DoD Global Emerging Infections Surveillance & Response System (DoD-GEIS)

An Update

Presented to the
Defense Health Board
23 May 2007

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Functions

- Provides Emerging Infectious Disease (EID) consultation
- Identifies and addresses EID vulnerabilities in surveillance, response, and infrastructure
- Assists DoD partners in developing and implementing programs and projects to prevent and mitigate EID threats
- Provides coordination for assembling and sharing information on EID threats

Surveillance Priorities

- Respiratory Illnesses (esp. influenza)
- Febrile Illnesses (esp. malaria and dengue)
- Enteric (acute diarrheal) Illnesses
- Antimicrobial Resistance
- Sexually-transmitted Infections

“A Global Network”

AFIP

WRAIR/NMRC

USACHPPM

NEHC

Navy Hub

Air Force Hub

Peru

Germany

Egypt

Kenya

Korea

Thailand

Indonesia

DoD’s Unique Assets – Overseas Presence with OCONUS Labs

Former DoD-GEIS Directors

COL (Ret) Patrick W. Kelley MD, DrPH
June 1997- June 2003

CAPT (Ret) Joseph L. Malone MD
June 2003 – February 2006

New Home of DoD-GEIS

(Since 1 October 2006)

2900 Linden Lane
Silver Spring, Maryland 20910

- Proto Armed Forces Health Surveillance Center
- Co-location with Army Medical Surveillance Activity (on 2nd floor)
- Within ½ mile of WRAIR and Forest Glen Annex
- Continued Support from WRAIR and USAMRMC

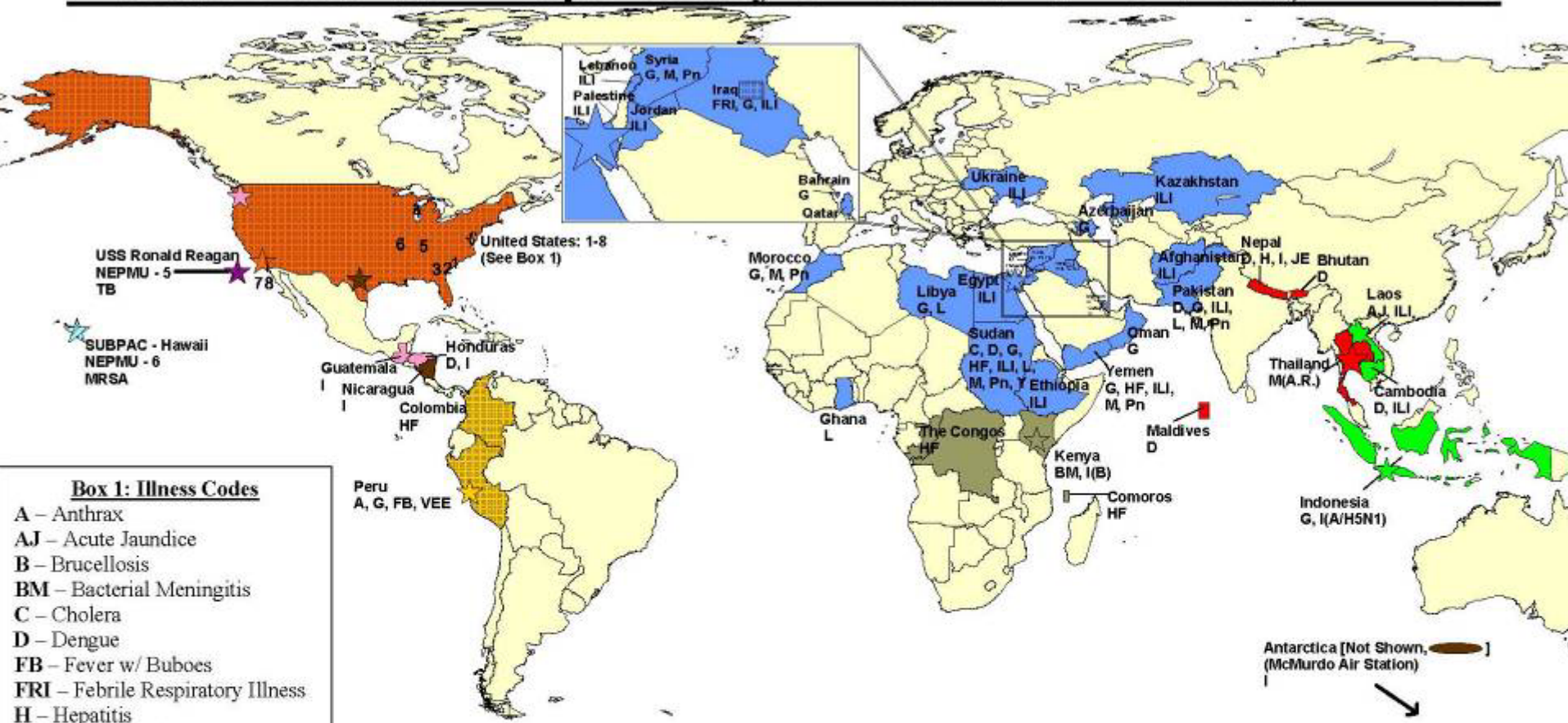
DoD-GEIS Communications Center

- Videoteleconference (VTC) Capability
- Main Suite & Workstations
- Main Control Desk

Interagency Collaboration

- Department of Health and Human Services/ Centers for Disease Control and Prevention
- Department of Homeland Security
- Department of State
- Department of Defense
  - Joint Staff
  - COCOMs
  - DTRA
  - Homeland Defense

Disease Outbreak Responses by GEIS and its Partners, FY 2006



Box 1: Illness Codes

- **A** – Anthrax
- **AJ** – Acute Jaundice
- **B** – Brucellosis
- **BM** – Bacterial Meningitis
- **C** – Cholera
- **D** – Dengue
- **FB** – Fever w/ Buboes
- **FRI** – Febrile Respiratory Illness
- **H** – Hepatitis
- **HF** –Hemorrhagic Fever
- **G** – Gastroenteritis
- **I( )** – Influenza (Type)
- **ILI** – Influenza-Like Illness
- **JE** – Japanese Encephalitis
- **L** – Leishmaniasis
- **M (A.R.)** – Malaria with artemisinin failures
- **MRSA** – Methicillin-Resistant Staphylococcus
- **Pn** – Pneumonia
- **S( )** Streptococcus (Group)
- **TB** - Tuberculosis
- **VEE** – Venezuelan Equine Encephalitis
- **Y**- Yellow Fever

Box 2: U.S.A.
NHRC FRI Surveillance
(Name: Disease Outbreaks)

1. Ft. Jackson: FRI, S(A)
2. MCRD Parris Island: FRI, S(A)
3. Ft. Benning: FRI
4. NRTC Great Lakes: FRI
5. Ft. Knox: S(A)
6. Ft. Leonard Wood: FRI, S(A)
7. MCRD San Diego: FRI, I(A)
8. BUD/S San Diego: S(Pn)

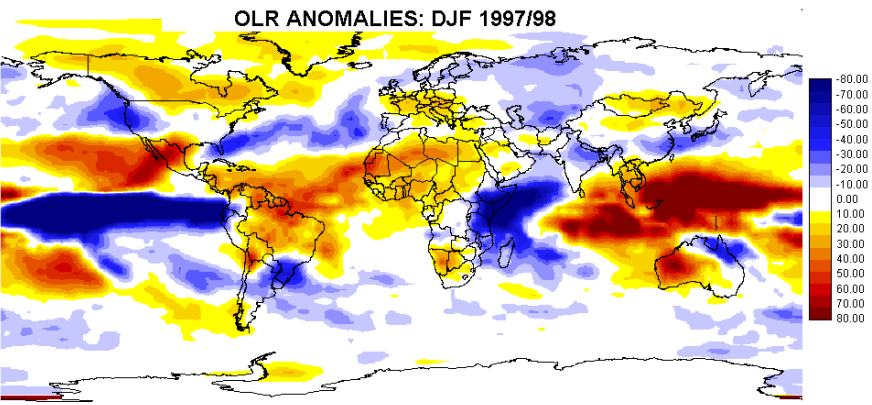
Legend

- NHRC
- CHPPM-W
- NEPMU-6
- NEPMU- 5
- NMRCD-Peru
- NAMRU-3
- AFRIMS
- NAMRU-2
- AFIOH
- USAMRU-K
- = In Military Population
- = In Civilian Population

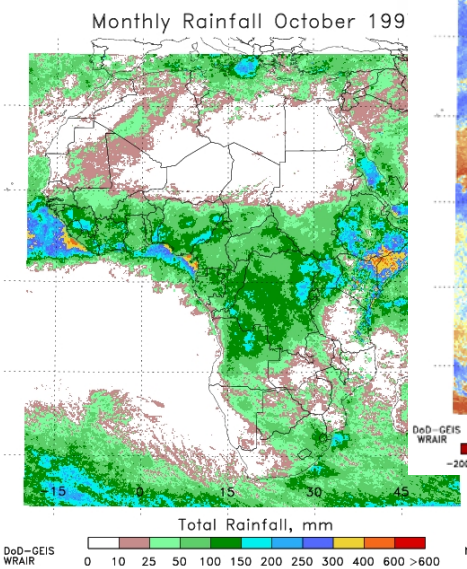
EID “In The News”

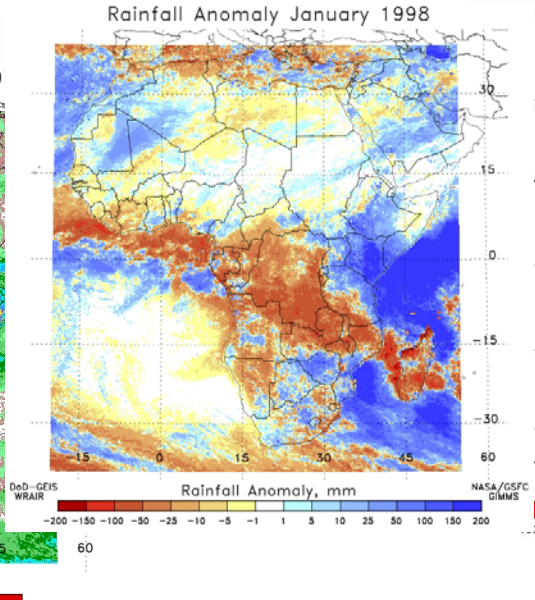
- XDR-Tb in South Africa
- Chikungunya in East Africa and Indian Ocean
- Threat Agents:
  - 300+ Sheep in Idaho with *Francisella tularensis*
  - 90+ cases with 5+ deaths of gastrointestinal anthrax in Indonesia
  - 18 cases of tularemia in R of Georgia

