Annex B. Success Stories, FY 2023 Q2

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From Paper to Digital Reporting of TB Data: IDDS Establishes DataToCare in Cambodia

Diagnostics connectivity solutions help countries take advantage of electronic data generated by laboratory instruments that detect diseases like tuberculosis (TB). Solutions like DataToCare connect instruments to a central server so data are simultaneously reported to public health officials and laboratory staff. Connectivity solutions are also able to notify clinicians and patients of test results automatically through text messages. The technology replaces conventional paper-based reporting, which takes more time and is prone to error, and allows for real-time monitoring and management of equipment performance and inventory, as well as real-time surveillance of diseases.

These connectivity solutions allow countries to make sense of the data and enable data-driven decision-making for disease control. The benefits of diagnostics connectivity also extend to individuals. With automated notification of test results, clinicians can follow up with patients who are diagnosed with TB and quickly connect them to treatment. Starting TB treatment as soon as possible is key to saving the patient's life, as well as to preventing further transmission in a community.

In Cambodia, there had been no diagnostics connectivity for TB even though there were 88 sites with GeneXpert® instruments—testing devices that have the capability to detect and electronically report TB—located across the country. Instead, laboratories relied on a paper-based reporting system. It took an average of seven days for patients to receive test results. To address this gap, the USAID-funded Infectious Disease Detection and Surveillance (IDDS) project worked with Cambodia's National Center for Tuberculosis and Leprosy Control (CENAT) and Savics (the developer of DataToCare) to pilot the use of DataToCare at 10 GeneXpert sites in 10 operational districts. As part of the pilot, an online interactive dashboard was created to meet CENAT's data collection needs (see image below).

To start the pilot, IDDS organized training for super-users and the installation of DataToCare on February 7–14, 2022. Super-users are individuals based in Cambodia who are selected by CENAT to train laboratory staff on DataToCare and provide post-training technical assistance to other staff on-site or remotely. Eighteen super-users successfully completed the training, travelled to pilot sites for installation, and provided end-user training on DataToCare. Following the pilot installation, all 10 sites were successfully providing real-time test results to CENAT through DataToCare.

Dr. Khun Kim Eam, deputy director of CENAT and system administrator of DataToCare, said, "DataToCare is a good platform that enables central management staff to receive timely test results from the sites for monitoring, analysis, and decision-making." Mr. Pann Vuth, a provincial laboratory supervisor, agreed that DataToCare provides important information that can improve monitoring and quality control: "Since DataToCare was installed and connected

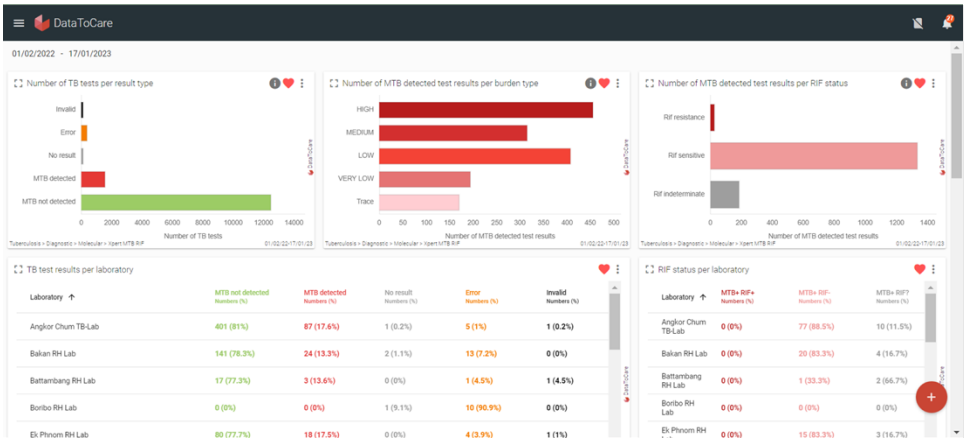
with GeneXpert machines in Kandal province, we have received on-time results from GeneXpert tests including information on GeneXpert performance, utilization, maintenance, and inventory through the DataToCare web portal everywhere we are, and provide the corrective action to the sites on time as needed."

After the successful pilot, IDDS and CENAT expanded diagnostics connectivity to 20 additional GeneXpert sites in September 2022. On September 12–16, super-users conducted end-user training and installed DataToCare at the additional sites, with limited remote support from Savics. To date, 114 laboratory staff from the 10 pilot and 20 additional sites have completed the training and are proficient users of DataToCare.

As a result of the expanded connectivity, more than 19,694 test results have been reported electronically to CENAT through DataToCare, as of March 24, 2023. This is a huge increase from the pilot installation period, during which only 583 test results were electronically available in February 2022. As the number of GeneXpert instruments that are connected to DataToCare increases, more people can receive their test results automatically through text message. Faster results mean that people receiving a positive diagnosis can start lifesaving treatment sooner.

To further support Cambodia in expanding diagnostics connectivity, IDDS will continue to work with partners to establish connectivity with Truenat®, a point-of-care, rapid molecular diagnostic instrument, in late 2022 and 2023. Two Truenat devices have been connected with DataToCare since January 2023. As a result of the Truenat connectivity, more than 114 test results have been reported electronically to CENAT through DataToCare, as of March 24, 2023.

Installation and end-user training. Photos by IDDS



DataToCare dashboard

[USAID's Infectious Disease Detection and Surveillance (IDDS) project] operates in more than 20 countries in Africa and Asia where there are significant gaps in health systems' ability to detect, track, and rapidly respond to infectious diseases and drug-resistant infections that pose a major threat to public health and global health security.

IDDS Supports the Development of Mpox Strategic Documents in Cameroon

On July 23, 2022, the World Health Organization director general declared the multi-country outbreak of mpox (originally known as monkeypox) a public health emergency of international concern. Mpox is a viral zoonotic disease (one that can jump from animals to humans) from the same family as smallpox. It is endemic in about 10 countries in West and Central Africa, including Cameroon, which is affected by both clades, or subtypes, of the virus. Cameroon shares borders with other countries where mpox is endemic. As of April 2023, the country has reported 18 confirmed cases and 3 deaths.

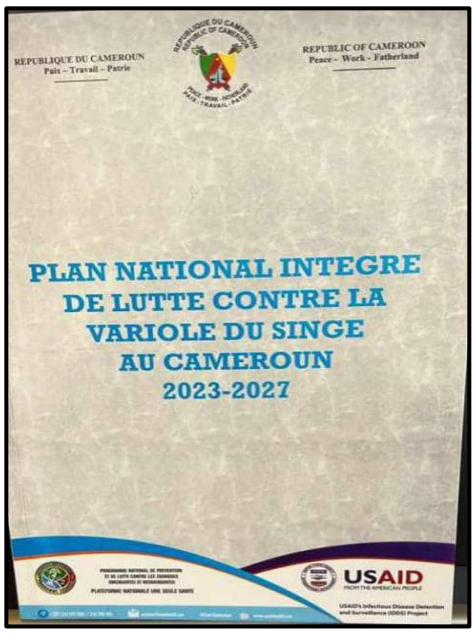
To effectively respond to the threat of mpox in Cameroon, USAID's Infectious Disease Detection and Surveillance (IDDS) project supported the Ministry of Public Health in developing two national strategic documents:

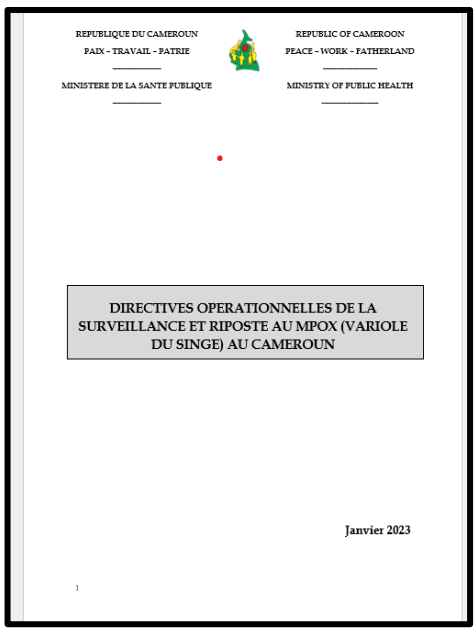
- The National Integrated Plan for the Fight Against Mpox in Cameroon (Photo 1)
- The Operational Guidelines for Mpox Surveillance in Cameroon (Photo 2)

These documents will improve coordination of mpox activities and will provide guidance for mpox surveillance and response activities. From October 2022 to February 2023, the documents were developed through a series of workshops involving key multisectoral actors such as the Ministry of Livestock, Fisheries, and Animal Industries; the Ministry of Environment, Nature Protection, and Sustainable Development; the Ministry of Public Health; and the Ministry of Forestry and Wildlife. Eight hundred copies of the national integrated plan were printed, in both English and French, and disseminated across the different key sectors and at each level of the health pyramid (national, regional, local). For the operational guidelines, the next step is the health minister's approval for dissemination.

Photo 1: National Integrated Plan for the Fight Against Mpox in Cameroon

Photo 2: Operational Guidelines for Mpox Surveillance





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DRC Studies the Causes of Stagnation of Bacc-TB

The Democratic Republic of the Congo (DRC) has made progress against tuberculosis (TB), but momentum has slowed, and DRC continues to be among the nations with the highest burdens of TB. One area in which progress has stagnated in TB case detection is confirmation: an initial positive diagnosis for TB, often by a skin test, needs to be confirmed. The World Health Organization recommends rapid molecular testing for TB case confirmation, which is a faster and more reliable method than the traditional smear microscopy method using a microscope to check for the TB bacteria, and it can also check for drug resistance.

USAID's Infectious Disease Detection and Surveillance (IDDS) project, together with DRC's National Tuberculosis Control Program (NTP), conducted a study to determine the causes of stagnation in the detection of bacteriologically confirmed tuberculosis (Bacc-TB) cases and the use of rapid molecular diagnostic testing. Data collection took place in the provinces of Kinshasa, Haut-Katanga, and Kongo Central on September 21–October 30, 2022.

The data generated by NTP, combined with key laboratory technicians' interviews, painted a detailed picture of the country's TB diagnostic network and particularly the barriers to accessing rapid molecular tests. An in-depth analysis of the data shows continued reliance on smear microscopy as a TB diagnostic test and the non-adherence of frontline workers to the TB testing algorithm, which guides decision-making about how to diagnose TB.

Rapid molecular testing uses a cartridge-based testing device, such as GeneXpert®. The study found that DRC has limited coverage of GeneXpert instruments, a high rate of non-functional GeneXpert devices due to frequent breakdown of modules, and an insufficient quantity of GeneXpert cartridges. The continued reliance on smear microscopy has led to neglect and misuse of DRC's stock of GeneXpert instruments. The study presents a clear pathway to increase the use of rapid molecular testing in DRC through staff training, regular maintenance of the GeneXpert machines, and restocking of cartridges.

