



# Communicable Diseases and Liver Flukes

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# Outline

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- Overview of Communicable Diseases
  - Introduction and Definition
  - Modes of transmission
  - Importance of CDs in Thailand
    - Tuberculosis
    - Malaria
    - Avian influenza
- Liver flukes



# Communicable Diseases: Definition

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- Defined as
  - “any condition which is transmitted directly or indirectly to a person from an infected person or animal through the agency of an intermediate animal, host, or vector, or through the inanimate environment”.
- Transmission is facilitated by the following
  - more frequent human contact due to
    - Increase in the volume and means of transportation (affordable international air travel),
    - globalization (increased trade and contact)
  - Microbial adaptation and change
  - Change in human demographics and behavior
  - Economic development and land use patterns



# Communicable Diseases account for a significant global disease burden

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- In 2005, CDs accounted for about 30% of the global BoD and 60% of the BoD in Africa.
- CDs typically affect LIC and MICs disproportionately.
  - Account for 40% of the disease burden in low and middle income countries
- Most communicable diseases are preventable or treatable.



# Importance of Communicable Diseases

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- Significant burden of disease especially in low and middle income countries
- Social impact
- Economic impact
- Potential for rapid spread
- Human security concerns



# Modes of transmission

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- Direct
  - Blood-borne or sexual – HIV, Hepatitis B,C
  - Inhalation – Tuberculosis, influenza, anthrax
  - Food-borne – *Entamoeba coli*, Salmonella
  - Contaminated water- Cholera, rotavirus, Hepatitis A
- Indirect
  - Vector-borne- malaria, Dengue
  - Formites
- Zoonotic diseases – animal handling and feeding practices (Mad cow disease, Avian Influenza, Rabies, Liver flukes)



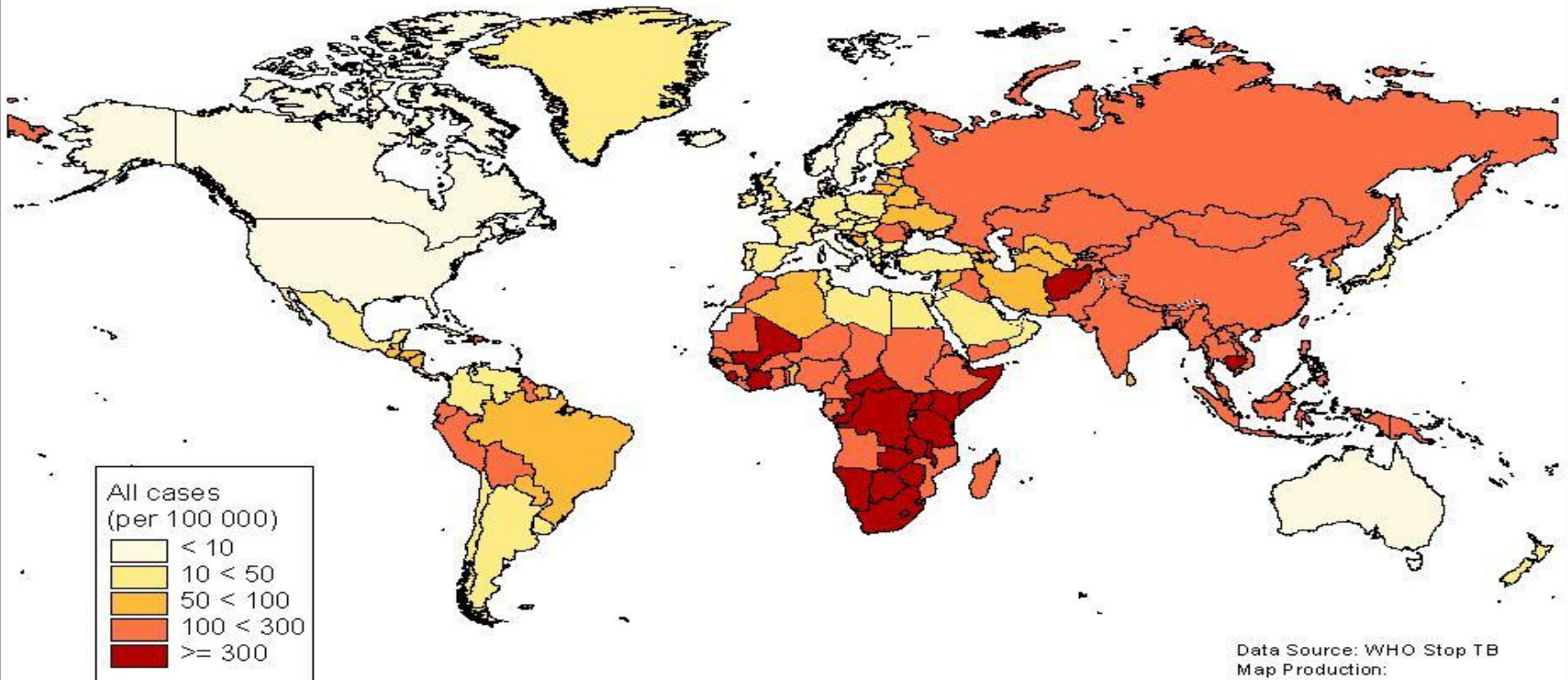
# Tuberculosis

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- 2 billion people infected with microbes that cause TB.
  - Not everyone develops active disease
  - A person is infected every second globally
- 22 countries account for 80% of TB cases.
  - >50% cases in Asia, 28% in Africa (which also has the highest per capita prevalence)
- In 2005, there were 8.8 million new TB cases; 1.6 million deaths from TB (about 4400 a day)
- Highly stigmatizing disease

# Global Prevalence of TB cases (WHO)

Estimated Tuberculosis Cases - 2001



All cases  
(per 100 000)

- < 10
- 10 < 50
- 50 < 100
- 100 < 300
- >= 300

Data Source: WHO Stop TB  
Map Production:  
Public Health Mapping Group  
Communicable Diseases (CDS)  
World Health Organization



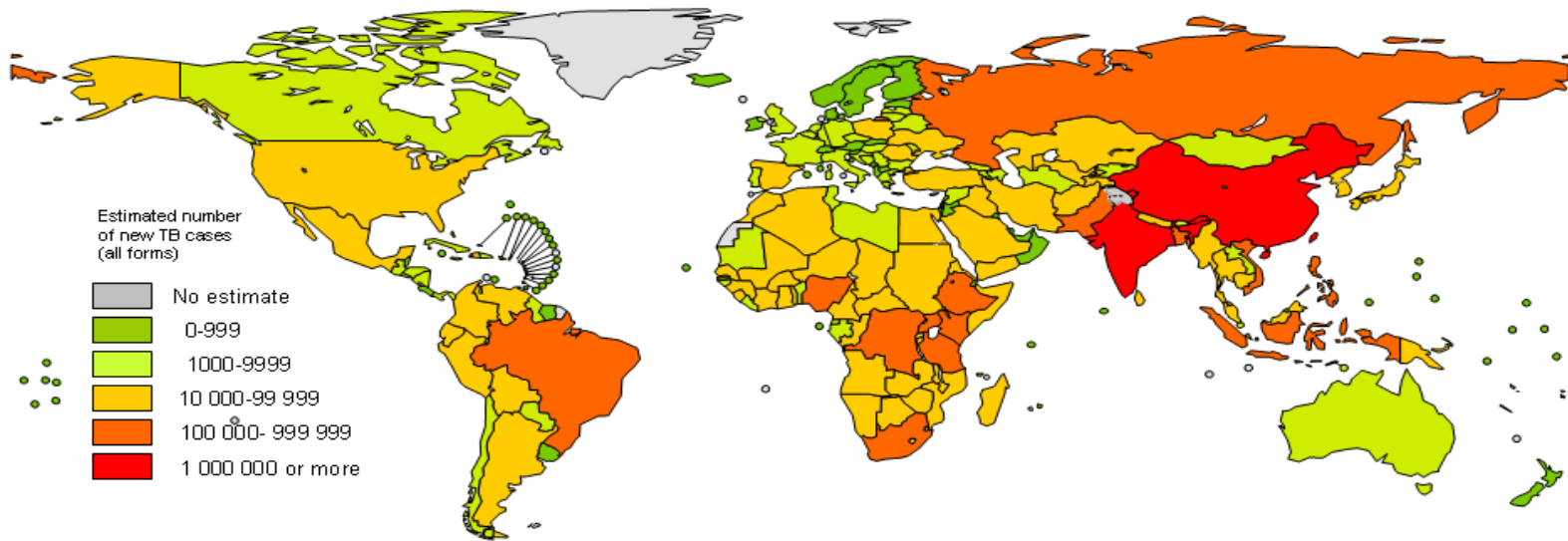
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# Tuberculosis

## Estimated numbers of new cases, 2005



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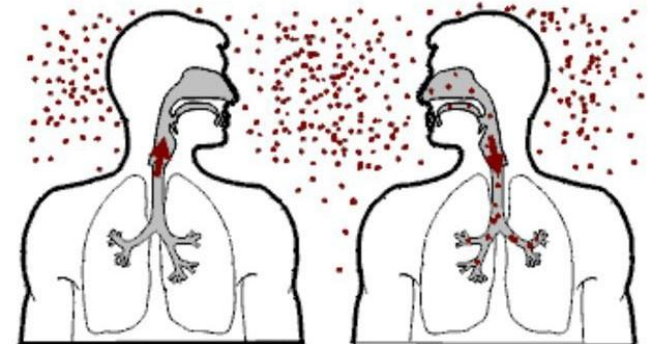
# Tuberculosis in Thailand

