

Global Impacts of Avian Influenza Viruses

Biosafety and Biosecurity Concerns



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Interspecies Transmission of Influenza A Viruses

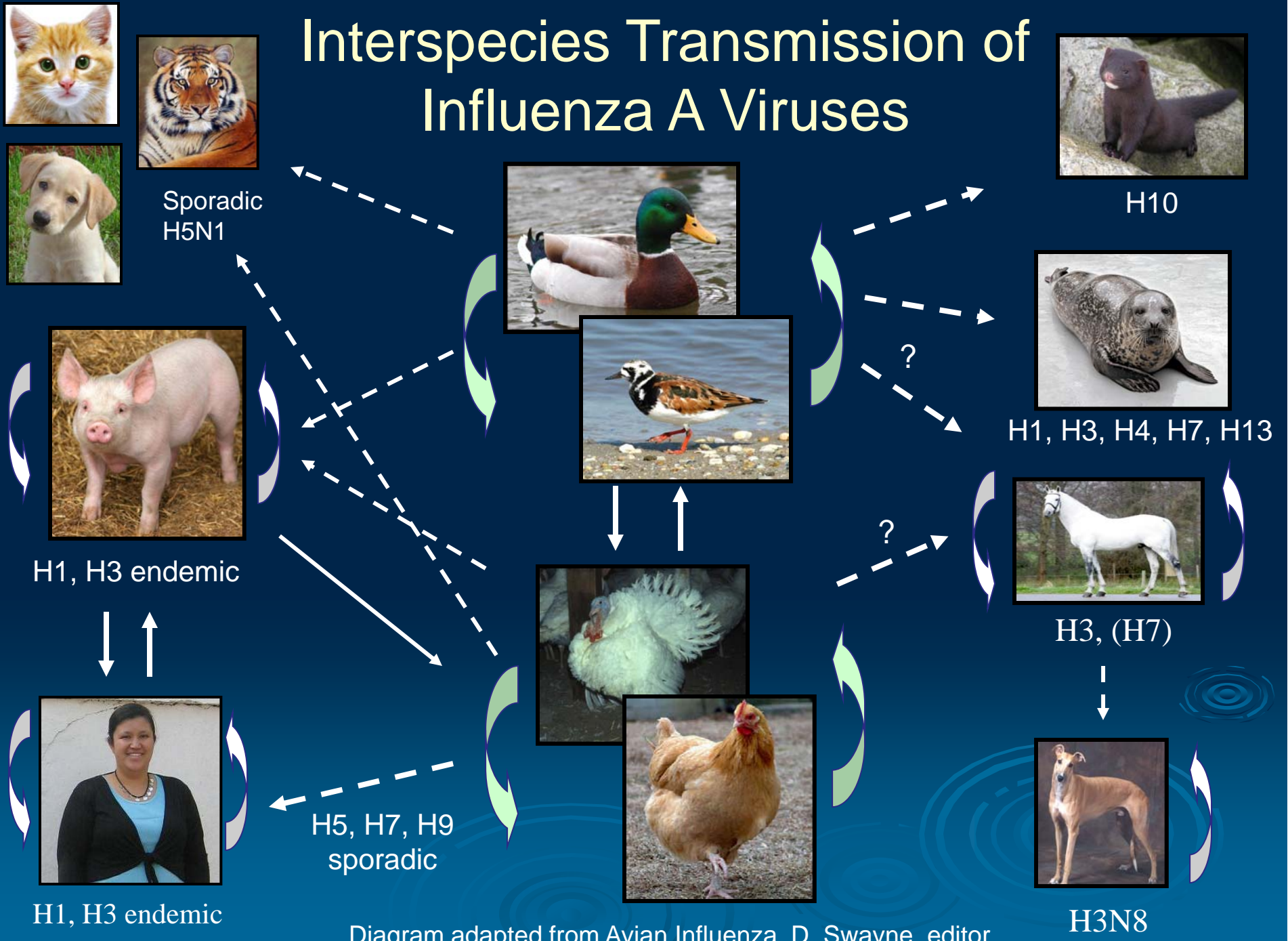


Diagram adapted from *Avian Influenza*, D. Swayne, editor

Low Pathogenic Avian Influenza



Highly Pathogenic Avian Influenza



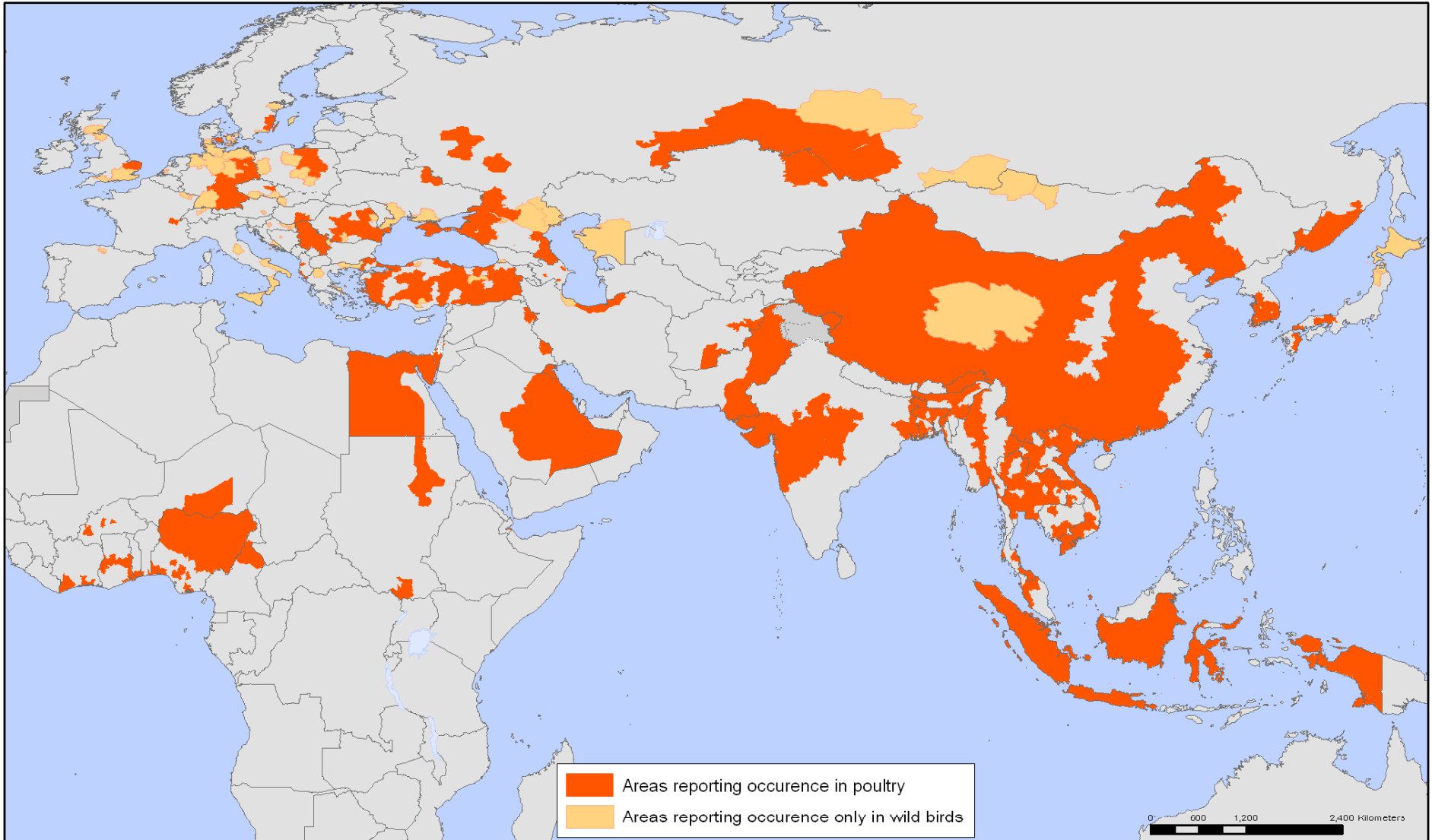
