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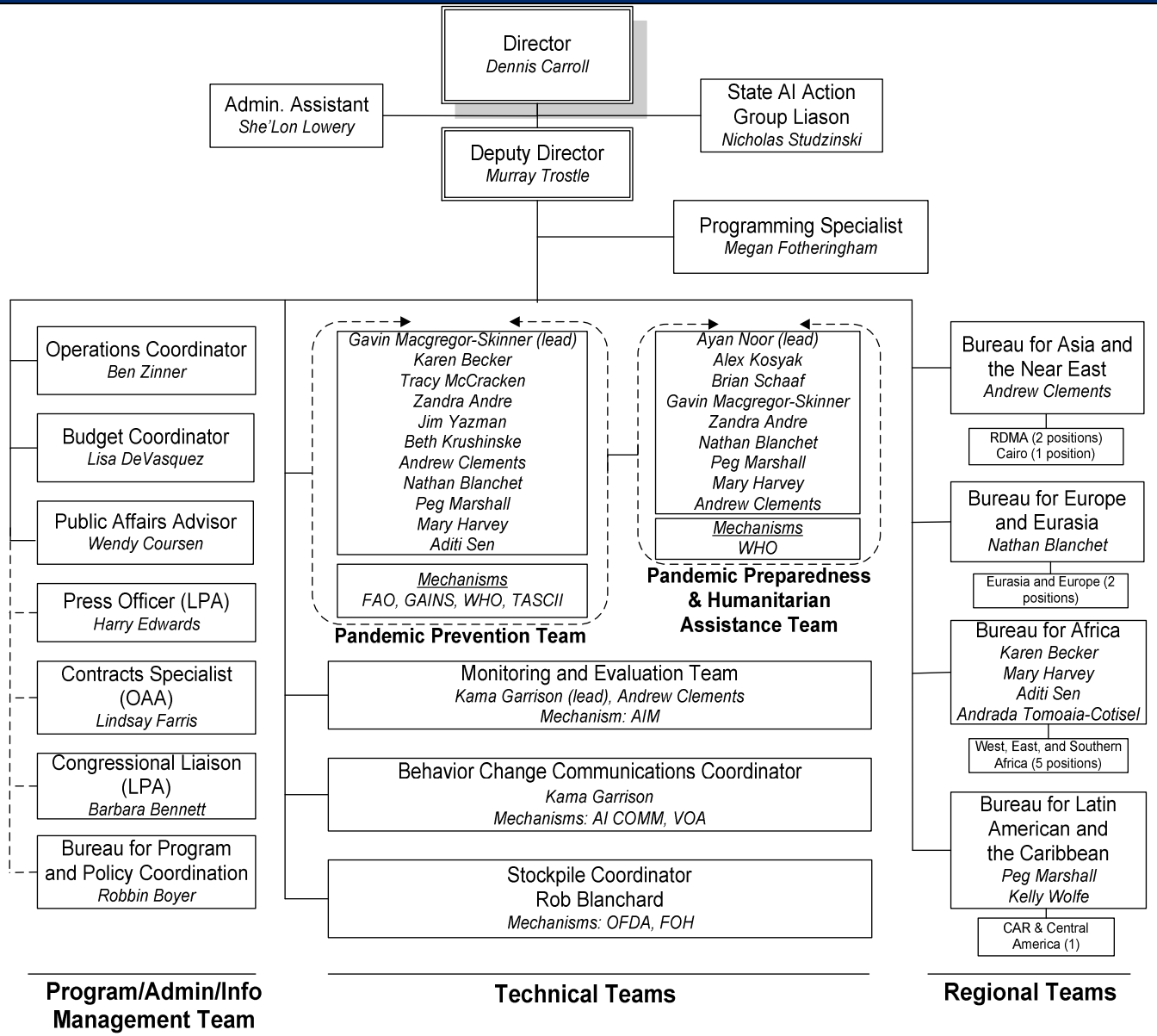
Global Domestic Poultry Surveillance and Epidemiology of H5N1 Avian Influenza

December 7, 2006

Dr. Gavin Macgregor-Skinner
BVSc, MSc, MPH, MRCVS
Pandemic Influenza Prevention Team Leader
U.S. Agency for International Development

USAID Avian and Pandemic Influenza Response Unit



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Coordinated USG Approach

- **DoD**
  - –Lab capacity strengthening; commodities and training for U.S. military
- **HHS, CDC**
  - –Surveillance and diagnostics, pandemic planning, research, communications
- **USDA**
  - –Technical assistance for animal surveillance and diagnostics, containment & prevention measures, planning
- **State Department**
  - –Public diplomacy, diplomatic engagement, delivery of donated supplies, overall coordination
- **USAID**
  - –Pandemic preparedness and planning, animal and human surveillance, behavior change communications, stockpiling protective commodities and decontamination kits, outbreak response support, private sector involvement, coordinating between human and animal health sectors

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Epidemiology

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Overview of the Current Situation

As of 29 November, 2006:

- H5N1 detected in birds in 55 countries
  - *4,465 poultry outbreaks reported to OIE*
  - *more than 250 million birds have died or been culled to control the disease*

- H5N1 detected in humans in 10 countries
  - *total of 258 cases and 154 deaths reported*
  - *average of 5-9 new cases per month*
  - *case fatality rate = 60%*

sources: WHO, OIE

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Current WHO phase of pandemic alert

Inter-pandemic phase	Low risk of human cases	1
New virus in animals, no human cases	Higher risk of human cases	2
Pandemic alert	No or very limited human-to-human transmission	3
New virus causes human cases	Evidence of increased human-to-human transmission	4
	Evidence of significant human-to-human transmission	5
Pandemic	Efficient and sustained human-to-human transmission	6

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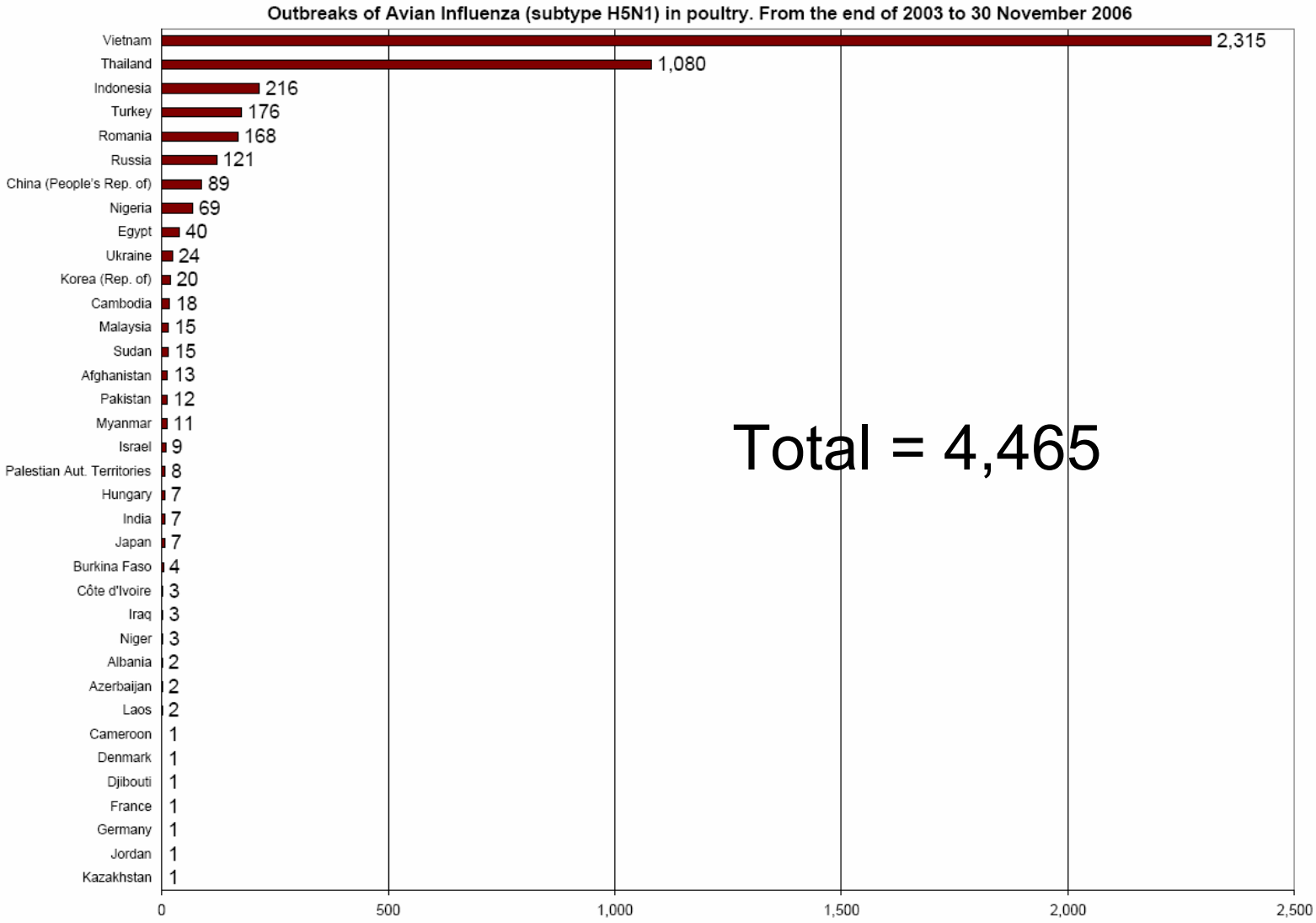
H5N1 cases in humans (29 November 2006)

Country	2003		2004		2005		2006		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	0	0	0	0	0	0	8	5	8	5
Cambodia	0	0	0	0	4	4	2	2	6	6
China	0	0	0	0	8	5	12	8	21	14
Djibouti	0	0	0	0	0	0	1	0	1	0
Egypt	0	0	0	0	0	0	15	7	15	7
Indonesia	0	0	0	0	17	11	55	45	74	57
Iraq	0	0	0	0	0	0	3	2	3	2
Thailand	0	0	17	12	5	2	3	3	25	17
Turkey	0	0	0	0	0	0	12	4	12	4
Viet Nam	3	3	29	20	61	19	0	0	93	42
Total	**3**	**3**	**46**	**32**	**95**	**41**	**111**	**76**	**258**	**154**
Case fatality rate	**100%**		**70%**		**43%**		**68%**		**60%**	