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- Thailand is ranked 18<sup>th</sup> on the list of “22 high-TB burden countries”
- Estimated TB incidence : 91,000 cases/year
- Generalized in HIV epidemic areas (0.9 % in 2007)
- High HIV prevalence among new TB patients: estimated 17%
- Estimated number of new TB/HIV patients: 15,470 cases /year
- TB is the most common opportunistic infection in HIV infected persons ( 27% of reported AIDS cases)

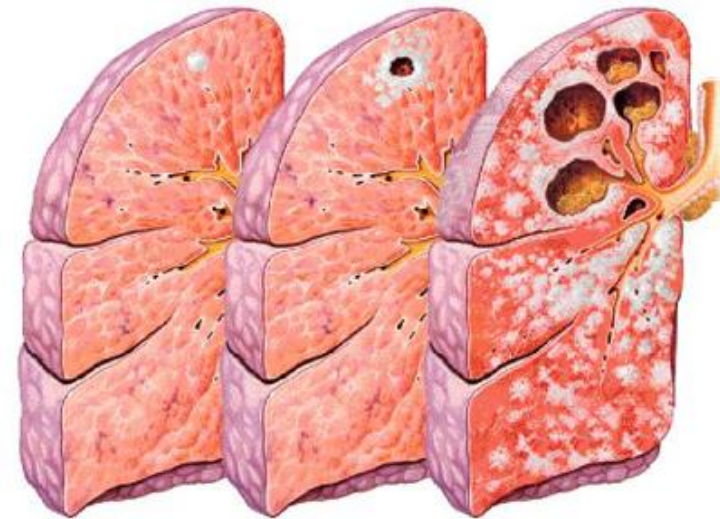
# Tuberculosis (TB)

- Chronic pulmonary disease
- Inhalation
- Tubercle bacilli (*Mycobacterium tuberculosis*)
- Transmitted by coughing, sneezing
  - Or direct contact with sputum
  - Rarely, skin or ingestion



# Tuberculosis (TB)

- Produces inflammatory lesions
  - Most often in lung
  - Can produce cavities
- May be dormant for years
- High-risk groups
  - Young and old
  - Immunocompromised



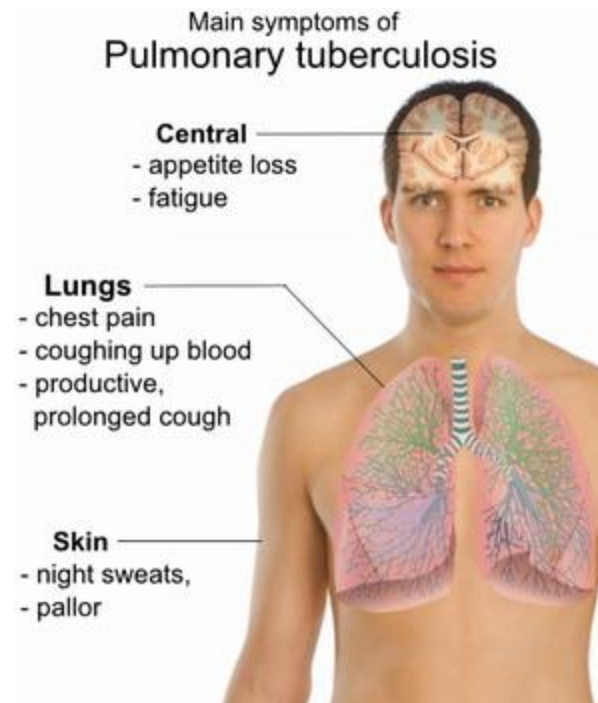
*Infección tuberculosa inicial en el lóbulo superior derecho*

*Placa inicial activa que progresa hacia una cavitación*

*Numerosas cavidades tuberculosas y erosión bronquial*

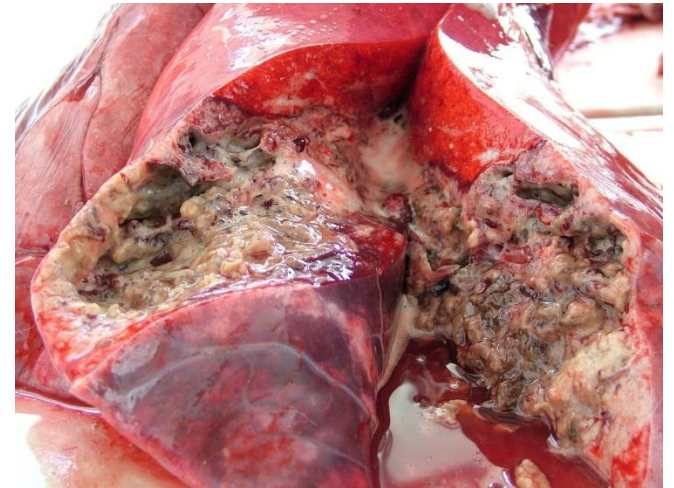
# Signs and Symptoms

- Cough
- Fever
- Night sweats
- Weight loss
- Fatigue
- Hemoptysis



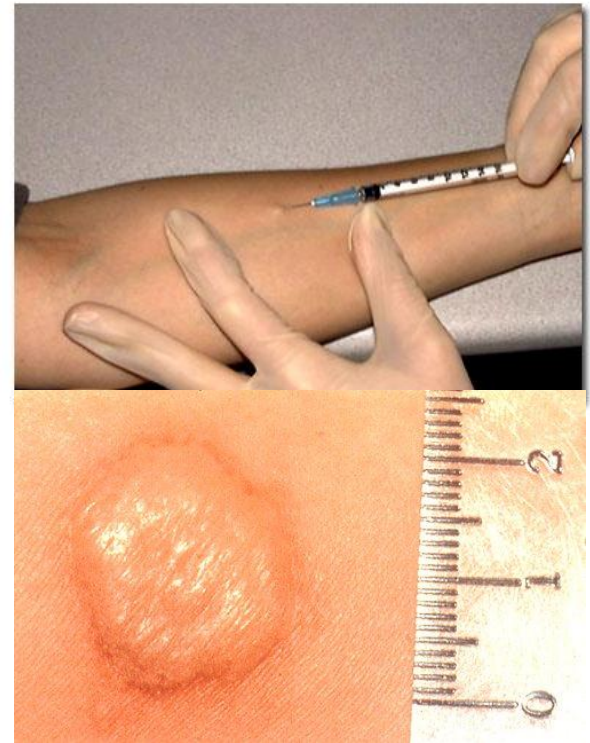
# Tuberculosis—Complications

- Pericardial effusions
- Disk deterioration
- Chronic arthritis of one joint
- Subacute meningitis
- Brain granulomas
- Systemic distribution in blood



# Tuberculosis—Testing

- PPD skin test annually
- More often if:
  - High incidence of TB
  - After exposure
- If positive:
  - CXR
  - Acid-fast bacilli sputum culture
- Treatment with HRSZE [Isoniazid (H), Rifampicin, Streptomycin (S), Pyrazinamide (Z), Ethambutol (E)]







# Tuberculosis and HIV

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- A third of those living with HIV are co-infected with TB
  - About 200,000 people with HIV die annually from TB
  - Most common opportunistic infection in Africa & Asia
  - 70% of TB patients are co-infected with HIV in some countries in Africa
- Impact of HIV on TB
  - TB is harder to diagnose in HIV-positive people.
  - TB progresses faster in HIV-infected people.
  - TB in HIV-positive people is almost certain to be fatal if undiagnosed or left untreated.
  - TB occurs earlier in the course of HIV infection than many other opportunistic infections.



# Tuberculosis Control

- Challenges for tuberculosis control
  - MDR-TB - In most countries. About 450000 new cases annually.
  - Weak health systems
  - TB and HIV
- The Global Plan to Stop TB 2006-2015.
  - an investment of US\$ 56 billion, a three-fold increase from 2005. The estimated funding gap is US\$ 31 billion.
  - Six step strategy: Expanding **DOTS** (directly observed treatment, short-course) treatment; Health Systems Strengthening; Engaging all care providers; Empowering patients and communities; Addressing MDR TB, Supporting research