Zoonotic Transmission

➤ Human infections with avian influenza viruses

- H5N1
 - Hong Kong, 1997 (18 cases, 6 deaths)
 - World epizootic, 2003-current
- H7N2
 - Virginia, 2002 (1 case) and New York, 2003 (1 case)
 - UK, 2007 (4 cases)
- H7N3
 - Canada, 2004 (2 cases)
- H7N7
 - UK, 1996 (1 case)
 - Netherlands, 2003 (89 cases, 1 death)
- H9N2
 - China, 1999 (2 cases)
 - Hong Kong, 2003 (1 case) and 2007 (1 case)
 - China, 2008 (1 case)

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

Status as of 12 December 2008
Latest available update



World Health Organization

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

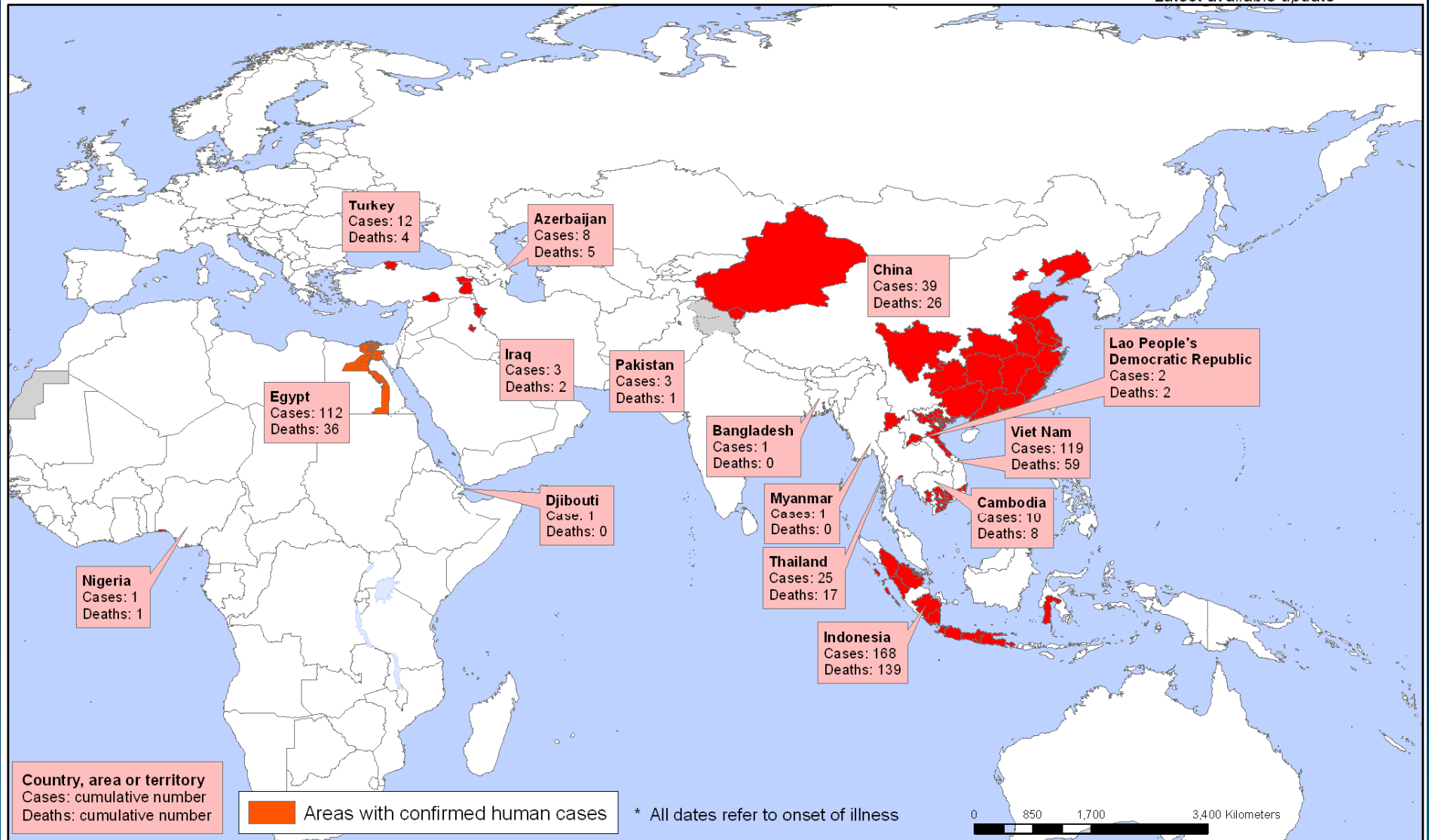
Map Production: Public Health Information and Geographic Information Systems (GIS), World Health Organization