Total number of cases includes number of deaths.
WHO reports only laboratory-confirmed cases.
Source: http://www.who.int/csr/disease/avian_influenza/country/cases_table_2006_11_29/en/index.html

H5N1 outbreaks in poultry (30 November 2006)



Source: http://www.oie.int/downld/AVIAN%20INFLUENZA/Graph%20HPAI/graphs%20HPAI%2030_11_2006.pdf

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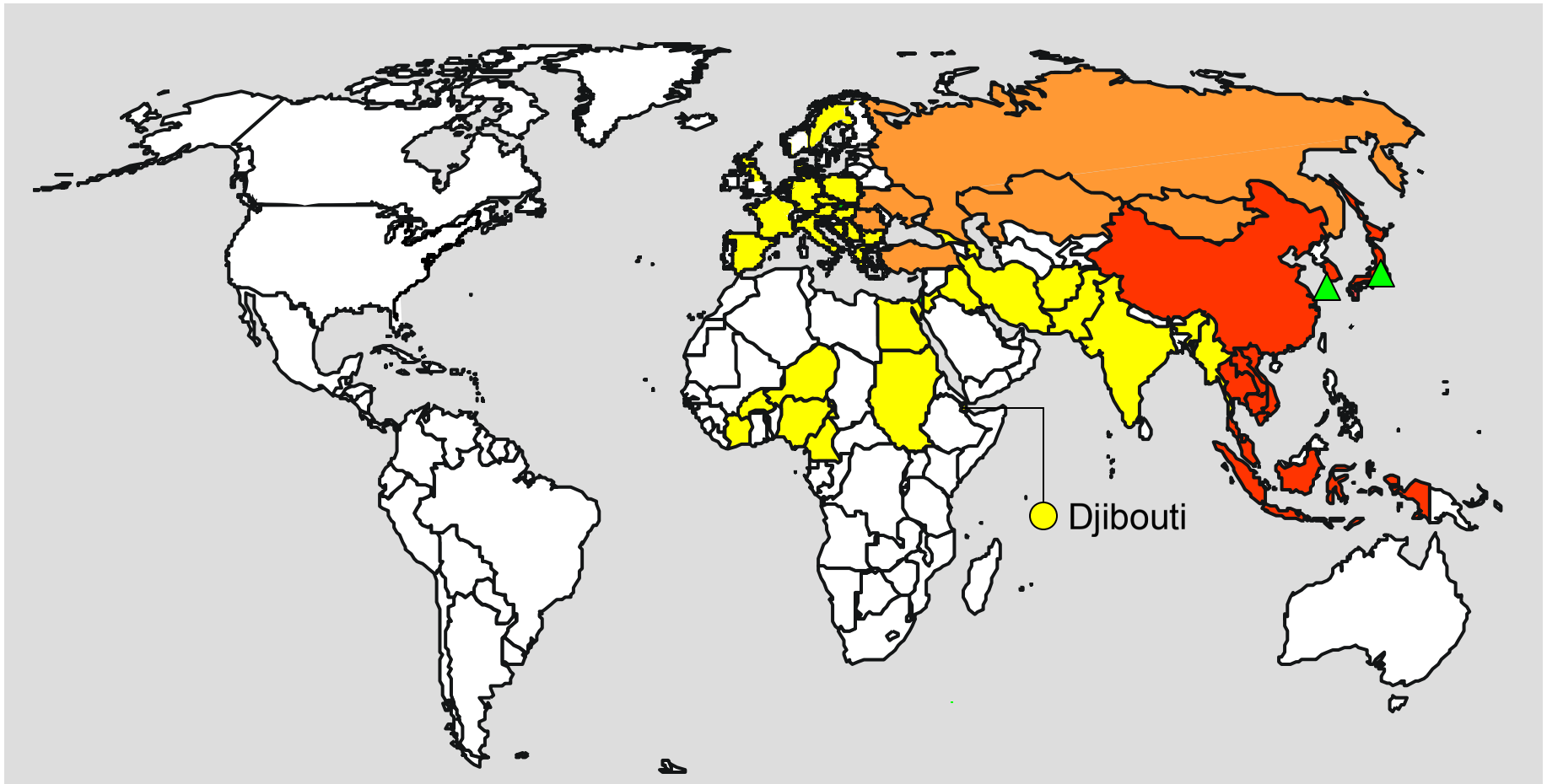
Since July 2005, H5N1 Avian Influenza has Spread Rapidly



Updated 10-16-06

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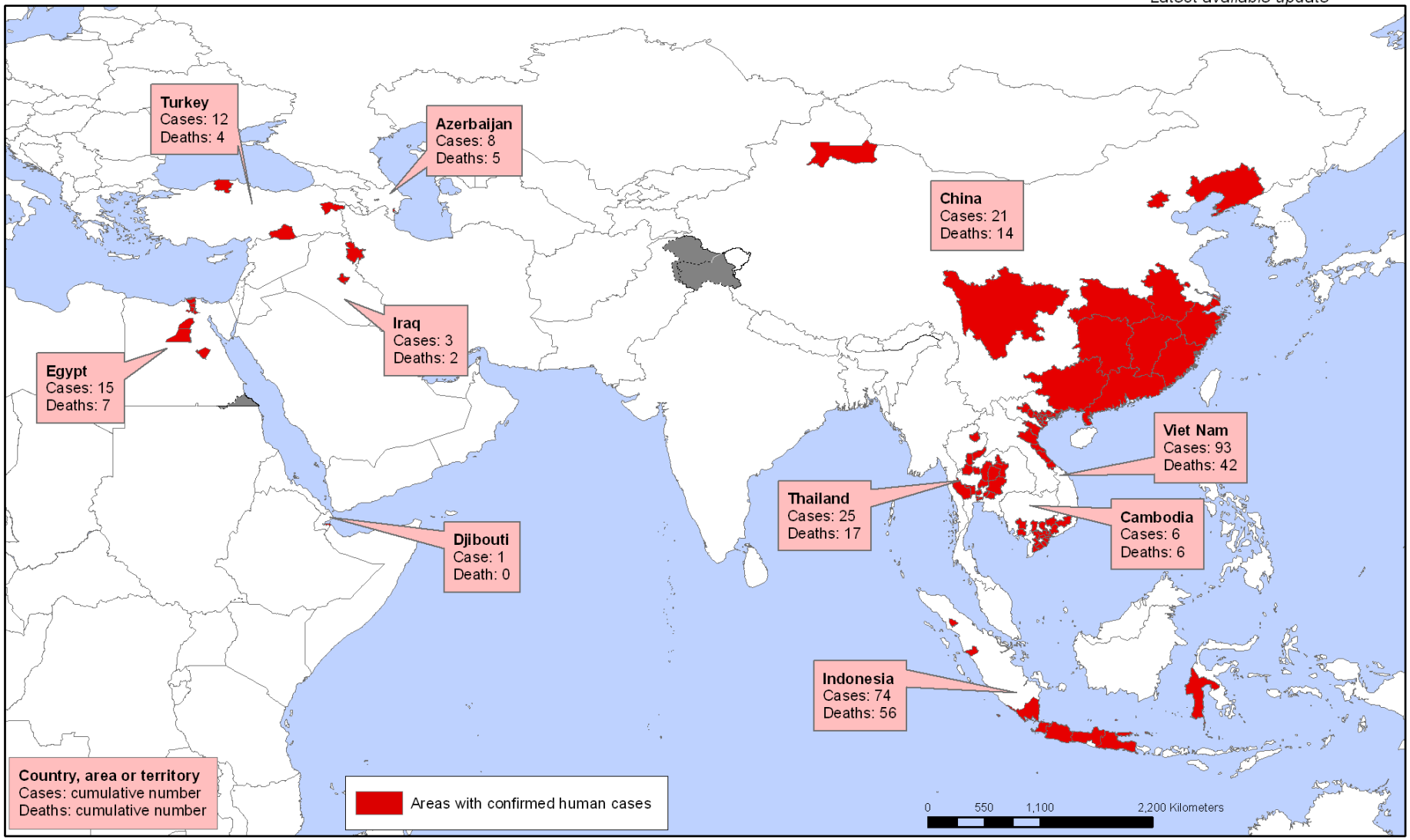
Confirmed human cases since 2003

Affected areas with confirmed human cases of H5N1 avian influenza since 2003

Status as of 13 November 2006
Latest available update



World Health Organization

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: WHO / Map Production: Public Health Mapping and GIS
Communicable Diseases (CDS) World Health Organization

