

Armed Forces Health Surveillance Branch H7N9 Surveillance Summary (31 AUG 2016)



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DEPARTMENT OF DEFENSE (AFHSB)

Avian Influenza A (H7N9) Surveillance Summary #65

31 AUG 2016 (next Summary as needed)



CASE REPORT: As of **31 AUG 2016**, according to WHO, China's National Health and Family Planning Commission (NHFP), and provincial governments within China, there have been **864 (+5)** human cases of avian influenza A (H7N9), including 315 deaths, in China, Hong Kong, Taiwan, Malaysia, and Canada. The cases in Taiwan (4), Hong Kong (14), Malaysia (1), and Canada (2) are thought to have been imported from mainland China. It is unusual for H7N9 transmission to continue in the summer; in previous years transmission has dropped off towards the end of MAY. It is unclear if this is an artifact in reporting due to the batching of cases or an actual continuation in transmission. **On 11 AUG, the NHFP released a batch of five cases with one death (included in the above case counts) with onset dates ranging from 24 JUN–29 JUL. Two of these five cases reported poultry exposure, and the remaining three had no history of poultry exposure. As of 17 AUG, WHO reports that limited human-to-human transmission cannot be ruled out amongst these three cases, who are reported as family members. Investigations into this possible cluster are ongoing.** The overall case-fatality proportion among known cases is **36%**, the average age of those affected is 54 years, and at least **221 (+3)** of the cases reported have been female. The most recent known date of onset was **10 JUL 2016**. Cases have been reported in 15 provinces of China: Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Zhejiang, and Xinjiang; and three municipalities, Beijing, Shanghai, and Tianjin.

TRANSMISSION: In a [study](#) published in CDC's APR 2015 EID Journal, H7N9 antibodies were found among 6.7% of case contacts identified between MAR 2013 and MAY 2014 in China, suggesting that human-to-human transmission does occur and could cause mild or asymptomatic infections. AFHSB notes that since much of the reporting out of China occurs in monthly batches, with limited information on age, gender, and location, it is possible that only the most severe cases and fatalities are being reported by China. It is unknown how many mild or asymptomatic cases have occurred and how many cases have occurred without laboratory testing. This lack of information coupled with the infrequent reporting makes spatial and temporal cluster analysis difficult. However, CDC reports there have been 23 known disease clusters since the beginning of the outbreak in 2013, and that cluster-associated cases account for only 5.9% of the total reported cases. A study published in the International Journal of Infectious Diseases determined that H7N9 presentation in primary cases in family clusters (with exposure to poultry) was much more severe than presentation in secondary cases. On 20 MAR, FAO [reported](#) that the circulation of H7N9 remains confined to China due to consumer preference for chickens of the yellow-feather breed, the species primarily involved in H7N9 transmission. The high, but exclusive, local demand for this species within China and the associated higher prices for this particular type of poultry could explain why the virus has yet to take hold in border countries.

BIRD MARKET CLOSURES: A study published in the Journal of One Health on 22 MAR reinforced previous findings that prolonged closure of live poultry markets in China can reduce bird-to-human and bird-to-bird transmission of H7N9. The study also found that interventions in live poultry markets, such as incorporating "periodic rest days" during which the markets would be closed, overnight depopulation of birds, and banning the sale of certain bird species could significantly and sustainably reduce the circulation of avian influenza viruses in the market. A recent study published in the Journal of Virology found that an infected chicken was able to transmit H7N9 to a quail housed in a cage directly below the chicken cage in a simulated live bird market. The quail's oral shedding of the virus was greater than ten-fold that of the directly inoculated chickens, resulting in the authors recommendation for alternative cage-stacking practices for live animal markets. A recent study in the Journal of Wildlife Diseases found that infected peridomestic birds (such as European Starlings) excrete sufficient amounts of virus to infect other birds suggesting that peridomestic birds may be a source of the virus in live bird markets and could play a role in the transmission to poultry and humans. **According to a local media report on 26 AUG, officials in Zaozhuang, Shandong Province cited more than 20 live poultry stalls for non-compliance with multiple city regulations, including environmental sanitation laws, and will slaughter all live poultry at these stalls to prevent the spread of disease. Officials shut down an illegal live duck and poultry sale operation in an underground garage in Hangzhou, Zhejiang Province on 22 AUG. An illegal live bird market in a subway station in Chengdu, Sichuan Province was shut down on 23 AUG after numerous complaints were made. Live bird markets in the city of Longhua, Hainan Province have been temporarily closed for regular disinfection as part of the province's disease control program; four live poultry markets in the city of Haikou, also in Hainan Province, will be closed for disinfection procedures on 10 SEP (2 markets), 15 SEP (1 market), and 20 SEP (1 market), respectively.**

Legend: Text updated from the previous report will be printed in **red**; items in **(+xx)** represent the change in number from the previous Summary (**3 AUG 2016**).

