

Armed Forces Health Surveillance Branch H7N9 Surveillance Summary (30 MAR 2016)



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DEPARTMENT OF DEFENSE (AFHSB)

Avian Influenza A (H7N9) Surveillance Summary #58

30 MAR 2016 (next Summary 13 APR)



CASE REPORT: As of 30 MAR 2016, 813 (+4) human cases of avian influenza A (H7N9), including 289 deaths, have been reported in China (+3), Hong Kong (+1), Taiwan, Malaysia, and Canada. The FAO's 15 MAR update indicates the death count may be as high as 294. The cases in Taiwan (4), Hong Kong (15), Malaysia (1), and Canada (2) are thought to have been imported from mainland China. According to WHO, the most recently imported case in Hong Kong occurred in a woman who had traveled to Kaiping, Guangdong, where she visited a wet market and was exposed to slaughtered poultry. China's National Health and Family Planning Commission (NHFPC) reported 29 cases for the month of FEB with minimal demographic detail, but local health sources report the majority of cases were identified in Jiangsu and Guangdong provinces. On 23 MAR, WHO reported additional details about the batch of 29 cases reported for FEB, noting that 24 cases (83%) had cited exposure to live poultry, slaughtered poultry, or live poultry markets. WHO also reported that three clusters were identified in this group of cases, two in Jiangsu and one in Fujian, each occurring within insular family units.

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 (+3) 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.

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 live poultry markets. The city of Shanghai announced on 16 JAN that it will suspend all live poultry trade from 8 FEB to 30 APR 2016, clarifying that some retailers will still be allowed to sell "chilled" poultry meat. Media report that Ningbo City, in Zhejiang province, has kept its urban poultry markets closed since JUL 2015 and taken steps to prevent transmission in the "countryside markets" as well. However, media report that rural residents are at higher risk of contracting the virus during winter "as many turn to breeding poultry in their homes" to avoid the cold conditions. As H7N9 is usually asymptomatic in birds, many bird owners are likely unaware of the risk of transmission.

On 2 FEB, the Food and Agriculture Organization (FAO) reported the sequencing results of previously detected avian influenza A (H7) cases, in poultry imported from Guangdong Province to a street market in Macao, to be low pathogenic avian influenza (LPAI) A (H7N9). The street market included 15,000 live chickens, all of which were culled to prevent further spread. Government officials imposed a three-day halt to live poultry sales, ordered all poultry stalls in the street market to be disinfected, and placed three workers from the market under medical observation for 10 days. On 14 FEB, FAO reported two additional cases of LPAI H7N9 in chickens in Zhejiang Province, one on a chicken farm and one in a live bird market. On 15 FEB, FAO reported 145 additional serum samples (from poultry) tested positive for H7 antibodies in Guizhou (68), Henan (56), Heilongjiang (8), Gansu (7), Sichuan (3), and Guangdong (3) provinces. On 9 MAR, China's Ministry of Agriculture (MOA) published results of the National Animal H7N9 Surveillance for the month of FEB in which 26,555 viral and 50,129 serum samples were collected from 3,412 locations in 20 provinces. Of these, two viral samples from chickens tested positive for H7N9 in Zhejiang (from a slaughtering facility in Ningbo City) and Guangdong (from a market in Chaozhou City) provinces, and five chicken serum samples tested positive for H7 antibodies in Hebei Province (originating from four chicken farms in Zhumadian City).

Legend: Text updated from the previous report will be printed in red; items in (+xx) represent the change in number from the previous Summary (16 MAR 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. 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. FAO expects human cases to “rise sharply in the coming weeks or months” as a result of virus seasonality and critical gaps in biosecurity found in the poultry industry, such as the mixing of species, lack of flock identification and movement control, and close contact between birds at live bird markets. According to WHO on 25 FEB, if the pattern of human cases follows the trends seen in previous years, the number of human cases may rise over the coming months.

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. The authors suggest this may explain why peaks have occurred around the Chinese New Year, in early FEB, when people are likely to consume more chicken during the celebration. Confirmed avian H7N9 has been rare and subclinical but has been previously identified. On 2 FEB, FAO reported 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. The overall case-fatality proportion among known cases is 36%, the average age of those affected is 53 years, and at least **162 (+1)** of the cases reported have been female. The most recent known date of onset was **10 MAR 2016**. Cases have been reported in 14 provinces of China: Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Shandong, Zhejiang, and Xinjiang; and two municipalities, Beijing and Shanghai.

