MI Flu Focus

Influenza Surveillance Updates
Bureaus of Epidemiology and Laboratories

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Current Influenza Activity Levels:

- **Michigan:** Regional activity
- **National:** During February 17 - 23, influenza activity remained elevated in the United States, but decreased in most areas

Updates of Interest

- **International:** Saudi Arabia confirms the 14th case of novel coronavirus worldwide

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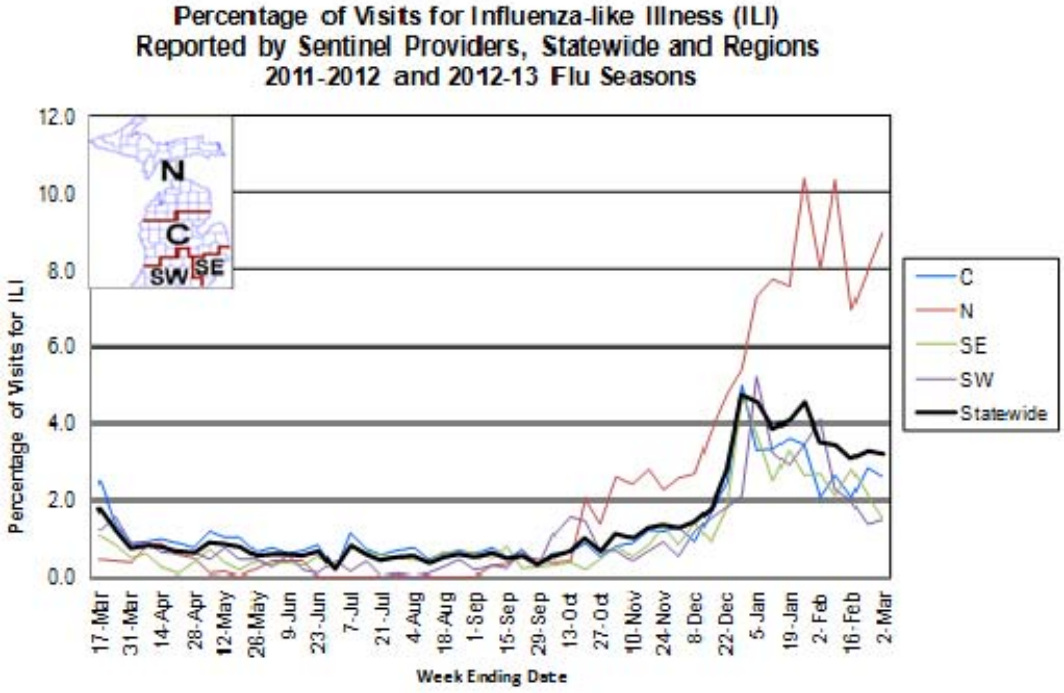
Influenza Surveillance Reports

