2021 APHL ALL-HAZARDS LABORATORY PREPAREDNESS SURVEY

Summary Data Report

JANUARY 2023

APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES®

ABOUT THE ALL-HAZARDS LABORATORY PREPAREDNESS SURVEY

APHL fielded the thirteenth annual All-Hazards Laboratory Preparedness Survey to assess public health laboratories' capability and capacity to respond to biological, chemical, radiological and other public health threats. The survey was administered in the fall of 2021 and covered a 12-month period from July 1, 2020 to June 30, 2021 representing the US Centers for Disease Control and Prevention (CDC) Public Health Emergency Preparedness (PHEP) Cooperative Agreement Fiscal Year 2020, also known as Budget Period 2. APHL received a 96% (52/54) response rate from public health laboratories in 50 states, Puerto Rico, the District of Columbia, Los Angeles and New York City.

This summary data report provides aggregate responses for all survey questions included in the 2021 APHL All-Hazards Laboratory Preparedness Survey. APHL will summarize key data points in an issue brief that will be distributed to respondents, collaborators and other public health partners. The summary data report, issue brief and other APHL resources serve as educational tools that can assist in educating policy makers, public health partners and the public on the important role that laboratories play in public health preparedness and response.

This publication was supported by Cooperative Agreement #NU60OE000104 funded by the US Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC or the Department of Health and Human Services (HHS).

CONTACT

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ACRONYM GLOSSARY

APHL ..... Association of Public Health Laboratories

ASM ..... American Society for Microbiology

ASPR ..... Administration for Strategic Preparedness and Response

BDS ..... Biohazard Detection System

BT ..... Bioterrorism or Biological Threat

BSO ..... Biosafety Officer

CAP ..... College of American Pathologists

CDC ..... Centers for Disease Control and Prevention

CLIA ..... Clinical Laboratory Improvement Amendments

COOP ..... Continuity of Operations Plan

CST ..... Civil Support Team

CT ..... Chemical Terrorism or Chemical Threat

CWA ..... Chemical Warfare Agent

DHS ..... US Department of Homeland Security

DoD ..... US Department of Defense

DSLR ..... Division of State and Local Readiness

EMT ..... Emergency Medical Technician

EPA ..... US Environmental Protection Agency

ERLN ..... Environmental Response Laboratory Network

FBI ..... Federal Bureau of Investigation

FEMA ..... Federal Emergency Management Agency

FERN ..... Food Emergency Response Network

FTIR ..... Fourier-Transform Infrared Spectroscopy

FSIS ..... Food Safety and Inspection Service

GC-MS ..... Gas Chromatography-Mass Spectrometry

HAN ..... Health Alert Network

HAZMAT ..... Hazardous Materials

HHS ..... US Department of Health and Human Services

HPP ..... Hospital Preparedness Program

HSEEP ..... Homeland Security Exercise and Evaluation Program

ICP-MS ..... Inductively Coupled Plasma-Mass Spectrometry

ISO ..... International Organization for Standardization

JLC ..... Joint Leadership Committee

LC-MS/MS .. Liquid Chromatography-Tandem Mass Spectrometry

LIMS ..... Laboratory Information Management System

LPX ..... Laboratory Preparedness Exercise

LPHL ..... Local Public Health Laboratory

LRN ..... Laboratory Response Network

LRN-B ..... Laboratory Response Network for Biological Threat Preparedness

LRN-C ..... Laboratory Response Network for Chemical Threat Preparedness

NAHLN ..... National Animal Health Laboratory Network

NCEH ..... National Center for Environmental Health

NIMS ..... National Incident Management System

NHSIP ..... National Health Security Preparedness Index

NPDN ..... National Plant Diagnostic Network

NRC ..... Nuclear Regulatory Commission

PCR ..... Polymerase Chain Reaction

PHEP ..... Public Health Emergency Preparedness

PHL ..... Public Health Laboratory

P&S ..... Packaging and Shipping

RT ..... Radiological Terrorism or Radiological Threat

SPaS ..... Specimen, Packing, and Shipping

SCPaS ..... Sample Collection, Packing and Shipping

SPHL ..... State Public Health Laboratory

TFAH ..... Trust for America's Health

UASI ..... Urban Areas Security Initiative

USDA ..... US Department of Agriculture

USPS ..... US Postal Service

Vet-LIRN ..... Veterinary Laboratory Investigation and Response Network

VOC ..... Volatile Organic Compound

WLA ..... Water Laboratory Alliance

WSLHPT ..... Wisconsin State Laboratory of Hygiene Proficiency Testing

USPS ..... US Postal Service

SECTION 1: DEMOGRAPHICS

Please provide the following information for your laboratory's contacts.
Individual laboratory contact information is on file with APHL.

SECTION 2: FUNDING & WORKFORCE

1. From July 1, 2020 – June 30, 2021, did your PHL experience any funding cuts to preparedness activities?

Funding cuts to preparedness activities?	%	Count
Yes	25.0%	13
No	75.0%	39

n=52

1a. Please choose the top five impacts of any preparedness funding cuts your PHL experienced from July 1, 2020 – June 30, 2021.

Impacts of preparedness funding cuts	%	Count
Unable to provide or reduced the number of training courses and outreach activities	53.8%	7
Increased staff turnover	46.2%	6
Unable to expand capabilities for new assays/tests/methods	38.5%	5
Unable to purchase reagents and supplies or materials	38.5%	5
Unable to renew service/maintenance contracts	38.5%	5
Unable to participate in national meetings/conferences/training courses	38.5%	5
Unable to purchase critical equipment (e.g., PCR instrumentation, automated extractors, biosafety cabinets, etc.)	30.8%	4
Unable to participate in exercises	30.8%	4
Consolidated staff positions	15.4%	2
Unable to purchase and/or upgrade Laboratory Information Management System (LIMS)	7.7%	1
Increased sample/specimen turnaround time	0.0%	0
Reduced 24/7 capability	0.0%	0
Reduced state courier services	0.0%	0
Lost position(s)	0.0%	0
Unable to respond to an event	0.0%	0
Experienced no change in laboratory operations	0.0%	0
Other—please specify	23.1%	3

n= 13. Other specified responses are on file with APHL.