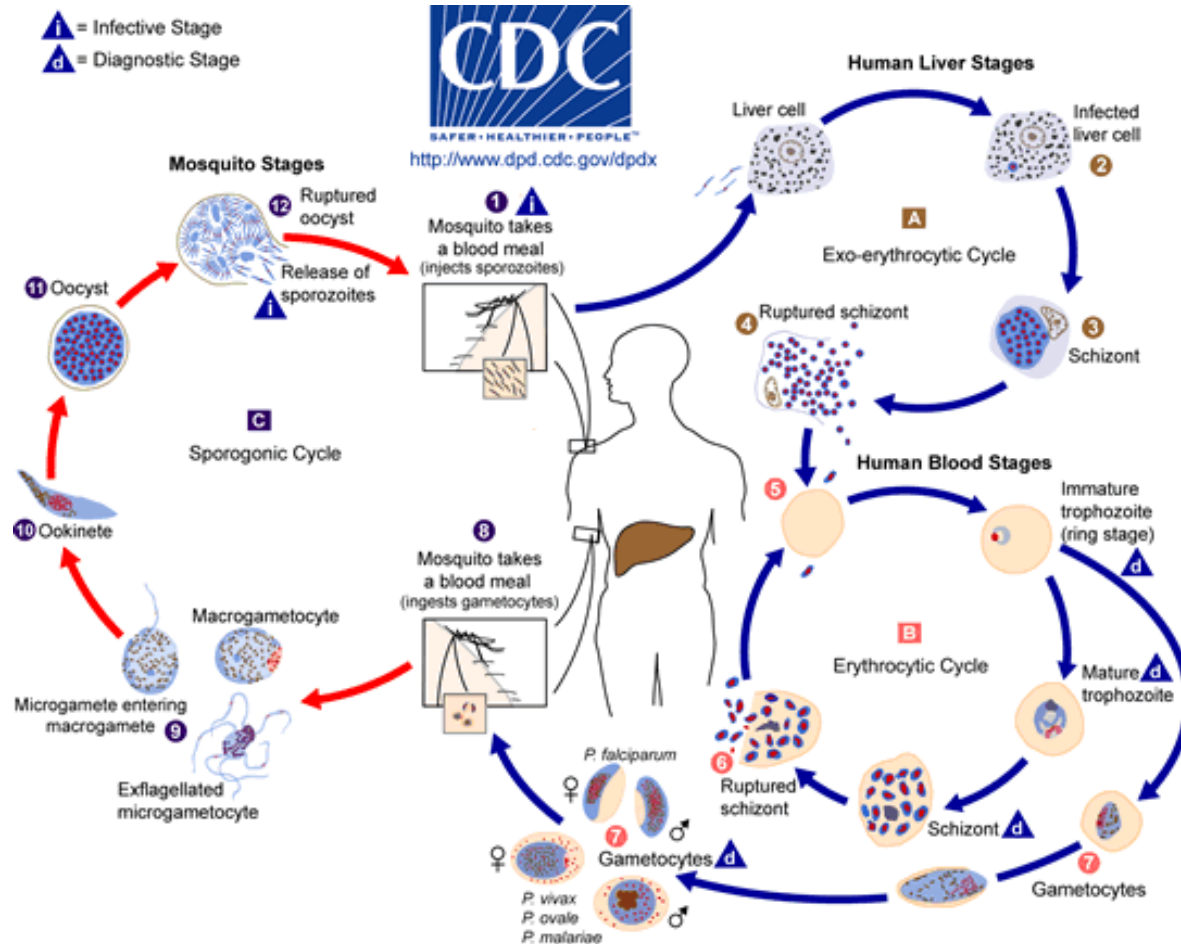


# Malaria

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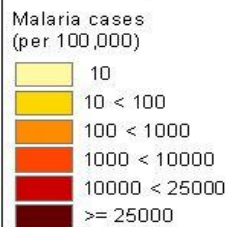
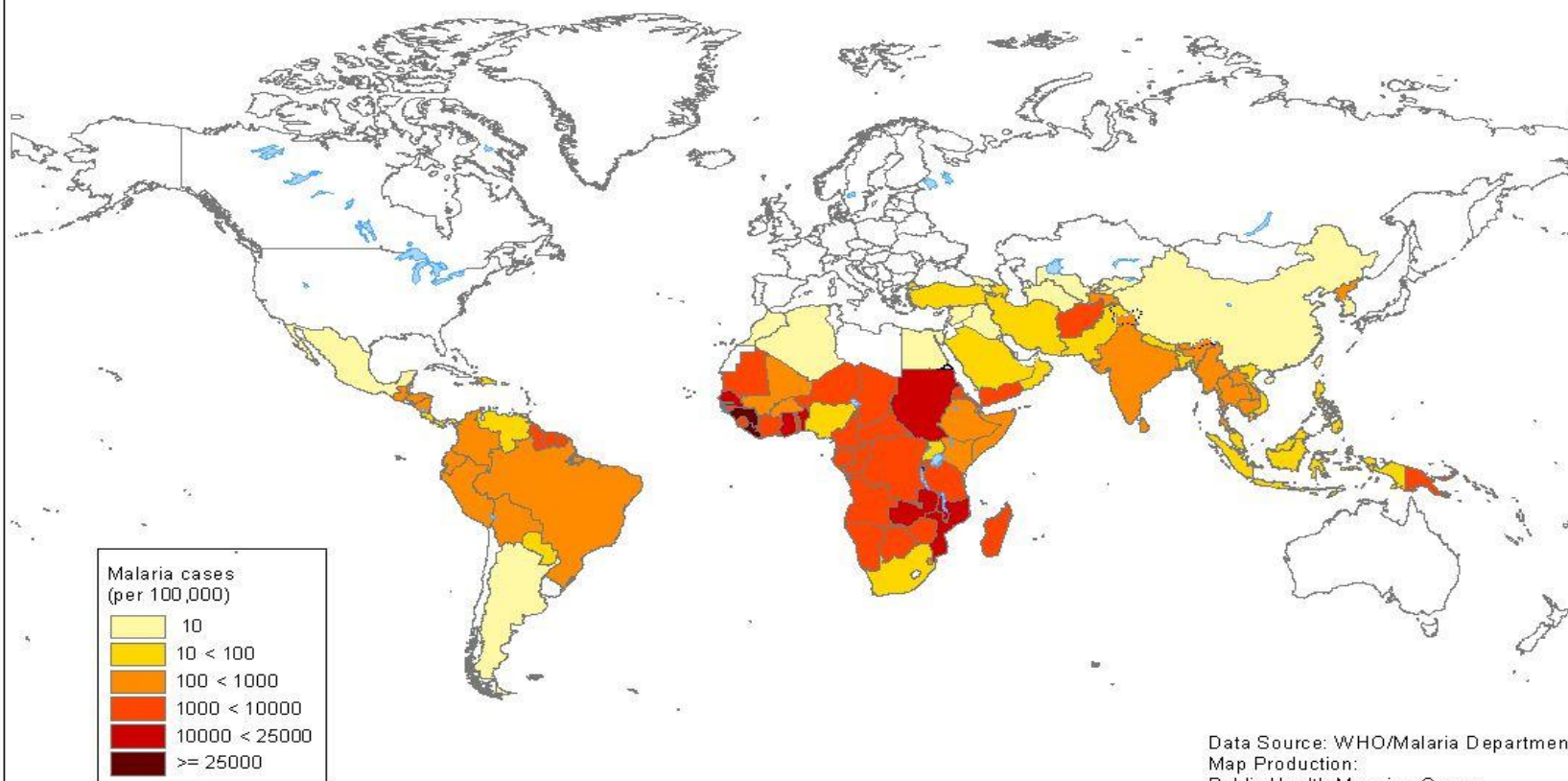
- Every year, 500 million people become severely ill with malaria
  - causes 30% of Low birth weight in newborns Globally.
- >1 million people die of malaria every year. One child dies from it every 30 seconds
- 40% of the world's population is at risk of malaria. Most cases and deaths occur in Africa.
- Malaria is the 9<sup>th</sup> leading cause of death in LICs and MICs
  - 11% of childhood deaths worldwide attributable to malaria
  - African children account for 82% of malaria deaths worldwide

