burden and impact of the waterborne disease is greatest in sub-Saharan Africa. In 2017, more than 150 000 cholera cases, including more than 3000 deaths, were reported in 17 African countries. This year, there has been a spike in cholera cases across Africa, with eight countries currently battling outbreaks.

The region is vulnerable to cholera for a range of reasons. Ninety-two million people in Africa still drink water from unsafe sources. In rural areas, piped water is often unavailable and people practice open defecation. Humanitarian crises, climate change, rapid urbanisation and population growth are also increasing the risk of cholera spreading.

In adopting the Regional Framework, countries pledged to reduce the magnitude of cholera outbreaks particularly among vulnerable populations and in humanitarian crises by 90%. They agreed to take evidence-based actions, which include enhancing epidemiological and laboratory surveillance, mapping cholera hotspots, improving access to timely treatment, strengthening cross-border surveillance, promoting community engagement and the use of the oral cholera vaccine as well as increasing investments in clean water and sanitation for the most vulnerable communities.

'WHO is working hand in hand with countries, providing key technical expertise and guidance', said Dr Moeti. 'The oral cholera vaccine has been shown to be highly effective and WHO has facilitated the vaccination of millions of people across Africa. We must continue to expand use of this new strategy.'

From 2013 to 2017, WHO supported 65 cholera vaccination campaigns and supplied more than 16 million doses of vaccines to 18 countries globally, including 11 in Africa. Many of the campaigns in Africa have taken place in the context of a humanitarian crisis or natural disaster.

Many of the risk factors for cholera such as poor sanitation and rapid urbanisation lie outside of the health sector. As a result, WHO is working with a broad coalition of partners to engage with all relevant sectors to build a comprehensive and sustainable response throughout the region.

Originally appeared in: WHO <https://afro.who.int/news/african-health-ministers-committing-to-expand-cholera-outbreaks-2030>

## HIV self-testing

**Researcher receives grant to expand youth-friendly HIV self-testing.** Nigerian youth are at the epicenter of an expanding HIV crisis in sub-Saharan Africa. As a country, Nigeria ranks second in the world in new HIV infections among youth, youth living with HIV and AIDS-related deaths among a youth population.

HIV testing is an important early entry point to accessing preventive education, care and treatment. Yet fewer than one in five Nigerian youth have been tested. A study at Saint Louis University (SLU), located in St. Louis, Missouri in the US, seeks to change this by developing and implementing Innovative Tools to Expand HIV Self-Testing (I-TEST) for at-risk youth ages 14-24.

Juliet Iwelunmor, PhD, an associate professor of global health and behavioral science and health education in SLU's College for Public Health and Social Justice, was awarded a \$2.3 million grant from the US National Institutes of Health to develop and evaluate the I-TEST project. The project will partner with Nigerian youth and their local communities to expand coverage and generate demand for HIV self-testing.

I-TEST supports Nigeria's strategic objectives to increase access to HIV testing services to enable 90% of young people living with HIV to know their status and be linked to relevant services.

Iwelunmor says that innovative solutions that leverage the resourcefulness and resilience of the young people are

needed to decrease HIV transmission. Researchers will develop youth-friendly HIV self-testing services based on open challenges and apprenticeships.

Solutions that are implemented from the local community have a greater chance of success. Three randomised, controlled trials based on open challenges have already been conducted in China by co-investigator Joseph Tucker, MD, PhD. These trials have led to improved rates of HIV testing and condom use among at-risk youth, but none of these approaches have been used in Africa.

Once HIV self-testing strategies that meet the needs of the population are identified, researchers will develop a comprehensive plan for enhancing uptake of other HIV prevention services, including HIV pre-exposure prophylaxis and behavioral approaches, for at-risk youth. Two strategies will be selected by a local steering committee in Nigeria made up of experts in health, technology, entrepreneurship, and digital/social media as semi-finalists and evaluated in separate local government pilots.

When a project meets strict requirements for trial readiness and effectiveness, a single strategy will be tested in a cluster, randomised trial in 24 different areas of Nigeria. The project aims to do the following:

- To use open challenges and apprenticeship to develop new HIV self-testing services;
- To evaluate the effectiveness of two semi-finalist participatory interventions on HIV testing and other key prevention services among at-risk, HIV-negative youth (14-24 years old);
- To determine the effectiveness of a finalist participatory intervention on HIV testing and other key HIV prevention outcomes.

Originally appeared in: Newswise <https://www.newswise.com/articles/researcher-receives-2.3-million-nih-grant-to-expand-youth-friendly-hiv-self-testing>

# Laboratory informatics in the era of viral load testing scale-up in resource-limited countries

## Overview

In the last decade, APHL has witnessed an acceleration in the demand for informatics capabilities to support laboratory networks and diagnostic testing. This is especially true in PEPFAR-supported laboratories due to the rapid increase in demand for laboratory diagnostic services. To respond to this growing need, APHL has offered a range of technical assistance to Ministries of Health including assessment of needs and development of specifications for selection of appropriate informatics solutions, implementation, training in the use and maintenance and analysis of laboratory data. In parallel, APHL has increased its staff at its headquarters and many of its country offices to lead more than 100 implementations of diverse laboratory information systems (LIS) in 8 countries, including both proprietary and open source solutions. As a result there is now a wealth of laboratory data available at these 100 plus laboratories in Asia and Africa.

As viral load testing increases across countries, with laboratories receiving test orders from multiple health facilities through specimen referral network programs, there is a need to improve test results, return to care providers and patients in a timely manner. Also, this increase of data flowing into laboratories presents an opportunity to improve the utilisation of data to better support the laboratory and the ability to determine an HIV-positive patient's response to treatment.

