110 laboratory scientists graduated from the APHL Emerging Leader Program since its founding 10 years ago. Ninety-six continue to work in the public health laboratory system.

Up to $15 million per year available to public health laboratories to improve opioid testing capabilities under a new federal law drafted with APHL input.

47 states met the criteria to perform whole genome sequencing for five foodborne pathogens, strengthening the PulseNet food safety network.

$7.6 million increase in federal funding for CDC’s Newborn Screening Quality Assurance Program, achieved as a result of advocacy by APHL and partners.
$15.2 million
awarded to APHL by CDC to equip storm-damaged public health laboratories in Puerto Rico, the US Virgin Islands and Houston, Texas

65
motorbikes purchased by APHL to transport HIV specimens to high-level “super labs” in Zimbabwe

$30,000
distributed by APHL for innovation projects at three regional public health laboratory networks

15,249
continuing education units (CEUs) awarded by APHL for trainings, webinars and conferences

$1.39 million
distributed by APHL to support full implementation of newborn screening for at least one new disorder at 17 state programs
Superior Science = Better Threat Preparedness

No one knows for sure which public health threats will dominate the news in 2019, but an educated guess would likely include some combination of:

- An increase in opioid overdoses
- A large-scale foodborne disease outbreak
- Severe weather events
- Accidental release of toxic industrial chemicals or waste products, perhaps related to a severe weather event
- A novel infectious disease, perhaps an especially virulent strain of influenza
- Outbreaks of antimicrobial resistant strains of bacteria like Clostridium difficile, E. coli and Neisseria gonorrhoeae.

In addition, some serious public health threats will probably not make the news. For example, more than 12,000 US babies will be born with a newborn screening disorder, like sickle cell disease or cystic fibrosis. And HIV will continue to be a problem worldwide.

Although each of these threats is in some way unique, they all have one thing in common: the response to each runs straight through the public health laboratory—the scientific engine that generates much of the data used to inform public health policies and emergency response.

In 2018, APHL and its members took proactive steps to prepare for all of these threats.
DELVING INTO OPIOID OVERDOSES

Every day 115 Americans, on average, die from an overdose involving an opioid like fentanyl, a drug that is 50 to 100 times more potent than morphine. APHL’s newly created Opioid Biosurveillance Task Force—headed by APHL past-president Ewa King, PhD—will help jurisdictions institute surveillance of non-fatal opioid overdoses to supply greater information about current drugs-of-abuse, such as the latest illicit fentanyl compounds. This type of surveillance is currently a laboratory surveillance blind spot. The task force will also explore how public health laboratories can further efforts to address neonatal abstinence syndrome—perhaps through surveillance of the drugs to which newborns are addicted.

Importantly, this work is made easier by H.R. 6—federal legislation drafted with APHL input and signed into law October 24, 2018. The law authorizes up to $15 million/year for a new US Centers for Disease Control and Prevention (CDC) initiative to support public health laboratories seeking to improve their opioid-testing capabilities. APHL will serve as a technical resource for both CDC and other federal and state, opioid-testing laboratories.

MEASURING CHEMICALS IN PEOPLE

APHL welcomed the first five members of the National Biomonitoring Network—a group of public health laboratories and professionals committed to improving the science and quality of human biomonitoring, whether for routine surveillance, targeted investigations or emergency response.

This relatively young field—focused on analysis of human specimens to assess exposure to harmful environmental chemicals—promises to dramatically improve our understanding of human exposure to naturally occurring toxicants (e.g., arsenic in ground water), legacy contaminants (e.g., lead in older house paints), industrial chemicals in the environment (e.g., toxic coal ash unearthed by hurricane Florence) and in consumer products (e.g., per- and polyfluoroalkyl substances (PFAS) in water-resistant clothing).

Among other activities, network members will develop guidelines to assure consistency across biomonitoring measurements and explore the possibility of a national repository of biomonitoring data.

SEQUENCING FOODBORNE BACTERIA

Since 1996, the national PulseNet laboratory network has relied on pulsed field gel electrophoresis (PFGE) to link cases of foodborne illness and thereby help to detect and investigate outbreaks. Today, PulseNet laboratories are replacing PFGE with whole genome sequencing (WGS)—a technology that will revolutionize future foodborne disease investigations by providing far more details about pathogenic bacteria so health authorities can better track their spread and, in some cases, quickly learn if they are resistant to specific drugs. By the close of 2018, 89% of non-federal PulseNet laboratories were certified to conduct WGS. In addition, APHL coordinated PulseNet proficiency testing—required annually to assure ongoing testing competence—for 51 WGS-certified laboratories.

