



MI Flu Focus

Influenza Surveillance Updates
Bureaus of Epidemiology and Laboratories

Michigan Department
of Community Health



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Updates of Interest:

- **International:** WHO announces new human cases of MERS-CoV
- **International:** WHO announces new human cases of avian influenza H7N9 in China

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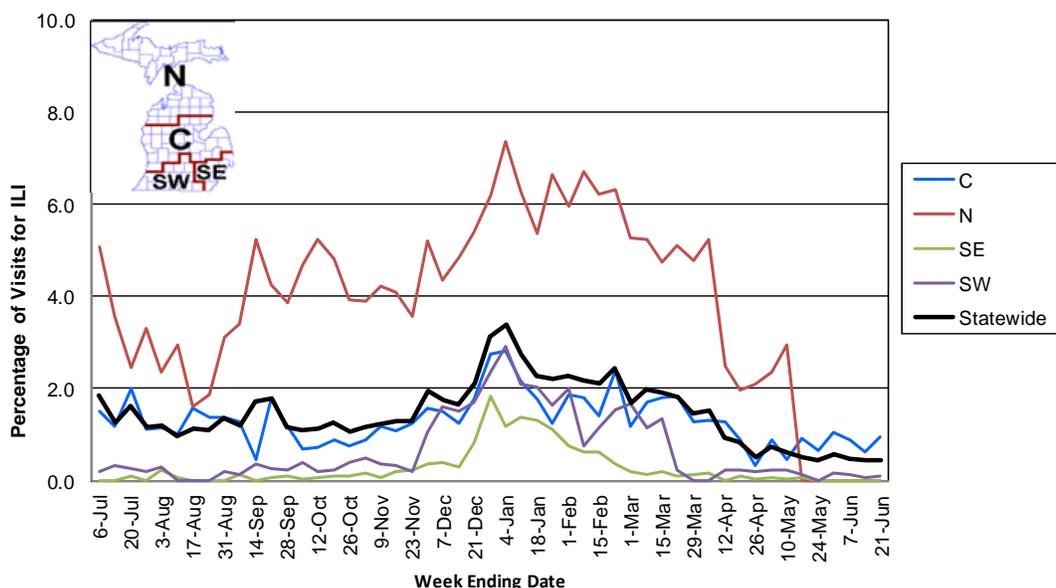
Influenza Surveillance Reports

Michigan Disease Surveillance System (as of June 26): MDSS influenza data for the week ending June 21, 2014 indicated that compared to levels from the previous week, individual and aggregate reports decreased. Aggregate reports are slightly lower than levels seen during the same time period last year, while individual reports are lower.

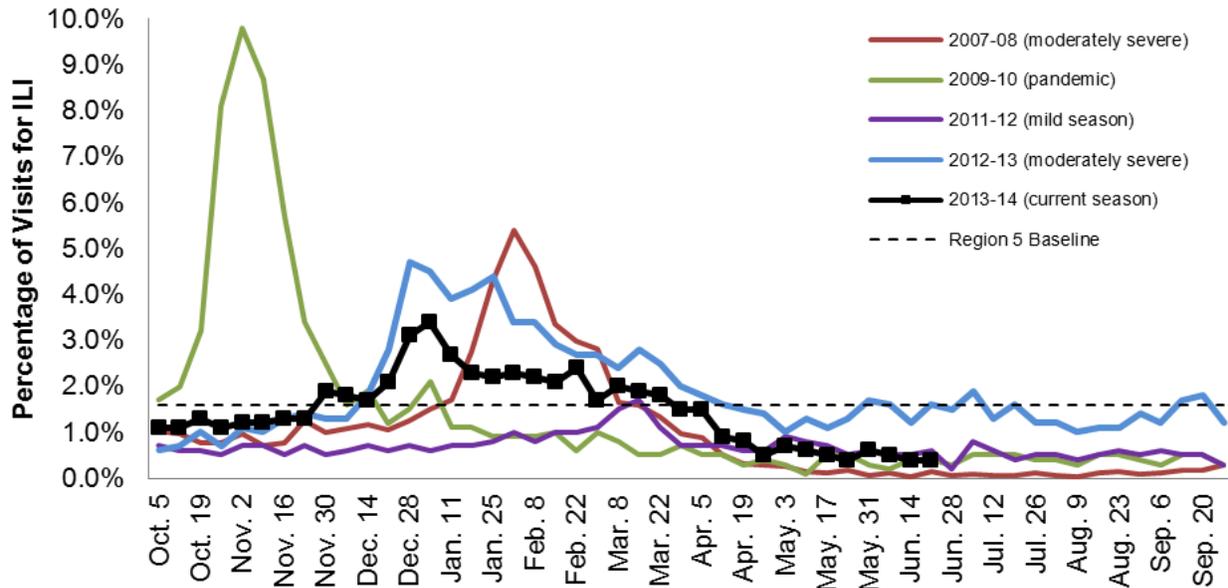
Emergency Department Surveillance (as of June 26): Emergency department visits due to constitutional complaints remained steady during the week ending June 21, 2014, while respiratory complaints decreased slightly. Emergency department visits from both constitutional and respiratory complaints are similar to levels during the same time period last year. In the past week, there were 5 constitutional alerts in the SW(1), SE(1) and N(3) Influenza Surveillance Regions and 5 respiratory alerts in the SW(2), C(2) and N(1) Regions.