INTERAGENCY/GLOBAL ACTIONS: CDC maintains its [Level 1: Practice Usual Precautions travel advisory for China](#), advising travelers to China to avoid contact with poultry (including poultry markets and farms), birds, and their droppings. CDC and WHO advise no special screenings at points of entry, and no trade or travel restrictions. On 25 FEB 2016, WHO included an updated risk assessment in their [Disease Outbreak News](#) update that says the overall public health risk from H7N9 has not changed since its last full [Risk Assessment of Human Infections with Avian Influenza A \(H7N9\) Virus](#) on 23 FEB 2015. On 15 OCT 2015, FAO released new guidelines for [biosecurity improvements in live bird markets](#) and [risk communication](#) regarding H7N9. On 9 NOV 2015, the China Ministry of Agriculture (MOA) released [recommendations](#) for how to improve H7N9 prevention and control efforts for the coming flu season. These include strengthening: monitoring and early warning, live bird market regulations for transporting live poultry, sectorial collaboration, emergency preparedness, advocacy, and information dissemination.

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 at the [AFHSB website](#). 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. This study, [published in the Journal of Clinical Investigation \(JCI\)](#), showed promising prophylactic results in mice.

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Source: [FAO H7N9 Situation Update 15 MAR 2016](#)

This map illustrates the geographic distribution of human H7N9 cases and H7N9-positive samples in birds or the environment in China since OCT 2014. Human cases are depicted in the geographic location where they were reported; for some cases, exposure may have occurred in a different geographic location. Precise location of 63 human cases in Fujian (31), Jiangsu (14), Zhejiang (11), Anhui (3), Guangdong (1), Hunan (1), Hubei (1), and Xinjiang (1) are currently not known. These cases are therefore not shown on the map. Imported cases in Canada (2) and Malaysia (1) are also not represented.

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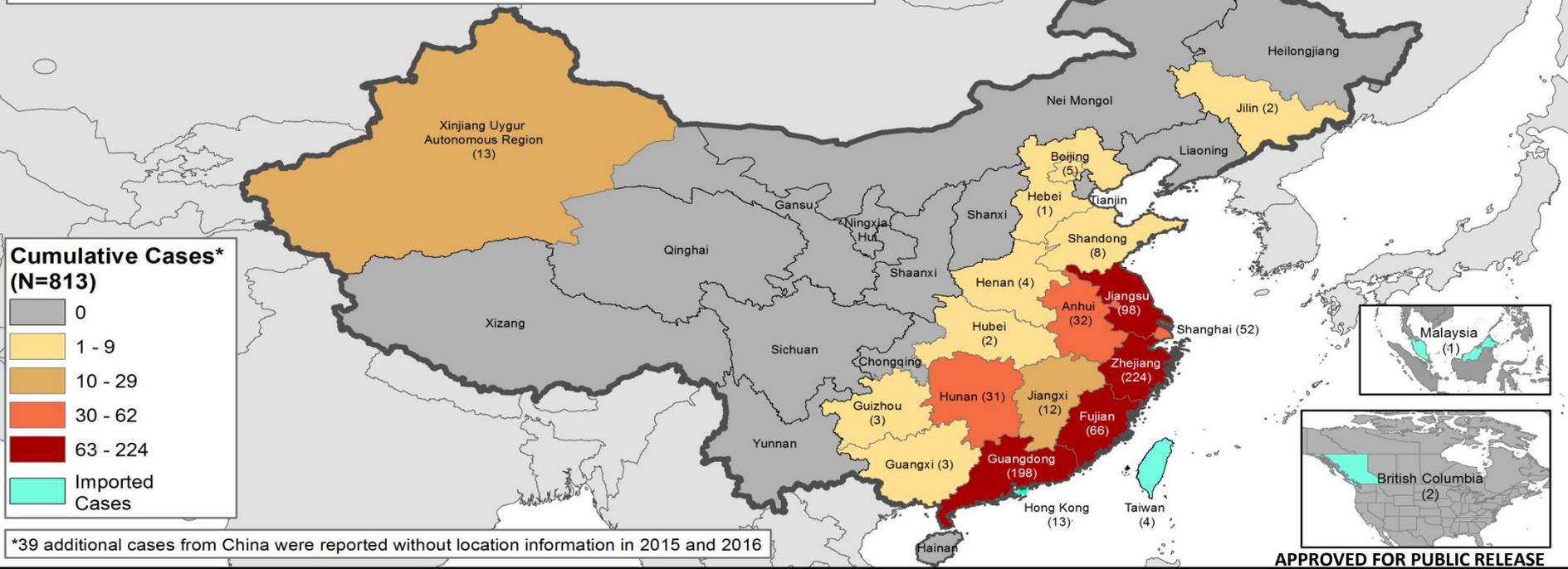
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Cumulative Human Cases of Avian Influenza A (H7N9)

