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Influenza and the Live Poultry Trade

LIVE POULTRY TRADE AT LOCAL MARKETS HAS LONG BEEN A PART OF CHINA'S NATIONAL IDENTITY. From small villages to big cities, the gathering and selling of different birds in this vibrant atmosphere is at the heart of the country's cuisine culture. Unfortunately, the backdrop to this tradition has changed. Last year, the H7N9 virus, a new strain of influenza A, jumped from birds to humans, causing 144 cases of human infection and 47 deaths in China. Now a second wave of this flu is coursing through the country, with 258 confirmed cases and 99 deaths as of 8 April 2014. Scientific evidence points to a connection between the conditions at these live markets and the spread of flu, suggesting that until other means are found to prevent the transmission of or effectively treat the illness, China must shut down live poultry markets to prevent further spread of the virus and a possible global pandemic.

Early in 2013, the Chinese Center for Disease Control and Prevention and several prominent Chinese research groups quickly identified H7N9 as the causative agent of the emerging flu. The source of the virus was immediately traced to live poultry markets. With a call for an immediate shutdown of these markets in major cities, including Hangzhou and Shanghai (where the first H7N9 human infection cases were found), the government quickly controlled the spread of the virus. But the government deemed long-term closure to be economically unviable, and the markets reopened soon after the summer. At the beginning of the new flu season in October, the virus bounced back in the eastern Yangtze River delta region. This year, it has spread to the Canton region (Guangdong province) in China, which is alarming because live poultry markets are commonplace there.

Approximately 87% of the people infected with H7N9 had close contact with live poultry or exposure to a contaminated environment such as the poultry markets, where the virus can spread quickly through birds. Poultry transportation between provinces is probably playing an important role in its spread across China. Although it is generally believed that H7N9 has not developed human-to-human transmissibility, the possibility cannot be excluded. There has been limited unsustained human-to-human transmission in several case clusters. Genomic analysis of the isolated viruses reveals that divergent strains exist and that the virus is not yet "fixed" in its identity and character. H7N9 has yet to adapt to humans by mixing its viral genes with those of a human-specific influenza virus. This can happen if a single host (a human or bird, for example) is infected by both an avian and a human virus. Such genomic reassortment generated the pandemic flu strains in 1918 and 2009, which killed 20 to 40 million and 250,000 people, respectively, worldwide. The risk of this occurring is precisely why the shutdown of live poultry markets is needed to avoid potential reassortments.

But H7N9 is not the only problem. Two new subtypes of influenza A virus have been isolated in humans: H6N1 in Taiwan and H10N8 in mainland China. Both have a clear poultry origin and are found in live poultry markets. Six genes of H10N8 are derived from H9N2, an avian influenza virus that is common in live poultry markets but has infected humans as well. Avian H7N9 and H9N2 coexist in chickens. That means that at any time, their genomes could mix and give rise to a potentially more virulent strain that infects humans.

The birds in live poultry markets are incubators for new subtypes of influenza virus, and the continuation of this culture is worrisome. It is simply not enough to implement regular birdcage disinfection measures and the killing of unsold birds every evening. Curtailing poultry transportation is even more difficult than shutting down markets. H7N9 is avirulent to poultry, so it is difficult to identify virus-carrying birds. Unless the government closes these markets, there is ample opportunity for the rise of a global and devastating pandemic.

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