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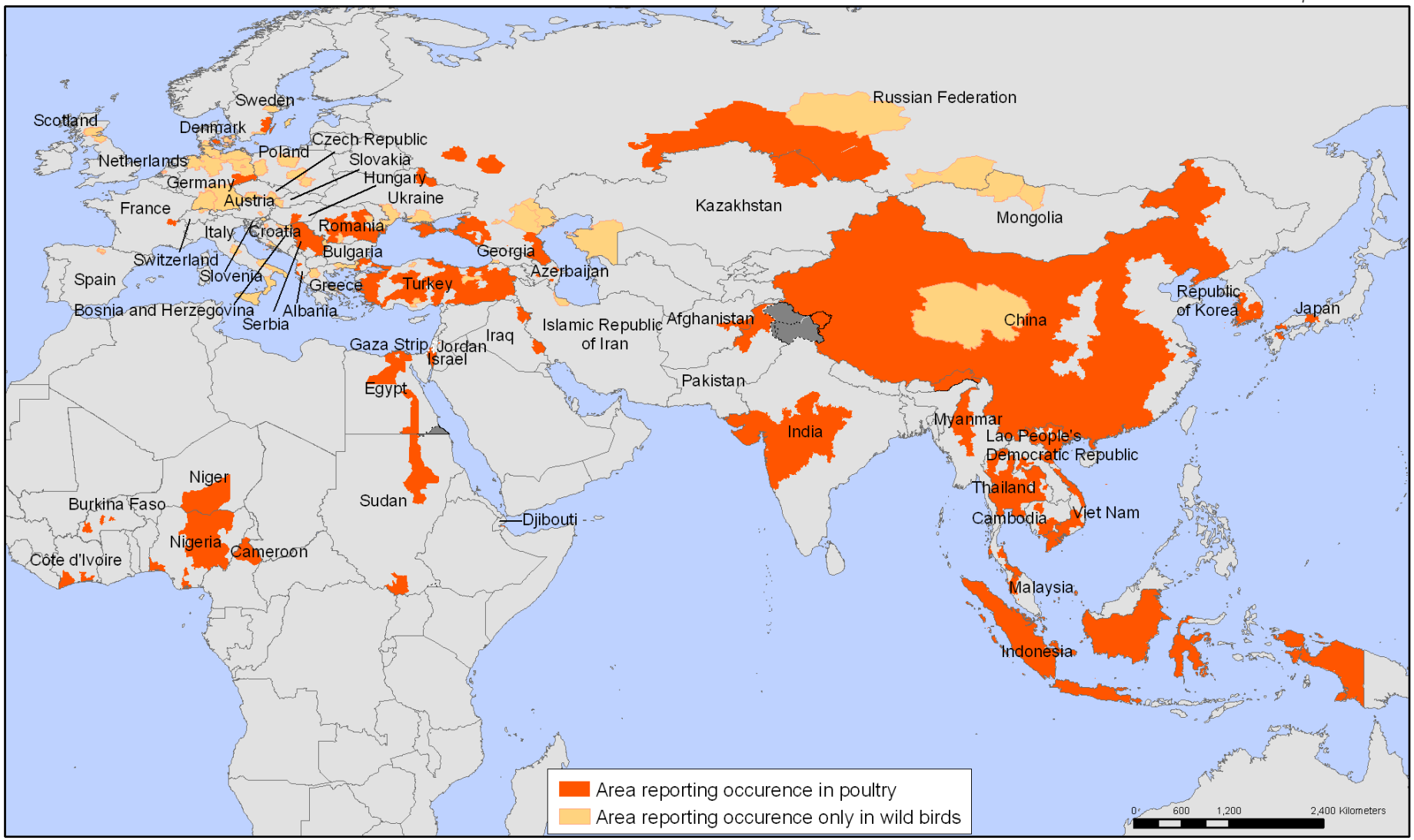
Bird outbreaks since 2003

Areas reporting confirmed occurrence of H5N1 avian influenza in poultry and wild birds since 2003

Status as of 01 December 2006
Latest available update



World Health Organization

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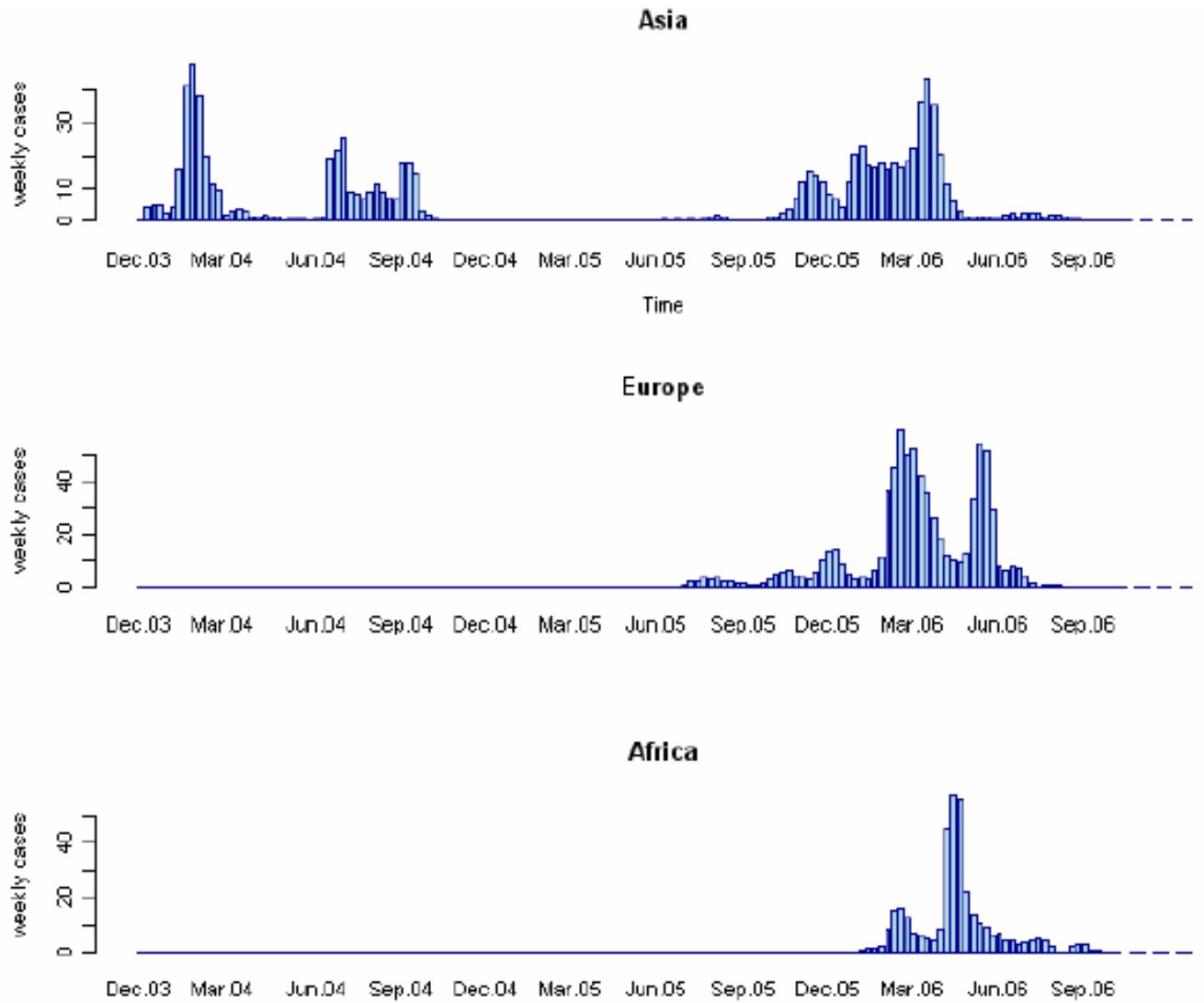
Data Source: World Organisation for Animal Health (OIE) and national governments

Map Production: Public Health Mapping and GIS
Communicable Diseases (CDS) World Health Organization

Global HPAI temporal spread since Dec 03



Source: EMPRES Watch: Evolution of Highly Pathogenic Avian Influenza type H5N1 in Europe: review of disease ecology, trends and prospects of spread in autumn-winter 2006
http://www.fao.org/docs/eims/upload/214878/EW_europe_oct06_hpai.pdf

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Initial Human H5N1 Cases Closely Follow Animal Outbreaks In Most Countries

Country	1st animal outbreak started*	1st human case (onset of symptoms)*	Time lag (months)	Total animal outbreaks	Total human cases*
Azerbaijan	Jan 2006	Feb 2006	1	2	8
Cambodia	Feb 2004	Jan 2005	11	18	6
China/HK	Mar 1997	May 1997	2	1	18
China	Feb 2004	Nov 2003	0	89	21
Djibouti	Apr 2006	Apr 2006	0	1	1
Egypt	Feb 2006	Mar 2006	1	40	15
Indonesia	Feb 2004	Jul 2005	17	216	72
Iraq	Jan 2006	Jan 2006	0	3	3
Thailand	Dec 2003	Jan 2004	1	1,080	25
Turkey	Oct 2005	Jan 2006	3	176	12
Vietnam	Dec 2003	Dec 2003	0	2,315	93

Mean = 3.3 months
Median = 1 month

Data from WHO and OIE

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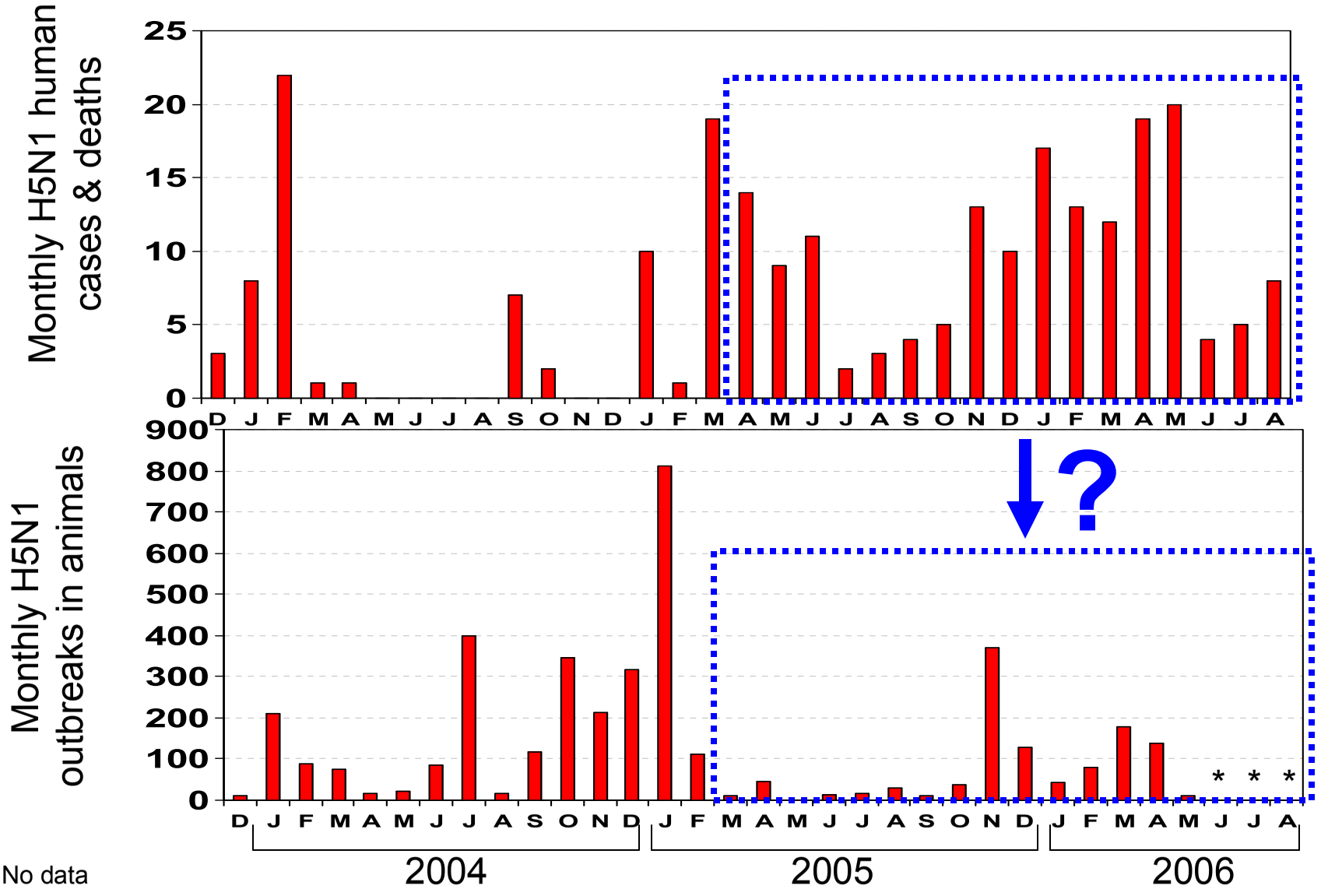
Human Case Reports Not Always Preceded by Animal Outbreak Reports



