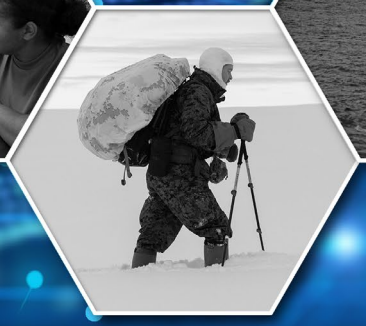
ARMED FORCES HEALTH SURVEILLANCE DIVISION

ANNUAL REPORT 2023

CDC/AMY E. LOCKWOOD, MS.



FRIENDS AND COLLEAGUES

The Armed Forces Health Surveillance Division (AFHSD) continues to be the Department of Defense's (DOD) central entity for global health surveillance. We are a division aligned with the Defense Centers for Public Health—Falls Church, within the Public Health Directorate under Healthcare Administration (HCA) in the Defense Health Agency (DHA). AFHSD operates three main branches: Epidemiology and Analysis (E&A), Global Emerging Infections Surveillance (GEIS), and Integrated Biosurveillance (IB).

In support of DHA's role as a Combat Support Agency, AFHSD provides early warning, health threat assessments, and force readiness information to operational forces. We are embracing technology and a novel mix of skillsets to utilize the tools and practices of modern data science, which will facilitate a more rapid data response and information dissemination. We are codifying our relationships across the DOD, seeking to leverage internal strengths, and working with global allies to increase our footprint.

AFHSD supports the nation's strategic, operational, and tactical objectives. Our team tirelessly works to provide senior leaders and frontline healthcare workers with critical information to shape the battlespace and support a unified military strategy. We embrace change for the betterment of the Military Health System and Defense Public Health. Therefore, transformation is critical to our continued success.

As you read AFHSD's annual report, we hope it will remind you of our recent successes and the future path we will take to ensure our mission in 2024. We look forward to continuing this effort with agility, relevance, and timeliness to support the Joint Force. Our goal is to help the Combatant Commands and the military services make the best decisions in protecting the health and readiness of the DOD's military and beneficiaries.

PATRICK W. KENNEDY, Colonel, USAF, BSC
Chief, Armed Forces Health Surveillance Division

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HISTORY OF SURVEILLANCE

The Armed Forces Health Surveillance Division (AFHSD) is the central public health entity of global health surveillance for the U.S. military. AFHSD is a component of the Defense Health Agency (DHA) within the Public Health Directorate. The division is organized into three branches: Epidemiology and Analysis, Global Emerging Infections Surveillance, and Integrated Biosurveillance (IB).

AFHSD was created in February 2008 as the Armed Forces Health Surveillance Center following the merger of the Army Medical Surveillance Activity's Defense Medical Surveillance System (DMSS) with the Department of Defense (DOD) Serum Repository (DODSR), the DOD Global Emerging Infections Surveillance and Response System (DOD-GEIS), and the Global Health Surveillance Activity from the Office of the Deputy Assistant Secretary of Defense for Force Health Protection and Readiness.

As the central repository of medical surveillance data for the U.S. Armed Forces, AFHSD fulfills its mission through its technical infrastructure, expertise in database management for the DMSS and related applications, and operations and management of the DODSR. The DMSS houses both current and historical data on diseases and medical events, including hospitalizations, ambulatory visits, reportable medical events (RMEs), laboratory tests, immunizations, periodic and deployment-related health assessments, and casualty data affecting service members throughout their military careers. It contains billions of data records on service members and other Military Health System (MHS) beneficiaries.

The DODSR was established in 1989 to store sera collected during the DOD's testing program for human immunodeficiency virus (HIV) infections. Later, the DODSR was designated to receive serum specimens collected before and after operational deployments.

With more than 74 million serial serum specimens from over 12.2 million individuals, the DODSR stands as the world's largest serum repository of its kind.

In 1997, the DOD established DOD-GEIS in response to a Presidential Decision Directive to expand its mission to include support for global surveillance, training, research, and response to emerging infectious disease (EID) threats. GEIS coordinates AFHSD's global EID surveillance and response initiatives among a network of partner organizations. It executes a militarily relevant surveillance program focused on respiratory, enteric, febrile and vector-borne infections (FVBI), and antimicrobial-resistant organisms.

AFHSD plays a key role in integrating biosurveillance efforts by collecting data and information in near real-time of the threats from endemic diseases and EIDs relevant to the military worldwide. AFHSD publishes summaries of notifiable diseases, trends of illnesses of special interest, and field reports describing outbreaks and case occurrences in its peer-reviewed journal, *Medical Surveillance Monthly Report* (MSMR). Additionally, AFHSD provides up-to-date information on diseases that could impact force health readiness and protection.

Maintaining a presence at three service public health hubs—Defense Center for Public Health—Aberdeen (Army), Defense Center for Public Health—Dayton (Air Force), and Defense Center for Public Health—Portsmouth (Navy and Marine Corps) —AFHSD's health information analysis supports worldwide disease surveillance and public health activities, enhancing the U.S. military's Force Health Protection mission.

THE ELEMENTS OF MILITARY MEDICAL SURVEILLANCE

TOOLS OF SURVEILLANCE

The DMSS and the DODSR are longstanding and vital components of medical surveillance within the U.S. Armed Forces. Originally established for routine screening and surveillance for human immunodeficiency virus (HIV), the DMSS and DODSR expanded their functions in the early 1990s to encompass all diseases and injuries relevant to protecting U.S. forces and deployment health.

The DMSS receives data from multiple sources and integrates it in a continuously expanding longitudinal surveillance database covering all individuals who have served in the military since 1990. DMSS records contain information on three fundamental elements of epidemiological surveillance – person, place, and time – providing a wealth of data for efficient and robust analyses of morbidity among Service members.

WITH MORE THAN 5.3 BILLION DATA RECORDS, INCLUDING MORE THAN 1.6 BILLION RECORDS ON U.S. SERVICE MEMBERS ALONE, THE DMSS REMAINS THE DEPARTMENT OF DEFENSE'S PREMIER EPIDEMIOLOGIC HEALTH SURVEILLANCE RESOURCE.

The Defense Medical Epidemiology Database (DMED), derived from the DMSS, offers select de-identified, remotely accessible data to authorized users. These users include U.S. military medical providers, epidemiologists, medical researchers, safety officers, and medical operations and clinical support staff tasked with assessing and analyzing medical event data in the U.S. military using standard epidemiologic methods and sharing their findings with commanders to enhance the health of active duty personnel. Civilian collaborators may also access DMED with appropriate documentation.

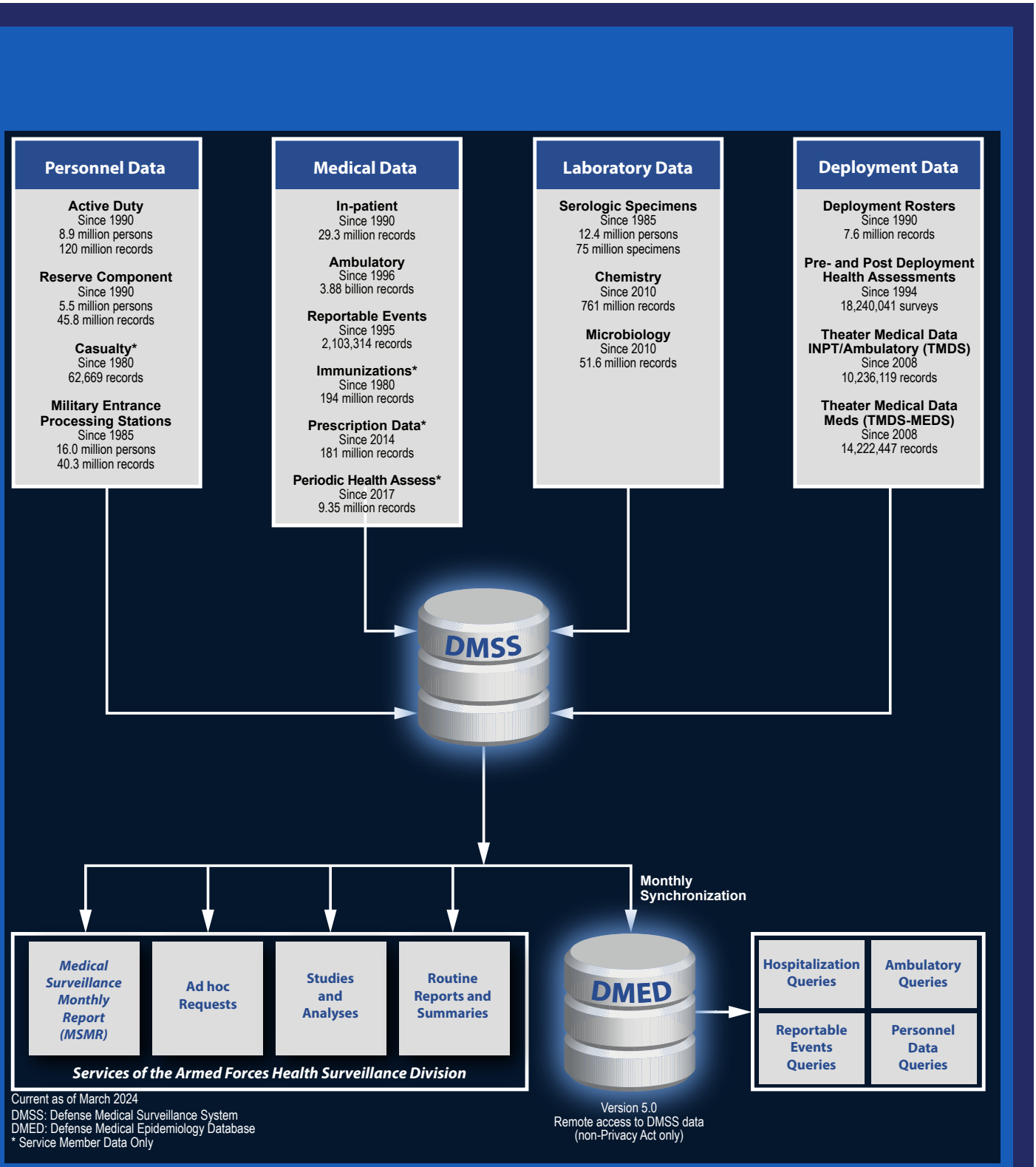
The DODSR was established in 1989 to store serum specimens collected from the DOD's testing program for HIV infections. Later, it was designated to store sera collected before and after operational deployments.

WITH MORE THAN 75 MILLION SERIAL SERUM SPECIMENS FROM OVER 12.4 MILLION INDIVIDUALS, THE DODSR IS THE WORLD'S LARGEST SERUM REPOSITORY OF ITS KIND.

The DODSR keeps specimens in state-of the-art freezers with advanced cooling technology. The DMSS database records demographic, occupational, and medical records longitudinally with links to the stored specimens. It is a unique and powerful resource which plays a pivotal role in supporting military medical surveillance, clinical care, and seroepidemiologic investigations.

In 2023, AFHSD processed and dispensed serum specimens in support of 14 seroepidemiologic studies and inquiries to meet clinical needs, operational investigations such as Latent Visceral Leishmaniasis among U.S. Military Personnel deployed in Afghanistan, Coccidioides Seroconversion among U.S. Marines, and Lyme Disease among U.S. personnel stationed in Honduras, as well as research endeavors, including a study examining the association between vitamin D and the risk of Multiple Sclerosis in African Americans.

DMSS STRUCTURE AND FUNCTIONAL RELATIONSHIP



FINANCES

AFHSD distributed approximately 80% of its funds directly to laboratory partners through the GEIS program following an extensive internal and external proposal review process. Baseline funding for the GEIS program was **$41.8M** in FY23. An additional **$15.9M** in supplemental funding was distributed to DOD CONUS and OCONUS laboratories to conduct infectious disease surveillance and maintain the DOD's next-generation sequencing capabilities.

Primary recipients of GEIS core biosurveillance funding included DHA (formerly Army) and Navy OCONUS Service laboratories; including, Walter Reed Army Institute of Research (WRAIR) Armed Forces Research Institute of Medical Sciences (AFRIMS), WRAIR Africa, WRAIR Europe and Middle East; and Naval Medical Research Unit (NAMRU) INDO PACIFIC (NAMRU IP), NAMRU EUROPE, AFRICA, CENTRAL (EURAFCENT), NAMRU SOUTH.

Multiple CONUS-based DOD also received funding, including: the Navy Entomology Center of Excellence (NECE); Naval Medical Research Command (NMRC); Pharmacovigilance Center (PVC); U.S. Air Force School of Aerospace Medicine (USAFSAM) / Defense Centers for Public Health-Dayton (DCPH-D); U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID); WRAIR; and Uniformed Services University of the Health Sciences (USUHS), among others.

TABLE 1. GEIS Branch Funding Distribution by Geographic Combatant Command (GCC)

GCC	AMOUNT	%
AFRICOM	$6,978,000	12.1
EUCOM	$1,434,000	2.5
INDOPACOM	$9,641,000	16.7
NORTHCOM	$5,521,489	9.6
SOUTHCOM	$6,662,000	11.5
Multi-GCC	$27,464,801	47.6
Total*	$57,701,290	100.0

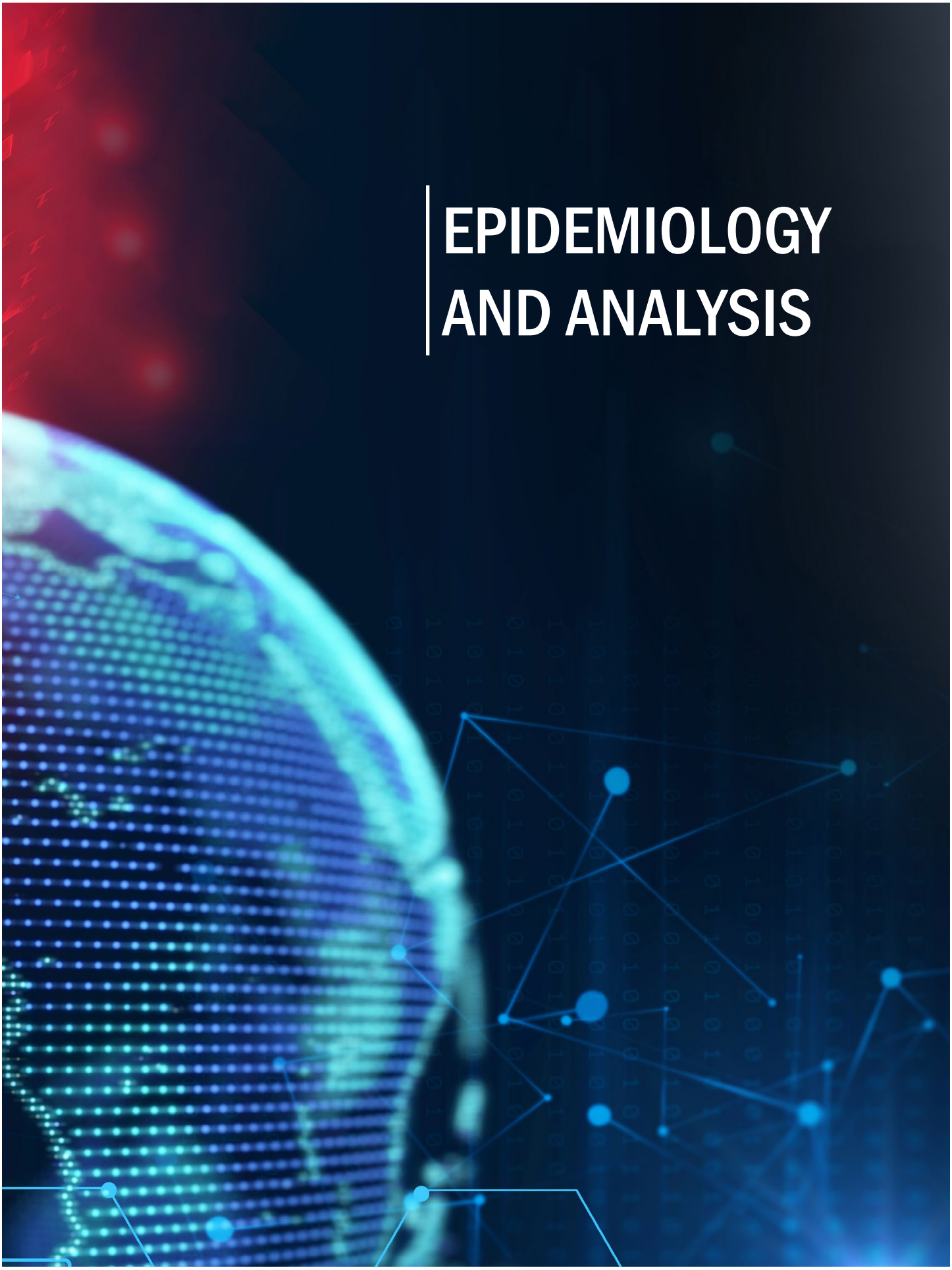
* Include reimbursement for publications and GEIS Program Office funds.
* Funding for activities taking place in the CENTCOM GCC is included in the Multi-GCC category.

TABLE 2. GEIS Branch Funding Distribution by Service

SERVICE	AMOUNT	%
Air Force	*$22,000*	0.04
Navy	*$24,053,000*	41.7
DHA	*$32,834,290*	56.9
USUHS	*$792,000*	1.4
Total	*$57,701,290*	100.0

Note: USAFSAM (former Air Force moved under DHA) and the former Army labs also moved under DHA

The remaining funds supported various AFHSD Branches and headquarters, biosurveillance initiatives, comprehensive health surveillance service, support contract staff, contract personnel working with the *MSMR* and the DODSR, and other infrastructure costs.



