LEADING IN SCIENCE
OUR VISION
A healthier world through quality laboratory systems.

OUR MISSION
Shape national and global health outcomes by promoting the value and contributions of public health laboratories and continuously improving the public health laboratory system and practice.
In some ways, 2017 was a challenging year for science—especially for science policy and scientists viewed as out of step with the federal government’s reshaped priorities. A proposed 12% cut to the US Centers for Disease Control and Prevention’s (CDC’s) budget topped the list of APHL’s policy concerns, as it would undermine the agency’s efforts to support everything from the national Laboratory Response Network—a critical public health and homeland security asset—to the implementation of gene sequencing in newborn screening, a critical technology to identify infants with certain rare, genetic disorders.

But science—the theme of this year’s annual report—also had its successes. Perhaps the most visible was the April March for Science. APHL was proud to add the organization’s name to the roster of co-sponsors and to field its own group of marchers for this lively event, which attracted over a million science advocates across the globe.

Of grave importance, APHL and partners also succeeded in preserving CDC funding, at least for the time being.

Among the association’s many other successes, described in the pages that follow, are:

• Beginning a fellowship program to train aspiring laboratorians in the scientific methods used to detect and characterize drug-resistant microbes.

• Leveraging the APHL Informatics Messaging Services (AIMS) platform to help achieve seamless, bidirectional data exchange between healthcare providers and public health authorities.

• Launching the National Biomonitoring Network to advance the science of biomonitoring, which measures human exposure to environmental toxicants like the polyfluoroalkyl substances found in many consumer products.

• Partnering with the University of South Florida to establish the United States’ sole doctoral program in public health laboratory science and practice.

• Helping to guide the move from pulsed-field gel electrophoresis to whole genome sequencing as the means for characterizing harmful foodborne bacteria through PulseNet, the nation’s largest food safety network.

On the global level, APHL supported the Global Health Security Agenda (GHSA) by reviewing Ghana’s biorisk management practices and strengthening laboratory quality assurance systems in Kenya, Tanzania and other high-risk nations. Also, in response to a CDC request, APHL sent a team of experts to post-hurricane Puerto Rico to survey the damage to the island’s public health laboratories and prioritize assistance needs.

All in all, 2017 was an eventful year for public health laboratory science. And 2018 promises more of the same. As ever, we continue to rely on our many partners to help navigate the unknown crises ahead and to continue to expand the boundaries of laboratory science to benefit us all.

Ewa King, PhD
President

Scott J. Becker, MS
Executive Director
Science has enabled humankind to view stars and galaxies from beyond our own solar system and to unravel the genetic code that shapes who we are. Today, it is the best hope for solving some of the most vexing problems in public health, such as the control of pathogenic microbes and assessment of human exposure to the toxins that can impact our environment.
As the voice of America’s state and local public health laboratories—including health department, environmental testing and agricultural laboratories—APHL is a leader in the development and application of scientific solutions in the public health sphere.

Consider MALDI-TOF—an advanced testing technology used to detect biothreat agents and other infectious organisms—which is gaining currency in microbiology laboratories because of its speed, power and ease of use. Yet some have raised questions about MALDI-TOF safety and accuracy. In 2017, APHL concluded a study that answers those questions and published “Safety and Accuracy of Matrix-Assisted Laser Desorption Ionization-Time of Flight Mass Spectrometry for Identification of Highly Pathogenic Organisms” in the Journal of Clinical Microbiology to share its findings. In short, the technology can be safe and accurate, but only if certain conditions are met.

APHL also contributed to a landmark paper, published in Eurosurveillance, detailing the scientific vision for PulseNet—a global food safety network that captures laboratory data on disease-causing foodborne bacteria, like Salmonella. As explained in the consensus document, the goal is to move from pulsed-field gel electrophoresis (PFGE) to more informative whole genome sequencing (WGS) (via extended multilocus sequence typing) to identify and subtype foodborne bacterial pathogens worldwide. The paper discusses analytical methods and other technical matters. It notes that a standardized WGS approach can meet the needs of real-time surveillance to detect and investigate foodborne disease outbreaks—no minor matter, considering that foodborne bacteria sicken almost a tenth of the world’s population every year.