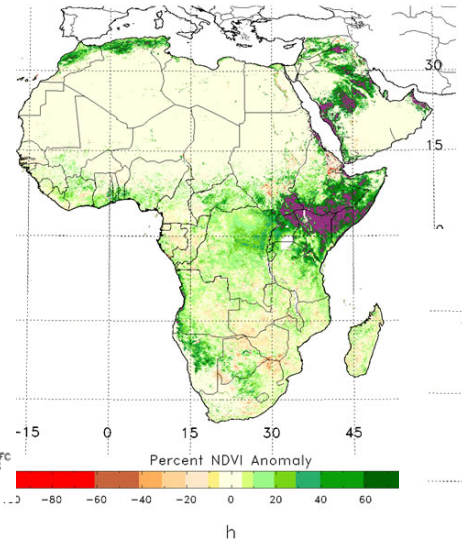
Rift Valley Fever Monitoring

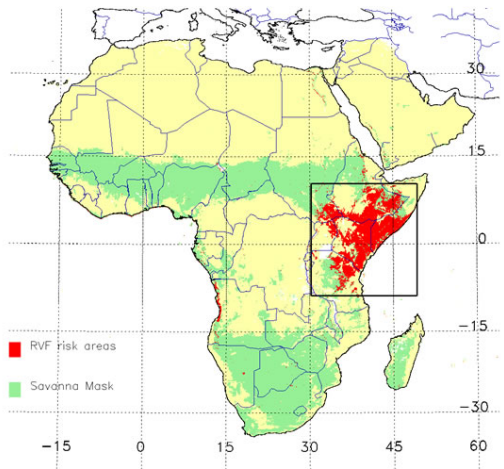


http://www.geis.ha.osd.mil/RVFWeb/index.htm









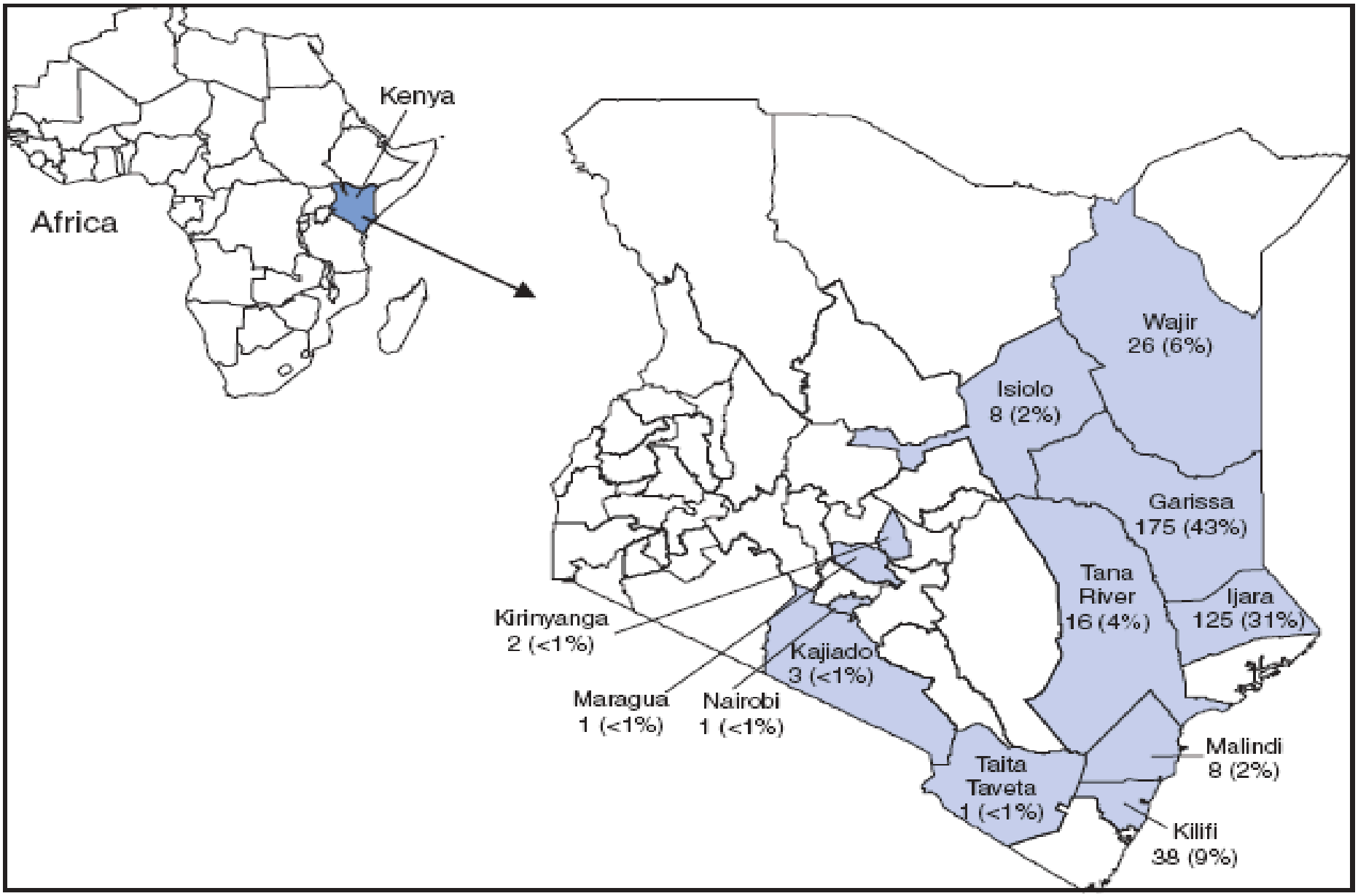
Persistence mapping of “above” normal vegetation conditions

g. DJF 1997/

DoD GEIS Global Emerging Infections System

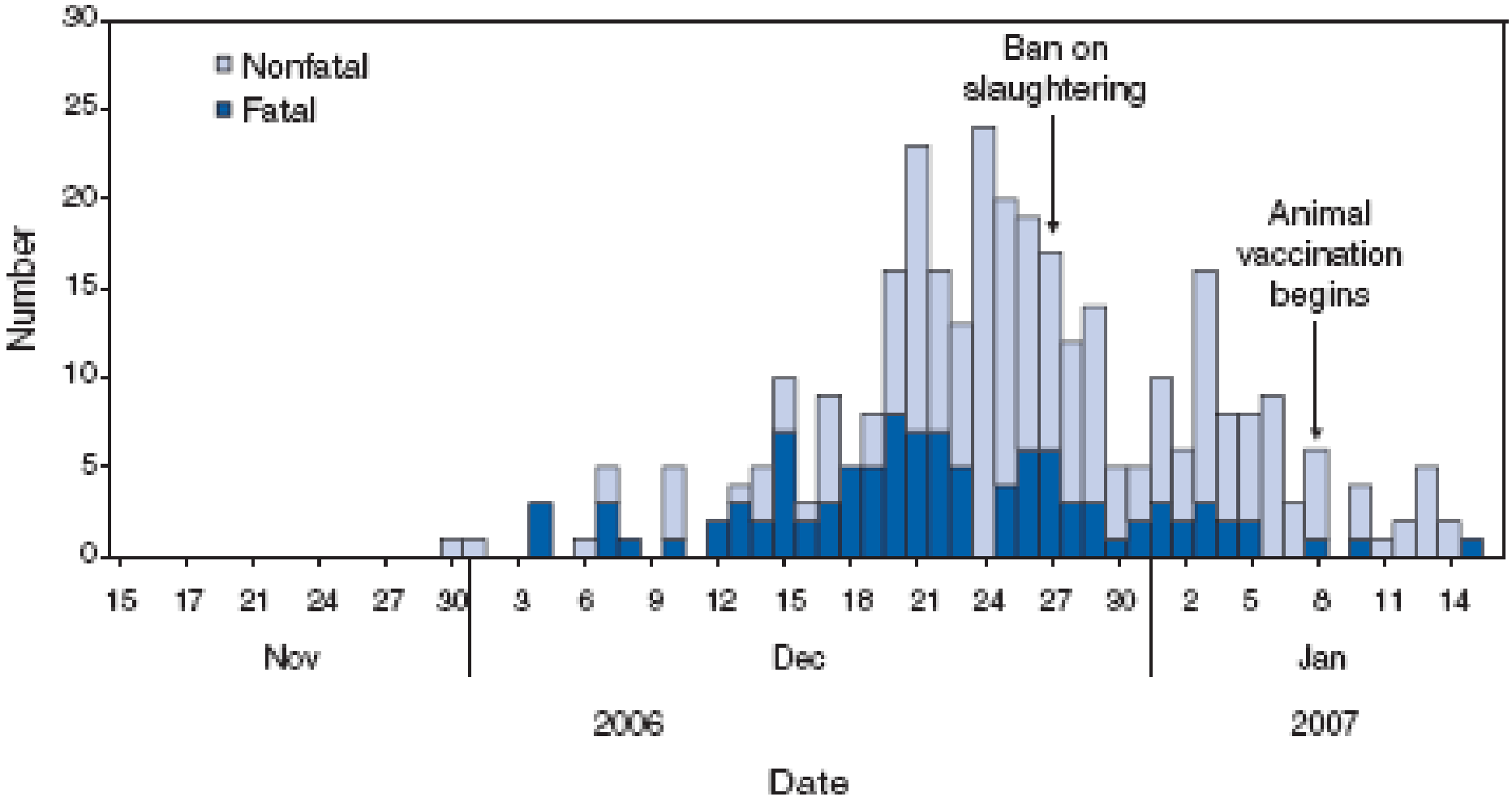
NASA

FIGURE 2. Number and percentage of reported Rift Valley fever cases (N = 404), by district — Kenya, November 2006–January 2007*



* As of January 25, 2007.

FIGURE 3. Number of reported Rift Valley fever cases (n = 330), by date of illness onset — Kenya November 2006–January 2007*



*As of January 25, 2007, for cases with known date of onset.

