BUREAU OF EPIDEMIOLOGY-Ministry of Public Health (MOPH),
THAILAND

Re-emergence of Chikungunya Fever in Thailand with African Strain Virus, 2008-2009

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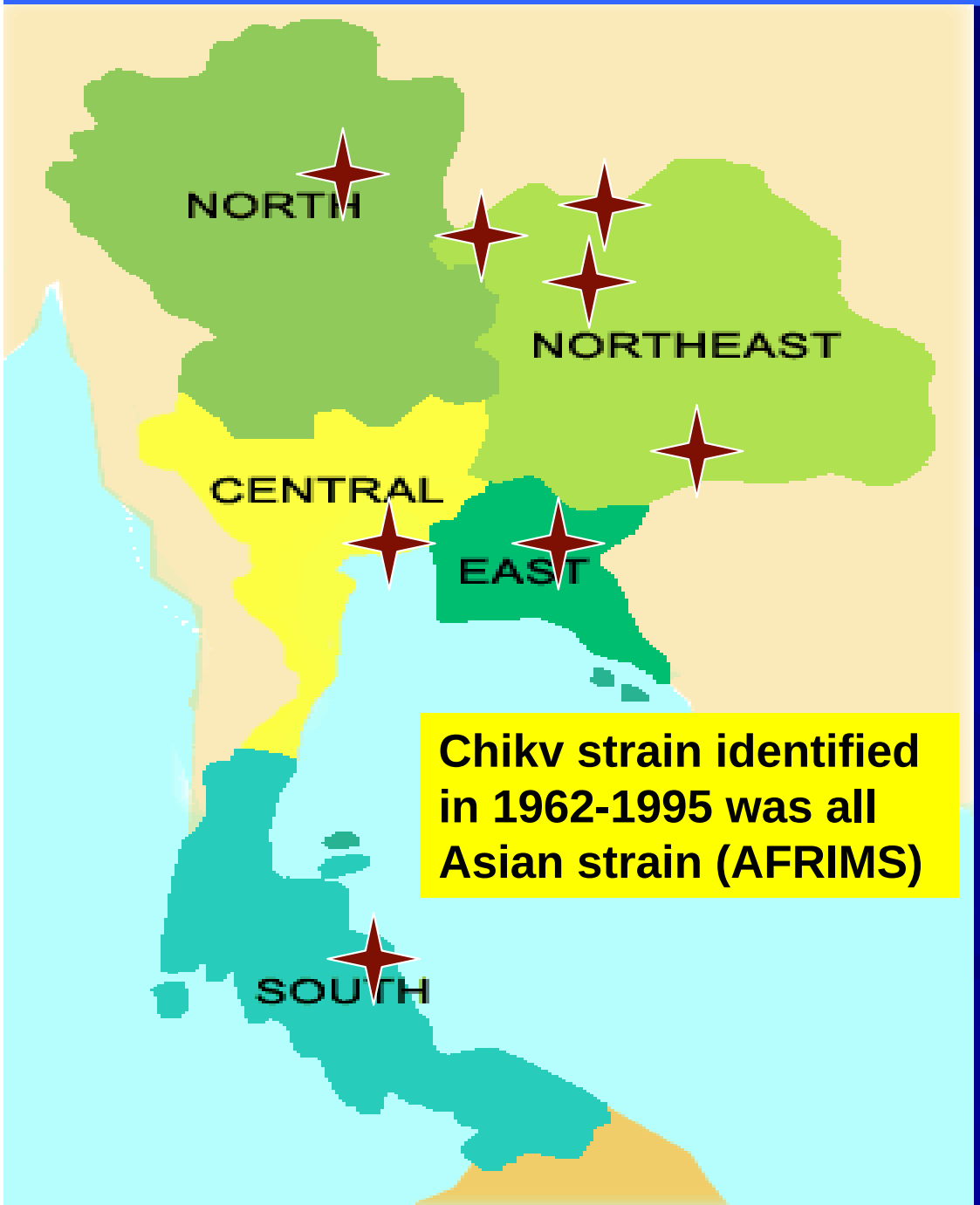
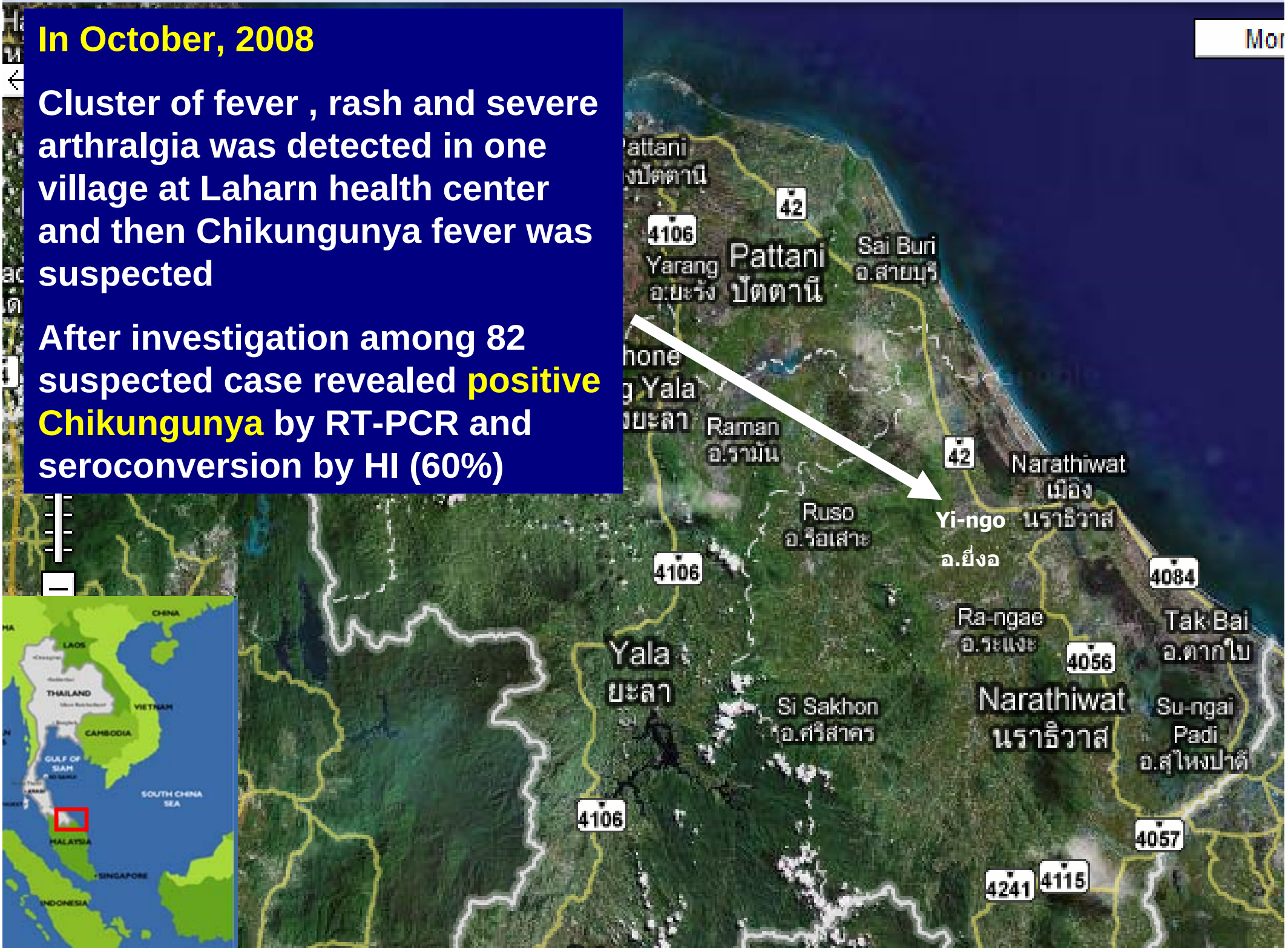