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BACKGROUND: On 1 APR 2013, WHO reported three human cases of infection with a novel influenza A (H7N9) virus in China. This was the first time human infection with H7N9 had been detected. CDC believes the H7N9 virus is likely a reassortment of H7N3 viruses from domestic ducks and H9N2 viruses from other domestic poultry. Seasonality has been observed since the beginning of this outbreak with a consistent pattern of declining incidence through the summer months followed by a spike in cases in the winter months. The FAO [reports](#) a “fourth wave” of the outbreak has begun and notes this follows the trend from previous years of an uptick in human cases each winter. A CDC study compared the severity of human H7N9 infections associated with each of the three epidemic waves of H7N9 occurring in China from 2013-2015. The study found hospitalized patients in waves 2 and 3 had a higher risk of death than their cohorts in wave 1; the authors hypothesized this variation in mortality risk “might be associated with differences in case ascertainment, changes in clinical management, or virus genetic diversity.” The study found this mortality risk continued to increase over time despite shorter times to admission and to laboratory confirmation. On 10 MAR, a study funded by the Hong Kong Research Grants Council and the National Natural Science Foundation of China concluded that “secular changes” (such as bird market closures) and environmental exposures have both contributed to transmission in the three previously identified waves of H7N9 in China.

Confirmed avian H7N9 has been rare and subclinical but has been previously identified. As H7N9 is usually asymptomatic in birds, many bird owners are likely unaware of the risk of transmission. FAO reports over 2,000 virus samples from the environment and chickens, pigeons, ducks, and wild birds have tested positive for H7N9 since the beginning of the outbreak. Most of the positive samples were from live bird markets, vendors, and commercial poultry farms.

INTERAGENCY/GLOBAL ACTIONS: U.S. CDC removed their Level 1: Practice Usual Precautions travel advisory for China in APR 2016. U.S. CDC and WHO advise no special screenings at points of entry, and no trade or travel restrictions. On 15 OCT 2015, FAO released guidelines for [biosecurity improvements in live bird markets](#) and [risk communication](#) regarding H7N9. Taiwan CDC currently lists [Anhui Province](#), Beijing City, [Fujian Province](#), [Guangdong Province](#), Hebei Province, [Henan Province](#), Hunan Province, [Jiangsu Province](#), [Jiangxi Province](#), Liaoning Province, [Shanghai City](#), [Sichuan Province](#), Tianjin City, and [Zhejiang Province](#) at Level 2: Alert for Avian Influenza. On 20 APR, the Hong Kong Center for Health Protection (CHP) released updated criteria for H7N9 case classification to now include contact with a live bird market as possible exposure criteria. China’s Ministry of Agriculture on 6 JUL began requiring electronic “inter-provincial transportation of livestock quarantine certification” and declared handwritten certification to be no longer acceptable. [On 18 AUG, the city of Jinzhou in Liaoning Province held an Avian Influenza A \(H7N9\) emergency response exercise that was observed by the Provincial Health Office’s Emergency Planning Commission.](#)

SURVEILLANCE: Reagents for surveillance testing purposes are available via the [CDC website](#). NMRC has produced amplicon H7N9 positive testing control material using the published WHO primers/probes. Kits have been sent to AFRIMS, NAMRU-3, NAMRU-6, NAMRU-2 Phnom Penh, NMRC-A and NHRC for surveillance. Nineteen DoD laboratories have been sent diagnostic kits, as have all 50 states, the District of Columbia, Puerto Rico, and more than 60 international labs.