Sentinel Provider Surveillance (as of June 26): During the week ending June 21, 2014, the proportion of visits due to influenza-like illness (ILI) remained the same at 0.4% overall; this is below the regional baseline (1.6%). A total of 33 patient visits due to ILI were reported out of 7,418 office visits. Data were provided by 21 sentinel sites from the following regions: Central (8), North (1), Southeast (9), and Southwest (3). ILI activity remained the same in three regions: N (0.0%), SE (0.0%), and SW (0.1%). ILI activity increased in one region: C (1.0%). Please note: These rates may change as additional reports are received.

**Percentage of Visits for Influenza-like Illness (ILI)
Reported by Sentinel Providers, Statewide and Regions
2013-14 Flu Season**



Percentage of Visits for Influenza-like Illness (ILI) Reported by the US Outpatient Influenza-like Illness Surveillance Network (ILINet): Michigan, Select Seasons



As part of pandemic influenza surveillance, CDC and MDCH highly encourage year-round participation from all sentinel providers. New practices are encouraged to join the sentinel surveillance program today! Contact Stefanie DeVita at 517-335-3385 or DeVitaS1@michigan.gov for more information.

Hospital Surveillance (as of June 26): The CDC Influenza Hospitalization Surveillance Project provides population-based rates of severe influenza illness through active surveillance and chart review of lab-confirmed cases, starting on October 1, 2013 and ending April 30, 2014, for Clinton, Eaton, Genesee, and Ingham counties. There were 232 influenza hospitalizations (69 pediatric, 163 adult) within the catchment area. Based on these counts, within the catchment area there are 33.0 pediatric influenza hospitalizations/100,000 population and 23.9 adult influenza hospitalizations/100,000.

The MDCH Influenza Sentinel Hospital Network monitors influenza hospitalizations reported voluntarily by hospitals statewide. Reporting for the 2013-14 season has concluded. 458 hospitalizations were reported during September 29, 2013-April 26, 2014.

Laboratory Surveillance (as of June 21): During June 8-21, no positive influenza results were reported by MDCH Bureau of Laboratories. For the 2013-14 season (starting Sept. 29, 2013), MDCH has identified 408 positive influenza results:

- Influenza 2009 A/H1N1pdm: 340 (77SE,132SW,94C,38N)
- Influenza A/H3: 30 (13SE,11SW,6C)
- Influenza A unsubtypeable: 1 (1SE)
- Influenza A and B (LAIV recovery): 1 (1SE)
- Influenza B: 41 (11SE,15SW,9C,6N)
- RSV: 2 (2SW)
- Adenovirus: 2 (1SE,1SW)
- Parainfluenza: 3 (1SE,2SW)
- Human metapneumovirus: 4 (4SW)

8 sentinel labs (SE,SW,C) reported for the week ending June 7, 2014. 2 labs (C) reported sporadic influenza A activity. 2 labs (C) reported sporadic RSV activity. 3 labs (SW,C) had sporadic parainfluenza activity. No labs reported influenza B, adenovirus or hMPV activity. Testing volumes are at low levels.

Michigan Influenza Antigenic Characterization (as of June 20): For the 2013-14 season, 3 Michigan influenza specimens (1SE,2C) have been characterized at CDC as A/California/07/2009-like/H1N1/pdm09, matching the influenza A/H1N1pdm09 strain in the 2013-14 Northern Hemisphere vaccine. 2 specimens (2C) have been characterized at CDC and MDCH as B/Brisbane/60/2008-like, which is a B/Victoria lineage virus; it is not in the 2013-14 Northern Hemisphere trivalent vaccine but is in the quadrivalent vaccine. 13 specimens (8SE,4SW,1C) have been characterized at CDC and MDCH as B/Massachusetts/02/2012-like, which is a B/Yamagata lineage virus that is included in the 2013-14 trivalent and quadrivalent vaccines.

