



EPIDEMIOLOGY AND DISEASE SURVEILLANCE (EDS)

EDS MISSION

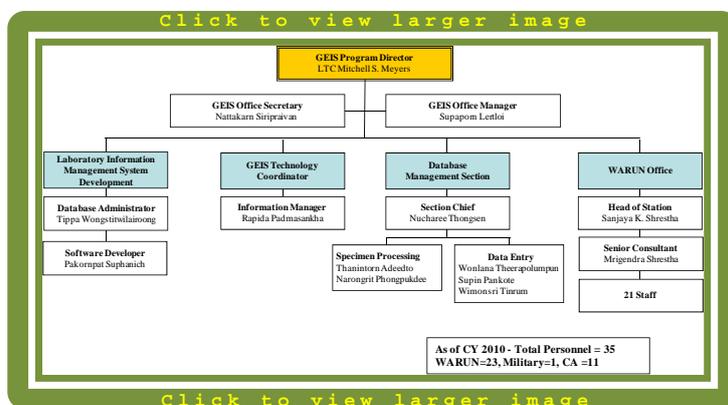
EDS develops and attempts to improve surveillance systems/networks throughout South and Southeast Asia to monitor a number of infectious diseases, including influenza, malaria, drug-resistant enteric organisms and febrile illnesses. Technology transfers and training conducted by AFRIMS promotes host nation ownership of these programs, ensuring sustainability. The local infrastructure improvement allows rapid diagnosis of diseases at the local level, improved patient care, and real-time surveillance of infectious diseases previously unavailable. This information is then available to the world health community and to the U.S. Department of Defense, providing improved global health security and force protection.

The pillars of the AFHSC-GEIS program at AFRIMS support the overall AFRIMS mission. They include:

Surveillance focusing on

- Respiratory illnesses, especially influenza
- Enteric pathogens and antibiotic resistance
- Malaria and anti-malarial resistance
- Etiologies of acute febrile illnesses
- Infectious disease outbreak response
- Training and capacity building

PERSONNEL



RESEARCH AREA DIRECTORATES (RADs)

Non-applicable

ACCOMPLISHMENTS

Global Emerging Infectious System (GEIS) funded programs at AFRIMS have expanded surveillance, response capabilities, laboratory capacity and training in Thailand and surrounding countries in South and Southeast Asia. Through these programs, the U.S. Military is assisting the region to build their laboratory capacity and surveillance programs, share data with the region and the world and ultimately provide global stability through advanced recognition and response to new and emerging pathogens.



Surveillance and Detection

GEIS support has allowed AFRIMS to leverage expertise in malaria drug-resistance, diarrheal disease and antibiotic resistance, febrile illnesses, zoonotic diseases and respiratory pathogens to expand surveillance programs throughout the region. With evidence of reduced overall sensitivity of *P. falciparum* to antimalarial drugs in SE Asia, AFRIMS is conducting an artesunate-mefloquine combination therapy efficacy trial along the Thai-Burmese border and performing surveillance for emerging artemisinin resistance.

AFRIMS conducted diarrheal pathogen surveillance in 5 sites in Thailand and 3 in Nepal. AFRIMS used EIA and RT-PCR to screen for emergent viral diarrheal pathogens in 625 stool samples from Nepal with no known enteric pathogens by standard microbiology for bacteria. Tests were done for rotavirus, adenovirus, astrovirus, Giardia, Cryptosporidium, Norovirus, Rotavirus, and Sapovirus. Testing revealed that Sapovirus was the most prevalent enteric virus detected at 11% from diarrhea cases and 6% from controls. Astrovirus was the second most prevalent virus detected at 3.3% from cases and 2.6% from controls.

Pooled results from thousands of diarrheal samples collected in Thailand and Nepal reveal that the majority of positive isolates are *Salmonella* or *Campylobacter* species, but with many controls also having positive stool cultures. The majority of *Campylobacter* were resistant to nalidixic acid and ciprofloxacin.

Many emerging infections are zoonoses. In response to this threat, AFRIMS is conducting ongoing rodent and ectoparasite surveys to establish basic descriptive information on species of ectoparasites and rodents collected from around the homes of patients suspected of having bartonellosis. AFRIMS is also evaluating archived rodent samples collected from Chumphon, Phetchaburi, and Prachuap Khiri Khan for the presence of pathogenic *Leptospira* using a Taqman-based real-time PCR assay. Out of 453 rodents tested so far, 47 were found to contain pathogenic *Leptospira* (10.4%).