EPIDEMIOLOGY AND ANALYSIS

EPIDEMIOLOGY AND ANALYSIS

The Epidemiology and Analysis (E&A) Branch integrates the expertise of epidemiologists, preventive medicine physicians, and data analysts to provide timely analyses and reports of actionable health information. The branch uses AFHSD health surveillance tools—the DMSS and the DODSR—and provides surveillance products to DOD policymakers, military leaders, healthcare providers, public health officers, and researchers.

In addition, E&A staff analyze and interpret large datasets, publish the *MSMR*, develop and disseminate standards for surveillance case definitions, and train preventive medicine residents. The branch receives and responds to hundreds of health-related inquiries and investigations on the U.S. military with the intent of preserving the health of the U.S. Armed Forces. Many inquiries are initiated by key leaders throughout the DOD and relate to military operations. Each analysis and report distributed by the branch entails numerous hours of epidemiologic expertise and programming by analysts to extract relevant data from the billions of health records stored in the DMSS and blood sera in the DODSR.

IN 2023, E&A STAFF MEMBERS SUPPORTED SEVERAL AD HOC REQUESTS FOR DATA ANALYSES AND DISTRIBUTED HUNDREDS OF PERIODIC REPORTS THROUGHOUT THE DOD.

These ad hoc requests and periodic reports look for trends over time of diseases and injuries, such as communicable dis- eases, training-related injuries, mental health illnesses, traumatic brain injury (TBI), and deployment health. The resulting reports have helped DOD policy makers shape their Force Health Protection (FHP) programs, as well as healthcare professionals develop preventive measures against diseases or injuries affecting U.S. service members and their beneficiaries.

IN 2023, E&A COMPLETED TWO ANALYSES IN RESPONSE TO CONGRESSIONAL INQUIRIES RELATED TO MILITARY EXPOSURES. E&A PROVIDED DATA ON INCIDENCE OF MUSCULOSKELETAL INJURIES, AND ON PREVALENCE OF GLIOBLASTOMA DIAGNOSES.

Examples of Select AFHSD Periodic Reports in 2023

1. Army Heat and Cold Weather Injury Report
2. Deployment Health Compliance Report
3. DOD Consolidated Influenza Surveillance Report
4. DOD Eye Injury Report
5. Health Affairs (HA) Mental Health Report
6. COVID-19 Vaccinations Report
7. HA TBI Report
8. Walk-in Contraceptive Services Outcomes Report
9. Public Health Assessment (PHA) Suicidal and Homicidal Ideation Report
10. PHA Tobacco Use Report
11. Congressionally Directed Medical Research Program (CDMRP) Incidence & Burden Reports
12. Medical Affairs HIV PrEP Report

E&A also continued to support important DOD research studies, including the Cancer Moonshot initiative launched in 2016 by then Vice President Joe Biden. This initiative aims to accelerate cancer research and make additional therapies available to patients, while improving cancer prevention and early detection efforts at the same time.

In 2023, E&A introduced a journal club to support staff analysts and epidemiologists in staying up to date with the latest epidemiologic methods and current developments in military-relevant research and surveillance activities. The club facilitates discussions on emerging developments in the field, as well as fosters skills in critical evaluation and the development of publication-quality manuscripts. E&A also implemented a process of creating SAS® code libraries to standardize programming code used for surveillance case definitions.

E&A SATELLITES

AFHSD E&A maintains satellite staff at Defense Centers for Public Health (DCPH) – Aberdeen, Portsmouth, and Dayton. Satellite staff primarily support surveillance at their respective public health centers but also contribute valuable expertise to the enterprise and regularly participate in joint meetings including the bi-weekly Request Assessment Process, monthly E&A staff meetings, and the quarterly Health Surveillance Steering Group.

THE ABERDEEN SATELLITE staff supports several divisions and branches within the Clinical Public Health and Epidemiology Directorate at DCPH-A, including Behavioral and Social Health Outcomes Practice, Injury Prevention, Disease Epidemiology, and Army Hearing Conservation and Readiness. Reports released during 2023 include the weekly Army COVID-19 Installation report, the annual Joint Health of the Force report, the Army Behavioral Health Monitoring Report, and Surveillance of Suicidal Behavior: U.S. Army Active and Reserve Component Soldiers, 2019 and 2020 public health reports. Other products include publications such as "Physical and Behavioral Characteristics of Soldiers Acquiring Recommended Amounts of Sleep per Night," published in *Sleep Health*, and "Cross-Sectional Examination of Physical Abuse Victimization Differences Between Lesbian, Gay, Bisexual, and Heterosexual Service Members in the U.S. Military, 2018," published in *LGBT Health*. Additionally, findings from mpox and COVID-19 surveillance were presented at the 2023 Association of Military Surgeons of the United States (AMSUS) Annual Meeting, DOD Suicide Event Report (DODSER) at the 2023 Army Suicide Prevention Program Managers (SPPM) Course, and the interactive Army Hearing Program Status Report (AHPSR) Dashboard at a Quarterly Hearing Consultant meeting for audiologists in each Medical Readiness Command.

THE PORTSMOUTH SATELLITE staff work within the EpiData Center (EDC), which, along with Health Analysis is part of the DCPH-P. Satellite staff serve as subject matter experts in behavioral and operational health, reportable and emerging infections, exposure and injury analysis, and data systems and application development.

THE DAYTON SATELLITE staff work closely with the DOD Global Respiratory Pathogen Surveillance Program, which collects and analyzes more than 20,000 specimens from sentinel sites around the world annually.

MEDICAL SURVEILLANCE MONTHLY REPORT

The *MSMR* is the premiere medical peer-reviewed journal published by AFHSD and DHA. The monthly journal, launched in 1995, provides evidence-based estimates of the incidence, distribution, impact, and trends of illness and injuries among U.S. military service members and associated populations. Continuously evaluating manuscript submissions for scientific accuracy, the *MSMR* publishes pertinent articles on military public health, epidemiology, surveillance, and disease and injury prevention.

MSMR reports present data, public health information, and original research with direct relevance to the operational fitness of military members or MHS beneficiaries' health, safety, and well-being. In addition, *MSMR* dedicates 1 issue annually to reporting on comprehensive morbidity burdens among service members and MHS beneficiaries.

IN 2023, MSMR PUBLISHED 31 ARTICLES, INCLUDING 13 ORIGINAL FULL REPORTS, 1 BRIEF REPORT, 15 PERIODIC UPDATES,

8 SURVEILLANCE SNAPSHOTS, 2 HISTORICAL PERSPECTIVES, AND 1 CASE REPORT. FOLLOWED BY THE HEALTH CARE BURDEN OF DISEASE AND INJURY, MENTAL HEALTH DISORDERS, AND HEAT INJURIES.

MSMR is indexed in PubMed Central, MEDLINE, and Scopus, which regularly review indexed journals for adherence to peer-reviewed standards. In 2023, *MSMR's* LinkOut hits on PubMed to published articles on health.mil continued to rise reaching 4,160, which represents an increase of 177% over the past 5 years. *MSMR's* average number of page hits per month on PubMed in 2023 was 346.

In 2023, *MSMR* articles published on health.mil received 6,632 total page views, with an additional 1,678 views for past reports. The 5 most read articles reported on trends among the active component in eating disorder incidence, eosinophilic esophagitis, overweight and diabetes, STIs, as well as a review of disease and non-battle injuries on Pacific islands during World War II. Over the period from 2019 to 2023, *MSMR* articles on health.mil registered a total 274,518 unique page views, averaging 296 views per article.

MSMR's has more than 1,400 subscribers with a diverse readership consisting of public health practitioners, clinicians, and military health leadership, as well as scientists, researchers, and educators from academic and private sectors.

GRADUATE MEDICAL EDUCATION

As a key DOD source for health surveillance and epidemiologic training, AFHSD hosts preventive medicine residents from USUHS for a 5-week practicum rotation under the supervision of senior staff. Residents enhance their understanding of the complexities of health surveillance systems, knowledge and application of epidemiology, and critical analytical skills. They are also exposed to AFHSD daily operations and initiatives. Central to their rotation, residents conduct an epidemiologic study using the DMSS. Residents engage in all stages of epidemiologic investigation starting with the formation of a hypothesis and development of an appropriate study design, then extract and analyze the data, interpret findings, and generate a publishable manuscript. Finally, they culminate their project by giving an oral presentation to peers and senior staff.

SINCE 2008 AFHSD HAS TRAINED 89 RESIDENTS WITH DIVERSE ACADEMIC BACKGROUNDS FROM THE 3 MILITARY SERVICES, AS WELL AS 2 DOCTOR OF PUBLIC HEALTH STUDENTS. IN 2023, AFHSD TRAINED A TOTAL OF 8 RESIDENTS, INCLUDING 3 FROM THE ARMY, 3 FROM THE NAVY, AND 2 FROM THE AIR FORCE.

Resident and student projects in 2023 resulted in published articles such as "Incidence and management of chronic insomnia, active component, U.S. Armed Forces, 2012 to 2021", "Obesity prevalence among active component service members prior to and during the COVID-19 pandemic, January 2018–July 2021," and "Clinically Diagnosed Sunburn Among Active Component Service Members, U.S. Armed Forces, 2014–2022." Completed resident projects are published in the *MSMR* or other peer-reviewed journals and presented at the American College of Preventive Medicine meeting. Additionally, the E&A Branch offers rotation and practicum opportunities for occupational and environmental medicine residents and candidates pursuing Master of Public Health and Master of Science in Public Health degrees at USUHS.

The Epidemiology and Analysis Branch welcomed the newest preventive medicine residents from Uniformed Services University. During their rotation, the residents focused on health surveillance and epidemiology training.

E&A PUBLICATIONS LIST 2023

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4. Stahlman SL, Langton RS. Surveillance snapshot: chikungunya in service members of the U.S. Armed Forces, 2016-2022. MSMR. 2023 Dec 20;30(12):11. PMID:38198282
5. Van Airsdale LA, Stahlman S, Hiban K, Wells NY. Clinically Diagnosed Sunburn Among Active Component Service Members, U.S. Armed Forces, 2014-2022. MSMR. 2023 Nov 20;30(11):12-14. PMID: 38051677
6. Winkler EL, Stahlman SL, Wells NY, Chauhan AV, Hiban KM, Costello AA, Mancuso JD. COVID-19 Booster Vaccination in the U.S. Military, August 2021-January 2022. Am J Prev Med. 2023 Feb;64(2):270-274. doi: 10.1016/j.amepre.2022.07.017. Epub 2022 Aug 29. PMID: 36123230; PMCID: PMC9420709
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11. Baldovich K, Stahlman SL, Lee RU. Increasing Incidence Rates of Eosinophilic Esophagitis in Active Component Service Members, U.S. Armed Forces, 2009-2021. MSMR. 2023 May 20;30(5):15-17. PMID: 37535319
12. Titanji BK, Eick-Cost A, Partan ES, Epstein L, Wells N, Stahlman SL, Devineni P, Munyoki B, Pyarajan S, Balajee A, Smith J, Woods CW, Holodniy M, Davey VJ, Bonomo RA, Young-Xu Y, Marconi VC. Effectiveness of Smallpox Vaccination to Prevent Mpox in Military Personnel. N Engl J Med. 2023 Sep 21;389(12):1147-1148. doi: 10.1056/NEJMc2300805. PMID: 37733313; PMCID: PMC10559046
13. Taylor KM, Ricks KM, Kuehnert PA, Eick-Cost AA, Scheckelhoff MR, Wiesen AR, Clements TL, Hu Z, Zak SE, Olschner SP, Herbert AS, Bazaco SL, Creppage KE, Fan MT, Sanchez JL. Seroprevalence as an Indicator of Undercounting of COVID-19 Cases in a Large Well-Described Cohort. AJPM Focus. 2023 Aug 15;2(4):100141. doi: 10.1016/j.focus.2023.100141. PMID: 37885754; PMCID: PMC10598697
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Cancer Study: Cancer Diagnosis and Mortality among Military Aviators and Aviation Support Personnel

WHAT IS THIS STUDY?

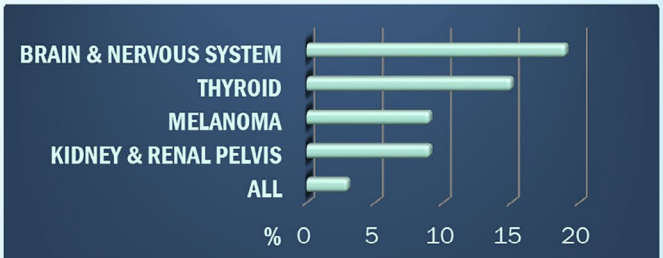
A "Study on the Incidence of Cancer Diagnosis and Mortality among Military Aviators and Aviation Support Personnel" was conducted from July 2021 to April 2022. **THIS LONG-TERM, TWO-PART STUDY IS CURRENTLY IN PHASE 1.**

WHAT ARE THE RESULTS OF THE PHASE 1 STUDY?

ACTIVE DUTY MILITARY AIRCREW AND GROUND CREW WERE OVERALL MORE LIKELY TO BE DIAGNOSED WITH CANCER BUT LESS LIKELY TO DIE FROM CANCER THAN THE U.S. POPULATION.

Health records from 156,050 aircrew and 737,891 ground crew who served from 1992 to 2017 were analyzed. The survey included military members from all services (Air Force, Army, Navy, and Marines).

AIRCREW had an 87% higher rate of melanoma, 39% higher rate of thyroid cancer, 16% higher rate of prostate cancer, and a 24% higher rate of cancer for all sites combined.



GROUND crew had a higher incidence of cancers of the brain and nervous system (by 19%), thyroid (by 15%), melanoma (by 9%), kidney and renal pelvis (by 9%), and of all sites combined (by 3%).

WHAT'S NEXT?

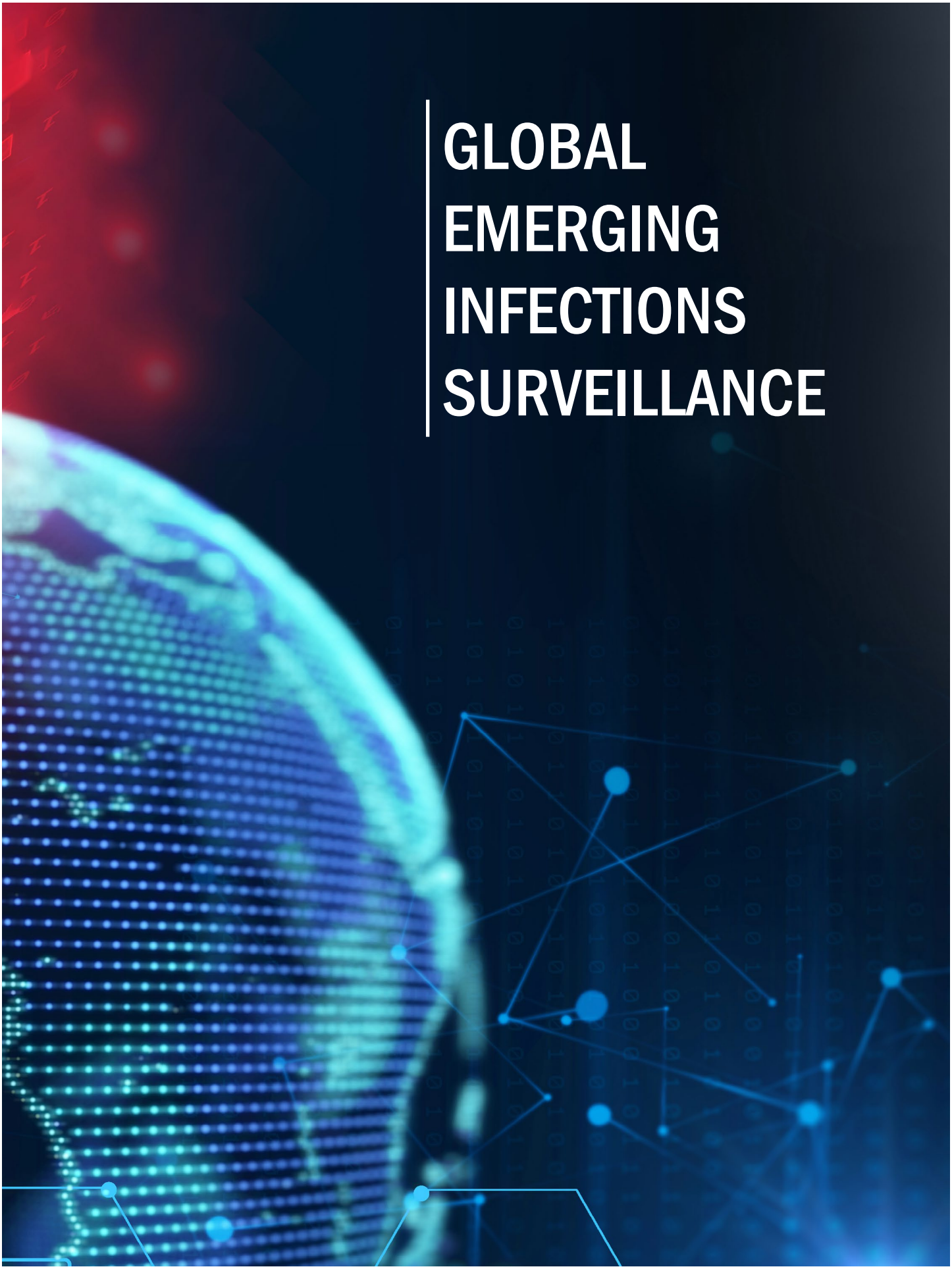
Phase 1B of the first study is ongoing and will include Veterans Affairs and cancer registry data from at least 40 States. Phase 2 of the study will investigate and identify the specific occupational and environmental risk factors associated with the increased risk of the cancers identified in the Phase 1 study.

LEARN MORE:

The Department of Defense remains committed to the health and safety of our men and women in uniform, their families, and the communities in which we serve. To learn more about the study, visit health.mil/CancerStudy

DHA Defense Health Agency ®

Cancer Study: Military Aviators and Aviation Support Personnel infographic. The William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (Public Law 116-283) Section 750, mandated a "Study on the Incidence of Cancer Diagnosis and Mortality among Military Aviators and Aviation Support Personnel," to examine the rate of cancer diagnosis and mortality among military fixed wing aviators (aircrew) and aviation support personnel (ground crew). DHA's Armed Forces Health Surveillance Division conducted this study between July of 2021 and April of 2022.