Michigan Influenza Antiviral Resistance Data (as of June 20): For the 2013-14 season, 123 2009 A/H1N1pdm (33SE,37SW,41C,12N) and 15 A/H3 (6SE,7SW,2C) influenza specimens have been tested at the MDCH BOL for antiviral resistance. None of the influenza specimens tested have been resistant. CDC has made recommendations regarding the use of antivirals for treatment and prophylaxis of influenza, which are available at <http://www.cdc.gov/flu/professionals/antivirals/index.htm>.

Influenza-associated Pediatric Mortality (as of June 26): 3 pediatric influenza-associated influenza mortalities (1SE,2C) have been reported to MDCH for the 2013-14 season.

CDC requires reporting of flu-associated pediatric deaths (<18 yrs), including pediatric deaths due to an influenza-like illness with lab confirmation of influenza or any unexplained pediatric death with evidence of an infectious process. Contact MDCH immediately for proper specimen collection. The MDCH protocol is at www.michigan.gov/documents/mdch/ME_pediatic_influenza_guidance_v2_214270_7.pdf.

Influenza Congregate Settings Outbreaks (as of June 26): No new respiratory outbreaks were reported to MDCH during the previous week. 21 respiratory outbreaks (2SE,10SW,7C,2N) have been reported to MDCH during the 2013-14 season:

- Influenza 2009 A/H1N1pdm: 4 (1SE,2SW,1C)
- Influenza A/H3: 1 (1SW)
- Influenza A: 4 (3SW,1C)
- Influenza B: 3 (1SW,1C,1N)
- Influenza positive: 1 (1SW)
- Human metapneumovirus: 2 (1SE,1N)
- RSV: 1 (1SW)
- Negative/no testing: 6 (1SW,5C)

National (CDC): Past weekly reports and updated data during the summer months are available online at: <http://www.cdc.gov/flu/weekly/>.

International (WHO [edited], June 16): Globally influenza activity was low. In North America and Europe, overall influenza activity was at inter-seasonal levels. In eastern Asia, influenza activity approached inter-seasonal levels in most countries with influenza A(H3N2) and influenza B virus predominating. In southern and south-eastern Asia, influenza activity continued to decline. In northern Africa and western Asia, influenza activity remained low. In the southern hemisphere, influenza activity remained low, although some countries in the temperate zone of South America showed increases in ILI activity with slight increase in influenza detections. Based on FluNet reporting (as of 12 June 2014, 11:15 UTC), during weeks 21 to 22 (18 May 2014 to 31 May 2014), National Influenza Centres and other national influenza laboratories from 76 countries, areas or territories reported data. The WHO GISRS laboratories tested more than 30179 specimens. 1919 were positive for influenza viruses, of which 1198 (62.4%) were typed as influenza A and 721 (37.6%) as influenza B. Of the sub-typed influenza A viruses, 188 (21.3%) were influenza A(H1N1)pdm09 and 694 (78.7%) were influenza A(H3N2). Of the characterized B viruses, 36 (80%) belong to the B-Yamagata lineage and 9 (20%) to the B-Victoria lineage.

The full report is online at www.who.int/influenza/surveillance_monitoring/updates/latest_update_GIP_surveillance/en/index.html.

Weekly reporting of influenza activity to the CDC has ended for the 2013-2014 influenza season.

For additional flu vaccination and education information, the MDCH *FluBytes* newsletter is available at http://www.michigan.gov/mdch/0,1607,7-132-2940_2955_22779_40563-125027--,00.html.

Novel Influenza Activity and Other News

WHO Pandemic Phase: Post-pandemic – Influenza disease activity has returned to levels normally seen for seasonal influenza.

International, MERS-CoV (WHO [edited], June 13): The National IHR Focal Points of Saudi Arabia, the United Arab Emirates (UAE) and the Islamic Republic of Iran recently reported additional laboratory-confirmed cases of infection with Middle East respiratory syndrome coronavirus (MERS-CoV) to WHO.

Details of the cases reported by Saudi Arabia are as follows:

Between 11 April and 9 June 2014, 515 cases of infection with Middle East respiratory syndrome coronavirus (MERS-CoV) have been reported from Saudi Arabia to WHO. This includes 402 laboratory-confirmed cases reported on various dates, and 113 cases that have been identified through retrospective

review of hospital records, and which was reported by Saudi Arabia on 3 June. Further information on these cases will be provided as information becomes available as part of the collaboration between the Saudi authorities and WHO on the MERS-CoV response.