According to Dr. Michel Kaswa, the director of NTP, "The Bacc-TB is one of the studies that has given the NTP evidence that will help it strengthen the network, because the data generated have gone beyond the reasons for stagnation, elucidating the consumption of GeneXpert inputs including its quantification, use, and management of waste generated by these inputs."

The results of this study will be shared with a global audience through a peer-reviewed publication and presentation at national and international conferences. Already, one manuscript and three abstracts have been written from the study. The abstracts were submitted to the Union World Conference on Lung Health, which takes place in November 2023.

In summary, the Bacc-TB study has shown that secondary analysis of program data, combined with key informant interviews, can provide an in-depth understanding of the barriers to accessing TB diagnostic services. "Operational research has always been a weak link at the NTP,

but with the support of USAID, some research has received funding, including the Bacc-TB study," said Dr. Gertrude Lay, head of the monitoring and evaluation division at NTP. "In the 2021-2023 strategic laboratory plan, a question was raised about how we justify the declining proportion of Bacc-TB in 2018, 2019, and 2020. We thought the decrease in Bacc-TB was related to the increase in TB-HIV co-infection. But the Bacc-TB study has revealed that the use of microscopy, the non-application of algorithms, the insufficiency of functional GeneXpert modules is evidence that can explain this stagnation."

Bacc-TB report validation meeting at National TB Reference Laboratory, chaired by the NTP deputy director. Photo by IDDS

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Assessing the Tuberculosis Diagnostic Network in the Democratic Republic of the Congo

The Democratic Republic of the Congo (DRC), home to some 96 million people, suffers from a very high burden of tuberculosis (TB). The country has a TB incidence of 318 per 100,000 population, with a mortality rate of 44 per 100,000 population.

A key step in reducing TB in any country is to undertake a thorough examination of the TB diagnostic system—where and how people are tested for TB across the entire health system. Such an examination is called a TB diagnostic network assessment, or TB DNA.

The objectives of the recent assessment in DRC were to review the overall diagnostic network and its current practices and processes, identify challenges that prevent the overall diagnostic network from performing efficiently and effectively, and propose evidence-based interventions to improve the overall ability of the TB diagnostic network to meet the goals and targets of the country's national strategic plan.

The TB DNA was organized by DRC's National TB Program (NTP) with the support of USAID's Infectious Disease Detection and Surveillance (IDDS) project. DRC is the first French-speaking country to organize a TB DNA. International assessors and local observers participated in the assessment and visited more than 100 facilities at all tiers of the health system, across 13 provinces, including hospitals, laboratories, drug supply centers, and prisons. The TB DNA took place in three stages: self-assessment (November 28–December 2, 2022), site verification visits (January 28–February 4, 2023), and restitution meeting (February 6–10, 2023).

Working session during the site verification visit—Wanie-Rukula General Referral Hospital, Tshopo Province. Photo by IDDS

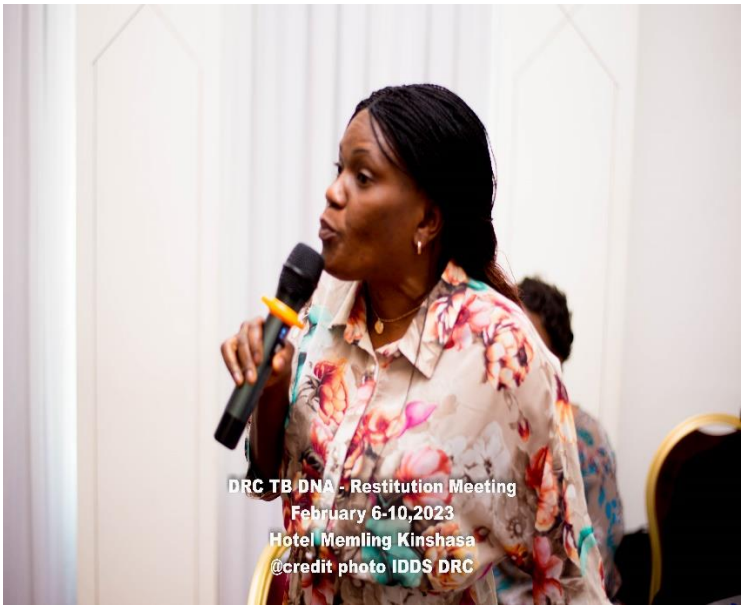
The key findings of the assessment have been incorporated into DRC's new TB strategic plan and a concept note for TB funding to the Global Fund to Fight AIDS, Tuberculosis and Malaria. The NTP/National TB Reference Laboratory is also taking steps to set up a TB working group with all relevant stakeholders to maintain the progress made by TB DNA.

The director of NTP emphasized the importance of the TB-NET tool, an analysis method used by IDDS that allowed for in-depth analysis and a better understanding of the reasons for underperformance in the current diagnostic network. The director recommended that the TB-NET tool be developed for use in all other components of NTP to continue improving performance and outcomes.

Alex Durena, USAID (left), Michel Kaswa, NTP director (center), Ochi Ibe, IDDS deputy director (right).

Albert Kuate Kuate, a TB expert from Cameroon, urged that the same evaluation be repeated and expanded to other French-speaking African nations to assist them in thoroughly assessing the obstacles facing their national TB control programs.

Dr. Nicole Anshambi, the Kinshasa provincial TB program coordinator, also emphasized the need for capacity building for all individuals involved in the TB diagnostic network and the various stakeholders during this initiative.



The TB DNA was conducted under challenging circumstances in DRC. These challenges included the severe degradation of road and airport infrastructure, navigation through areas with security risks, and difficulties in accessing certain regions due to natural barriers such as the Congo River, other rivers, forests, and savannahs.

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DRC Laboratory Achieves National Milestone with IDDS Support: First Plague Specimens Cultured

The plague is a disease that most people associate with history books, and although it is now curable with antibiotics, it persists in several countries, including the Democratic Republic of the Congo (DRC). The DRC province of Ituri has had several outbreaks of plague since the end of colonial rule in 1960. On April 4, 2022, the Provincial Health Division (DPS) of Ituri declared a resurgence of the plague in the health zone of Rethy, in the territory of Djugu. Since 2021, a total of 795 suspected cases of plague have been reported in Ituri, resulting in 35 deaths (a case fatality rate of 4.4 percent). Of the 795 cases, 668 (84 percent) suspected cases were identified in the Rethy health zone.

Previously, when health officials suspected that patients had plague, DPS of Ituri sent specimens to the laboratories of the National Biomedical Research Institute (INRB) in Kinshasa or Goma for testing. However, unbeknownst to the provincial health divisions, these laboratories did not have the tests to detect and confirm the plague. Also, rapid diagnostic tests were missing in the health zones for screening patients. Consequently, the lack of screening and confirmatory testing at the regional and national reference public health laboratories delayed plague case detection, management, and control.

USAID's Infectious Disease Detection and Surveillance (IDDS) project collaborated with DPS of Ituri, DPS of North Kivu, and INRB in Goma to support the response to the ongoing plague outbreak in eastern DRC provinces. IDDS support during 2022 included the provision of reagents and materials for the collection of specimens and their transport to INRB, as well as the provision of supplies for confirmatory testing using bacteriological culture for *Yersinia pestis* (the bacterium that causes plague).

On March 15–20, 2023, IDDS provided on-site technical assistance to three staff members (one female) at the INRB laboratory in Goma on *Yersinia pestis* bacteriological culture, focusing on specific/selective culture medium preparation, gram staining, microscopy, culture for plague specimens, and identification of *Yersinia pestis* and differentiation from other *Yersinia* species (namely *Yersinia enterocolitica*). A total of eight plague specimens were cultured during the training, representing the first time that culture for *Yersinia pestis* had ever been conducted in DRC. With IDDS support, the INRB public health reference laboratory in Goma is now the first laboratory in DRC to reach this important milestone of successfully conducting bacteriology confirmatory testing for plague.

This achievement will significantly contribute to obtaining confirmatory results for plague within 48–72 hours from the time of specimen receipt by the laboratory. In the past, it took one month or longer to ship plague specimens to the INRB laboratory in Kinshasa, only to wait for results that never became available, because of the lack of detection and confirmatory tests.

In addition, during the training visit to the INRB laboratory in Goma, IDDS staff helped identify other gaps and training needs in the bacteriology department that might improve the quality of laboratory services, such as storage needs for staining reagents and prevention of repetitive contamination of culture media. “We have learned a lot from you through your visit and your assistance,” said Faida Kitoga, a biologist at the INRB Rodolphe Mérieux Laboratory in Goma. “The concepts learned will not only allow us to culture and identify the causative agent of the plague, but we are also now able to improve certain practices and solve certain challenges that we have always encountered in our bacteriology department.”

Dr. Andy Numbi, IDDS global health security team lead in DRC, providing training on plague bacteriological culture to INRB staff in Goma. Photos by IDDS

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"A Better Way Forward": Using Stool Specimens to Detect Pediatric TB in DRC

In the Democratic Republic of the Congo (DRC), detecting tuberculosis (TB) remains a challenge for several reasons, including limited availability of and access to World Health Organization-recommended rapid molecular diagnostic technologies as well as the difficulty of obtaining sputum specimens from children. The DRC's capital, Kinshasa, is home to more than 17 million people, and its overcrowded slums are ideal conditions for the transmission of infectious diseases like TB. To help address these challenges, the DRC's National Tuberculosis Control Program (NTP) collaborated with USAID's Infectious Disease Detection and Surveillance (IDDS) project to pilot stool-based GeneXpert® testing in Kinshasa.

Health care providers and caretakers find stool testing acceptable due to its noninvasive nature, the relative ease of collecting specimens, and the ability to integrate the procedure into routine health care settings. Using a stool specimen, children do not have to try to produce sputum, which young children especially find very difficult. *Mycobacterium tuberculosis*, the pathogen that causes TB, survives in the stool of infected people.

Twenty-five sites in Kinshasa implemented the pilot from June to November 2022. Seven of the 25 sites had GeneXpert instruments, which serve 18 TB diagnostic and treatment centers. A total of 25 clinical providers, 25 laboratory technicians, and 3 nurse supervisors from the pilot sites attended training on stool-based testing on June 7–10, 2022. Eveline, one of health care workers trained said, "The stool is easy; it saves children."

By the end of the pilot, 703 children with TB symptoms were referred for stool-based testing. Of these, 125 (18 percent) were positive for TB on the stool test, 2 with rifampicin-resistant TB. Based on these findings, NTP decided to introduce stool-based testing as a routine procedure.

The director of NTP, Michel Kaswa Kayomo, congratulated all for the quality of their work, saying, "This will help the NTP to reduce the gap in pediatric TB detection of TB in general and especially bacteriologically confirmed cases."