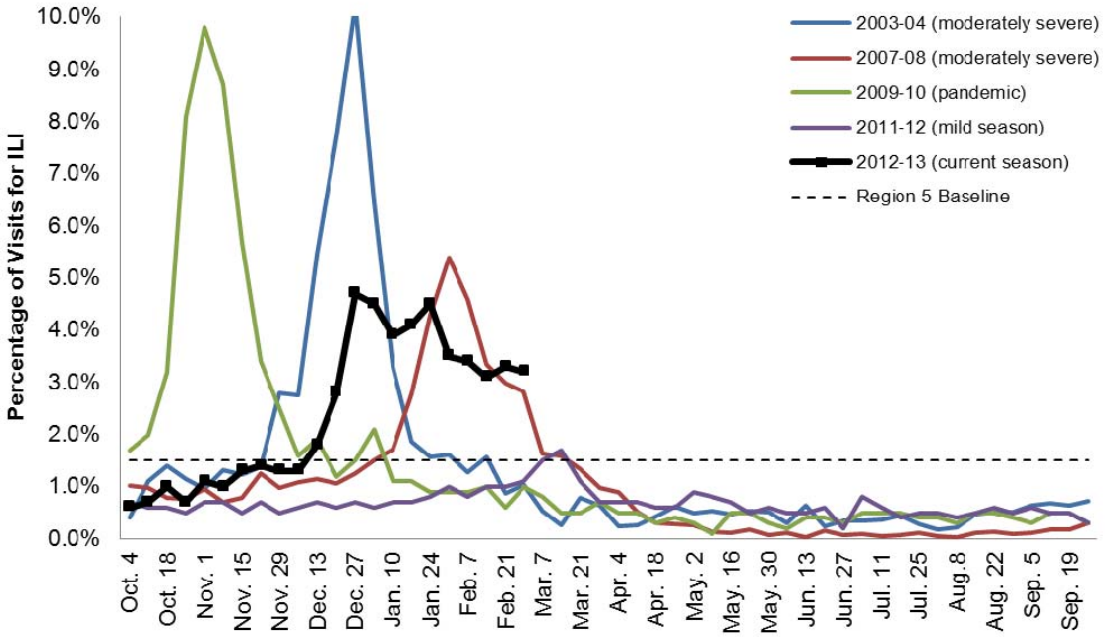
Michigan Disease Surveillance System (as of March 7): MDSS data for the week ending March 2nd indicated that compared to levels from the previous week, individual reports remained steady while aggregate influenza reports slightly decreased. Aggregate reports are slightly decreased when compared to levels seen during the same time period last year, while individual reports are moderately increased.

Emergency Department Surveillance (as of March 7): Compared to levels from the week prior, emergency department visits from constitutional complaints decreased, while respiratory complaints remained steady. Constitutional complaints are similar to levels reported during the same time period last year, while respiratory complaints are lower. In the past week, there were 3 constitutional alerts in the C(2) and N(1) Influenza Surveillance Regions and 2 respiratory alerts in the SW(1) and C(1) Regions.

Sentinel Provider Surveillance (as of March 7): During the week ending March 1, 2013, the proportion of visits due to influenza-like illness (ILI) decreased to 3.2% overall; this is above the regional baseline (1.5%). A total of 355 patient visits due to ILI were reported out of 11,057 office visits. Data were provided by forty sentinel sites from the following regions: C (14), N (9), SE (12) and SW (5). ILI activity increased in two surveillance regions: North (8.9%) and Southwest (1.5%); and decreased in the remaining two surveillance regions: Central (2.6%) and Southeast (1.5%). Please Note: these rates may change as additional reports are received.



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 Cristi Carlton at 517-335-9104 or CarltonC2@michigan.gov for more information.

Hospital Surveillance (as of March 2): 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, 2012, in the Clinton, Eaton, Genesee, and Ingham counties. 11 new cases were identified during the past week. As of March 2nd, there have been 214 influenza hospitalizations (144 adult, 70 pediatric) within the catchment area. The incidence rate for adults is 21.1 hospitalizations per 100,000 population and for children is 33.5 hospitalizations per 100,000.

The MDCH Influenza Sentinel Hospital Network monitors influenza hospitalizations reported voluntarily by hospitals statewide. 9 hospitals (SE, SW, C, N) reported for the week ending March 2, 2013. Results are listed in the table below.

Age Group	Hospitalizations Reported During Current Week	Total Hospitalizations 2012-13 Season
0-4 years	0	29 (6SE, 19C, 4N)
5-17 years	1 (1C)	13 (3SE, 8C, 2N)
18-49 years	3 (3SE)	40 (25SE, 1SW, 10C, 4N)
50-64 years	3 (3SE)	67 (47SE, 3SW, 7C, 10N)
≥65 years	7 (6SE, 1SW)	206 (138SE, 14SW, 14C, 40N)
Total	14 (12SE, 1SW, 1C)	355 (219SE, 18SW, 58C, 60N)

