

# Epidemiology of Avian Influenza A(H5N1) in Cambodia

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# Kingdom of Cambodia

- ▶ Population: ~ 15 Million
  - ▶ 80% in rural area
- ▶ Rainy season: May-October
- ▶ Temperature: 21-35°C



← Population density



# Poultry Raising and Trading in Cambodia



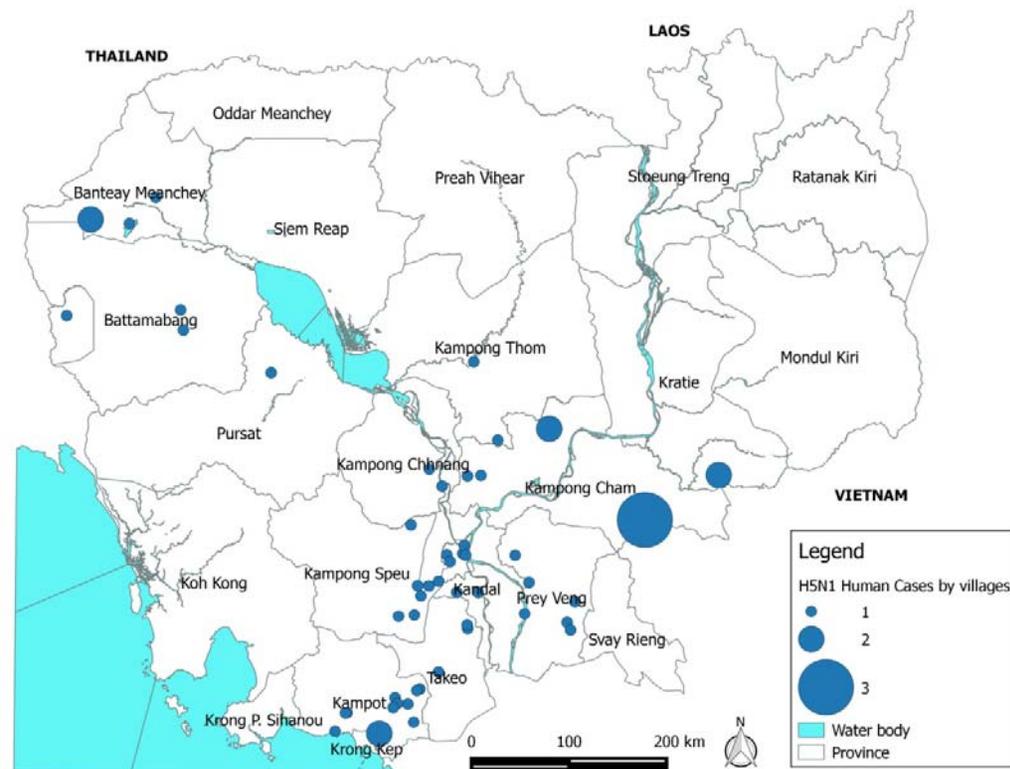
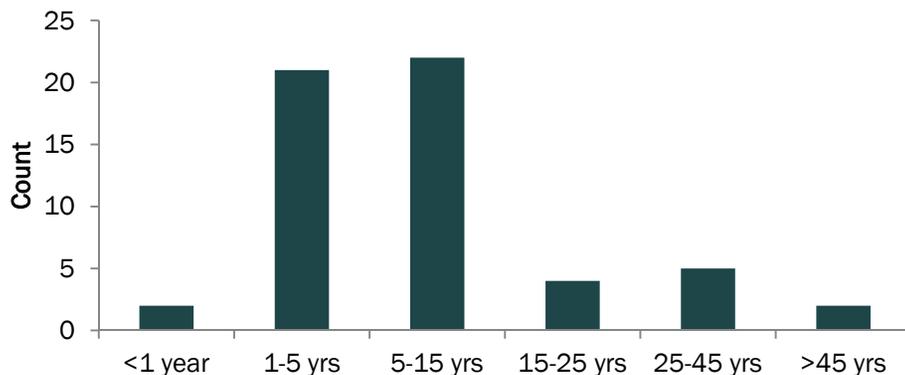
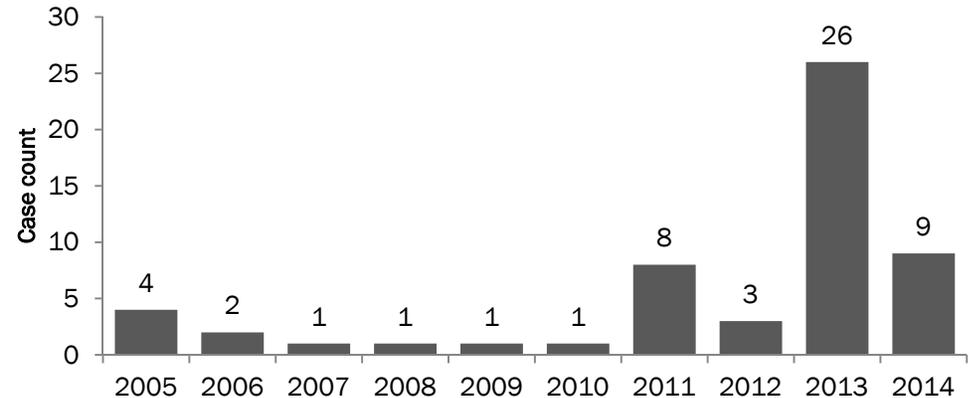
- ▶ Backyard poultry husbandry: 80%