Two other pathogens that drew APHL’s attention in 2017 are Zika virus and Treponema pallidum, the cause of syphilis. Zika—an emerging, mosquito-borne flavivirus—has spread rapidly within the Americas since 2015. Because the virus poses a severe risk to infants infected in utero, health officials are eager to identify every case among pregnant women. But Zika testing is complex and prone to cross-reactivity. To resolve this predicament, APHL recruited six of its member laboratories to evaluate two serological tests (antibody testing) for Zika. The ongoing scientific study will inform changes to Zika test algorithms to achieve a more effective testing process. Treponema pallidum has infected humans for millennia, but testing options have evolved dramatically over the last decades. Since there has been a surge in syphilis cases in the past few years—including among infants who contract the disease during pregnancy or childbirth—there is a pressing need for guidance on how to use tests in combination for maximal efficiency and effectiveness. APHL is working with the CDC to fill this information gap. Updated test recommendations have been completed and will be released in 2018.

Among APHL’s other scientific endeavors in 2017:

- **National Biomonitoring Network launch.** Though still in its infancy, this critically important network was created to promote the science of biomonitoring—the measurement of human exposure to lead, pesticides, phthalates and other environmental toxicants. Although CDC assesses the US population’s background exposure to hundreds of chemicals, this data is only applicable at the national level. Thus, many state and local governmental laboratories have begun their own biomonitoring programs to assess local environmental hazards (such as naturally occurring arsenic in groundwater or industrial chemical releases) and to evaluate the success of chemical remediation efforts. One of the network’s first undertakings will be to develop guidance to harmonize how biomonitoring studies and laboratory-based programs operate, so data can be comparable across state lines.
• **Per- and polyfluoroalkyl substance (PFAS) test method validation.** PFASs pervade the environment—in food products, consumer products (e.g., coatings on cookware and textiles) and in the air, water and soil. They have also been tentatively linked to a range of health problems, including developmental problems for children and increased cancer risk. Working with the US Environmental Protection Agency, APHL is helping to modify and validate a PFAS test method for drinking water, so that it can also be used to measure PFAS levels in wastewater. The modified test represents a big step forward in gauging the spread of these highly persistent environmental contaminants.

• **Spinal muscular atrophy (SMA) and severe combined immunodeficiency (SCID) multiplexed test development.** SMA, a genetic disorder that causes severe muscle wasting, often leads to early death. However, the US Food and Drug Administration just approved a new gene-based therapy to treat the disorder, and it may be added to the federal list of recommended newborn screening (NBS) tests next year. To help states prepare for SMA screening, APHL, with support from the US Health Resources and Services Administration, funded the Wisconsin State Laboratory of Hygiene to modify an existing assay for SCID—which is already on the recommended newborn screening list—so it can be used to screen for SCID and SMA simultaneously, making it far easier for newborn screening laboratories to add SMA to their test panels. For affected infants, early detection could be life-saving.

• **GHSA evaluation framework development.** The GHSA is an ambitious global effort to contain infectious disease threats. Evaluation, though often under-appreciated, is essential to gauge progress toward GHSA goals, to inform program planning and to drive continuous program improvement. APHL’s newly released Evaluation and Performance Management Framework provides a comprehensive list of indicators—such as the number of priority health threats a country can detect via laboratory testing—to do just that, moving us closer to a world free from infectious disease threats.

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**GROWING SCIENCE LEADERS**

Among all the challenges facing the US public health laboratory system, one sometimes gets overlooked: a chronic shortage of qualified laboratory leaders. Indeed, it takes an exceptional individual to run a public health laboratory—someone with advanced credentials and skills in science, communications, quality management, budgeting, biosafety and more.

In 2017, APHL created two new resources to address the dearth of science leaders by helping laboratory professionals earn the scientific credentials required to run a moderate- or high-complexity laboratory certified under federal CLIA regulations:

• **Doctoral program in public health laboratory science and practice.** Developed in collaboration with the University of South Florida (USF) College of Public Health, the program is the only one of its kind in the nation, with the goal of preparing future health department, environmental, and agricultural laboratory scientist-managers and directors. Importantly, the DrPH degree can be achieved primarily through online coursework, making it possible for working scientists to earn the degree even if their home laboratory is far from USF’s Tampa campus. The first cohort of students is expected in May 2021.

• **Board certification resources**—including a set of 2,000 flash cards—to help aspiring laboratory leaders prepare for the rigorous examination they must pass to achieve certification through the American Board of Medical Microbiology, the American Board of Bioanalysis or another CLIA-approved certifying body.