Laboratory Surveillance (as of March 2): During February 24 – March 2, 4 influenza A(H3) (1SE, 1SW, 2C), 2 influenza A(H1N1)pdm09 (2SE), and 4 influenza B (2SE, 2SW) results were reported by MDCH. For the 2012-13 season (starting Sept. 30, 2012), MDCH has identified 616 influenza results:

- Influenza A(H3): 487 (124SE, 169SW, 157C, 37N)
- Influenza A(H1N1)pdm09: 15 (3SE, 2SW, 2C, 2N)
- Influenza B: 114 (27SE, 21SW, 54C, 12N)
- Parainfluenza: 8 (3SW, 1C, 4N)
- RSV: 1 (1N)

14 sentinel labs (SE, SW, C, N) reported for the week ending March 2, 2013. 10 labs (SE, SW, C) reported low or decreasing flu A activity. 11 labs (SE, SW, C, N) reported flu B activity, with the highest activity occurring in the SE. Flu B activity is higher than flu A activity. 2 labs (SE, C) had sporadic parainfluenza activity. 12 labs (SE, SW, C, N) reported steady or declining RSV activity. 3 labs (SE, SW) had low HMPV activity. Testing volumes are moderate but falling, with the highest in the SE.

Michigan Influenza Antigenic Characterization (as of March 7): For the 2012-13 season, 83 Michigan influenza B specimens have been characterized at MDCH BOL. 65 specimens are B/Wisconsin/01/2010-like, matching the B component of the 2012-13 influenza vaccine. 18 influenza B specimens were characterized as B/Brisbane/60/2008-like, which is not included in the 2012-13 vaccine.

Michigan Influenza Antiviral Resistance Data (as of March 7): For the 2012-13 season, 30 influenza A/H3 specimens and 8 influenza A(H1N1)pdm09 specimens have been tested at the MDCH BOL for antiviral resistance. None of the influenza isolates 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.

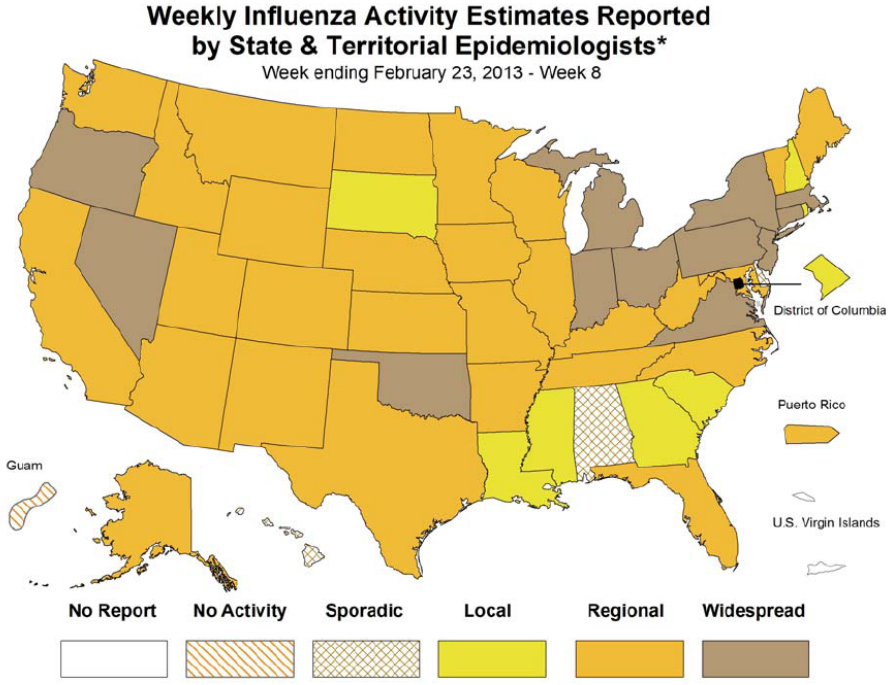
Influenza-associated Pediatric Mortality (as of March 7): 5 pediatric influenza-associated influenza mortalities (2 A/H3, 3B) have been reported for the 2012-13 season.