Eveline Klinkenberg, IDDS consultant, observing simple one-step stool processing in one of the pilot sites, Kinshasa, DRC. Photo by IDDS

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The Revitalization of TB Screening Activities Using Truenat at DRC's Mupanja Hospital

Manasse Katoka, a newly trained Truenat user. Photo by IDDS

USAID's Infectious Disease Detection and Surveillance (IDDS) project is working to increase access to testing for tuberculosis (TB) in the Democratic Republic of the Congo (DRC). DRC has suffered from one of the world's highest TB burdens, with 215,787 people falling ill with the disease in 2021. The strategy to increase testing, implemented in partnership with the DRC's National Tuberculosis Control Program (NTP), includes the rollout of Truenat® testing technology.

Truenat is a rapid molecular test, which works by identifying the DNA of the pathogen, the disease-causing organism. Truenat can run on battery power and is suitable for use in small, local health facilities, and it is these smaller hospitals and clinics where potential TB sufferers come to seek testing and treatment.

Mupanja Hospital is one of these accessible, local facilities. It is one of the 11 new Truenat sites located in Lualaba health zone of Lualaba province in southern DRC.

After training for 11 new Truenat users from the Lualaba sites in April 2022 by IDDS and an expert from Truenat's manufacturer, Molbio Diagnostics, IDDS installed the instruments at the sites. Rollout went well in 10 sites, but the Mupanja site was facing challenges. The Truenat user was not proficient with the instrument, which resulted in multiple errors, including repeated breakdowns on the Trueprep® and Truelab® devices that run the Truenat test, despite the training and ongoing support provided by IDDS and Molbio Diagnostics. On several occasions, the equipment needed to be sent to the capital, Kinshasa, for repair by Molbio staff.

Initially, the local Molbio representative and the head of the national laboratory network decided to move the instrument from Mupanja Hospital to another site, in response to the recurrent breakdowns. However, after consultation with provincial health staff and the management team of Mupanja Hospital, IDDS decided to persevere rather than disrupt access to TB testing by the local community because of an inexperienced technician not proficient with Truenat.

A meeting was held between the Mupanja Hospital management team, the provincial TB coordination office, and IDDS. The management team of Mupanja Hospital was asked to propose an alternative laboratory technician to be trained by the "super-users" in Lualaba.

To acquaint himself with Truenat, the newly designated laboratory technician, Manasse Katoka, requested (and was permitted) to bring along the Truenat instrument from Mupanja during the two-week training in Lualaba during November 2022. IDDS sent him the specimens from Mupanja Hospital to avoid any backlog or shutdown of TB screening activities. After training and evaluation, Katoka returned to Mupanja and IDDS continued with follow-up remote supervision and mentorship through a Truenat user group on WhatsApp.

To date, Katoka is proficient using the Truenat technology, with no complaints since December 2022. Truenat is capable of also testing for drug-resistant TB, and every month Mupanja Hospital has detected at least one rifampicin-resistant case.

“I am very happy and satisfied to be trained on the Truenat technique, which allows me to diagnose tuberculosis by knowing [patients’] profiles directly, a capability that microscopy does not give,” said Katoka.

IDDS has learned that collaboration between Truenat users (and perhaps users of other new laboratory technology) should be fostered by creating a community of practice for sharing knowledge and mutually solving challenges encountered. With the users continuing to work daily on testing, this is a key ingredient for continuous quality improvement. At the Mupanja site, errors related to Trueprep extraction and Truelab analysis are becoming more and more rare.

Mupanja Hospital. Photo by IDDS

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Intensified Mentorship Improves the Quality of AMR Detection and Surveillance in Ethiopia

Mentoring programs for laboratory technicians are essential for establishing and maintaining quality management systems. The quality management systems are in turn essential for ensuring the high quality of tests generated in all laboratories, including tests for antimicrobial resistance (AMR).

In 2022, USAID's Infectious Disease Detection and Surveillance (IDDS) project resumed its implementation of AMR work in Ethiopia: equipping laboratories with the skills to test for drug resistance in dangerous bacteria.

The new AMR work started with baseline assessments of the six IDDS-supported AMR laboratories in Ethiopia. Based on the gaps identified in laboratory processes, IDDS started an intensified mentorship program. Mentoring goes beyond training and is a longer-term learning relationship between an experienced technician and a newer staff member. The mentorship program follows a structure outlined by the Ethiopian Public Health Institute (EPHI). As a result of the intensified mentorship, IDDS, EPHI, and the AMR laboratories developed standard operating procedures, job aids, and manuals, all designed to ensure high-quality work on AMR detection. The mentorship helped develop and continue uninterrupted and quality-assured AMR testing services by addressing the bottlenecks that these laboratories were facing before the resumption of IDDS support.

With guidance from EPHI, many public laboratories in Ethiopia have received International Organization for Standardization (ISO) 15189 accreditation from the Ethiopian Accreditation Service for several tests, as well as full testing scope accreditation for GeneXpert®, HIV and TB tests, clinical chemistry, and hematology tests at national, regional, and tertiary hospital laboratories. This was achieved after implementing the Stepwise Laboratory Quality Improvement Process Towards Accreditation framework.

However, none of the public hospital laboratories in Ethiopia are accredited for bacteriology tests. Bacteriology is essential for testing for AMR. To achieve accreditation for bacteriology testing services, laboratories must provide intensive mentoring for a wide range of tests. In low-income countries like Ethiopia, there are several issues that make ISO accreditation for bacteriology challenging:

- Poor design of laboratory rooms hampers the laboratory workflow and safety requirements that are unique to the bacteriology laboratory.
- Many hospitals lack qualified and skilled biomedical engineers who can perform maintenance on delicate bacteriology equipment.
- Laboratory quality management training provided to bacteriology laboratories' personnel is not designed to address all aspects of the testing principles and procedures.
- There is a lack of reliable suppliers/vendors in the country who can continuously provide the supplies necessary for microbiology, such as antimicrobial susceptibility testing discs.

- There are few skilled microbiologists who can provide competency assessments of staff as well as test method verification.
- It can take a long time to receive bacteriology test results, so clinicians may not want to request laboratory services.

To address these challenges, IDDS began an intensified AMR detection and surveillance mentorship program at its five human health AMR laboratories. IDDS conducted minor site refurbishments to improve the workflow and biosafety/biosecurity measures at the five laboratories (e.g., replacing damaged doors and windows, and installing bacteriology laboratory door access control devices).

The project then provided multiple training sessions on microbiology equipment for biomedical engineers and technicians at the hospitals of the IDDS-supported laboratories, microbiology-specific laboratory quality management training, and a four-day ISO 15189 orientation workshop aimed at discussing the findings of the IDDS baseline assessment of the laboratories. Finally, a workshop on microbiology supply store management, quantification, and forecasting was held on January 2–5, 2023. In February and March 2023, IDDS conducted two AMR diagnostic stewardship workshops to provide on-site training for selected clinicians on the microbiology laboratory services available, the types of specimens to submit to the laboratory for analysis, and how to effectively use the AMR testing results for optimal patient outcomes.

As a result of the intensified mentoring, two of the five laboratories cleared their non-conformities and are preparing for ISO accreditation and expected to obtain accreditation before September 2023. Microbiology heads of the laboratories are now actively participating in antimicrobial stewardship programs, and laboratories are providing uninterrupted AMR testing and surveillance services. Laboratory quality management has improved, as clearly shown by the ISO 15189 audit conducted at the IDDS-supported sites, and all five AMR laboratories have reported AMR data to national and global surveillance systems.

“I would like to extend my appreciation to the IDDS team for what they did on ISO 15189 orientation training, the professionalism, and the endless hours that you have spent,” said Dereje Mamuye of EPHI.

IDDS implemented an EPHI mentorship program at the IDDS-supported AMR sites. Photos by IDDS

IDDS procured laboratory commodities and provided equipment maintenance training. Photos by IDDS

IDDS and EPHI jointly conducted an annual AMR surveillance review meeting (February 15-17, 2023). Photo by IDDS

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Private-sector Model for TB Diagnosis in India's Hisar District is Delivering Results

More than half a million people died from tuberculosis (TB) in India in 2021, at a time when TB deaths increased for the first time in more than a decade and COVID-19 posed new obstacles for TB patients seeking health care. Increasing access to TB testing is critical to fighting the spread of the disease, because patients who are never accurately diagnosed are also left untreated and can potentially infect others.

In May 2022, India's National Tuberculosis Elimination Program (NTEP) and USAID's Infectious Disease Detection and Surveillance (IDDS) project launched a new model for TB diagnosis that harnesses the power of the extensive private health sector. By consolidating services such as X-ray screening, rapid molecular testing, and universal drug susceptibility testing under a single provider, the "one-stop TB/drug-resistant (DR)-TB diagnostic model" aims to eliminate delays in diagnosis to ensure that patients who are sick with TB receive accurate, timely, and quality-assured diagnoses to obtain potentially life-saving treatment. The model was piloted in Hisar District, in Haryana State, and makes use of small, local private clinics—the type that many people in India routinely turn to for health care.

The state TB cell (the state office of NTEP) and other implementing partners have reviewed results from the pilot project on a regular basis. In January 2023, the state TB officer invited the joint director from India's Central TB Division (CTD), as well as the laboratory technical team at CTD, to review the model by visiting Hisar. During the visit, the CTD team met with district TB staff and medical officers to understand how efficiencies gained in Hisar can be incorporated into the routine NTEP system in other areas of the country. World Health Organization officials also joined the visit.

An independent assessment of the model is being conducted by IQVIA, a health care consulting services provider engaged through USAID's iDEFEAT TB project. January's midcourse review visit included the presentation of preliminary results from the independent assessment.

Meeting on midcourse review of the model. Photo by IDDS

The agency presented a comparison of baseline and midcourse results, including a decrease in the number of patient visits to the health facility for specimen collection, an increase in upfront molecular testing, completion of sequential testing as per the NTEP diagnostic

algorithm, near-zero loss of patients, and the issue of reports within NTEP-defined turnaround times.

In February, IDDS and IQVIA hosted another presentation of the midcourse review findings to showcase the results to the deputy executive director of the Stop TB Partnership, Dr. Suvanand Sahu. Dr. Sahu provided constructive feedback by identifying potential cost savings to the project from purchasing GeneXpert® cartridges at government or IPAQT prices and by noting the benefits of documenting the challenges with local engagement of X-ray services in the model. It was noted that a particular strength of the model is the coordination with NTEP to report all tests to the online Ni-kshay database.

The new model has demonstrated that the additional TB diagnostic services purchased from the private sector can seamlessly fill the capacity gaps in the existing public sector services, effectively adding to the number of diagnosed TB patients who complete their TB testing and initiate appropriate treatment.