Christine Rogers analyzes an animal forage sample via NIR at the Mississippi State Chemical Laboratory.
But credentials alone don’t make a leader. In 2017, APHL’s National Center for Laboratory Leadership graduated its ninth class of “emerging leaders”—who undergo a structured program of skills-building and group projects—and recruited its tenth class of 16 individuals, including two from CDC and a laboratorian from the Canadian Public Health System. The success of the Emerging Leader Program (ELP) can be gauged by the success of its alumni: 87% of the 113 ELP graduates to date remain in public health laboratory practice, and almost a third are now public health laboratory directors or assistant directors. In fact, the program has been so successful that it was delivered in Uganda and Lesotho, and 40 ELP alumni are peer coaches for practicing public health laboratorians in the US and abroad.

A related effort, the Global Laboratory Leadership Program—a two-year, CDC-funded fellowship program operated largely by APHL in collaboration with the World Health Organization (WHO), World Organisation for Animal Health and the United Nation’s Food and Agricultural Organization—was organized in 2017 and will be launched in 2018. The idea is to groom a handful of emerging laboratory leaders, chosen through a competitive process, to respond to infectious disease outbreaks in resource-limited countries. The comprehensive program is based on APHL-developed laboratory competencies covering principles of epidemiology, biorisk management, quality management, microbiology and other core disciplines.

Other APHL leadership development activities target specific scientific challenges:

- **The Southeastern European Quality Assurance Mentoring Program**—a joint effort of APHL, CDC, WHO, the Southeast European Center of Infectious Diseases Surveillance and Control and other partners—pairs expert APHL consultants with national influenza laboratories in southeastern Europe to help them qualify as WHO national influenza centers. Four of six participating laboratories are now set to receive that designation—a huge boon for global influenza surveillance. Moreover, the program is now moving into West Africa, which heretofore has been an influenza “data desert.”

- **Antimicrobial Resistance Fellowship Program** held its first cohort orientation in August 2017. Ten fellows have been placed at CDC and state public health laboratories to gain a deep understanding of the molecular mechanisms associated with drug-resistance in microbes like Neisseria gonorrhoeae and Carbapenem-resistant Enterobacteriaceae, a group of highly-resistant pathogens known as the “Superbug.”

- **Ronald H. Laessig Memorial Newborn Screening Fellowship** selected the North Carolina State Laboratory of Public Health to host the program’s current fellow from 2017-2019. The fellow, recruited by the host lab, is gaining valuable training while implementing cystic fibrosis screening for the 120,000 or so infants born in North Carolina each year. Both of the previous two fellows are now in leadership roles in newborn screening.

- **Bioinformatics Fellowship Program** is now three years old and is helping develop the expertise needed for laboratories to adopt new hardware and software technologies. Fellows collaborate with public health laboratorians, epidemiologists and other subject matter experts to synthesize and correlate data into actionable public health information as part of ongoing advanced molecular detection projects. In 2017, the program had seven new fellows and six continuing fellows.
ADJUSTING PUBLIC HEALTH PRACTICE TO KEEP STEP WITH A CHANGING WORLD

Nothing is static in public health—not the scientific tools of the trade, the disease-causing microbes, the chemical threats or even the human genome. Thus, in addition to leadership development via fellowship, mentoring and coaching programs, APHL offers a full slate of scientific meetings, workshops and online resources for practicing laboratory professionals. Sometimes the association also provides direct funding or technical assistance to push the boundaries of the field.
In 2017, APHL offered 22 live webinars, with individuals at 1,750 clinical and governmental laboratory sites attending programs on infectious diseases, food safety, and newborn screening & genetics, among others. Other highlights of APHL’s 2017 work include:

**BIOSAFETY AND BIOSECURITY**
- The first two in a series of APHL biosafety and biosecurity workshops were held in Pearl City, Hawaii, and Phoenix, Arizona. The workshops aim to develop the technical and leadership skills of laboratory biosafety officers in the US and the US-affiliated Pacific Islands. With the rise of highly dangerous threat agents, such as anthrax and Ebola virus, these workshops fill a critical need to keep laboratorians and the public safe.
- The 10th National Laboratory Training Conference was open to public health laboratory training coordinators and biosafety officers. The four-day event, with 120 attendees, emphasized the need to base training content on laboratory competencies, and included sessions on training theory and techniques, as well as biorisk assessment and other biosafety concerns.