EID in the Military

- Antibiotic resistance in Acinetobacter strains (wound infections)
- Respiratory disease
  - In deployed forces (Afghanistan)
  - Adenovirus 14 at recruit bases
- Hepatitis E in deployed forces
- Possible under-diagnosed diseases
  - Q fever in deployed forces
  - Scrub Typhus (Korea)
  - Malaria (Afghanistan)

Growing Relationships for GEIS

Seul Institut de médecine tropicale militaire en Europe

Institut de médecine tropicale du service de santé des armées

French Foreign Operations

Since 1992
BOSNIE
ASTREE

Since 1999
KOSOVO
TRIDENT

Since 1978
LIBAN
FINUL/DAMAN 2006

Since 2006
LIBAN
BALISTE

Since 2001
AFGHANISTAN
PAMIR

Since 2001
TADJIKISTAN
HERACLES

Since 2002
RCI
LICORNE

Since 2004
RCI
ONUCI

9 Active theaters
11 Operations in progress
55% Multinational
4% = Rate SSA / strength
500 Permanents on duty

Since 1986
TCHAD
EPERVIER

Since 1996
CAMEROUN
ARAMIS

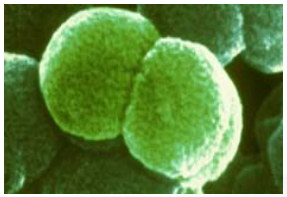
Since 2003
RCA
BOALI

2007

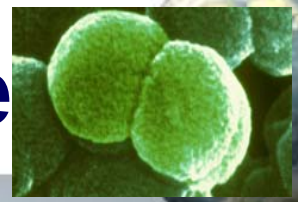
ONU OTAN UE FR

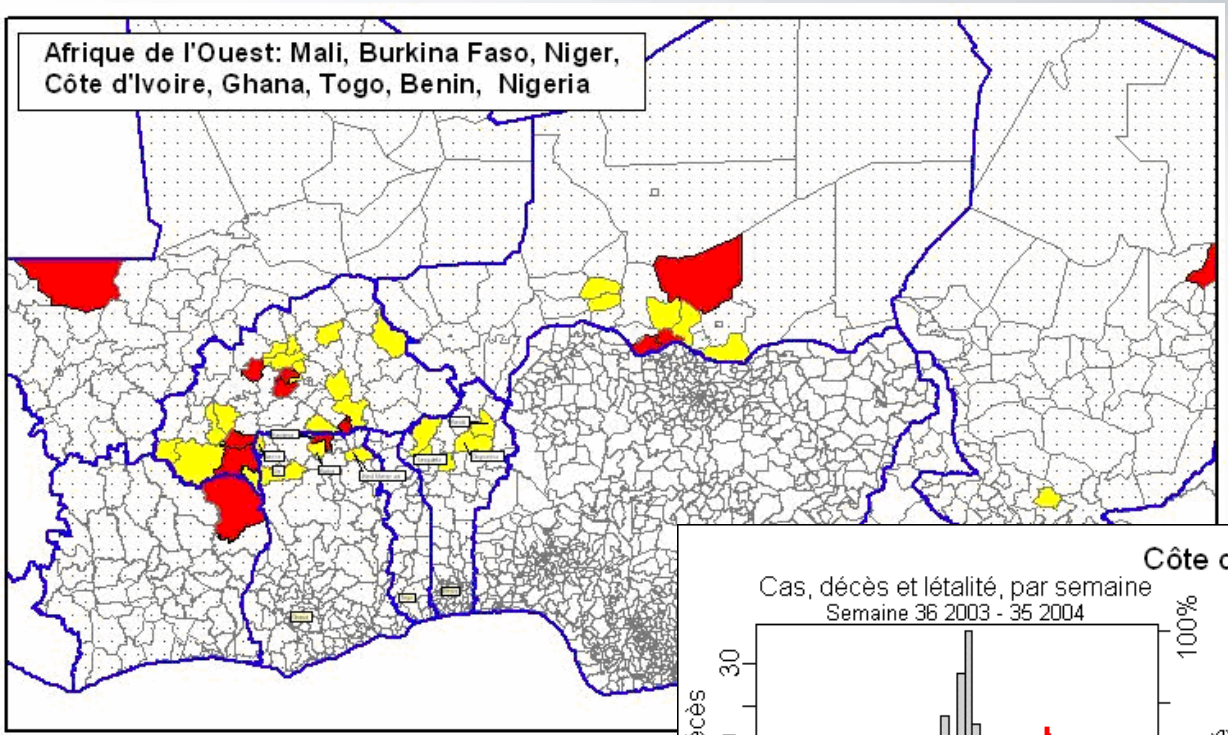
Forces hors métropole

40.000 militaires, 5 continents, 30 localisations



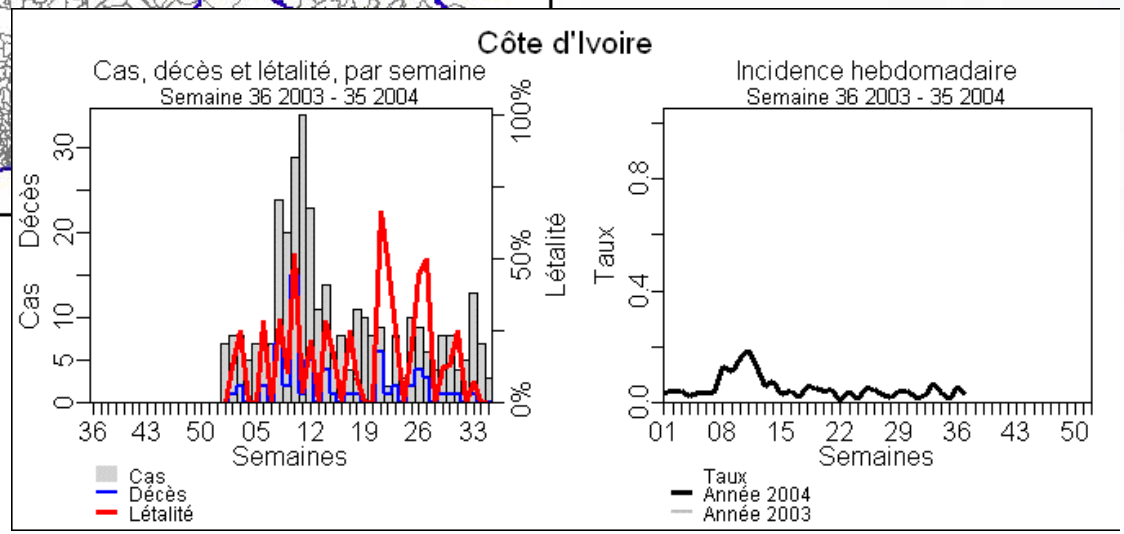
Unité du méningocoque





Situation de la méningite en Afrique de l'Ouest en 2004 (OMS)

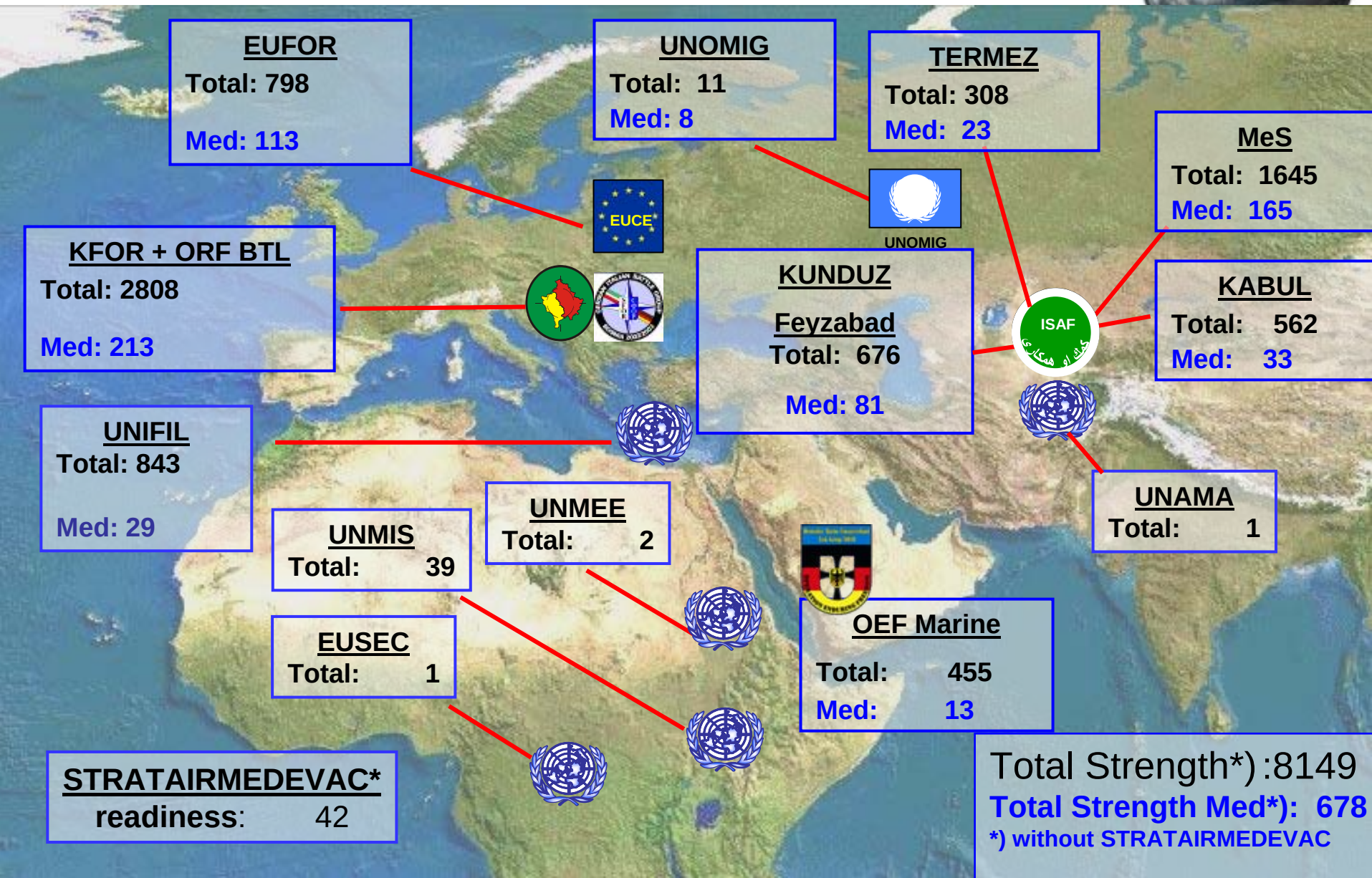
- **Majorité de groupe A**
- **Burkina : A et W135**