# Life cycle of malaria parasite



# Global malaria prevalence

Malaria cases (per 100,000) by country, latest available data



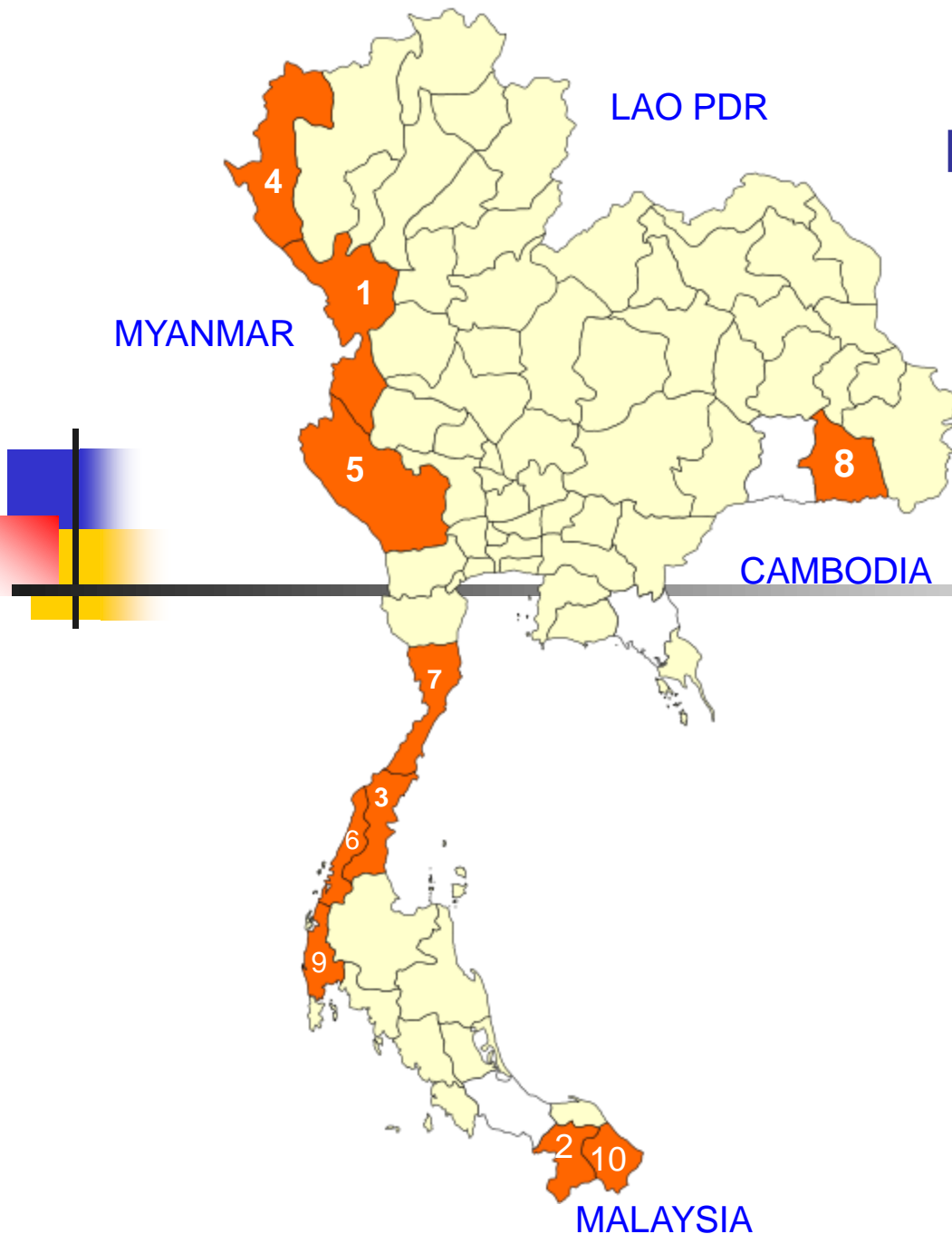
Data Source: WHO/Malaria Department  
Map Production:  
Public Health Mapping Group  
Communicable Diseases (CDS)  
World Health Organization



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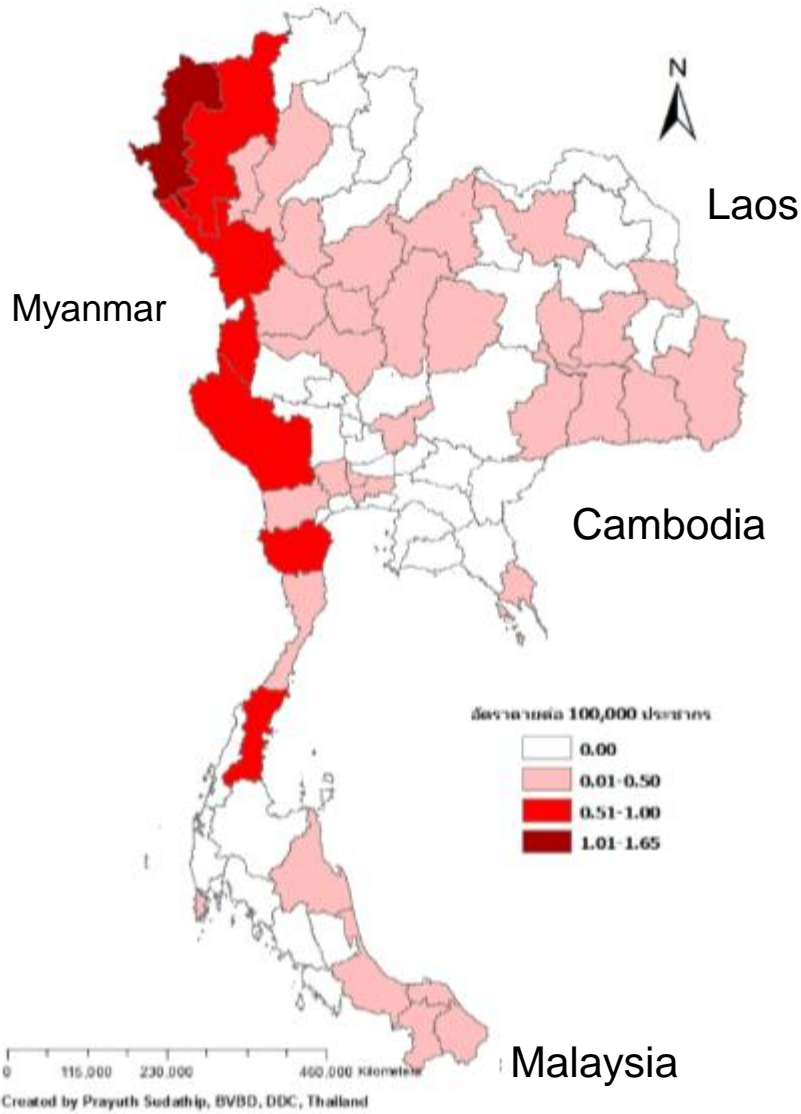
## Map showing Top Ten Provinces of Thailand with highest malaria cases, FY2010



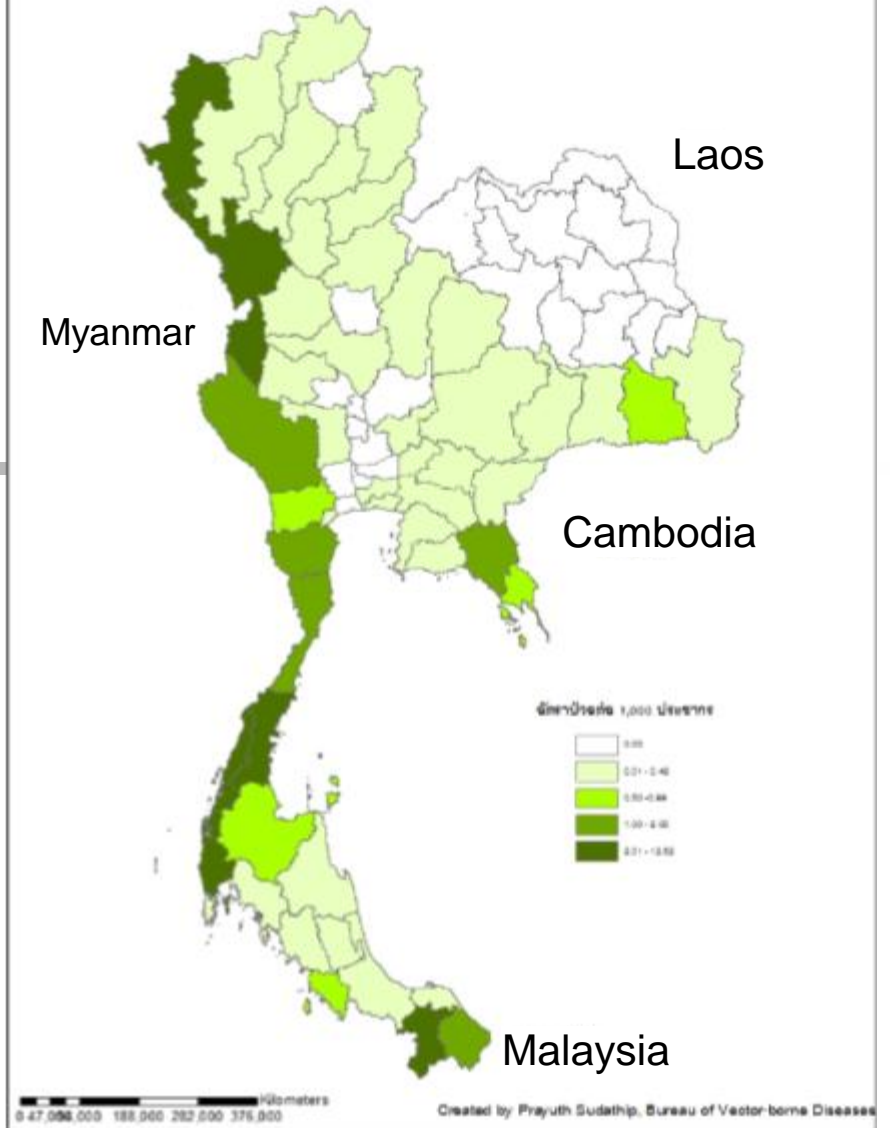
1. Tak 6,844
2. Yala 2,917
3. Chumporn 1,871
4. Mae Hong Son 1,511
5. Kanchanaburi 1,385
6. Ranong 984
7. Prachuap Khiri Khan 963
8. Srisaket 848
9. Phangha 832
10. Narathiwat 745