**PUBLIC HEALTH PREPAREDNESS AND RESPONSE**
- In April 2017, APHL and the CDC Laboratory Response Network (LRN) convened the LRN Conventional Methods Training Course at the Virginia Division of Consolidated Laboratory Services. Sixteen LRN scientists received training on conventional culture and biochemical methods to detect biological threat agents, such as anthrax and plague.

**OPIOIDS**
- APHL launched the Opioids Community of Practice to explore how government public health laboratories can contribute to America’s opioid epidemic response; for example, by identifying the latest synthetic fentanyls to reach the street market.

**ENVIRONMENTAL HEALTH**
- APHL convened the latest in a series of CDC-funded meetings to connect governmental environmental testing scientists with the broader environmental health system of epidemiologists, toxicologists and other health professionals. The 2017 meeting focused on communicating complex environmental health issues to the public. By boosting coordination among a multidisciplinary group of stakeholders, APHL is helping to make environmental health investigations and emergency response more efficient, effective and responsive to the public.

**NEWBORN SCREENING**
- APHL awarded funding to 14 state newborn screening programs to implement screening for some of the latest disorders to be added to the federal Recommended Uniform Screening Panel: Pompe disease, X-linked adrenoleukodystrophy and Mucopolysaccharidosis I. Altogether, this funding will expand screening for the three disorders to over 1.8 million infants. To assist the grantees with this scientifically challenging work, the association awarded funding through a competitive RFP process to state public health laboratories in Missouri, Wisconsin and New York to serve as technical support centers.
- The association hosted two national meetings that brought together state NBS program stakeholders to address specific challenges. A February 2017 meeting sought to identify barriers to implementing gene sequencing in NBS laboratories as well as possible solutions, such as centralizing sequencing in one laboratory and serving multiple states to reduce costs. An August 2017 meeting brought together laboratorians and clinicians to discuss short- and long-term follow up for infants with positive screening results for SCID. The goal was to enhance the relationship between the NBS laboratory and follow-up specialists to ensure a seamless transition for families.
FOOD SAFETY

- The 2017 Integrated Foodborne Outbreak Response and Management (InFORM) conference, co-sponsored by APHL, attracted nearly 650 laboratorians, epidemiologists and environmental health specialists involved with enteric disease response. These officials discussed issues such as options for implementing whole genome sequencing, public health bioinformatics tools, a timeline for the de-escalation of PFGE in PulseNet food safety laboratories, and the benefits and challenges posed by the use of culture-independent diagnostic tests (CIDTs) in clinical laboratories.

- Under a new cooperative agreement with the US Food and Drug Administration (FDA), APHL began a major effort to provide training and educational resources to laboratories seeking ISO/IEC 17025 accreditation and to laboratories participating in FDA’s GenomeTrakr Network, the FDA-based laboratory network that sequences foodborne pathogens from tainted foods. Since both networks now perform cutting-edge, WGS to varying extents, this highly technical work required the creation of brand new protocols for proficiency testing and results analysis. With standardized protocols across the networks, scientists who perform testing for both will no longer have to undergo two rounds of proficiency testing, saving time and money.

- APHL and the California Department of Public Health co-sponsored a November 2017 meeting that brought together California’s county epidemiologists and laboratory staff to solve a persistent problem: how to improve norovirus strain surveillance in the state. Although strain surveillance has no treatment implications, it is important to monitor genetic changes in the virus, which is the leading cause of foodborne illness and outbreaks in the US. The California Department of Public Health is one of five APHL-funded CaliciNet laboratories, certified to test and sequence norovirus outbreak strains.

- In its role as quality manager for the national PulseNet surveillance network, APHL helped to harmonize the proficiency testing programs for PulseNet—the CDC-based laboratory network that sequences foodborne pathogens in human specimens—and GenomeTrakr—the FDA-based laboratory network that sequences pathogens from tainted foods. Since both networks now perform cutting-edge, WGS to varying extents, this highly technical work required the creation of brand new protocols for proficiency testing and results analysis. With standardized protocols across the networks, scientists who perform testing for both will no longer have to undergo two rounds of proficiency testing, saving time and money.
AFTER THE STORM: Restoring Essential Laboratory Services

Tests for laboratory leaders come in many forms. In 2017, three of the most high-profile tests were named Harvey, Irma and Maria—the hurricanes that devastated parts of Texas and virtually all of Puerto Rico and the US Virgin Islands. APHL responded swiftly.