DIAGNOSTICS AND TREATMENT: The H7N9 testing and reporting guidelines and a list of DoD laboratories can be found [here](#). On 19 APR 2013, FDA issued an [Emergency Use Authorization](#) for the CDC Human Influenza Virus Real-Time RT-PCR diagnostic panel – Influenza A/H7 assay; this was made available on 26 APR 2013. WHO confirms oseltamivir (Tamiflu) and zanamivir (Relenza) are recommended treatments for H7N9. A study, published on 7 DEC 2015 in the Lancet, found that a live attenuated influenza vaccine (LAIV) candidate for avian influenza A (H7N9) was well tolerated by the phase one trial participants and showed significant immunogenicity. On 10 FEB, a retrospective study by Zhejiang University found that in adults with H7N9 virus infection, the use of oseltamivir-peramivir combination therapy was not superior to oseltamivir monotherapy. On 9 MAR, Vanderbilt University Medical Center (VUMC) announced it has developed human antibodies against H7 avian influenzas that can provide short-term protection to people at risk of exposure or be given as an antiviral treatment to already infected patients. A new article in Protein & Cell found that ribavirin, a broad-spectrum synthetic nucleoside antiviral agent, is effective against both neuraminidase inhibitor (NAI)-sensitive and NAI-resistant viruses in mice.

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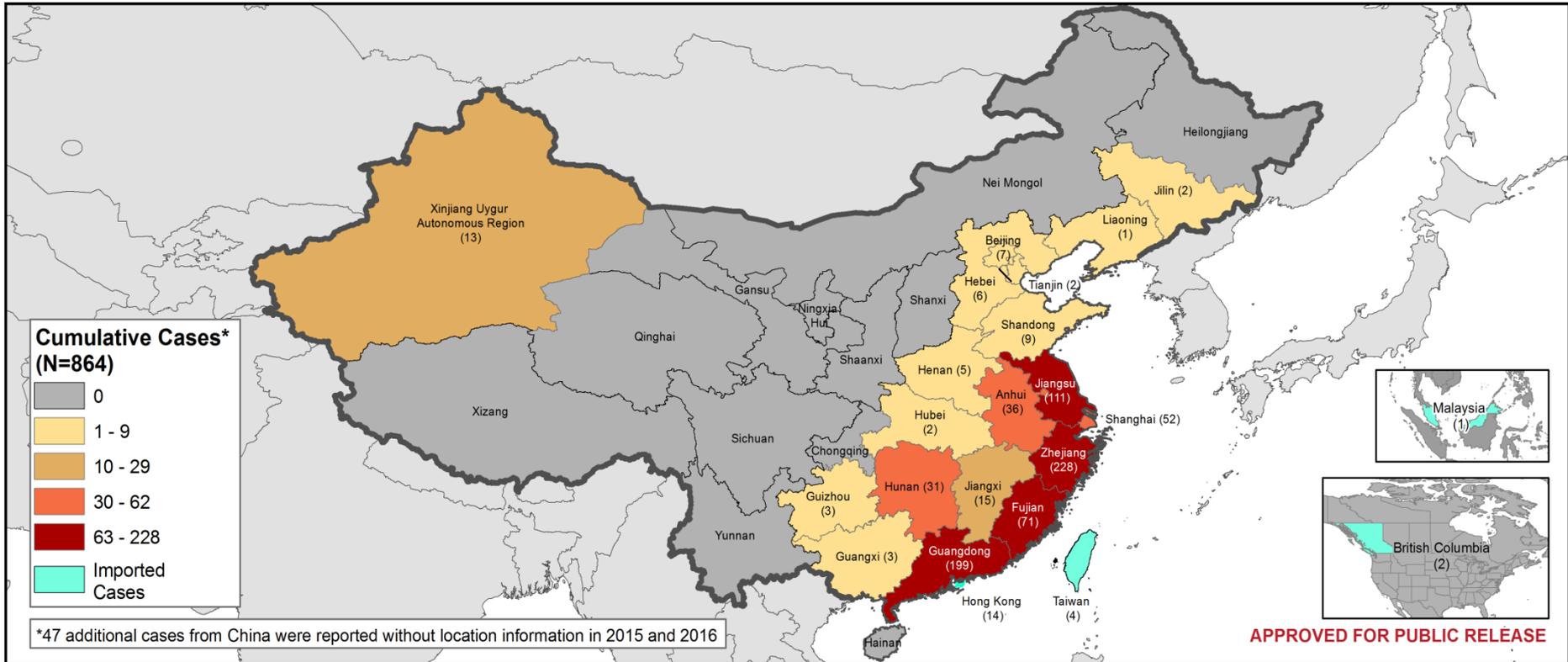
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Cumulative Human Cases of Avian Influenza A (H7N9)

01 APR 2013 - 31 AUG 2016



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Wave 1

APR 2013-SEP 2013

Wave 2

OCT 2013-SEP 2014

Wave 3

OCT 2014-SEP 2015

Wave 4

OCT 2015-AUG 2016



Since the beginning of the avian influenza A (H7N9) outbreak, spikes in cases have been associated with seasonality. These "waves" of cases typically span 1 OCT to 30 SEP of the following year, see the above maps. These "wave" maps only illustrate autochthonous cases in China, not imported cases.