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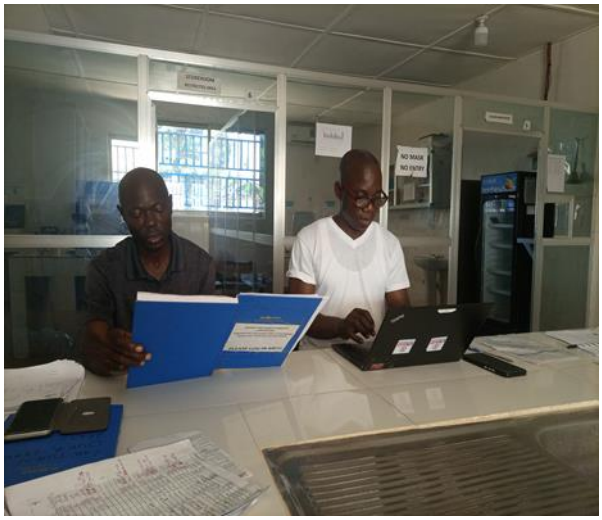
Transition from Paper-based to Electronic Data Capture of Laboratory Commodities in Liberia

Efficient and accurate data recording is an essential component of laboratory quality management systems and ensures quality and cost-effectiveness. Paper-based data capture has historically been the main method used to record information at the laboratory at G.W. Harley Hospital in Liberia. From the time the new G.W. Harley Hospital laboratory opened its doors in April 2021 until December 2022, the laboratory had been using a paper-based system to capture data on laboratory supplies.

USAID's Infectious Disease Detection and Surveillance (IDDS) project led the renovation of the G.W. Harley Hospital laboratory. IDDS had noted that laboratory staff lacked the computer skills needed to establish an inventory database that captures laboratory reagents and consumables (essential laboratory supplies for testing). To remedy this, IDDS provided on-the-bench mentorship to two laboratory staff. The two-day mentorship focused on the use of the computer to create a database and capture laboratory commodities. IDDS provided mentorship to the quality officer, Moses Gleatee, and safety officer, Anthony Bundeh, who were then able to capture all the inventory items in an electronic spreadsheet.

As of January 3, 2023, the G.W. Harley Hospital laboratory has transitioned from paper-based data capture to an electronic database to ensure that laboratory reagents and consumables are fully captured for future reference. The electronic database will increase efficiency, cost-effectiveness, and accuracy, and will facilitate real-time validation and reporting.



G.W. Harley Hospital laboratory quality and safety officers, Moses Gleatee and Anthony Bundeh, capturing data in a computer. Photo by IDDS

USAID's Infectious Disease Detection and Surveillance (IDDS) project operates in more than 20 countries in Africa and Asia where there are significant gaps in health systems' ability to detect, track, and rapidly respond to infectious diseases and drug-resistant infections that pose a major threat to public health and global health security.

IDDS Equips the Mali National Institute of Public Health for Infectious Disease Detection, including COVID-19 Genomic Sequencing

USAID's Infectious Disease Detection and Surveillance (IDDS) project donated laboratory supplies and equipment to the Government of Mali through the National Institute of Public Health (INSP) to enable the country to detect infectious diseases, including COVID-19 genomic sequencing. The supplies and equipment, including 20,000 test kits, were officially handed over to INSP on April 13, 2023, by the supply chain advisor at USAID in Mali, Dr. Aligui Yattara.

"These commodities will be very useful for the government of Mali to detect various infectious diseases and to improve Malian population health stratus," said Abdoulaye S. Dabo, head of human resources and administration at INSP.

Handover ceremony participants from INSP, USAID, and IDDS. Photo by IDDS

The INSP head of human resources and administration (representative of the general director), Abdoulaye S Dabo (left), receiving a sample of the supplies from Dr. Aligui Yattara, supply chain advisor at USAID in Mali. Photo by IDDS

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Stool-based TB Testing Pilot Contributing to Improved Childhood TB Detection in Malawi

Pulmonary tuberculosis (TB) diagnosis in children remains a difficult process. Young children find it difficult to produce sputum specimens. There can be a low TB bacteria presence in sputum, and there is limited availability of TB diagnostic options for microbiological confirmation (second test to confirm TB). To improve childhood TB detection, with support from USAID's Infectious Disease Detection and Surveillance (IDDS) project, the National TB and Leprosy Elimination Program (NTLEP) in Malawi is piloting stool-based GeneXpert® testing to diagnose pediatric TB at eight selected sites.

Mzuzu Central Hospital is among the eight facilities that are carrying out the pilot study in Malawi. Since the start of the study in November 2022, the site has recorded steady improvement in the notifications of pediatric TB cases. For example, data from the Ministry of Health show that the facility almost doubled its childhood notifications, from 5 cases reported in July–September 2022, to 11 in October–December 2022.

Grace Mabaso, a laboratory technician at the hospital, expressed the satisfaction that she gets on her job when using the stool-based diagnosis method during a recent joint monitoring and supportive supervision with USAID in March 2023. "Both clinical and laboratory staff are very appreciative for this innovation as it accords us with critical information to provide correct treatment," said Mabaso.

During a recent visit to the hospital, the technical advisory team (which includes IDDS) established that Mzuzu Central Hospital had registered a total of 40 participants, of which 2 were diagnosed with TB directly from the stool analysis. "Out of the two TB cases, one case was diagnosed as drug-resistant TB [DR-TB] which turned out to be rifampicin resistant [RR]," Mabaso explained. "I am happy to report that this RR case was reassessed by a team of clinicians and was promptly initiated on DR-TB treatment."

Mabaso revealed that the child was now responding well to anti-TB treatment and generally in good health. "Otherwise, we would like to thank the IDDS through NTLEP with support from USAID for supporting this innovation which I believe will be scaled up across the country to improve the diagnosis of TB in children," she concluded.

Members of the joint monitoring and supportive supervision team at Mzuzu Central Hospital. Photo by IDDS

Overall, the pilot study has built the capacity of 92 health care workers from both clinical and laboratory sections as well as TB focal persons using this procedure. Cumulatively, 414

participants have been enrolled in the pilot study, with 78 TB cases being diagnosed. Notably, 25 of the 78 TB cases were directly diagnosed through stool analysis.

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Launching Event-based Surveillance in Senegal

Event-based surveillance (EBS) is a key tool in stopping outbreaks of dangerous infectious diseases. For example, a teacher might report a high number of children absent from school at the same time with illness, and health officials will investigate and take any action necessary. In 2019, Senegal started to set up a nationwide EBS system to better protect its citizens. The Directorate of Prevention (DP) of the Ministry of Health (MoH) set up a central mechanism for the implementation, monitoring, and evaluation of EBS at all levels of the health system.

To pilot the new EBS system, DP started a hotline using the MoH toll-free number, housed at the National Service of Education and Information for Health. The EBS system was expected to begin in the first quarter of 2020, but this plan was delayed by the COVID-19 pandemic. Instead, for effective and early response to the pandemic, DP set up the COVID-19 alert platform with the creation of a toll-free number for community members to report suspected cases.

At the start of 2023, DP was again ready to relaunch and start implementation of EBS at all levels of the health system. To support this, USAID's Infectious Disease Detection and Surveillance (IDDS) project organized a meeting on March 2–3 in Dakar to update the EBS protocol for implementation. Participants included representatives from National Service of Education and Information for Health, the U.S. Centers for Disease Control and Prevention country office, the World Health Organization country office, mInfoSanté (a free SMS texting system), and the Emergency Operations Center. The COVID-19 alert platform was integrated into the EBS system. This system will receive reports that may be events of public health importance.

Working group sessions at the EBS protocol update meeting at DP.
Photo by IDDS

Following that meeting, a workshop was organized on March 6–10 in Thies to develop and review EBS tools, including standard operating procedures, guidelines, and communications materials for promoting an alert cell phone number to the public across Senegal. On March

15–17, IDDS organized a validation meeting at DP to approve all the new or reviewed documents created during the EBS workshop at Thies.

These three steps (the two meetings and workshop), conducted with technical and financial support from IDDS, were highly appreciated by the manager of the MoH Surveillance Division, Dr. Boly Diop. In his concluding remarks, he said: "We really appreciated the support that IDDS has provided to us to have all these documents ready for the implementation of the EBS system, which with the indicator-based surveillance system [the reporting of specific diseases from health care providers to public health officials] are the two pillars of epidemic intelligence. The latter is well-known and implemented at all levels of the health system since 2016 and well-functioning. EBS completes this process to ensure any events of public health importance is captured by the system."

With IDDS support, surveillance officers will now be armed with the knowledge to implement the EBS standard protocols and tools.

Working group sessions during the workshop for EBS tools review organized in Thies region. Photo by IDDS

EBS tools validation meeting at DP. Photo by IDDS

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IDDS Work in Tanzania Impacts Lives: From Institutional and Systems Capacity Building to Relieving Human Suffering

Antimicrobial resistance (AMR) is a growing global public health threat. The infections it can cause can lead to socioeconomic hardships due to the cost of care and treatment, long-term illness, and loss of life, especially in low- and middle-income countries. AMR detection and surveillance in low- and middle-income countries is beset with the challenges of the existing gaps in laboratory services, lack of skilled personnel and laboratory supplies, and limited data management and disease surveillance infrastructure. This leads to a lack of trust in and underuse of AMR laboratory services, and continuous prescription of antibiotics by clinicians. Non-responsiveness to treatment aggravates patients' suffering and reduces trust in health systems.

In Tanzania, USAID's Infectious Disease Detection and Surveillance (IDDS) project supported the government to operationalize the national AMR surveillance framework. This has built the capacity of laboratory and surveillance systems to detect AMR, improved AMR data quality and reporting, and improved the use of AMR data for patient management and disease surveillance. IDDS support has led to improved clinical decisions, optimized antibiotic use, reduced suffering, and improved patient treatment.

Latifa Omar, head of the microbiology section at Maweni Regional Referral Hospital laboratory (one of the IDDS-supported AMR surveillance sites), in Kigoma, Tanzania, related an example of the benefit of increased AMR surveillance: "A four-year-old male child was spotted in a clinic in Maweni Regional Referral Hospital suffering from chronic ear discharge which had occurred since birth," said Omar. "The family and the clinical team had apparently given up on him. A laboratory staff member who participates in surveillance activities supported by IDDS advised the family and clinician to perform culture and antibiotic susceptibility testing on the ear pus discharge. *Pseudomonas aeruginosa* was isolated, sensitive only to meropenem and levofloxacin. These are expensive antibiotics and difficult to access locally. They were obtained in another city, and after one month the child was completely healed, and freed from four years of suffering from chronic ear discharge."

Omar added, "I am grateful to IDDS for selecting and building the capacity of our hospital through mentorships and supportive supervision on AMR testing and reporting. This has built our confidence."

Dr. Siril Kullaya, team lead for IDDS in Tanzania, said: "This is one of several cases which demonstrate the impact IDDS has had in the lives of people—from institutional and systems capacity building, to relieving people's suffering."