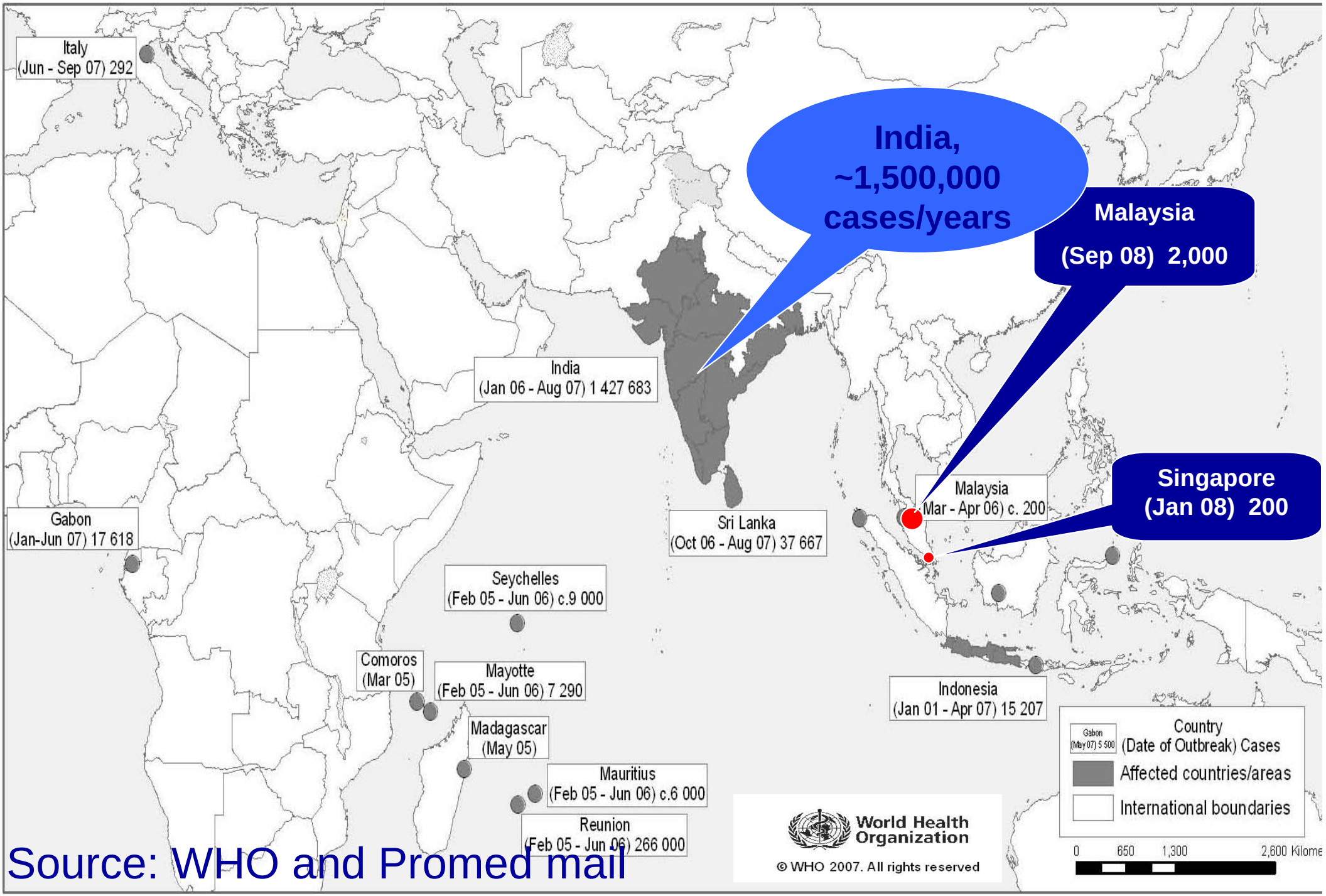
History of Chikungunya Fever in Thailand

1958, First identified in Bangkok & till 1980

1976	Prachinburi
1988	Surin
1991	Khon Khean
1993	Loei, Phrayao
1995	Nongkhai(94), Nakhon Si Thammarat(576)


In October, 2008
Cluster of fever , rash and severe arthralgia was detected in one village at Laharn health center and then Chikungunya fever was suspected
After investigation among 82 suspected case revealed positive Chikungunya by RT-PCR and seroconversion by HI (60%)
Pattani
ปัตตานี
Yarang
อ.ยะรัง
Sai Buri
อ.สายบุรี
Raman
อ.รามัน
Ruso
อ.รือเสาะ
Yi-ngo
อ.ยี่งอ
Narathiwat
เมือง
นราธิวาส
Ra-ngae
อ.ระแงะ
Tak Bai
อ.ตากใบ
Yala
ยะลา
Si Sakhon
อ.ศรีสาคร
Narathiwat
นราธิวาส
Su-ngai Padi
อ.สุไหงปาดี
4106
42
4084
4056
4057
4241
4115
CHINA
LAOS
THAILAND
VIETNAM
CAMBODIA
GULF OF SIAM
SOUTH CHINA SEA
MALAYSIA
SINGAPORE
INDONESIA

Chikungunya Outbreak reported countries, as of October 2007



Source: WHO and Promed mail

Surveillance

- Since Chikungunya fever was not a notifiable disease in Thailand, thus the Bureau of Epidemiology included Chikungunya fever is the latest notifiable disease and launched in November 2008 (passive surveillance nationwide; all gov. hospitals and some private)
- Three case definitions were described as suspected, probable and confirmed
- All suspected cases required to retrospective report to the national surveillance system

Case Definitions

- Suspected Case: Fever with at least two of the following symptoms
  1. **Arthralgia or Arthritis or Joint swelling**
  2. **Rash**
  3. **Myalgia**
  4. **Headache**
  5. **Retro-orbital pain**

→ **Require Investigation and Response within 24 hr**

- Probable Case: suspected case with

  1) PLT normal and WBC < 5000 or

  2) Epi-linkage with confirmed case or traveling from epidemic area

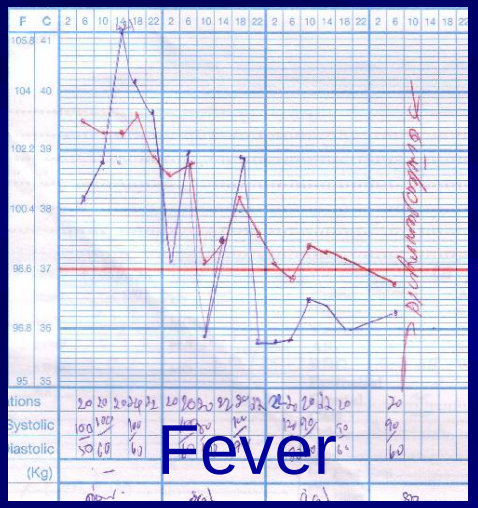
- Confirmed Case: suspected case with

  CHIKV laboratory confirmed by viral isolation, PCR and sero-conversion of HI (4-fold) a/o IgM (Single IgM was excluded)