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_pediatric_influenza_guidance_v2_214270_7.pdf.

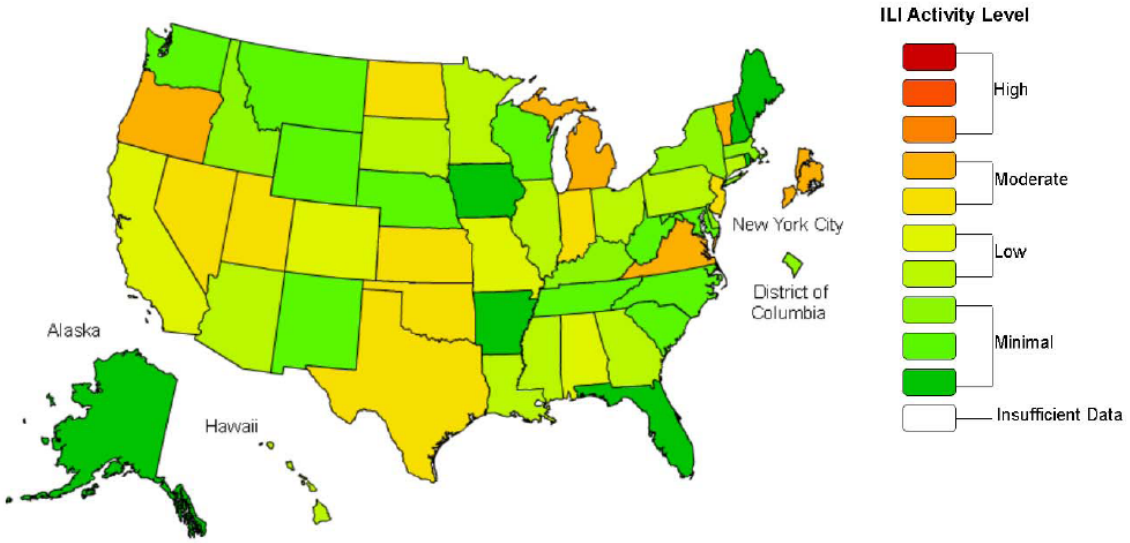
Influenza Congregate Settings Outbreaks (as of March 7): 1 respiratory outbreak due to influenza A in a long-term are facility (C Region) was reported during the previous week. 102 respiratory outbreaks (19SE, 28SW, 38C, 17N) have been reported to MDCH during the 2012-13 season; testing results are listed below.

- Influenza A/H3: 16 (7SW, 9C)
- Influenza A: 53 (9SE, 13SW, 19C, 12N)
- Influenza B: 6 (1SE, 3SW, 1C, 1N)
- Influenza A and B: 2 (1SE, 1SW)
- Influenza positive: 4 (1SE, 1SW, 2C)
- Influenza and RSV positive: 1 (1C)
- Negative/no testing: 10 (7SE, 3SW, 6C, 4N)

National (CDC [edited], March 1): During week 8 (February 17 - 23, 2013), influenza activity remained elevated in the United States, but decreased in most areas. Of 7,609 specimens tested and reported by collaborating laboratories, 1,288 (16.9%) were positive for influenza. The proportion of deaths attributed to pneumonia and influenza (P&I) was above the epidemic threshold. Three pediatric deaths were reported. A cumulative rate for the season of 36.7 laboratory-confirmed influenza-associated hospitalizations per 100,000 population was reported. Of reported hospitalizations, over 51% were among adults 65 years and older. The proportion of outpatient visits for influenza-like illness (ILI) was 2.7%. This is above the national baseline of 2.2%. Eight of 10 regions reported ILI at or above region-specific baseline levels. Twelve states and New York City experienced moderate activity; 15 states experienced low activity, and 23 states and the District of Columbia experienced minimal activity. Twelve states reported widespread influenza activity; Puerto Rico and 28 states reported regional influenza activity; 7 states and the District of Columbia reported local influenza activity; 3 states reported sporadic influenza activity; Guam reported no influenza activity, and the U.S. Virgin Islands did not report.