Capacity building through on-site mentorship programs supported by USAID IDDS in Tanzania. Mentors and protégés participate in different areas of microbiology laboratory activities, such as media preparation and culture plate reading (left) to cross-checking of AMR data from microbiology culture worksheets and WHONET data files (right). Photos by IDDS

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IDDS Supports Uganda's Animal Health National Reference Laboratories to Build Quality Management Systems

In an age when an infection can travel between continents in a matter of hours, it is crucial that countries share their data on outbreaks of dangerous infectious diseases. But only effective management of quality in health laboratories will enable countries to produce test results that the global community will trust in cases of international emergency. Every step in a laboratory's testing process needs to come under the eye of quality management.

Globally, countries commit to building national health systems and infrastructure to detect and respond to public health events of international concern when they ratify the World Health Organization's International Health Regulations (2005). Achieving, maintaining, and improving laboratory quality management systems (QMSs) guarantees the continuous release of laboratory test results that are accurate, timely, and reliable—but this remains a major challenge for animal health laboratories.

A QMS is the infrastructure built to support a laboratory's efforts to understand the policies, processes, and procedures that work together to deliver services. A QMS is defined by the World Health Organization as the "coordinated activities to direct and control an organization with regard to quality."

In Uganda, USAID's Infectious Disease Detection and Surveillance (IDDS) project recently supported a document review workshop to standardize and align QMS managerial documents (including policy documents such as the quality and biosafety manuals and standard operating procedures required by the International Organization for Standardization [ISO]) for three national reference laboratories that support animal health. National reference laboratories are required to lead a country's laboratory quality assurance and are usually where testing for resistance to first- and second-line drugs is done. The supported sites are:

- Uganda Wildlife Authority's Queen Elizabeth National Park Research and Diagnostics Laboratory
- National Livestock Resources Research Institute
- National Animal Disease Diagnostics and Epidemiology Center, operated by the Ministry of Agriculture, Animal Industry and Fisheries

The document review was led by experienced facilitators, trained by the South African National Accreditation System. The meeting, which took place on March 6–10, 2023, also paired quality managers and their deputies with experienced QMS subject matter experts to aid in developing the QMS mandatory documents based on the ISO 17025 standard, such as the quality manuals that are vital to implement quality-controlled processes that will yield consistent quality and accurate products. A key outcome of the workshop was the development and realignment of all key standard operating procedures, as required by ISO 17025, the standard for testing and calibration laboratories.

According to the quality manager of the Queen Elizabeth National Park laboratory, Gloria Akurut: “These documents are vital tools to implement the set standards as we build our laboratory quality management systems. A QMS is designed to provide a common understanding of the coordinated quality activities in an organization and form the basis for continual improvement. Continual improvement of systems and services is the definitive goal of a successful QMS. Every organization needs to understand their definition of quality and consider how they will best achieve it.”

Facilitator introducing the standard formats to be used when aligning documents. Photo by IDDS

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IDDS Builds Capacity to Implement Integrated Disease Surveillance and Response in Buikwe District

To effectively halt infectious disease outbreaks, public health agencies, private laboratories, and community partners must closely coordinate their responses to emerging threats. This idea formed the basis of the Integrated Disease Surveillance and Response (IDSR) framework, first established in Africa in 1988. Created by the World Health Organization's African region, the IDSR framework helps these groups decide when and how to act—by recommending thresholds for action on dangerous infectious diseases, determining events and conditions that merit a public health response, and establishing alert systems that help contain infectious diseases.

In Uganda, USAID's Infectious Disease Detection and Surveillance (IDDS) project rolled out the latest IDSR guidelines to frontline health workers in Buikwe district, which borders Lake Victoria. The February 2023 rollout in Buikwe district followed the national launch of the third edition of the national guidelines for IDSR in September 2021. As part of the effort to introduce the new guidelines, IDDS trained 109 health workers and veterinarians (49 female) at Café Jungle, Mabira, on February 6–10, 2023. Regional IDSR trainers from the Buikwe district health office facilitated the training, with support from IDDS and national IDSR trainers from Uganda's Ministry of Health (MoH). Representing 32 of the district's 65 health facilities, these 109 trained professionals will share their knowledge of the third edition IDSR guidelines with other health workers at their facilities. Through the rollout, new case definitions were distributed to all 65 health facilities to foster early detection of priority diseases, conditions, and events.

While closing the five-day training, Dr. Richard Bbosa Serunkuma, Buikwe district health officer, said, "I would like to thank IDDS and MoH for this timely training that has reinforced the district's capacity to prevent, detect, and respond to public health emergencies that are occurring more frequently."

Dr. Richard Bbosa Serunkuma, Buikwe district health officer (standing), gives remarks during the IDSR training. Photo by IDDS.

The IDSR framework makes surveillance and laboratory data more usable, helping public health managers and decisionmakers improve the detection of and response to the leading causes of illness, death, and disability in African countries. IDDS followed up the February training with visits to 16 of the district's 65 health facilities on March 20–24, in partnership with MoH and district IDSR trainers. During the visits, the supervisors administered an IDSR checklist to assess the quality of IDSR data submitted by the health facilities.

With improved capacity for reporting quality IDSR data in the field, Uganda's health officials are well on their way toward receiving valid, timely, and complete health information for early detection of disease outbreaks.

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Uganda IDDS Team Hosts a USAID Technical Support Supervision Visit

With the experience of the COVID-19 pandemic, there is an increased focus on addressing epidemic-prone disease threats worldwide that pose a risk to the health and well-being of the entire global population. Launched in 2014, the Global Health Security (GHS) Agenda predates the pandemic and is a global effort to prevent, detect, and respond to infectious disease threats. Countries with robust capacities to prevent, detect, and respond to outbreaks can avert many of the social, political, economic, and health system costs of severe disease outbreaks.

USAID's Infectious Disease Detection and Surveillance (IDDS) project is part of the United States' support for GHS. In Uganda, USAID has supported the government and collaborated with several partners to introduce and implement the country's National Action Plan for Health Security.

USAID undertakes technical and supervisory support to GHS implementing partners like IDDS operating in Uganda. A visit jointly led by the USAID mission, USAID, and IDDS occurred on February 19–25, 2023, in southwestern Uganda. Uganda is considered a high-risk area for the emergence of new zoonotic diseases, which are those that can jump from animals to humans, such as COVID-19 and Ebola virus disease. The choice of districts was based on the operational area of the two USAID projects (IDDS and STOP Spillover) in this region. IDDS-supported sites visited were Mbarara Veterinary Laboratory, in Mbarara District, and Uganda Wildlife Authority's Diagnostics and Research Laboratory, in Queen Elizabeth National Park in Kasese.

This visiting team and IDDS staff held discussions with representatives of the government of Uganda and USAID on the prioritization of project activities in solving pressing GHS challenges. This visit was also meant to gauge the status of Integrated Disease Surveillance and Response (World Health Organization guidelines for integrated disease surveillance) implementation and plan for the use of additional funding from the USAID Bureau for Africa.

The USAID and IDDS visiting team at the Uganda Wildlife Authority's Diagnostics and Research Laboratory. Photo by IDDS

Dorothy Peprah, USAID senior global health security agenda advisor, said, "I want to take this opportunity to say what a wonderful trip this was. Linda Venczel, Derrick Mimbe, and the IDDS Uganda team could not have been better hosts. Their professionalism and expertise could not be beat. The results of their hard work were on full display. As a result of this trip, our [USAID] Uganda Mission chose to up its investments in IDDS. We hope this contribution enables the program to finish strong. I have shared the report with my colleagues and the mission for any questions, but rest assured they share the same sentiments."

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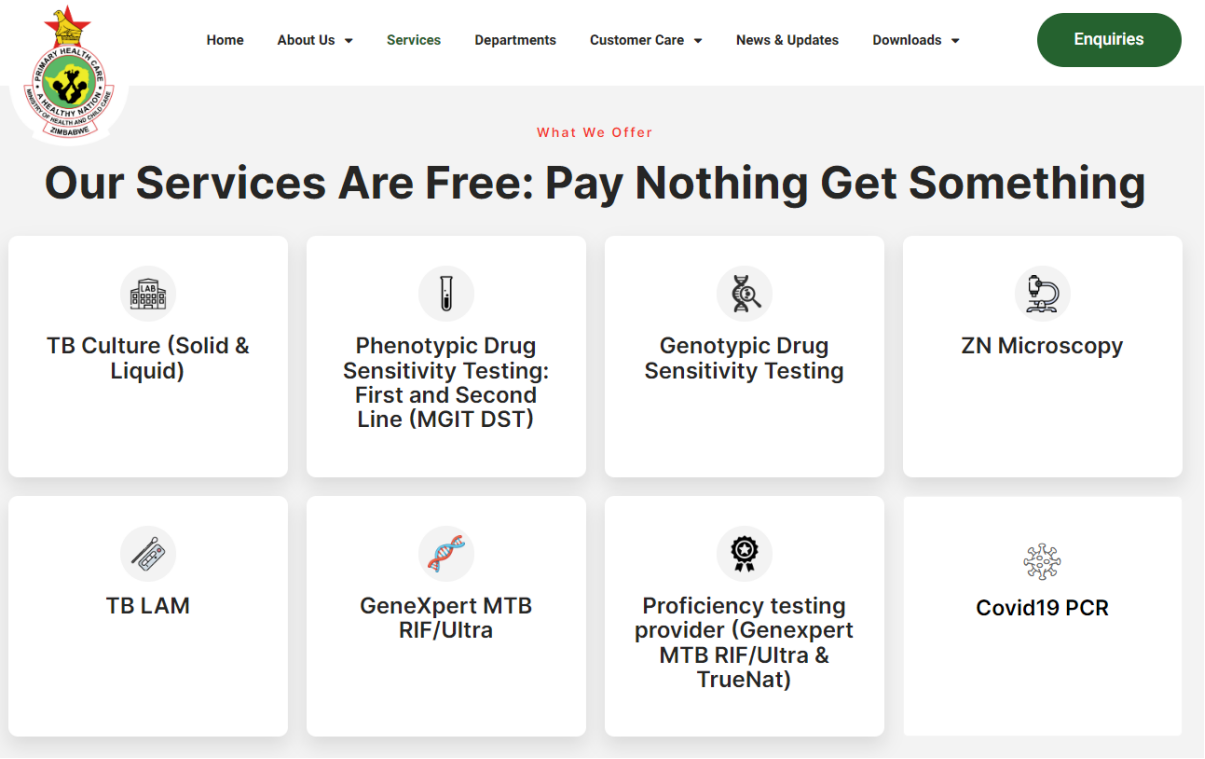
IDDS Helps Launch New Website for the National Tuberculosis Reference Laboratory in Zimbabwe

A primary focus for USAID's Infectious Disease Detection and Surveillance (IDDS) project is to support partner countries and their ministries of health to strengthen laboratory systems. This includes ensuring that they have the laboratory facilities, functional equipment, supplies, and training they need to provide safe, accurate, and timely diagnostic testing services. Like any other organization, a reference laboratory (a laboratory that does additional analysis or testing on a sample or specimen sent from another laboratory) needs a functional and user-friendly website to communicate information about its services.