Harvey, the first of the major storms, made landfall on the Texas Gulf Coast at the end of August and stalled over Houston, precipitating catastrophic flooding. On September 7, the association stood up its incident command structure. APHL convened calls with officials in public health laboratories in Houston, Austin, Corpus Christi and San Antonio to assess Harvey’s impact on the labs themselves and to create situational awareness across those affected. Subsequently, the association:

• Provided a forum for members to discuss their needs such as restocking supplies of select agents, which one laboratory destroyed before the storm hit as a precautionary measure. (The agents are essential for quality control activities.)
• Compiled a list of available laboratories that could be used for surge capacity testing of well water and public drinking water.
• Provided periodic updates on laboratory capabilities and needs to federal partners, including CDC and EPA, and to non-governmental public health organizations engaged in the response.

Hurricane Irma delivered a glancing blow to Puerto Rico, but the Category 5 storm wreaked havoc on other parts of the Caribbean in early September. On September 20, Maria, a Category 4 hurricane with 160-mile-per-hour sustained winds, made landfall. Once it subsided, APHL sent a team of experts to the main island to assess damage to the territory’s four health department laboratories: the central public health laboratory in San Juan, two satellite laboratories performing milk and water testing, and a chemical emergency laboratory in San Juan. The ensuing report, developed at CDC’s request, included recommendations for the tiered restoration of essential testing services. Among them:

• Repairing roof damage and water leaks
• Eliminating airborne mold
• Arranging security to safeguard sample integrity, laboratory assets and the general public (One of the laboratories had been breached and cleaning supplies pilfered)
• Restoring reliable electrical power, without which damage to laboratory instrumentation, freezers, refrigerators and other equipment could not be assessed

APHL shared the report with CDC and later compiled and shared a list of ruined laboratory reagents needing replacement.

Dr Martina McGarvey, Dr. Andrew Cannons and Dr. Christine Bean assess damage to labs in Puerto Rico.
BUILDING A DIGITAL BRIDGE TO THE FUTURE

Although unheralded in the mainstream media, a “digital bridge” is set to revolutionize communications between clinicians and public health officials in the US, while boosting real-time, electronic surveillance of nascent health threats. The Digital Bridge Project—a momentous, first of its kind collaboration among healthcare, public health and health IT leaders—is quietly creating systems for seamless, bidirectional data exchange between healthcare providers and public health authorities. And the keystone is the APHL Informatics Messaging Services (AIMS) platform—the only electronic messaging platform widely used today to route messages among healthcare and public health partners.
In 2017, the Bridge began working with a subset of major healthcare providers in Kansas, Michigan and Utah, converting a one-directional reporting mechanism into an automated, bi-directional dialogue that will improve patient health and prevent the spread of communicable diseases through early intervention.

How will the system work? It begins with a patient who visits a physician after falling ill. The physician records patient data, such as relevant travel history, lab tests ordered and perhaps a preliminary diagnosis, in an electronic health record (EHR). The EHR, in turn, makes an automatic assessment (based in part on ICD-9 disease codes), to determine if the data should trigger an initial electronic case report to public health authorities. If so, the EHR creates the report and forwards it to AIMS. Software on the secure AIMS platform then performs a second-tier assessment to identify which public health authorities should receive the data. Thus, for example, if a patient is diagnosed with pertussis in Detroit, but lives in Salt Lake City, health authorities in both jurisdictions would have an interest in the case.

But that is not the end of the story. Once the case report is transmitted, the system sends the originating provider a “reportability response,” indicating where the report was sent and possibly additional information from the public health recipient(s), such as a link to the Utah Department of Health pertussis web page for clinicians. Importantly, each public health authority authors its own notifiable disease reporting requirements and disease-specific “reportability response” messages—all housed on AIMS.