Commonly diseases mimic to CHIK in Thailand

Rubella

Measles



Chikungunya fever

Dengue fever

Parvovirus

Distinguished by Clinical & Laboratory Investigation

Protocol for Lab Testing

A Suspected Chikungunya Fever

Epidemic area

Chikungunya (NIH)
1.RT PCR (onset < 5 days)
2.HI (2-3 weeks a part)
Dengue (NIH)
1.HI/ELISA (2-3 weeks a part)
JE (NIH)
1. ELISA

Other area

Same as epidemic area and **PLUS**
1. Measles IgM (NIH)
2. Rubella IgM (NIH)

Entomology

Mosquito trapping:
Human base technique
Aspirator technique

Isolated CHIKV:
at AFRIM and NIH
Molecular sequencing:
at AFRIM and NIH
(both human & mosquito)
Identified *Aedes* spp.:
at AFRIM and NIH

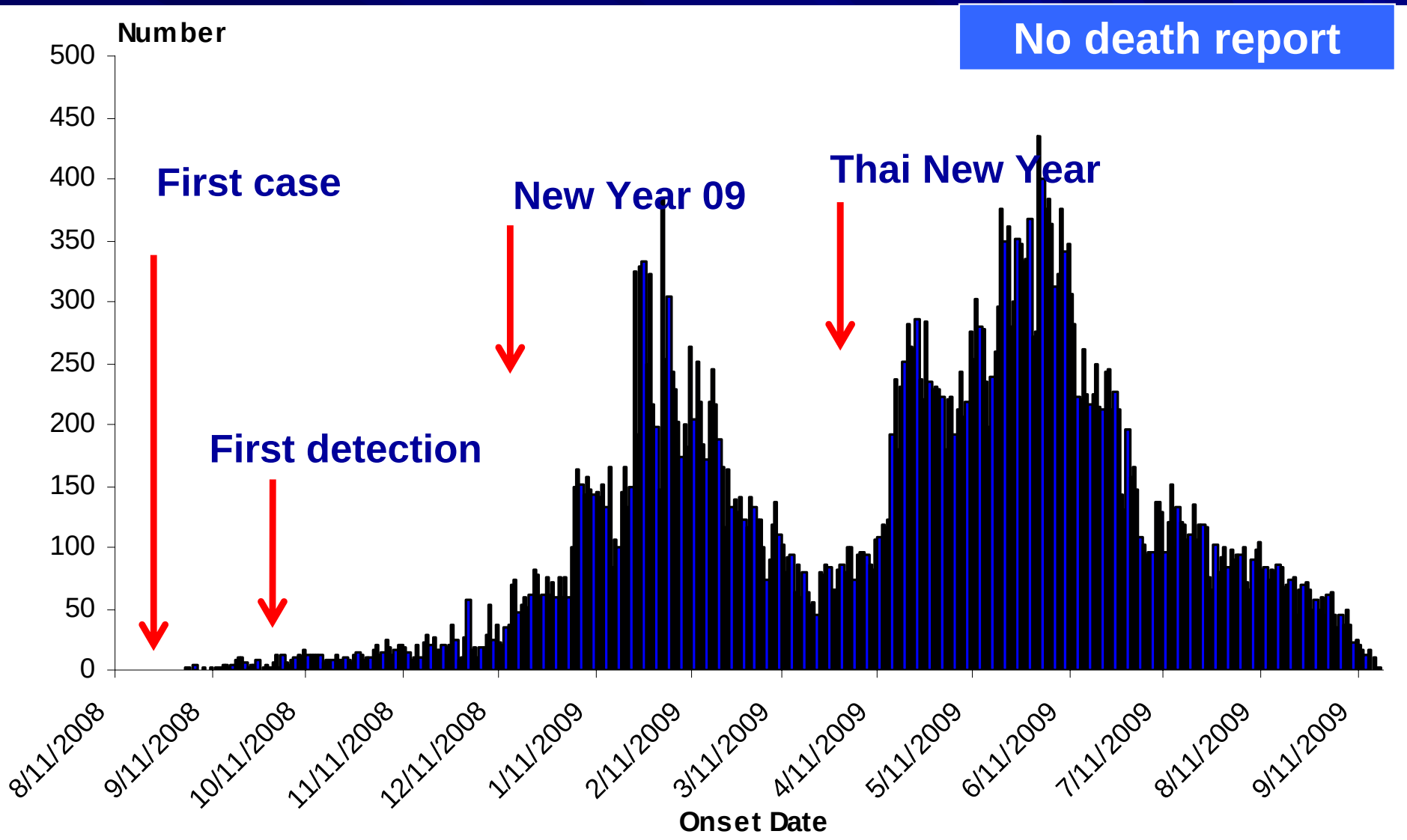
Methodology

Two database were analyzed

- Case information from 2008-2009 found in the national notifiable disease surveillance system (Epi Info, US CDC).
  - Basic demographic data; age, gender, onset occupation and address
- The results of CHIK and Dengue parallel testing performed by the Thai National Institute of Health (NIH) and USAMC-AFRIMS (Bangkok)