GLOBAL
EMERGING
INFECTIONS
SURVEILLANCE

GLOBAL EMERGING INFECTIONS SURVEILLANCE

The GEIS Branch oversees and manages a portfolio of infectious disease surveillance projects executed through a strategically positioned global network of Army, Navy, Air Force, and DHA laboratory partners, as well as critical public health and Military Treatment Facility (MTF) laboratories.

GEIS accomplishes its purpose through three strategic objectives: Surveillance, Products, and Program Management. The GEIS Program Office (GEIS- PO) carries out these objectives by:

- Funding GEIS Partner Laboratories (GEIS-PLs) to conduct surveillance for emerging infections that threaten the health of the Force and/or military operations.
- Developing and disseminating surveillance information products to stakeholders that provide early warning of emerging threats and battlespace awareness of infectious diseases across geographical locations.
- Managing the GEIS Network (GEIS-N) of laboratory partners through an annual business cycle that incorporates strategic guidance, program evaluation, and fiscal stewardship.

Partners in the GEIS-N conduct near-real time surveillance on infectious disease threats to inform DOD decision-makers. Timely communication about operational public health threats is critical for Geographic Combatant Command (GCC) FHP decision-making and mission success. The Branch coordinates directly with the GCC Command Surgeons and Service component FHP Officers to capture operational infectious disease priorities. These priorities are communicated to the GEIS-N through strategic guidance documents in the annual Request for Proposals. The GEIS-PLs utilize these guidance documents to develop and execute surveillance activities within three Focus Areas: Antimicrobial Resistant Infections (AMRI), Febrile and Vector-Borne Infections (FVBI), and Respiratory Infections (RI).

Each GEIS Focus Area defines its priorities and direction through Focus Area Roadmaps, review of annual proposals, data collection, and translation of findings into products disseminated to GEIS audience members. The GEIS-PLs incorporate the GEIS Strategic Plan, Focus Area Roadmaps, and GEIS-GCC alignment documents into the design of surveillance activities in annual proposals. In 2023, the GEIS Branch replaced its mission and vision with a 'Purpose Statement' that aligns with the DHA mission and vision. New objectives, surveillance lines of effort, and re-scoped Focus Areas were included in the GEIS Strategic Plan update. The former Strategic Ends are now objectives aligned with the three main pillars of the GEIS program: Surveillance, Products, and Program Management. These objectives will be used to improve evaluation of surveillance activities and focus efforts on generating meaningful data with a high return on investment. The new surveillance lines of effort reflect DHA priorities, with each project in the GEIS-funded portfolio mapping to one or more of the following: 1) pandemic preparedness, 2) operational support, 3) countermeasure assessment, and 4) MTF support/ direct care delivery.

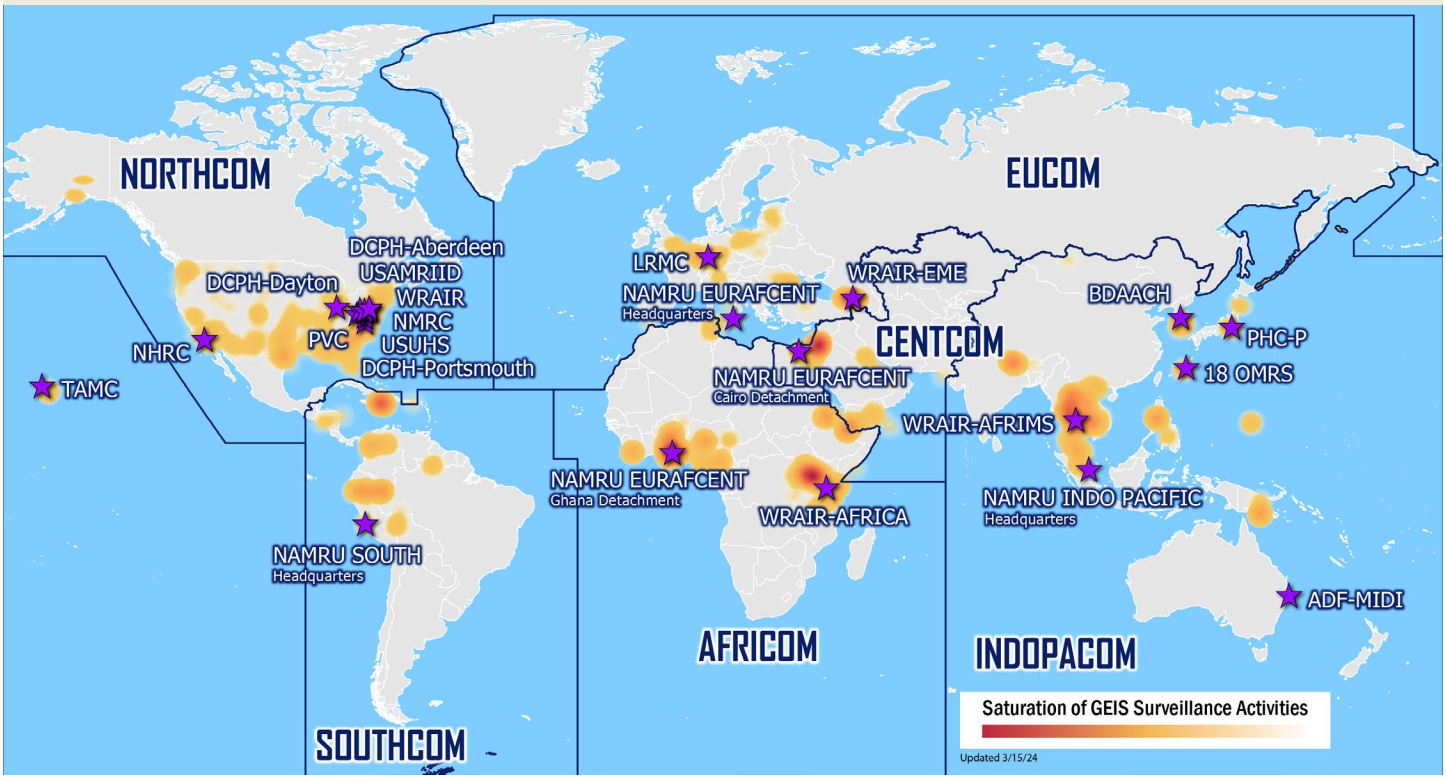
The former Antimicrobial Resistant and Sexually Transmitted Infections (AMR/STI) Focus Area merged with the Enteric Infections (EI) Focus Area to become the Antimicrobial Resistant Infections (AMRI) Focus Area. This still encompasses pathogen priorities for STIs and EIs but emphasizes antimicrobial resistance as a surveillance priority. Three cross-cutting initiatives have been codified in the Strategic Plan, highlighting the central, strategic role of next-generation sequencing (NGS) and bioinformatics (BI), One Health, and data modernization in nearly all GEIS-funded activities.

Looking to FY25, the GEIS Branch will continue to refine its guidance documents to align with the DHA Strategic Plan. The Focus Area Roadmaps will be re-worked and expanded as standalone documents featuring key themes of the GEIS Strategic Plan, implementing new Strategies and Tactics to guide each Focus Area portfolio of activities meet program objectives.

IN 2023, GEIS DISTRIBUTED $57.7M IN FUNDING TO 21 DOD LABORATORIES AND MTFS TO CONDUCT INFECTIOUS DISEASE SURVEILLANCE TO INFORM FHP. OF THIS FUNDING, $5.96M WAS DEDICATED TO SUSTAINING THE DOD'S NEXT GENERATION SE QUENCING EFFORTS. ONCE FUNDED, GEIS PLS WORK WITH HOST NATIONS AND REGIONAL PARTNERS TO CONDUCT INFECTIOUS DISEASE SURVEILLANCE ACROSS THE GLOBE.

GEIS PARTNERS

FIGURE 1. Map of GEIS Partner Locations



GEIS-PLS:

- Naval Medical Research Command (NMRC), including Naval Medical Research Unit (NAMRU) INDO PACIFIC, NAMRU EURAFCENT, NAMRU SOUTH, and the Naval Health Research Center (NHRC)
- Walter Reed Army Institute of Research (WRAIR), including WRAIR Africa (WRAIR- A), WRAIR Armed Forces Research Institute of Medical Sciences (WRAIR - AFRIMS), and WRAIR Europe - Middle East (WRAIR – EME)

ADDITIONAL PARTNERS:

- 18th Operational Medical Readiness Squadron (18 OMRS)
- Brian D. Allgood Army Community Hospital (BDAACH)
- Australian Defence Force Malaria and Infectious Disease Institute Laboratory (ADF-MIDI)
- Navy Entomology Center of Excellence (NECE)
- Pharmacovigilance Center (PVC)
- U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)
- Uniformed Services University of the Health Sciences (USUHS)

MILITARY TREATMENT FACILITY PARTNERS:

- Joint-Base Lewis-McChord (JBLM)/Madigan Army Medical Center (MAMC)
- Landstuhl Regional Medical Center (LRMC)
- Tripler Army Medical Center (TAMC)

PUBLIC HEALTH COMMAND/CENTER PARTNERS:

- Defense Centers for Public Health (DCPH)-Aberdeen (DCPH-A), Dayton (DCPH-D), Portsmouth-EpiData Center (DCPH-P)
- Navy Environmental Preventive Medicine Units (NEPMU) - NEPMU 2, NEPMU 5, NEPMU 7
- Public Health Command - Pacific (PHC -P)

INITIATIVES

The GEIS-PO spearheads several initiatives to bolster its surveillance activities. Key initiatives include Data-to-Decision (D2D), data modernization, and next-generation sequencing and bioinformatics (NGS-BI).

DATA-TO-DECISION

The D2D Initiative, launched in late 2017, aims to rapidly communicate infectious disease surveillance findings to the GEIS audience (e.g., GCCs) to inform FHP decision-making. In 2023, GEIS-PLs continued to provide monthly surveillance findings to the GEIS Branch, which developed and disseminated 11 Monthly Surveillance Reports and 16 Synchronized Predeployment and Operational Tracker reports. These reports urgently communicated notable, high and moderate threat surveillance findings to GEIS audience members. The SPOT reports also highlighted various potential threats to U.S. service members, including the detection of antimicrobial resistance patterns in Ukraine.

Over the past year, the D2D Initiative has accomplished several goals. First, the GEIS-PO continued to curate its CarePoint site, making several modifications to enhance navigation and functionality for GEIS-PLs and other audiences. Second, the flagship product of the GEIS program was reworked to incorporate new sections that feature notable surveillance and other public health updates, as well as recent partner publications. These additions aim to better illustrate GEIS-N surveillance activities and contributions to scientific literature. The AMRI Focus Area continues to pilot structured data collection and synthesis on antimicrobial resistance testing among three GEIS-PLs. This data was collected, summarized, and reported over 6 months with the intention to expand this data initiative to all laboratories conducting antimicrobial resistance surveillance in the GEIS-N within 1 to 2 years. As a result of this pilot effort, the AMRI Focus Area will develop and share a standardized data collection tool with all laboratories conducting antimicrobial resistance surveillance activities and generating similar data. Finally, the GEIS Branch began developing a new product titled the Clinicians' Newsletter, a quarterly publication to be featured in the *MSMR*. This newsletter aims to contextualize GEIS surveillance findings for the clinical community. The inaugural edition of the Clinicians' Newsletter is scheduled to be released in 2024. These examples demonstrate GEIS's steadfast commitment to process improvements aimed at yielding more effective data products and alleviating the reporting burden on the GEIS-PLs.

DATA MODERNIZATION

Data modernization is essential for accelerating decision-making, increasing resource efficiency, and maintaining productivity in today's data-driven world. The GEIS program's data modernization plan encompasses both programmatic and surveillance data. The plan for programmatic data will be implemented through the Smartsheet GOV[1], a web-based tool, that will enable powerful program management insights and task automation to effectively oversee the expansive GEIS-N activities, facilitating alignment with modern standards in comparable industries.

The surveillance data modernization plan will be largely executed through provision and implementation of a computerized health information system across the GEIS-PLs. DHIS2 is an accessible health information system that is utilized in more than 80 countries. It offers:

- Mobile and web-based access
- Custom and standardized data entry forms to synchronize data streams across GEIS-PLs
- Real-time viewing of collected, screened, and analyzed data between a GEIS-PL and the GEIS-PO
- Data validation rules that ensure data quality and accuracy
- Data analysis and visualization tools that amplifies GEIS-PL's ability to leverage their data with ease.

This holistic data modernization plan will enable the GEIS-PO and GEIS-PLs to dedicate more time to increasing the value and timeliness of insights from funded surveillance projects. By reducing the time spent on tasks resulting from outdated and siloed software-driven processes, this initiative will streamline operations and enhance efficiency.

NEXT GENERATION SEQUENCING AND BIOINFORMATICS CONSORTIUM

The GEIS Next-Generation Sequencing and Bioinformatics Consortium (NGSBC) continues to coordinate NGS-BI activities within the GEIS portfolio. The NGSBC is comprised of DOD subject-matter experts in NGS-BI and laboratory partners with varying levels of expertise in NGS-BI methods for genomic surveillance. The NGSBC uses a three-tiered framework to enable NGS-BI capabilities throughout the network and conducts routine assessments (e.g., surveys, site visits, and testing exercises) to direct limited resources for training, equipment, and reach backsupport. This multi-pronged approach ensures that NGS-BI capabilities are continuously strengthened throughout the GEIS-N, ultimately improving biosurveillance. A notable example of collaborative reach back support by the NGSBC was a 3-week NGS-BI workshop organized by WRAIR Viral Diseases Branch (WRAIR-VDB), NMRC-Biological Defense Research Directorate (NMRC-BDRD), and WRAIR AFRICA. The workshop provided valuable training and fostered collaboration among participants.

In September 2023, the AFHSD-GEIS Branch hosted its first Next-Generation Sequencing Summit in Silver Spring, Maryland. Attendees included representatives from GEIS-PLs and other U.S. government agencies. The Summit convened

1 https://www.smartsheet.com/solutions/federal-government

partners with expertise in pathogen sequencing and bioinformatics to offer updates on current laboratory capabilities and deliberate alignment of sequencing and genomic surveillance activities to the U.S. DOD 2023 Biodefense Posture Review priorities. Presentations covered a range of topics, including sequencing challenges throughout the GEIS-N, the Pathogen Detection Project (PDP) 2.0 -a blinded panel proficiency test assessing all aspects of unbiased sequencing and bioinformatics methods, bacterial pathogen sequencing, data operationalization, as well as subjects such as wastewater surveillance and pathogen-agnostic sequencing.

The GEIS NGSBC began the PDP 2.0 exercise in late 2023. Led by NMRC-BDRD, with support from WRAIR-VDB and the USAMRIID Center for Genome Sciences, the second iteration of the PDP is a smaller blinded panel of simulated clinical specimens sent to participating laboratories to assesses current methods in sequencing and bioinformatic analysis for unknown pathogens. As part of the current exercise, the GEIS-PO and NGSBC are working with the Digital Biobank program to evaluate options for a secure and globally accessible platform for data transfer and analysis. This is also in accordance with priorities of the Biodefense Posture Review Funding for big data transfer within DOD for genomic data collection and analysis.

STAYING ON THE LEADING EDGE

The GEIS Branch is responsible for several initiatives to stay 'on the leading edge' of the ever-evolving landscape of biosurveillance laboratory capabilities and technologies. For example, as genetic sequencing capabilities have evolved and grown, so has the demand for mobile platforms that could shorten the time from sample collection to reporting results. To support the deployment and utilization of this technology, the GEIS Branch established a user group for partners leveraging the MinION, a portable genetic sequencing platform. Since 2019, the MinION User Group has served as a forum for government-funded users of the Oxford Nanopore MinION to share information and best practices, discuss troubleshooting and challenges, and foster collaboration. Currently, the group has nearly 200 participants from approximately 35 U.S. Government (USG) and other organizations. In 2023, the MinION User Group facilitated six presentations that were shared widely among GEIS-N and interagency partners. In the coming year, we aim to expand the group to include other NGS platforms, such as Illumina instruments, Bio Molecular Systems (Mic qPCR), and other genomic sequencing platforms utilized by the GEIS -N. The program will continue to offer the opportunity for partners to present their findings and learn from others through this forum.

While wastewater surveillance for infectious disease threats is not a new concept[2], there has been a greater emphasis on wastewater surveillance in the post-COVID-19 era. The DOD is looking for opportunities to leverage this method to prepare for the next emerging threat. The GEIS Branch, which has been funding wastewater surveillance since 2022, has participated in the newly created Wastewater Surveillance Subgroup, a part of the DOD Office of the Under Secretary of Defense Biosurveillance Program Group. With its experience in program management and wastewater surveillance, the GEIS program has become a key player and is poised to lead DHA's wastewater surveillance initiatives. In FY23, the GEIS program funded three wastewater surveillance projects through three GEIS-PLs in Kenya, Peru, and Thailand. Looking forward to FY24, the program plans to expand its wastewater surveillance portfolio to include three additional wastewater surveillance projects at strategic military installation locations in the U.S.

GEIS staff members hosted laboratory network partners, including Service, Defense Health Agency, and Military Treatment Facility-based laboratories, as well as external partners from interagency organizations for its first annual Next-Generation Sequencing Summit held at AFHSD in Silver Spring, Maryland. (AFHSD/Tanisha Blaise)

The GEIS Branch has been leading an initiative that seeks to better support military exercises and conduct surveillance for infectious disease threats that may be used to inform decision-making within Preventive Medicine on actions needed to maintain medical readiness. The Operational Medical Readiness Framework offers a flexible structure with adaptable modules tailored to address the specific needs, information gaps, and restrictions of a given exercise. This includes a Modular Mobile Molecular Kit that allows for field-deployable, high throughput pathogen screening. The initial pilot, addressing only vector-borne diseases, was successfully executed in support of Talisman

2 https://www.nature.com/articles/s41591-022-01940-x

Sabre 23. Engagements with various GCCs and FHP personnel following the pilot have resulted in an iteratively improved framework and communication plan that will be piloted more holistically in support of Balikatan in 2024.