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A second APHL informatics initiative deals with notifiable disease, electronic laboratory reporting (ELR) by Quest Diagnostics, Inc., one of the largest providers of clinical testing services in the US. APHL’s role is to provide the messaging platform—AIMS—and informatics expertise to enable the transport, validation, translation and routing of electronic data. APHL support will allow Quest to send ELR from multiple facilities to a single messaging platform. That platform will then route the electronic reports automatically to the appropriate state health agencies in HL7 files with each agency’s preferred messaging wrapper. So far, out of the 54 state public health agencies currently engaged in the Quest project, 17 are in live production, meaning they have eliminated paper reporting and are completely electronic. Once all sites are operational, the CDC-funded project is expected to significantly increase electronic reporting of national notifiable diseases to state health authorities, with about two million messages routed through AIMS monthly.

Finally, a third APHL informatics effort focuses on antimicrobial resistance. In 2016, CDC established its Antibiotic Resistance Laboratory Network (ARLN), comprising 56 public health laboratories, including seven state laboratories serving as advanced regional test centers (MD, MN, NY, TN, TX, WA, WI), the National Tuberculosis Molecular Surveillance Center at the Michigan Bureau of Laboratories, and numerous state and local public health laboratories performing first line antibiotic resistance (AR) testing.
Overall, the AIMS platform routed over 12.5 million messages in 2017—up from 2.7 million in 2016—among 142 trading partners, including 13 CDC programs. Moreover, APHL receives 2-3 requests each week for new AIMS-related projects.

APHL was tasked with solving key problems for the network:

- How to report standardized electronic data from the seven regional test centers to a host of CDC programs
- How to report first line test data from all 56 network laboratories to CDC’s AR program and to enable reliable access for other CDC programs
- How to achieve more efficient electronic AR test ordering and results reporting to assure a timely flow of test data from network laboratories to other stakeholders—clinical providers, hospital healthcare-associated infection coordinators and state epidemiologists

Collectively, the solution boiled down to the development of two cloud-based portals: (1) an ARLN portal, supporting national reporting between public health laboratories and CDC programs and (2) the Lab Web Portal, supporting regional AR test ordering and results reporting between clinical and public health partners. Both portals are hosted on the AIMS platform and will be fully operational by January 2018, achieving a centralized solution that can evolve as needs change.

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Other APHL efforts to strengthen science-based systems in governmental laboratory practice include:

- Supporting use of the LRN for Zika preparedness and response. Although provisional US Zika case counts in 2017 are in the hundreds, instead of the thousands reported in 2016, APHL recognizes the need for continued public health laboratory preparedness for this nationally notifiable condition. In 2016-17, the LRN was used to deploy standardized Zika assays, test reagents and proficiency test samples, as well as for data reporting, demonstrating the utility and versatility of a network initially created for terrorism response.
- Conducting initial Laboratory System Improvement Program (L-SIP) assessments of public health laboratories in Florida, Idaho, Illinois and Michigan, and a re-assessment of the New Mexico Department of Health, Scientific Laboratory Division. The L-SIP assessments identify opportunities to strengthen state and local laboratory systems. The latest round of assessments found room for improvement at some sites in two areas: (1) assuring a competent healthcare workforce and (2) conducting research to solve health problems.
- Assembling a toolbox of instruments and other resources to aid laboratories wishing to incorporate behavior-based laboratory competencies into their workplace processes. APHL led the mammoth effort to develop competencies specific to public health laboratory practice and is now leading the effort to institutionalize them. The online toolbox, available at https://www.aphl.org/professional_development/Pages/Competencies-Tools.aspx, includes position description templates, sample career ladders, a competency assessment database, and more.
- Launching the Public Health Laboratory System Database, which will eventually store information on the testing capabilities/capacities of every APHL member state and local public health laboratory. Given that these labs collectively perform over 3,500 different clinical and environmental tests, the database will be an indispensable test directory to inform decision making during emergencies and to facilitate cross-laboratory collaboration.
- Finalizing results from APHL’s 2016 Comprehensive Laboratory Services Survey—a key data source for the National Health Security Preparedness Index and the sole data source for Health People 2020 Public Health Infrastructure Objective 11, regarding laboratory support for essential public health services. APHL found that eight of eleven sub-objectives have been met; the biggest remaining gap pertains to laboratory partnerships and communications.
COUNTRY BY COUNTRY, CREATING A GLOBAL LABORATORY SYSTEM

APHL has long been a leader in international laboratory systems building, helping countries improve their clinical laboratory programs and laboratory-based disease surveillance.

In 2017, the association entered into a new cooperative agreement with CDC to expand this important work and specifically to help resource-limited nations meet the laboratory-focused goals of GHSA—a multinational partnership to eliminate infectious disease threats worldwide and meet the requirements of the International Health Regulations.