Results

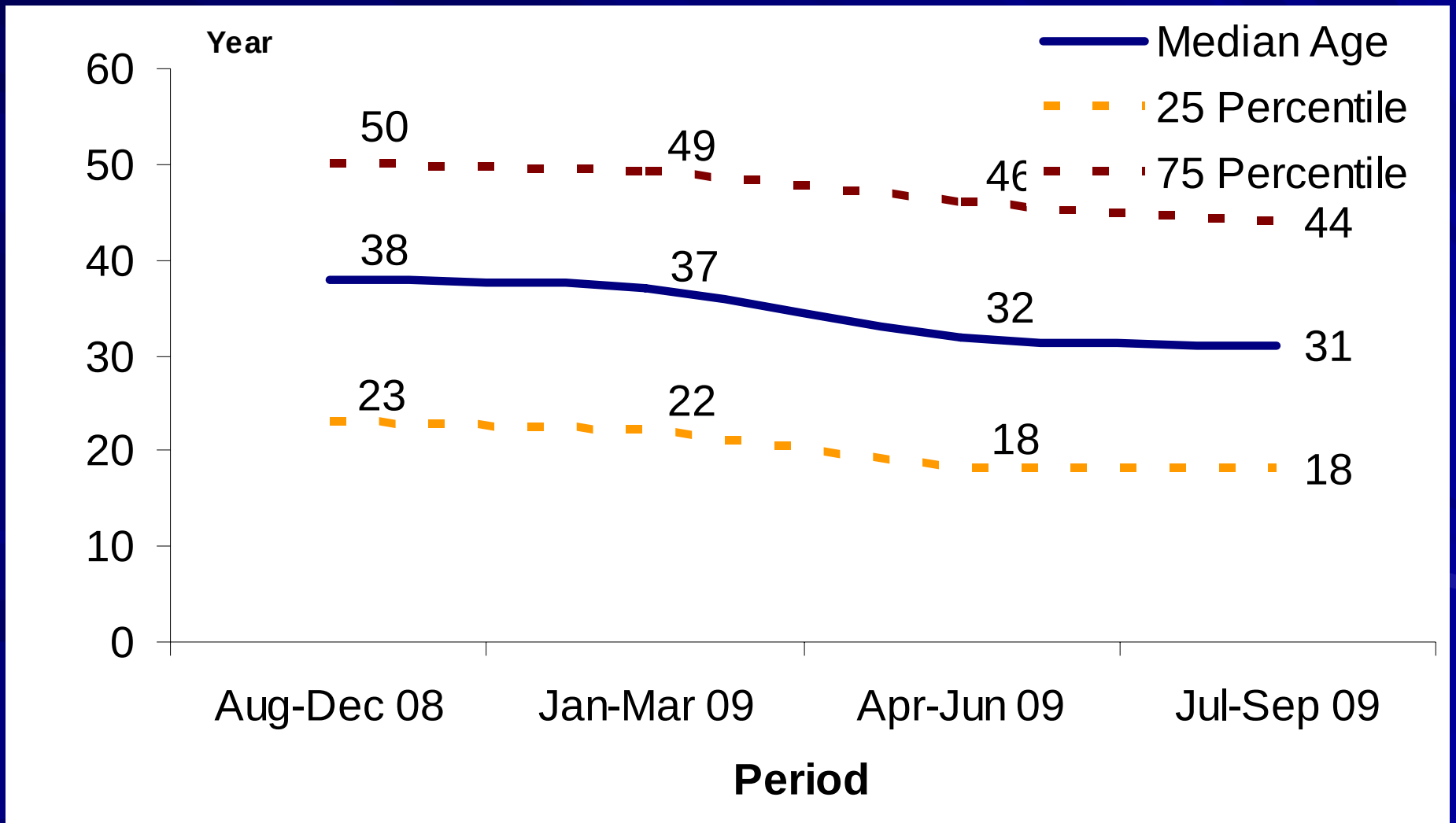
Number of suspected CHIK by date of onset Notifiable Diseases Surveillance, Thailand, Aug 2008 – Sep 2009 (N=44,040)



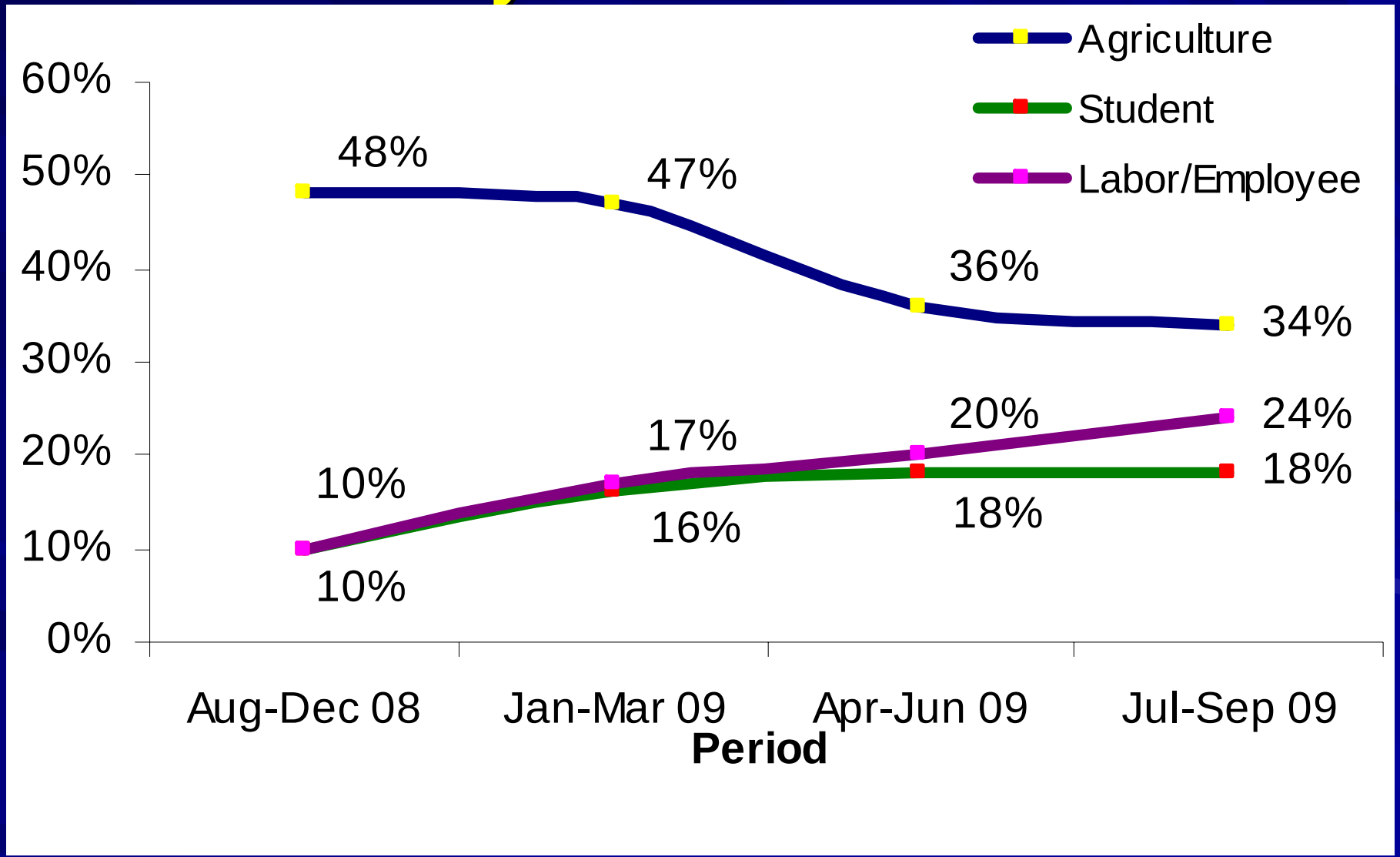
Characteristics and trend of demographic data of suspected CHIK, Thailand 2008-09

Periods	Aug-Dec 08	Jan-Mar 09	Apr-Jun 09	Jul-Aug 09
Total number	2,494	13,341	21,758	6,292
Gender M:F (National 1:1.3)	1:1.5	1:1.5	1:1.5	1:1.5
Children	12%	14%	19%	19%
Median age	38 (IQR 23, 50)	37 (IQR 22, 49)	32 (IQR 18,46)	31 (IQR 18,44)
Occupation				
1. Agriculture	48%	47%	36%	34%
2. Student	10%	16%	18%	18%
3. Labor/ Employee	10%	17%	20%	24%