2. What factors affected your PHL's ability to carry out preparedness activities from July 1, 2020 – June 30, 2021? Please check all that apply.

Barriers to preparedness activities	%	Count
COVID-19 Pandemic	84.6%	44
Non-competitive salaries	40.4%	21
Insufficient funding	17.3%	9
Hiring freezes	13.5%	7
No difficulties experienced	5.8%	3
Lay-offs	0.0%	0
Furloughs	0.0%	0
Position eliminated	0.0%	0
Other—please specify	34.6%	18

n= 18. Other specified responses include supply shortages, facility issues, training needs and additional challenges related to staffing such as finding qualified applicants to fill vacant positions and the desire to telework. Individual responses are on file with APHL.

2a. What are your laboratory's preparedness and response needs?

n=52. Specific responses include additional staff, trainings and exercises, funding, outreach support, more laboratory space, reliable source of supplies and reagents, new instrumentation and multi-year service contracts for equipment maintenance.

3. From July 1, 2020—June 30, 2021, how much preparedness funding did your PHL receive? Please enter "0" if none.

Funding Source	Biological Preparedness	Chemical Preparedness	Radiological Preparedness
CDC: PHEP Cooperative Agreement	$59,521,100	$33,347,135	$942,055
CDC: DSLR Crisis Response Notice of Funding Opportunity	$60,067,980	$283,310	-
CDC: ELC Strengthening Public Health Laboratory Preparedness	$139,729,315	-	-
ASPR: HPP Cooperative Agreement	$268,390	-	-
DHS/FEMA Preparedness Grants (e.g., UASI, State Homeland Security Grant)	$846,000	$130,000	$148,000
DHS/BioWatch Funding	$4,798,445	-	-
EPA: ERLN	-	-	-
EPA: Water Lab Alliance	-	-	-
FDA: FERN	$1,820,660	$1,224,775	$1,848,350
USDA (FSIS): FERN	$678,625	$340,305	$146,595
State	$5,679,880	$1,536,760	$693,987
Other – please specify	$59,170,307	$326,155	$417,400

n= 52. Individual responses for other funding sources are on file with APHL.

4. From July 1, 2020 – June 30, 2021, how much of the CDC PHEP Cooperative Agreement fund were allocated to the following activities?

Funded Activities	CDC PHEP Funds for:		
	Biological Preparedness	Chemical Preparedness	Radiological Preparedness
Distributed to other laboratories—please specify which labs	$1,960,605	$772,313	-
Salaries and fringe	$30,129,285	$15,229,923	$502,278
Equipment purchase	$2,770,905	$2,694,560	-
Equipment maintenance	$5,820,680	$5,459,415	$78,609
Supplies	$5,137,630	$3,725,230	$82,478
Training and travel	$555,115	$198,695	$1,066
General overhead	$4,193,845	$3,197,830	$48,198
Renovations	$201,226	$14,306	-
Unobligated/unspent	$4,407,508	$1,296,412	-
Other	$4,344,296	$758,450	$229,427

n= 52. Individual responses for other funding sources are on file with APHL.

4a. Do you have any recommendations for improving the CDC PHEP Cooperative Agreement?
Individual responses are on file with APHL.

5. In addition to your BT coordinator, CT coordinator and BSO, do you have a position responsible for outreach to clinical laboratories?

Position responsible for clinical lab outreach?	%	Count
Yes	40.4%	21
No	59.6%	31

n=52

6. Do you have a Laboratory Advisory Council or similar group where members of the clinical laboratory community are involved in communicating with or advising the PHL?

Laboratory advisory group?	%	Count
Yes	42.3%	22
No	34.6%	18
Planning in future	23.1%	12

n=52

6a. How often are meetings held?

Advisory meeting regularity	%	Count
Quarterly	27.3%	6
Semi-annually	27.3%	6
Annually	9.1%	2
Other—please specify	36.4%	8

n=22. Other specified responses include meeting monthly and as needed. Individual responses are on file with APHL.

7. What resources or tools are needed to support your laboratory with outreach to clinical laboratories?
n=52. Responses include virtual training platforms, development of educational materials and sustainable funding to support dedicated staff for outreach activities, travel and training material costs. Individual responses are on file with APHL.

SECTION 3: PLANNING & RESPONSE

8. (NHSPI & TFAH) Does your PHL have a plan to handle a significant surge in testing over a six to eight week period in response to an outbreak or other public health event?

Surge testing plan in place?	%	Count
Yes	98%	51
No	2%	1

n=52

9. What are the triggers for activation of your surge capacity plan?
n=51. Specific responses include public health emergency declarations, activation of state emergency operation center, significant increases in testing volume or when unable to meet established/routine turnaround times, facility failures and unexpected events/conditions. Individual responses are on file with APHL.

10. Please select the elements which are included in your surge capacity plan. Check all that apply.

Surge capacity plan elements	%	Count
Prioritization of testing based upon risk or threat assessment	86.3%	44
Prioritization of testing based upon sample type	84.3%	43
Procedures for triage and management of surge testing, which may include referral of samples to other LRN reference and national laboratories within or outside the jurisdiction	82.4%	42
Procedures to secure and deploy surge personnel, equipment, and facility resources for short-term (days) and long-term (weeks to months) response efforts	72.5%	37
Procedures for referral to commercial laboratories	51.0%	26
Procedures for referral to LRN sentinel clinical laboratories	31.4%	16

n=51

11. Does your laboratory have a formal agreement (e.g. contract, memorandum of agreement) in place with other laboratories to handle surge capacity? Please check all that apply.