Some of APHL’s early work under this agreement includes a desktop review of Ghana’s biorisk management program and development of recommendations, tools and training to close safety gaps; for example, through proper use of biosafety cabinets, secure sample storage, and separation of “clean” and “dirty” work areas.

Even as this effort was progressing, APHL continued to carry out a full slate of activities funded under the President’s Emergency Plan for AIDS Relief (PEPFAR). Much of this work is concentrated in Africa, a continent that has been dealing with HIV, Ebola, Zika and, most recently, plague. Among APHL’s 2017 successes are laboratory improvements in Zimbabwe, Kenya and Tanzania.

Zimbabwe: APHL has been working in Zimbabwe for many years to develop robust external quality assurance systems for HIV testing—a crucial need in a county where 13.5% of adults are infected with the virus.

APHL:

• Aided in the selection of an open source software application—and software training—that will eventually streamline the country’s HIV rapid diagnostic, proficiency test program with electronic results reporting and data analysis.

• Renovated the server room at the National Microbiology Reference Laboratory with new security cameras and fireproof doors.

• Instituted a mentorship program at laboratories performing viral load testing to monitor patients receiving HIV treatment.

APHL’s involvement in Zimbabwe began in 2013 with just a handful of laboratories. In 2017, it extends to more than 1,000 labs. The association is now gradually transferring its laboratory responsibilities to the Zimbabwe Ministry of Health—a notable measure of success.

Kenya: The Kenya laboratory system employs the same open source proficiency test software as Zimbabwe. APHL worked through a local resource here to enhance the software with three additional modules, making it a central repository for a variety of HIV proficiency tests, including viral load tests. Laboratories in 27 of the country’s 47 major jurisdictions are expected to participate in HIV proficiency testing in the next year.

Tanzania: Since June 2017, hundreds of Tanzanian laboratories have enjoyed the benefits of critical data integration between the sample referral system and the laboratory information system, and at zonal labs through APHL support. By relaying sample data (e.g., test request data and the patient’s demographic info) to the testing laboratory’s information system before the sample arrives on site, the new referral system vastly reduces the need for manual data entry. Instead, laboratory staff can focus their efforts on reducing test turn¬around-time and other activities to enhance their efficiency and quality practices.
CHAMPIONING PRO-SCIENCE POLICIES

At a time when legitimate research is derided as “fake news,” and fact is placed in quotation marks, APHL is unabashedly pro-science. Moreover, the association’s vision—a healthier world through quality laboratory systems—assumes the need for scientific data to inform health policies.
Perhaps the most visible symbol of the association’s commitment during the past year is the March for Science—a series of rallies and marches held in Washington, DC, and more than 600 other cities across the world on Earth Day 2017. APHL not only co-sponsored the non-partisan event, but led its own contingent of marchers in Washington, DC, and encouraged its members to participate in events in their areas. Ultimately, hundreds of thousands of Americans came out into the public square to voice the need to inject science into statehouses, executive offices and the US Congress.

In the field of public health, leaders recognize that decision-making is easier when far-reaching threats—think Ebola virus or antibiotic resistant superbugs—are well understood and when evidence-based interventions are available. Yet recent federal legislative proposals would seriously undermine state and national efforts to detect threats and to devise science-based solutions.

In 2017, APHL was part of a large coalition opposing a series of congressional proposals to eliminate the Affordable Care Act’s Prevention and Public Health Fund for CDC—a potential loss of $900 million/year. Such a sizable cut—12% of the agency’s budget—would place every CDC program at risk and negatively impact every US jurisdiction. For example, the $40 million/year CDC disbursements to states and a few large cities to build capacity for laboratory-based disease surveillance and epidemiological investigations would be gone, compromising preparedness for everything from pandemic influenza to bioterrorism. So far the alarms raised by APHL and coalition partners have helped stave off action on these unwise proposals.

In a January 2017 letter to FDA, APHL notes that FDA’s $50 million investment in helping 30 state food testing laboratories achieve ISO accreditation—an imprimatur of quality—will be wasted if these laboratories lack resources to support the ongoing training, proficiency testing, auditing and continuous quality improvement needed to sustain (or expand) accreditation and to accommodate changes in the ISO standard. At least $4.5 million is needed in baseline federal funding to assure the continued accreditation of all 30 laboratories.