Bundeswehr Institute of Microbiology, Munich

Bayern State Health Department, Munich

Current Situation Troop Strength

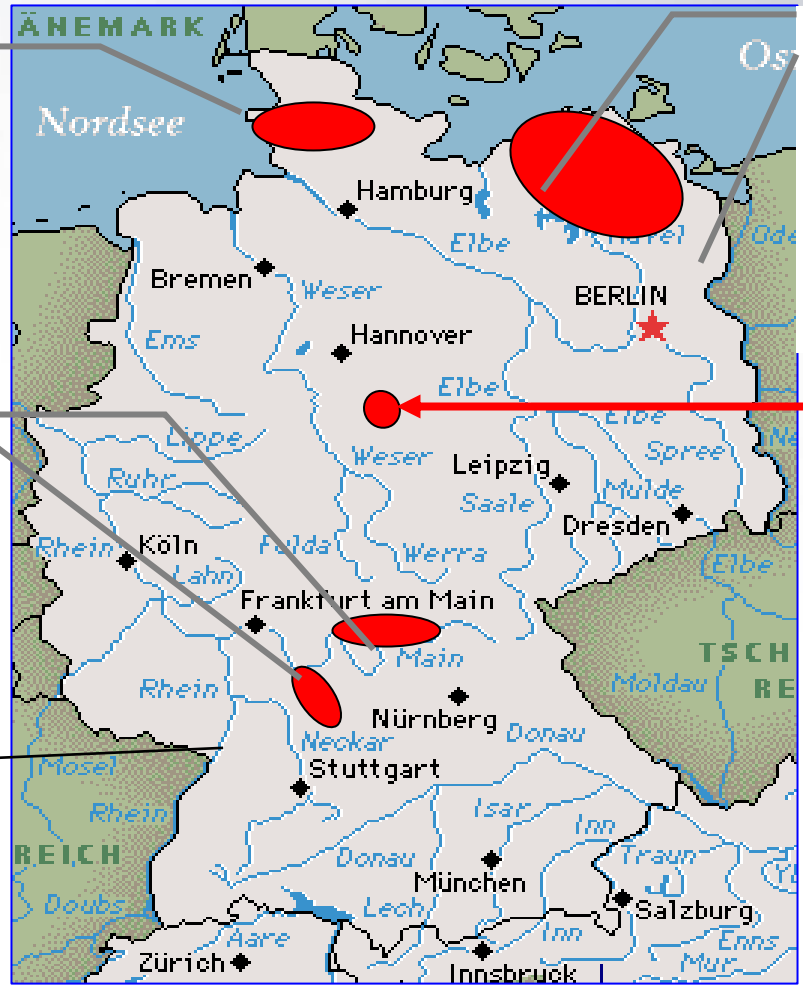


Facit: New Background Level of Tularemia in Germany

Endemic-enzootic areas

Eiderstedt
County
(1949-61)
140 cases

Mecklenburg-Vorpommern, Uckermark
(1949-60)
102 cases



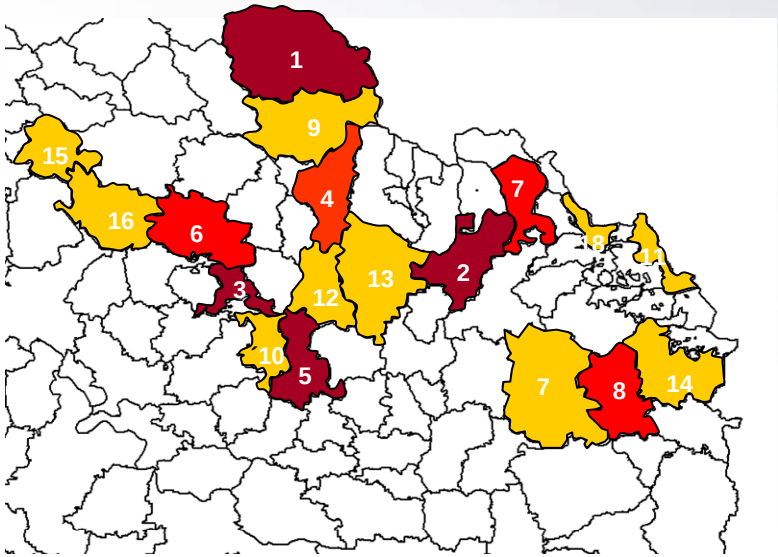
Main-Tauber Valleys
(1950-61)
57 cases

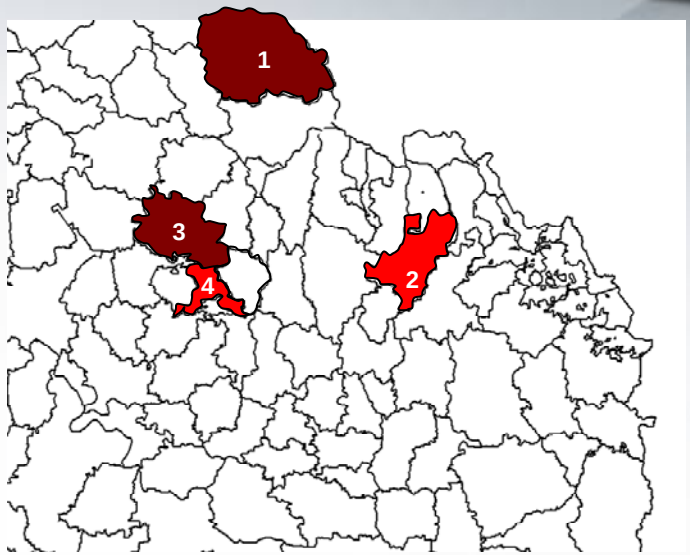
Göttingen County
2002, 2004, 2005

Darmstadt county
Autumn 2005
(13 cases)

Identification of a new natural focus of *Tularemia* in Germany!

Correlation of Occurrence of Human Cases and Hantavirus Positive Rodents





13.03.04

① Lindberg	3 cases	11.Haidmühle	1 case
② Hohenau	3 cases	12. Schönberg	1 case
③ Schöfweg	3 cases	13. Grafenau	1 case
④ Spiegelau	3 cases	14. Neureichenau	1 case
⑤ Thurmannsbang	3 cases	15. Zachenberg	1 case
⑥ Kirchberg	2 cases	16. Bischofsmais	1 case
⑦ Mauth	2 case	17. Waldkirchen	1 case
⑧ Jandelsbrunn	2 case	18. Philippsreut	1 case
⑨ Frauenau	1 case		
⑩ Zenting	1 case		

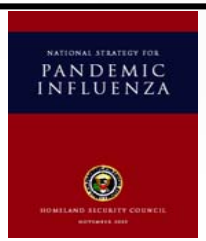
location	voles	PCR+	Serology+	
① **Falkenstein**	**9**	**33%**	**33%**	
② **Raimundsreuth**	**14**	**21%**	**21%**	**+ 33% y-n. mouse**
③ **Hangenleithen**	**5**	**40%**	**20%**	
④ **Langfurth/ Mutzenwinkel**	**5**	**0**	**40%**	

InstMikroBioBw, Munich
Diagnostic Capabilities

Since 1989:	Orthopox virus diseases	Germany
Since 1996:	Meliodosis cases	Germany/ Southeast Asia
1997:	Plague epidemics	Madagascar
1999:	Glanders (horses)	Turkey
Since 1998:	Tularemia cases	Germany
2000/2002:	Tularemia epidemics	Kosovo
Since 2000:	Monkeypox outbreaks	Zaire/Congo
Since 2002:	Brucellosis Surveillance	Germany
2003:	Tularemia outbreak	Sweden
	Ebola fever outbreak	DR Congo
2004/05:	„Konjunctivitis“- outbreaks	Germany
	Tularemia outbreak	Germany
	Nephropathia epidemica	Germany
	Glanders outbreak	United Arabic Emirates
Since 2005:	Plague outbreaks	DR Congo
	Chikungunya-fever, Rickettsiosis	Germany (imported)

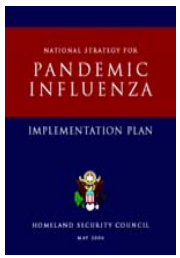
DoD Influenza Surveillance and Response Activities

Applicable Guidance & Authority



National Strategy

- **Preparedness and Communication**
- **Surveillance and Detection**
- **Response and Containment**
- *Signed by the President Nov 2005*



National Implementation Plan

- **POTUS level document -** *signed by the President May 5, 2006*
- **Directs Departments and Agencies to develop supporting plans**
- **Assigns 323 inter-agency tasks**
- **Clarifies roles/responsibilities of all stakeholders with key topics**
- **HSC identified 4 planning priorities – Protection of Health/Safety of Personnel/Resources, Determination of Essential Functions/Services, Support to Federal-State-Local levels, Effective Communications**
- **DOD added 5th Priority – Support to Int'l Partners, Int'l Stability and Security**

DoD Implementation Plan

- **"Top priority protection of DOD forces…critical military, civilian, contractor roles…and resources to maintain readiness…priority consideration...given to protect DOD beneficiaries"**
- **114 of the 323 total tasks assigned to DOD**
- **31 as Lead and 83 as Support**
- **DOD Implementation Plan tasks subordinate DOD Departments/Agencies**

Biosurveillance, Disease Detection, and Information Sharing Requirements for PI Expanded Missions (GEIS Tasks)