The GEIS Branch continues to encourage its partners to contribute to the GEIS Partner Publication Database, which allows tracking publications as part of evaluating project progress and outcomes resulting from GEIS-funded efforts. From 2016 to 2023, the GEIS program logged 381 publications in 156 unique journals. In 2023 alone, the GEIS-N partners published 26 manuscripts. These initiatives have brought tremendous value to the Branch, which remains committed to seeking further innovation opportunities to stay 'on the leading edge.'

KEY ENGAGEMENTS

Key engagements with GEIS-PLs, GCCs, operational FHP units, and host-nation partners are critical to ensuring that GEIS is funding surveillance activities of strategic importance and producing data products tailored to the needs of the GEIS audience, ultimately informing FHP. These engagements include, but are not limited to, site visits to GEIS-PLs to assess capabilities, identify gaps, and plan for future surveillance activities; GCC-led engagements such as MIL to MIL exercises and operational planning meetings to align the GEIS portfolio with strategic pathogens and countries; and technical site visits (TSVs) to support GEIS PLs in standing up new data procedures and capabilities.

In 2023, the GEIS Branch conducted site visits at WRAIR EUROPE – MIDDLE EAST in Republic of Georgia and at NAMRU SOUTH in Peru. These visits allowed the staff to meet with leadership and investigators at the laboratories, evaluate surveillance site locations, and assess on-site capabilities for high-impact activities such as next-generation sequencing and bioinformatics. Team members from the Branch, also participated in two Tabletop Exercises: Able Resolve (USINDOPACOM) and the Pandemics and Infectious Diseases Coordination Conference/Viral Supremacy 2023, the latter held at the Medical Research Institute of Chemical Defense in Aberdeen Proving Grounds, Maryland (USNORTHCOM). Finally, members of the GEIS Branch attended the annual American Society of Tropical Medicine and Hygiene (ASTMH) conference in Chicago, Illinois where many GEIS-N partners were in attendance, presented their work, and networked with the GEIS Branch team.

Prior to the site visits to WRAIR EUROPE – MIDDLE EAST and NAMRU SOUTH, a GEIS staff member traveled to the same laboratories to pilot a novel technical site visit approach. This type of engagement allows for more in-depth support in real-time to address various technical needs of a given partner laboratory, including developing data collection tools, evaluating existing data collection and reporting methods, mapping of expansive partner networks, and outlining of laboratory workflows.

GEIS Chief U.S. Navy Cdr. Matthew Kasper viewed specimens collected and processed at NAMRU SOUTH's laboratory detachment during a site visit to Iquitos. (AFHSD/June Early)

GEIS Chief U.S. Navy Cdr. Matthew Kasper (right) stands with Dara Russell, Dr. Stephanie Cinkovich, U.S. Army Maj. Christan Stager, and USPHS LCDR Shayne Gallaway at the American Society of Tropical Medicine & Hygiene annual meeting in Chicago, Illinois. (ASTMH)

BRANCH FOCUS AREA OVERVIEWS

ANTIMICROBIAL RESISTANT INFECTIONS (AMRI) FOCUS AREA

In 2023, the previous AMR/STI and EI Focus Areas merged into the AMRI Focus Area with three Pathogen Domains: ESKAPE+, STIs, and EI. The AMRI Focus Area portfolio addresses the surveillance of antibiotic resistant organisms. The ESKAPE+ Pathogen Domain conducts surveillance of *Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa*, and *Enterobacter* spp., as well as *Escherichia coli* & *Candida auris* (ESKAPE+). These are clinically relevant pathogens that exhibit a high propensity for developing antimicrobial resistance. The STI Pathogen Domain surveils for multidrug-resistant STIs, specifically *Neisseria gonorrhoeae* and *Mycoplasma genitalium*, among U.S. Service members and other FHP-relevant populations around the world. The EI Pathogen Domain conducts surveillance for bacterial, viral, and parasitic causes of diarrheal illness, including monitoring antimicrobial resistance patterns among bacterial enteric pathogens. The projects in the AMRI portfolio are divided into "surveillance categories," a collection of similar surveillance activities centered on common themes such as pathogen/disease targets, populations, surveillance techniques, etc. These surveillance categories and sub-categories are:

- ESKAPE+ Surveillance
    - Laboratory-Based Surveillance
    - Trauma-Related Infection Surveillance
    - Military Health System (MHS) Surveillance
- Sexually Transmitted Infections Surveillance
- Enteric Infections Surveillance
    - Travelers' Diarrhea Surveillance
    - Acute Gastroenteritis & Acute Diarrhea Surveillance
- Environmental Surveillance
    - Wastewater Surveillance
    - One Health

The objective of coordinated surveillance for AMRI pathogens is to provide data to inform FHP decision-making, DOD policy, and public health authorities in preventing, detecting, and responding to military-relevant infectious disease and AMR threats.

CURRENT PORTFOLIO:

In 2023, the ESKAPE+ and STI Pathogen Domains funded 21 extension and 2 pilot projects at 12 DOD partner laboratories, totaling approximately $8.7 million. This amount included $4.1 million dedicated to advancing the U.S. National Action Plan for Combating Antibiotic-Resistant Bacteria (CARB National Action Plan) through AMR surveillance within the MHS. The GEIS program also maintains funding for two critical multi-drug-resistant organism (MDRO) pathogen repositories - the WRAIR Multidrug-Resistant Organism Repository and Surveillance Network (MRSN) and the Uniformed Services University Gonococcal Repository & Reference Laboratory (USU GC Repository). Overall, the ESKAPE+ and STI Pathogen Domains conducted prospective surveillance in 21 operationally important countries worldwide.

In 2023, the EI Pathogen Domain supported nine extension projects and one pilot project across nine DOD partner laboratories, totaling approximately $4.6 million in funding. The multisite Global Travelers' Diarrhea (GTD) Study continued prospective surveillance efforts in Djibouti, Egypt, Honduras, Kenya, Nepal, Peru, and the Republic of Georgia. The GEIS-PLs (WRAIR AFRIMS and WRAIR EUROPE-MIDDLE EAST) conducted enteric surveillance activities during military exercises in the INDOPACOM and EUCOM areas of responsibility. Additionally, advanced characterization of enteric pathogens expanded to focus on antibiotics used for empiric treatment for diarrheal illness. The AMRI Focus Area created a testing priority list for molecular markers that will enhance the understanding of resistance genes, antibiotic resistance patterns, and dispersion of enteric pathogens geographically.

WHERE WE ARE GOING:

The ESKAPE+ Pathogen Domains will concentrate on additional FHP-relevant targets, such as surveillance in TRICARE-approved hospitals, community-acquired infections, and MDRO infections in traumatic injuries. Increased collaboration and harmonization of surveillance methodologies across the GEIS-N will improve the integrity and cohesiveness of data and outputs, which will ultimately better inform FHP. The AMRI Focus Area works with partners to establish a more integrated, standardized, and harmonized approach to ESKAPE+ surveillance activities across the network. Wastewater surveillance is a strong priority for ESKAPE+ surveillance, and the AMRI Focus Area will continue strengthening and adding projects in this area. One Health domains (i.e., human, animal, and environmental) will also become a priority of the Focus Area, incorporating surveillance that uses animal and environmental sentinels to improve data collected for FHP decision-making. The STI Pathogen Domain will focus on developing a Pacific network of STI surveillance among DOD facilities. It will also continue growing and reinforcing its existing STI network, connecting OCONUS laboratories with the USU GC Repository.

The EI Pathogen Domain continues to fund projects across the GCCs that will increase knowledge of the epidemiology, etiology, and antimicrobial resistance patterns of enteric infections. Testing for resistance among diarrheagenic pathogens

poses numerous challenges, including the need to standardize the methodology for testing and interpretation. Therefore, the GEIS Branch continued collaboration with NHRC to harmonize and standardize reporting for the GTD study. These efforts involve updating patient questionnaires, case definitions, data extraction and related standard operating procedures across sites in five continents.

RECENT ACCOMPLISHMENTS:

In 2023, the AMRI Focus Area received a total of seven SPOT reports, six from WRAIR-MRSN and one from NHRC. Additionally, WRAIR-MRSN receives bacterial isolate shipments from CONUS and OCONUS laboratories for further characterization, with reports and data shared with partner laboratories within GEIS-N. Pathogens collected from CONUS and OCONUS laboratories are linked to facilitate enhanced detection of MDROs.

- WRAIR-MRSN reported a Carbapenem-resistant *K. pneumoniae* harboring the NDM gene conferring resistance to all carbapenems and ceftazidime-avibactam. The case was admitted to a local hospital in the Philippines and subsequently transferred to the Naval Medical Center San Diego, where a culture was collected after admission. Further characterization at the WRAIR-MRSN indicated that the strain of bacteria was related to others collected previously from hospitals in Thailand and the Philippines. The results suggest that the case likely acquired this NDM-carrying strain of *K. pneumoniae* during their OCONUS hospitalization, underscoring the importance of screening upon admission to detect and prevent the spread of MDROs.

- LRMC reported an *A. baumannii* isolate that was extensively drug-resistant from a U.S. Army contractor after receiving medical treatment in health facilities in the CENTCOM area of operation. Further analysis by the WRAIR-MRSN from a blood culture obtained at LRMC on admission isolated *A. baumannii* harboring the blaNDM-1, blaOXA-23, and armA genes. These genes confer extensive antibiotic resistance (XDR), including resistance to all carbapenems. The XDR *A. baumannii* was not susceptible to any clinically relevant antibiotics and was found to belong to ST-2, a globally distributed clone associated with hospital transmission.

- WRAIR AFRIMS submitted 35 isolates cultured from wastewater samples in Thailand to the WRAIR-MRSN for sequencing as part of a project to describe the burden of multidrug-resistant pathogens within Southeast Asia. Over 75% of these isolates were found to be priority ESKAPE+ pathogens, including *E. coli*, *Enterobacter* spp., *K. pneumoniae* complex, and *A. baumannii*. Genes conferring antimicrobial resistance to carbapenems, cephalosporins, colistin, extended-spectrum beta-lactams, aminoglycosides, and penicillins were identified among the isolates. Colistin resistance genes were detected in the wastewater isolates, raising concerns about the potential transfer of antimicrobial resistance between bacterial species in the environment. Colistin is a last-line antibiotic used for the treatment of pan-drug resistant organisms or difficult to treat extensively-drug resistant organisms. These findings emphasize the need to monitor resistant bacterial pathogens and resistance genes in all relevant settings.

- The NHRC study of population-based surveillance for pathogens associated with Acute Gastro- enteritis (AGE) among U.S. military trainees identified an elevated rate of AGE Basic Underwater Demolition / SEAL (BUD/S) trainees at the Naval Special Warfare Center in Coronado, CA. Eighty-four BUD/S were reported to be symptomatic from 11 January 2023 to 17 January 2023. Five specimens were received by NHRC for diagnostic testing and characterization within the AGE surveillance study. Eighty percent of the specimens were positive for rotavirus A, while 20% were positive for norovirus GI/GII. These cases marked the first large-scale cluster of AGE among BUD/S trainees in over a year. AGE continues to be a concern due to its potential to disrupt or halt military operations.

FEBRILE AND VECTOR-BORNE INFECTIONS (FVBI) FOCUS AREA

The FVBI Focus Area portfolio focuses on actionable surveillance of vector-borne and zoonotic febrile infections that pose threats to the health of U.S. service members. The FVBI Focus Area seeks to better characterize the composite risk of febrile and vector-borne diseases to U.S. personnel, informing FHP decision-making with timely and relevant surveillance data, and contributing to countermeasure development. To accomplish these objectives, the FVBI Focus Area surveillance projects are organized into three general areas: 1) characterizing

Military working dog trainees that are surveilled as part of a WRAIR Europe-Middle East project in Tbilisi, Republic of Georgia (GEIS/Kathleen Creppage)

acute febrile illnesses (AFI) by linking syndromes to causative pathogens; 2) documenting the geographic and temporal distributions of vectors, reservoirs, and associated pathogens; and 3) assessing the effectiveness of FHP countermeasures to vector-borne infections.

CURRENT PORTFOLIO:

In 2023, the FVBI Focus Area supported 9 pilot projects and 37 extension projects at 14 partner laboratories with over $18.1 million for insecticide resistance, AFI, and vector surveillance activities. The FVBI Focus Area strengthened vector surveillance across OCONUS partner labs. Specific efforts included instituting standardized acaricide resistance monitoring at sites hosting large military exercises through WRAIR – AFRIMS and conducting synergistic analysis of infection risk based on insecticide resistance and pathogen prevalence rates with NAMRU SOUTH. WRAIR – EME continued their prolific field surveillance of various vectors, providing the GEIS-N consistent awareness of vector threats in high-priority EUCOM countries. AFI surveillance was sustained in partner nations and included modest expansions for specific types of febrile infections, such as rodent-borne febrile illnesses in Ghana through NAMRU EURAFCENT. The FVBI Focus Area continued to prioritize factors responsible for rapid diagnostic test (RDT) failure in malaria screening, such as the distribution of *pfhrp2* gene-deleted *Plasmodium falciparum* parasites. Surveillance data from ADF-MIDI, in partnership with WRAIR AFRIMS, NAMRU EURAFCENT, NAMRU INDO PACIFIC, and WRAIR AFRICA demonstrated that RDT failure rates can be highly variable within countries. Collectively, their findings also illustrated that the GEIS-N has maintained the capability to provide such nuanced FHP countermeasure risk analysis for the DOD. Finally, PHC-P and the Walter Reed Bioinformatics Unit further developed their field-testing capability and taxonomic analysis proficiency, respectively, into standardized methods for creation of infectious disease risk assessments, particularly at sites that host military exercises and exchanges.

Stephanie Cinkovich, and Public Health – Pacific U.S. Army Cpt. John Eads analyze tick findings from their pre-exercise surveillance prior to the Talisman Sabre exercise in Australia. (GEIS/Stephanie Cinkovich)

WHERE WE ARE GOING:

The FVBI Focus Area aims to increase value for DOD customers by further refining its surveillance niche and harnessing efficiencies made possible by new tools and techniques. First, the FVBI Focus Area will prioritize directing activity and resources toward unique DOD FHP needs, constraints, and gaps. The FVBI Focus Area will leverage its familiarity with DOD personnel, tools, and operations to provide tailored and actionable surveillance. This includes expanding surveillance support for military exercises and operations, as well as continued monitoring of FHP countermeasure effectiveness (e.g., malaria RDTs). Second, the FVBI Focus Area will enter the next phases in its initiative to harmonize surveillance procedures and data integration across GEIS-N. These phases will focus on dissemination of protocols and identification of standardized tools and equipment that can deliver the appropriate level of surveillance information faster and at lower cost. Third, the FVBI Focus Area will solidify its shift toward AFI surveillance, focusing on more specific regional questions. The nascent approach is resulting in better characterization of AFI threats and leading to locally actionable FHP recommendations. The FVBI Focus Area seeks to maximize surveillance impact by exploiting established methods and equipment, directing resources to fill gaps identified by operational customers, and increasing synergies across GEIS-PL surveillance activities and collaborations.

RECENT ACCOMPLISHMENTS:

- In Thailand, WRAIR AFRIMS identified acaricide susceptibility or resistance to permethrin in local *Rhipicephalus sanguineus* ticks using phenotypic and genotypic techniques. As of December 2023, investigators have determined the resistance allele frequency for each mutation in the *vgsc* gene of tick subsamples from six locations. Preliminary findings indicate a strong association between tick populations with high phenotypic resistance and the presence of specific resistance alleles. This type of phenotypic-to-genotypic comparison in ticks is understudied in the GEIS-N, and the results can help drive the development of an insecticide resistance management or vector control and mitigation program in the region.

- NECE, in collaboration with USAMRIID, assessed the efficacy of malaria RDT on malaria parasites collected from Haiti. As of December 2023, USAMRIID received 423 RDTs collected between 2021 and 2023 from southern Haiti. This set included a mixture of malaria positive and negative RDTs. A triplex real-time PCR assay was used to screen 33 negative RDTs that tested positive for *Plasmodium* spp. Seven were positive for *P. falciparum* specifically, and

of those, five were positive while two were negative for HRP-2. These are the first instances of deletion mutants identified in Haiti. While this may be a small sample size, efforts such as this help address gaps in malaria countermeasure surveillance.

- Pacific Health Command-Pacific Entomology and Molecular teams were deployed to Australia to conduct pre-exercise surveillance ahead of the Talisman Sabre 2023 exercise. The team worked in tandem with medical professionals from ADF-MIDI. Information generated from the pre-exercise surveillance was used to pilot the GEIS Branch's Battle-Ready Risk Report, a powerful tool for leaders to proactively address biosurveillance threats using real-time data. The success of this project has spurred interest among GEIS-PLs and GEIS customers for more field deployable surveillance methods and equipment.

RESPIRATORY INFECTIONS (RI) FOCUS AREA

The RI Focus Area portfolio supports surveillance activities for many respiratory pathogens but specializes in the detection of and response to pathogens with pandemic potential, including those that emerge at the human-animal interface. This occurs through routine surveillance among U.S. military members (including recruits, cadets, shipboard, and pre- and post-deployment populations), MHS beneficiaries, foreign military, and civilian populations, as well as animal and environmental sampling. Advanced characterization evaluates vaccine effectiveness and monitors potential antigenic shift/drift and emerging SARS-CoV-2 and influenza variants.