Formal agreement?	%	Count
Yes, agreement with other public health laboratory(ies) outside of the state	62.7%	32
Yes, agreement with commercial laboratory(ies) for other agents	29.4%	15
Yes, agreement with commercial laboratory(ies) for biological agents	23.5%	12
Yes, agreement with local public health laboratory(ies) within the state	17.6%	9
Yes, agreement with other state laboratory (e.g., agricultural lab) within state	17.6%	9
Yes, agreement with other state public health laboratory within the state	9.8%	5
Other—please specify	49.0%	25
No	5.9%	3

n=51. Other specified responses include agreements with civil support teams (CST) and clinical laboratories and informal agreements with other regional public health and academic laboratories. Individual responses are on file with APHL.

12. What are the barriers to entering into formal agreements with other entities for surge capacity testing needs?
n=52. Specific responses include state-specific legal requirements and restrictions that limit contracting with external laboratories, licensure requirements, lengthy contracting processes, liability concerns, submission/reporting requirements and funding to maintain surge testing contracts. Individual responses are on file with APHL.

13. Did you modify your laboratory's surge capacity plan to respond to COVID-19?

Surge capacity exercises?	%	Count
Yes—please specify	48.1%	25
No	51.9%	27

n=52. Specific responses to changes made include cross-training of staff, establishing processes for rapid procurement needs, the addition of shifts and external partners for testing services. Individual responses on file with APHL.

14. Since the beginning of 2020, how much funding did your PHL receive from any of the following sources for COVID-19 response? If the amount is known, please provide it below. Please select all that apply.

Funding source for COVID-19 response	%	Count	Amount
AMD Sequencing & Analytics Supplement (CDC ELC)	100%	52	$139,296,479
ELC Enhancing Detection (CDC ELC)	96.2%	50	$2,010,167,835
Strengthening Public Health Laboratory (PHL) Preparedness Through Laboratory Response Network (LRN) (CDC ELC)	86.5%	45	$29,225,295
ELC Enhancing Detection Through Coronavirus Response and Relief (CRR) Supplemental Funds (CDC ELC)	73.1%	38	$2,087,049,214
CDC Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Diseases (CDC ELC)	63.5%	33	$64,807,896
COVID-19 Crisis Response Cooperative Agreement (CDC Crisis Response Cooperative Agreement)	42.3%	22	$44,626,461
Cooperative Agreement for Emergency Response: Public Health Crisis Response COVID-19 Crisis Response Cooperative Agreement – Components A and B Supplemental Funding (CDC Crisis Response Cooperative Agreement)	40.4%	21	$25,711,022
COVID-19 Public Health Workforce Supplemental Funding (CDC Crisis Response Cooperative Agreement)	40.4%	21	$23,891,644
Epidemiology and Laboratory Capacity Reopen America (CDC ELC)	38.5%	20	$50,109,838
ELC Data Modernization COVID Award (CDC ELC)	36.5%	19	$17,079,339
ELC Reopening Schools: Support for Screening Testing to Reopen & Keep Schools Operating Safely (CDC ELC)	26.9%	14	$667,148,493
Coronavirus Relief Fund (US Department of the Treasury)	25%	13	$66,431,940
Detection & Mitigation of COVID-19 in Confinement Facilities (CDC ELC)	17.3%	9	$13,521,443
Local, State, Territorial Funds	9.6%	5	$1,265,698
Coronavirus State and Local Fiscal Recovery Funds (US Department of the Treasury)	7.7%	4	$1,061,637,304
National Initiative to Address COVID-19 Health Disparities Among Populations at High-Risk and Underserved, Including Racial and Ethnic Minority Populations and Rural Communities (CDC Grant)	3.8%	2	$33,488,463
Other (please specify)	11.5%	6	$113,791,864
None	0.0%	0	-

n=52. Other responses include funding from state government and the CDC PHEP Cooperative Agreement. Individual responses are on file with APHL.

14a. How have new COVID-19 funds been used to strengthen laboratory preparedness? Please select all that apply.

Use of funds	%	Count
Procurement of additional testing equipment, reagents and/or personal protective equipment	100%	52
Implementation of new diagnostic methods	98.1%	51
Enhancements to informatics/LIMS capabilities	96.2%	50
Hired new staff	94.2%	49
Conducted additional outreach or training to clinical laboratories and other partners	61.5%	32
Other (please specify)	28.8%	15
None	0.0%	0

n=52. Specific responses include laboratory renovations and building improvements, mobile laboratory facilities, additional couriers and support for field testing and partnership contracts. Individual responses are on file with APHL.

14b. How have your laboratory operations been impacted as a result of COVID-19? Please select all that apply.

Impacts to lab operations	%	Count
Staff required to work additional days/hours	98.1%	51
Staff cross-trained or shifted to other areas	98.1%	51
Reduced laboratory space	78.8%	41
Equipment from other sections utilized for COVID-19 testing	73.1%	38
Challenges with data reporting requirements	69.2%	36
Lost Staff	61.5%	32
Non-COVID testing put on hold	46.2%	24
Slower turn-around time for routine testing	44.2%	23
Other—please specify	38.5%	20
None	0.0%	0

n=52. Other specified responses include the addition of shifts to allow for social distancing, staffing challenges due to exposures and personnel burn out, the repurposing of laboratory space to prioritize COVID-19 testing and consistent challenges with procuring supplies and reagents due to supply chain issues. Individual responses are on file with APHL.

14c. During COVID-19 response, did your laboratory engage the following partners for testing? Please select all that apply.

Types of partners	%	Count	Total Partners Engaged
Commercial Laboratory	76.9%	40	776
Non-Traditional Site (e.g. Nursing Homes, Prisons etc.)	61.5%	32	6,309
Point of Care Settings (Physician's Offices, Clinics, Pharmacies etc.)	42.3%	22	6,662
Other	59.6%	31	1,099

n=52

14d. Please share any major successes and challenges your laboratory encountered regarding implementing surge capacity during the response to COVID-19. APHL staff may contact you to follow-up on these stories and to solicit photos. Stories may be featured in issue briefs or other APHL publications, such as *Lab Matters*, eUpdate or the APHL blog.

Individual responses are on file with APHL.