* No data

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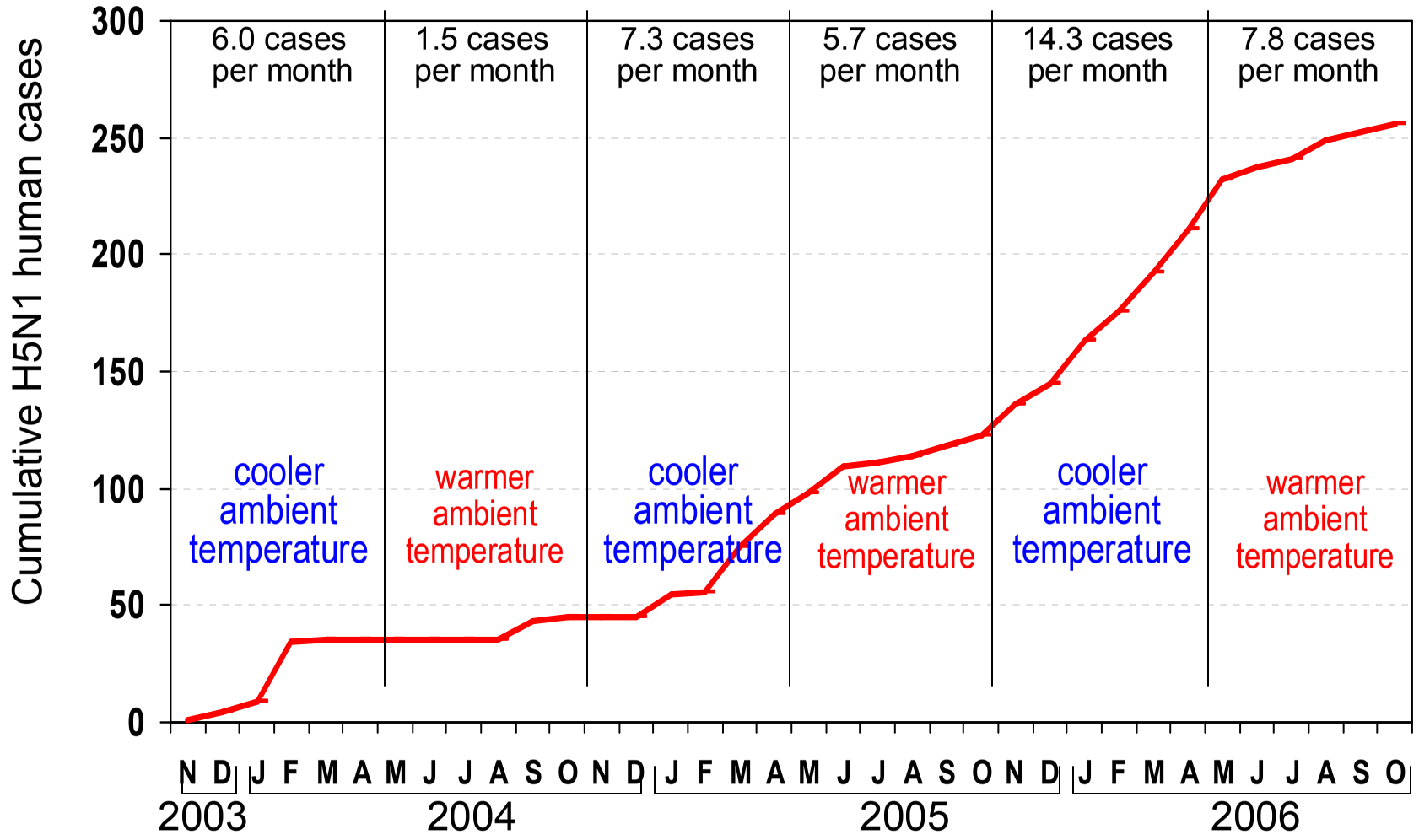
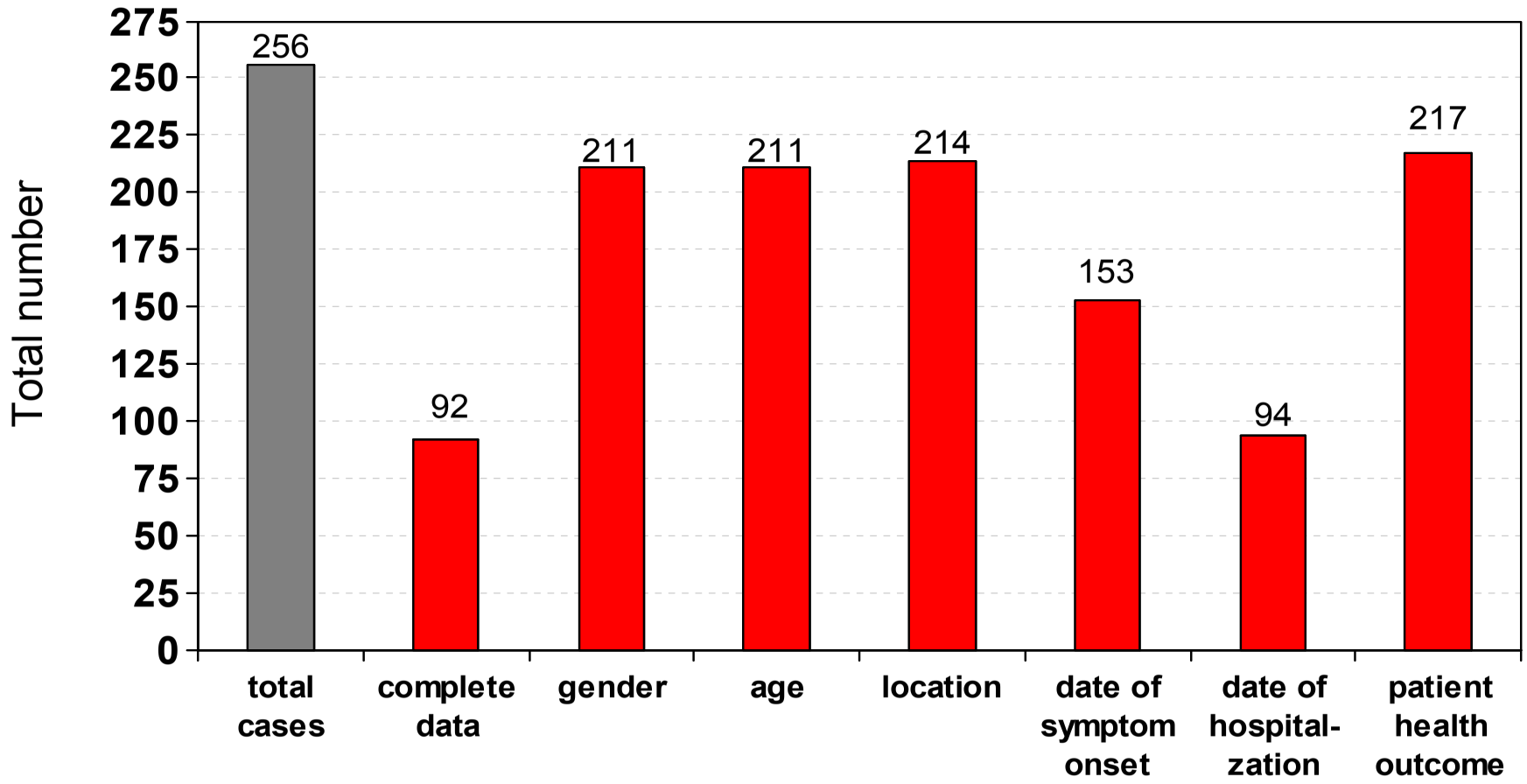
Bird to Human Transmission of H5N1 maybe Less Common in "Warmer" Months but Still Occurs



Laboratory-confirmed H5N1 cases and deaths in humans reported to the World Health Organization as of 16 October 2006.