This update covers 402 laboratory-confirmed cases, including 114 deaths.

Thirty-five cases were reported from Madina, 132 from Riyadh, 208 from Mecca Province (including 154 from Jeddah, 39 from Mecca, 8 from Qunfudhah and 7 from Al Taif), 10 from Tabuk, 6 from Al Jawf, 3 from Najran, and 3 from Ash Sharqiyah. The location from where 5 cases were reported was not specified.

The median age of the 402 cases is 46 years old (ranging from 9 months to 94 years old) and 58.3% of those with information on sex (n=388) are men. Almost half (44.5%) of the cases with reported information (n=398) experienced severe disease including 114 cases who died; and 114 cases (28.6%) were reported to be asymptomatic or have mild disease. Underlying medical conditions were only reported for 149 of the 402 cases, of which 140 cases were reported to have at least one underlying medical condition.

More than 25% (109) of the 402 reported cases are health care workers. Among the 109 health care workers, 63 were reported as asymptomatic or developing mild symptoms, 35 were reported with moderate symptoms (requiring hospitalization but not admission to an intensive care unit), 7 were reported as having severe disease and 4 died.

Details of the case reported by the UAE on 4 June 2014 are as follows:

The patient is a 36 year-old butcher residing in Abu Dhabi. He works in a local slaughter house for camels and sheep. He was asymptomatic. His sputum was tested positive for MERS-CoV on 20 May 2014 as part of a general screening in slaughter houses. The patient had no contact with a previously laboratory-confirmed MERS-CoV case. He had no history of travel. The patient is currently isolated and is in a stable condition.

Investigations and follow up of contacts of the patient have been carried out and no other case was detected.

Details of the case reported by the Islamic Republic of Iran on 4 June 2014 are as follows:

The patient is a 35 year-old nurse assistant. She developed a mild illness on 26 May 2014 followed by a productive cough on 28 May 2014. Her throat swab taken on 26 May 2014 was tested positive for MERS-CoV.

She has been advised to stay home and follow infection control precautions. The patient is a close contact to the first laboratory-confirmed MERS-CoV case in the country reported to WHO on 26 May 2014. The patient did not have an underlying medical condition. She had no history of contact with animals and no history of consumption of raw camel products in the 14 days prior to becoming ill. She became asymptomatic on 3 June 2014 and her condition is currently stable.

Investigations into her contacts among health care workers and family members is on-going.

Globally, 697 laboratory-confirmed cases of infection with MERS-CoV including at least 210 related deaths have officially been reported to WHO. This global total includes all the cases in this update; of the abovementioned 402 cases reported by Saudi Arabia, 390 cases have been included in previous Disease Outbreak News (DON) updates published since 14 April 2014.

The full report is available online at http://www.who.int/csr/don/2014_06_13_mers/en/.

International, MERS-CoV (WHO [edited], June 14): On 31 May 2014, the National IHR Focal Point of Algeria notified WHO of two laboratory-confirmed cases of infection with Middle East respiratory syndrome coronavirus (MERS-CoV). This is the first report of laboratory-confirmed cases in Algeria.

Details of the two cases are as follows:

- The first case is a 66-year-old man who was part of a pilgrimage group that went to Saudi Arabia to perform Umrah on 14 May 2014. The patient became ill on 23 May 2014, while in Saudi Arabia. Upon his arrival to Algeria on 28 May 2014, he was hospitalized. The patient has underlying medical conditions.
- The second case is a 59-year-old man who went on a pilgrimage in Saudi Arabia on 5 May 2014. The patient became ill on 23 May 2014, while in Saudi Arabia. On 29 May 2014, he was hospitalized. He did

not have any underlying medical condition. Despite all medical care, the patient died on 10 June 2014 from multi-organ failure.

Since June 2013, the Ministry of Health, Population and Hospital Reform (MSPRH) has enhanced activities for the early detection and monitoring of MERS-CoV. MSPRH was alerted by the Prefecture Health Services of Tipaza and Tlemcen of the 2 suspected cases of MERS-CoV on 29 May 2014. On 30 May 2014, laboratory confirmation was established for both cases by the Institut Pasteur in Algeria.