15. (NHSPI) Does your PHL have a Continuity of Operations Plan (COOP) consistent with National Incident Management System (NIMS) guidelines?

PHL COOP in place?	%	Count
Yes, a state agency or department-wide COOP that includes the laboratory	55.8%	29
Yes, a laboratory-specific COOP	40.4%	21
No, but the laboratory or state is developing a COOP	3.8%	2
No	0.0%	0

n=52

15a. Does your laboratory review and update COOP?

COOP review and updates?	%	Count
Yes, annually	59.6%	31
Yes, biennially	13.5%	7
Other—please specify	25.0%	13
No	1.9%	1

n=52. Other specified responses include updating COOP as needed and currently developing a new COOP. Individual responses are on file with APHL.

15b. If your PHL shuts down and only a portion of staff were available to work, in terms of COOP, which test(s) are critical for your laboratory? Please check all that apply.

Laboratory-critical tests	%	Count
LRN Biological Testing	94.2%	49
Infectious diseases (e.g., reference and specialized testing)—please specify	90.4%	47
LRN Chemical Testing	76.9%	40
Newborn screening	59.6%	31
Environmental health (e.g., water testing, lead testing)	57.7%	30
Food safety	48.1%	25
Other—please specify	32.7%	17
No critical tests identified	0.0%	0

n=52. Other specified responses include BioWatch testing. Individual responses are on file with APHL.

15c. From July 1, 2020 – June 30, 2021, did your PHL evaluate the functionality of your COOP via a real event or an exercise?

COOP evaluated?	%	Count
Yes	75.0%	39
No	25.0%	13

n=52

15d. From July 1, 2020 – June 30, 2021, did you activate your laboratory COOP?

COOP activated this year?	%	Count
Yes—please provide any additional information on the steps and outcomes	69.2%	36
No	30.8%	16

n=52. Individual responses are on file with APHL.

15e. Please specify state, local and/or other jurisdictional requirements that may impact a response. For example, some states have licensure requirements and laboratorians without a license are not permitted to work in that state. Please enter N/A for none.

28 respondents replied with "N/A." Other responses include both federal and state licensure requirements. Individual responses are on file with APHL.

16. Does your state have any legal and/or jurisdictional requirements that could complicate testing being performed by another state or prevent additional staff from coming on-site to perform testing (e.g. state licensure requirements)?

Legal/jurisdictional requirements	%	Count
No	61.5%	32
Yes, requirements prevent additional staff from coming on-site—please specify	21.2%	11
Yes, requirements prevent another state from assisting with testing—please specify	17.3%	9

n=52. Individual responses are on file with APHL.

17. (TFAH) Has your PHL implemented a laboratory management system (LIMS) to receive and report laboratory information electronically (e.g., electronic test order and report with hospitals and clinical labs, surveillance data from public health laboratory to epidemiology).

LIMS implementation status and functionality	%	Count
Yes, bidirectional capability to receive and report	92.3%	48
Report only	7.7%	4
Receive only	0.0%	0
No electronic messaging capability at this time	0.0%	0

n=52

17a. Do you have dedicated IT support for your LIMS?

Dedicated IT LIMS support?	%	Count
Yes, the laboratory has personnel dedicated to LIMS	78.8%	41
No, the laboratory relies on external contractors (e.g., LIMS vendor)	7.7%	4
No, the laboratory receives IT personnel support from the state/local government for LIMS	3.8%	2
Other—please specify	9.6%	5
No	0.0%	0

n=52. Other specified responses include laboratory personnel who manage LIMS as a secondary duty and support contracted with a LIMS vendor. Individual responses are on file with APHL.

18. (NHSPI) Please indicate the number of preparedness exercises your PHL conducted or participated in from July 1, 2020 – June 30, 2021. Do not include your responses to real events and proficiency tests. Enter "0" if none.

	Tabletop Exercises	Drills	Functional Exercises	Full-Scale Exercises
Biological threats	25	41	14	5
Chemical threats	10	4	32	5
Radiological threats	1	1	3	1
Multi-hazards	5	20	9	1
Pandemic influenza	4	0	0	0
COOP	19	5	1	0
Other	7	18	7	4
Total	71	89	66	16

n=52. Other specified response were not captured.

19. From July 1, 2020 – June 30, 2021, please enter the total number of samples and specimens you accepted and tested in your preparedness and response system. Do not include proficiency tests or exercises as part of your preparedness and response system. Please enter "0" if none.

	Total Number Accepted	BT Agents Tested	CT Agents Tested	RT Agents Tested	Other Analyses
Clinical	462,860	1,809	232	100	673,695
Environmental (e.g., food, water, unknown substances)	1,338	908	322	1,308	3,015
BioWatch	158,859	136,597	0	0	596

n=52. Note: some samples were tested for multiple agents.

20. (NHSPI) Does your PHL assure the timely transportation (pick-up and delivery) of specimens/samples 24/7/365 days to the appropriate public health LRN Reference Laboratory? (This system can encompass a state-operated courier, FedEx, contract courier service, etc.)

Timely sample/specimen transport to LRN Reference Laboratory?	%	Count
Yes	94.2%	49
No	5.8%	3

n=52

21. (NHSPI) Does your PHL have a plan to receive samples from a sentinel laboratory during non-business hours?

After-hours sample receipt plan?	%	Count
Yes	98.1%	51
No	1.9%	1

n=52

SECTION 4: SAFETY

22. Does your laboratory have a biosafety officer?

Biosafety officer?	%	Count
Yes, full-time staff designated to biosafety	63.5%	33
Yes, part-time staff	36.5%	19
No—please explain why there is no staff	0.0%	0

n= 52

22a. Please specify what percentage of the BSO time is dedicated to the duties below.

Activities	Average % of Duties
Internal biosafety/biosecurity	59.3%
External clinical lab outreach	13.1%
Other	27.7%

n=52. Other duties not captured.