Reporting of Human Cases Often Not Complete



Source: Laboratory-confirmed H5N1 cases and deaths in humans reported to the World Health Organization as of 16 October 2006

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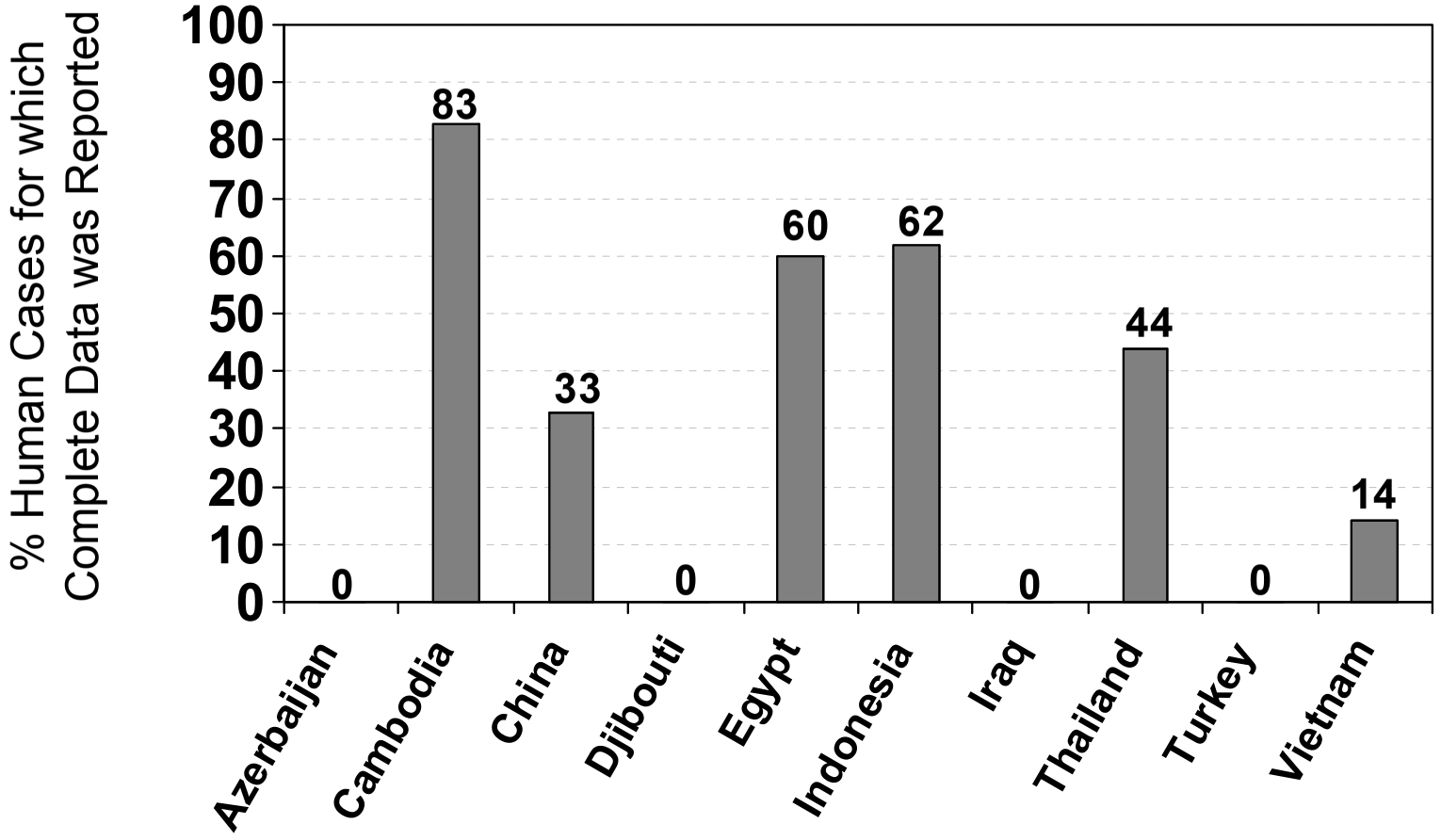
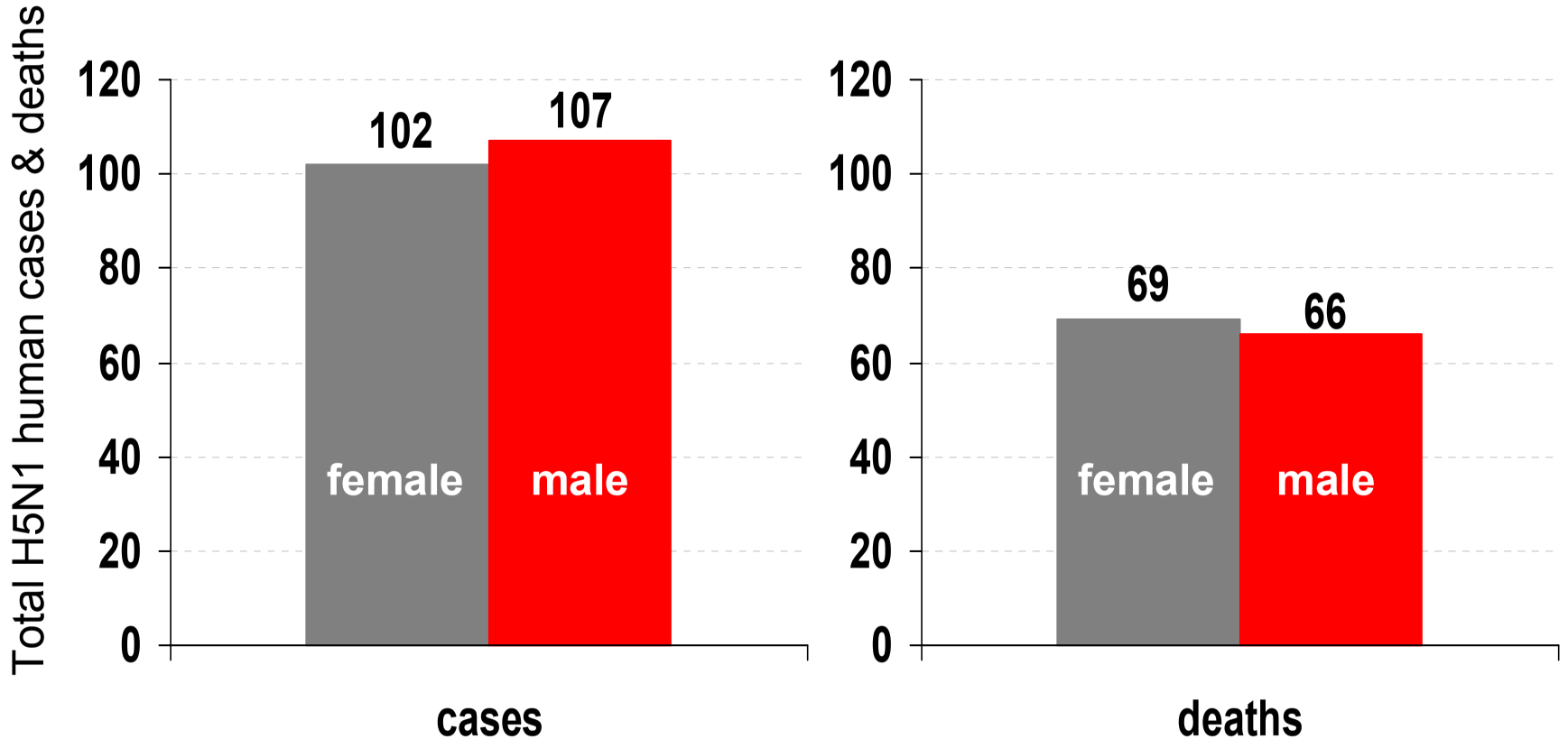
Most Countries Don't Provide Complete Data



Source: Laboratory-confirmed H5N1 cases and deaths in humans reported to the World Health Organization as of 16 October 2006.

Males and Females Appear to be Equally Susceptible to H5N1 Infection



Source: Only includes laboratory-confirmed H5N1 cases and deaths in humans reported to the World Health Organization as of 16 October 2006 for which there is data.

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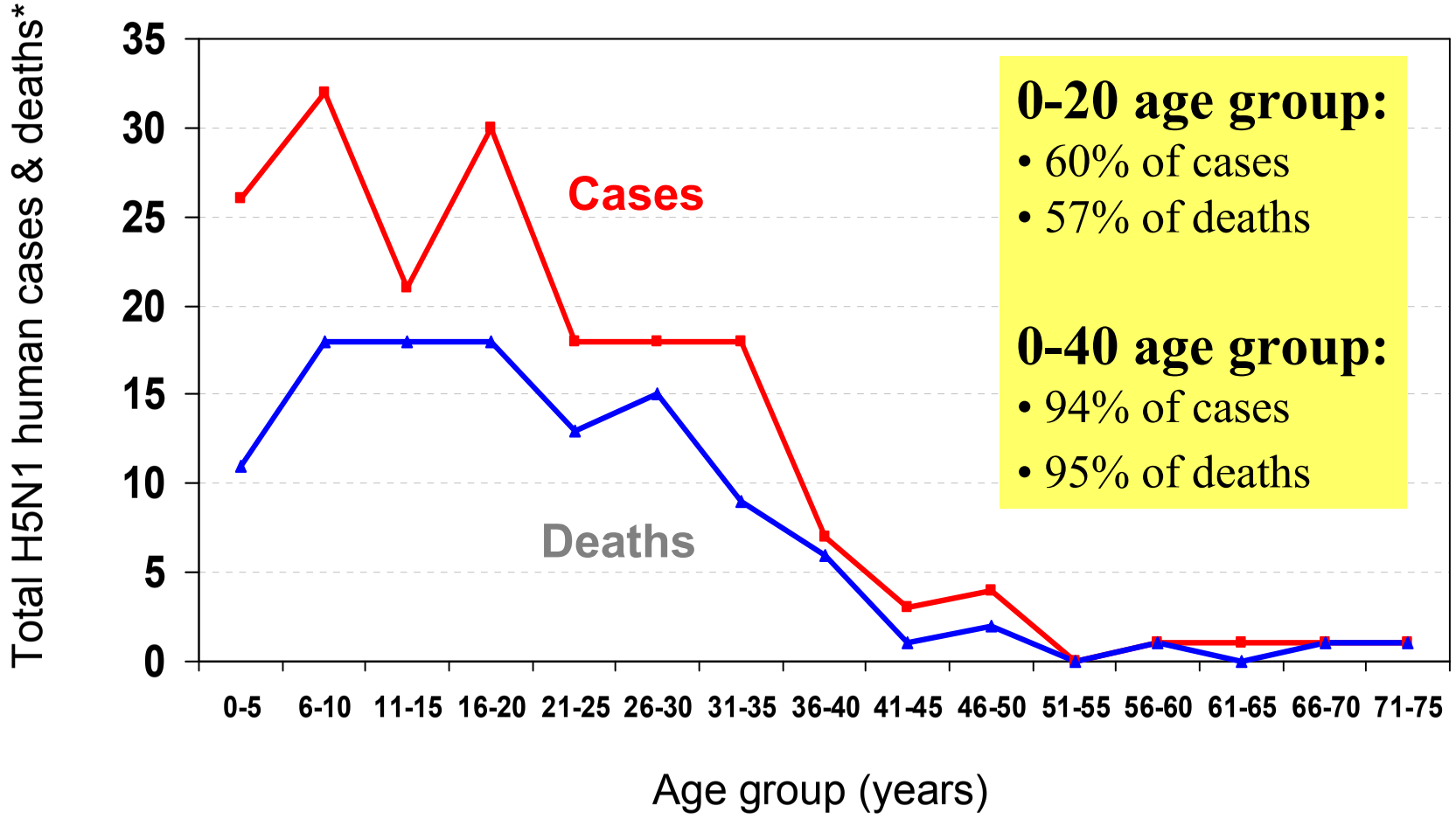
Age distribution of cases and deaths



* Only includes laboratory-confirmed H5N1 cases and deaths in humans reported to the World Health Organization as of 20 June 2006 for which there is age data.