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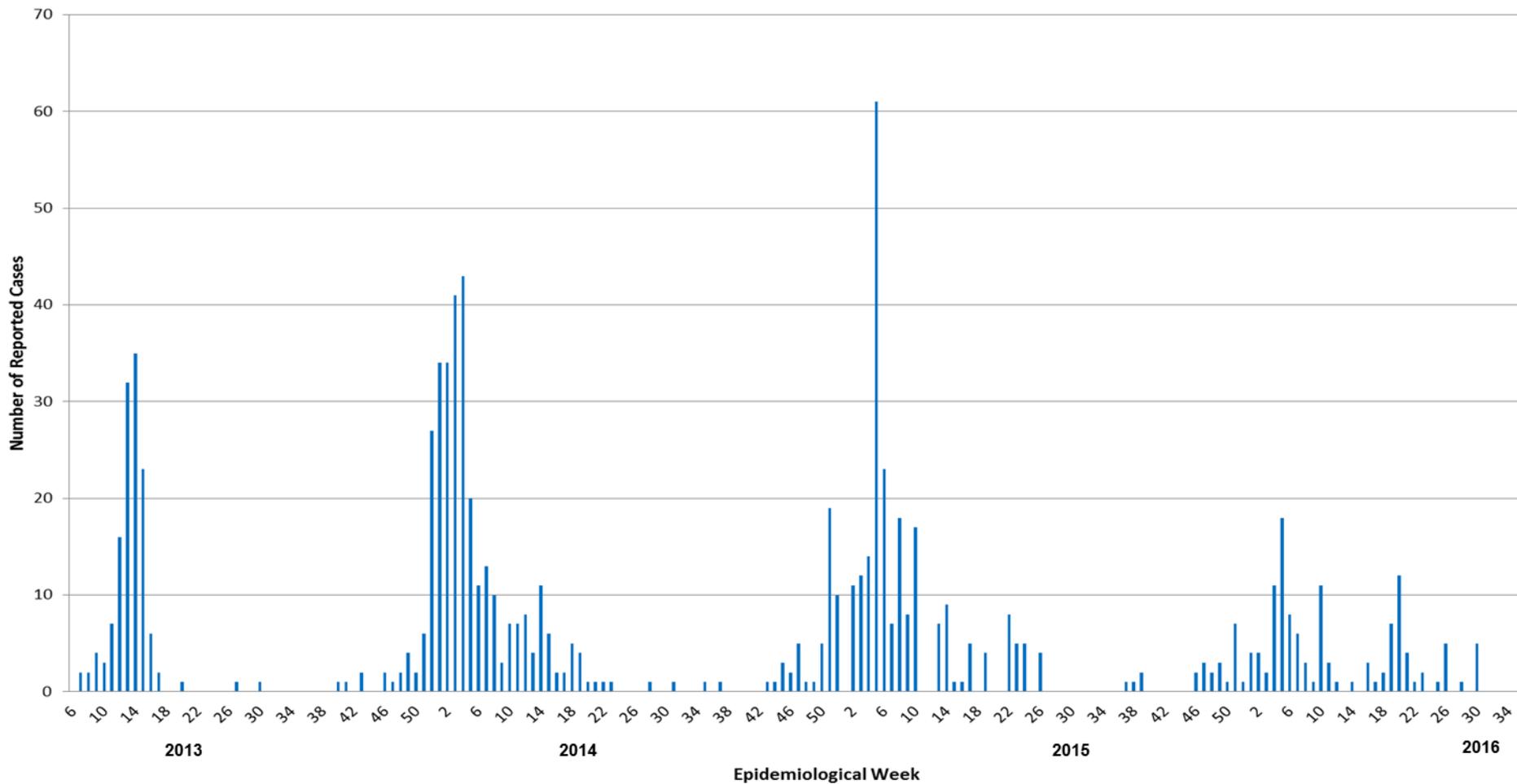
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Avian Influenza A (H7N9) Cases by Estimated Week of Onset As of 31 AUG 2016 (N = 864)



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