CURRENT PORTFOLIO:

In FY23, the RI Focus Area supported 21 extension, one pilot, and two provisional projects at 13 DOD partner laboratories across all GCCs, totaling approximately $18.5 million in funded surveillance activities for respiratory infections. Unlike the more recent post-pandemic years, influenza (A/B/non-subtyped) represented the greatest proportion of respiratory infections detected and reported to the GEIS-PO. SARS-CoV-2, rhinovirus/enterovirus, and other respiratory infections continued to be detected less frequently. The RI Focus Area continues surveillance at the human-animal interface, monitoring animal influenza surveillance activities throughout South America, Africa, and Asia. Respiratory projects leveraged the NGSBC to provide high quality viral pathogen sequencing and advanced characterization to generate timely data for actionable FHP decision-making.

WHERE WE ARE GOING:

The RI Focus Area continues to support the DOD Global Respiratory Pathogen Surveillance Program (DODGRPSP) to provide broad surveillance of respiratory infections across the Department. The annual review and selection of sentinel military installation sites optimize surveillance across the MHS by ensuring sites with greater potential for participation continue to be included as part of the network, while inactive sites are removed or further evaluated to understand barriers to participation. The RI Focus Area will support routine surveillance of viral and bacterial respiratory pathogens, advanced characterization of respiratory pathogens (to include sequencing), vaccine effectiveness analyses, as well as activities designed to examine a wide array of viral respiratory pathogens associated with increased severity, transmission, and pandemic potential. Surveillance at the human-animal interface will continue, emphasizing the One Health approach for surveillance that includes advanced characterization (over basic testing) to provide more useful and actionable data. The RI Focus Area will concentrate on improving awareness of partner findings and resources to enhance network collaboration, particularly regarding next-generation sequencing and bioinformatics. It aims to coordinate with external organizations to improve synchronization and decrease duplicate surveillance efforts in comparable geographic regions. Finally, the RI Focus Area is working to fill surveillance gaps where possible to improve the likelihood of the GEIS-N detecting novel or emerging respiratory pathogens of public health importance.

RECENT ACCOMPLISHMENTS:

- In collaboration with the GEIS-PO, DCPH-D continued to manage DODGRPSP in FY23, producing 52 weekly summary reports. DCPH-D identified over 100 sentinel sites for participation in the 2023-2024 respiratory reporting season.

- DCPH-D generated more than 650 influenza sequences (and identified strains) from samples or data contributed by 8 GEIS-funded laboratories (an increase from FY22) for the 2023-2024 Vaccine and Related Biological Products Advisory Committee to inform the composition of the 2024-2025 Northern Hemisphere influenza vaccine.

- WRAIR AFRIMS, in collaboration with the Armed Forces Philippines (AFP), detected and reported on an outbreak of influenza A among students at the Armed Forces Philippines Health Service Education and Training Center, which resulted in the development of new policy to offer vaccination to all students and staff prior to start of course enrollment.

- NAMRU INDO PACIFIC successfully expanded surveillance in Papua New Guinea and established local sequencing capabilities for SARS-CoV-2, influenza, and novel respiratory pathogens where they were previously non-existent.

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The GridION, by Oxford Nanopore Technologies, is a sequencing instrument used by select laboratories in the GEIS network. This instrument generates long sequencing reads, which can be particularly helpful for examining genomes with highly repeti tive elements. GEIS Network laboratories use the GridION for a variety of applications, from identification of vector borne patho gens to analysis of antimicrobial resistance determinants. (CDC/Courtney Wheeler)


INTEGRATED
BIOSURVEILLANCE

INTEGRATED BIOSURVEILLANCE

The Integrated Biosurveillance (IB) Branch, established in 2012, serves to provide early warning and to increase situational awareness of infectious diseases and health threats to the DOD enterprise. It also aims to improve strategic coordination and collaboration to enhance biodefense, aligning with the priorities outlined in the inaugural 2023 Biodefense Posture Review. The branch aids in making informed decisions for timely public health interventions and assists Combatant Commands (CCMD) in formulating Force Health Protection (FHP) guidelines or adjusting priority levels in specific regions and countries.

This branch remains a pivotal component of a global network that maintains crucial partnerships and facilitates the exchange of surveillance information with DOD partners and interagency counterparts. The network's objective is to facilitate the prompt identification and tracking of infectious disease threats, as well as the sharing and implementation of effective responses to prevent the occurrence of catastrophic events such as the COVID-19 pandemic. The global network comprises numerous agencies, including the National Center for Medical Intelligence (NCMI), the Department of Homeland Security/National Biosurveillance Integration Center (NBIC), the Centers for Disease Control and Prevention (CDC), the Department of State, and the Defense Threat Reduction Agency (DTRA). Other significant collaborative partnerships include those with the French Armed Forces Centre for Epidemiology and Public Health and the Bundeswehr, German Federal Armed Forces.

Infectious disease surveillance has become a cornerstone of global public health. The emphasis on biosurveillance has facilitated the involvement of new actors to take an active role in stopping the spread of outbreaks and in generating new technical means to identify potential health threats as early as possible. Consequently, the IB branch serves as a comprehensive "One-Stop Shop" that not only collects, analyzes, and distributes biosurveillance information, but also responds to the demands of the DOD enterprise. This is achieved by incorporating concepts from "One Health" and by sharing and integrating military and civilian health information in a timely manner, which greatly enhances and accelerates the understanding of emerging and re-emerging infectious diseases worldwide.

The IB branch is composed of four sections: Alert and Response Operations (ARO), Innovation and Evaluation (I&E), Geographic Information System (GIS), and the Biosurveillance Hub and Portal (BSHP). IB generates a variety of recurring and ad hoc health surveillance reports, including the weekly AFHSD Health Surveillance Update (AHSU), Executive Summaries, SPOT Reports, Disease-Specific Surveillance Summaries, Forecast Reports, and Reportable Medical Event Summaries. Additionally, IB strives to identify potential public health threats via all-hazards horizon scanning of open-source surveillance data and communicates on these events through various formal channels. IB also conducts syndromic and event-based surveillance of MHS beneficiaries through systems such as Disease Reporting System internet (DRSi) and DOD Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE). All IB products are accessible in the Health Surveillance Explorer (HSE), a web-mapping application.

The HSE is an interactive web-based application developed by the GIS Section to provide CCMD decision-makers with timely, relevant, actionable, and comprehensive health surveillance information to promote, maintain, and enhance the health of active duty service members and Military Health System (MHS) beneficiaries. It also provides a near real-time picture of health threats, disease outbreaks, and other events of military interest and relevance to the DOD. Information about the HSE including how to register for an account is available at www.health.mil/hse.

IB is always forward-looking and responsive, using forecasting techniques to anticipate future threats and inform planning and decision-making to enhance military readiness.

What we do in the field of biosurveillance for the DOD enterprise? The IB Branch team conducts:

- Early warning and risk awareness of health threats to the DOD
- Open-source epidemic intelligence
- In-depth surveillance analysis for GCC's military exercises (e.g., Able Resolve)
- Integration of military and civilian surveillance data and information
- DOD and interagency collaboration (e.g., NBIC, DTRA)
- Cooperation and information sharing with allies and partners
- Outbreak surveillance and reporting (e.g., DOD mpox)
- Forecasting analysis of respiratory infections (e.g., COVID-19, RSV, and influenza)
- Syndromic surveillance with Electronic Surveillance System for the Early Notification of Community based Epidemics (ESSENCE)
- Management of the Health Surveillance Explorer (HSE) for near real-time health surveillance
- Development of the Biosurveillance Hub and Portal (BSHP)

ALERT AND RESPONSE OPERATIONS SIGNIFICANT ACCOMPLISHMENTS

The Alert and Response (ARO) Section continued to actively provide the most relevant information on health threats of military interest and to expand the reach of its numerous biosurveillance products. In addition to producing a weekly AFHSD-IB Health Surveillance Update (AHSU), several Executive Summaries (EXSUMs), Surveillance Summaries, and SPOT Reports, the ARO also responded to nine requests for information (RFIs) and supported two military exercises. The ARO Section participated in a number of interagency and interdepartmental meetings to foster collaboration with partners. Lastly, the ARO Section continued to monitor the presence of infectious diseases worldwide, including COVID-19, mpox, Ebola, novel avian influenza, and other undiagnosed infectious illnesses.

Below are the significant accomplishments for the ARO Section in 2023:

- **GENERATED WEEKLY HEALTH SURVEILLANCE UPDATES.** In 2023, the IB-ARO Section produced and distributed 52 AHSU reports. The AHSU is a weekly assessment and analysis of public health threats that are of military relevance in support of the GCCs. Threats were identified through event- and indicator-based surveillance. Event-based surveillance monitored and reported on trends above the baseline of a pathogen; novel pathogens, host and vector relationships, transmission routes, or new type of antimicrobial resistance; and environmental conditions that might influence disease spread. Indicator-based surveillance monitored and reported on MHS data, including laboratory results, medical encounters, and reportable medical events (RMEs). The AHSU contributes to DOD biosurveillance by informing military public health decisions through near real-time comprehensive medical information. The AHSU uses open-source information, including but not limited to academic journals, the DRSi, internal AFHSD reports (Epidemiology & Analysis [E&A], Global Emerging Infections Surveillance [GEIS], Innovation & Evaluation [I&E]), surveillance data (ESSENCE), public health agency and interagency sites and reports (CDC, Country Ministries of Health [MOHs], Defense Intelligence Agency [DIA]/ National Center for Medical Intelligence [NCMI], World Health Organization [WHO], etc.), RSS (Really Simple Syndication) feeds, social media platforms, blogs, and the National Biosurveillance Integration Center's (NBIC) Biofeeds web scraper, which allows for surveillance of thousands of open-source media and journal articles.

- **GENERATED EXSUMS OF MAJOR HEALTH THREATS.** During 2023, by integrating military and civilian biosurveillance information, the ARO Section produced and distributed 19 EXSUMs, which are one-page summaries of high-importance events, including executive issues, background, discussion, and recommendations. Fourteen EXSUMs were produced regarding the global COVID-19 outbreak, including one on IB activities following the end of the COVID-19 Public Health Emergency Declaration. The remaining five were single reports on a Marburg virus disease (MVD) outbreak in Equatorial Guinea, an MVD outbreak in Tanzania, Nipah virus (NiV) infection outbreak in India, the first cases of novel influenza A(H1N2v) and A(H3v) infections in the U.S., and locally acquired malaria in the U.S.

  - **COVID-19.** Beginning in January 2020, the ARO Section produced daily COVID-19 outbreak EXSUMs covering global, U.S., and MHS cases and deaths, U.S. and MHS hospitalizations, wastewater surveillance, prevalent sublineages, as well as significant news items. In 2023, thirteen COVID-19 EXSUMs were distributed, ending on May 22 with the discontinuation of the COVID-19 public health emergency on May 11, 2023. On May 22, an additional EXSUM was sent out detailing IB's COVID-19 monitoring in the wake of the COVID-19 public health emergency ending and the subsequent discontinuation of several critical COVID-19 data sources, which included but not limited to CDC, WHO, and the European CDC reports.

  - **MARBURG VIRUS DISEASE.** In February and March, the ARO Section released two EXSUMs on MVD outbreaks, one each in Equatorial Guinea and Tanzania. Both outbreaks were the first ever reported in each country. The reports were produced on the day the outbreaks in Equatorial Guinea and Tanzania were confirmed by WHO and the Tanzanian MOH, respectively. ARO tracked the outbreak progress in the AHSU for 17 weeks for Equatorial Guinea and 10 weeks for Tanzania, until the outbreaks were officially declared over by WHO. On March 23, the ARO Section produced a SPOT report to provide updates on the ongoing MVD outbreak in northeastern Equatorial Guinea. The purpose of the SPOT report was to provide situational awareness on the extent and progression of the outbreak and its potential risk to the MHS population.

"We have been receiving your weekly reports of AFHSD Health Surveillance Update (AHSU) with the last version dated Feb 07, 2023, and occasional disease-specific reports, such as the AFHSG Global COVID-19 Surveillance Summary, with the last version dated Feb 27, 2023. Your reports are regarded as one of our gold standard resources that have been helping us gain awareness of current and prospective public health situation. For that, on behalf of CDC Red Sky, please allow me to take this opportunity to express our sincere appreciation for your support."

– U.S. CDC Red Sky Team (March 2023)

Through this product, the ARO Section ensured that leadership had the necessary information to make critical decisions related to FHP.

- **NIPAH VIRUS DISEASE.** In September, the ARO Section released an EXSUM on the fourth NiV infection outbreak in Kerala State, India. Subsequent tracking in the AHSU for 5 weeks ultimately found 6 confirmed cases of NiV infection (89 suspected cases and 2 deaths) in the outbreak.
- **NOVEL SWINE INFLUENZA.** On Aug. 4, an EXSUM was released reporting two novel swine influenza cases: one A(H1N2v) and one A(H3v) among county fairgoers in Michigan who had exposure to swine.
- **LOCALLY ACQUIRED MALARIA.** After tracking the progress over nine reports in the AHSU, ARO produced an EXSUM for locally acquired malaria in the U.S., with 10 cases reported among 4 states. This included the first locally acquired malaria case ever reported in Arkansas, the first in Maryland in more than 40 years, and the first in Texas since 1994.

In all of the aforementioned EXSUMs, the ARO Section played a pivotal role as one of the primary sources of information. The ARO Section strives for near-real time surveillance and is committed to getting information out to DOD and other interagency partners as swiftly as possible, enabling rapid responses to these emerging outbreaks.

► **DEVELOPED DISEASE SURVEILLANCE SUMMARIES FOR COVID-19 AND EBOLA VIRUS DISEASE.** During 2023, the ARO section produced and distributed 11 surveillance summaries. Ten of these focused on the global COVID-19 outbreak, while one addressed the Ebola virus disease (EVD) outbreak in Uganda that began on September 20, 2022 (11 total reports since October 21, 2022). Surveillance summaries offer a comprehensive analysis of ongoing disease outbreaks that hold significant military interest. These summaries include information on the background and progression of the threat over time, along with details on diagnostics, transmission, and medical countermeasures. On COVID-19, the ARO Section also reported on pertinent research, genomic surveillance, therapeutic developments, and post-COVID-19 condition, commonly referred to as long COVID. For EVD, the ARO Section focused on surveillance in neighboring countries, travel advisories, and items of DOD relevance, including DOD- specific guidance and threat assessments. The summaries were developed using open-source information, including but not limited to academic journals, internal AFHSD reports (E&A, GEIS, I&E), public health agency and interagency sites and reports (CDC, Country MOHs, DIA/NCMI, WHO, etc.), RSS feeds, social media platforms, blogs, and web scrapers. While agencies such as CDC and WHO produced similar reports, the ARO Section fulfilled the need for comprehensive disease surveillance reports tailored to the context of the DOD and FHP situational awareness, contributing to DOD biosurveillance.

► **COMPLETED REQUESTS FOR INFORMATION.** During 2023, the ARO Section produced and distributed nine reports in response to RFIs. These reports included surveillance of current events, such as outbreaks in India and health threats in Haiti and Kenya, as well as background information on disease and non-battle injuries related to Typhoon Mawar and human infections associated with marine exposures. Information from domestic and international organizations, such as CDC, WHO and non-governmental organizations (NGOs), local and global media sources, and scientific journals were utilized to develop these reports. Through these reports, the ARO Section provided DOD leadership with essential information to make critical decisions related to FHP.

- **DISEASE AND NON-BATTLE INJURY.** The ARO Section generated a report outlining potential disease and non-battle injury (DNBI) risks related to Typhoon Mawar in the Philippines to the USAF 36 Medical Group (MDG), Guam. The report highlighted various possible sources of morbidity and mortality, including injuries (e.g., drowning, blunt trauma), infectious diseases (e.g., vector-borne, respiratory, and gastrointestinal), and other health events (e.g., heart attacks and stress-related disorders). Infectious disease surveillance data was also provided on MHS personnel from areas affected by the typhoon. The report may serve as a future reference for assessments of potential risks and threats associated with other weather-related events.
- **INFECTIONS FOLLOWING MARINE EXPOSURES.** The ARO Section produced a report specifically focused on 10 human infections (9 bacterial and 1 viral) associated with marine exposures for the USAF 36 MDG, Guam. The RFI emphasized infections that result in various illnesses, such as gastroenteritis, skin and soft tissue infections, sepsis, and systemic diseases. Through this deliverable, the ARO Section ensured that leadership possessed essential information to mitigate the risks associated with marine exposures.
- **DISEASE OUTBREAKS IN INDIA.** In response to a request from USINDOPACOM FHP, the ARO Section generated a report highlighting current infectious disease outbreaks in India, including respiratory diseases (COVID-19, seasonal influenza, and measles) and vector-borne diseases (dengue, Japanese encephalitis, and malaria). The purpose of the report was to provide information on potential health threats to MHS personnel preparing for deployment to the country. The report referenced NCMI's infectious disease risk assessments and included several maps.
- **DISEASE OUTBREAKS IN THE USCENTCOM AREA OF RESPONSIBILITY.** The ARO Section developed a report highlighting current health threats and disease outbreaks in 22 countries within the USCENTCOM Area of Responsibility (AOR) in response to a request from the USCENTCOM Public Health Command. The report

provided a comprehensive overview of infectious diseases threats present in the AOR and included information on gastrointestinal illnesses (e.g., cholera, norovirus, salmonellosis, cryptosporidiosis), vaccine preventable diseases (e.g., poliomyelitis, measles, pertussis), vector-borne diseases (e.g., West Nile virus [WNV] disease, dengue, malaria), and other relevant diseases (e.g., anthrax, Crimean Congo hemorrhagic fever, avian influenza). The report provided information on potential health threats to MHS personnel deployed to the AOR.

- **NOVEL AVIAN INFLUENZA A(H5N1).** The U.S. Coast Guard requested information on novel avian influenza A(H5N1). The ARO generated a report detailing the history, epidemiology, infection prevention and control guidance, and available countermeasures for A(H5N1). It aimed to provide situational awareness of the A(H5N1) threat and recommendations on methods to maintain the health and safety of individuals at risk. The ARO used information from CDC, European Centre for Disease Prevention and Control, WHO, and scientific journals.