CONTAINING INFECTIOUS DISEASES

APHL and CDC convened a four-day Laboratory Impact Workshop in Johannesburg, South Africa, to support laboratories participating in the Global Health Security Agenda (GHSA)—a partnership of nearly 50 nations and other stakeholders working to achieve a world secure from infectious disease threats. APHL helped to develop the meeting content, focused on imparting additional knowledge and skills to attendees from 22 countries in Asia and Africa. Topics included viral and bacterial diagnostics, data management, specimen transport and other areas critical to detecting and containing infectious diseases before they spread across national borders.
HIGHLIGHTING ANTIBACTERIAL RESISTANCE (AMR)

APHL signed onto the US Government’s year-long AMR Challenge, part of a global effort to prevent an “antibiotic apocalypse”—a future without effective antibacterial drugs. APHL advocates for a One Health approach, focusing on both human and animal health, and is committed to advocating for increased AMR funding and to raising awareness of AMR risks and public health solutions.

IDENTIFYING BABIES WITH THREE NEW DISORDERS

In 2018, APHL provided nearly $1.4 million in direct funding to 17 state newborn screening programs to speed their implementation of screening for at least one of three congenital disorders recently added to the federal government’s list of conditions recommended for state-based newborn screening: X-linked adrenoleukodystrophy, Pompe disease and mucopolysaccharidosis I. All have potentially devastating consequences, but are treatable.

CURBING HIV

In Zimbabwe, where just over 13% of individuals ages 15-49 are HIV-positive, locally hired APHL staff are mentoring laboratory technicians who perform HIV testing in eight “super labs.” These laboratories sit at the center of a hub-and-spokes system that has enabled a dramatic ramp up in HIV viral load testing—a service that relies on costly and complex instrumentation, but is essential to inform patient treatment and to help control the spread of infection. Nearly half a million Zimbabwe patients—out of 850,000 needing viral load testing—are served by these super labs. And among the patients with access to advanced HIV testing, viral suppression is at an impressive 85%.
INDISPENSABLE PEOPLE = BRAINPOWER
DRIVING PUBLIC HEALTH LABORATORIES

America’s laboratories are experiencing a talent scarcity.
And the timing couldn’t be worse: today’s public health laboratories have a steady demand for scientists with advanced training in new technologies and disciplines like bioinformatics. According to APHL survey data, nearly 90% of state public health laboratory scientists have at least a bachelor’s degree, and roughly 30% have a master’s degree or higher. Yet even with this academic preparation, they require months of onboarding to learn the unique aspects of public health laboratory practice.

Alarmingly, in 2016, almost a third of state public health laboratory professionals reported an intent to leave within the next five years.
Recruiting their replacements won’t be easy.
Workforce development is a challenge APHL has focused on for many years. Most recently, in September 2018, APHL convened a workgroup to drill down on strategies to attract and retain scientists from the Millennial generation. APHL survey data suggest that new incentives are needed for these young professionals, perhaps including tuition reimbursement and flexible schedules.

Past APHL activities are also bearing fruit. The association’s Emerging Leader Program celebrated its ten-year anniversary in 2018. One hundred and ten talented scientist-managers have completed the year-long program. Of these:
• 87% are still working in the public health laboratory system
• Over 25% are current public health laboratory directors or assistant/deputy directors
• 40% serve (or have served) on APHL committees, helping to shape future public health laboratory practice.

(From l to r:) Susan Ishimbulo, Lusaka Public Health Office cooperative agreement coordinator; Genessa Gorgi, CDC Zambia Finance and Grants Office; Milimo Hamomba, APHL laboratory mentor and Mary Lombe-Chileshe, APHL office manager

(From l to r:) Susan Ishimbulo, Lusaka Public Health Office cooperative agreement coordinator; Genessa Gorgi, CDC Zambia Finance and Grants Office; Milimo Hamomba, APHL laboratory mentor and Mary Lombe-Chileshe, APHL office manager
Other APHL workforce initiatives include:

**TRAINING COMMUNITY OF PRACTICE**

Given the influx of younger public health laboratory staff—and the rapid pace of technological change—training is a perennial laboratory need. In 2018, APHL created a community of practice for the hundreds of state and local public health laboratory training coordinators, biosafety officers, terrorism response officials and outreach staff who oversee training for clinical laboratory workers. The goal is to promote an exchange of training tips, techniques and materials.

**TRAINING HUMAN AND ANIMAL FOOD LABORATORY PROFESSIONALS**

In 2018, there were at least 20 multistate foodborne disease outbreaks of note, involving foods from Romaine lettuce to ground beef to cereal. Since 2012, APHL has been working with the US Food and Drug Administration (FDA) to assure regulatory human and animal food laboratory professionals have the standardized training needed to perform comparable testing at laboratories across all levels of government and thereby better support human and animal food safety investigations. So far, APHL and partners—Association of Food and Drug Officials, Association of American Feed Control Officials and the International Food Protection Training Institute—have created a laboratory curriculum framework and key competencies for entry-level scientists. Under a new, five-year FDA-APHL cooperative agreement—signed September 2018—the partners will complete the development of a competency-based curriculum grounded in the existing framework. This curriculum will serve as a roadmap for laboratory career paths and for development of food testing laboratory training courses.