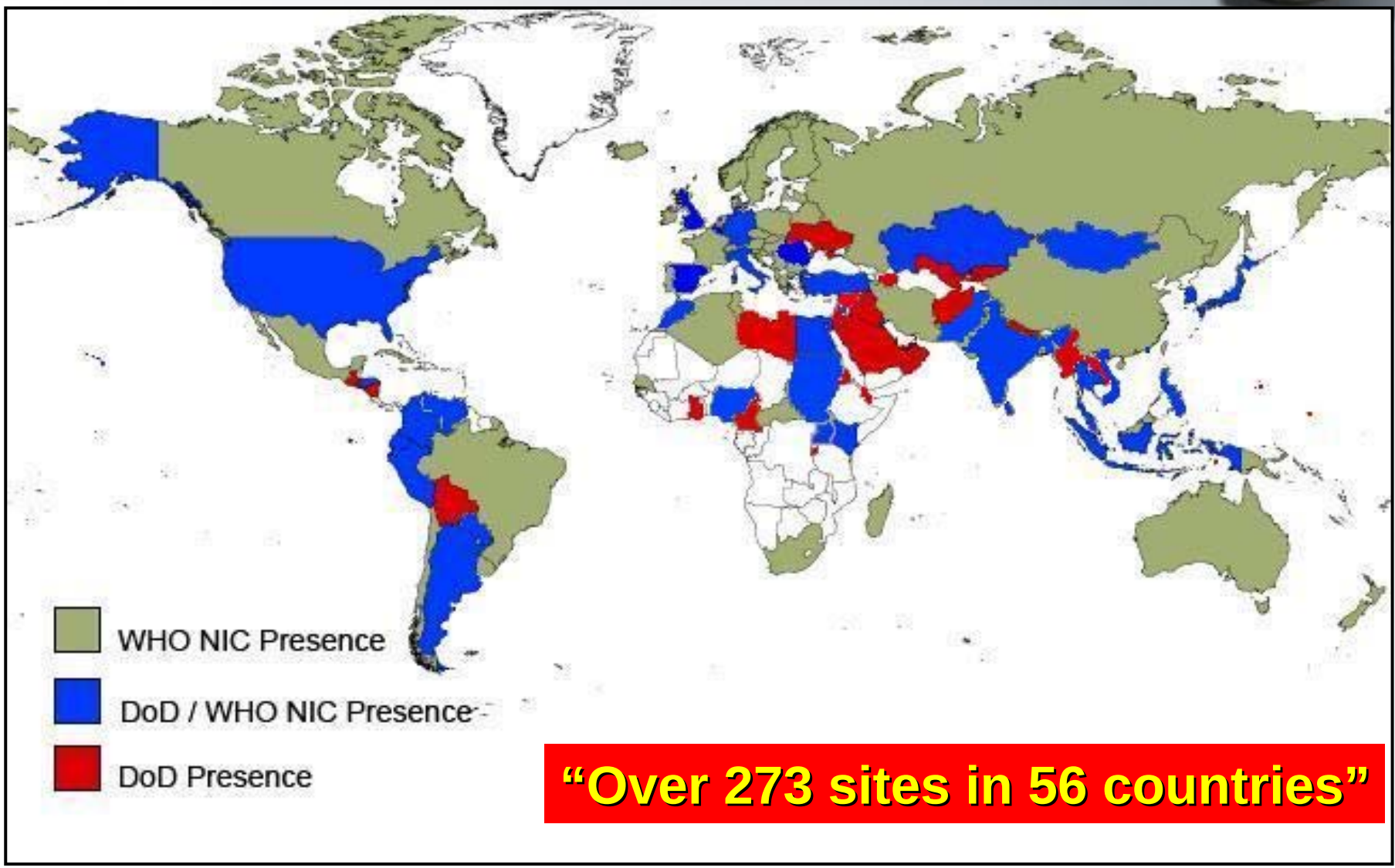
Expansion of Mission Tasks Requiring Additional Funding (FY07/Outyears)

- 4.2.2.5 – Inpatient/Outpatient Disease Surveillance ($3M/17M)
- 4.2.2.7 – Assist with Influenza Surveillance in Host Nations ($8M/57M)
- 4.2.3.8 – Develop/Enhance DoD Network of Overseas Infrastructure ($15M/99M)
- 6.2.2.9 – Enhance Public Health Response Capabilities ($9M/58M)
- 6.2.3.4 – Access to Improved Rapid Diagnostic Tests ($2M/13.8M) "related to GEIS, but not a GEIS task"
- 6.3.4.7 – Enhance Influenza Surveillance Reporting Techniques ($10M/66M)

Lab-Based Influenza Surveillance

- **Sentinel Surveillance**
  - Air Force Institute for Operational Health (San Antonio, Texas)
- **Population-based Surveillance**
  - Navy Health Research Center (San Diego, California)
- **International Surveillance**
  - NAMRU-2 (Jakarta, Indonesia)
  - NAMRU-3 (Cairo, Egypt)
  - NMRCD (Lima, Peru)
  - AFRIMS (Bangkok, Thailand)
  - USAMRU-K (Nairobi, Kenya)

Influenza Surveillance by DoD



"Over 273 sites in 56 countries"

Sentinel Surveillance Impact

- CDC has received > 900 isolates (1998-2006)
  - Total of 120 isolates in FY06
- Growing number of sites internationally
- Identify genetic drifts/shifts through sequencing
  - H1N1 in Japan, RoK, Thailand & Kuwait (Summer 06)
- Vaccine contributions in the past (year used):
  - A/Panama/H3N2: Seed virus for vaccine 4 yrs (2000-04)
  - A/New Caledonia/H1N1: Peruvian cadets, 1999 (2000-07)
  - A/California/H3N2: Nepal, 2004 (2005-06)
  - B/Malaysia: Arizona and Nepal, 2005 (2006-07)

Population-based Surveillance

Naval Health Research Center

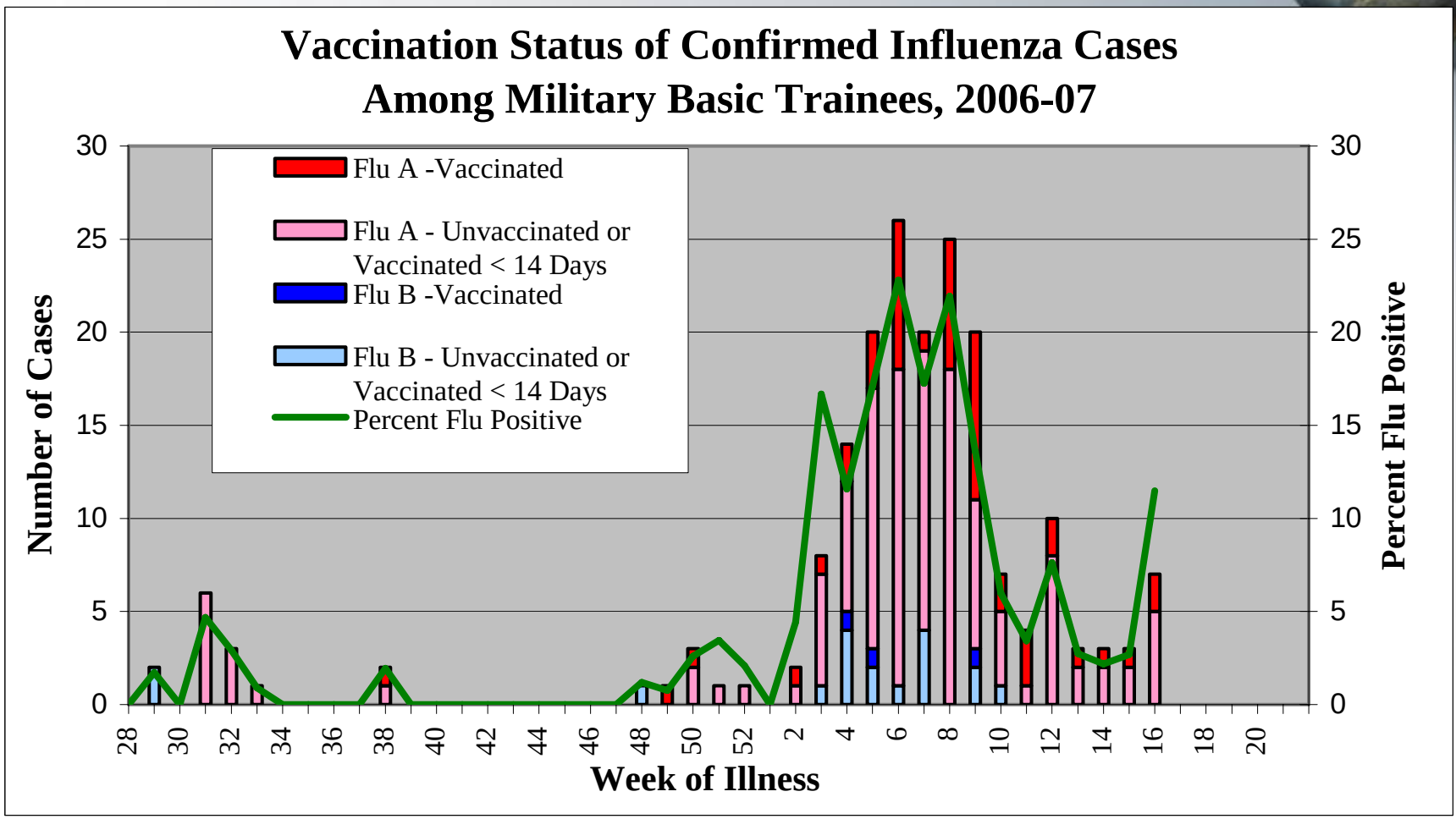
- Febrile Respiratory Illness (FRI) Surveillance
- FRI Surveillance in a U.S.-Mexico Border Population
- Shipboard Surveillance for Febrile Respiratory Illness

Influenza Diagnostic Collaborators:

- Center for Disease Control and Prevention (CDC)
- Armed Forces Institute of Operational Health (AFIOH)

Population-based Surveillance

Vaccination Effectiveness



Estimated vaccine effectiveness among basic trainees in 2005-06 = 92%

(Strickler JK, Hawksworth AW, Myers C, Irvine M, Ryan MAK, Russell KL. *Influenza vaccine effectiveness among US military basic trainees, 2005–06 season.* Emerg Infect Dis, 2007 Apr)

EUCOM-led Surveillance

- Population-based ILI surveillance throughout EUCOM
- Collaboration between LRMC, USACHPPM-Eur and AFIOH
- Inclusion of approximately 65 surveillance sites
- Referral of Influenza-positive specimens to AFIOH for genetic sequencing in support of seasonal vaccine development
- Laboratory Response Network (LRN) site for confirmation of H1, H3 and H5 (in future H7 and H9)
- BSL-3 level facility to be completed in FY08 with assistance of German authorities & sharing of data with German (Koch Institute) NIC

Participating Military Treatment Facilities in Europe

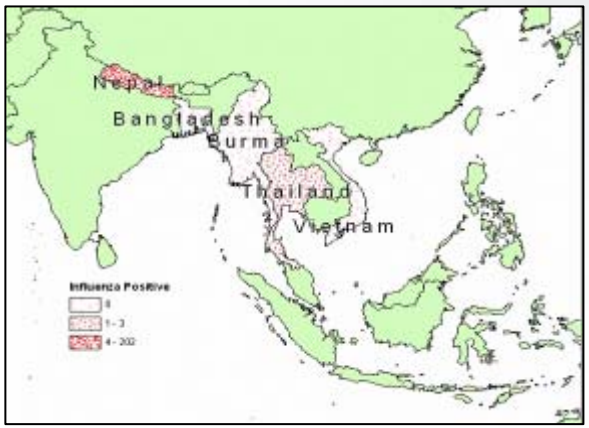
- Navy (NAVEUR)
- Air Force (USAFE)
- Army (USAREUR)
- Deployed Site

*A few specimens have also been submitted by deployed locations in CENTCOM (Kuwait, Qatar).