In Zimbabwe, the National Tuberculosis (TB) Reference Laboratory (NTBRL) in Bulawayo serves as a referral facility for the southern region of the country. NTBRL performs specialized diagnostic testing for TB and COVID-19, conducts disease surveillance, and provides support for and supervision of lower-level laboratories. NTBRL is an accredited laboratory (International Organization for Standardization 15189:2012), reflecting its effort to establish and maintain a sound quality management system that meets the national and international standards.

NTBRL needed a website to communicate its services, provide request forms directly to users, and share its newsletter. IDDS worked with the Ministry of Health and Child Care to develop, install, and launch the NTBRL website on March 23, 2023, after three months in development. "Congratulations team. This is a remarkable achievement," said Dr. Fungai Kavenga, acting manager of the National TB Program. The new website will ensure continuous visibility of testing services that the laboratory offers. "Amazing progress indeed," agreed Dr. Ronald Ncube, executive director of the Union Zimbabwe Trust.



Screenshot of the new NTBRL website page describing services offered

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The Journey to Childhood TB Diagnosis using the Simple One-Step Method in Harare Province

One of the laboratory scientists processing a stool specimen during training at Newlands Clinic, Harare. Photo by IDDS

Clinical staff at Rujeko Polyclinic learning about the SOS method for the diagnosis of TB in children. Photo by IDDS

Tuberculosis (TB) is difficult to diagnose in children and people living with HIV (PLHIV), because diagnostic tests for pulmonary TB usually require a sputum specimen. Children, especially younger children, and PLHIV who are seriously ill cannot produce sputum on demand. Fortunately, there is another way to test for TB: both children and adults swallow their sputum, and the bacteria passes through the stomach and ends up in the stool. Stool can now be used as an accurate test for the diagnosis of TB in both adults and children.

Netherlands-based KNCV TB Foundation developed the simple one-step (SOS) method to process stool specimens for GeneXpert® *Mycobacterium tuberculosis* (MTB)/rifampicin (RIF) testing. The method uses similar supplies and equipment as used for sputum GeneXpert testing. How it works: the stool is placed in the bottle provided in the GeneXpert kit containing reagents. After incubation, the upper layer of the supernatant (surface liquid) containing the bacteria is transferred into the GeneXpert cartridge and tested according to the protocol of the manufacturer, just as the technician would do for sputum testing.

The World Health Organization endorsed the use of stool as a diagnostic specimen on the Xpert® MTB/RIF Ultra platform in 2021, but uptake of the new method in IDDS-supported laboratories in the Harare metropolitan area in Zimbabwe has been limited. As part of a pilot project to accelerate uptake, USAID's Infectious Disease Detection and Surveillance (IDDS) project trained 129 health care workers in 24 facilities in Harare over a period of two weeks in January 2023. By enabling staff at these laboratories to conduct stool testing on the Xpert MTB/RIF platform, the project aims to increase TB notifications among children from 6 to 12 percent. The trainees who attended included both clinical staff (60 percent)

and laboratory staff (40 percent), with 43 percent female and 57 percent male. “The SOS method is simple to carry out and will be easy to train all levels of laboratory professionals,” said Barnabas Kuchocha, a senior laboratory technologist based at Beatrice Road Infectious Diseases Hospital.

After receiving training from IDDS, all laboratory staff attained a grade of 90 percent or higher and are qualified to work independently. After the training, IDDS conducted on-site mentorship to further sharpen skills and create demand for stool testing. Within 2 months of the training, 11 stool tests were conducted (5 were specimens from children and 6 were specimens from critically ill PLHIV adult patients). No errors were encountered during this period, indicating an excellent understanding of the method among staff at the IDDS-supported facilities, and the results will inform the rollout of the method to additional facilities in Harare province.

“We have been having challenges in diagnosis of TB in children,” said Sister-in-Charge Miriam Mgweni, a registered nurse based at Rujeko Polyclinic. “This is a welcome intervention."

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IDDS Supports Zimbabwe Laboratories to Improve Truenat Proficiency Testing Scores

The World Health Organization's End TB Strategy envisions a world free of tuberculosis (TB) by 2035, when there will be ''zero deaths, disease, and suffering due to TB.'' Achieving this goal requires effective early detection and treatment of cases, including increasing bacteriological confirmation of TB and treating confirmed cases.

To accelerate TB detection, the Stop TB Partnership and USAID embarked on an initiative known as the introducing New Tools Project to roll out a package of the latest innovations in diagnostics, treatments, and digital health technologies to strengthen TB care in high-burden countries. This includes eight cutting-edge tools, including Truenat® technology.

Truenat, manufactured by Molbio Diagnostics of India, is a portable, battery-operated, chip-based rapid molecular test to detect *Mycobacterium tuberculosis* complex bacteria and rifampicin resistance at the peripheral level. Considered a near-point-of-care technology to detect TB and rifampicin resistance, Truenat can be operated at room temperature in ''low-infrastructure'' settings, unlike GeneXpert®, which is limited to facilities with a controlled environment. Under the introducing New Tools Project, Zimbabwe's National TB Program, together with the USAID-funded Infectious Disease Detection and Surveillance (IDDS) project, introduced Truenat technology in December 2021.

In Zimbabwe, IDDS was involved in procurement and delivery of Truenat instruments and cartridges, installation of instruments at selected sites, training of end-users and super-users, external quality assessment (EQA), and supervision.

Proficiency testing is an independent measure of a laboratory's competency in providing accurate, reliable results using the new Truenat technology. Laboratories receive test panels from SmartSpot Quality, an accredited manufacturer of validated panels, which consist of four dry culture spots. Laboratories test the panels using Truenat and upload their results within 30 days. Figure 1 shows how Zimbabwe's laboratories have improved their Truenat proficiency testing scores since rollout.

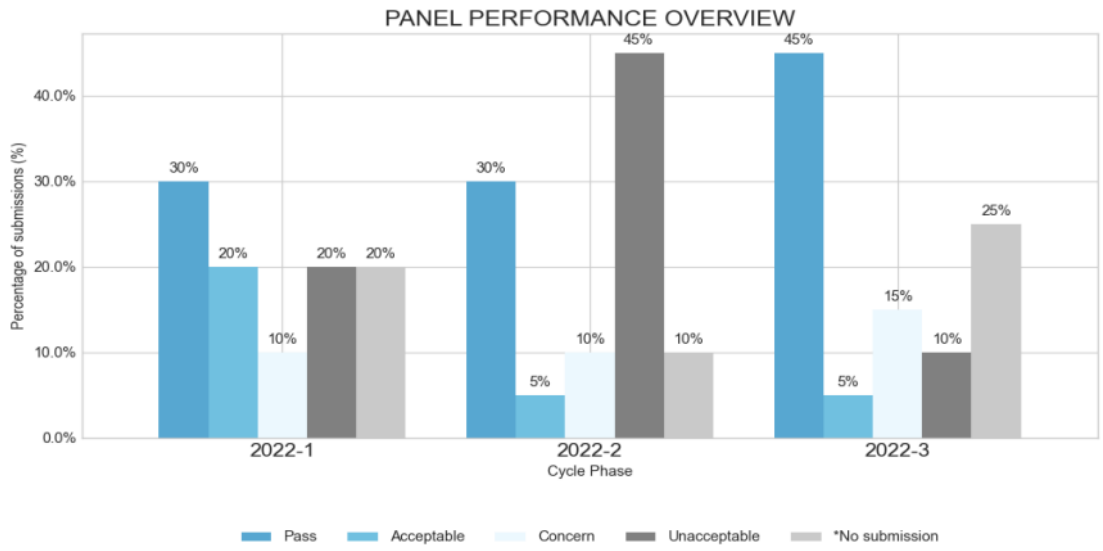

Figure 1: Proficiency testing panel scores by cycle

The average score of the Truenat sites improved significantly, from 80.7 percent in Cycle 1 to 92.9 percent in Cycle 3. However, there was an increase in the number of sites that were not able to report EQA data, due to power outages or lack of trained staff. After the third cycle of EQA, IDDS held a debriefing session to discuss the results, identify existing issues, and devise corrective action for further improvement.

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Indonesia Prepares to Face Future Epidemics by Institutionalizing a "One Health" Approach

(*This article was first published in Agrilinks*)

Indonesia is one of Asia's hotspots for emerging infectious diseases (EIDs) that can jump from animals to humans. Epidemics of zoonotic diseases have become more frequent and spread more quickly than ever, with devastating health, social, and economic consequences. In recognition of this growing problem, in 2019, Indonesia issued a presidential instruction, which set in motion a government-wide initiative to better prepare for and respond to potential pandemics.

USAID's Infectious Disease Detection and Surveillance (IDDS) project is helping the country build a strong, integrated surveillance system, complete with laboratory capacity, information systems, and well-trained staff to prevent, detect, and quickly respond to outbreaks using the One Health approach. One Health is a collaborative, multisectoral approach that recognizes the health impacts of the connections between humans, animals, and their shared environment.

In 2020, IDDS supported the Government of Indonesia to establish the One Health Coordination Working Group, which aims to support the government in handling EIDs through cross-sectoral collaboration and coordination nationally and locally. The working group consists of three subworking groups: the One Health Laboratory Network, Integrated Surveillance, and the Zoonosis and EID Information System (SIZE). In 2021, the One Health Coordination Working Group was formally legalized under the Deputy Decree of the Coordinating Minister.

Animal Health, Human Health, and the Environment

IDDS also supported the government in developing the Cross-Sectoral Integrated Surveillance Guideline, the Revitalization Four-Way Linking (4WL) Guideline, and the National SIZE Roadmap (which became annexes of the Regulation of the Coordinating Minister). In 2022, the pilot implementation of the joint risk assessment (JRA), using the 4WL framework and the Cross-Sectoral Integrated Surveillance Guideline, was carried out at the district level, with a focus on controlling the high number of cases of leptospirosis, a disease that is worsened during the rainy season when water becomes contaminated with Leptospira bacteria. Agricultural workers are at higher risk of contracting the disease, and its prevalence among humans, livestock, and ruminants may be severely underestimated in Indonesia.

The pilot included all stakeholders, including human health, animal health, and wildlife/environment health professionals from central and local government, as well as international partners: the World Health Organization, Food and Agriculture Organization of the United Nations (FAO), and Australia Indonesia Health Security Partnership. The JRA-4WL revealed a high risk of leptospirosis in Demak district, finding sporadic increases in both human and livestock disease cases. The preliminary findings have been presented to the head of local government, along with several recommendations:

- Strengthen existing programs by adding educational content on leptospirosis prevention
- Improve infrastructure, such as laboratory equipment for detecting processes and reporting tools
- Conduct risk communication, such as socialization, involving local champions and local people

IDDS expects to expand the implementation of the JRA-4WL and Cross-Sectoral Integrated Surveillance to other priority zoonosis and other regions in Indonesia in 2023.