01 APR 2013 - 30 MAR 2016



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Wave 1

FEB 2013-SEP 2013

Wave 2

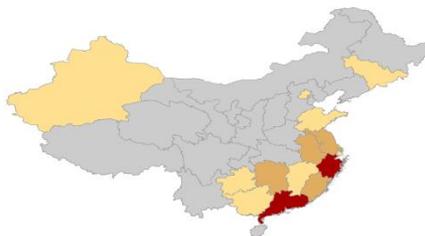
OCT 2013-SEP 2014

Wave 3

OCT 2014-SEP 2015

Wave 4

OCT 2015-MAR 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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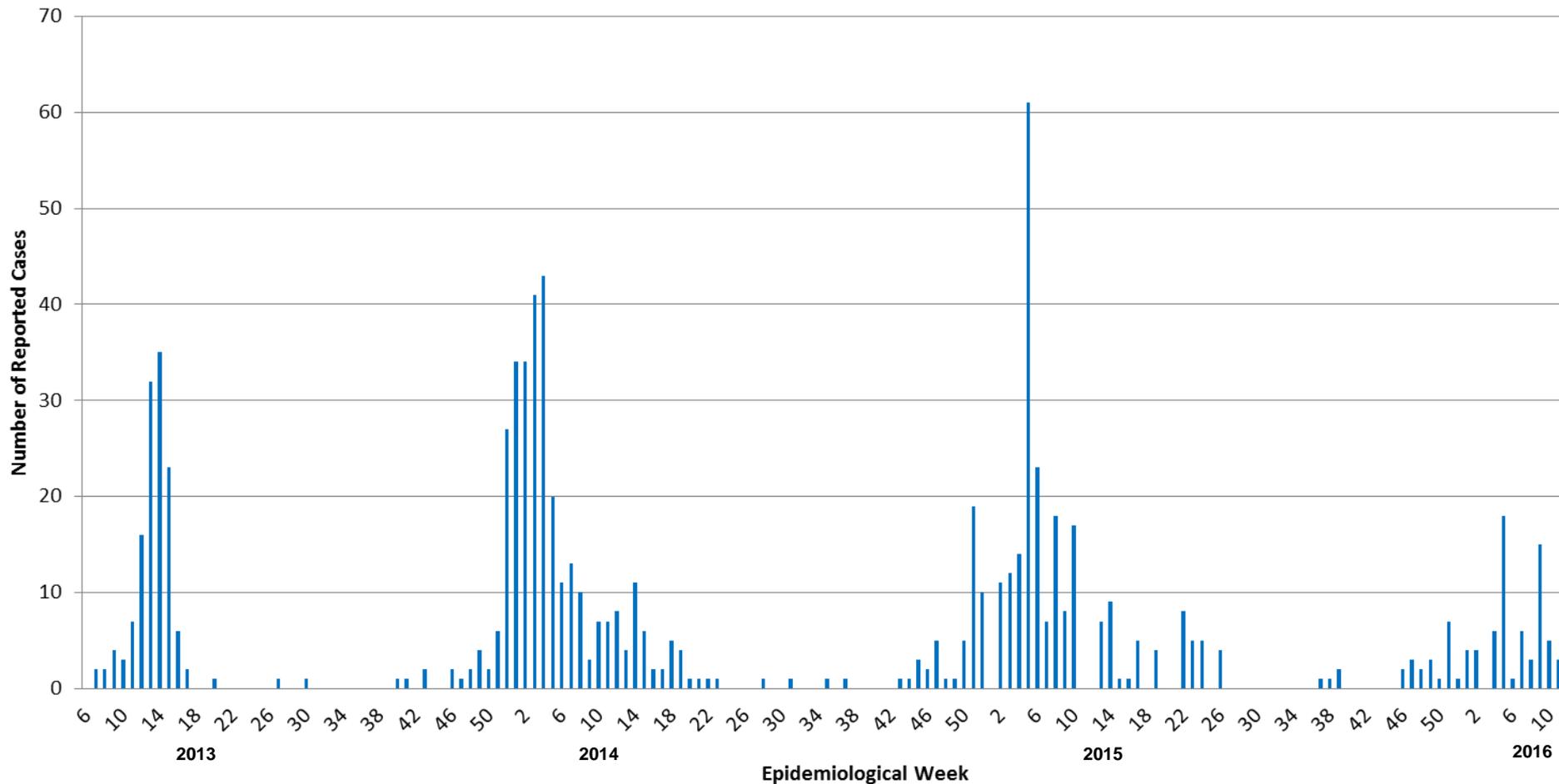
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Avian Influenza A (H7N9) Cases by Estimated Week of Onset As of 30 MAR 2016 (N = 813)