Comprehensive influenza surveillance is critical in Southeast Asia and AFRIMS has established influenza sentinel sites throughout the region. In CY10 AFRIMS performed laboratory-based influenza surveillance on samples from approximately 70 field sites in South and Southeast Asia. It collected and processed 5,528 specimens from patients meeting ILI criteria in Bhutan, Cambodia, Nepal, Philippines, Thailand, and several U.S. Embassies. Of these samples 39% were PCR positive for influenza, 48% were negative for influenza, and 13% are still pending definitive analysis.

Response and Readiness

AFRIMS assists the Thai Ministry of Public Health and other regional governments in diagnosing emerging infections. In CY10 a large outbreak of febrile illness occurred in Nepal killing dozens of people. Both WARUN and AFRIMS assisted the Nepalese National Laboratory to help determine possible causes of the outbreak.

GEIS also supports the use of electronic surveillance tools and has helped to develop the software now being used by the Royal Thai Army in its remote border areas for conducting syndromic surveillance and responding to outbreaks. In CY10 RTA-AFRIMS added three new Royal Thai Army syndromic surveillance stations on the northern Thai-Cambodia border area and trained 1,049 RTA personnel to use the recently adopted military unit-based surveillance (UBS) software system 2.0.



Integration and Innovation

AFRIMS works with multiple agencies throughout SE Asia to integrate important public health data with existing surveillance networks. All influenza testing results are provided to the countries for inclusion in the WHO FluNet Program. In addition, there are several projects that use innovative techniques to bring new data to the attention of public health agencies. The Royal Thai Army has established an early warning system for medical threats in military-controlled areas along the Thai border that are not accessible to the Ministry of Public Health network. At the field site in Cebu, Philippines, AFRIMS used GIS to establish baseline spatial, demographic and health facility utilization data for households to determine spatial and temporal relationships of disease incidence and transmission correlated to possible causative factors. For influenza diagnostics AFRIMS evaluated the Quidel QuickVue influenza A+B rapid test for detection of pandemic influenza A/H1N1 2009. Analysis of 360 nasal specimens indicates that the kit only has a moderate sensitivity of 63%, but a specificity of 96% for this influenza strain.

Cooperation and Capacity Building

An important goal at AFRIMS is to strengthen regional capacity, both with AFRIMS assets to provide diagnostic support and to improve our partner's capabilities. We have added diagnostic capabilities for West Nile virus, Brucellosis, hepatitis A, B and C, leptospirosis and malaria as well as blood cultures and antibiotic sensitivity testing to the Walter Reed/AFRIMS Research Unit-Nepal (WARUN).

AFRIMS developed a robust system to support its influenza surveillance and research efforts, which includes commissioning the first fully certified BSL-3 laboratory in Thailand. This facility will benefit AFRIMS, the U.S. government, Thailand, the region, and the COCOM by providing capabilities of working with HPAI and other select agents in safe, biosecure environment. Lab personnel completed all the required training to start working with Chikungunya, and are currently awaiting approval of a second protocol.

AFRIMS is working with the Vietnam Ministry of Defense to improve their influenza diagnostic and surveillance capacity.

With GEIS support, a liquid nitrogen plant is being built that will increase the lab capacity to maintain frozen specimens at the blackout prone facility in Kathmandu.

Training is an important part of AFRIMS' mission and, with GEIS support, AFRIMS set up a clinical training program for Cambodian soldiers and civilians on febrile respiratory illness surveillance and trained laboratory personnel on PCR methods for influenza detection.

IN-HOUSE TRAINING PROGRAMS AND OUTSIDE TRAINING OF PERSONNEL

In-House Biomedical Education

Training is performed continuously at AFRIMS. Laboratory personnel from WARUN, Cebu and Kamphaeng Phet have received training in new influenza primers and protocols for real-time PCR, including the pandemic H1N12009. AFRIMS also serves as a training site for U.S. military and civilian medical students, residents, and infectious disease fellows pursuing careers in tropical medicine and research.

Outside Training Provided by Department

Hosted Nepalese Epidemiology and Disease Control Division lab personnel for advanced malaria microscopy training with the Department of Immunology, September 2010.

Influenza Surveillance Training, Siem Reap, Cambodia, October 2010.