Medical and preventive measures have been implemented in accordance with the instructions issued by MSPRH, which include:

- meetings of the crisis committee;
- points of entries have been informed to heighten surveillance, and inform passengers travelling to pilgrim areas. Information products have been developed and are distributed to passengers. A special area has been assigned to facilitate interaction with passengers, the distribution of leaflets with public health recommendations, as well as the distribution of disinfectant and masks;
- investigation teams are following up on confirmed and suspected MERS-CoV cases based on national directives for surveillance and alert; and
- information campaigns are ongoing, using different channels of information including the media.

Globally, 699 laboratory-confirmed cases of infection with MERS-CoV including at least 211 related deaths have officially been reported to WHO.

The full report is available online at http://www.who.int/csr/don/2014_06_14_mers/en/.

International, MERS-CoV (WHO [edited], June 16): On 12 and 13 June 2014, the National IHR Focal Point of Saudi Arabia notified WHO of 2 additional laboratory-confirmed cases of infection with Middle East respiratory syndrome coronavirus (MERS-CoV).

Details of the cases are as follow:

- A 36-year-old resident of Almahwah city, Baha Region. The patient works as a truck driver. He became ill on 4 June 2014, was diagnosed with mild pneumonia and was admitted to a hospital on 9 June 2014. The patient is currently in a stable condition. He has underlying medical conditions. He was tested positive to MERS-CoV on 11 June 2014. The patient frequently commutes to Qunfudah city, Qunfudah Region and Wadi Addawaser city, Riyadh Region. The patient has no other travel history. He is reported to have possible contacts with animals as he delivers hay to a mixed animal market. He has no contact with a known laboratory confirmed MERS-CoV case.
- A 33-year-old man, resident of Qunfudah city, Qunfudah Region. He works as a national security guard. The patient is asymptomatic, and was detected through the screening of contacts of previously laboratory-confirmed MERS-CoV cases (reported between 11 April – 9 June 2014). He has no underlying medical condition. He was tested positive to MERS-CoV on 13 June 2014. The patient has a history of frequent travel to Jeddah. He has no history of contact with animals.

Investigation of contacts of the patients and follow up is ongoing.

Additionally, Saudi Arabia has reported an additional 38 deaths among the laboratory-confirmed MERS-CoV cases reported between 11 April – 9 June 2014.

Globally, 701 laboratory-confirmed cases of infection with MERS-CoV, including at least 249 related deaths have officially been reported to WHO.

The full report is available online at http://www.who.int/csr/don/2014_06_16_mers/en/.

International, Human (WHO [edited], June 18): On 16 June 2014, the National Health and Family Planning Commission (NHFPC) of China notified WHO of one additional laboratory-confirmed case of human infection with avian influenza A(H7N9) virus.

The patient is a 42 year-old man from Jiangmen City, Guangdong Province. He became ill on 25 May, was admitted to a hospital on 31 May and died on 5 June. The patient had no exposure to live poultry.

The Chinese Government has taken the following surveillance and control measures:

1. Strengthen surveillance and situation analysis;

- 2.Reinforce case management and medical treatment;
- 3.Conduct risk communication with the public and release information.

The overall risk assessment has not changed.

The full report is available online at http://www.who.int/csr/don/2014_06_18_avian_influenza/en/.

International, Human (WHO [edited], June 24): On 23 June 2014, the National Health and Family Planning Commission (NHFPC) of China notified WHO of one additional laboratory-confirmed case of human infection with avian influenza A(H7N9) virus.

The patient is a 51-year-old male from Taizhou City, Zhejiang Province. He had onset of symptoms on 2 June, was admitted to hospital on 6 June, and is currently in a severe condition. The patient has a history of exposure to live poultry.

The overall risk assessment has not changed.

The full report is available online at http://www.who.int/csr/don/2014_06_24_avian_influenza/en/.

International, Poultry (OIE [edited], June 13): Low pathogenic avian influenza H7N7; South Africa
Outbreak 1: LPAI_2014_H7N7_001, Hessequa, WESTERN CAPE PROVINCE
Start date of outbreak: 31/01/2014; Epidemiological unit: Farm; Affected population: Commercial ostriches
Species: Birds; Susceptible: 467; Cases: 38; Deaths: 0; Destroyed: 0

Outbreak 2: LPAI_2014_H7N7_002, Hessequa, WESTERN CAPE PROVINCE
Start date of outbreak: 01/04/2014; Epidemiological unit: Farm; Affected population: Commercial ostriches
Species: Birds; Susceptible: 465; Cases: 307; Deaths: 215; Destroyed: 0

International, Research (Journal of Virology abstract, June 4): Gonzalez G, et al. Infection and pathogenesis of canine, equine and human influenza viruses in canine tracheas. J Virol. 2014 Jun 4. pii: JVI.00887-14. [Epub ahead of print]

Influenza A viruses (IAVs) can jump species barriers and occasionally cause epidemics, epizootics, pandemics and panzootics. Characterizing the infection dynamics at the target tissues of natural hosts is central to understanding the mechanisms that control host range, tropism and virulence. Canine influenza virus (CIV, H3N8) originated after the transfer of an equine influenza virus (EIV) into dogs. Thus comparing CIV and EIV isolates provides an opportunity to study the determinants of influenza emergence.