THAILAND

AFRIMS

Highlights of AI/PI Work in FY06/07



- Sentinel surveillance sites established in Nepal, Thailand and the Philippines and at regional US Embassies
- Philippines: New sites in early FY07
- Nepal-based Influenza surveillance network:
  - Detected H1N1 and H3N2 strain emergence in Jun-Jul 04-05
  - Jul-Aug 06 outbreak with 174 cases sampled by WARUN staff
  - H3N2 subtype similar to vaccine strain for 2006-07 (Wisconsin-like strains)

AFRIMS

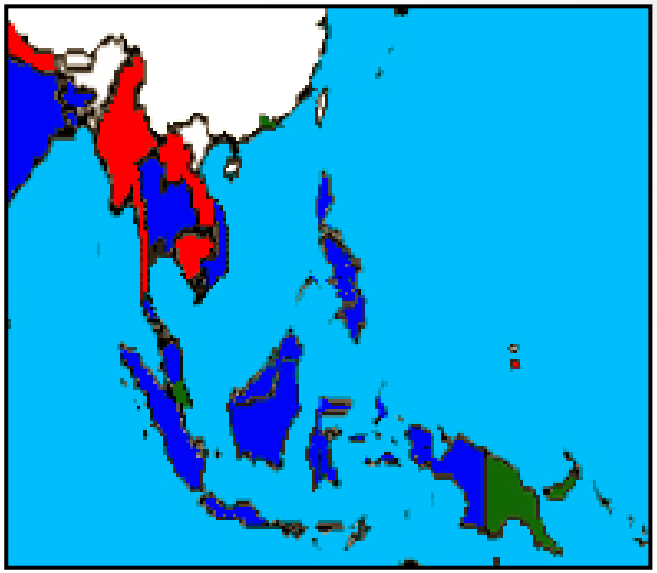
Highlights of AI/PI Work in FY06/07

- US Embassy site reporting from 11 countries in region
- Internet-based reporting from Thai civilian hospitals in 18 key provinces and 6 Royal Thai Army hospitals in border areas of Burma, Laos, Cambodia & Malaysia
- Build-up of new BSL-3 laboratory in Bangkok
- PCR lab in Burmese border in FY07
- Upgrade of Vet Med BSL-3 facility

INDONESIA

NAMRU-2

Highlights of AI/PI Work in FY06/07

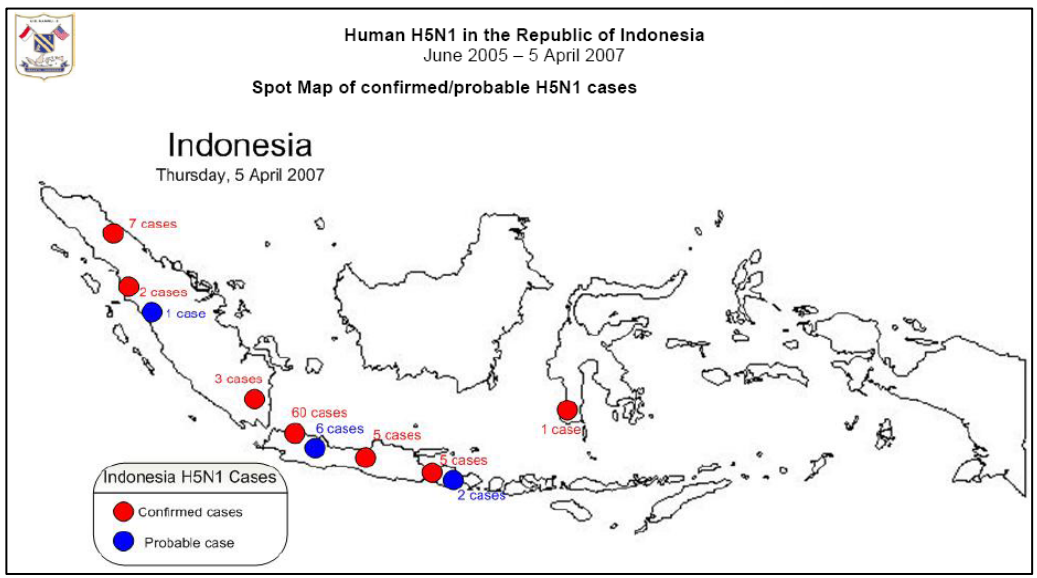


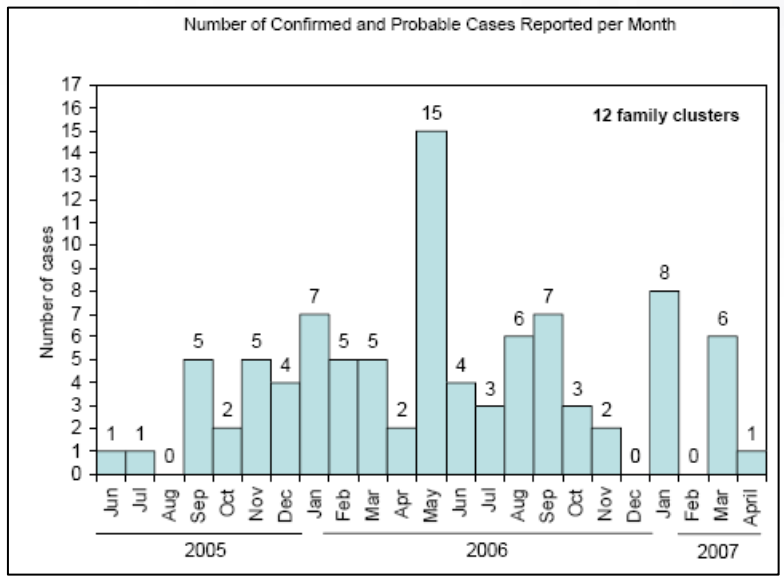
- Surveillance sites in 3 countries
- BSL-2+ Labs in Jakarta & Phnom Penh
- Collaborative Lab in Vientiane (at NCLE)
- Singapore Diagnostic Lab Platform
- Key Studies in FY06-07:
  - Longitudinal cohort study of 600+ households in Cambodia & Thailand (H1-H9 surveillance; w/ Univ of Iowa-CEID)
  - Remote sensing & environmental risk factor modeling project
  - Migratory and domestic bird surveillance
  - Pediatric and Influenza-like illness study

NAMRU-2
Jakarta, Indonesia

NIHRD, WHO and CDC collaboration and investigative support for all H5N1 suspected cases

- **Total of 83 confirmed cases (Jun 05-Apr 07), young age**
- **Peak of cases in May 06 and Jan 07; activity throughout past 2 years**
- **High-level mortality (63 deaths, 76%)**
- **Twelve familial clusters identified (Jun 05-Apr 07)**





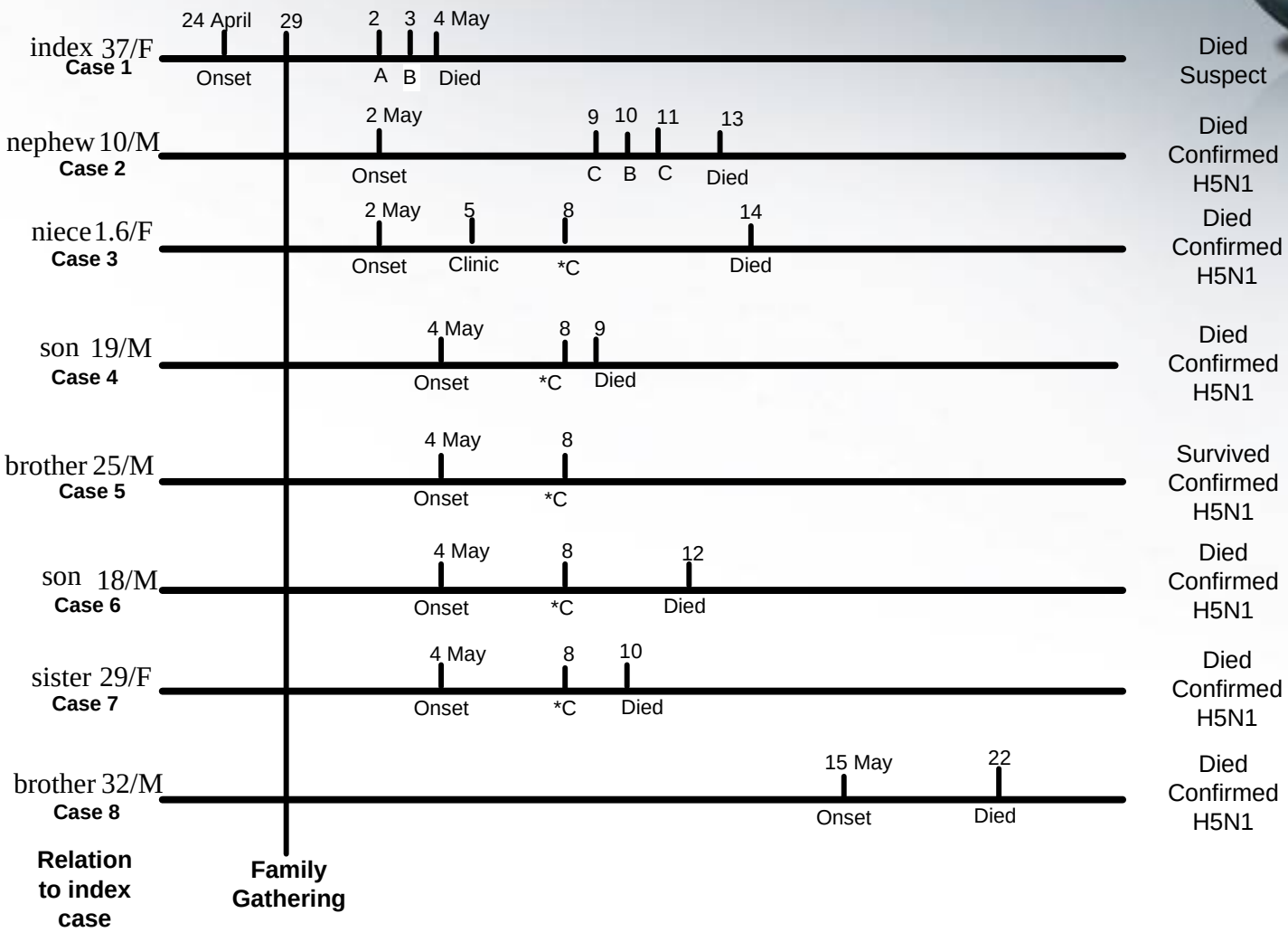
North Sumatra, May 2006

Karo District, N. Sumatra, Indonesia

G. Tallis, WHO

Home of Index Case

Timeline of suspect and confirmed H5N1 cases, Karo District, North Sumatra Province, Indonesia 24 April – 22 May 2006