# Maps showing annual parasite incidence rate (per 1,000 pop.) and malaria mortality rate (per 100,000 pop.) (2010)

Annual Parasite Incidence per 1,000 population

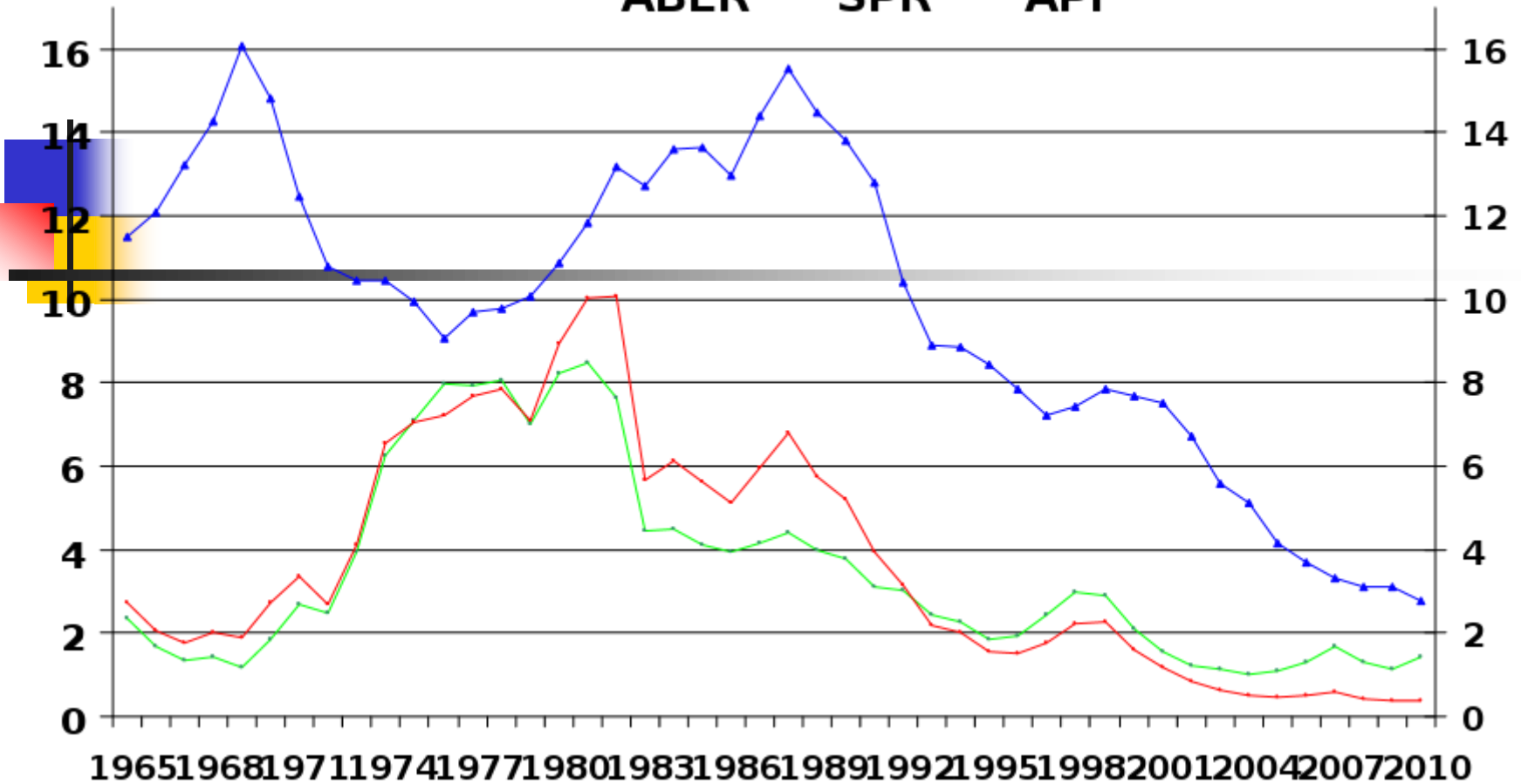


Malaria Mortality per 100,000 population



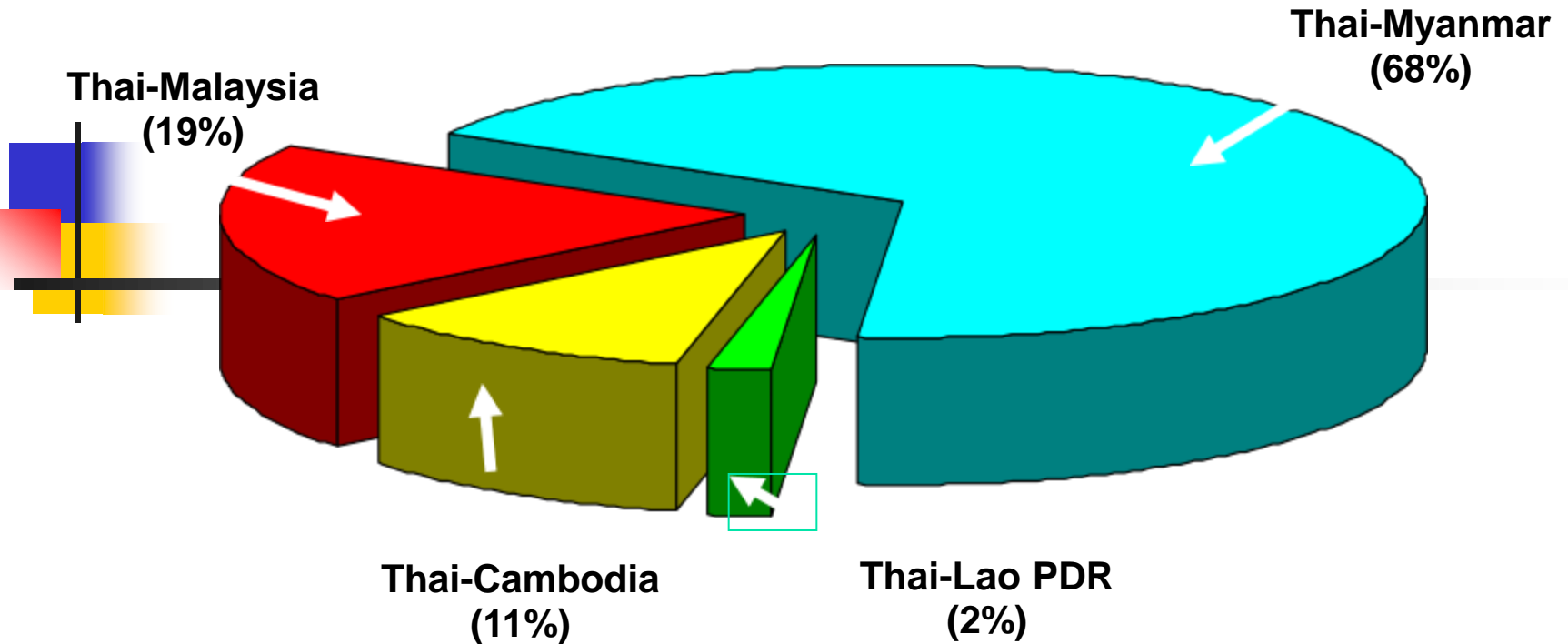
# Annual Parasite Incidence (API), Annual Blood Slide Examination Rate (ABER) and Slide Positive Rate (SPR), 1965-2010