- **DISEASE OUTBREAKS IN COLOMBIA, ECUADOR, GUATEMALA, HAITI, AND THE SAHEL REGION IN AFRICA.** The USTRANSCOM Command Surgeon requested information on current health threats and disease outbreaks in Colombia, Ecuador, Guatemala, Haiti, and the Sahel Region in Africa (Mali, Niger, Nigeria). The report covered avian influenza, gastrointestinal illnesses (e.g., cholera), vaccine preventable diseases (e.g., diphtheria, measles), vector-borne diseases (e.g., dengue, chikungunya, and malaria), and other relevant threats (e.g., gang violence, medication shortage). It also included an overview of the COVID-19 situation in each country, as well as the impact of ongoing humanitarian crises and the El Niño phenomenon.

- **DISEASE OUTBREAKS IN HAITI AND KENYA.** USSOUTHCOM FHP requested information on current health threats and disease outbreaks in Haiti and Kenya. The report focused on vector-borne diseases (e.g., chikungunya, dengue, leishmaniasis, malaria, Mayaro virus disease, Rift Valley fever, WNV disease, yellow fever, and Zika), as well as other relevant disease threats (e.g., avian influenza, COVID-19, vaccine-preventable diseases, cholera, and African swine fever). The request for information was preceded by media reports of Kenya's plans to lead a deployment of police officers and armed forces to Haiti to aid in the management of gang violence.

- **CHIKUNGUNYA IN DOD PRIORITY COUNTRIES.** To inform vaccine decision-making, the Director for Preventive Medicine at the Office of the Assistant Secretary of Defense for Health Affairs requested information on the burden of chikungunya in DOD priority countries. The ARO Section used information primarily from domestic and international organizations, such as CDC, WHO and NGOs, and Global Infectious Diseases and Epidemiology Online Network (GIDEON). The report provides a table of locally acquired chikungunya cases by country in 2023 and an average annual case count from 2018 to 2022.

- **DISEASE OUTBREAKS IN SOUTH KOREA.** USINDOPACOM FHP officer requested information on current health threats and disease outbreaks in the Republic of Korea. The report focused on flea, mite, and tick-borne diseases (e.g., Lyme disease, murine typhus, severe fever with thrombocytopenia syndrome, scrub typhus, and spotted fever rickettsioses) and mosquito-borne diseases (e.g., dengue, Japanese encephalitis, malaria) and other zoonotic diseases (e.g., hemorrhagic fever with renal syndrome and leptospirosis).

► **SURVEILLANCE SUPPORT FOR MILITARY EXERCISES.** During 2023, the ARO Section provided biosurveillance support for several military exercises.

- **TALISMAN SABRE 23 – AUSTRALIA.** From July 10 to August 18, the ARO Section provided biosurveillance support for the Talisman Sabre 23 exercise in Australia. The exercise, which ran from July 22 to August 4, consisted of 35,000 troops from 13 countries participating in 15 events. The purpose of the exercise was to advance a free and open Indo-Pacific by strengthening relationships and interoperability among key allies and enhancing collective capabilities to respond to a wide array of potential security concerns. The exercise took place across Australia with events held in New South Wales, Northern Territory, Queensland, and Western Territory states. Biosurveillance activities, integral to FHP, occurred before, during, and after military exercises. Surveillance data guided medical planners in making decisions about which preventive measures (mosquito repellents, special clothing, etc.) and prophylaxis (anti-malarial drugs, vaccines, etc.) should be required for troops participating in the exercise. The ARO Section began pre-exercise surveillance efforts in Australia 2 weeks ahead of Talisman Sabre 23. Findings were communicated to the USINDOPACOM FHP staff via email and were posted on the Health Surveillance Explorer (HSE).

  Throughout the exercise, the ARO Section continued surveillance and participated in daily meetings with the ESSENCE team to discuss any new disease or outbreak occurring in the AOR to help inform ESSENCE surveillance. Each day, the ARO Section and ESSENCE teams met with the USINDOPACOM FHP staff to provide updates on surveillance findings. Following these meetings, an email summary was sent out, and all relevant events were posted to the HSE. Further, weekly wrap-up summaries of the preceding weeks' events were disseminated. After the conclusion of the exercise, the ARO Section continued surveillance for an additional 2 weeks. Any events of interest were communicated to the USINDOPACOM FHP staff via

U.S. soldiers conduct air mobility operations supported by partner forces from Australia, New Zealand, Fiji and France during exercise Talisman Sabre 23 in Townsville Field Training Area, Queensland, Australia, July 26, 2023. Source: defense.gov

email. Finally, the ARO Section and ESSENCE compiled and sent out a final wrap-up summary of all the events identified during the exercise.

Additionally, IB partnered with the Defense Threat Reduction Agency (DTRA) to provide seasonal influenza forecasting during the exercise. The ARO Section provided data to our DTRA partners, enabling them to model expected seasonal influenza cases in Australia for July and August. The ARO Section received many kudos for their work during Talisman Sabre 23 and the timely and relevant surveillance information they distributed. It requires significant manpower to conduct this type of surveillance and medical planners may not have the capacity to undertake deep surveillance independently. The ARO Section used multiple sources for surveillance information, prioritizing the Australian MOH, the government websites of each state, the WHO Western Pacific Region reports, the WHO South-East Asia Region Epidemiological Bulletins, Relief Web, and Biofeeds. In all, ARO reported on nearly 60 events in Australia and participating countries, sent 13 summary emails, and participated in 15 daily meetings. ARO's support of Talisman Sabre 23 served as a proof of concept, demonstrating the capabilities of the ARO Section to contribute to military exercises.

- **RESOLUTE SENTINEL 23 – PERU.** From June 1 to July 27, the ARO Section provided biosurveillance support for the Resolute Sentinel 23 exercise in Peru. The goal of Resolute Sentinel 23 was to provide joint training and improved readiness of U.S. and partner nation civil engineers, medical professionals, and support personnel through humanitarian assistance activities. This included integrating combat interoperability and disaster response training in addition to medical exchanges, training and aid, and construction projects. Nearly 200 Air Force troops participated in the exercise, which took place in Callao, Lima, Piura, Pucusana, and Talara. The ARO Section provided eight reports to the USSOUTHCOM FHP staff tracking dengue, leptospirosis, seasonal influenza, and Guillain Barré syndrome cases. In 2023, Peru experienced its worst dengue outbreak since at least 2017, which peaked in early May but remained above average levels until August. The USSOUTHCOM FHP staff used the surveillance data to inform their prevention activities and medical planning. The ARO Section primarily relied on data from the Peru Ministry of Health (MINSA) and open-source media reports. The ARO Section received kudos for the data provided during Resolute Sentinel 23, noting its usefulness for exercise planning and the valuable insights it offered into the health situation in Peru.

► **INTERAGENCY/INTERDEPARTMENTAL COLLABORATION.** The ARO Section participated in an interagency Biosurveillance Indications and Warning Analytic Community – Analyst to Analyst Knowledge Exchange in November. The meeting brought together 60 analysts from across the federal interagency (CDC, Food and Drug Administration, State Department, Department of Homeland Security, etc.) to discuss our respective missions, resources, achievements, and challenges, and to work together on a tabletop exercise. The 2-day exchange allowed ARO analysts to network with colleagues in other branches of the government doing similar work and to set the groundwork for continued future collaboration. In addition, the ARO Section participated in the Viral Supremacy Tabletop Exercise in August, providing critical insights to enhance and improve biosurveillance practices within the DOD.

► **OTHER SIGNIFICANT ACCOMPLISHMENTS OF THE ARO SECTION:**

- Formalized relationship between AFHSD-IB and the Pacific Disaster Center via an updated Memorandum of Understanding in January 2023.
- Launched MHS outbreaks layer on the Health Surveillance Explorer using data from the Disease Reporting System internet (DRSi).
- Gained access to MHS GENESIS system and utilized for case validation of mpox and other anomalous disease events reported in MHS beneficiaries.
- Developed a formal template for regular reporting of MHS outbreak and disease events in the AHSU.
- Curated a master list of DMIS IDs existing as reporting units in DRSi and utilized these to create monthly GCC-specific reports summarizing new RMEs entered into DRSi.

GEOGRAPHIC INFORMATION SYSTEMS SIGNIFICANT ACCOMPLISHMENTS

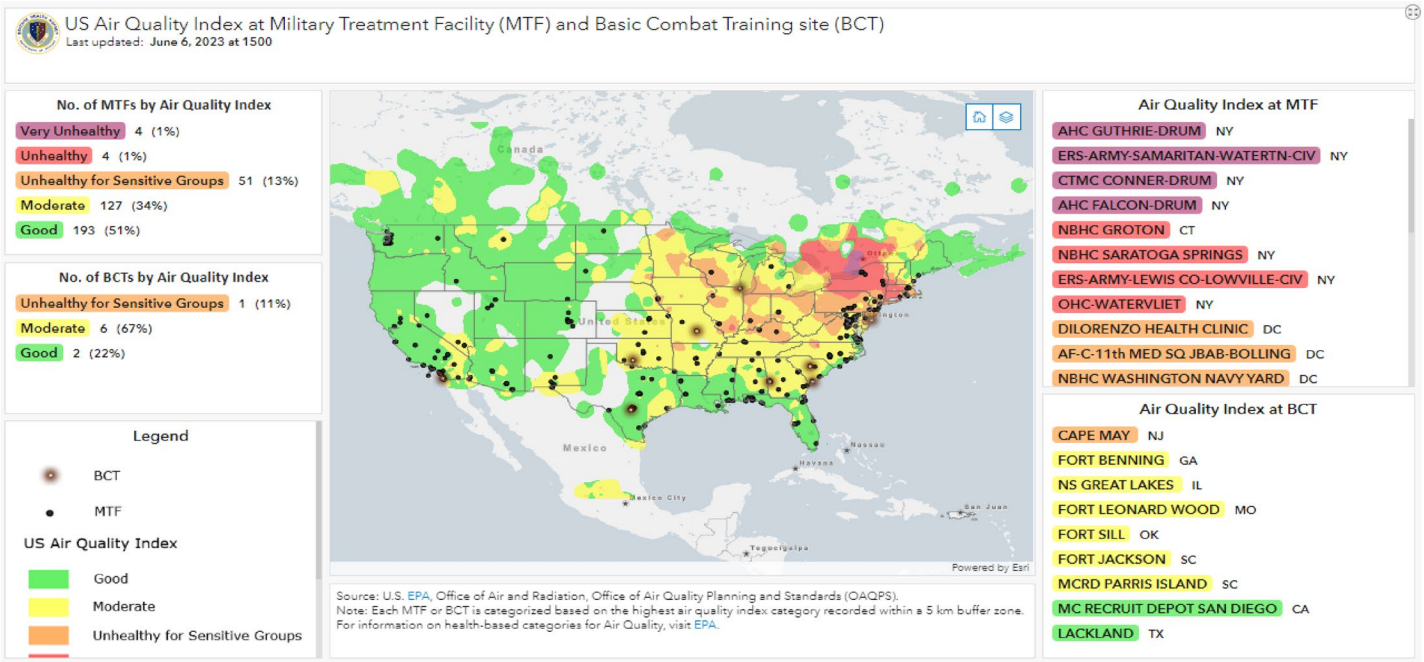
In 2017, the GIS Section created the Health Surveillance Explorer (HSE) to provide near real-time health surveillance across the DOD enterprise. Maps are an effective means of displaying biosurveillance data, as they facilitate decision-making at all levels of the DOD. The HSE contains digital and interactive web-based dashboards that provide up-to-date information on relevant infectious diseases of military interest. This information is gathered and synthesized from a variety of sources, surveillance platforms, and databases, thereby creating a centralized hub for stakeholders. To access the HSE, which is hosted by the National Geospatial-Intelligence Agency, visit: https://health.mil/hse (CAC required).

Below are the significant accomplishments for the GIS Section in 2023:

- **ENHANCED OUR EXISTING PRODUCTS TO UPHOLD OUR REPUTATION FOR EXCELLENCE.** In 2023, the HSE Newsroom Dashboard saw a significant surge in use, reaching nearly 15,000 views, an impressive leap of 3,000 views from the preceding year, showcasing its growing influence and reach. Working in conjunction with the ARO Section, the GIS Section reviewed and standardized the names of over 12,000 events in the archive of the Health Surveillance Explorer. This process eliminated redundancy and transformed the HSE query function into a more user-friendly, streamlined tool, enhancing the efficiency of searching for historical events in the HSE.

- **DEVELOPED A NEW MOBILE-FRIENDLY VERSION OF THE HSE NEWSROOM.** Mobile technology is an emerging concept that uses mobile devices coupled with wireless technology for health care purposes and disease surveillance efforts. The use of mobile devices in public health governance has been proven successful. The GIS Section debuted a new mobile-friendly version of the HSE Newsroom. The mobile HSE is a dynamic, CAC-enabled web-mapping application that offers Combatant Command decision makers timely, relevant, actionable, and comprehensive health surveillance information (e.g., global health threats, disease outbreaks) in near real-time. The Mobile HSE is an expansion of the HSE application that provides access to relevant information in the HSE through mobile devices, such as government cellphones. To access the Mobile HSE, visit: https://health.mil/hse (CAC required).

- **DEVELOPED A NEW AIR QUALITY DASHBOARD.** The GIS Section created a new dashboard to monitor the air quality index, PM 2.5, and ozone levels, as well as wildfires around CONUS military installations and basic combat training sites using daily data from the Environmental Protection Agency. This dashboard plays a critical role



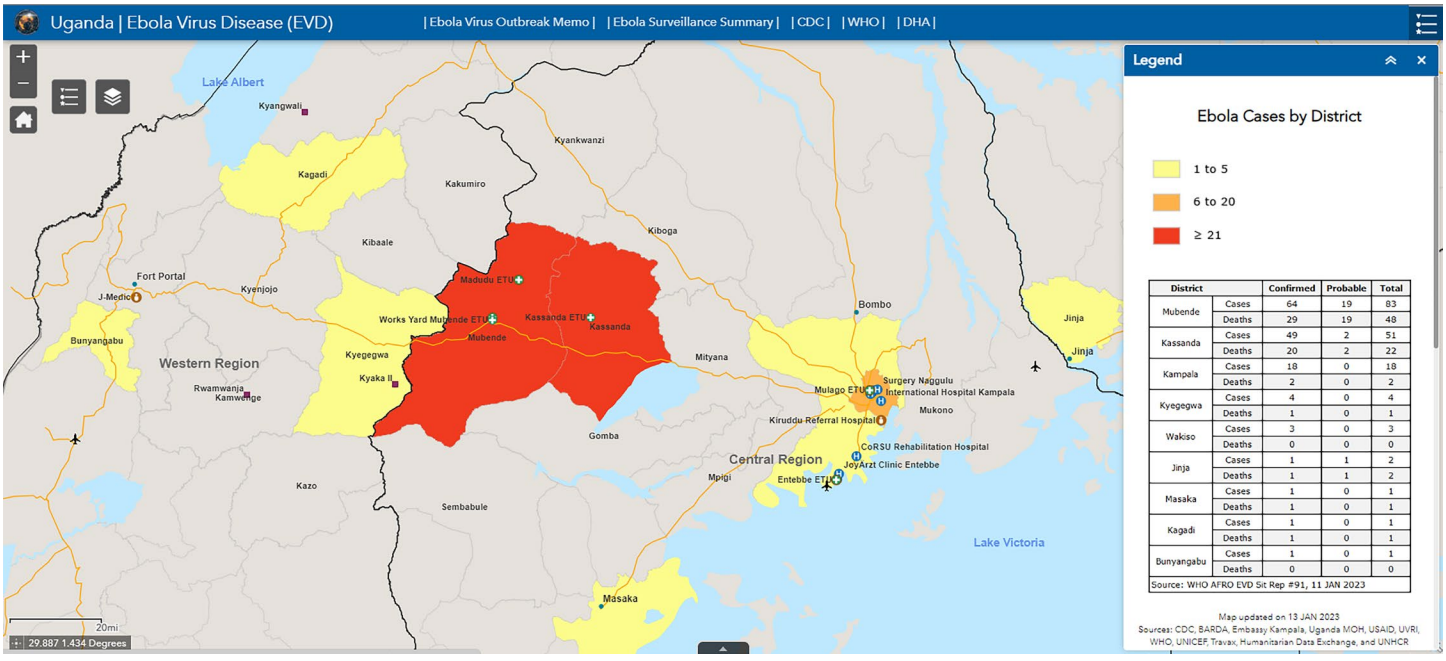
The Air Quality Index Dashboard displays air quality, wildfire, and respiratory encounter data at and around CONUS medical treatment facilities and basic combat training sites.

in ensuring operation readiness, safeguarding the health of all MHS beneficiaries, and protecting force health. Poor air quality can adversely affect respiratory and cardiovascular health, impacting physical performance. GIS-enabled monitoring helps military leaders make informed decisions about environmental risks. It helps them keep their personnel safe and plan for operations, including outdoor training. This approach to monitoring underscores the importance of integrating air quality data into health surveillance.

- **DEVELOPED THE UGANDA EBOLA VIRUS DISEASE (EVD) WEB MAP.** In September 2022, the GIS Section designed and published a critical tool in the global health security arsenal, the Uganda EVD Web Map, following the declaration of an outbreak in the country. This interactive map displayed the number of EVD cases by district, as well as the locations of airports, Ebola treatment units, isolation centers, trauma hospitals, refugee camps, major cities, and roads. This sophisticated planning tool offered near real-time insights into outbreak dynamics, equipping military decision-makers with crucial information to protect troops and prepare for any necessary supportive actions in containment and medical aid. Its application went beyond simple data tracking; it underpinned strategic military and health planning, ensuring the vigilance of forces and readiness to respond to emerging health threats. The Web Map was viewed nearly 800 times in less than 2 months, an indication of its value to the DOD and global health community. In addition to the Uganda EVD Web Map, the GIS Section created weekly static maps of the EVD outbreak, featured in the AHSU each week. These maps, modelled after the Uganda EVD Web Map, provided decision-makers with another tool for analyzing the outbreak and its potential implications for the MHS.