23. Has your staff received training on the following topics?

Training	Yes		No		Additional Training Needed		Total Labs Responding
	%	Count	%	Count	%	Count	
BSL-2 standard and special practices e.g., fundamentals of biological materials safety practices, excluding blood-borne pathogen training	98.1%	51	0.0%	0	9.6%	5	52
Biological risk assessment	98.1%	51	0.0%	0	15.4%	8	52
Personal protective equipment	100.0%	52	0.0%	0	3.8%	2	52
Biological safety cabinets (BSCs) and other engineering controls	100.0%	52	0.0%	0	7.7%	4	52
Bloodborne pathogens	98.1%	51	0.0%	0	5.8%	3	52
Chemical fume hoods	90.4%	47	7.7%	4	9.6%	5	52
Glove boxes	32.7%	17	65.4%	34	5.8%	3	52
Naloxone	46.2%	24	42.3%	22	17.3%	9	52
Spill prevention, control and response plan	100.0%	52	0.0%	0	7.7%	4	52
Sharps Hazard	96.2%	50	3.8%	2	5.8%	3	52
Safe handling and use of cryogenic liquids	67.3%	35	25.0%	13	15.4%	8	52
Chemical hazards	94.2%	49	1.9%	1	11.5%	6	52
Decontamination	96.2%	50	1.9%	1	9.6%	5	52
Regulated waste management	90.4%	47	7.7%	4	11.5%	6	52
Emergency management and response	92.3%	48	1.9%	1	19.2%	10	52
Certification in packaging and shipping of Division 6.2 infectious substances	100.0%	52	0.0%	0	1.9%	1	52
Biosecurity plan	96.2%	50	1.9%	1	9.6%	5	52
Select Agent regulations	96.2%	50	3.8%	2	5.8%	3	52
BSL-3 standard and special practices	98.1%	51	0.0%	0	9.6%	5	52
Continuous quality improvement e.g., review, improvement and implementation	90.4%	47	7.7%	4	15.4%	8	52

SECTION 5: BIOLOGICAL THREATS

24. Does your PHL maintain a database of active sentinel clinical laboratories with the required elements (e.g., CLIA number, address, primary contact, 24/7 emergency contact) listed in the current Sentinel Clinical Laboratories Definition?

Database of active sentinel clinical laboratories?	%	Count
Yes, for the entire state	90.4%	47
Yes, for my jurisdiction only (may not be the entire state)	7.7%	4
No	1.9%	1

n=52

24a. How many active sentinel clinical laboratories are in your database?

	Minimum reported	Maximum reported	Average reported	Total
Active sentinel clinical laboratories in PHL databases	7	526	69.2	3,529

n=51

25. How do you identify sentinel clinical laboratories? Please check all that apply.

Definition of sentinel clinical laboratories	%	Count
Use APHL, CDC LRN and ASM definition	85.2%	46
Use other definition—please specify	14.8%	8
We do not identify sentinel clinical laboratories	0.0%	0

n=47. Other specified responses include states that have their own definition. Individual responses are on file with APHL.

25a. Please provide any additional information on the criteria your laboratory used to identify a sentinel clinical laboratory.

23 respondents replied with "N/A." Other specified responses include state-based designation and microbiology capabilities of laboratories. Individual responses are on file with APHL.

26. From July 1, 2020 – June 30, 2021, did your PHL award a certificate of recognition to sentinel clinical laboratories in your state? Please check all that apply.

Recognition given to sentinel clinical laboratory?	%	Count
No	88.5%	46
Yes, awarded a state-developed certificate	7.7%	4
Yes, awarded the LRN Joint Leadership Committee (JLC) approved certificate	5.8%	3

n=52. One laboratory issues both types of certificate of recognition.

26a. How many sentinel clinical laboratories received a certificate? Please enter "0" if none.

Six PHLs responded, indicating a total of 214 sentinel clinical laboratories received certificates.

27. Which of the following do you use to assess the competency of sentinel clinical laboratories to rule-out and refer BT agents? Please check all that apply.

Competency assessment of sentinel clinical laboratories	%	Count
College of American Pathologists (CAP) Laboratory Preparedness Exercise (LPX)	92.3%	48
State-developed	11.5%	6
Wisconsin State Laboratory of Hygiene Proficiency Testing (WSLHPT)/ Challenge Set for Sentinel Laboratories	5.8%	3
Other—please specify	0.0%	0
None of the above	3.8%	2

n=52.

27a. Do these competency assessments impact the renewal status of sentinel clinical laboratories?

Competency assessments impact renewal status of sentinel clinical laboratories?	%	Count
No	92.0%	46
Yes	8.0%	4

n=50

27b. How do you utilize the CAP LPX in your state? Please check all that apply.

Utilization of CAP LAX	%	Count
Track which sentinel clinical laboratories contact the LRN Reference PHL	92.3%	48
Provide training and outreach to the sentinel clinical laboratories that do not provide the intended responses for the LPX organisms	78.8%	41
Test competency of LRN-B staff at your state PHL e.g., your PHL actively participates in the testing of the LPX organisms	65.4%	34
Test the ability of sentinel clinical laboratories to package and ship specimens to the LRN Reference PHL	36.5%	19
Other—please specify	7.7%	4

n=49. Other specified responses include testing competency for chain of custody and specific questions about shipping category A and B specimens. Individual responses are on file with APHL.

28. From July 1, 2020 – June 30, 2021, did your PHL conduct an exercise or utilize a real event to evaluate the time for sentinel clinical laboratories to acknowledge receipt of an urgent message from your laboratory? (You may factor requests to sentinel clinical laboratories to contact you during the CAP LPX in your response.)

Evaluation of sentinel clinical laboratory response time?	%	Count
Yes	67.3%	35
No	32.7%	17

n=52

29. (NHSPI) For which of the following have you utilized a rapid method (HAN, blast email or fax) for your sentinel clinical laboratories and other partners? Please check all that apply.