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Summary

- A quick analysis of available data reveals
  - Lot of missing data
  - Need to develop local level registration and reporting systems, containing both veterinary and medical data
  - Need standardized approaches and forms, and translated for ease of use

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Surveillance

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www.gains.org

Global Avian Influenza Network for Surveillance

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Wild Bird Global Avian Influenza Network for Surveillance (GAINS)

Wild Bird Global Avian Influenza Network for Surveillance

The aim of the Wild Bird ***Global Avian Influenza Network for Surveillance*** (GAINS) program is to expand operational field capabilities, improve the understanding of viral strains and transmission of influenza viruses in wild birds, and to disseminate information to all levels of governments, international organizations, the private sector and the general public.

GAINS will establish a global surveillance network of wild birds by: improving the collection, coordination, and laboratory evaluation of samples from wild birds in order to identify locations of avian influenza viral strains; identifying genetic changes in virus isolates; enhancing links with wild bird distribution and migration information, and providing an early warning system for global spread of *highly pathogenic avian influenza* (HPAI) that threatens domestic poultry and human health as well as biodiversity (particularly avian).

The GAINS program and partners will work in or travel to areas of importance in key migratory routes, as well as in areas where it is necessary to consult with reference laboratories, and local, national, and international agencies involved in avian influenza preparedness and response. These individuals and organizations will not only work in an advisory capacity to host governments and local/national organizations by providing technical input into wild bird surveillance programs, but will emphasize transfer of technical capacity to local staff where needed. The GAINS staff and partners will create, update, and make available information related to wild bird avian influenza surveillance and migratory bird activity through a comprehensive database which will also include agency reports, scientific publications, news, etc. The goal is to create a system useful and attractive to enough colleagues working around the world that we will all want to use it to openly share such information as a global good.

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Surveillance and Mobile Phones

- US-based Voxiva HealthWatch™ deployed with Indonesia's Ministry of Agriculture in partnership with Microsoft, USAID, the GSM Association and Winrock International
- Allows staff in the field to submit real-time data reports to the system via web, text messaging, mobile phone or PDA
- Data can be mapped and analyzed via a web interface
- Use the communication tools to send alerts and broadcast messages back out to the field
- Currently in Peru, India and Indonesia.

FAO Poultry Sector Classification

Industrial integrated system; high level biosecurity

Semi-vertical integrated system; moderate biosecurity

Small commercial poultry production; low biosecurity

Village or backyard poultry; no biosecurity

Participatory Disease Surveillance and Response

Participatory Disease Surveillance [PDS]

and Response [PDR]

are methods to enhance disease surveillance for the collection of rapid, decision-oriented intelligence on where disease outbreaks are occurring.

Timely identification of outbreaks permits a rapid targeted response to suppress or eradicate the incidence of disease.

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Case Definition to Capture HPAI

Sudden Death in Poultry

Sudden Death (individual clinical course of less than 1 day)
[possibly sometimes not so obvious in more traditional systems]

May occur with one or more of the following:

Petaechial haemorrhages on and swelling of feet
Cyanotic combs and swelling of head
Petaechial hemorrhages in of skin over breast and thigh areas
Nasal discharge
Salivation
Head drop
Drop in egg production
Decreased feed intake

= HPAI compatible event

FLOCK – RAPID ANTIGEN TEST POSITIVE

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Participatory Disease Surveillance

- Animal health officers teams in 75 districts
- Average of 2 outbreaks per district per week (8%)
- Integrate with human health surveillance teams and community-based activities
- Created an evidence-based avian influenza surveillance and control program that is providing the first high quality reporting of animal outbreaks and better implementation of recommended control measures
- Nov 06 – trained 30 people from WHO

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Participatory Disease Surveillance

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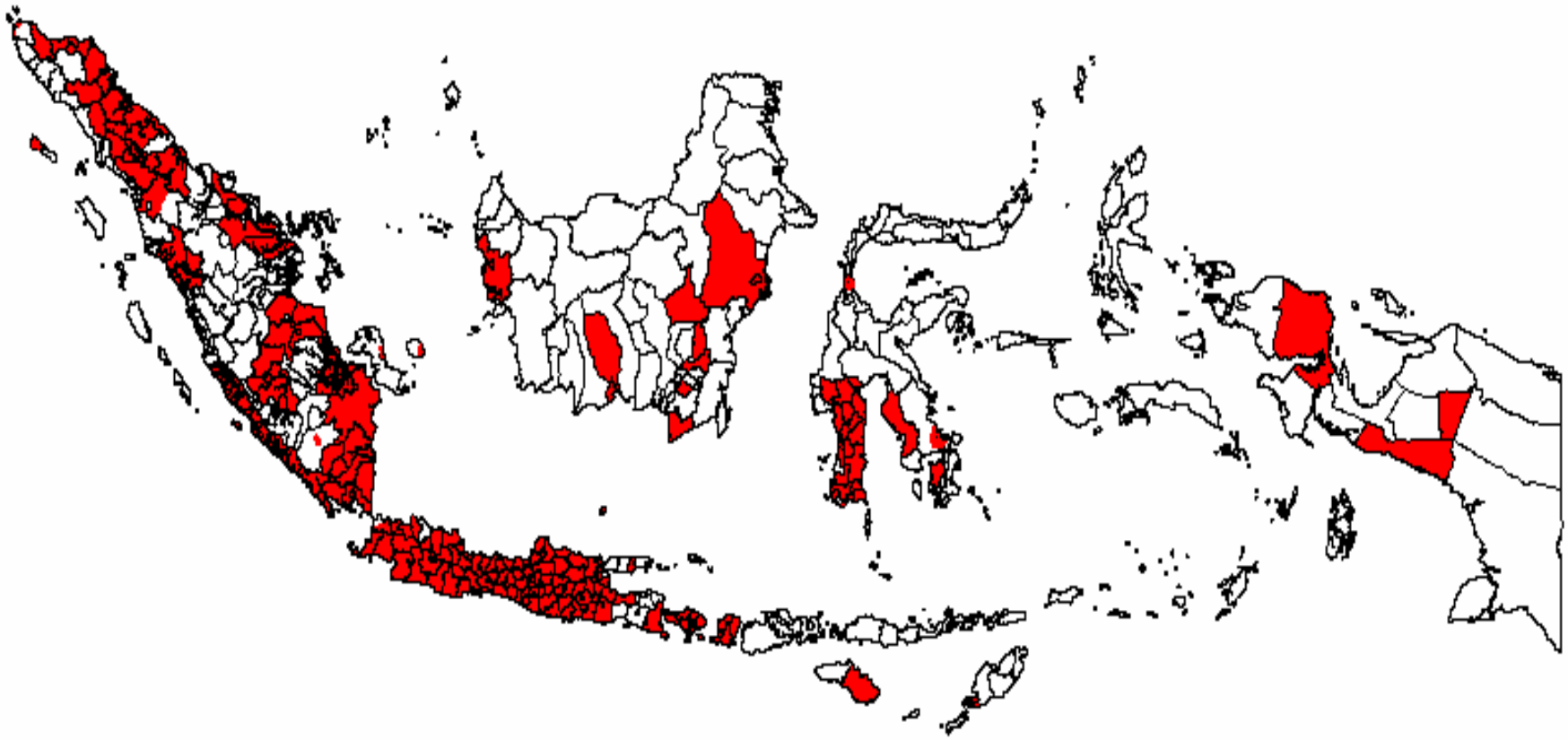
Indonesia HPAI H5N1 Cases