Therefore, over the last two years, APHL has focused on establishing and strengthening the following:

- A specimen referral network that includes the means to electronically request test orders and receive test results and can be introduced in health facilities with limited resources

- A data repository and associated data visualisation tools to enable use of these laboratory data for decision making

## Electronic specimen referral network

The electronic specimen referral network is constructed on the premise that while the health facility has very limited resources, there is buy-in to improve their capability with respect to sending and receiving data on viral load tests. The primary hardware requirements include a desktop computer and an internet modem that can be limited to use on the specific computer. Additional requirements may include a barcode and laser printers. In terms of software requirements, APHL has used two approaches:

**1. Direct login to the LIMS at the testing laboratory by authorized users at the health facility.** APHL, in collaboration with care and treatment partners, established internet access and set up a desktop computer at health facilities that allows them to access the LIMS that is in use at the testing facility. This is done via secure web-based portal that is only accessible to approved users. Users are able to enter and submit test requests and review test results through the web portal. A unique identifier is generated at the time of creating the specimen record which is manually written on the specimen. Specimens are usually sent as a batch to the testing laboratory. Users at the testing laboratory log into the LIMS, enter the unique identifier to retrieve the specimen record by using the unique identifier, acknowledge receipt of the specimen, and note specimen condition and accept/reject status. No additional entry is required in the accessioning area of the testing laboratory.



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## Association of Public Health Laboratories

The Association of Public Health Laboratories (APHL) works to strengthen laboratory systems serving the public's health in the US and globally. APHL's member laboratories protect the public's health by monitoring and detecting infectious and foodborne diseases, environmental contaminants, terrorist agents, genetic disorders in newborns, and other diverse health threats.

The work presented in this article was supported by Cooperative Agreements # NU2GGH001097 & NU600E000103 funded by the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC or the Department of Health and Human Services. This project was 100% funded with federal funds.

Once results are validated and verified in the LIMS by the testing laboratory, health facility users can log into the LIMS and retrieve results. The users only have access only to results for specimens submitted by them; therefore, test results for specimens collected by other health facilities are not available for viewing.

**2. Use of a standalone application at the health facility for entry of all test order data.** APHL has collaborated with the LIMS vendor to develop an application that can be installed on a minimal capacity computer workstation at a health facility. The application, unlike the web portal approach, does not allow direct access to the LIMS that is in place at the testing facility and, therefore, enables “offline” data entry. Authorized users login to the application, enter data from a paper test request form, and generate a unique identifier that is printed using a connected barcode label printer. This identifier label is attached to the specimens. Once the user completes entering data on a batch of specimens, they can print a shipment list which includes the unique barcode for each specimen. The electronic data captured in the application on this batch of specimens are transferred via secure file transfer protocol (FTP) to the LIMS at the testing laboratory. In short, FTP is a process that facilitates files

to be transferred securely between the two applications (the LIMS and the test request and results application) using a standard set of rules. As specimens arrive at the testing laboratory, the LIMS users can scan the specimen barcode label, which then triggers the LIMS software to communicate with the FTP site to retrieve the associated data for each specimen barcode. This process occurs behind the scenes and users are usually unaware. Specimens are received and tested as usual in the laboratory. Besides the specimen condition information, there is no additional data entry required by the receiving area of the testing laboratory.

Once results are validated and verified in the LIMS, a results file is automatically generated for each facility and sent to the FTP sites. The application at the health facility can retrieve these results. Again, these data exchanges occur without the users’ awareness or need to do any additional steps. Users at the health facility login to the standalone application and are able to see that results are waiting to be viewed and printed.

In both cases, APHL has had a significant impact on turn-around time and data quality. In our experience, the greatest bottlenecks occurred during specimen reception in testing laboratories when managing a high volume of specimens. The burden of data entry during

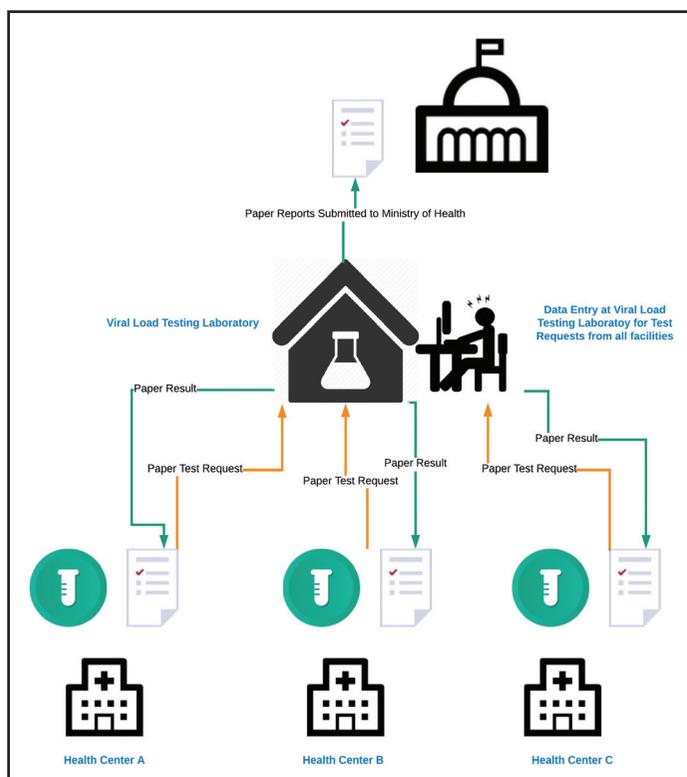


Figure 1: Prior to the electronic specimen referral network, all test requests from health centers were received at the viral load testing laboratory and data entry was done by laboratory staff resulting in significant time and effort.