Confirmed Human Cases of AI H5N1 as of 20 January 2011

Country	Cases	Deaths
Azerbaijan	8	5
Bangladesh	1	0
✦ Cambodia	10	8
✦ China	40	26
Djibouti	1	0
✦ Egypt	121	40
✦ Indonesia	171	141
Iraq	3	2
Myanmar	1	0
Lao	2	2
Nigeria	1	1
Pakistan	3	1
Thailand	25	17
Turkey	12	4
✦ Viet Nam	119	59
Total	518	306

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

Status as of 31 August 2010
Latest available update



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Data Source: WHO
Map Production: Public Health Information and Geographic Information System (GIS)
World Health Organization

H5N1 Persistence and Spread

- Village and local commercial poultry production with poor biosecurity
 - Extensive movement of poultry over small and large geographical areas
 - Live animal markets
 - Illegal smuggling
 - Domestic waterfowl populations
 - Wild birds
 - Lack of needed veterinary infrastructure
- 



Biosecurity

➤ Poor biosecurity

- Sector 3 and 4 poultry production
 - Commercial production with low biosecurity
 - Village/backyard production
- Frequent poultry movement
- Complex movement systems to local markets, collecting points and slaughter points
- Free-range flocks, contact with other poultry/ducks/birds
- Lack of biosecurity measures























Human-Animal Interface and Public Health Concerns

- Loss of food for a population
- Human exposure
 - Slaughter / processing
 - Contact with sick / dead poultry
 - Consumption of raw food products (duck blood)
- Human cases
 - Difficult to diagnose cases in humans and animals in some countries (humans as sentinels)
 - Difficult to prevent animal contact in some countries
 - Villages rely on poultry production for income and to feed village