Rapid communication event	%	Count
Outbreaks	84.6%	44
Routine updates	75.0%	39
Training events, such as providing a training calendar	75.0%	39
Other—please specify	42.3%	22
Have not used it	0.0%	0

n=52. Other specified responses include health HAN alerts, communication drills and exercises, change of service notices, guidance distribution, updates to facility contact information and for distributing meeting information. Individual responses are on file with APHL.

30. From July 1, 2020 – June 30, 2021, did your PHL sponsor any sentinel clinical laboratory trainings for biological threat agents?

Lab-sponsored BT sentinel clinical laboratory trainings?	%	Count
Yes	44.2%	23
No	55.8%	29

n=52

30a. Please indicate how many classes were provided and how many facilities were trained. Please enter "0" if none.

	Rule-out testing only	Packaging and shipping (P&S) only	Any combo of categories (Rule-Out, P&S)	Biosafety	Other
Number of classes	17	150	13	19	12
Percentage of facilities in jurisdiction that received training	19.2%	41.5%	10.8%	20.7%	35.8%
Number of laboratorians that received training	225	1312	192	487	653

n=23

31. From July 1, 2020 – June 30, 2021, approximately how many sentinel clinical laboratories did your did your staff visit? Enter 0 for none.

Number of sentinel clinical laboratory site visits conducted by PHLs	%	Count
Physical (On-site)	12.9%	64
Virtual (Phone and/or Video)	87.1%	431

n=52. All laboratories reported conducting at least one type of site visit, with 495 total site visits.

32. Did you experience any barriers to providing biosafety training to sentinel clinical laboratories?

Training barriers?	%	Count
Yes	98.1%	51
No	1.9%	1

32a. What were the barriers to providing training to sentinel clinical laboratories? Please check all that apply.

Training barriers	%	Count
Issues with coordination or access to sentinel clinical laboratories	28.8%	15
Lack of training staff at the public health laboratory	26.9%	14
Lack of interest from the sentinel clinical labs	19.2%	10
Information technology compatibility issues e.g., different platforms for web-based training	15.4%	8
No funding	9.6%	5
Other—please specify	86.5%	45

n=51. Other specified responses include competing priorities due to COVID-19, travel restrictions and lack of available staff at sentinel laboratories able to participate. Individual responses are on file with APHL.

33. Please share any major successes and challenges your laboratory encountered regarding biological threats preparedness (e.g., response to an event, development of new tests, etc.) during the time period of July 1, 2020 – June 30, 2021. In addition to your stories, we encourage you to share best practices.
Individual responses are on file with APHL.

SECTION 6: CHEMICAL THREATS

34. From July 1, 2020 – June 30, 2021, did your LRN-C capability increase, decrease, or was it maintained?

LRN-C capability	%	Count
Maintained	69.2%	36
Increased	23.1%	12
Decreased	7.7%	4

n=52.

34a. How did your capability increase? Please check all that apply.

LRN-C capabilities	%	Count
Added CT equipment	75.0%	9
Added one LRN-C method	16.7%	2
Added CT personnel	8.3%	1
Added two LRN-C methods	0.0%	0
Added more than two LRN-C methods	0.0%	0
Increased CT level	0.0%	0
Other—please specify	16.7%	2

n=12. Other specified responses include the implementation of electronic laboratory reporting for LRN-C and cross-training staff for LRN-C.

34b. How did your capability decrease? Please check all that apply.

LRN-C capabilities	%	Count
Decrease in CT personnel	50.0%	2
Decrease in CT equipment	25.0%	1
Reduced support from the broader system	25.0%	1
Lack of connection to those responding (i.e., first responders, communities, epidemiologists, etc.)	25.0%	1
Unable to purchase new equipment required to add methods	0.0%	0
Unable to maintain service agreement(s) on current equipment	0.0%	0
Dropped a CT Level	0.0%	0
Other—please specify	25.0%	1

n=4. No other responses specified.

35. From July 1, 2020 – June 30, 2021, did your PHL utilize your CT capabilities to respond to any of the following? Please check all that apply.

CT capabilities utilized?	%	Count
Biomonitoring investigations	26.9%	14
Chemical threat—non-clinical sample	15.4%	8
Chemical threat—clinical sample	11.5%	6
Community concern—non-clinical sample e.g., exposure to a potentially toxic chemical	11.5%	6
Community concern—clinical sample e.g., exposure to a potentially toxic chemical	5.8%	3
Chemical spill or other emergency incident—non-clinical sample	3.8%	2
Chemical spill or other emergency incident—clinical sample	0.0%	0
Other—please specify	19.2%	10
No	48.1%	25

n=52. Other specified responses include state lead programs, opioid epidemic response efforts and to conduct exercises and drills.

35a. Which LRN-C resources are you utilizing for your laboratory's biomonitoring efforts? Please check all that apply.

LRN-C resources utilized for biomonitoring	%	Count
Instruments/equipment	100.0%	14
Personnel	78.6%	11
Analytical methods	71.4%	10
Relationships with clinical community, other relationships	42.9%	6
Technical training	35.7%	5

n=14

35b. What other funding sources are you utilizing for biomonitoring? Please check all that apply.

Biomonitoring funding sources	%	Count
State—please explain	71.4%	10
Other federal—please explain	64.3%	9
Other—please explain	28.6%	4

n=14. Other specified responses for federal funding include CDC biomonitoring, National Institute of Environmental Health Sciences and FDA Food Emergency Response Network (FERN) funding. Individual responses are on file with APHL.

36. As of June 30, 2021, for which quality assessment programs facilitated by CDC/NCEH did your lab qualify? Please check all that apply.