Median age of CHIK reporting case by onset 2008-2009



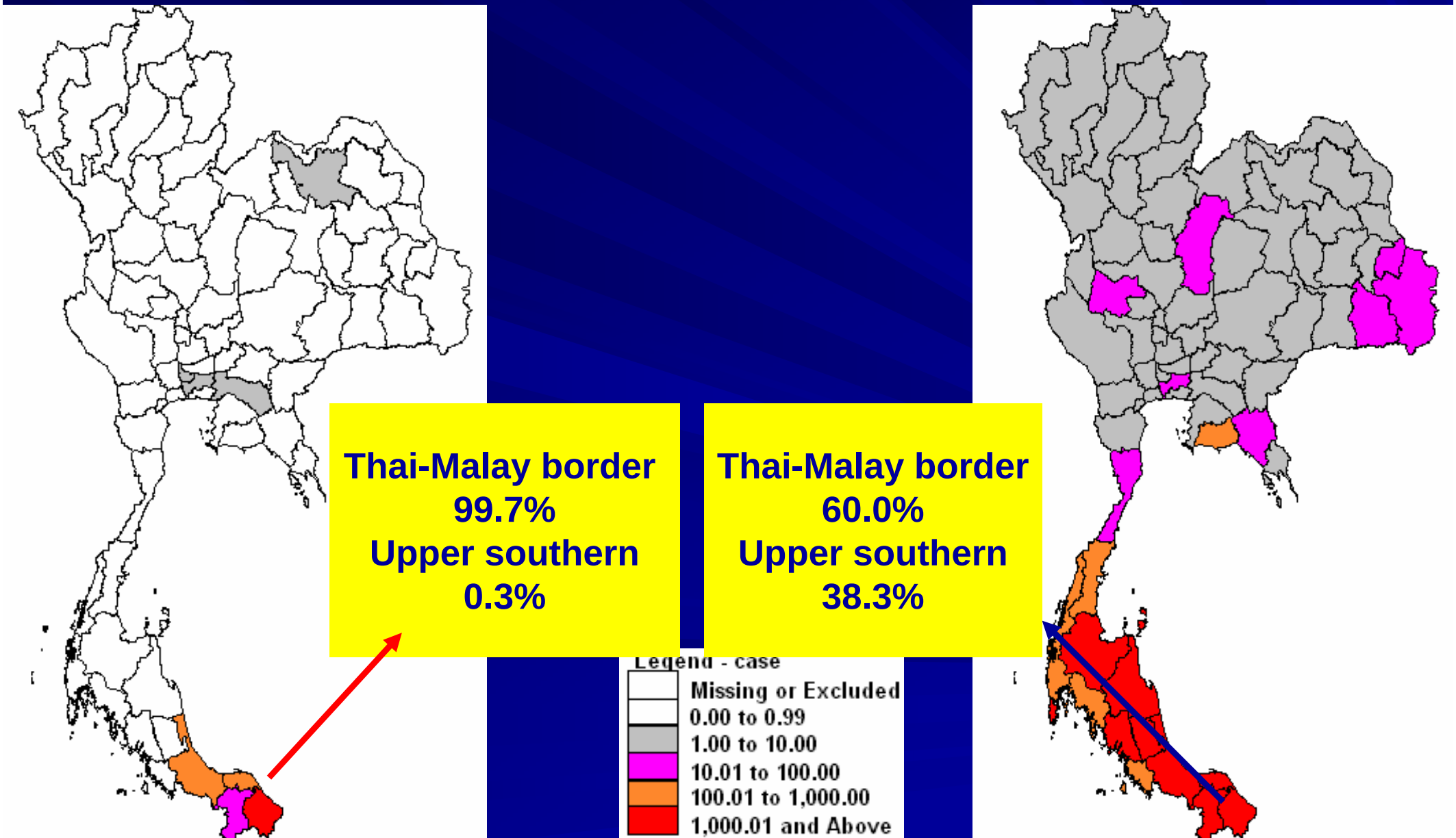
Proportion of Occupation of CHIK reporting case by onset 2008-2009

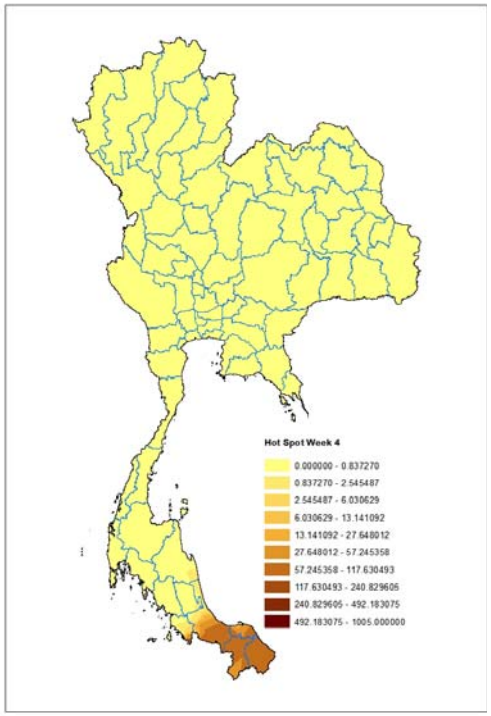


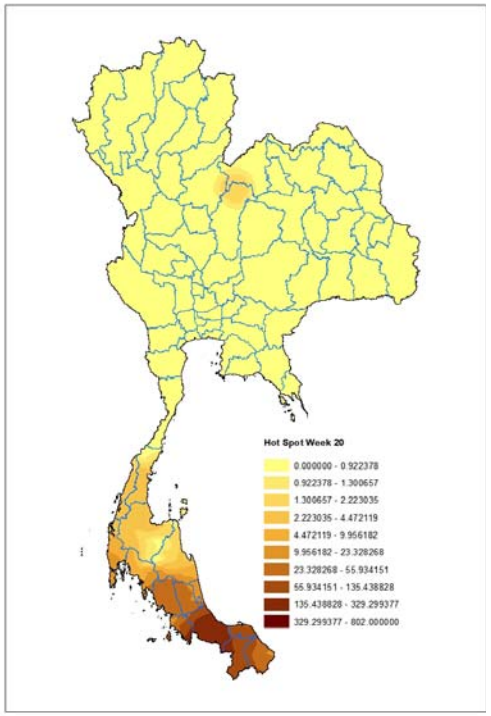
Geographic distribution of CHIK report between 2008 and 2009, Thailand

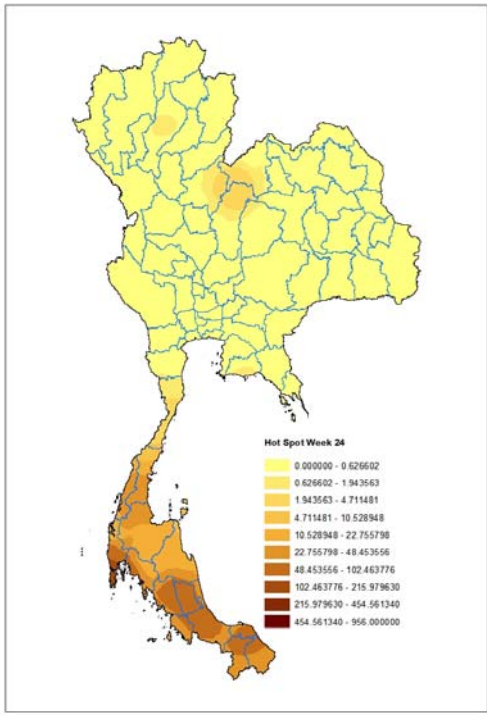
2008 (n=2,494)