**INFORMATICS INSTRUCTION**

In collaboration with CDC, APHL released the first two in a planned series of three courses to introduce laboratory professionals to informatics, a discipline now embedded into virtually every aspect of public health laboratory practice. The courses, *Life of a Specimen* and *Life of a Result*, follow a tuberculosis specimen as it progresses through the laboratory in tandem with related data and that data is delivered to external stakeholders such as state epidemiologists.

**SAFETY FIRST**

After the massive West African Ebola outbreak in 2015-16, CDC and APHL redoubled their focus on laboratory biosafety and biosecurity. As part of this effort, in 2018, APHL (1) wrapped up a series of leadership workshops reaching biosafety officers in 34 public health laboratories, (2) expanded its biosafety mentoring program and (3) together with the Laboratory Response Network and American Society for Microbiology, developed a series of biothreat agent bench cards for laboratory staff in hospitals and other clinical settings. The bench cards summarize recommended biosafety and biothreat response practices and provide tips for either identifying key biothreat agents (e.g., anthrax) or ruling out their presence. After federal, post-Ebola biosafety funding ends in spring 2019, efforts such as these will become harder to finance.
LIFE-SAVING SYSTEMS = IMPROVED LABORATORY EFFICIENCY, DATA QUALITY AND EMERGENCY RESPONSE

In public health laboratory practice, speed matters.

So does accuracy.

That’s why APHL has invested so much effort designing services to streamline and strengthen laboratory systems.

That effort is paying off in myriad ways, from a motorbike courier system transporting HIV specimens in Zimbabwe to a new funding mechanism to speed resources to US public health laboratories engaged in crisis response.

One of APHL’s most significant contributions to the public health system is virtual: 2018 was the ten-year anniversary of the APHL Informatics Messaging Services (AIMS) platform—a cloud-based platform that has radically revamped public health data exchange.

APHL AIMS HIGHER

The AIMS platform launched in 2008 with just six trading partners from a single industry (public health laboratories) and one application (forwarding influenza surveillance data to CDC). A decade later, it supports trading partners from commercial laboratories, state and local health agencies, clinical providers, electronic health record vendors, federal agencies and, of course, state and local public health laboratories nationwide.

Among other things, the AIMS platform is being used to:

- Report notifiable disease results to jurisdictional health authorities
- Transport CDC-ordered test results to state public health agencies
- Route case reports between healthcare and public health agencies
- House a centralized, open-source laboratory information management system so public health laboratories don’t have to maintain their own servers
- House and aggregate data from multiple partners to inform public health investigations.

To date, AIMS has 18 separate applications with more being added. A new, stand-alone web portal, for example, is routing antimicrobial resistance laboratory data to CDC. Expect more new services as part of AIMS continual evolution to help ready the public health system for future health threats.
REDEFINING PREPAREDNESS IN THE LRN

APHL convened the 2018 meeting of the Laboratory Response Network—co-founded by APHL, CDC and the Federal Bureau of Investigation—to assure an integrated system of public health, federal, military and international laboratories for all-hazards response. The meeting was the first to include FDA officials, and a key discussion centered on pre-qualifying laboratories to deploy tests for novel, emerging pathogens via an FDA pre-emergency use authorization. Ideally, testing assets could also be pre-positioned at qualified laboratories, greatly reducing response times.

QUALITY SCREENING FOR BABIES

CDC’s Newborn Screening Quality Assurance Program (NSQAP) exists to support state newborn screening programs via scientific training, development of test guidelines and quality control materials, and much more. Given that new conditions have been added to the federal list of disorders recommended for newborn screening, APHL has advocated for a $20 million hike in NSQAP funding. Although that full increase has not yet been reached, the US Congress approved a $5 million increase for federal fiscal year (FFY) 2018 and another $2.6 million increase for FFY 2019. This extra revenue will support ongoing NSQAP activities and help CDC to assist states seeking to expand their newborn screening test panel.