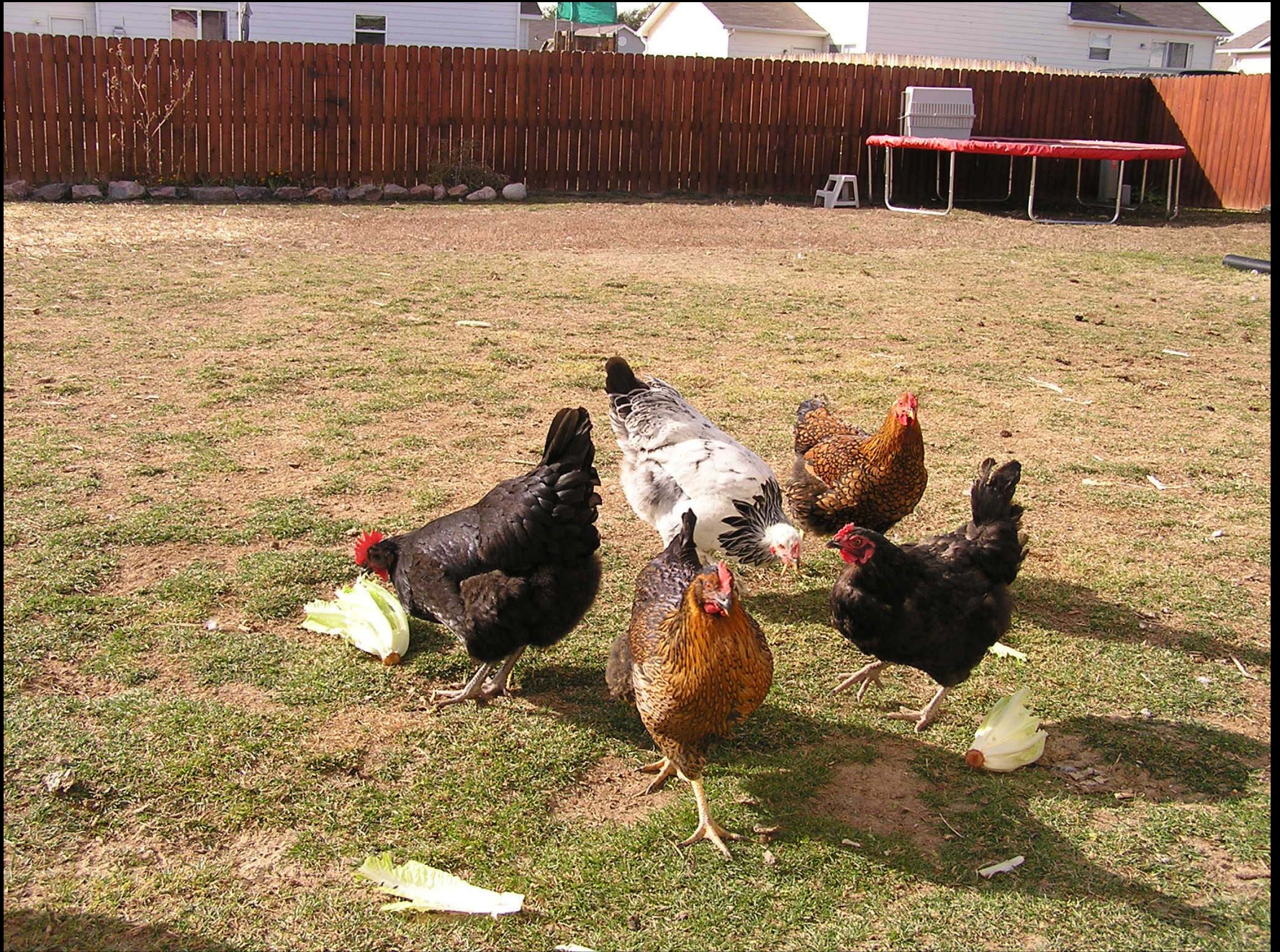












Laboratory Biosafety

- Many countries lack federal/national laboratory biosafety guidelines and audit system
- Infrastructure challenges make it difficult to maintain biosafety
- Lack of education for laboratory workers
- Few BSL3 facilities in developing countries
 - Difficult to build
 - Difficult to certify









CAUTION
USE OF EQUIPMENT OR
FLAMMABLE SUBSTANCES IN
THIS CABINET SHOULD BE
CONTROLLED BY THE
APPROPRIATE SAFETY
PERSONNEL.



CLASS II
BIOLOGICAL SAFETY CABINET

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(REV. 1/2002 / 10/02 / 2002)

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Field Work

- Maintaining appropriate PPE can be challenging
 - May not be available
 - Cultural disinterest in use
 - Concerning to villagers / flock owners
 - Physically demanding - difficult to wear
 - Environmental conditions – high temperatures, rain, humidity











HPAI Response Efforts

- Environmental contamination
- Animal depopulation and carcass disposal
 - Requires methods for rapid, humane depopulation
 - Protect workers
 - Minimize further virus spread
 - Prevent environmental contamination
 - Environmentally sound











Any Questions?