# A(H5N1) Human Cases in Cambodia

- ▶ 56 human cases since 2005
  - ▶ 26 (46%) in 2013 alone
- ▶ 38 deaths (67.9%)
- ▶ Female: 51.8%
- ▶ Age
  - ▶ Median: 6 yrs ; Means: 11 yrs
  - ▶ Min-max: 0.7 – 58 yrs





# Circumstance of Detection of Human Cases in Cambodia

- ▶ Most samples from Kuntha Bopha children hospital (Kuntha Bopha foundation)
- ▶ By community-based surveillance of ILI (NAMRU-2)
- ▶ Around major traditional festivals of the year
- ▶ Many times, detection of human cases before notification of poultry die-off in the community



# Response to Occurrence of Human Case

## Coordination

- Communicable Disease Control Department (CDC-MOH)
- National Veterinary Research Institute (NaVRI-MoA)
- Institut Pasteur du Cambodge (IPC)
- WHO and FAO

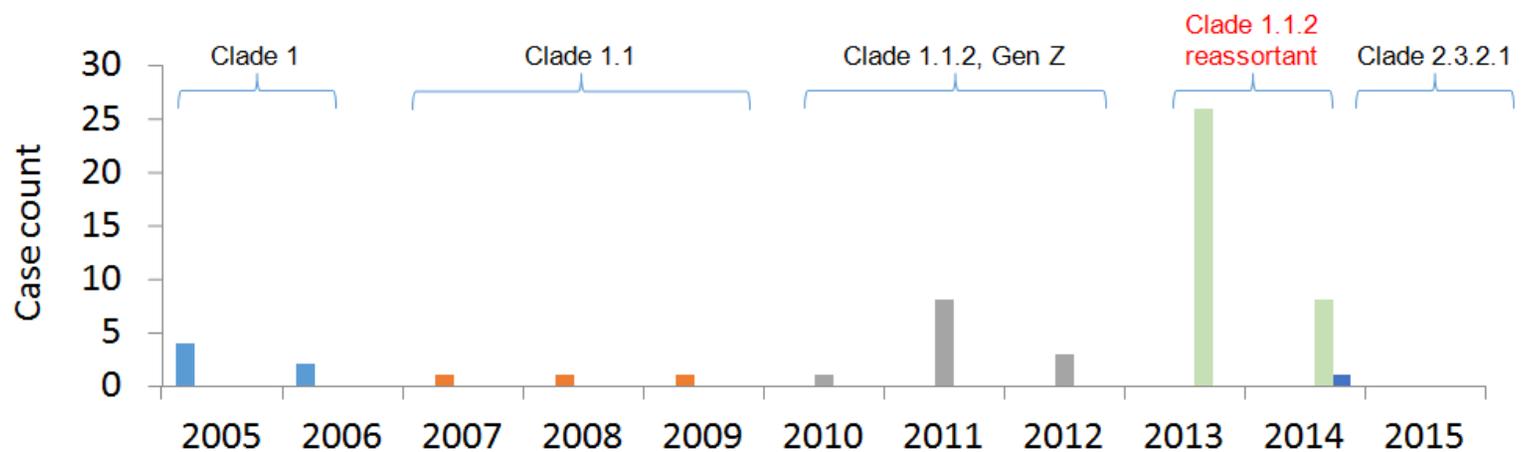
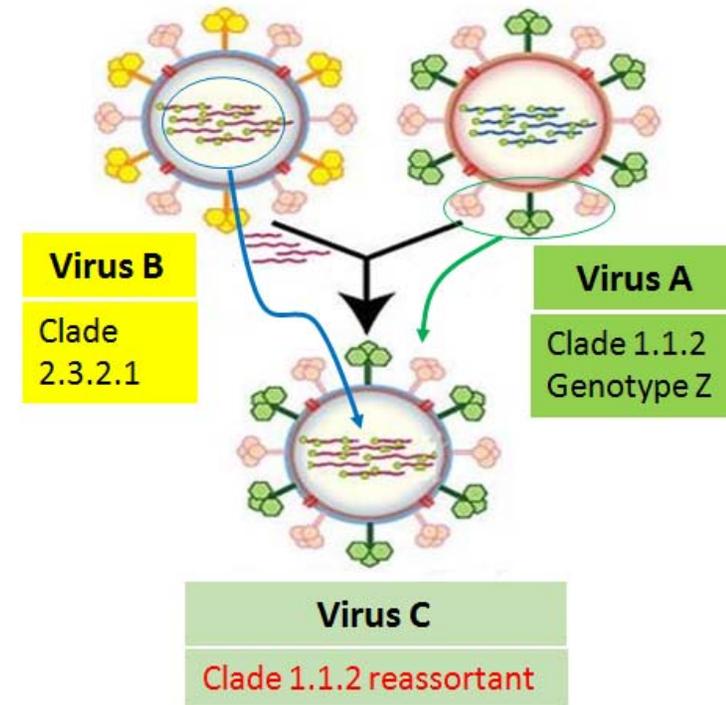
Focus	Laboratory	Epidemiology in human	Epidemiology and Controls in poultry	Case Management
Tasks	Confirmation Drug resistance Serology Virus characterization	Contact tracing  Surveillance and active case finding  Seroprevalence	Poultry mortality survey Surveillance Control measures	Treatment and Quarantine
Key actor	NaVRI NIPH-MoH IPC	CDC-MoH IPC WHO	NaVRI FAO	CDC-MoH Referral hospitals