—●— ABER —●— SPR —●— API



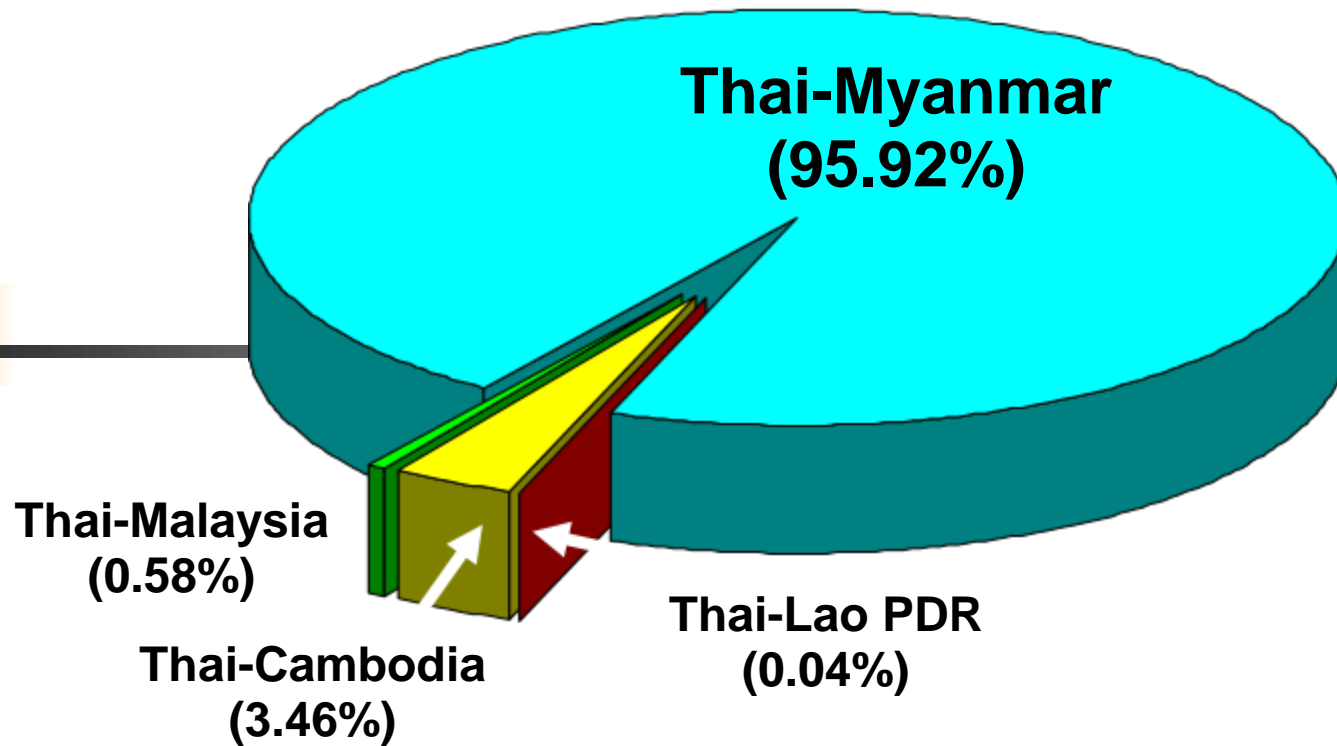


# Proportion of Thai cases by border sites, Thailand, Fiscal Year 2010

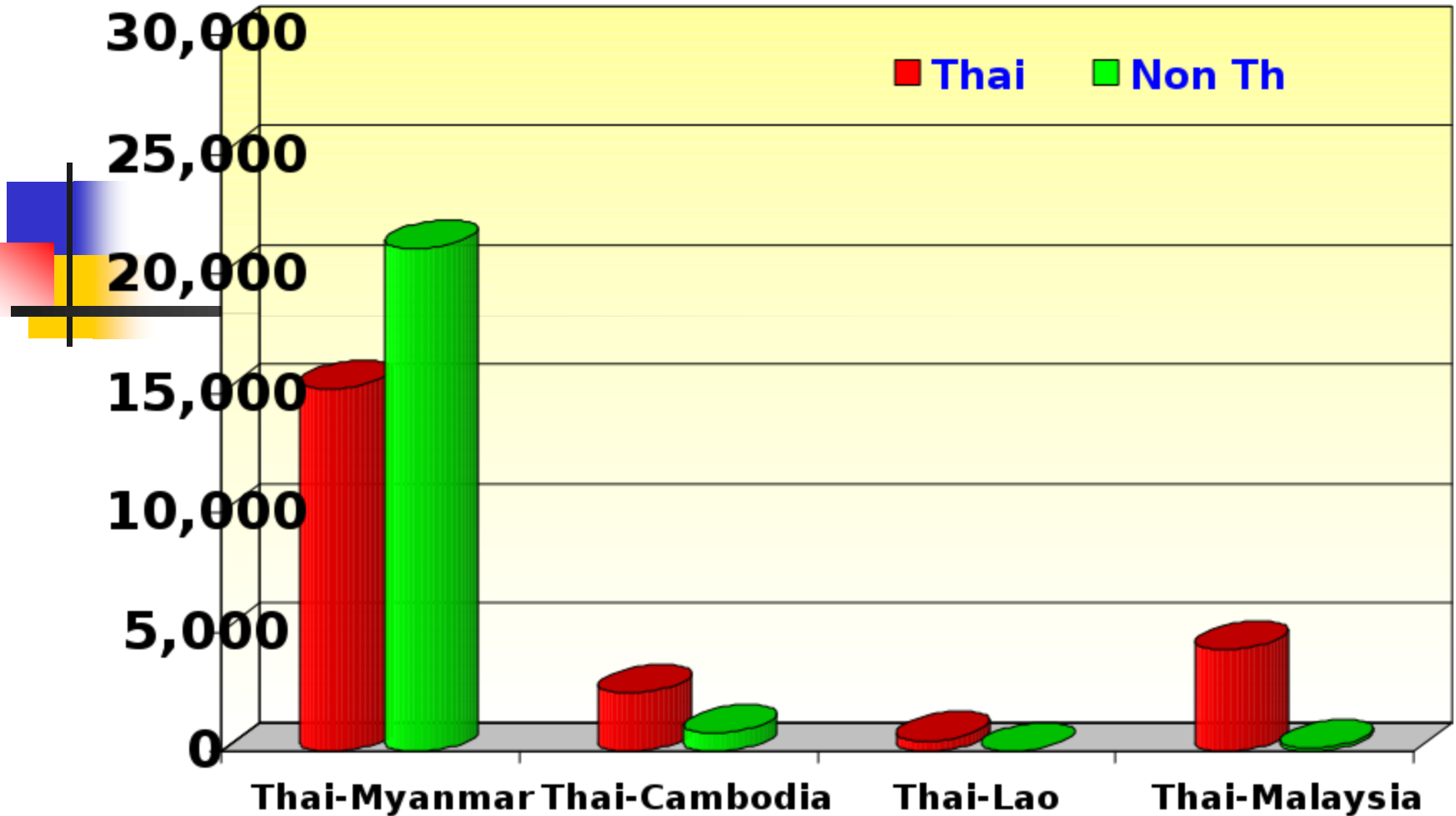




# Proportion of foreign cases by border sites, Thailand, Fiscal Year 2010



# Number of Thai and Non-Thai cases by border site Fiscal Year 2010



# National Drug Policy for *P. falciparum* malaria, January 2008 onward

Age (year)	1 <sup>st</sup> Day		2 <sup>nd</sup> Day		3 <sup>rd</sup> Day	
	ATS (tab)	M (tab)	ATS (tab)	M (tab)	ATS (tab)	P (mg.)
14+	4	3	4	2	4	30
8 -13	3	2	3	1 ½	2	15
3-7	2	1 ½	2	1	2	10
1-2	1	¾	1	½	1	5
6-11m	1	½	1	⅓	-	-

Refer children <6 m and pregnancy women to hospital

ATS = Artesunate 50 mg, M = Mefloquine 250 mg, P = Primaquine

# National Drug Policy for *P. vivax* or *P. ovale* malaria

Age (year)	1 <sup>st</sup> Day				2 <sup>nd</sup> Day		3 <sup>rd</sup> Day		Day 4-14
	1 <sup>st</sup> C (tab)	2 <sup>nd</sup> C (tab)	3 <sup>rd</sup> C + P (tab) (mg)		Once a day C + P (tab) (mg)		Once a day C + P (tab) (mg)		
14+	2	2	2	15	2	15	2	15	15
8-13	2	2	0	10	1	10	1	10	10
3-7	1	1	1	5	1	5	1	5	5
1-2	1	1	0	2 1/2	1	2 1/2	1	2 1/2	2 1/2
6-11 m	1	0	0	0	1/2	0	1/2	0	0
< 6 m	1/2	0	0	0	1/2	0	1/2	0	0
Pregnant	2	2	2	0	2	0	2	0	0

C = Chloroquine phosphate 250 mg, P = Primaquine 5 mg and 15 mg.