Laboratory qualified for __ quality assessment programs	%	Count
Sample collection, packing and shipping (SCPaS)	96.2%	50
Cd/Hg/Pb in blood by ICP-MS	82.7%	43
Cyanide in blood by GC-MS	80.8%	42
Tetramine in urine by GC-MS	80.8%	42
VOCs in blood by GC-MS	78.8%	41
As/Ba/Be/Cd/Pb/Ti/U in urine by ICP-MS	78.8%	41
Ricinine/Abrine in urine by LC-MS/MS	78.8%	41
Nerve agent metabolites in serum by LC-MS/MS	78.8%	41
Nerve agent metabolites in urine by LC-MS/MS	76.9%	40
Tetranitromethane metabolite in urine by LC-MS/MS	42.3%	22
Lewisite metabolite in urine by LC-ICP-MS	32.7%	17
Sulfur mustard metabolite in serum by LC-MS/MS	25.0%	13
Sulfur mustard metabolite in urine by LC-MS/MS	23.1%	12
Nitrogen mustard metabolite in urine by LC-MS/MS	19.2%	10
Not qualified	0.0%	0

n=52

37. Do you use your LRN-C instrumentation for biosurveillance for misused drugs, such as opioids?

Biosurveillance for misused drugs?	%	Count
No	69.2%	36
Yes	31.4%	16

n=52

38. (NHSPI) Please provide the certification/accreditation status of your LRN-C laboratory. Please check all that apply.

Question	Currently certified / accredited		Planning for certification / accreditation next year		Not certified / not planning	
	%	Count	%	Count	%	Count
CLIA toxicology subspeciality	63.5%	33	3.8%	2	32.7%	17
CAP	15.4%	8	0.0%	0	84.6%	44
ISO	11.5%	6	5.8%	3	82.7%	43
Other— please specify	7.7%	4	0.0%	0	92.3%	48

n=52. Other specified responses include certifications with EPA and state-based accreditation programs. Individual responses are on file with APHL.

39. Does your PHL plan to replace or otherwise purchase any instruments for LRN-C or emergency response use? Please check all that apply.

LRN-C instrument replacements	%	Count
Equipment already in place; replacements not needed	21.2%	11
LC/MS or LC/MS/MS Organophosphate nerve agents (OPNA), abrin/ricinine, MTP3, other organic chemicals	21.2%	11
GC/MS with multi-purpose sampler (MPS) VOCs, cyanide, other organic chemicals	21.2%	11
GC/MS Tetramine, other organic chemicals	15.4%	8
ICP/MS Metals	13.5%	7
High Resolution Mass Spectrometer LC/HRMS, GC/HRMS, ICP-HRMS	13.5%	7
Other—please specify Solid phase extraction, automated extraction platforms, etc.	25.0%	13
None of the above	21.2%	11

n=52. Other specified responses include automated extraction platforms and liquid handlers. Individual responses are on file with APHL.

39a. How many of each instrument do you plan to replace?

Individual responses are on file with APHL.

39b. When do you plan to replace the instrument(s)?

Individual responses are on file with APHL.

40. Is the instrument(s) used for programs other than CT?

Question	Yes		No or N/A		Total
	%	Count	%	Count	
LC/MS or LC/MS/MS OPNA, abrin/ricinine, MTP3, other organic chemicals	45.5%	5	54.5%	6	11
GC/MS with MPS VOCs, cyanide, other organic chemicals	18.2%	2	81.8%	9	11
GC/MS Tetramine, other organic chemicals	0.0%	0	100.0%	8	8
ICP/MS Metals	57.1%	4	42.9%	3	7
High Resolution Mass Spectrometer LC/HRMS, GC/HRMS, ICP-HRMS	57.1%	4	42.9%	3	7
Other—please specify Solid phase extraction, automated extraction platforms, etc.	53.8%	7	46.2%	6	13

n=30. Other specified responses include testing for drugs of abuse and biomonitoring. Individual responses are on file with APHL.

41. Does your PHL plan to purchase a service contract for the following LRN-C instruments? Please check all that apply.

Plan to purchase service contract for LRN-C instruments?	%	Count
ICP/MS	86.5%	45
GC/MS	61.5%	32
GC/MS (MPS)	76.9%	40
LC/MS	78.8%	41
HRMS	28.8%	15
Other—please specify	44.2%	23
None of the above	13.5%	7

n=52. Other specified responses include automated liquid handlers and solid phase extraction platforms. Individual responses are on file with APHL.

42. What is the source of funding for service contracts for LRN-C instruments? Please check all that apply.

Source funding for CT instrument service contracts	%	Count
CDC PHEP Cooperative Agreement	80.8%	42
State funding	21.2%	11
Local funding	5.8%	3
Other federal—please specify	7.7%	4
Other—please specify	15.4%	8

n=52. One laboratory reported support from APHL. Other sources of Federal funding include Overdose Data to Action (OD2A).

43. Please share any major successes and challenges your laboratory encountered regarding chemical threats preparedness (e.g., response to an event, development of new tests, etc.) during the time period of July 1, 2020 to June 30, 2021.
Individual responses are on file with APHL.

SECTION 7: RADIOLOGICAL THREATS

44. Does your laboratory have the ability to perform radiological testing in the following matrices? Please check all that apply.

Question	Yes		No	
	%	Count	%	Count
Environmental samples	50.0%	26	50.0%	26
Food samples	42.3%	22	57.7%	30
Human clinical (bioassay) samples	7.7%	4	92.3%	48

n=52

44a. Is your laboratory interested in developing the capability to measure human radiation contamination and become CLIA compliant for radiobioassay in clinical samples?

Interest in developing human radiation testing capability?	%	Count
No—please specify why not	56.3%	27
Yes	43.8%	21

n=48. Specified responses include lack of staff and infrastructure. Individual responses are on file with APHL.

44b. Does another laboratory in your state perform clinical radiobioassay? If so, please list the laboratory's name and briefly describe their capability (e.g., radionuclides tested and throughput per week).

Another laboratory in state performing clinical bioassay testing?	%	Count
No	87.5%	42
Yes—please specify	12.5%	6

n=49. Individual responses are on file with APHL.

45. Does your laboratory have responsibility for radiological surveillance and response preparedness? (e.g. testing environmental, food or clinical samples)

Responsible for radiological preparedness?	%	Count
No	51.9%	27
Yes—please describe	48.1%	25

n=52. Specified responses include environmental and food sample testing and clinical specimen testing. Individual responses are on file with APHL.