Preventing and Detecting Outbreaks

To increase laboratory capacity to detect new EIDs with epidemic potential, IDDS developed the PREDICT laboratory protocol curriculum in collaboration with the Eijkman Institute for Molecular Biology. The certified training on PREDICT has been successfully carried out at four public health laboratories (Balai Teknik Kesehatan Lingkungan dan Pengendalian Penyakit (BTKLPP) Manado, Ambon, Makassar, and Batam). After participating in this training, around 20 public health laboratory officers were certified by the Human Resources Training Center, Ministry of Health. Laboratory test results from the pilot were reported in SIZE to be circulated and responded to by provincial and central levels, showing the improvement of Indonesia's capacity to prevent and respond to future outbreaks.

Information technology is another key area for preventing and detecting outbreaks of infectious diseases. IDDS supports the government to develop, operationalize, and optimize the SIZE information system, which integrates human and animal disease data from across Indonesia. In 2019, SIZE was piloted to detect rabies in four provinces (North Sulawesi, West Kalimantan, Riau, and Central Java), supported by the FAO. To accelerate SIZE implementation, IDDS supported the government to conduct training sessions, including One Health training in Karawang, West Java, which will be followed by the upcoming SIZE onsite technical training on priority zoonoses. It will be targeted to four additional provinces (North Sumatera, West Sumatera, Banten, and West Nusa Tenggara) that expect to implement SIZE in the future. Meanwhile, the improvement of SIZE to be interoperable and integrated with human, animal, and wildlife information systems, as well as to cover more priority zoonoses, is ongoing to ensure that SIZE will be regularly updated and functional in Indonesia.

For more effective responses in Indonesia, we must first understand the epidemiology of zoonotic diseases and track their incidence and prevalence across sectors. Through international collaboration and investments, the government of Indonesia has made substantial progress toward achieving an integrated disease information system, has articulated its vision and roadmap toward integrated surveillance, and has taken important steps toward training the health workforce and building capacity for preparedness and response, including within the agricultural sector. With zoonotic diseases an ever-present threat, the vision established at the G20 summit held in Indonesia in November—to redouble efforts to strengthen national health systems and global health governance across sectors—is more important than ever.

USAID's Infectious Disease Detection and Surveillance (IDDS) project operates in more than 20 countries in Africa and Asia where there are significant gaps in health systems' ability to detect, track, and rapidly respond to infectious diseases and drug-resistant infections that pose a major threat to public health and global health security.

Malawi: Uncovering Opportunities to Improve TB Detection

(This article was first published in LeaderNet)

Though tuberculosis (TB) has infected humans for thousands of years, detecting and diagnosing the disease remains surprisingly difficult. TB is the world's thirteenth most common cause of death, and the second-leading infectious killer after COVID-19. In 2021, 10.6 million people fell ill with TB, including 1.2 million children, and 1.6 million people died.

From community health clinics to centrally located reference laboratories, many organizations play a role in determining whether a patient is ill with TB, and together they comprise the "diagnostic network." One of the first steps to improving detection of TB is understanding the capabilities of the network, services offered and their locations, and challenges that prevent the network from performing efficiently and effectively. To do so, many countries have commissioned a "diagnostic network assessment," or DNA, that analyzes gaps in the network and opportunities for improving its function.

USAID's Infectious Disease Detection and Surveillance (IDDS) project partners with national TB programs to complete TB DNAs. IDDS works to improve disease detection and surveillance systems and has supported DNAs in Ethiopia, Tanzania, Uganda, Vietnam, and Zimbabwe. Drawing on lessons learned from these experiences, the project recently implemented a DNA in Malawi, a country where TB is the fourth leading cause of death and sickens more than 25,000 per year.

For Malawi's DNA, seven teams of international and local assessors visited health facilities in 22 districts in January 2023. Participants from the national TB program and local observers from the Ministry of Health also attended the visits, which created buy-in from program staff to implement the recommendations to strengthen the network. This also builds capacity of national program staff to lead re-assessments in the future.

One notable finding is Malawi's expansion of the diagnostic network to include private health care facilities. Public-private partnerships are one strategy to improve access to testing for TB, which can help to reduce the spread of the disease in the community. I recently visited Mwaiwathu Private Hospital, which provides testing free of charge to patients, using government-supplied Xpert® MTB/RIF Ultra test cartridges. The hospital's laboratory also refers patients' specimens to the public reference laboratories for additional drug resistance testing.

Stakeholders are already working together to employ creative solutions in the face of daunting challenges. One innovation that I encountered while visiting a peripheral-level laboratory in the rural Chikwawa district was the use of drones to transport patient specimens, as well as medical and laboratory supplies. Before drones were used, flooding during the rainy season rendered roads impassable and delayed specimens from arriving at laboratories for days. Ensuring timely specimen referrals to laboratories is key to improving the rate of testing for resistance to TB drugs so that doctors can adjust patient treatments and improve health outcomes.

Though the DNA will guide future collaborative programming to address gaps in the diagnostic network, IDDS is already working to provide new diagnostic equipment and training in Malawi. For instance, IDDS is working with the Stop TB Partnership to provide four Truenat® instruments to sites in Malawi that will use them to detect both TB and drug-resistant TB cases. IDDS is also refurbishing the Ekwendeni Mission Hospital in Malawi and providing the site with X-ray equipment that can aid in TB diagnosis.

Even as the team compiles their recommendations from the DNA, IDDS will continue to advance TB detection in Malawi through interventions like these. I look forward to continued collaboration with our partners in Malawi, including the national TB program and Ministry of Health, as we work together to end TB.

In rural Malawi, drones are used to deliver medical and laboratory supplies and transfer specimens from peripheral health facilities and laboratories to laboratories with more complex testing capacities. Photo by IDDS.

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Mali's Health Workers Fight Outbreaks in their Communities

(This article was first published on usaid.gov)

Community-based disease surveillance is a crucial way to stop dangerous outbreaks before they spread. Community members are trained to spot disease among people and animals in their community and report to health authorities. For example, yellow eyes could be a case of yellow fever, a dangerous infectious disease.

During 2020, USAID's Infectious Disease Detection and Surveillance (IDDS) project worked with Mali's General Directorate of Health and Public Hygiene (DGSHP) to produce reporting tools and a community-based surveillance guide for Mali. Following a successful pilot phase in Kadiolo health district, IDDS supported DGSHP to expand this approach to Mali's 75 health districts.

To date, IDDS has helped bring community-based surveillance to four additional health districts covering 2.3 million people in Kati, Kangaba, Sikasso, and Kolondiéba. Preliminary results from the first six months of the new Community-based surveillance system clearly demonstrate the importance of this approach with newly trained community health workers reporting more than 350 events leading to the detection of 16 cases of measles and one case of yellow fever.

"With the training received on Community-based surveillance and the communication tools I can conduct sensitization sessions in my community on diseases and events under surveillance so I can detect, and report suspected cases to my supervisors," explains Yacouba Kone, a community health worker in the town of Niamala in southern Mali. Kone used his new skills to successfully detect a case of acute flaccid paralysis.

With USAID IDDS support, there are now five health districts actively conducting community-based surveillance with more to come. This effort not only helps to prevent outbreaks before they spread, but also contributes to the country's response to a 2017 World Health Organization Joint External Evaluation recommendation for Mali: "adequate training of personnel from key sectors at all levels, including that of the community, so that they can fully play their roles in prevention, detection and response to all public health events."

Yacouba Kone, community health worker in Niamala, conducting sensitization during a home visit after detection of AFP case. Photo by IDDS

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Global Health Security: Empowering Community Health Workers to Halt Infectious Disease Outbreaks

(This article was first published in Health Systems Global)

In 2021, Maimuna (not her real name), a community health worker (CHW) in Mali's Kadiolo district noticed a yellow tint in a young mother's eyes. Suspecting yellow fever, Maimuna educated the woman and her family members on the risks associated with the disease and convinced the woman's husband to take her to the nearby health center where Maimuna is affiliated. Staff there collected a blood sample and Maimuna's suspicions were soon confirmed by the laboratory at the National Institute of Public Health in Bamako, Mali. Yellow fever is an infectious disease prone to epidemics because of its rapid spread by mosquitoes. The United States Agency for International Development's Infectious Disease Detection and Surveillance (IDDS) project had trained Maimuna and other CHWs in community-based disease surveillance.

Empowering Community Health Workers to Detect Public Health Events

CHWs like Maimuna have traditionally been utilized to improve community health initiatives and fill gaps within the health care system. They have historically been involved in disease eradication initiatives such as poliomyelitis and measles, programs for disease control (HIV/AIDS, Malaria and Tuberculosis), and as early warning systems and responses to public health emergencies. When appropriately trained, supervised, equipped with medical commodities and personal protective equipment, and properly compensated, CHWs can help prevent the rapid spread of infectious diseases and mitigate their impact by supporting community-based infection prevention and control, facilitating safe sample collection, conducting contact tracing, accelerating vaccination roll-out, and providing home-based care.

Yet there is even more these essential workers can do, at a time when emerging and re-emerging infections with potential to cause disease outbreaks remain a constant threat to global health security (GHS). The Global Health Security Agenda (GHSA) is an international initiative launched in 2014. It aims to strengthen countries' capacity to prevent, detect, and respond to emerging public health threats in a manner that aligns with International Health Regulations (IHR) 2005 requirements. The IHR 2005 and the corresponding Joint External Evaluation (JEE) Tool are the foremost international frameworks for building and assessing resilient public health systems, stipulating that countries should have a skilled and competent workforce for maintaining sustainable public health surveillance and response mechanisms. The GHSA's original framework included 11 action packages, developed to facilitate regional and global collaboration toward specific GHSA objectives and targets measured by the JEE tool. More than 70 countries, including the United States, have committed to the GHSA and begun to strengthen several action packages, including surveillance, which calls for improved functioning of indicator- and event-based surveillance systems capable of identifying potential events of concern for public health and health security. Involving community members to identify and report health events for public health surveillance purposes—an approach commonly described as community-based

surveillance (CBS)—has increasingly gained interest as the world continues to grapple with the fight against COVID-19 and recurrent infectious diseases outbreaks such as Ebola virus disease and Monkeypox.

CBS empowers CHWs, volunteers, and the communities they serve to:

- Identify risks and implement practices to prevent the spread of epidemic diseases
- Recognize potential disease events (termed "alerts") and notify authorities
- Engage with community gatekeepers and members to take early action to control disease spread

The CHWs, like other prominent community leaders, such as teachers and faith leaders, often serve as trusted voices in the community and are well placed to detect and monitor health events in the community, mobilize community action, distribute health information during outbreaks and request national assistance and emergency resources to protect public health. Recent CBS implementation experiences and results in Indonesia, Sierra Leone, and Uganda demonstrated that alerts generated by volunteers were highly accurate, matching community case definitions in 96 percent of cases in Sierra Leone, 90 percent in Indonesia, and 73 percent in Uganda. On average, 94 percent of these alerts were detected and reported to authorities within the optimal timeframe of 24 hours.