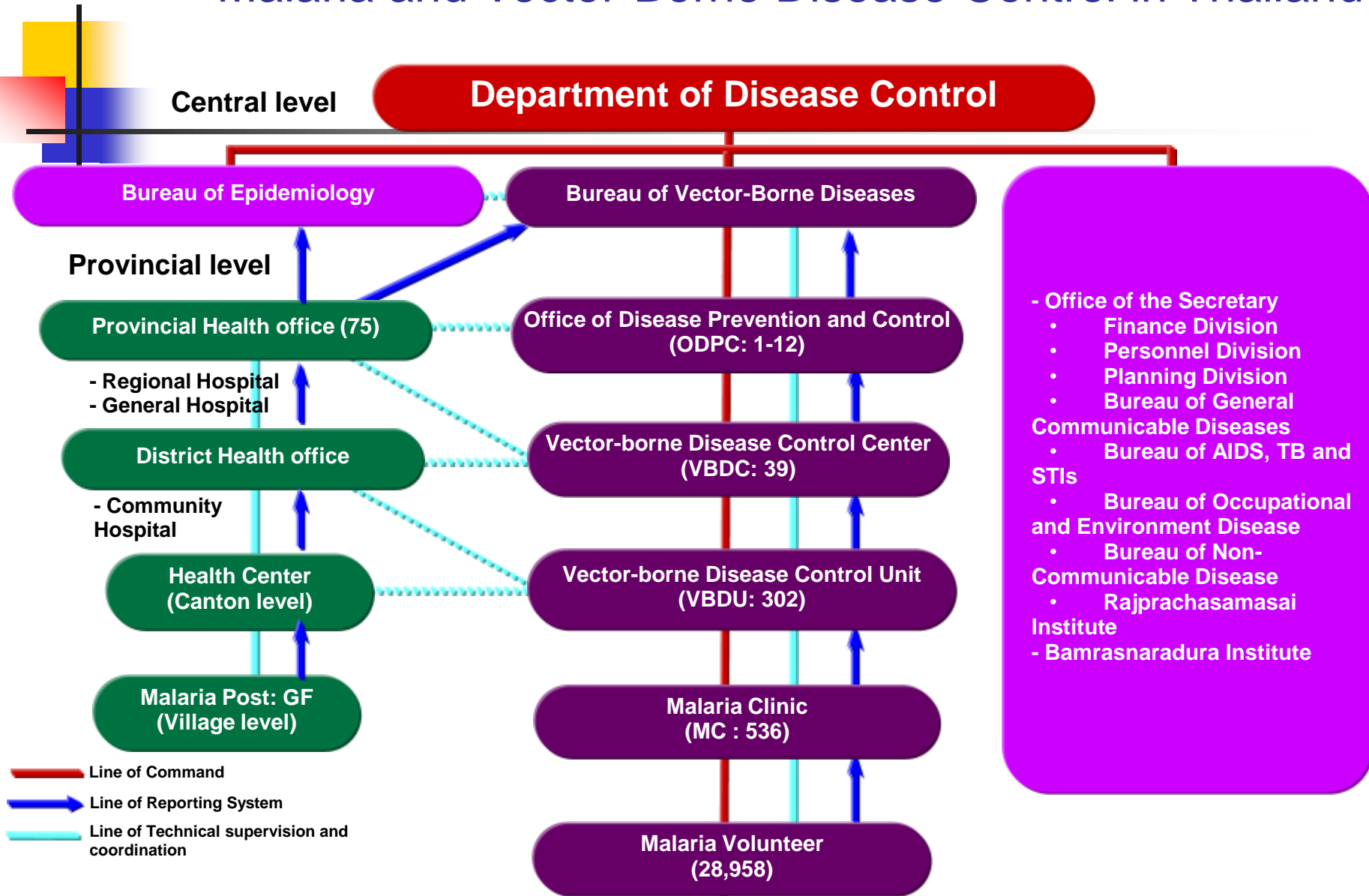


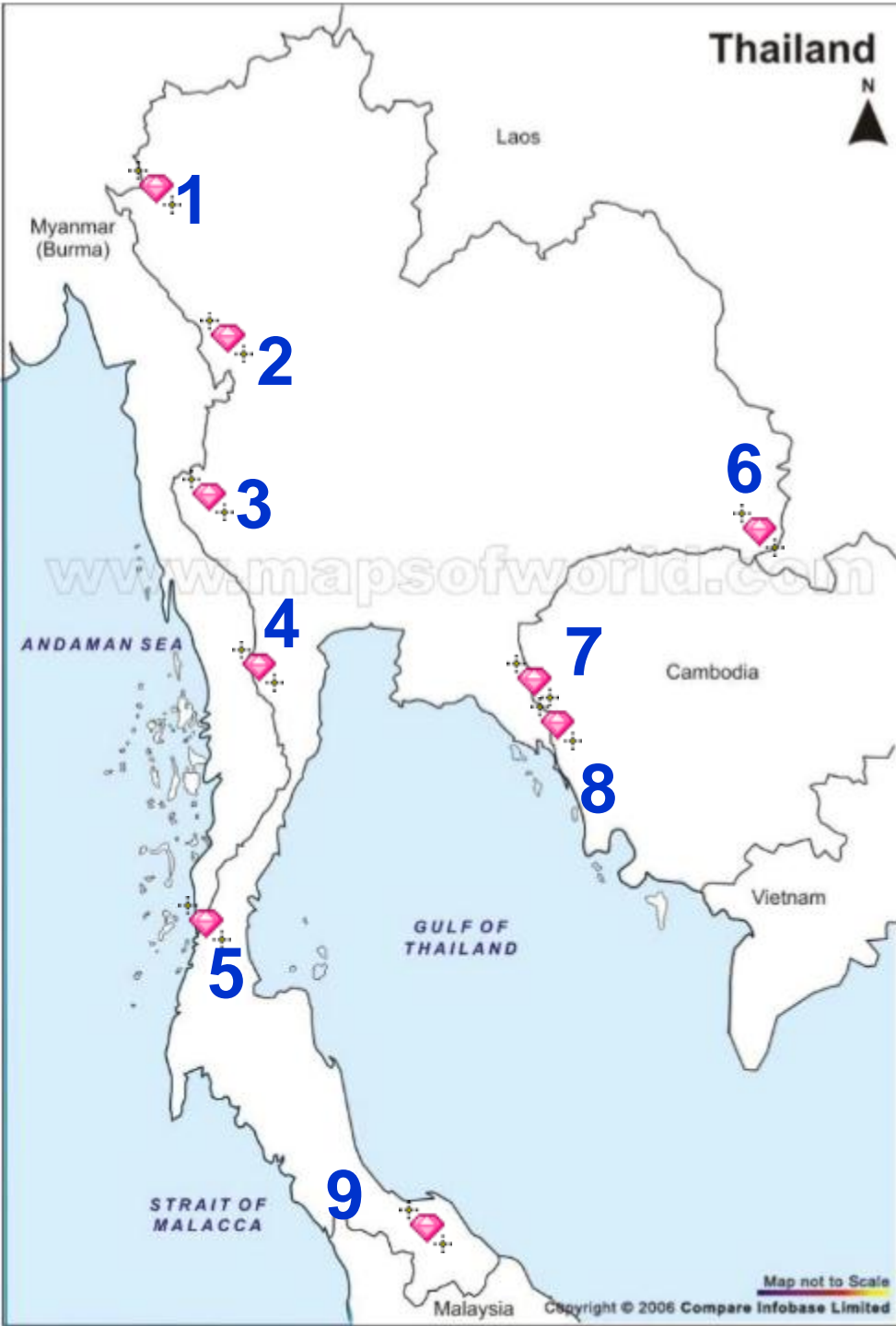
# Malaria Control

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- Malaria control
  - Early diagnosis and prompt treatment to cure patients and reduce parasite reservoir
  - Vector control:
    - Indoor residual spraying
    - Long lasting Insecticide treated bed nets
  - Intermittent preventive treatment of pregnant women
- Challenges in malaria control
  - Widespread resistance to conventional anti-malaria drugs
  - Malaria and HIV
  - Health Systems Constraints
    - Access to services
    - Coverage of prevention interventions

# Organization Chart and Reporting System of Malaria and Vector-Borne Disease Control in Thailand





## Nine Provinces as Sentinel sites for monitoring of drug resistance

1. Mae Hong Son
2. Tak
3. Kanchanaburi
4. Ratchaburi
5. Ranong
6. Ubon Ratchathani
7. Chanthaburi
8. Trat
9. Yala



# Avian Influenza

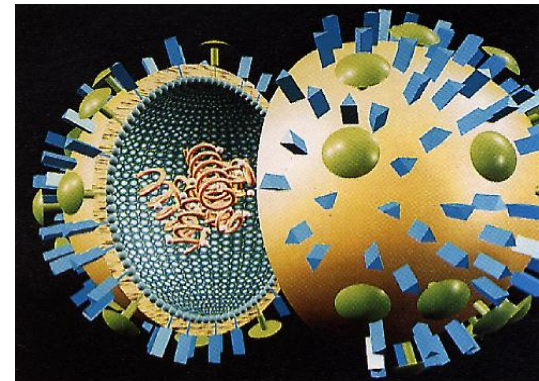
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- Seasonal influenza causes severe illness in 3-5 million people and 250000 – 500000 deaths yearly
- 1<sup>st</sup> H5N1 avian influenza case in Hong Kong in 1997.
- By October 2007 – 331 human cases, 202 deaths.



# Influenza A viruses have 16 H subtypes and 9 N subtypes.

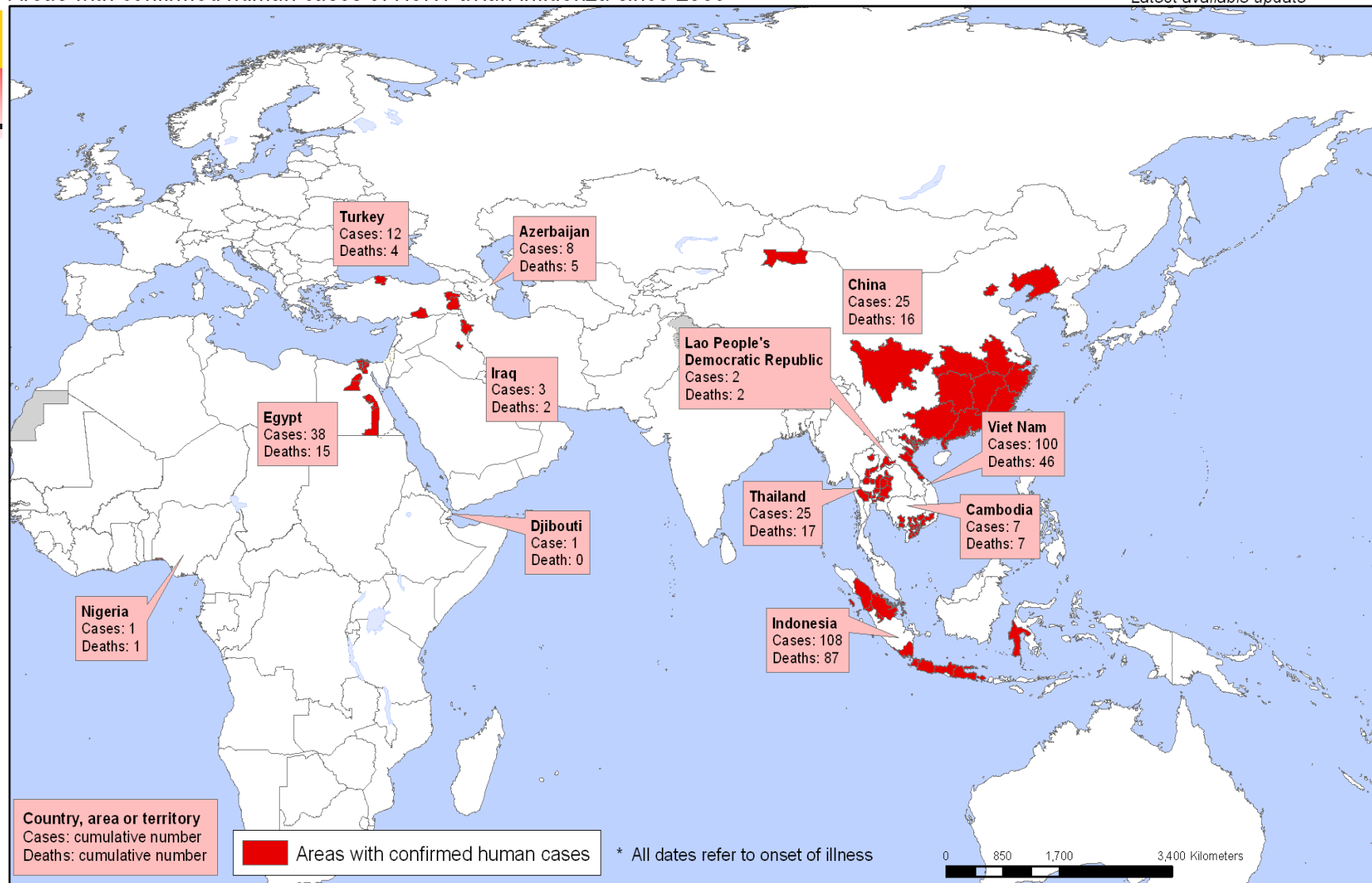
- In poultry, the viruses can mutate, usually within a few months, from the low pathogenic avian influenza (LPAI) form into the highly pathogenic form (HPAI).
- Only viruses of the H5 and H7 subtypes are known to cause the highly pathogenic (HPAI) form of the disease.