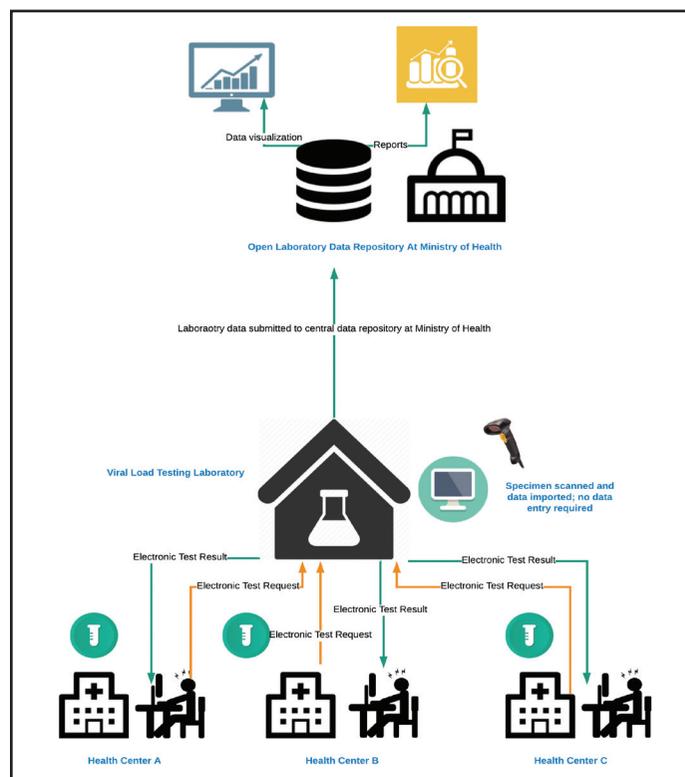


Figure 2: Following the electronic specimen referral network, paper test requests are sent by health centers to hubs where data entry is completed before the specimen is sent to the viral load testing laboratory. When the specimen is received at the testing laboratory, these data are available in the LIS and the laboratory staff enter minimal data related to acceptance/rejection of specimen. This enables the testing laboratory to concentrate efforts on testing and greatly reduces turnaround time within the laboratory.

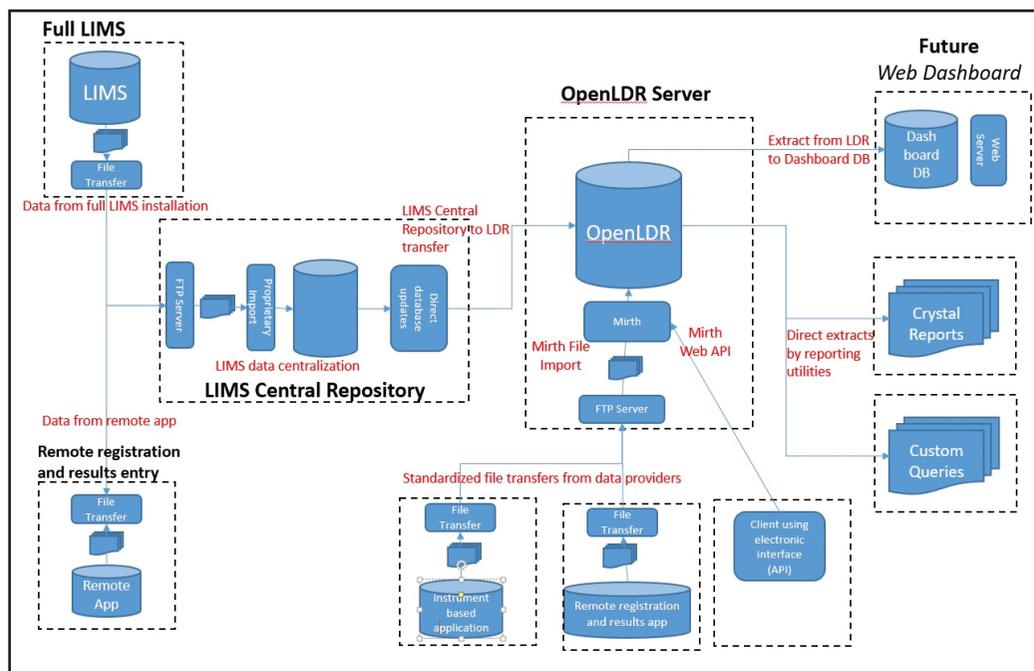


Figure 3: The central laboratory data repository or OpenLDR can receive data from disparate systems including the electronic specimen referral network, and can serve as the source of laboratory data for the Ministries of Health.

registration resulted in challenges with data quality, as critical data fields were often missed or incorrectly entered due to the urgency of the day’s workload. The implementation of an electronic specimen referral network places the onus of data quality on health facilities that generate the data and makes them responsible for data completeness and accuracy. This process eliminates gridlocks from the testing laboratories by decentralising the data entry process and, thereby, positively influencing turn-around time.

## Central laboratory data repository and data visualisation

The central laboratory data repository designed by APHL has been termed the OpenLDR or Open Laboratory Data Repository (<https://sites.google.com/site/openldr/>). This repository was designed by APHL without a specific LIMS in mind, taking into account the role APHL has played in multiple countries implementing diverse LIMS. It creates a means for data capture and storage from multiple laboratories and disparate LIMS. The server on which OpenLDR resides is located at the Ministry of Health, thereby centralising laboratory data from multiple laboratory facilities. As a LIMS usually captures data on all tests, these are also made available in the OpenLDR to the Ministry of Health.