Here we characterize the replication of canine, equine and human IAVs in the trachea of the dog, a species to which humans are heavily exposed.

We defined a phenotype of infection for CIV, which is characterized by high levels of virus replication and extensive tissue damage. CIV was compared to evolutionary distinct EIVs, and the early EIV isolates showed an impaired ability to infect dog tracheas, while EIVs that circulated near the time of CIV emergence exhibited a CIV-like infection phenotype. Inoculating dog tracheas with various human IAVs (hIAVs) showed that those infected the tracheal epithelium with various efficiencies depending on the virus tested. Finally, we show that reassortant viruses carrying gene segments of CIV and hIAV are viable and that addition of the hemagglutinin (HA) and neuraminidase (NA) of CIV to the 2009 human pandemic virus results in a virus that replicates at high levels and causes significant lesions. This provides important insights into the role of evolution on viral emergence and on the role of HA and NA as determinants of pathogenicity.

IMPORTANCE Influenza A viruses (IAVs) have entered new hosts species in recent history, sometimes with devastating consequences. Canine influenza virus (CIV) H3N8 originated from a direct transfer of an equine influenza virus (EIV) in the early 2000's. We studied the infection patterns of IAVs that circulate in dogs or to which dogs are commonly exposed and showed that CIV emergence was likely caused by an adaptive driver as evolutionary distinct EIVs display distinct infection phenotypes. We also showed that many human viruses can infect dog tracheas and that reassortment with CIV results in viable viruses. Finally, we showed that the hemagglutinin and neuraminidase of CIV act as virulence factors.

Our findings have significant implications because they show that dogs might act as “mixing vessels” in which novel viruses with pandemic potential could emerge, and also provide experimental evidence supporting the role of viral evolution on influenza emergence.

The abstract is available online at <http://jvi.asm.org/content/early/2014/05/28/JVI.00887-14.full.pdf+html>.

International Poultry and Wild Bird Surveillance (OIE): Reports of avian influenza activity, including summary graphs of avian influenza H5N1 outbreaks in poultry, can be found at the following website: http://www.oie.int/download/AVIAN%20INFLUENZA/A_AI-Asia.htm.

For questions or to be added to the distribution list, please contact Susan Peters at peterss1@michigan.gov

MDCH Contributors

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Table. H5N1 Influenza in Humans – As of January 24, 2014. http://www.who.int/influenza/human_animal_interface/EN_GIP_20130124_CumulativeNumberH5N1cases.pdf. Downloaded 02/05/2014. Cumulative lab-confirmed cases reported to WHO. Total cases include deaths.

Country	2003-2010		2011		2012		2013		2014		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Azerbaijan	8	5	0	0	0	0	0	0	0	0	8	5
Bangladesh	1	0	2	0	3	0	1	1	0	0	7	1
Cambodia	10	8	8	8	3	3	26	14	0	0	47	33
Canada	0	0	0	0	0	0	1	1	0	0	1	1
China	40	26	1	1	2	1	2	2	0	0	45	30
Djibouti	1	0	0	0	0	0	0	0	0	0	1	0
Egypt	119	40	39	15	11	5	4	3	0	0	173	63
Indonesia	171	141	12	10	9	9	3	3	0	0	195	163
Iraq	3	2	0	0	0	0	0	0	0	0	3	2
Lao PDR	2	2	0	0	0	0	0	0	0	0	2	2
Myanmar	1	0	0	0	0	0	0	0	0	0	1	0
Nigeria	1	1	0	0	0	0	0	0	0	0	1	1
Pakistan	3	1	0	0	0	0	0	0	0	0	3	1
Thailand	25	17	0	0	0	0	0	0	0	0	25	17
Turkey	12	4	0	0	0	0	0	0	0	0	12	4
Vietnam	119	59	0	0	4	2	2	1	1	1	126	63
Total	516	306	62	34	32	20	39	25	1	1	650	386