AI confirmed in 30/33 Provinces; 216/444 Districts

Source: GOI and FAO Indonesia

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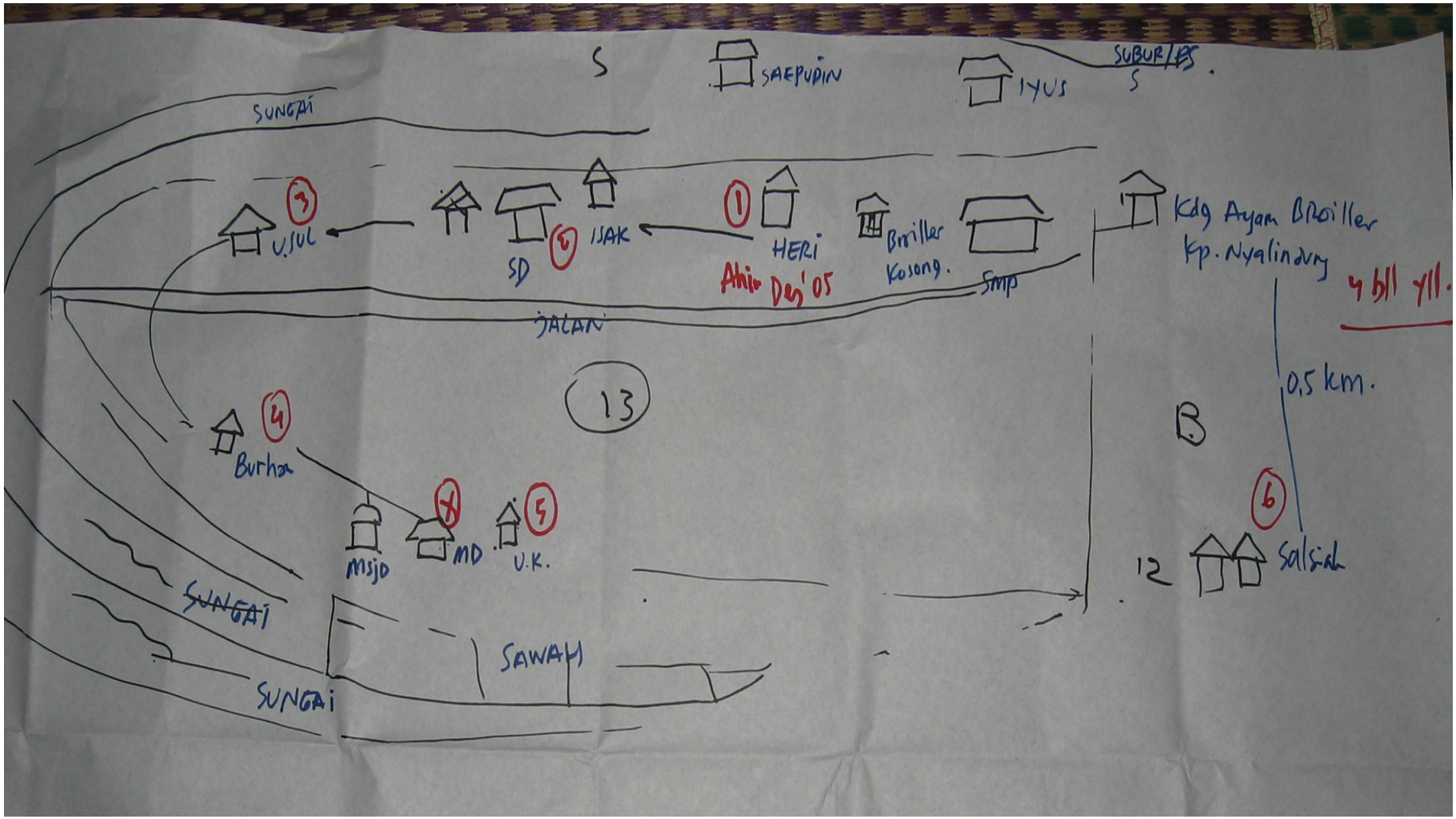
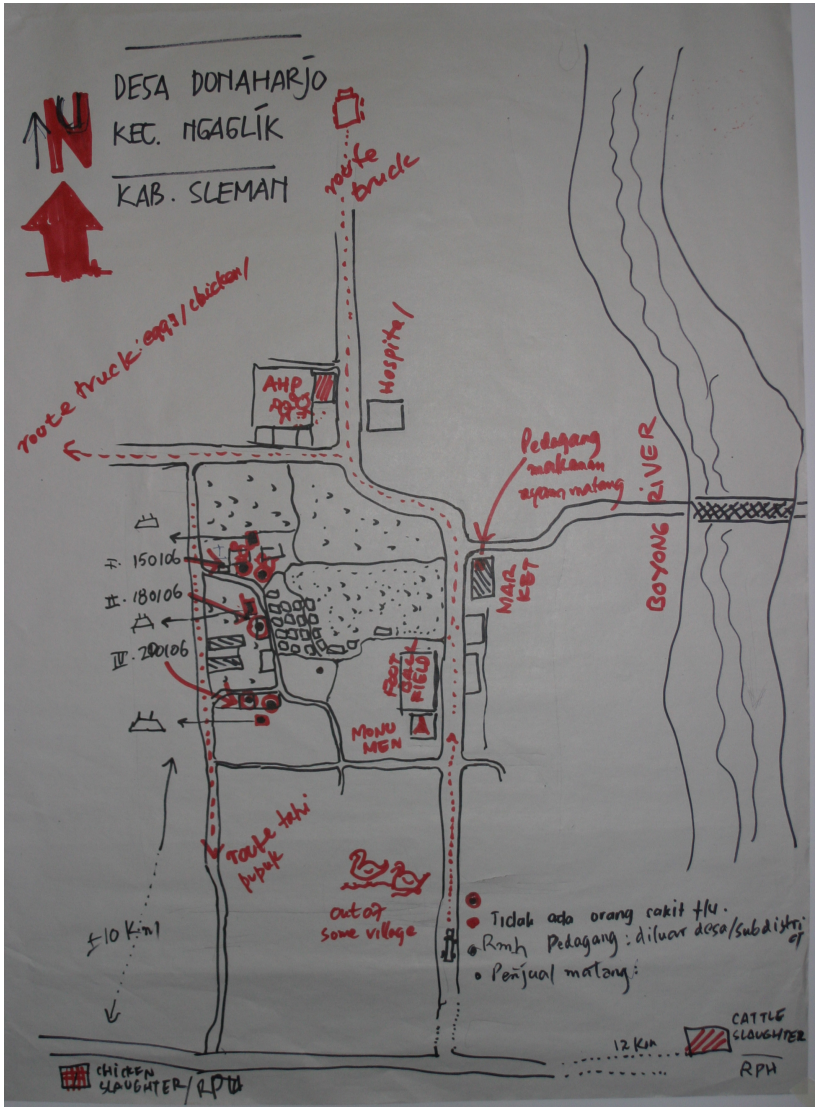
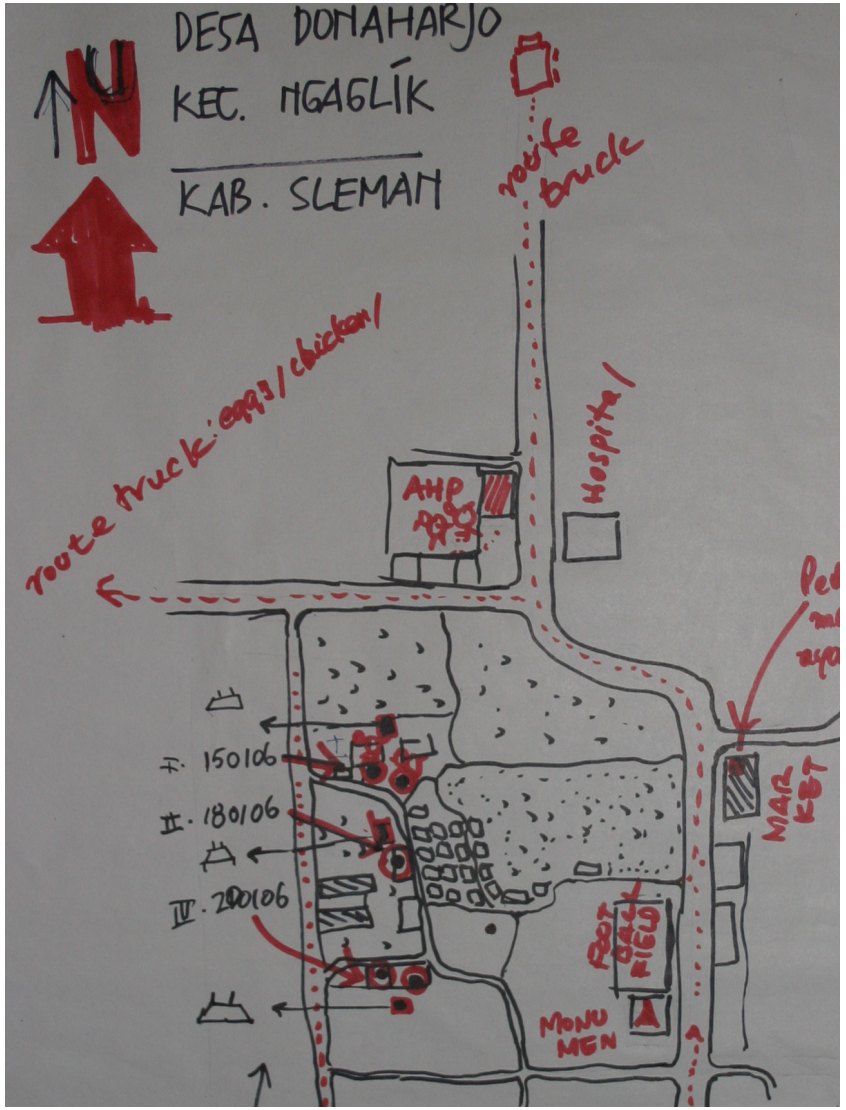
Community Mapping

Mapping in the rural Indonesian PDS Context



Mapping in the peri-urban Indonesian PDS Context





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Tracheal Samples

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Cloacal Samples

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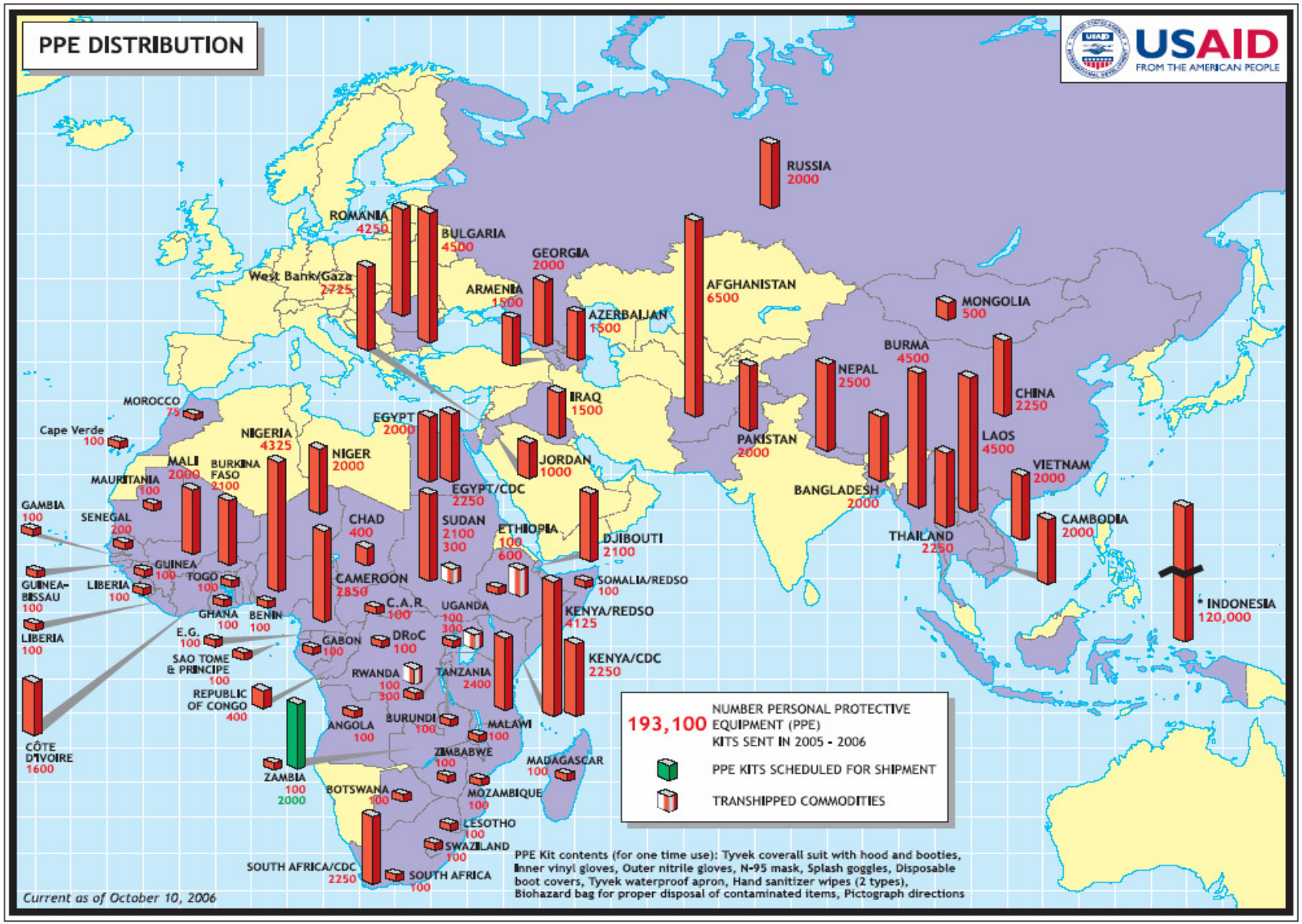
Personal Protection