The Open LDR simplifies the structure that exists in most LIMS by using three primary tables—Requests, Results, and Monitoring. Data from LIMS needs to be mapped to data elements in the OpenLDR so there is correct

association between the data elements in each database. These data can be transmitted from a LIMS to the OpenLDR at any agreed upon frequency. Therefore, the data can be transmitted in a near real-time manner or at the end of the day, end of the week, etc. Ideally, the same frequency of submission is followed by all laboratories. The OpenLDR can be queried using a variety of tools. APHL has used Crystal Reports to create both ad hoc and

stored reporting capability at the Ministry of Health. The OpenLDR was implemented with minimalist approach to save time and reduce cost for implementation and long-term maintenance, simplicity, ability to enforce standardisation and to keep the design flexible to support expansion without disruption of the core design principles. The ability of countries to implement and sustain their systems can sometimes be dependent on cost. As a result, developing a simple solution that can be replicated was important for APHL. In addition to reporting capability, APHL has also led the implementation of a data visualisation framework in three countries using common tools and approaches. This visualisation framework enables countries to create dashboards for the pathogen/disease area of their choice. Key performance indicators can be incorporated, such as, turn-around time, specimen rejection rates for individual reportable diseases, and laboratory based surveillance. At present, the framework supports indicators for viral load, microbiology, and tuberculosis tests.

This visualisation framework was developed with the goal of enabling effective utilisation of laboratory data by laboratories and respective Ministries of Health. As a result, there is potential for real-time situational analysis and decision support. With the Ministries of Health in Tanzania, Mozambique, and Zambia using the OpenLDR, APHL recognised an opportunity to save on development cost. The visualisation framework utilizes data from the OpenLDR, which then allows the reports to be interchangeable across countries.

# Assessing specimen referral systems across West Africa to strengthen laboratory networks

By Ms. Kameko Nichols, Mr. Aaron Pattillo — The Nichols Group LLC November 2017

## Background

As part of the 'Building Laboratory Capacity to Support the Global Health Security Agenda Project' implemented by the African Society for Laboratory Medicine (ASLM), a subject matter expert was hired as a consultant to perform a situational analysis on the status of specimen referral systems across West Africa. The initial analysis was performed onsite in the West African countries of Burkina Faso, Cote d'Ivoire, Guinea Bissau, Senegal, Mali, and The Gambia from October 2015 through May 2016.

The aim of the initial assessments was to understand the current referral systems and laboratory networks in each country and provide recommendations on how they can be strengthened to effectively respond to global health security threats. The consultant's team worked with the respective Ministries of Health and health

partners to review and report on existing laboratory networks and specimen referral systems including evaluation of status, coverage, strengths, readiness to respond to epidemics, integration with various disease types, running costs, private sector engagement, etc. The assessments were presented to the countries in report format for initial fact-checking and feedback. They were then shared with stakeholders. A set of recommendations on next steps to strengthen the specimen referral networks in the respective countries was also offered.

## Observations/comparisons of specimen referral networks across different countries

One commonality in the countries assessed was the lack of robust specimen referral systems that are typically found in Southern and East African countries with high burdens of HIV and tuberculosis. In high-burden countries, the large volume and high frequency of specimens that require referral to higher-level laboratories often justify a dedicated logistics system for specimens. However, in the countries ASLM performed the assessment, specimens are generated at a much lower-volume and on an irregular basis, mainly for diseases under surveillance such as meningitis, measles, yellow fever, cholera, etc., although HIV-and tuberculosis-related specimens are also collected. Thus, the methods for specimen referral were more

commonly ad-hoc. For example, specimens might be sent on public transportation, either accompanied or un-accompanied by a staff member from the referring facility.

Other similarities in the specimen referral systems were the fragmentation and lack of coordination across specimen types and disease programs, lack of communication and transparency among stakeholders, and lack of mapping out various systems. Another notable difference between countries was the engagement of various government and private sector stakeholders. In Mali and Burkina Faso, for instance, the national postal system is quite strong and has the ability to potentially transport specimens, although there was no current engagement in this area. In Cote d'Ivoire, however, the national postal system was not as viable as a potential service provider for specimen transport due



Health center staff in Burkina Faso. [Source: Kameko Nichols, Independent Consultant, ASLM].



Outside the National Public Health Laboratory in Cote d'Ivoire. [Source: Kameko Nichols, Independent Consultant, ASLM].

to its collapse during the civil war. However, Cote d'Ivoire does have a highly functional central medical store, which could provide a good touchpoint for lessons learned and logistics system details (such as routing, transport management, etc.).

## Key recommendations

Key recommendations for all of the countries assessed were as follows:

- Build on the efforts of any disease programme that has already initiated a specimen referral mechanism.
- Explore and utilise software or other platforms that allow for mapping of the surveillance/diagnostics networks, as well as optimisation and simulation.
- Improve coordination and information sharing/transparency through a specimen referral technical working group or coordinating body, fully inclusive of various stakeholders (regardless of the specimen or disease), who meets regularly and is governed by clear terms of reference.
- Develop national plans, policies, and guidelines for specimen referral.

Other recommendations were country-specific, such as:

- Build on other assessments that had been recently performed.
- Learn from the central medical store logistics/distribution.
- Increase biosafety and biosecurity measures for specimen referral.

In certain countries, these recommendations served as an extension into the second phase of the project, which focused on the design and implementation aspects of piloting specimen referral networks. In Burkina Faso (right) and Mali, the report and its recommendations led

*continued on next page*

# Highlight on Burkina Faso

By Ms. Kameko Nichols, Mr. Aaron Pattillo, and Mr. Abdoulaye Nikiema

## Assessing, designing, and piloting a specimen referral system for acute respiratory illness surveillance using the national postal system

**Phase I – Assessment.** In 2015, the assessment to understand specimen referrals was performed in partnership with the Burkina Faso Ministry of Health and the United States Centers for Disease Control and Prevention (CDC). The assessment mapped the existing referral networks, examined existing infrastructure, and analysed various strengths and weaknesses reported by key stakeholders. In Burkina Faso, it was found that specimens are carried by laboratory staff on public transportation to referral laboratories, which is costly and takes qualified staff away from their duties.