Influenza-Like Illness (ILI) Activity Level Indicator Determined by Data Reported to ILINet
2012-13 Influenza Season Week 8 ending Feb 23, 2013



This map uses the proportion of outpatient visits to healthcare providers for influenza-like illness to measure the ILI activity level within a state. Therefore, outbreaks occurring in a single city could cause the state to display high activity levels. Data collected in ILINet may disproportionately represent certain populations within a state, and therefore, may not accurately depict the full picture of influenza activity for the whole state. Data displayed on this map are based on data collected in ILINet, whereas the State and Territorial flu activity map are based on reports from state and territorial epidemiologists.

	Week 8
No. of specimens tested	7,609
No. of positive specimens (%)	1,288 (16.9%)
Positive specimens by type/subtype	
Influenza A	605 (47.0%)
2009 H1N1	39 (6.4%)
Subtyping not performed	322 (53.2%)
H3	244 (40.3%)
Influenza B	683 (53.0%)

The complete FluView report is available online at http://www.cdc.gov/flu/weekly/fluactivity.htm.

International (WHO [edited], March 1): Influenza activity in North America continued to decrease overall, though activity remained high in some areas. The proportion of influenza B increased slightly, but influenza A(H3N2) was still the most commonly detected virus subtype. The season has been more severe than average in the United States of America, with notably high number of pneumonia and influenza-related hospitalizations among adults aged 65 years and older. Influenza activity in Europe decreased in some northern and western countries but continued to increase in the eastern part of the region. While influenza A(H1N1)pdm09 was the most commonly detected virus overall, notable exceptions included Denmark, Ireland and the United Kingdom, which reporting much more influenza A(H3N2) and influenza B than the rest of Europe, and Bulgaria, Italy, and Spain which reported more influenza B than A. Excess mortality for the 14 countries reporting to the European Mortality Monitoring project has been higher than average for individuals over the age of 65 years but not as high as the previous two seasons. Influenza activity throughout the temperate region of Asia decreased except in Mongolia where it appears to have reached a peak. Only low levels of influenza activity were reported across the tropical regions of the world and activity in countries of the southern hemisphere remained at inter-seasonal levels. The WHO Consultation on the Composition of Influenza Virus Vaccines for the Northern Hemisphere 2013–2014 took place during the third week of February, and updates to the A(H3N2) and B/Yamagata lineage components were recommended. The full report can be found at: http://www.who.int/influenza/vaccines/virus/recommendations/2013_14_north/en/.

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

MDCH reported REGIONAL INFLUENZA ACTIVITY to CDC for the week ending March 2, 2013.

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. It is expected that the pandemic virus will behave as a seasonal influenza A virus. It is important to maintain surveillance and update pandemic preparedness/response plans accordingly.

National, Research (American Society for Microbiology press release, February 28): A single mutation in the H5N1 avian influenza virus that affects the pH at which the hemagglutinin surface protein is activated simultaneously reduces its capacity to infect ducks and enhances its capacity to grow in mice according to research published ahead of print today in the Journal of Virology.

"Knowing the factors and markers that govern the efficient growth of a virus in one host species, tissue, or cell culture versus another is of fundamental importance in viral infectious disease," says Charles J. Russell of St. Jude Children's Research Hospital, Memphis, TN, an author on the study. "It is essential for us to identify influenza viruses that have increased potential to jump species, to help us make decisions to cull animals, or quarantine humans." The same knowledge "will help us identify targets to make new drugs that stop the virus… [and] engineer vaccines."

Various influenza viruses are spreading around the globe among wild birds, but fortunately, few gain the ability to jump to humans. However, those that do, and are able to then spread efficiently from person to person, cause global epidemics, such as the infamous pandemic of 1918, which infected one fifth and killed an estimated 2.7 percent of the world's population. Occasionally, one of these viruses is exceptionally lethal. For example, H5N1 has killed more than half of the humans it has infected. The specter of such a virus becoming easily transmissible among humans truly frightens public health officials. But understanding the mechanisms of transmission could help microbiologists find ways to mitigate major epidemics.