46. Does the PHL have university and/or in-house trained radiochemists that perform radiochemistry procedures?

Nuclear power plant?	%	Count
Yes	50.0%	26
No	50.0%	26

n=52

46a. What is the total number of university and/or in-house trained radiochemists that perform radiochemistry procedures in your laboratory?

Number of radiochemists that perform radiochemistry procedures	%	Count
0	0.0%	0
1	7.7%	2
2	15.4%	4
3	23.1%	6
4	19.2%	5
5	11.5%	3
6	7.7%	2
7	3.8%	1
8	0.0%	0
9	0.0%	0
10	7.7%	2
Other—please specify	3.8%	1

n=26. One laboratory indicated they had 11 radiochemists that perform radiochemistry procedures.

46b. In how many years are these radiochemists expected to retire? Please enter a number of radiochemists for each timeframe that applies.

Number Retiring	Retirement Timeframe							
	0–2 years		3–5 years		6–10 years		11+ years	
	%	Count	%	Count	%	Count	%	Count
0	61.5%	16	61.5%	16	57.7%	15	11.5%	3
1	30.8%	8	34.6%	9	19.2%	5	23.1%	6
2	7.7%	2	3.8%	1	11.5%	3	15.4%	4
3	0.0%	0	0.0%	0	7.7%	2	19.2%	5
4	0.0%	0	0.0%	0	3.8%	1	11.5%	3
5	0.0%	0	0.0%	0	0.0%	0	11.5%	3
6	0.0%	0	0.0%	0	0.0%	0	3.8%	1
7	0.0%	0	0.0%	0	0.0%	0	3.8%	1

n=26

47. Including your current staff, what is the total number of university and/or in-house-trained radiochemists that perform radiochemistry procedures that is needed to meet your laboratory's surveillance and emergency radiochemistry response requirements?

Number of radiochemists needed	%	Count
1	3.8%	1
2	19.2%	5
3	15.4%	4
4	26.9%	7
5	11.5%	3
6	3.8%	1
7	0.0%	0
8	7.7%	2
9	0.0%	0
10	3.8%	1
Other—please specify	7.7%	2

n=26. Two laboratories indicated they needed more than 10 radiochemists to meet their surveillance and emergency radiochemistry response requirements.

48. What radiochemistry staffing challenges and needs do you foresee that your laboratory will have to meet your surveillance and emergency response requirements (e.g., training, mentoring, emergency response)?
Specified responses include recruitment and retention, training, mentorship and funding to maintain staff. Individual responses are on file with APHL.

49. Please share any major successes and challenges your laboratory encountered regarding radiological threats preparedness (e.g., response to an event, development of new tests, etc.) during the time period of July 1, 2020 to June 30, 2021.
Individual responses are on file with APHL.

SECTION 8: ELECTRONIC DATA MESSAGING FOR THE LABORATORY RESPONSE NETWORK

50. What system is your laboratory currently using to message LRN data to CDC? Please select all that apply.

LRN Type	LRN Results Messenger		Laboratory Information Management System integration (LIMSi)		Electronic Laboratory Reporting (ELR)	
	%	Count	%	Count	%	Count
LRN-B	65.8%	48	17.8%	13	16.4%	12
LRN-C	90.6%	48	1.9%	1	7.5%	4

n=52

50a. Why is your laboratory not utilizing ELR? Please check all that apply.

Limitations for utilizing ELR	%	Count
Lack of funding to support implementation (e.g. funding to support internal staff, external vendors)	14.3%	2
No dedicated laboratory IT staff	7.1%	1
Have not yet implemented ELR	7.1%	1
Lack of funding for expansion of LIMS to support ELR	0.0%	0
Difficulty coordinating between the laboratory and software vendor	0.0%	0
Difficulty coordinating between the laboratory and IT personnel	0.0%	0
Difficulty coordinating between the laboratory and CDC	0.0%	0
Other—please specify	71.4%	10

n=12. Other specified responses include ELR not yet implemented due to labs working on LIMS upgrades and only having ELR capability for LRN-B.

51. Following ELR implementation, has your laboratory continued to use ELR for electronic data messaging results to the CDC?

Continued use of ELR for electronic data messaging to CDC?	%	Count
Yes	42.2%	19
Other—please specify	57.8%	26

n=45. Specified responses on file with APHL.

52. What are the barriers to maintaining ELR to message LRN data to CDC after initial implementation? Please check all that apply.

Barriers to maintaining ELR	%	Count
Coordination and support from internal IT staff	23.4%	11
Funding (e.g. funding to support internal staff, external vendors)	14.9%	7
Coordination and support from LIMS vendors	10.6%	5
Funding to support LIMS service contracts	10.6%	5
Timeliness of updates being released by CDC	2.1%	1
Other—please specify	38.3%	18

n=26. Other specified responses on file with APHL.

53. Describe how your laboratory is using ELR? Please check all that apply.

Utilization of ELR	%	Count
Send electronic reports to state epidemiologists	91.7%	11
Message LRN-B testing data to CDC	83.3%	10
Electronic test order from sentinel clinical laboratories	58.3%	7
Electronic results reporting to sentinel clinical laboratories	58.3%	7
Send electronic reports to local epidemiologists	33.3%	4
Message LRN-C testing data to CDC	16.7%	2
Message LRN-C Proficiency Testing data to CDC	16.7%	2
Message LRN-B Proficiency Testing data to CDC	16.7%	2
Send electronic reports to law enforcement such as the FBI	0.0%	0

n=12

54. During a large-scale event which system would you use to provide LRN data to CDC? Please select all that apply.

System	LRN-B		LRN-C		Total
	%	Count	%	Count	
ELR only	64.3%	9	35.7%	5	14
LIMSi only	81.8%	9	18.2%	2	11
RM only	41.0%	25	59.0%	36	61
ELR and RM	60.0%	15	40.0%	10	25
LIMSi and RM	76.9%	10	23.1%	3	13
Other – please specify	40.0%	4	60.0%	6	10

n=52. Other specified responses on file with APHL.