In 2017, APHL was part of a large coalition opposing a series of congressional proposals to eliminate the Affordable Care Act’s Prevention and Public Health Fund for CDC—a potential loss of $900 million/year.
APHL and its member laboratories are well aware of the dangers of cutting funding for science. And that is why the association has not only been a leader in science, but a leading advocate for science funding. In addition to this work, APHL has been preoccupied with more targeted public health policies:

- A new APHL position statement recommends that newborn screening laboratories operate at least six days/week to speed the reporting of screening results so that affected infants receive the full benefit of early medical interventions.

- A *National Approach to Human and Animal Food Laboratory Accreditation* outlines the benefits and drivers of laboratory accreditation to the ISO/IEC 17025 standard—including data reproducibility and defensibility—and lays out a vision for sustaining laboratory accreditation to achieve a fully integrated US food safety system with standardized quality measures.

- An APHL position statement, released March 2017, urges FDA to give preference to ISO-accredited state and local food and animal feed testing laboratories for domestic regulatory testing. According to the statement, “Governmental laboratories should be developed and respected as the most fundamentally capable and legally credible analytical resource for laboratory-based regulatory evidence.”

- APHL engaged with CDC’s Division of State and Local Readiness to suggest changes to the agency’s list of public health preparedness capabilities, created in 2011 to set national standards for emergency preparedness and to assist state and local planners in their own strategic planning and prioritizing. APHL experts recommended that public health laboratory capabilities focus on three core activities: (1) maintaining relationships with first responders, clinical laboratories and government epidemiologists; (2) testing samples for routine surveillance and surge capacity; and (3) reporting results.

- APHL’s in-house research program began work on a series of state public health laboratory data reports based on information from recent longitudinal and cross-sectional APHL surveys. The intent is to provide reference data on salient characteristics of the US public health laboratory system—including staffing, funding, test capabilities, etc.—that can be used to inform policymaking at individual laboratories and at the national level, inform public health laboratory advocacy efforts, and identify key data gaps.
2017 FINANCIALS
(unaudited figures)

REVENUE

- Grants and Contracts $49,215,947
- Membership dues $874,568
- Workshops $168,759
- Conferences & Exhibits $964,827
- Other $635,586

Total Revenue $51,859,687
(unaudited figures)

EXPENSES

- Global Programs $16,029,248
- Domestic Programs $35,974,067

Total Expenses $52,003,315
(unaudited figures)

### Domestic Programs
- Infectious Diseases $11,175,566
- Informatics 5,688,994
- Newborn Screening 4,421,163
- Food Safety 2,874,848
- Lab Strengthening/Leadership 2,516,302
- Workshops 1,776,281
- Public Health Preparedness 1,623,497
- Member Services 1,395,519
- Leadership Development 1,224,189
- Environmental Health 893,758
- Conferences 733,375
- Laboratory Systems and Standards 705,048
- APHL Consulting 671,099
- Administration 274,429

**Domestic Programs Total** $35,974,067

### Global Programs
- Angola $1,056,440
- Botswana 39,952
- DRC 130,020
- Ethiopia 203,825
- Georgia 42,176
- Ghana 548,321
- Guinea 643,924
- India 52,169
- Indonesia 8,121
- International Flu Activities 1,208,774
- Kazakhstan 175,262
- Kenya 1,477,152
- Leadership Development 83,782
- Mozambique 1,014,283
- Namibia 9,846
- Nigeria 129,978
- Other Global Health 2,443,146
- Program Management 542,218
- Senegal 35,367
- Sierra Leone 1,271,903
- Swaziland 56,029
- Tanzania 598,883
- Uganda 92,805
- Ukraine 160,220
- Vietnam 95,751
- Zambia 1,643,198
- Zimbabwe 2,265,703

**Global Programs Total** $16,029,248
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Health Department Laboratory

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Associate director, Food Safety Office, National Center for Emerging and Zoonotic Infectious Diseases, CDC

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Erin Bowles
WI Clinical Laboratory Network coordinator, Wisconsin State Laboratory of Hygiene

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Susanne Zanto
Deputy laboratory director, Montana Public Health Laboratory

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Dr. Christina Egan
Director, Biodefense Laboratory, Wadsworth Center

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Dr. Michael Pentella
Clinical professor, Epidemiology Department, University of Iowa
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