IMPROVING LABORATORY SYSTEMS

Since 2007, APHL has strengthened state and local laboratory systems through the Laboratory Systems Improvement Program (L-SIP). L-SIP convenes public health laboratory partners from across a jurisdiction to assess the performance of their laboratory system, identify needed improvements and implement strategies for change. In 2018, an APHL L-SIP team conducted initial assessments of the Virginia Division of Consolidated Laboratory Services and the Vermont Department of Health Laboratory, and a reassessment of the City of Milwaukee Health Department Laboratory. Additionally, APHL’s Newborn Screening and Genetics Program conducted customized site reviews of newborn screening programs in eight states: Florida, Illinois, Indiana, Kansas, Minnesota, New Jersey, North Carolina and Pennsylvania. The reviews provided detailed recommendations for improving newborn screening methods and procedures, and assuring the financial stability of program operations.

TRACKING LAB ASSETS

The year-old APHL Public Health Laboratory System Database was conceived so laboratory leaders can have easy access to information on public health laboratory infrastructure, regulatory compliance, equipment and testing capability. At least 34 state and local public health laboratories have entered information into the database, and APHL is offering technical assistance to speed up the process for the remainder. So far, the biggest reported benefit of the database has been identifying testing platforms in use for assay development; as laboratories bring on new assays, they are turning to their peers to learn the pros and cons of different test platforms. ●
2018 FINANCIALS
(unaudited figures)

Total Revenue by Category

- Grants and Contracts: $50,168,807
- Membership Dues: $843,336
- Conferences and Exhibits: $655,302
- Other: $(115,543)

Total Revenue (unaudited figures): $51,551,902

Total Expenses by Category

- Domestic Programs: $34,531,339
- Global Health Programs: $17,662,380

Total Expenses (unaudited figures): $52,193,719

Domestic Programs
- Infectious Diseases: $10,934,119
- Informatics: 5,711,927
- Newborn Screening: 4,170,993
- Lab Strengthening/Leadership: 2,409,770
- Food Safety: 2,289,171
- Public Health Preparedness: 1,860,897
- Member Services: 1,558,750
- Leadership Development: 1,260,651
- Workshops: 1,180,159
- Environmental Health: 1,034,076
- APHL Consulting: 797,512
- Conferences: 602,456
- Laboratory Systems and Standards: 420,823
- Administration: 300,035

Domestic Programs Total: $34,531,339

Global Programs
- Angola: $1,337,849
- Botswana: 3,358
- DRC: 196,057
- Ethiopia: 228,094
- Ghana: 1,277,046
- Guinea: 393,451
- India: 42,807
- Indonesia: 117,342
- Kazakhstan: 200,908
- Kenya: 1,259,399
- Mozambique: 1,622,561
- Nigeria: 158,618
- Other Global Health: 2,234,744
- Public Health Preparedness: 572,764
- Program Management: 102,019
- Public Health Preparedness: 56,007
- Sierra Leone: 1,123,974
- Tanzania: 328,056
- Uganda: 73,413
- Ukraine: 255,674
- Vietnam: 32,841
- Zambia: 3,205,879
- Zimbabwe: 2,839,519

Global Programs Total: $17,662,380
2018 APHL AWARDS

2018 HEALTHIEST LABORATORY AWARD
North Dakota Department of Health
Department of Laboratory Services

ON THE FRONT LINE AWARD
Deborah Birx, MD
Ambassador-at-Large, US Global AIDS Coordinator and US Special Representative for Global Health Diplomacy, US Department of State

EMERGING LEADER AWARD
Jennifer Rakeman, PhD
Assistant Commissioner, New York City Public Health Laboratory

THOMAS E. MAXSON EDUCATION, TRAINING & WORKFORCE DEVELOPMENT AWARD
Shoolah Escott, MS, MT(ASCP)
Biosafety Manager, Massachusetts Department of Public Health

LEADERSHIP IN BIOSAFETY & BIOSECURITY AWARD
Philip Lee, MSc, FIBMS
Lead Biological Defense Coordinator, Florida Department of Health, Bureau of Laboratories-Jacksonville

SILVER AWARD
Maureen Sullivan, MPH
Supervisor, Emergency Preparedness and Response Laboratory Unit, Public Health Laboratory Division, Minnesota Department of Health
GOLD STANDARD FOR PUBLIC HEALTH LABORATORY EXCELLENCE AWARD

Patrick Parsons, PhD
Professor of Environmental Chemistry, University of Albany

CHAMPION OF THE PUBLIC HEALTH LABORATORY AWARD

Ruth Lynfield, MD
State Epidemiologist and Medical Director, Minnesota Department of Health

SILVER AWARD

Martina McGarvey, DM
Laboratory Director, Pennsylvania Department of Environmental Protection

PRESIDENTIAL AWARD

Lovisa Romanoff, MS, MPH
Deputy Director, CDC Division of Laboratory Sciences

LIFETIME ACHIEVEMENT AWARD

Christopher Atchison, MPA
Former Director, State Hygienic Laboratory at the University of Iowa

LIFETIME ACHIEVEMENT AWARD

Michael Pentella, PhD, MS, D(ABMM)
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