When influenza viruses infect birds, the hemagglutinin surface protein of the virus is activated by acid in the entry pathway inside the host cell, enabling it to invade that cell. In earlier work, Russell and collaborators showed that a mutant version of the influenza H5N1 virus called K58I that resists acid activation, loses its capacity to infect ducks. Noting that the upper airways of mammals are more acidic than infected tissues of birds, they hypothesized, correctly, that a mutation rendering the hemagglutinin protein resistant to acid might render the virus more infective in mammals.

In this study the investigators found that K58I grows 100-fold better than the wild-type in the nasal cavities of mice, and is 50 percent more lethal. Conversely, the mutant K58I virus failed completely to kill ducks the investigators infected, while the wild-type killed 66 percent of ducks, says Russell. "A single mutation that eliminates H5N1 growth in ducks simultaneously enhances the capacity of H5N1 to grow in mice. We conclude that enhanced resistance to acid inactivation helps adapt H5N1 influenza virus from an avian to a mammalian host."

"These data contribute new information about viral determinants of influenza virus virulence and provide additional evidence to support the idea that H5N1 influenza virus pathogenesis in birds and mammals is linked to the pH of [hemagglutinin] activation in an opposing fashion," Terence S. Dermody of Vanderbilt University et al. write in an editorial in the journal accompanying the paper. "A higher pH optimum of [hemagglutinin] activation favors virulence in birds, whereas a lower pH optimum… favors virulence in mammals."

Based on this and another study, "…surveillance should include phenotypic assessment of the [hemagglutinin] activation pH in addition to sequence analysis," Dermody writes.

The journal carefully considered whether to publish the paper, because it raised issues of "dual use research of concern" (DURC), writes Dermody. DURC is defined as "Life sciences research that, based on current understanding, can be reasonably anticipated to provide knowledge, information, products, or technologies that could be directly misapplied to pose a significant threat with broad potential consequences to public health and safety, agricultural crops and other plants, animals, the environment,

materiel, or national security," according to a US government policy document. However, both the National Institute of Allergy and Infectious Diseases and the St. Jude Institutional Biosafety Committee concluded that the study failed to meet the definition of DURC. Clinching the case, "the addition of the key mutation in the Russell paper to other previously reported mutations would not result in an even more virulent H5N1 influenza virus," says Dermody.

The press release is available at http://www.eurekalert.org/pub_releases/2013-02/asfm-mas022813.php. The publication is available at http://www.asm.org/images/Communications/tips/2013/0213h5n1.pdf.

National, Human (MMWR, March 7): Update: Severe Respiratory Illness Associated with a Novel Coronavirus — Worldwide, 2012–2013. MMWR Early Release Vol. 62.

As of March 7, 2013, a total of 13 confirmed cases of infection with a novel coronavirus have been reported to the World Health Organization, with seven deaths. Illness onsets have occurred from April 2012 through February 2013. To date, no cases have been reported in the United States. This report provides an update on the global public health risk posed by this novel coronavirus.

The full publication is available online at http://www.cdc.gov/mmwr/pdf/wk/mm62e0307.pdf.

International, Human (WHO, March 6): The Ministry of Health in Saudi Arabia has informed WHO of a new confirmed case of infection with the novel coronavirus (NCoV).

The patient, a 69-year-old male, was hospitalized on 10 February 2013 and died on 19 February 2013. Preliminary investigation indicated that the patient had no contact with previously reported cases of NCoV infection and did not have recent history of travel.

To date, WHO has been informed of a global total of 14 confirmed cases of human infection with NCoV, including eight deaths. Of the total number, seven cases, including five deaths, have been reported from Saudi Arabia.