- **DEVELOPED THE EQUATORIAL GUINEA AND TANZANIA MARBURG VIRUS DISEASE (MVD) MAPS.** From March to June, Equatorial Guinea and Tanzania experienced concurrent deadly outbreaks of MVD, raising concerns about the disease potentially spreading through a larger part of Africa. The GIS Section responded by developing static maps for each country, showing MVD cases and deaths in Equatorial Guinea and Tanzania by municipality and region, respectively. These maps were updated weekly and included in the AHSU, alongside epidemiological data, reports from international and government agencies, and news articles about developments and the response to the outbreak. In addition, the maps provided valuable visual aids for evaluating the threats and implications of the outbreaks, both for public health and military security, in Africa and beyond.

- **INCREASED COLLABORATION WITH NATO PARTNERS.** In August, the GIS Section hosted a delegation of representatives from the Bundeswehr (the Armed Forces of the Federal Republic of Germany) and the NATO Center of Excellence for Military Medicine, showcasing the biosurveillance products that the GIS Section produces and maintains. Over the course of 3 days, participants strategized and discussed methods by which AFHSD and NATO partners can share data and collaborate to



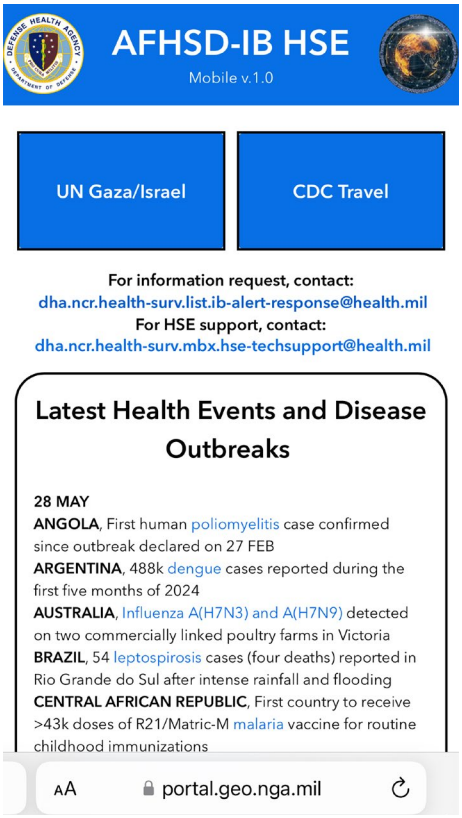
District		Confirmed	Probable	Total
Mubende	Cases	64	19	83
	Deaths	29	19	48
Kassanda	Cases	49	2	51
	Deaths	20	2	22
Kampala	Cases	18	0	18
	Deaths	2	0	2
Kyegegwa	Cases	4	0	4
	Deaths	1	0	1
Wakiso	Cases	3	0	3
	Deaths	0	0	0
Jinja	Cases	1	1	2
	Deaths	1	1	2
Masaka	Cases	1	0	1
	Deaths	1	0	1
Kagadi	Cases	1	0	1
	Deaths	1	0	1
Bunyangabu	Cases	1	0	1
	Deaths	0	0	0

Source: WHO AFRO EVD Sit Rep #91, 11 JAN 2023

The Uganda Ebola Virus Disease (EVD) Web Map provided a valuable visual aid for evaluating the threats and implications of the 2022-2023 Uganda EVD outbreak.

improve GIS and biosurveillance capabilities. In a concerted effort to fortify global biosurveillance capabilities, the GIS Section leveraged the power of Protected Internet eXchange (PiX) for data dissemination, aiming to bridge gaps in knowledge and understanding across NATO partnerships. This initiative not only enhances our collective ability to monitor and respond to health threats, but also emphasizes our commitment to advancing public health security on an international scale. Through this strategic partnership, the IB Branch seeks to ensure a more informed and responsive global health community.

- **COLLABORATED WITH MEDCOP HSE TEAM.** The GIS Section continued to forge a strategic partnership with Accenture Federal Services, working in lockstep to harmonize NGA HSE version and MedCOP HSE Minimum Viable Product. This concerted effort ensures that both platforms align seamlessly and provide comprehensive and accessible health data critical to the well-being of armed forces and their families. By pooling expertise and resources, the partnership created a cohesive ecosystem of information where data integrity and user experience are paramount. This collaboration underscores a commitment to leveraging cutting-edge technology to deliver exceptional access to health information, facilitating informed decisions, and fostering a supportive environment in service of those who serve.



The Mobile HSE extends the capabilities of the HSE, allowing users access to near real-time health surveillance information on mobile devices.

INNOVATION AND EVALUATION SIGNIFICANT ACCOMPLISHMENTS

The Innovation and Evaluation (I&E) Section represents a vital component of the IB Branch. It is responsible for providing forecasting analysis on respiratory disease threats, including COVID-19, respiratory syncytial virus (RSV), and seasonal influenza. In response to the global pandemic of COVID-19 and the growing interest in the impact of seasonal respiratory illnesses on the MHS population, the I&E Section produces a weekly product entitled "Markets to Watch". This product combines civilian and military data sources to highlight trends in respiratory illness activity and allows near real-time monitoring of DOD health status across the AFHSD Surveillance Markets. These markets consist of neighboring installations, clinics, and hospitals, as well as civilian counties within 30 miles. The "Markets to Watch" provides senior leaders with a crucial planning tool for expeditious decision-making, enabling them to anticipate potential threats to military health and readiness.

Below are the significant accomplishments for the I&E Section in 2023:

- **PRODUCED AND DISTRIBUTED "MARKETS TO WATCH" REPORTS.** The I&E Section developed and disseminated more than 50 COVID-19 and respiratory "Markets to Watch" reports, spotlighting disease activity and trends within and surrounding AFHSD surveillance markets and Defense Health Networks. These reports facilitated real-time monitoring and provided a comprehensive overview of the health status of MHS beneficiaries regarding COVID-19, influenza, and RSV cases, health encounters, and hospitalizations from both MHS and civilian sources.

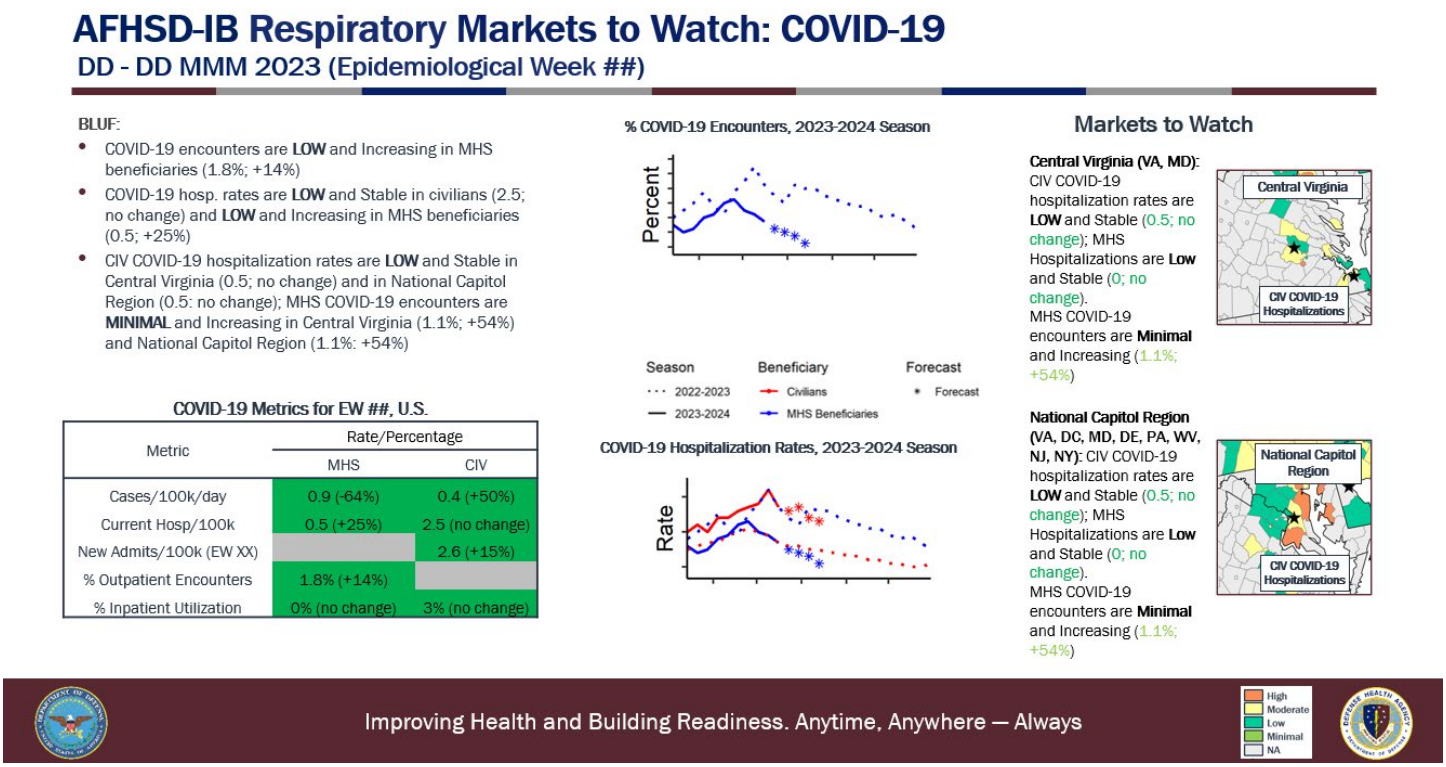
- **EXPANDED THE "COVID-19 MARKETS TO WATCH" PRODUCT AND DASHBOARD.** While the "COVID-19 Markets to Watch" was essential during the height of the pandemic, it did not reflect other respiratory pathogens, such as seasonal influenza and RSV, circulating during flu season. To address this gap, I&E created the "Respiratory Markets to Watch" product, offering a comprehensive risk analysis of respiratory diseases by surveillance market during the influenza season (October to May). Previous "Markets to Watch" reports were confined to markets in the U.S. and Puerto Rico. The I&E Section expanded the coverage to include OCONUS markets in Germany, Guam, Italy, Japan, the Republic of Korea, Spain, Turkey, and the United Kingdom. The expansion has turned the "Markets to Watch" into a more comprehensive respiratory surveillance tool that can adapt to new and emerging respiratory pathogens over time. The "Markets to Watch" product draws

from various data sources within the DOD (AFHSD-E&A COVID-19 Master Case List, MHS Bed Status Report, and DOD ESSENCE) and civilian space (CDC, HHS Protect, Robert Koch Institute, and NSSP ESSENCE). The expansion required identifying additional DOD and civilian data sources for COVID-19 and other respiratory diseases and incorporating them into the weekly "Markets to Watch" workflow. This entailed writing new R code to import data through APIs, aggregate data into AFHSD markets, and create data files needed for product development.

► **REVISED THE AFHSD SURVEILLANCE MARKETS FOR THE 2023-2024 INFLUENZA SEASON TO BETTER REFLECT GEOGRAPHIC RELATIONSHIPS AND ALIGN WITH EXISTING DHA HEALTHCARE MARKETS.** Creating a new market structure required downloading the monthly DHA DMIS-ID mapping table, analyzing existing data (ESSENCE, AFHSD-E&A COVID-19 Master Case List) by DMIS-ID, and consulting with other groups (ESSENCE, DCPH-Portsmouth) to determine a set of DMIS-ID for each market. Countries within 30 miles of each market were then mapped using ArcGIS Pro software. The market restructuring was also crucial to maintaining relevance within DHA and to expanding surveillance outside of the U.S., as new USEUCOM and USINDOPACOM markets were added. The accompanying "Markets to Watch" dashboard makes this information accessible to senior leaders, who can drill down to individual surveillance markets or Defense Health Networks to quickly gather information about respiratory disease activity in a specific location.

► **COLLABORATED WITH PRIVATE INDUSTRY PARTNERS TO COMPLETE FORECASTING PROJECTS ON INFLUENZA-LIKE ILLNESS (ILI) AND COVID-19 FOR THE 2022-2023 INFLUENZA SEASON.** I&E conducts an annual forecasting challenge aimed at predicting respiratory illnesses during the influenza season. I&E enrolls interested teams to submit forecasts and generates its own internal forecasts. In 2023, I&E successfully completed the 2022-2023 forecasting season and began the 2023-2024 season. Using advanced forecasting techniques and analysis of civilian and MHS beneficial medical encounter and hospitalization data, these projects produced accurate short-term forecasts within CONUS MHS Markets and AFHSD Surveillance Markets. The forecasts provided leadership with invaluable insights for proactive decision-making and timely interventions to prevent and control the spread of respiratory pathogens. I&E has been conducting respiratory disease surveillance since 2019 and continues to expand this project to include new targets and locations each year.

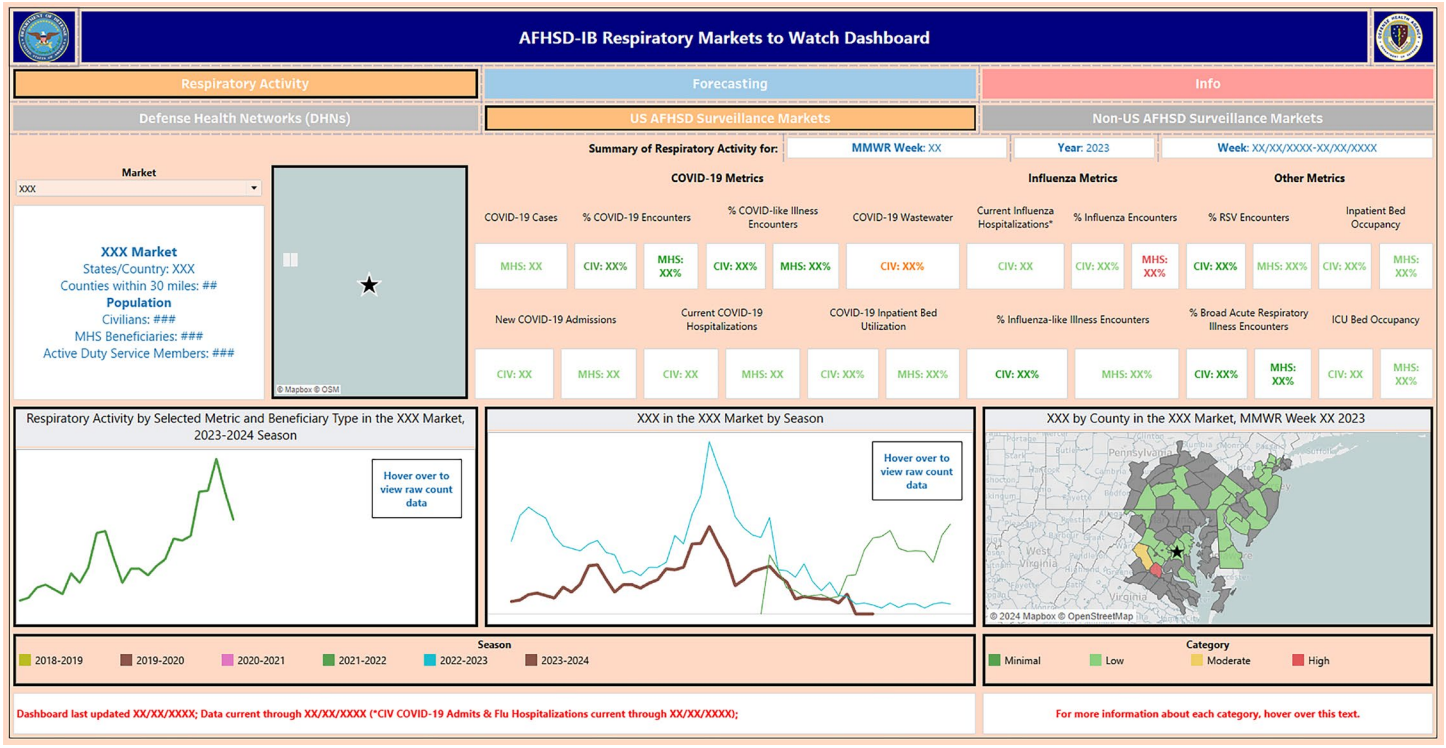
- Forecasting the short-term trajectory of COVID-19, influenza, and RSV is crucial for DOD decision-making and situational awareness during the influenza season. Incorporating new data elements introduced for the 2023-2024 season, the project used market-specific respiratory disease data utilized by the "Markets to Watch" product to generate 1- through 4-week ahead forecasts in each market. This entailed developing R code to run new and existing time series, machine learning, and count regression models, as well as scoring the forecasts