**Phase II – Design.** Under the Global Health Security Agenda and during the transition to phase II of the project, Burkina Faso was focused on strengthening surveillance for severe acute respiratory infections, which generates specimens requiring transport to the National Influenza Reference Laboratory (Laboratoire National de Référence pour les Gripes, LNR-G). Design of a pilot system for severe acute respiratory infections samples was undertaken by performing primary research and interviews at multiple levels of the health system, including the primary health center, district laboratory, LNR-G and central Ministry of Health levels. Key partners, including the consultant, ASLM, CDC



Sonapost showing how the post packages its shipments. [Source: Kameko Nichols, Independent Consultant, ASLM].

*continued on next page*



The team from CDC-Burkina Faso, Davycas, Sonapost and ASLM. [Source: Kameko Nichols, Independent Consultant, ASLM].

to strengthening of the referral network through ASLM support. Limitations on funding and readiness precluded the advancement into the second phase, which will be highlighted in more detail in the future, for every assessed country.

The overall assessment process and tools developed by the consultant under this project have also served in other specimen referral assessments across Africa with other partners and funders, such as in Mozambique, Zambia and Nigeria. Since the initial assessments, the Global Laboratory Initiative (GLI) launched its [Guide to TB Specimen Referral Systems and Integrated Networks](#). The Guide is a comprehensive document to help support in-country Ministries of Health and laboratory partners in developing and strengthening integrated specimen referral networks. In addition, a companion [specimen referral toolkit](#) was also recently released by GLI, which will provide tools, resources, and links to other relevant information.

The assessments reported in this article were provided by The Nichols Group LLC. The Nichols Group works with a range of clients to focus on aspects of transport and logistics within health systems across primarily sub-Saharan Africa and Asia. Projects have included designing a module of an assessment for vaccine management systems, conducting specimen transportation network assessments and system design across 17 countries, analysing a costing tool for cold chain equipment maintenance and recommending alternative cost frameworks. For more information, please visit: <http://www.thenicholsgroupllc.com/>

Four photos - right: Triple packaging for biosafety and biosecurity, as well as specimen quality. [Source: Aaron Pattillo, Independent Consultant, ASLM]

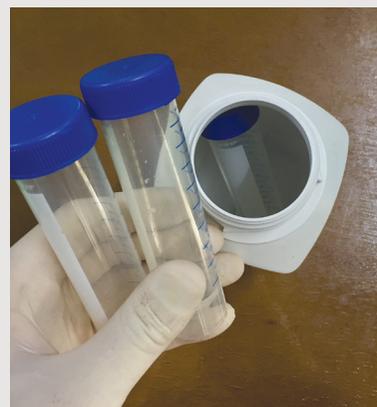
and a local organisation, Davycas, then developed a sample referral design that was approved by the Ministry of Health to connect four district laboratories to LNR-G. This design was tendered out and awarded to SONAPOST (the national postal system), using their Express Mail service.

**Phase III – Implementation.** Following the design phase and identification of the transport partner, the implementation of the pilot programme began. A key element of this process involved incorporating and negotiating critical components of the pilot programme into the agreement with the transport partner, including:

- Delivery to LNR-G within 24-hours of collection from any site
- Training to ensure specimen quality and biosafety
- Cost-containment using volume-based package pricing
- Customised communication, data collection and tracking mechanisms
- Ability to incorporate other specimen types (to realise cost savings).

Activation of the pilot programme began 15 April 2017, initially for a six-month period. The implementation and performance of the programme will be studied in detail separately.

In sum, the three-tiered approach used in Burkina Faso to assess, design, and implement the country's first specimen referral network can serve as a model for other countries to follow.



Ms. Kameko Nichols



Mr. Aaron Pattillo



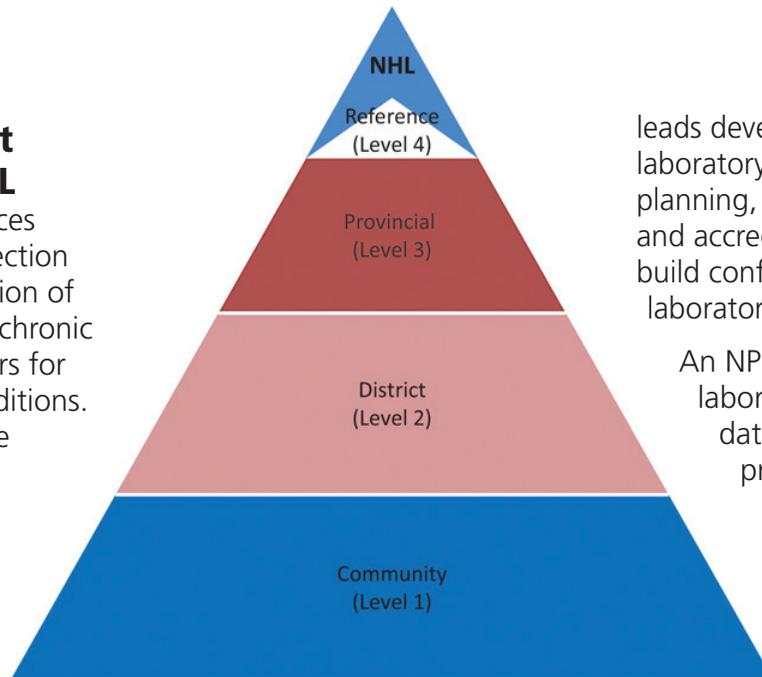
Mr. Abdoulaye Nikiema

# Why should every country have a national public health laboratory?

## Every country must have a strong NPHL

Laboratory testing services are essential to the detection and accurate identification of disease pathogens and chronic conditions, or risk factors for developing chronic conditions. Every country must have a strong national public health laboratory (NPHL) to lead its laboratory network and coordinate the complexity of laboratory systems to assure protection against epidemics and access to quality laboratory testing for prevention and treatment of illnesses.