Based on the current situation and available information, WHO encourages all Member States (MS) to continue their surveillance for severe acute respiratory infections (SARI) and to carefully review any unusual patterns. WHO is currently working with international experts and countries where cases have been reported to assess the situation and review recommendations for surveillance and monitoring.

All MS are reminded to promptly assess and notify WHO of any new case of infection with NCoV along with information about potential exposures that may have resulted in infection and a description of the clinical course.

WHO does not advise special screening at points of entry with regard to this event nor does it recommend that any travel or trade restrictions be applied.

WHO continues to closely monitor the situation.

The update is available online at http://www.who.int/csr/don/2013_03_06/en/index.html.

National, Wild Birds (PLoS ONE abstract, March 5): Wilson HM, Hall JS, Flint PL, Franson JC, Ely CR, et al. (2013) High Seroprevalence of Antibodies to Avian Influenza Viruses among Wild Waterfowl in Alaska: Implications for Surveillance. PLoS ONE 8(3): e58308. doi:10.1371/journal.pone.0058308

We examined seroprevalence (presence of detectable antibodies in serum) for avian influenza viruses (AIV) among 4,485 birds, from 11 species of wild waterfowl in Alaska (1998–2010), sampled during breeding/molting periods. Seroprevalence varied among species (highest in eiders (Somateria and Polysticta species), and emperor geese (Chen canagica)), ages (adults higher than juveniles), across geographic locations (highest in the Arctic and Alaska Peninsula) and among years in tundra swans (Cygnus columbianus). All seroprevalence rates in excess of 60% were found in marine-dependent species. Seroprevalence was much higher than AIV infection based on rRT-PCR or virus isolation alone. Because pre-existing AIV antibodies can infer some protection against highly pathogenic AIV (HPAI H5N1), our results imply that some wild waterfowl in Alaska could be protected from lethal HPAIV infections. Seroprevalence should be considered in deciphering patterns of exposure, differential infection, and rates of AIV transmission. Our results suggest surveillance programs include species and populations with high AIV seroprevalences, in addition to those with high infection rates. Serologic testing,

including examination of serotype-specific antibodies throughout the annual cycle, would help to better assess spatial and temporal patterns of AIV transmission and overall disease dynamics.

The full article is available at www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0058308.

Michigan Wild Bird Surveillance (USDA, as of March 7): For the 2012 season (April 1, 2012-March 31, 2013), highly pathogenic avian influenza H5N1 has not been recovered from the 68 samples tested nationwide. For more information, visit http://www.nwhc.usgs.gov/ai/. To learn about avian influenza surveillance in wild birds or to report dead waterfowl, go to the Emerging Disease website at http://www.michigan.gov/emergingdiseases.

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/downld/AVIAN%20INFLUENZA/A_AI-Asia.htm.

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

Contributors

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Table. H5N1 Influenza in Humans – As of February 15, 2013. http://www.who.int/influenza/human_animal_interface/EN_GIP_20130215CumulativeNumberH5N1cases.pdf. Downloaded 2/15/2013. Cumulative lab-confirmed cases reported to WHO. Total cases include deaths.

Country	2003-2006		2007		2008		2009		2010		2011		2012		2013		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Azerbaijan	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	5
Bangladesh	0	0	0	0	1	0	0	0	0	0	2	0	3	0	0	0	6	0
Cambodia	6	6	1	1	1	0	1	0	1	1	8	8	3	3	7	6	28	25
China	22	14	5	3	4	4	7	4	2	1	1	1	2	1	2	0	45	28
Djibouti	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Egypt	18	10	25	9	8	4	39	4	29	13	39	15	11	5	1	1	170	61
Indonesia	75	58	42	37	24	20	21	19	9	7	12	10	9	9	0	0	192	160
Iraq	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2
Lao PDR	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Myanmar	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Nigeria	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Pakistan	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Thailand	25	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	17
Turkey	12	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	4
Vietnam	93	42	8	5	6	5	5	5	7	2	0	0	4	2	0	0	123	61
Total	263	158	88	59	44	33	73	32	48	24	62	34	32	20	10	7	620	367