Influenza Type A Antigen Positive

PPE Distribution



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PPE kit unpacked

PPE kit in use*

* Snow not included

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Shipping Diagnostic Samples

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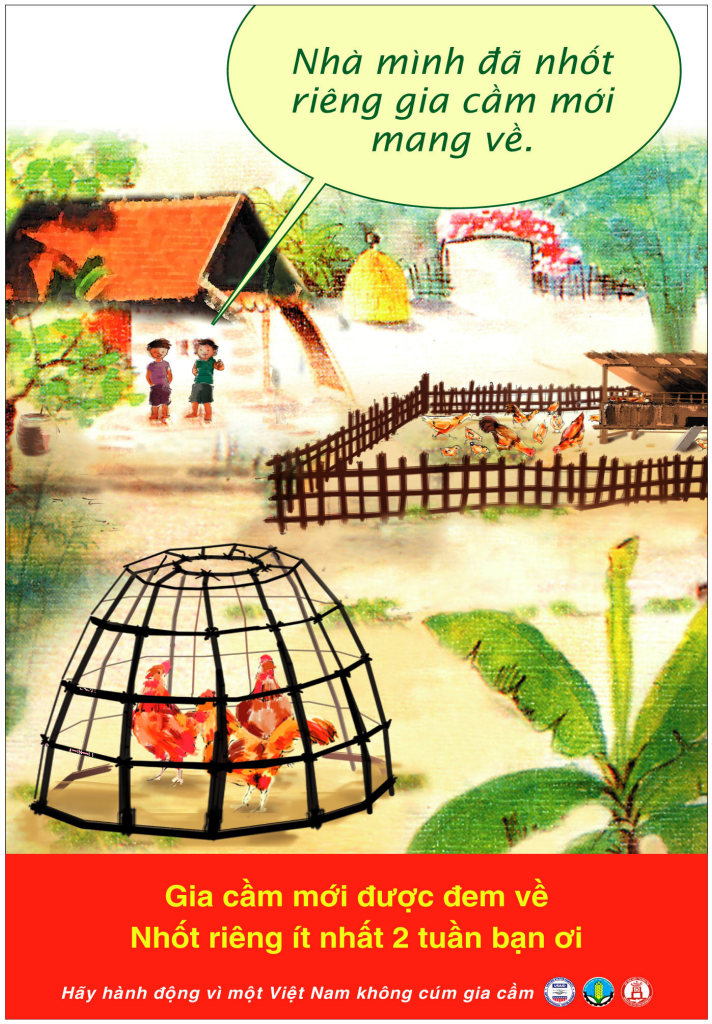
Rapid Communication

Preventing poultry cases



Poster 01(Final Layout)

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Preventing human cases

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Mapping outbreaks and resources

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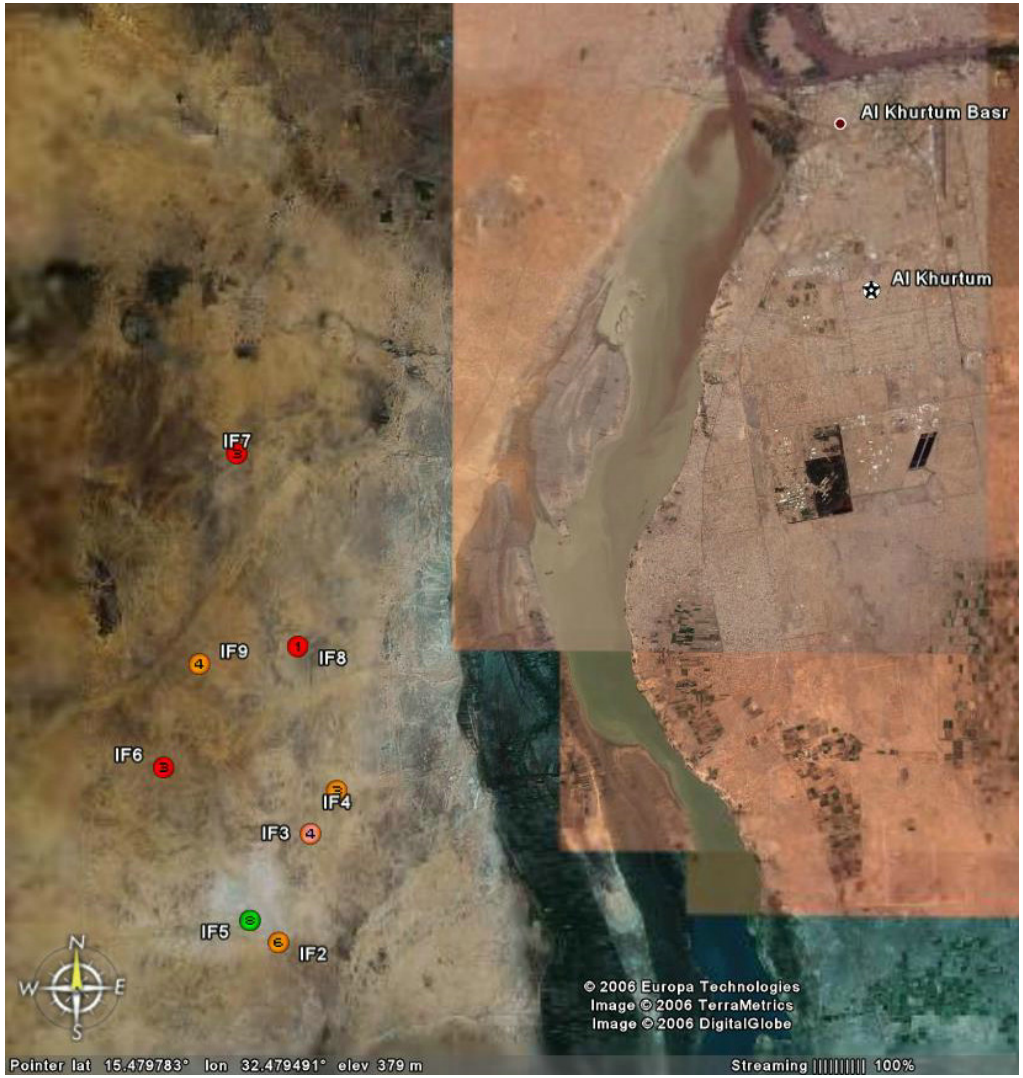
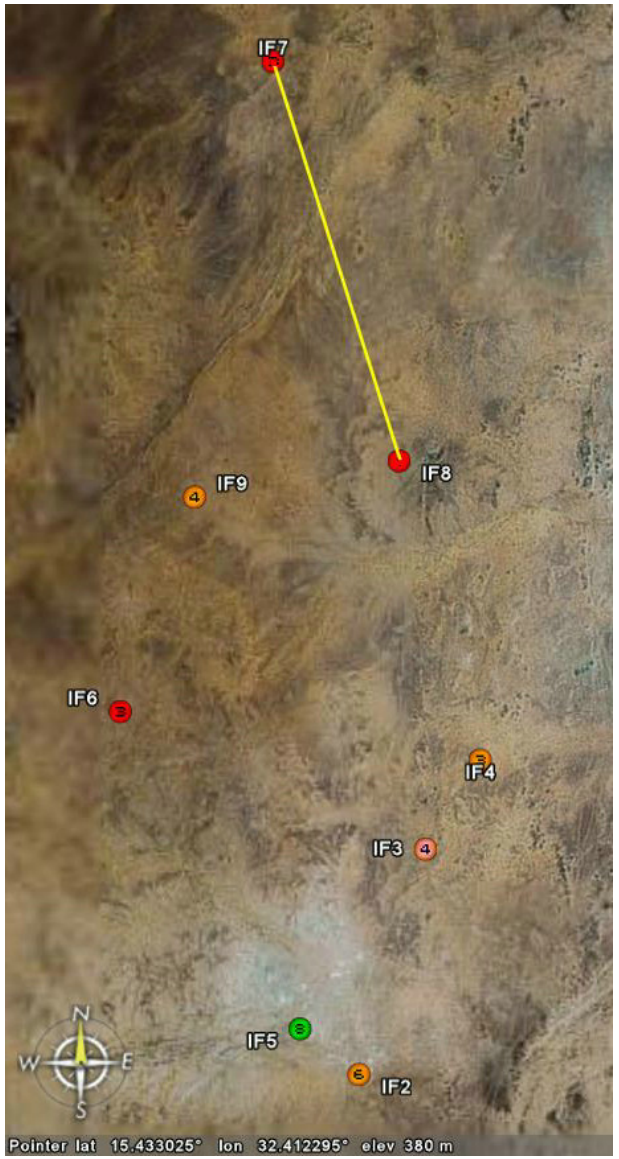
Effective Response





Standardized Investigations

Source: Tim Uyeki/Ray Arthur, CDC

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Standardized protocols

Engage All Stakeholders

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Conclusion

- We have a “transformational moment” to directly address the causes that give rise to avian influenza and other emergent diseases.
- By integrating and coordinating both animal and human health sectors, we have the chance to simultaneously save lives and secure livelihoods.

Additional Resources

For more information and regular updates on

USAID's response to this threat,

visit www.usaid.gov and click on "Avian Influenza Response"

For more information and resources related to pandemic flu,

visit www.pandemicflu.gov