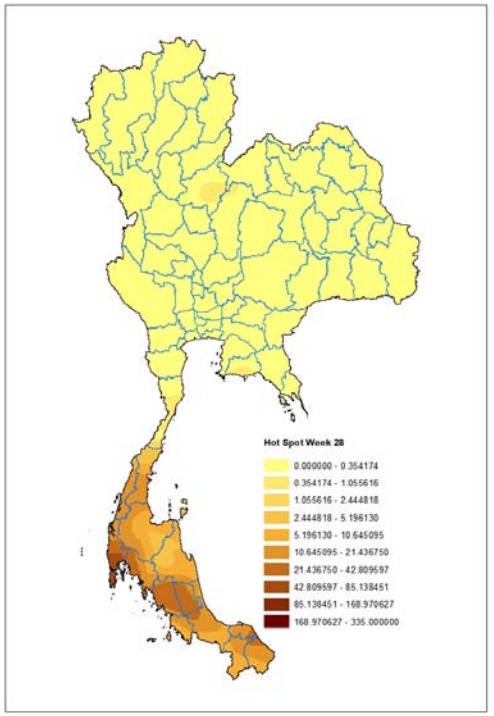
2009 (n=41,546)









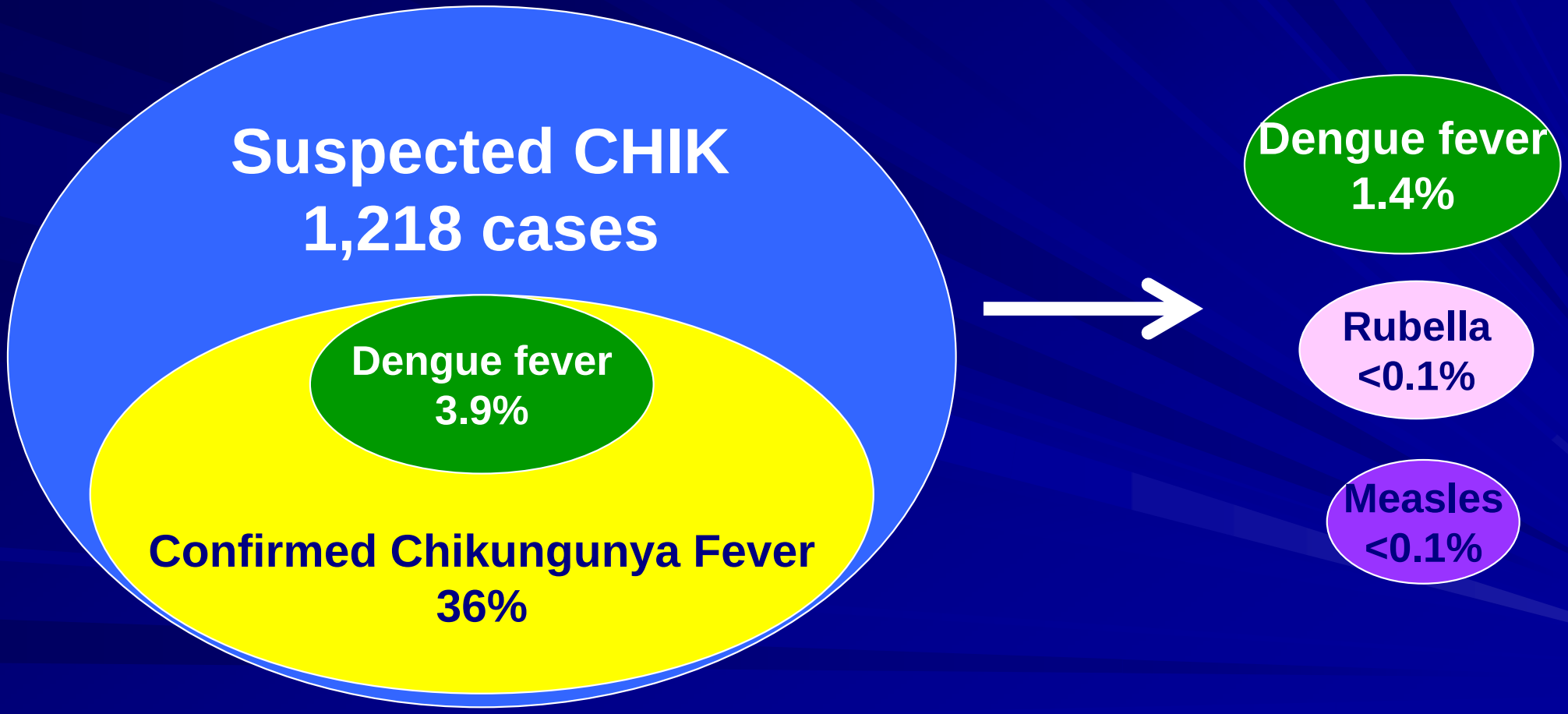


CHIK reporting case movement from southernmost to upper southern provinces

Laboratory Results

- Totally 1,218 cases were sent for CHIKV laboratory testing at Thai-NIH (till August, 2009)
  - 440 cases were laboratory confirmed (36%) either RT-PCR or sero-conversion for HI (four-fold rising)
  - The yield of RT-PCR for CHIKV was 49.7% (388/781) and sero-conversion of HI was 35.3% (89/252)