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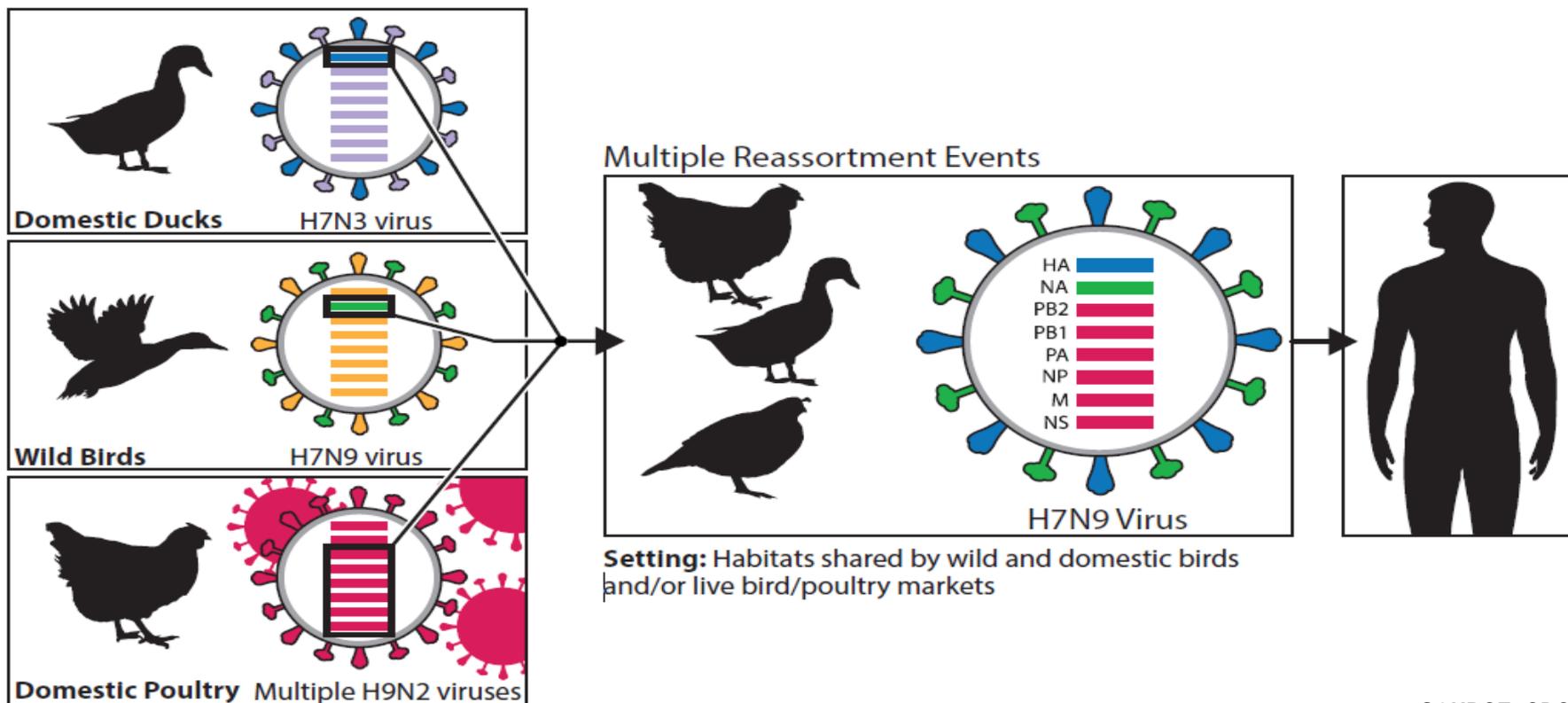
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Genetic Evolution of H7N9 Virus in China, 2013



SOURCE: CDC

The eight genes of the H7N9 virus are closely related to avian influenza viruses found in domestic ducks, wild birds and domestic poultry in Asia. The virus likely emerged from “reassortment,” a process in which two or more influenza viruses co-infect a single host and exchange genes. This can result in the creation of a new influenza virus. Experts think multiple reassortment events led to the creation of the H7N9 virus. These events may have occurred in habitats shared by wild and domestic birds and/or in live bird/poultry markets, where different species of birds are bought and sold for food. As the above diagram shows, the H7N9 virus likely obtained its HA (hemagglutinin) gene from domestic ducks, its NA (neuraminidase) gene from wild birds, and its six remaining genes from multiple related H9N2 influenza viruses in domestic poultry.

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