The unique functions of an NPHL help achieve national health priorities. An NPHL provides advanced testing capabilities for surveillance and early detection of emerging infectious disease risks and communication with the World Health Organization. Early detection guides decisions for effective prevention and saves lives. This capability is also critical for a country to meet the International Health Regulations requirement to, "report public health events of international concern".



The integrated Tiered Laboratory Network (Level 4 in some countries includes the reference laboratories and the National Public Health Laboratory is on top of the system).

An NPHL organizes the technical expertise and capacity of laboratory professionals to advise on development of workforce and adoption of technology to support quality-assured testing services. Quality-assured laboratory tests aid more accurate diagnoses and better health outcomes. An NPHL also

leads development of national laboratory policy and strategic planning, including certification and accreditation strategies that build confidence and trust in laboratory services.

An NPHL manages a national laboratory specimen and data repository that provides trusted materials and information for evaluating disease prevalence and health effects to support public health research, guide resource allocation for effective use and

evaluate disease trends to speed effective intervention.

A strong NPHL detects emerging infectious disease health risks and inform a coordinated response for early action to interrupt the spread of disease and prevent the catastrophic effects of widespread disease outbreaks. Every country must have a strong NPHL.

**Ralph Timperi, MPH,**  
Senior Adviser, Laboratory Practice  
& Management, Association of  
Public Health Laboratories





## Meet Professor Souleymane Mboup, PhD

**Executive Director, Institute for Health Research, Epidemiological Surveillance and Training (IRESSEF; Institut de Recherche en Santé, de Surveillance Epidémiologique et de Formation)**

*Prof Mboup studied at Cheikh Anta Diop University in Dakar and the University of Tours in France. As a former student at the Senegalese Military Health Training Academy, he also holds the title of Colonel in the Senegalese armed forces. He has held several high profile positions and has been a member of several scientific societies in Senegal and internationally. He is the author of more than 350 publications and 18 books, and he has acted as an International Projects Review Expert and Principal Investigator on several research projects.*

### Who is Prof Souleymane Mboup? Can you tell us about some key experiences that led you to your career in laboratory medicine?

I am a Senegalese microbiologist with expertise in HIV/AIDS, tuberculosis, malaria, hepatitis, Ebola and other infectious tropical diseases. I live in Dakar and lead the Institute for Health Research, Epidemiological Surveillance and Training (IRESSEF) as the founder and Executive Director. My first degree is in Pharmacy, followed by training in microbiology at the University of Tours in France and at Harvard University. I have dedicated more than 40 years of my life to HIV/AIDS research, and owing to a passion for collaborative research, co-discovered the HIV-2 virus. In Senegal, for many years, I contributed to reduce the HIV prevalence to one of the lowest in Africa and helped develop the tools and knowledge that are essential in turning the tide on this terrible disease. Most recently, I spearheaded the establishment of IRESSEF, an ambitious research and training institute in global health based in West Africa.

### What is the idea behind IRESSEF, its mission and vision, and how did you come to be its Executive Director?

I still strongly believe that even more investment needs to be made on our continent; the burden is really on Africa. There are many opportunities here, but inspirational leaders and resources are scarce. These are the reasons why I conceptualized IRESSEF, sought and found the necessary funds for its construction and for fully equipping it with the best available laboratory machines, thanks to The Gilead Foundation.

IRESSEF is accredited to ISO 15189 and 15190 and is a recognized non-profit public institution supported by the Government of Senegal. IRESSEF is located in the outskirts of Dakar (30km), in the new urban centre of Diamniadio.

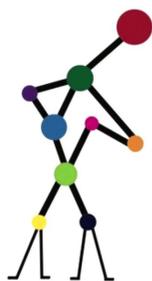
IRESSEF's vision is to become a pan-African centre of excellence in health research, disease surveillance, training, systems strengthening and capacity building programs. It is organized around four pillars of activity: Training, Research, Surveillance and Diagnostics.

IRESSEF's objectives are twofold:

- To establish a clinical research platform that meets international standards
- To train internationally competitive leaders of tomorrow

To achieve these goals, a five-year strategic plan was developed in which the sustainability of the institution will be based on:

- Ensuring that IRESSEF provides a unique working environment in Africa
- Building research leadership through academic programs, as well as hands-on training
- Securing domestic resources (leveraging our own projects, state support, provision of services, etc.)
- Promoting excellence and attracting new grants
- Establishing and maintaining collaborative and strategic partnerships with organizations such as ASLM, the US Centers for Disease Control and Prevention Atlanta, The Bill and Melinda Gates Foundation Africa Office, the London School of Hygiene and Tropical Medicine, etc.
- Diversifying funding sources



**IRESSEF**  
INSTITUT DE RECHERCHE  
EN SANTÉ, DE SURVEILLANCE  
ÉPIDÉMIOLOGIQUE

### What will be the most important emerging challenges for public health in Africa over the next 5 years? How can ASLM work with IRESSEF to meet those challenges?

Today, many determinants of global health are weak in Africa. Many infectious diseases have emerged; others have reappeared unexpectedly. Among the reasons for this situation are the impoverishment of populations, environmental changes and the mobility of populations. The persistence of poverty and the exacerbation of regional and global inequalities are the first and foremost focuses of concern.