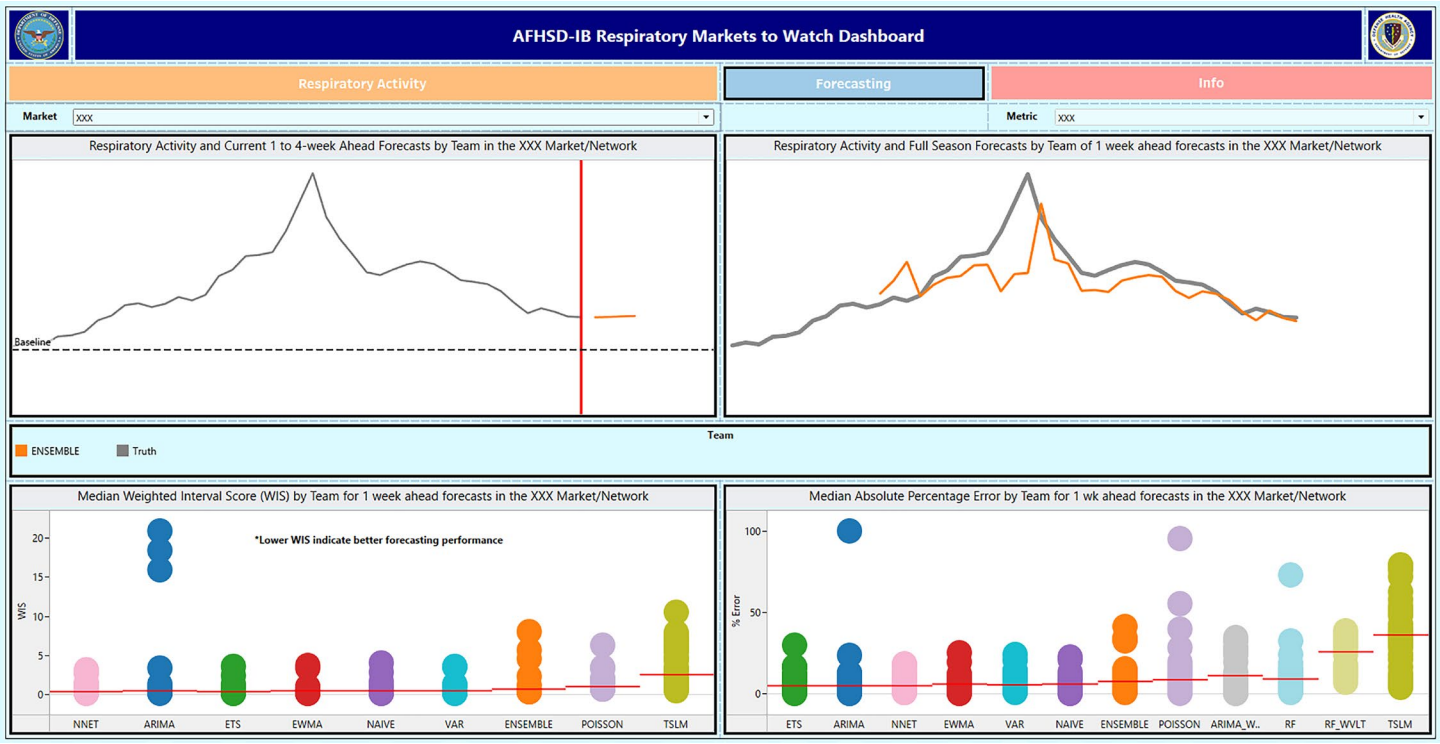


The AFHSD Surveillance Market and Forecasting tabs from the new combined Respiratory Markets to Watch dashboard.

using observed data. Additionally, I&E developed a new section of the Tableau "Markets to Watch" dashboard to display the forecasting results. This stands as the only regular product within DOD that delivers forecasts of respiratory disease activity in both the MHS and civilian populations, aiding senior leaders in preparation during the influenza season. I&E's respiratory forecasting uses many of the same data sources as the "Markets to Watch" product, including the AFHSD-E&A COVID-19 Master Case List, MHS Bed Status Report, DOD ESSENCE, CDC website, HHS Protect, Robert Koch Institute, and NSSP ESSENCE.

► **DEVELOPED A NEW INTERACTIVE AND COMBINED "MARKETS TO WATCH" AND RESPIRATORY FORECASTING DASHBOARD.** The "Markets to Watch" product offered market-level





The Markets to Watch and Respiratory Forecasting Dashboard found the Health Surveillance Explorer.

crucial surveillance of respiratory diseases both within the U.S. and globally. The "Respiratory Markets to Watch" dashboard utilized time-series, count regression, and machine learning models to forecast short-term (spanning 1 to 4 weeks ahead) disease trajectory for 130 CONUS and OCONUS AFHSD Surveillance Markets and nine Defense Health Networks during the 2023-2024 influenza season. The "Respiratory Markets to Watch" dashboard incorporated additional data elements and updated forecasting data by the newly created AFHSD surveillance markets. In addition to forecasting, the "Respiratory Markets to Watch" dashboard provided routine surveillance of respiratory illnesses among MHS and civilian populations, allowing for market-specific breakdowns of cases, health encounters, hospitalizations, and inpatient and Intensive Care Unit (ICU) occupancy trends. The resource guided planning and resource allocation within the MHS population in anticipation of increasing respiratory disease activity that could impact military health and readiness. To access the IB forecasting dashboard, visit: https://bitab.health.mil/#/projects/1493 (CAC required).

- **FOSTERED PARTNERSHIPS WITH NEW STAKEHOLDERS: SIGSCI AND THE DEFENSE THREAT REDUCTION AGENCY (DTRA).** The I&E Section and SigSci, a web application security company, began collaboration on a new R tool created by SigSci used for forecasting validation called Plausibility Analysis of Epidemiological Signals (PLANES). PLANES is intended to assist I&E with quality control of respiratory data and weekly forecasts. I&E generates a significant amount of data across more than 100 locations with over 30,000 individual forecasts each week. Manually reviewing such data would be time-consuming. The PLANES tool allows I&E to automatically check the data and flag any issues that require human review, improving data quality. I&E began testing the PLANES in the winter of 2023 and has integrated it into existing workflows to improve data and forecast validation. The collaboration with SigSci uses the same data sources as the "Markets to Watch" product. I&E sends SigSci weekly respiratory data from the "Markets to Watch" and Respiratory Forecasting Collaboration and holds monthly meetings to review progress in evaluating the tool and troubleshoot any issues.

  - I&E and DTRA have been meeting regularly to discuss ongoing forecasting and predictive analytics projects. I&E has requested DTRA's assistance with specific forecasting projects, including an analysis of influenza infections in Australia for use during the Talisman Sabre exercise in July and August 2023. The DTRA collaboration allows I&E to engage with experts in the field of predictive analytics and leverage their expertise for advanced projects. AFHSD is looking to expand collaborations with external groups to help I&E promptly identify issues, improve workflows and enhance reliability of forecasting efforts.

ESSENCE FY23 SIGNIFICANT ACCOMPLISHMENTS

The DOD ESSENCE program, the Electronic Surveillance System for the Early Notification of Community-based Epidemics, is a global and Military Health System (MHS) monitoring capability for the early detection of imminent health threats that may impact the readiness of active duty service members. ESSENCE uses syndromic data and is the only global capability for the early detection of threats to FHP available within the MHS. Using the same software as the CDC and more than half of the U.S. state public health departments, ESSENCE enables enhanced collaboration with local civilian counterparts during outbreaks. The AFHSD, the Service-specific public health centers, and the Military Treatment Facilities (MTFs) worldwide use ESSENCE daily to monitor the health status of the MHS population in a time where concerns about possible biomedical terrorist attacks and naturally occurring emerging infections are heightened.

ESSENCE monitors the direct care of over 9.4 million beneficiaries within the MHS population. The program facilitates recognition and investigation of the Tri-Service RMEs and grants access to aggregate and individual data to analyze the epidemiologic characteristics of health events for medical situational awareness and readiness.

Below are the significant accomplishments for ESSENCE in 2023:

- Published a manuscript in the May 2023 edition of the Medical Surveillance Monthly Report (MSMR), describing the use of ESSENCE for mpox surveillance: "Enhanced Mpox Outbreak Case Detection Among MHS Beneficiaries Through Use of ESSENCE."

- Conducted four National Syndromic Surveillance Program ESSENCE trainings for MTF users (144 attendees).

- Developed, tested, and successfully implemented 29 updates to ESSENCE (bug fixes, new functionality) over four releases. Four significant new features included:

  - The ability for users to add custom alerts of interest to their ESSENCE dashboards to facilitate awareness of important data findings.

  - Additions to the list of fields by which users can query the data (e.g., DMISID; MTF description for Theater Medical Data Store data).

  - Built-in queries available for users to select from (e.g., broad acute respiratory illness, suicide).

  - A new field to capture the date of initial receipt of data for each encounter, regardless of subsequent updates to the record, enabling the calculation and monitoring of lag times (important data quality metric).

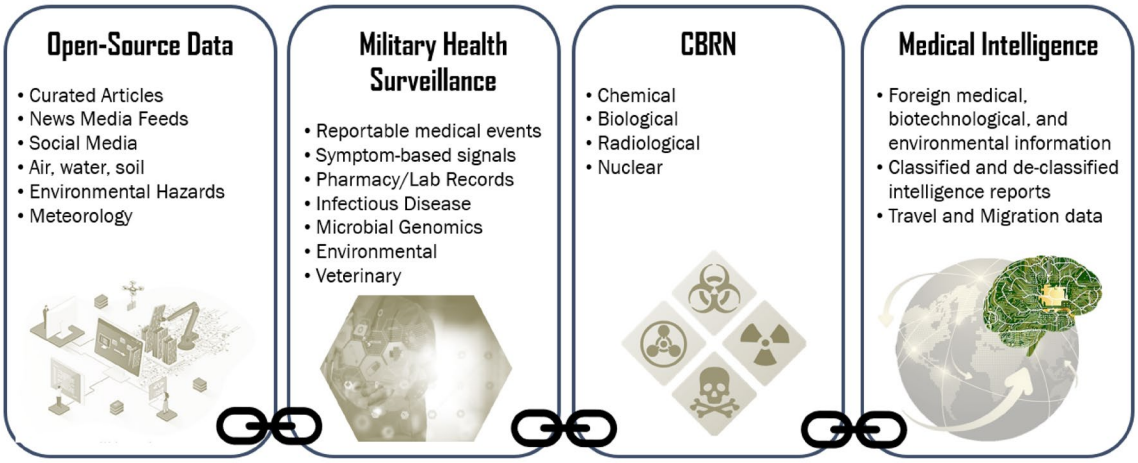
- Included ESSENCE surveillance data in 24 weekly AFHSD Health Surveillance Updates.
- Distributed 18 monthly forward projection base reports for the Army and Navy (launched March 2023) and Air Force (launched June 2023), summarizing surveillance data findings.
- Distributed 8 monthly training base reports for the Army, Navy and Air Force, summarizing surveillance data findings.
- Conducted near real-time surveillance of health encounters aboard four ships during Exercise Talisman Sabre 2023 and provided verbal and written surveillance updates to 18th MEDCOM.
- Collaborated with the Navy to launch a pilot project to use ESSENCE Theater Medical Data Store data to conduct near real-time biosurveillance on ships (launched Apr 2023).
- Beginning June 2023, provided weekly data extracts of COVID-19 laboratory data to E&A to support the analyses with datasets generated and distributed to various AFHSD stakeholders.
- Developed a data access partnership with New Jersey, allowing access to their ESSENCE data using the CDC's National Syndromic Surveillance ESSENCE program.
    - AFHSD-IB has now data access partnerships with eight states (AZ, MD, FL, GA, NY, NC, NJ, VA), the District of Columbia, and the Veterans Administration, allowing DOD users access to civilian data in their surrounding jurisdiction using the CDC National Syndromic Surveillance Program platform.

ESSENCE capabilities and accomplishments were presented in a session at the 2023 Defense Health Information Technology Symposium, "The ESSENCE of Post Pandemic Response," August 8-10, New Orleans, Louisiana.

BIOSURVEILLANCE HUB AND PORTAL (BSHP) FY23 SIGNIFICANT ACCOMPLISHMENTS

The BSHP project was initially conceptualized to meet the urgent operational need for real-time health surveillance information with communication channels across the health community. The project evolved into an all-hazards biosurveillance system, following mandates in the National Biodefense Strategy and DOD Directive 6420.02 "DOD Biosurveillance", which directs the DOD to establish a biosurveillance program that "integrates, synchronizes, and standardizes biosurveillance-related activities, to support countering weapons of mass destruction, biodefense and comprehensive health surveillance and forecasting." Comprehensive biosurveillance includes naturally occurring, accidental, and intentional health threats to people, animals, and the environment. Building an integrated and comprehensive biosurveillance system for the DOD necessitates engagement from health; chemical, biological, radiological, and nuclear (CBRN); and medical intelligence entities. In response to a September 2020 INDOPACOM Joint Urgent Operational Need (JUON), the Joint Requirements Oversight Council (JROC) validated capability gaps across all CCMDs and issued three Memorandums (JROCM) (098-20, 049-21, and 066-22) requesting that the DHA "accelerate the development of a centralized DOD biosurveillance hub and standard portal to integrate collected internal and external data and information across the Services and CCMDs."

The BSHP, as conceived, will provide a workbench where subject matter experts can collaborate to integrate curated products from existing systems across the DOD Health, CBRN, and medical intelligence surveillance entities. It will also provide the capability to review underlying data and synthesize publicly



The Biosurveillance Hub and Portal will use a federated approach to combine traditionally siloed or separate DOD biosurveillance information and data systems to achieve a common purpose.

available information, leading to the development of products with specific actionable information and operational relevance. The BSHP will offer communication tools necessary to rapidly disseminate these findings.

The BSHP will ensure that leadership, key stakeholders, and other partners have trusted biosurveillance information available to make informed decisions. An all-hazards biosurveillance system, such as the BSHP, requires a seamless integration of biosurveillance assets, including people, processes, tools, and technology. To execute the BSHP project, AFHSD works in coordination with the Program Executive Office Defense Healthcare Managements Systems (PEO-DHMS).

Below are the significant accomplishments for the AFHSD-IB BSHP in 2023:

- Contributed to 11 briefings for the Deputy Assistant Secretary of Defense (DASD) level Biodefense Council and Biosurveillance Strategy Group regarding BSHP progress and recommendations for the future of BSV across the DOD enterprise.
- Collaborated effectively across the CCMDs, key stakeholders, and agencies to gain insights into their needs as customers of BSHP and how the system can be designed to support their missions. BSHP engaged with 28 stakeholder groups, including AFRICOM, Air Force Surgeon General, Army Office of the Surgeon General, Bureau of Medicine and Surgery N2, Centers for Disease Control, Defense Advanced Research Projects Agency, DASD and the DASD Chemical Biological Radiological and Nuclear Office. Efforts with these stakeholders included briefings and informational meetings aimed at facilitating communication to ensure alignment with their needs and understanding of the efforts within their unique agencies/CCMDs.
- Completed an in-service system survey and held meetings on 11 platforms and software programs to explore existing solutions for biosurveillance gaps to be incorporated into the BSHP infrastructure. These engagements included: BIOFEEDS, BLUEDOT, DELOITTE, ESSENCE, GIDE, JHU – AGENT, JHU - SHIPBOARD OPERATIONAL READINESS PROJECT, NBIC BSVE, NCMI ASSYLUM, NCMI HORIZON, and REDI-NET. Through these engagements, the team and PEO-DHMS were able to gather information about existing systems and potential BSV gap solutions already available within the DOD and across industry.
- Presented the BSHP project at exercises, symposiums, and meetings to connect with key stakeholders and colleagues to further socialize current efforts in biosurveillance. These activities included: Able Resolve TTX, DHA/VA Collaboratory, DHA Transformation offsite, Defense Health Information Technology Symposium, GEIS Sequencing Summit, Military Health System (MHS) Conference, and Viral Supremacy TTX.
- Contributed to the three weeklong Capabilities-Based Assessment workshops held by Health Affairs, which meticulously examined existing surveillance activities and tools to identify areas for improvement. Through comprehensive research and analysis, discrepancies and inefficiencies were uncovered and addressed in the report, as well as next steps to strengthen the effectiveness of existing activities.
- Contributed programmatic materials to the DHA's comprehensive MHS Playbook aimed at optimizing operational processes and enhancing overall biosurveillance effectiveness.
- Prepared and disseminated a comprehensive 6-month update memo to the Secretary of Defense's National Defense Strategy (NDS), which summarized key achievements and milestones, as well as progress toward biosurveillance goals, fostering transparency with leadership and alignment with the NDS.
- Authored a comprehensive white paper for the U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency to provide insights into the current state, future needs, and potential requirements in the agency's surveillance efforts. The analysis provided actionable insights for the BSHP program.
- Led the development and launch of a functional SharePoint webpage to aid in leadership visibility of programmatic tasks, risks, and accomplishments for the BSHP program. Created features on the SharePoint site to collaborate with external users, stakeholders, and senior leaders across agencies and within BSHP-led working groups.
- Produced a white paper for the Deputy Assistant Secretary of Defense for Personnel & Readiness, describing the BSHP project, outlining the goals, mission, and areas of focus, as well as stakeholders involved and potential end users.
- Developed a white paper for DASD for Personnel & Readiness analyzing the current state of the BSHP project while forecasting its future state path at that time. The future state outline provided strategic insights to leadership to drive informed decision-making and project success.
- Organized and facilitated a strategic offsite for AFHSD and PEO-DHMS to receive briefs on PEO-DHMS efforts towards BSHP proof of concepts and technical build. This offsite fostered collaboration and alignment to develop a forward-thinking roadmap in how BSHP will support DOD BSV in achieving its objectives and supporting the mission.
- Established the Epidemiologist Sub-Working Group (SWG), including identification of key stakeholders to collaborate on the needs and requirements of the BSHP project build. Hosted the Epidemiologist SWG on a weekly basis to facilitate requirement elucidation, existing workflows, and other key elements that need to be integrated into the BSHP from a health surveillance perspective.
- Maintained the Functional Requirements Working Group to oversee and validate the requirements developed in the SWG(s), including identification of key stakeholders and interim validation of functional requirements gathered by the AFHSD IB-BSHP team.

DHA

MISSION:

The Defense Health Agency supports our Nation by improving health and building readiness—making extraordinary experiences ordinary and exceptional outcomes routine.

VISION:

Unrelenting pursuit of excellence as we care for our joint force and those we are privileged to serve. Anytime, Anywhere—Always.

AFHSD

PURPOSE:

To protect the Total Force from “all hazard” threats via actionable health surveillance information and support.

GOALS:

- Flexible, Responsive, and Predictive to Our Customers
- Early warning Capability of Global “all hazard” Threat Assessment Specific to Our Customers
- Inform Risk Management Decisions Across the Health Surveillance Enterprise.

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