A = admission to Kabanjahe Hospital
B = admission to Saint Elizabeth Hospital
C = admission to Adam Malik Hospital (*denotes seen at Klinik Mandala, Kabanjahe prior to admission)

PERU

NMRCD-Lima

Highlights of AI/PI Work in FY06/07

- Respiratory disease surveillance for past 6 years
  - FY00 under Project Gargle ~ 200-300 samples/year (isolation rates ~ 20-25%)
  - FY06: ~ 2,000 samples (isolation rate ~ 40%)
  - FY06: Surveillance at 35 clinic/hospital sites in 6 countries
  - FY07: Expansion to ~ 71 sites in 10 countries
- Lab Capacity: ~ 3,000-4,000 samples in FY07
- Increased capability for cell culture of viral pathogens & PCR testing (under BSL-2 +)
- New BSL-3 suite approved; to be completed by mid-FY07
- EWORS-based surveillance in 9 sites in Peru (2-Tumbes, 7-Lima)
- Alerta-DISAMAR syndromic surveillance reporting in Peruvian Navy and expanding to Peruvian Army bases

Wild Bird Specimen Collection

Dr. Salazar collecting dead bird

KENYA

USAMRU-K

Influenza Surveillance Sites - Kenya

- Largest sub-Saharan country with ongoing human influenza surveillance system
- Collaboration with CDC's IEIP and KEMRI with referral of specimens to the National Influenza Center, Kenyatta Hospital, Nairobi.
- Eight sites established in key areas:
  - Malindi District Hospital, SE Coastal region
  - Isiolo District Hospital, NE region
  - Port Reitz District Hospital, Mombassa
  - Mbagathi District Hospital, Nairobi
  - Kondele Children's Hospital, Kisumu, West, Lake Victoria region
  - Kisii District Hospital
  - New Nyanza Provincial Gen Hospital (NNPGH)
  - Busia District Hospital (Jun 07)

USAMRU-K
Future Efforts in FY07-08

- **Uganda:**
  - Agreement with Makerere Univ (Kampala) through HJF-MRI
  - Human surveillance: 3-4 hospital sites
- **Cameroon:**
  - Agreement with Univ of Buea (Yaounde) through HJF-MRI
  - Human surveillance: 3-4 hospital sites
  - Additional sites with JHUCWR Project (Nate Wolfe) for avian & animal surveillance
- **Nigeria:**
  - Establish mil-mil collaboration with Nigerian MoD
  - Human surveillance at 3-4 surveillance sites in FY08

USAMRU-K

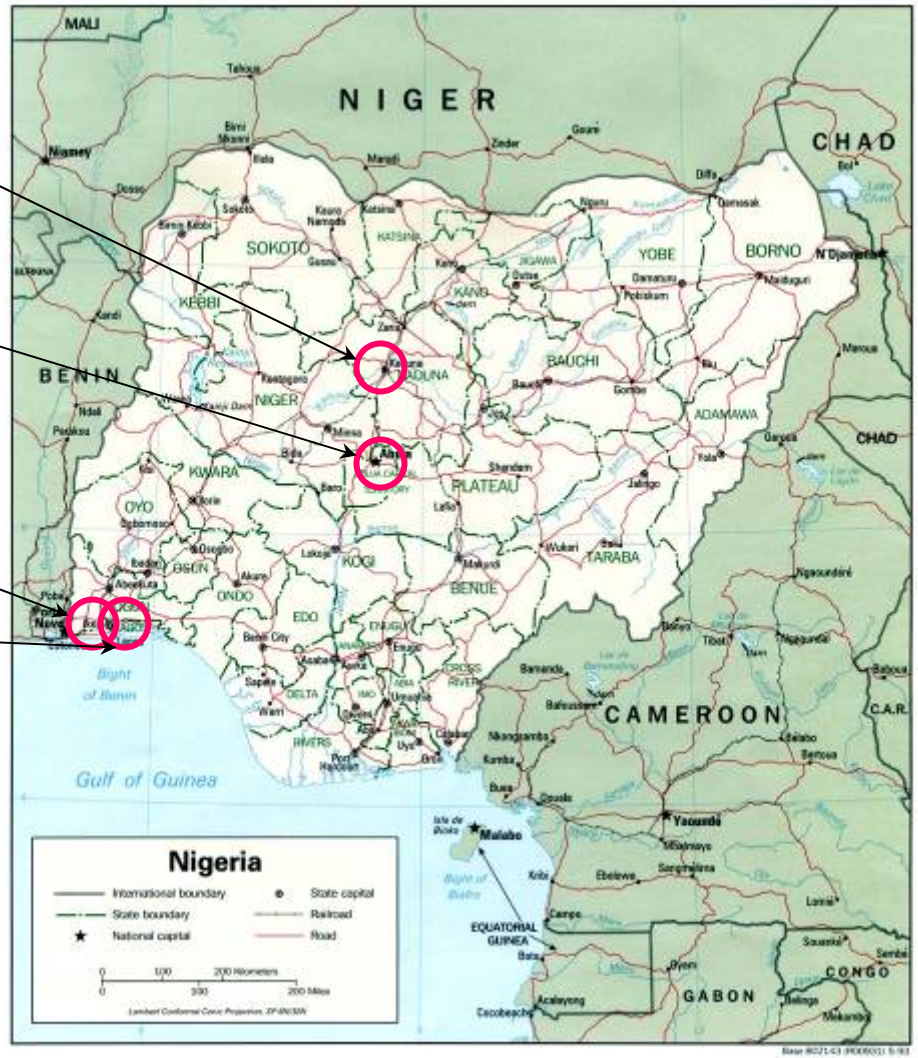
Future Efforts in Nigeria-FY08

44 NARHK
(Kaduna)

DHQ-MRS
(Abuja)

445 NAF
(Ikeja)

NNH
(Ojo)



EGYPT

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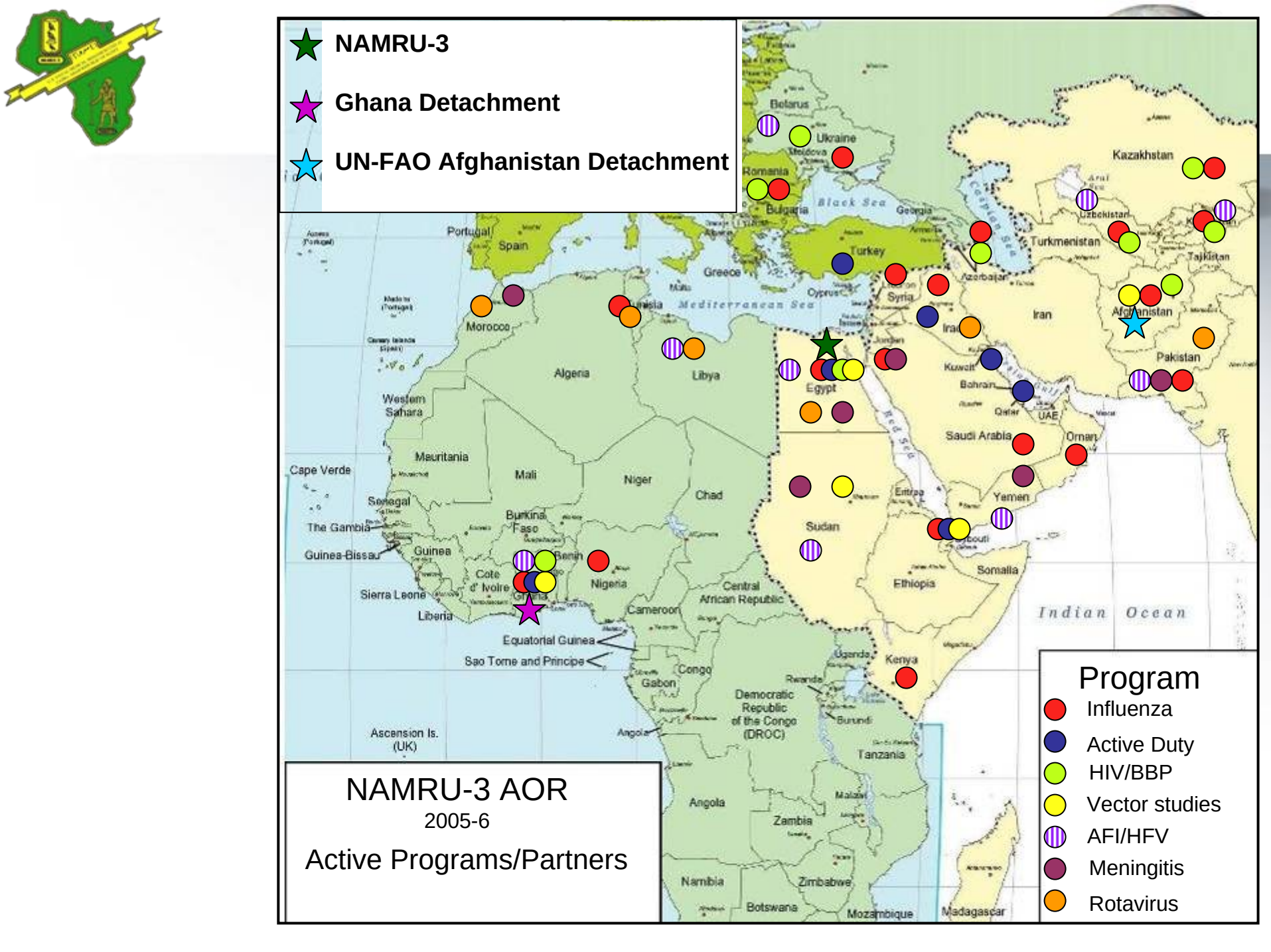
Highlights of AI/PI Work in FY06/07

- Seasonal human (11 countries) & animal surveillance
  - Over 30 locations and clinical centers
  - At least 19 countries in Africa, East Europe, the Middle East and the FSU
- Afghani MoH GEIS-AI funded lab in Kabul has petitioned the WHO to become an NIC (Apr 07)
- Assisting Jordanian MoH with establishment Influenza Surveillance Network
- Assisting Libyan MoH to develop an Influenza Reference Laboratory in Tripoli