# A(H5N1) Clade 1.1.2 reassortant

- ▶ Reassortant first detected in January 2013
- ▶ Emergence coincided with a dramatic increase in human cases
  - ▶ Increased transmission to humans?
  - ▶ Increased transmission between poultry?
  - ▶ Improved awareness and surveillance?





# Contact Tracing

- ▶ To detect human-to-human transmission and additional symptomatic cases
- ▶ Identification and biological sampling
  - ▶ Blood
  - ▶ Nasopharyngeal swab in presence of ILI symptoms
- ▶ Screening by National Institute of Public Health (NIPH), MoH
- ▶ Confirmation by IPC





# Contact Tracing

- ▶ Since 2005
- ▶ More than 500 contact people screened
- ▶ No evidence of human-to-human transmission



# Seroprevalence Surveys

- ▶ To assess the extend of transmission among at-risk population
- ▶ Test all people living in the same village as the confirmed Index Case
- ▶ 2 blood samples with an interval of 4 weeks





# Seroprevalence Surveys

- ▶ 7 seroprevalence surveys in Cambodia during 2005-2014
- ▶ Tested 5,729 people
- ▶ 37 positive = 0.6% (range: 0.5-0.9%)





# Surveillance in Live Bird Markets (LBMs)

- ▶ Study by IPC and NaVRI-MAFF
  - ▶ In 2011 (Horm et al., Emerg Infect Dis, 2013)
  - ▶ **In 2013 (Horm et al., Emerge Microbes Infect, 2016)**
  - ▶ In 2015 (analysis ongoing)

## In 2013 (Horm et al., Emerge Microbes Infect, 2016)

- ▶ In 4 markets
- ▶ Weekly specimen collection in environment and poultry
- ▶ Seroprevalence in poultry workers
  - ▶ 4 sequential blood samples to monitor the risk of infection by A(H5N1), A(H9N2) and A(H7N9)