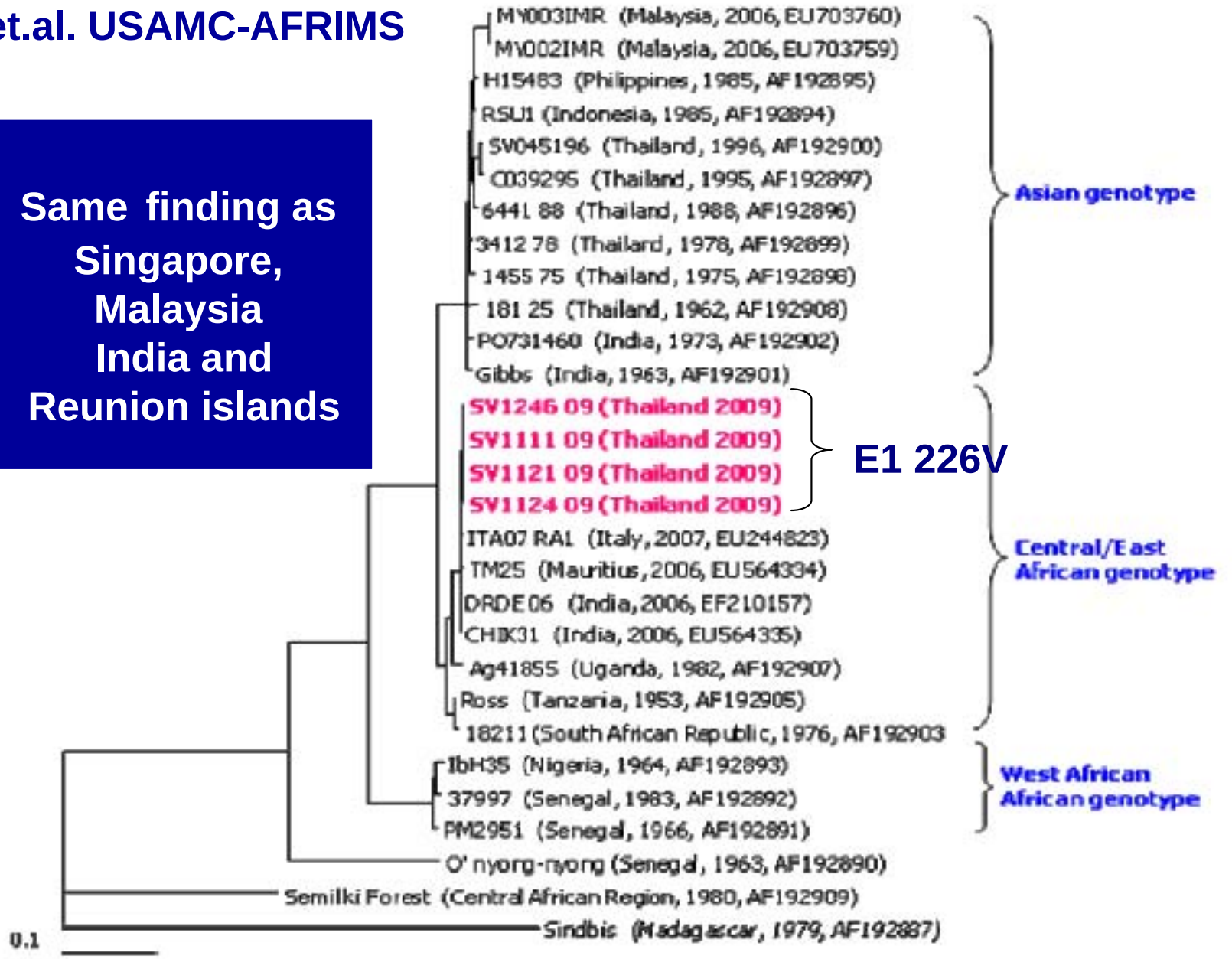
Laboratory Result



Molecular Sequencing of Chikungunya virus in human

Courtesy by RG. Jarman et.al. USAMC-AFRIMS

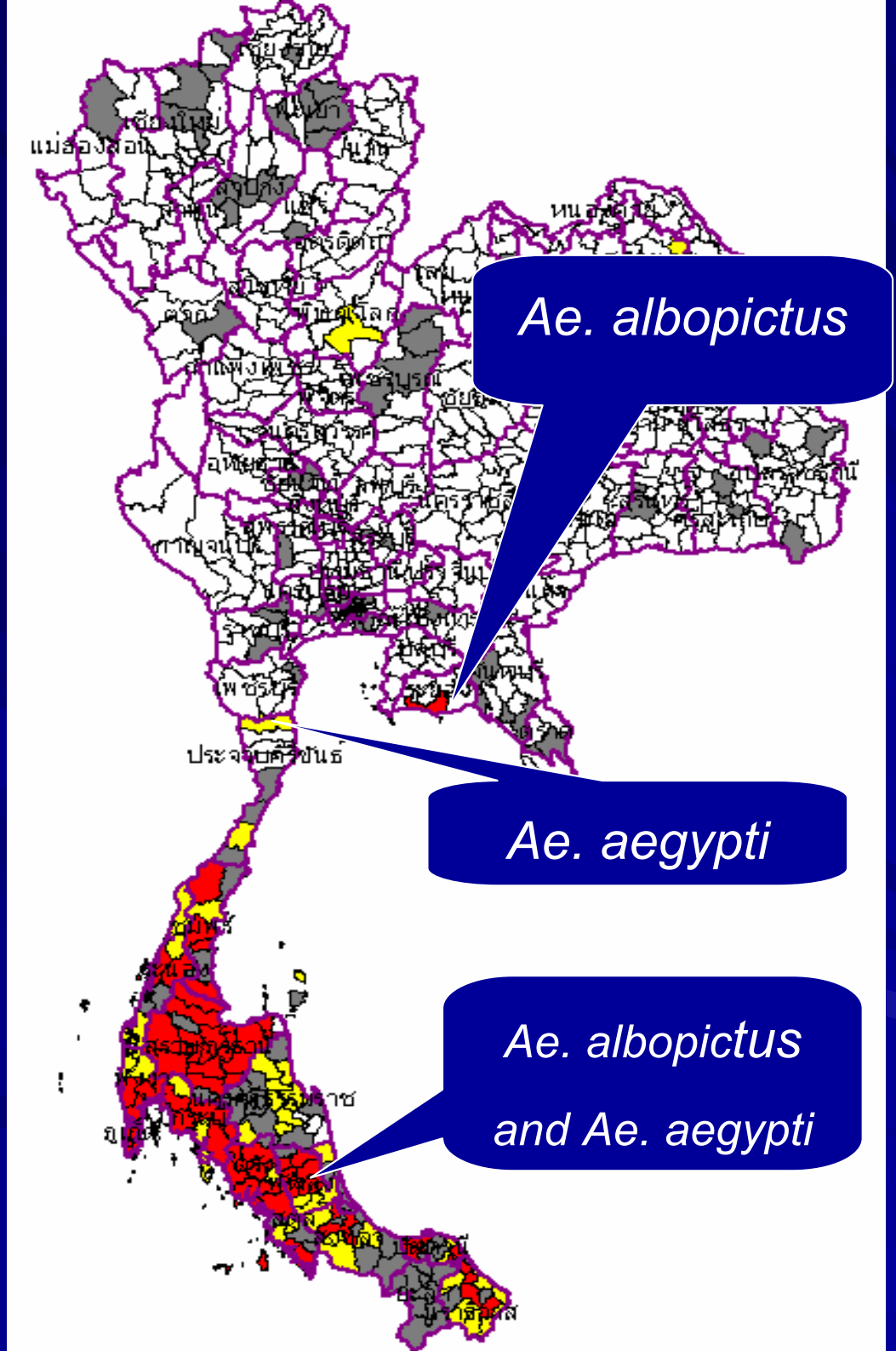
Same finding as Singapore, Malaysia India and Reunion islands



Entomology Results

Epidemiological week

30th



Mosquito Survey Result in a southern province

- A total of 210 adult mosquitoes (both sexes) were trapped and identified as:

Cx. quinquefasciatus	132
Ae. aegypti	29
Ae. albopictus	25
Ar. Subalbatus	24

Classification	Indoor		Outdoor	
	Female	Male	Female	Male
Ae. aegypti	11	17	0	1
Ae. albopictus	1	0	15	9