Furthermore, in too many African countries the United Nation's



Millennium Development Goals (MDGs), including those related to health and sustainability, are rare or non-existent. Country policies should generally include a link between environmental sustainability (MDG 7) and health, which is often lacking. Many health workers report that the social cohesion and sustainability of Earth's ecological and geophysical systems are a necessary foundation for health.

The answer to such a situation, towards which IRESSEF and ASLM can work together, is better

health promotion and creating more opportunities for academic training in global health. Finally, we can contribute to promoting more research on Africa's health challenges.

### What would be your advice to next generation of African laboratory scientists?

First, we must recognize the difficulties young scientists face in finding their place and a decent job. There are too few opportunities for many promising talents. To make this situation more complex, the supervision, coaching and mentoring of these young people is not always up to par. Thus, it is important that these gaps are recognized and addressed without delay.

The message is, therefore, to give them hope, to never give up, to never stop having ambition for themselves, for their people. The most persistent of them will be the global health leaders of tomorrow. They must be rooted in the African context but also open to recent discoveries and external collaborations. They must be competent but also imbued with international ethical and moral principles and values.



## Fighting HIV—from ordinary to extraordinary

A 28-year-old African community youth worker, Evah Namakula, has won the first, global CARES HIV/AIDS award, designed to recognize ordinary people who have shown care, dedication, and commitment in their communities as part of the fight against the disease.

The Beckman Coulter Life Sciences CARES award celebrates the vision and endeavor of an individual whose humanitarian work, combined with their own commitment, has significantly improved the lives of local people impacted by AIDS. The goal of the award is to recognize dynamic individuals whose commitment and work serve as inspiration for the community.

In its first year (2017) the CARES award focused on the dedication of ordinary people in Africa—one of the areas in the world most affected by HIV/AIDS. The award has two categories of winners (1) an individual, Namakula, and (2) an organization, the Hillcrest AIDS Centre Trust (HACT). HACT is a South African charity that cares for some of the poorest and most disadvantaged people in Africa.

An independent judging panel described Namakula's achievements as 'remarkable' in her local Ugandan community to dispel the stigma of HIV/AIDS. She is also global youth ambassador for Reach Out Integrity Africa, where she helps to promote health and sexual responsibility to young people. Namakula has recently founded her own charity, IGNITE, to carry her work forward.

Namakula is part of the Young African Leaders Initiative (YALI) set up by former United States President Barak Obama to empower leadership skills in African



youth. As a YALI volunteer, she has been working as a leadership mentor in local communities and schools, helping to develop public speaking skills.

Inspired as a child by the determination of her mother and siblings, Namakula said, 'I had already become a campaigner, but it was while I was working in my local hospital laboratory that I realized how I could use my medical knowledge to reduce the myth young people in my community had about HIV/AIDS.'



### 2018 CARES award

Potential candidates for the 2018 CARES award include nurses, healthcare workers, national coordinators, laboratory scientists, and even clinicians.

It also includes lay people who are active in community outreach work or social workers providing AIDS counseling. Once a name has been added to the list of nominations, the HIV community will have the chance to vote in their support. The top three with the greatest number of nominations will be put forward

**2017 CARES award winner, Evah Namakula (Uganda).**



HACT caregiver Philisiwe Magoso tending to a patient in the Respite Unit.



HACT Respite Unit, South Africa.

for the final judging panel. An internationally recognized panel of judges selects the award recipient(s) and bestows an award of \$5,000.

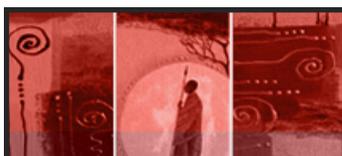
Nominations for the 2018 award must be made via the website where rules of entry, names of judges, and the official causes likely to benefit are available.

CARES supports the UNAIDS 90-90-90 target to ensure that by the year

2020, 90% of people living with HIV will know their status, 90% of those with diagnosed HIV infection will receive sustained antiretroviral therapy, and 90% of all people receiving antiretroviral therapy will have viral suppression.

CARES focuses on encouraging innovative solutions for the monitoring of HIV/AIDS treatment. It was inspired by the work of Professor Debbie Glencross, a

leading South African laboratory pathologist, who found an inexpensive way to measure a patient's CD4 count, a special type of white blood cell that can indicate how compromised a person's immune system might be. Prof Glencross serves as Director and Principle Pathologist in the Flow Cytometry unit of the Department of Hematology at the Charlotte Maxeke Johannesburg Academic Hospital.



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# International Accreditation: the UCH Ibadan HIV Laboratory Experience

## Background

The HIV Laboratory is a unit in the Department of Virology, College of Medicine, University of Ibadan, Nigeria. The Department, which is an academic unit of the University of Ibadan, is also the Clinical Virology Department of the University College Hospital (UCH), Ibadan. The laboratory provides clinical services for the National HIV treatment centre at the UCH with funding support from the United States' President's Emergency Plan for AIDS Relief (PEPFAR) programme through the AIDS Prevention Initiative in Nigeria (APIN), a leading non-governmental organisation duly registered in Nigeria, now known as APIN Public Health Initiative. The components of services provided by the laboratory include serology, immunology, haematology, clinical chemistry, molecular biology and training, as well as basic and operational research.