# Surveillance in LBMs



Slide: Virology Unit, IPC



Duck swabs



Chicken swabs



Discarded feathers



Poultry drinking water



Carcass wash water



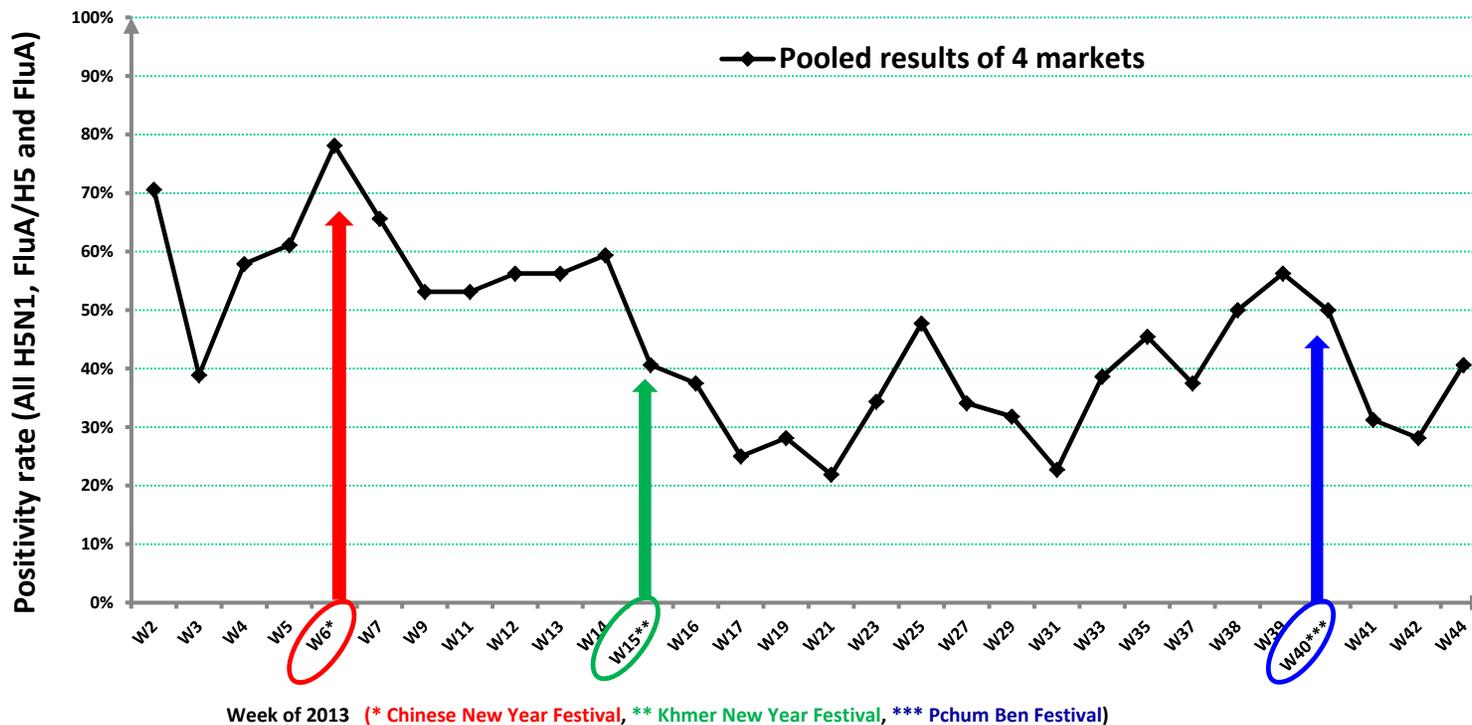
Soil/mud around cages  
or holding areas

# Surveillance in LBM

(Horm et al., Emerge Microbes Infect, 2016)