Entomological Study

- Center: first case's house
- Radius: 200 meters
- 106 households surveyed

Common type of containers: Man-made

Common type of containers: Natural

The Environment of Family Outbreak



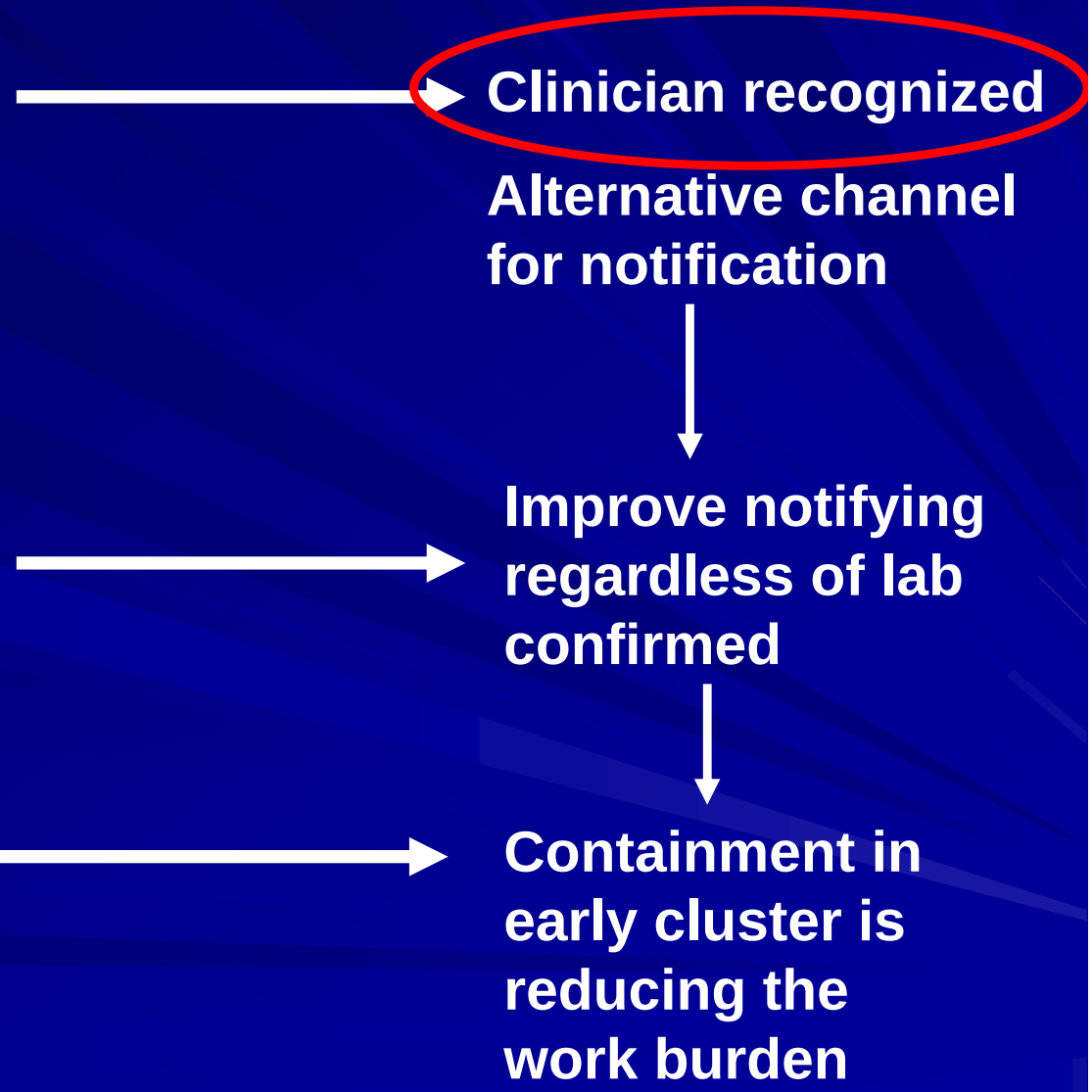



New implement of CHIK effect on blood donation, August 14th, 2009

- Thai Red Cross launched new history screening for people who want to blood donate
- But not screen PCR or antibody blood
  - You have been diagnosis with CHIK or have fever with arthralgia within 1 month (UK 6 mo) ?
  - Your household member have been diagnosis with CHIK or have fever with arthralgia within 1 month?
  - You still have a persistent arthralgia?

Suggestions

- Early diagnosis is delay (passive surveillance)
- Delay notification
- Delay early containment



Suggestions

Special surveillances

- Nursing colleges: human and mosquito
- Military camps
- Human and mosquito
- Bus and train transportation for mosquito surveillance

Conclusion

- The re-emerging Chikungunya fever is confirmed after the 13-year absence with new East/Central African strain (226V)
- CHIK continues to spread in a northward distribution throughout Thailand with *Ae. albopictus* predominate.
- All southern and some eastern parts are ongoing epidemic but reporting trend is decreasing
- The epidemic pattern in 2009 is changing from rural to urban settings as evidence by increasing infection rates among students.
- The vector control measures were limited in the first area where are complicated situation with high density of both species of *Aedes* mosquito circulation
- The major interventions include early case detection by clinical criteria and then laboratory testing with PCR, rapid investigation and implementation of control measures

Not known well

- **Virology**
  - Are there other strain circulating in this epidemic years?
  - We know replication time in 226V African strain in mosquito, it should compare between Asian, 226A African strains.
  - Are there other alpha viruses in Thailand?
  - We accidental found positive PCR during 8-32 days after onset. Might be
    - Re-infection
    - Re-lapsing
    - Lab error
    - Other cause

Not known well

Immunology

- Why IgM in patient is persist in high level and for long period?
  - Natural history or re-infection
  - Hidden in somewhere else
- Asian strain immunity is really protected East-central African (both 226A and 226V)
- Cross-reaction of CHIK vs Rubella viruses (we faced with this problem when use CHIK rapid test in Rubella cases)

Not known well

Entomology

- Mosquito behavior in different region (AFRIM is ongoing study with BOE)
- Replication of virus (226V vs 226A vs Asian strain) in both *Albopictus and Aegypti* species or other *Aedes* species.
- Potential other vector
- Virus matching between case and mosquito surrounding house

Not known well

Clinical

- Medication for treatment
- Clinical different between child and adult
- Long term clinical outcome
- Parameter of severe illness or outcome
- Vaccine development
- Cause of death (if present)
- Improve rapid test (so severe)
  - Company X claim Sens = 83, Spec = 100 %
  - Field trial shown Sens = 33, Spec = 25 % (N=20)

Not known well

Epidemiology and Control

- Dynamic (modeling)
- Surveillance evaluation (done ~ 7 fields: Pattani, Pattalung, Ubon, Rayong…)
- Control measure evaluation
- New control measure innovation
- Clinician early recognition

Contributions

- Department of Disease Control
- Department of Medical Sciences
- Department of Medical Services
- Offices of Permanent Secretary

MOPH

- Medical Schools/Universities
- Royal College of Physician and Pediatrics of Thailand
- Ministry of Defense
- AFRIMS

Acknowledgement

- Dr. Sujitra Nimmanitya who support clinical and treatment knowledge of CHIK
- USAMC-AFRIMS who is a long term relationship in vector-borne diseases studies including control and prevention
- All 1,030 Surveillance and Rapid Response Team (SRRT) in Thailand who are hardly working to fight CHIK
- All CHIK patients
- And my beloved dad and mom

Thank you for your kind attention

SAWASDEE

KRUB

THAILAND