# Confirmed human cases of HPAI

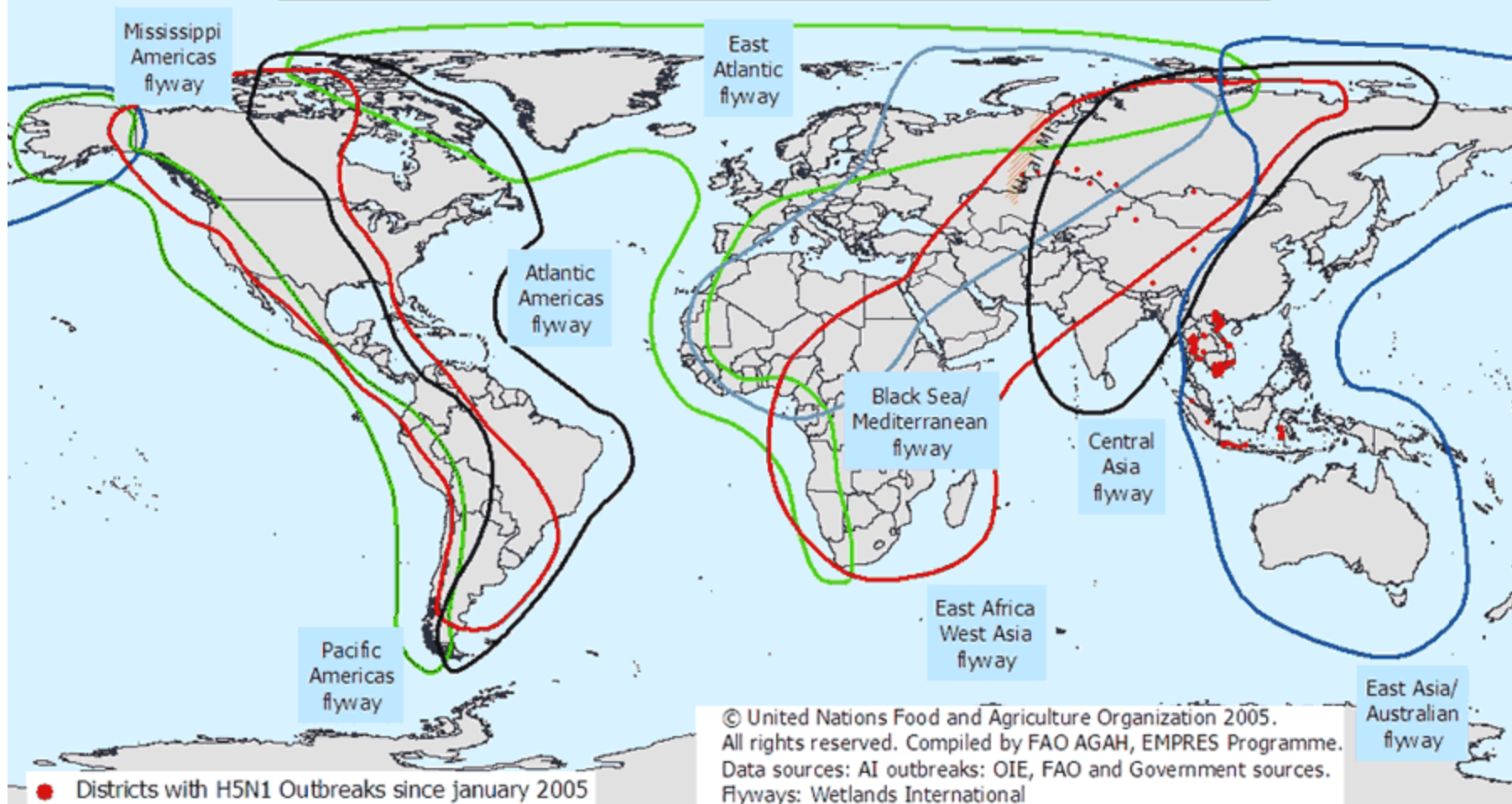
Status as of 08 October 2007  
Latest available update

Areas with confirmed human cases of H5N1 avian influenza since 2003 \*



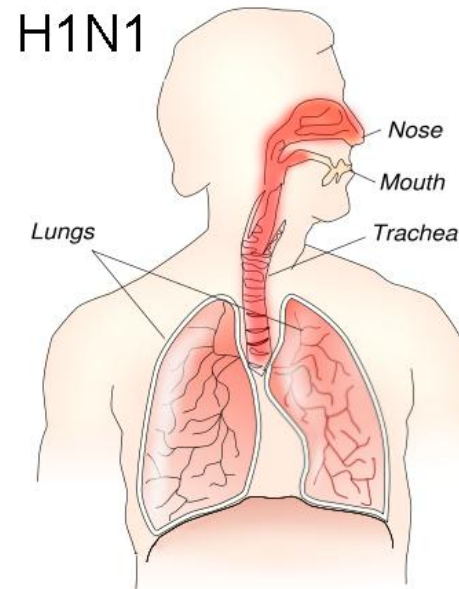
# Migratory pathway for birds and Avian influenza

**H5N1 outbreaks in 2005 and major flyways of migratory birds**  
Situation on 30 August 2005

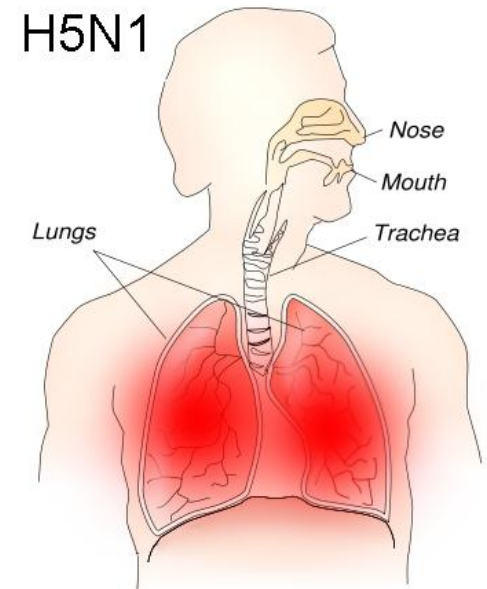


# Human-Poultry interaction

- China and Viet Nam account for the bulk of this – 775 million or 75 percent
- Thailand has about 11 million ducks.



Easily spread  
Rarely fatal



Spreads slowly  
Often fatal



# Control of Avian Influenza

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- Control depends on the phase of the epidemic
  - Pre-Pandemic Phase
    - Reduce opportunity for human infection
    - Strengthen early warning system
  - Emergence of Pandemic virus
    - Contain and/or delay the spread at source
  - Pandemic Declared
    - Reduce mortality, morbidity and social disruption
    - Conduct research to guide response measures
- Antiviral medications – Oseltamivir (Tamiflu), Amantadine
- Vaccine – still experimental under development.
  - Can only be produced in significant quantity after an outbreak



# Control of HPAI in Thailand

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- The local movements of ducks decreased when the Thai government started to support in-door keeping of ducks, offering feed subsidies and construction of enclosures.
- Together, these measures stopped the H5N1 transmission cycle. Since late 2005, Thailand has suffered only sporadic outbreaks.



# Control of HPAI in Thailand





# Neglected tropical diseases (NTDs)

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- Cause over 500,000 deaths and 57 million DALYs annually.
- Include the following
  - Helminthic infections
    - Hookworm (Ascaris, trichuris), lymphatic filariasis, onchocerciasis, schistosomiasis, **liver flukes**
  - Protozoan infections
    - Leishmaniasis, African trypanosomiasis, Chagas disease
  - Bacterial infections
    - Leprosy, trachoma, buruli ulcer