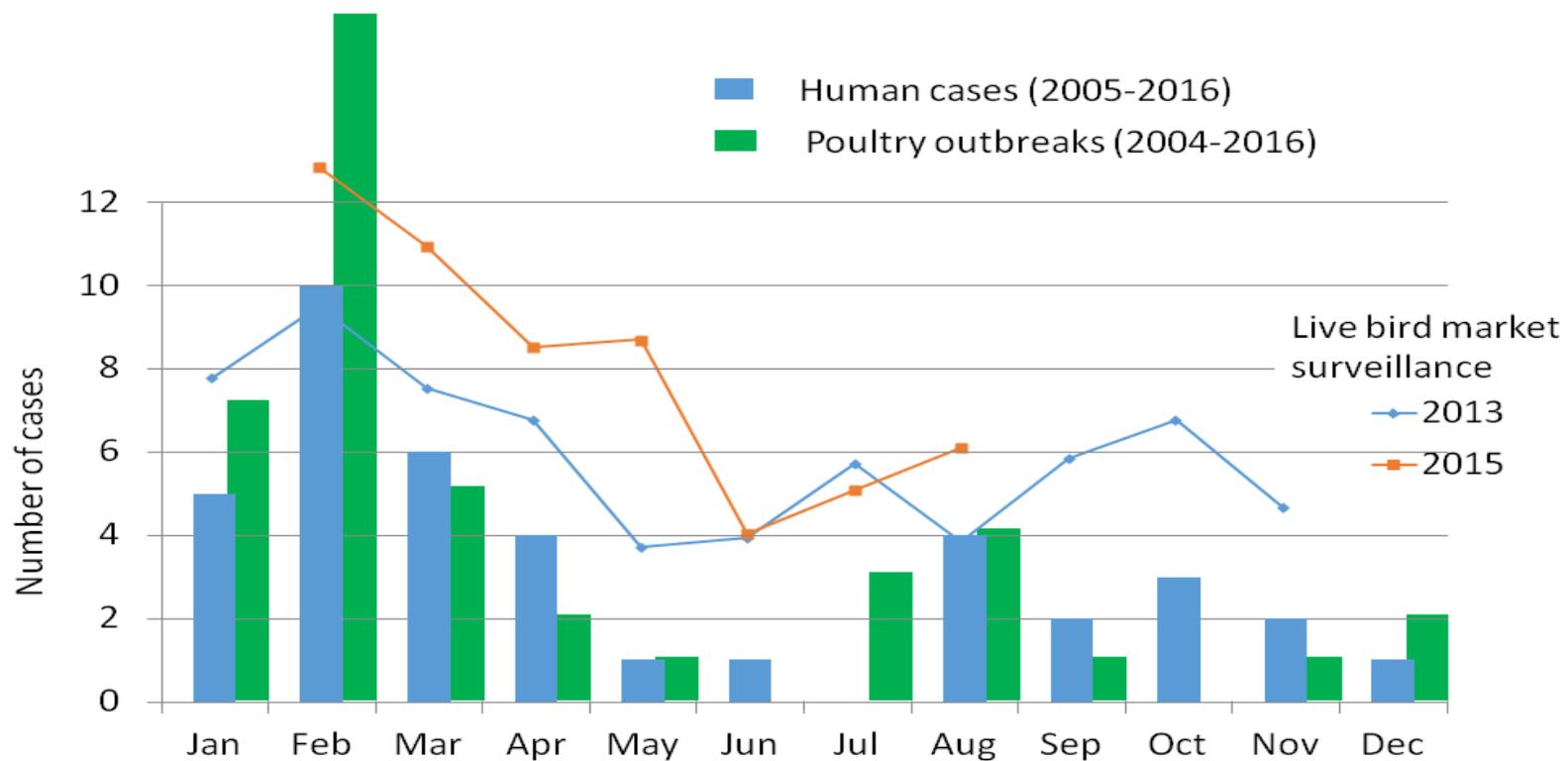
- ▶ In 2013, 45% of environmental and poultry specimens found positive for influenza A (tested n=1,048)
- ▶ 35% positive for A(H5N1) virus, all Clade 1.1.2 reassortant
- ▶ At least 9 low pathogenic avian influenza viruses co-circulated



- ▶ In a cohort of 125 poultry workers, serology testing found antibodies
  - ▶ 4.5% to A(H5N1)
  - ▶ 1.5% to A(H9N2)



# Seasonality of A(H5N1) Circulation in Human, Poultry, LBMs in Cambodia





# Conclusion

- ▶ Low transmission of A(H5N1) to human in Cambodia
- ▶ No evidence of human-to-human transmission
- ▶ Surveillance of SARI at hospitals is important for cases detection
  - ▶ Example of Kuntha Bopha children hospital
- ▶ Surveillance of poultry mortality would lead to early detection of virus circulation, thus better prevention of transmission to human
  - ▶ But difficult in a setting with 80% as backyard poultry husbandry
  - ▶ Newcastle disease causes confusion with same high poultry mortality



# Conclusion

- ▶ High co-circulation of A(H5N1) and other AI viruses in LBMs
  - ▶ Potential for emergence of new strains with high impact on human and animal health
  - ▶ Intervention needed and to be maintained
- ▶ Testing of environmental samples in LBMs is very efficient to detect avian influenza circulation
- ▶ Other research activities are ongoing.

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Children's Hospitals



Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™



WHO Collaborating Centre  
for Reference and  
Research on Influenza  
**VIDRL**



**Thank You  
For Your Attention!**