The laboratory's journey to accreditation started in 2010 with participation in the World Health Organization's (WHO) Strengthening Laboratory Management Toward Accreditation (SLMTA) programme<sup>1</sup> and the WHO Regional Office for Africa's Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA)<sup>2</sup> in 2011-2012. The laboratory qualified for an international accreditation assessment after obtaining a 4-star grading on an exit audit conducted by the African Society for Laboratory Medicine (ASLM) using the SLIPTA guidelines in January 2014. The accreditation audit—or 'D-day'—finally came on 23-24 November 2017 and was conducted by the South African National Accreditation System (SANAS) in line with the ISO15189 (2012) standard to assess quality and competence for clinical chemistry, haematology, serology

and molecular biology (virology) assays. After a thorough audit, the SANAS assessors confirmed that the laboratory operates a quality management system and recommended it for accreditation. Their recommendation was approved by the SANAS Approval Advisory Committee and the University of Ibadan/UCH HIV Laboratory was officially accredited as an international medical testing laboratory effective 29 March 2018, which only two other public laboratories in Nigeria have achieved. The journey to this unique feat was both eventful and exciting.

## Specific actions that contributed to achievement

A number of factors contributed to the achievement of this great success.

1. The laboratory enjoyed a very strong top management commitment to the programme throughout the process.
2. The laboratory had a carefully planned and well implemented mentoring process provided by laboratory advisors from APIN.<sup>3,4</sup> The support, training and evaluation visits by APIN were invaluable to the entire process. The laboratory also benefited from the wealth of experience of an ASLM-accredited auditor.
3. The laboratory has a highly motivated and committed mix of staff that included laboratory technicians, technologists, scientists, data analysts and information technology personnel, as well as academic faculty members, that worked well as a team.
4. Everyone contributed substantially to the process. Sub-groups were built around specific processes that were pivotal to the quality management system such as audit, quality indicator monitoring, personnel, equipment verification, stores and inventory,



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towards developing a robust quality management system with very relevant standard operating procedures (SOPs). Everyone was encouraged daily to imbibe the culture of operating as specified in the SOPs.

8. It was ensured that management review meetings took place early in the year and were very comprehensive. The agenda covered all the requirements of the standard. Meeting observations and recommendations provided a working template, as well as an opportunity to monitor performance.

### Challenges/roadblocks

A major roadblock was controlling documents and records—an ongoing challenge that has been seeking resolve since the SLIPTA programme. Due to the process, it was not easy to get the documents under control. Documents were developed by various sub-teams assigned with

management reviews, document and records, client satisfaction and surveys, and safety and logistics—everyone was involved in at least one.

5. All laboratory personnel met at least once a week to review the quality management system. This meeting provided the throttle for process direction. The meetings became very regular—almost daily—as we moved closer to site visits. They were also very useful in bidirectional communication/feedback between staff members and upper management.
6. The SLIPTA and SLMTA trainings were the foundation for the process. The feedback and corrective actions from these trainings laid a solid base for this achievement. The training also provided a very broad overview of what was needed to put in place.

A think-tank was established to carefully interpret the standards and properly understand the requirements. The think-tank also served as gatekeepers who ensured that actions, or lack thereof, were in conformity with the requirements.

7. A lot of training time was invested



HIV Laboratory equipment, College of Medicine, University of Ibadan.



HIV Laboratory staff and the SANAS assessors, College of Medicine, University of Ibadan.

specific tasks, while the Quality Manager coordinated the process and ensured that the documents were submitted and approved by the relevant authority before use. All records were kept at the various units, however, some of the procedures for controlling the records were not properly followed. This challenge was worked on by ensuring that the documents not directly originating from the desk of the Quality Manager were retrieved and controlled. A staff member was also assigned to be in charge of documents and records. This person coordinated the control of documents and records from a centralised position and worked closely with the Quality Manager.

### Advice for laboratories preparing for accreditation

1. Ensure that top management is fully committed to the idea. The process cannot go far without top management commitment. Mentors must be carried along at every stage of the process. Their experience and skills are invaluable.
2. Take it step by step. Develop a plan towards the process and carry the mentors along. The SLIPTA/SLMTA model is a very good approach. As weak areas are worked upon, ensure that strengths are not lost or diminished. It is often more difficult to maintain the strengths than improve upon the weakness.
3. Invest heavily in staff training and ensure that everyone is convinced about the need for international accreditation. When all players have the same vision, achieving the goal will be easier. The process must be given the best of everything, by everyone involved, at all times. As the laboratory is developed for accreditation, staff development should be created as well. This brings the added advantage of acquiring relevant life skills that are useful in other areas of staff member's lives.
4. All hands must be on deck and be ready for a lot of work. It takes a lot of work, discipline, rigor, and time to get a laboratory accredited to an international standard.
5. All assignments must be reviewed promptly and corrections made

immediately. Regardless of the personnel involved, review the standard with staff. Never assume certain tasks will be done. No one process is more important than the others. In the end, the weakest point in the processing system may greatly affect the strength of the whole.

### Acknowledgements

The entire staff of HIV Laboratory UCH, Ibadan Nigeria are grateful for the support received from APIN Public Health Initiative Nigeria, CDC Nigeria Office, Federal Ministry of Health Nigeria, WHO Regional Office for Africa, and the leadership of the University of Ibadan and the University College Hospital.

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# Are you a HIV Hero?

## 2018 CARES Award

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The Beckman Coulter CARES Award celebrates the vision and endeavor of an individual whose humanitarian work, combined with their own commitment, has significantly improved the lives of local people impacted by HIV.

The campaigning work of a 27-year-old Ugandan biomedical scientist won the 2017 CARES award, in recognition of her community work with young people and women to dispel the stigma of HIV. Ms Evah Namakula is a global youth ambassador for Reach Out Integrity (ROI) Africa, where she helps to promote health and sexual responsibility to young people.

The goal of the 2018 CARES Award is to recognize dynamic individuals whose commitment and work serve as inspiration for the community.

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