While these results are encouraging, CHWs require significant training and support if they are to be empowered to effectively implement CBS. In addition to Mali, IDDS has supported CBS implementation in other focus countries in sub-Saharan Africa, namely Guinea and Senegal. In Senegal, IDDS expanded the surveillance of eight human and six zoonotic priority diseases in Saint Louis and Tambacounda regions by training medical officers, animal health officers, environment officers, nurses, livestock staff, and community health volunteers, and has been supporting field investigations of cases reported through CBS. Using a One Health approach, this strategy allows public health and animal health professionals to be alerted by communities through a short message service (SMS), allowing real-time notification via an electronic tool and mobile platform (mInfoSanté) that can integrate information across health databases to coordinate available resources and deliver assistance such as ambulances. In Guinea, the post-Ebola strategy focused on creating a strong network of trusted and well-trained CHWs to serve as the first line for disease detection and provide a critical link between the community and formal health services. IDDS supported the Guinea National Health Security Agency and CBS technical working group to update their existing CBS training materials for CHW to incorporate COVID-19 information. Subsequently, IDDS trained 84 health workers in Guinea during a pilot of their new training materials. IDDS trains and mentors frontline workers including CHWs on community- and event-based surveillance, integrates data collected in communities with data collected by health facilities, bolsters mobile early warning systems, and harmonizes approaches across animal and human health surveillance.

Investing in the "First Mile" of Outbreak Prevention

In Africa, one of the main lessons learned from the 2014–2016 Ebola virus disease outbreak is that communities have a key role to play in GHS. During the outbreak, to contain the

disease, the government of Sierra Leone, with support from the United Nations Population Fund and other partners, implemented responses at the community level. CHWs were involved in contact tracing (a method of tracking contacts, or people linked to confirmed or probable Ebola cases). In Kailahun District—the epicenter of the country's outbreak and the most affected district—the CHWs went door-to-door to learn about people who might be affected, and then followed up with each possible contact. Their work allowed authorities to track the spread of the outbreak and ensured early detection of infections and immediate treatment. CHWs were also involved in educating the community about disease prevention, resulting in an increase over time in the proportion of safe burials and the rate of reported cases referred for medical care within 24 hours of symptom onset.

Pandemics begin and end in communities. To prevent and manage them, community engagement must be a priority. Communities need to be recognized as central actors in health systems and not simply recipients of health services. Engaging community members to collect health information from within their communities and report suspect cases and other events to public health authorities is a cost-effective way to halt the spread of epidemic-prone diseases. During the COVID-19 response, CHWs and volunteers were key to engaging communities and strengthening their capacity to limit the spread of disease. In recognition of these essential workers, the 72nd World Health Assembly adopted a resolution that recognizes that CHWs are an "integral part of all phases of an emergency health response (prevention, detection and response) in their own communities and are indispensable to contribute to ongoing primary health care services during emergencies."

In promoting public health at the local level, CHWs and volunteers should be the first line of defense against an outbreak. During the crucial early stages of an outbreak, when there is highest risk for spread but the greatest opportunity for containment, community resources must be leveraged to capture health information and mount an effective response. Daniel H. de Vries and his colleagues suggest that the community and CHWs should be regarded as the "first mile" in disease detection rather than the last mile within early warning systems. By targeting investments to the community level, they argue that we will be able to hasten timely capture of information about an imminent disease and deliver more culturally appropriate responses. Often, the community is aware of a health risk, but those in a position to mobilize response resources receive this information too late to stop the spread of disease and save as many lives as possible.

Integrating CBS into Existing Community Health Systems

The COVID-19 response highlighted the need to include CHWs in health policies and to invest in their training, equipment, and compensation, in line with WHO's policy recommendations. Advocacy efforts should be centered on increasing the numbers of well trained, supervised, equipped, and compensated CHWs globally to build resilience (inherent and adaptive) in health systems, and provide emergency response capacity. As Ballard et. al recognize, "the best pandemic response is a strong, preexisting primary health care system integrated with the community level." Therefore, GHS investments targeted at improving CBS as part of pandemic preparedness need to ensure that the support is integrated into the national health system instead of operationalized as vertical programs.

Looking ahead, the GHS and its frameworks should include building robust community health systems as part of the detection and response packages, instead of supporting CBS implementation in a piecemeal and non-integrated fashion, as observed in some countries supported with GHS investments. Ensuring that health security resources are invested in building strong primary health care systems has been duly recognized by the Global Fund to Fight AIDS, Tuberculosis and Malaria, which is the largest multilateral provider of grants for strengthening systems for health. The Global Fund is investing $1.5 billion a year in formal and community health systems through their core grants and their COVID-19 response funds, in recognition of the fact that strong community health systems play a critical role in increasing access to equitable and high-quality services. These investments in resilient and equitable primary health care systems position countries to achieve their universal health coverage goals.

Ballard et. al also advocate for doing away with earmarking resources or supporting short-term implementation of CHW-led activities in favor of pooling resources and making long-term investment commitments that align with a supported country's priorities in building resilient health systems that promote "CHW institutionalization and professionalization." As community health data plays an essential role in pandemic response, strong community data and data systems are key to successful pandemic preparedness and the future of GHS.

Exercise of SMS sending via mInfoSanté software. Community health workers training, Tambacounda, Senegal. Photo by IDDS

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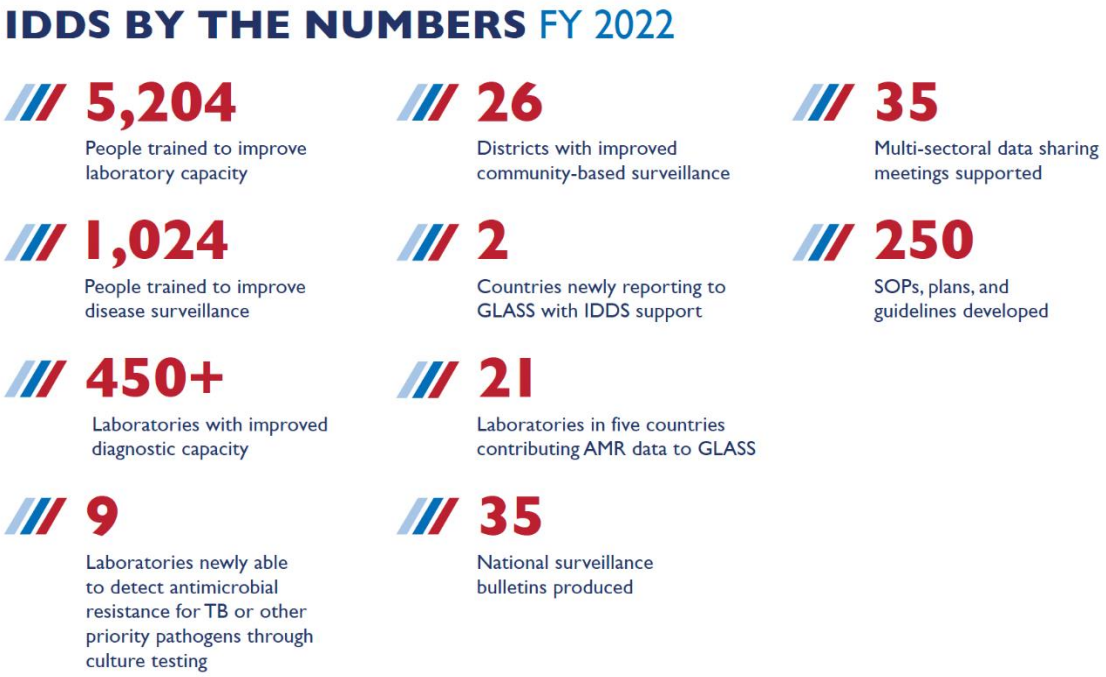
Strengthening Defenses, Laboratory by Laboratory

(This article was first published in Learning Lab)



USAID's Infectious Disease Detection and Surveillance (IDDS) project strengthens health systems by focusing on laboratory networks. As one of the USAID Global Health Bureau's leading diagnostic projects, IDDS has supported more than 450 laboratories to improve diagnostic accuracy and turnaround times, trained over 5,000 people on testing and surveillance, spearheaded enhancements to biosecurity and specimen transport, and expanded community access to quality laboratory services. When IDDS began in 2018, there was no way to know that its launch would coincide with a global health emergency: COVID-19. IDDS deployed experts dedicated to expanding diagnostic services and strengthening localized disease surveillance, supporting global pandemic response in more than 15 countries. Concurrently, IDDS recognized the need to integrate its rapid response into ongoing efforts to sustainably strengthen national diagnostic and surveillance systems.

Developing Networks and Partnerships

Five years later, IDDS is demonstrating its impact. An important aspect of integrating USAID's Collaboration, Learning, and Adaptation framework into programming has been IDDS' focus on creating country-led forums for experts to collaborate and share lessons. These forums create opportunities for infectious disease experts and other key partners to inform policy and program decisions, creating new linkages to improve diagnostic networks. In Southeast Asia, IDDS strengthened regional linkages through financial and logistical support to the Regional Public Health Laboratories Network and convened stakeholders from 11 Association of Southeast Asian Nations countries to share experiences and resources on disease detection. As COVID-19 spread, the network proved instrumental to

cross-country learning and problem solving. IDDS has since sustainably localized management and coordination of the network.

Ensuring Capacity for Testing and Surveillance
IDDS builds health system capacity for detecting and responding to infectious diseases while it supports COVID-19 response. From October 2020 to September 2021, IDDS transported more than 35,400 COVID-19 specimens for testing and trained 473 people on managing and testing COVID-19 specimens. The project has trained more than 1,000 people to improve disease surveillance.

IDDS continues to invest in localized laboratory capacity and connect the dots between the many facets of a well-functioning, efficient diagnostic network and broader health system. The goal is to cement progress toward national infectious disease programs capable of rapid and effective response, informed by global best practices. In nine countries, IDDS has deployed and is institutionalizing use of Truenat®, a rapid molecular test for tuberculosis for low resource settings, and will expand its rollout to additional countries in 2023. In Bangladesh, Uganda, and Vietnam, IDDS is integrating costs and processes into existing health systems through costed plans for strengthening diagnostic networks, laboratories, and organizational structures supported by domestic resources. IDDS is also building national capacity by improving digital connectivity between human and animal health disease reporting systems.

Enhancing Information Systems
National health programs need effective and integrated real-time information systems to inform decision-making. In Mali, IDDS expanded community-based surveillance to two districts, detecting four measles outbreaks and a yellow fever outbreak. The integration of community surveillance data into the national system via mobile phones is critical for future outbreaks and current response efforts.

Through these interventions and others, IDDS shapes country-based diagnostic and surveillance networks with self-sustaining capacity and supports testing networks to access needed financing and resources. By expanding diagnostic services to hard-to-reach areas and strengthening surveillance systems, IDDS is building defenses against future epidemics and pandemics, laboratory by laboratory.

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