NAMRU-3
Ghana Detachment
UN-FAO Afghanistan Detachment
Program
Influenza
Active Duty
HIV/BBP
Vector studies
AFI/HFV
Meningitis
Rotavirus
NAMRU-3 AOR
2005-6
Active Programs/Partners
Mediterranean Sea
Black Sea
Caspian Sea
Red Sea
Indian Ocean
Portugal
Spain
Morocco
Algeria
Libya
Egypt
Western Sahara
Mauritania
Cape Verde
Mali
Niger
Chad
Senegal
The Gambia
Guinea-Bissau
Guinea
Burkina Faso
Benin
Nigeria
Cote d' Ivoire
Ghana
Sierra Leone
Liberia
Cameroon
Central African Republic
Equatorial Guinea
Sao Tome and Principe
Gabon
Congo
Democratic Republic of the Congo (DROC)
Angola
Ascension Is. (UK)
Sudan
Eritrea
Ethiopia
Somalia
Yemen
Saudi Arabia
Oman
UAE
Qatar
Bahrain
Kuwait
Iraq
Iran
Syria
Turkey
Greece
Cyprus
Lebanon
Jordan
Israel
Belarus
Ukraine
Moldova
Romania
Bulgaria
Georgia
Azerbaijan
Kazakhstan
Uzbekistan
Turkmenistan
Tajikistan
Afghanistan
Pakistan
Uganda
Kenya
Rwanda
Burundi
Tanzania
Malawi
Zambia
Zimbabwe
Namibia
Botswana
Mozambique
Madagascar

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Highlights of AI/PI Work in FY06/07 (Jul 05-Apr 07)

- Approx 6,360 human specimens obtained during influenza seasonal surveillance and outbreak investigations:
  - 39 (6.9%) of 565 tested positive for H5N1 (36-Egypt, 1-Djibouti, 1-Iraq, 1-Jordan)
- Of 2,890 avian specimens obtained during AI surveillance and outbreak investigations:
  - 97 (3.4%) of 2,890 tested positive for H5N1
- Ongoing coordination for co-location of CDC's Global Disease Detection (GDD) and response unit (separate funding by DHHS)

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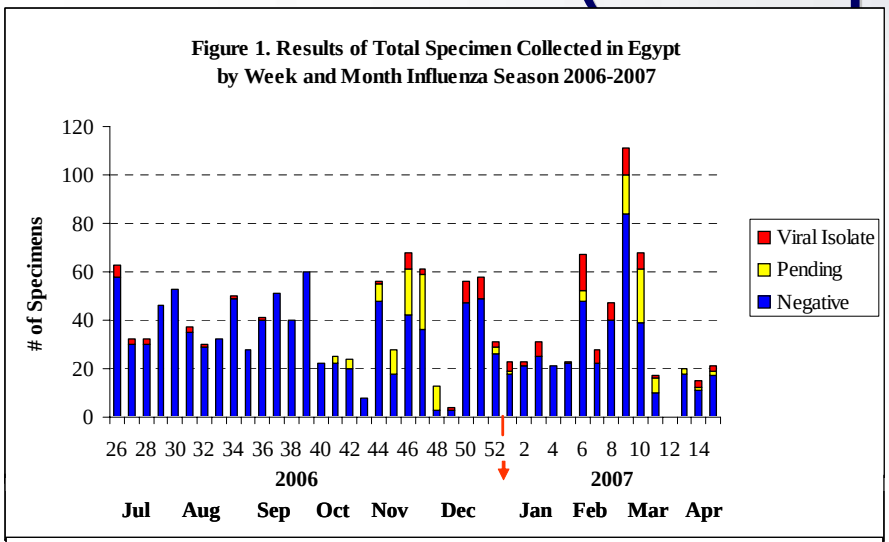
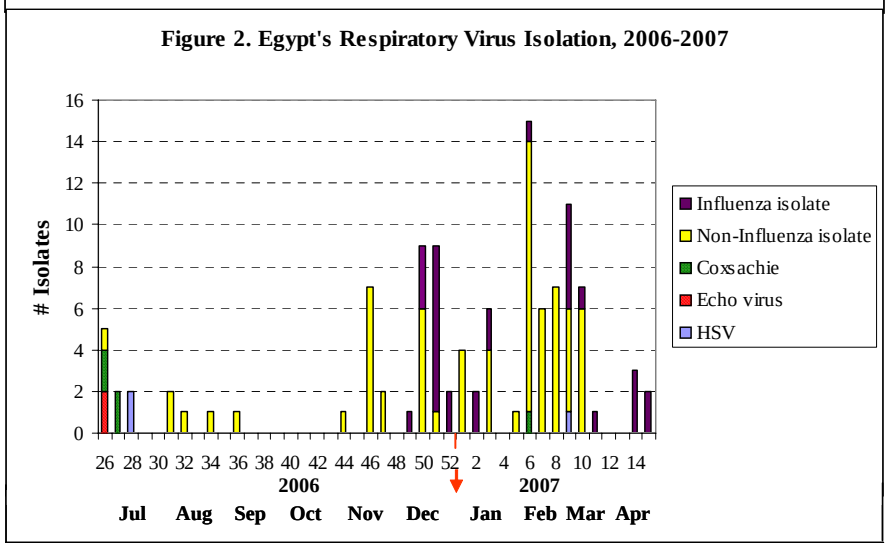
Influenza & Other Respiratory Pathogen Isolations - Egypt (Jul 06-Apr 07)

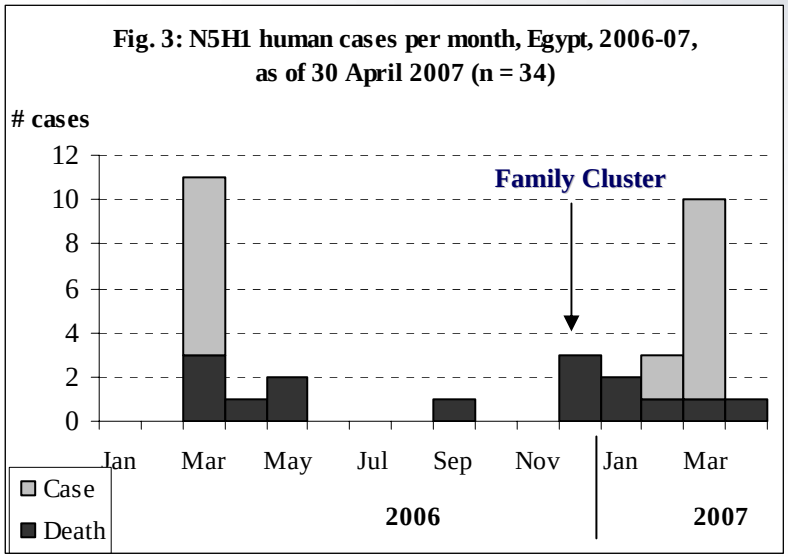


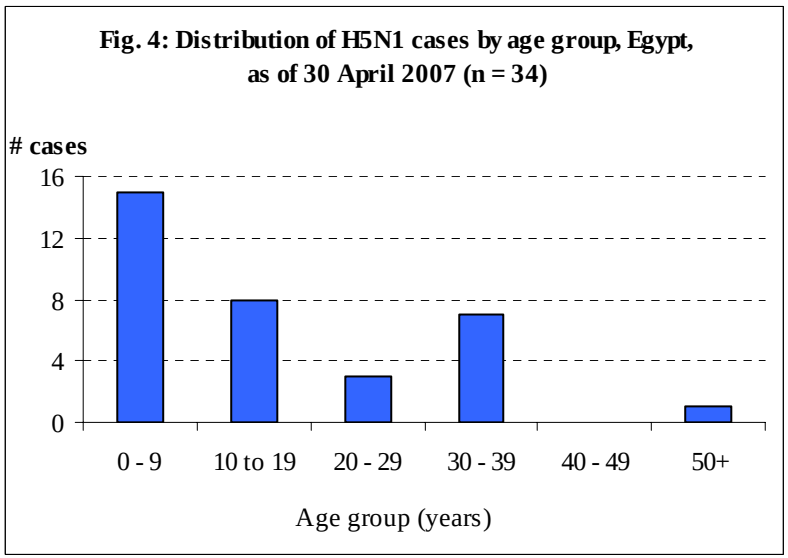


- **110 of 2,173 samples grew an isolate**
  - **31 (1.4%) - Influenza**
  - **79 (3.6%) – Other**

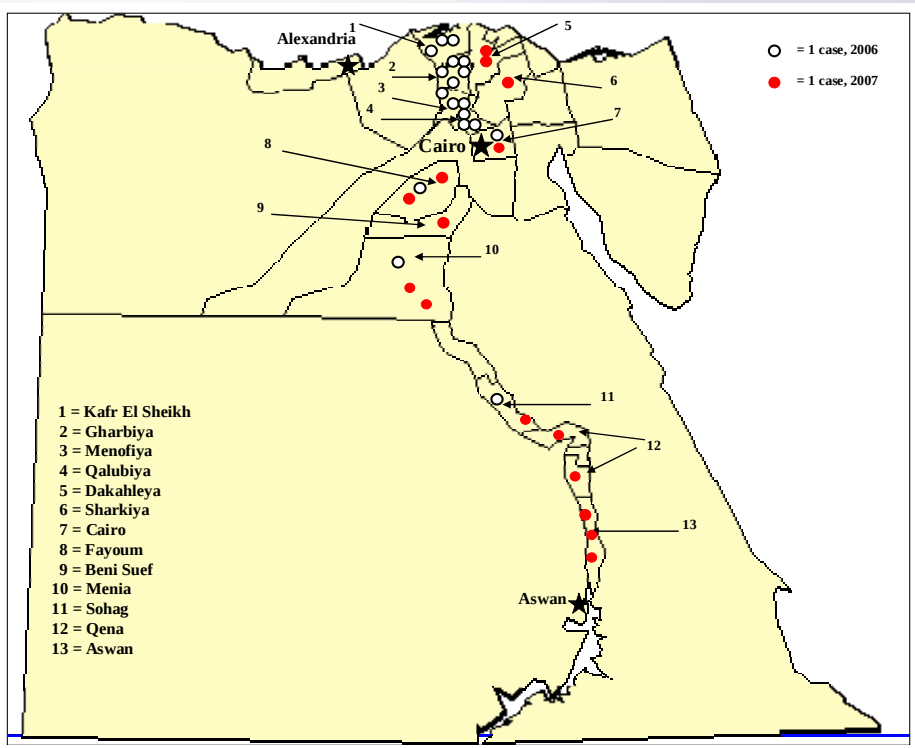
- **Predominance of isolates in Dec – Feb timeframe**

H5N1 Cases – Egypt
(as of 16 May 07)





34 of 35 cases (one in mid-May 07)



Source: NAMRU-3 Influenza Report (Apr 07)

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