Report to the Boards of Health
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Mid-Michigan District Health Department, Wednesday, January 22, 2025
Central Michigan District Health Department, Wednesday, January 22, 2025
District Health Department 10, Friday, January 31, 2025

H5N1 Update (from Your Local Epidemiologist)

Your Local Epidemiologist

H5N1 Update: January 7

First bird flu death in the U.S., my level of concern, and FAQs
Katelyn Jetelina Jan 07, 2025
With additional Q and A from Jan 09, 2025 More of your H5N1 questions answered
https://yourlocalepidemiologist.substack.com/p/more-of-your-h5n1-questions-answered

H5N1 has been dominating headlines and social media. Yesterday, the first H5N1 (bird flu) death was reported in Louisiana—a tragic reminder that H5N1 is a very dangerous virus, and we've been, quite frankly, lucky so far.

The risk of H5N1 is still low to the general public, but here are the latest developments, what I see through the inkblots, and answers to FAQs.

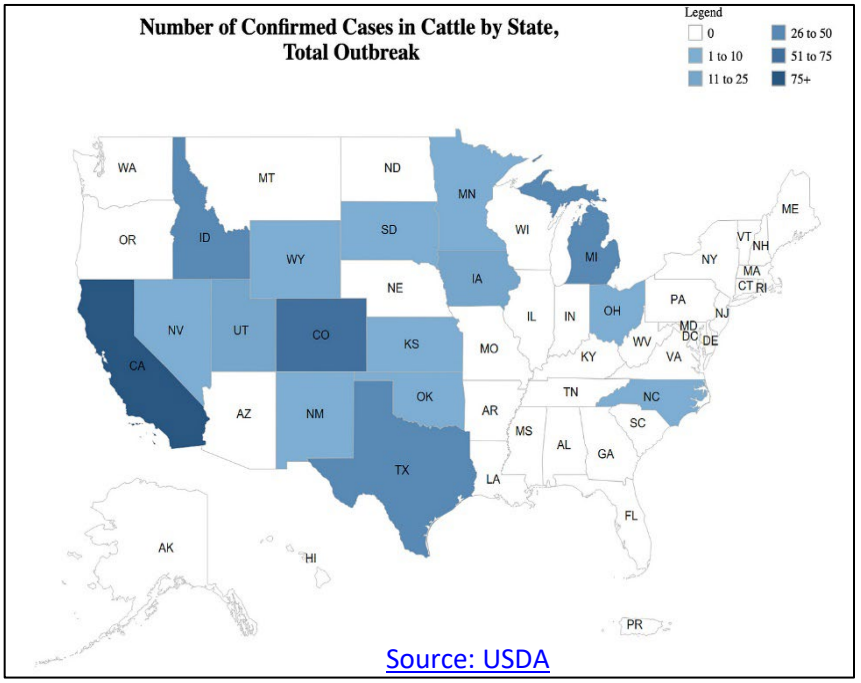
H5N1 keeps spreading among animals

H5N1 is an old virus established in wild birds 25 years ago. In 2021, a variant called clade 2.3.4.4b started to spread among birds, like poultry, and mammals worldwide. Then, in 2024, we saw it spread from cow to cow for the first time in the U.S. This was unexpected, as we don't typically see flu in cows, but this is also what flu does—unexpected things.

Since, H5N1 hasn't stopped spreading. (It certainly has not burned out as the USDA continues to hope for.) The latest tally of *known* infections includes:

- 10,922 wild birds,
- 917 dairy herds, and
- 130,674,361 poultry— a big reason why eggs are hard to find and expensive.

Spread among animals, particularly those in close physical proximity to humans, means we continue to see "spillover" infections to humans. In other words, the virus keeps jumping from animal to human, which is bad because every time it jumps, the virus can mutate.



Source: USDA

CDC has tallied 74 human infections thus far (67 confirmed + 7 probable). However, because testing is limited, we could be missing many infections, especially the milder ones that don't make people seek care.

People are mostly getting sick from direct exposure to sick dairy cows (44 people) or sick poultry in massive operations (23 people). Thankfully, we have not seen human-to-human transmission. The virus hasn't mutated to do so yet.

It was only a matter of time until we saw severe cases

Historically, H5N1 has caused severe disease, so this death shouldn't be a surprise. While the WHO cites a 50% mortality rate from H5N1, this is likely a gross overestimate due to the under detection of human cases who have mild or asymptomatic diseases.

Out of the 74 American H5N1 cases, we've had two severe cases:

1. *Louisiana*: Older adult; infected from their backyard poultry. This patient died.

2. *Missouri*: Older adult; it's unknown how they got infected.

Notably, there has also been a severe case among a teenager in Canada who was fighting for their life. (A recent NEJM case study described how severely sick she was.)

There aren't enough human cases to start drawing patterns of severe disease. But historically, the flu has been unkind to those with weaker immune systems, including children, older adults, and those with comorbidities. Thus far, we have seen severe disease only among these groups. Also, we know some severe cases had exposure to a ton of virus (as opposed to cases from dairy milk, where viral levels are lower.)

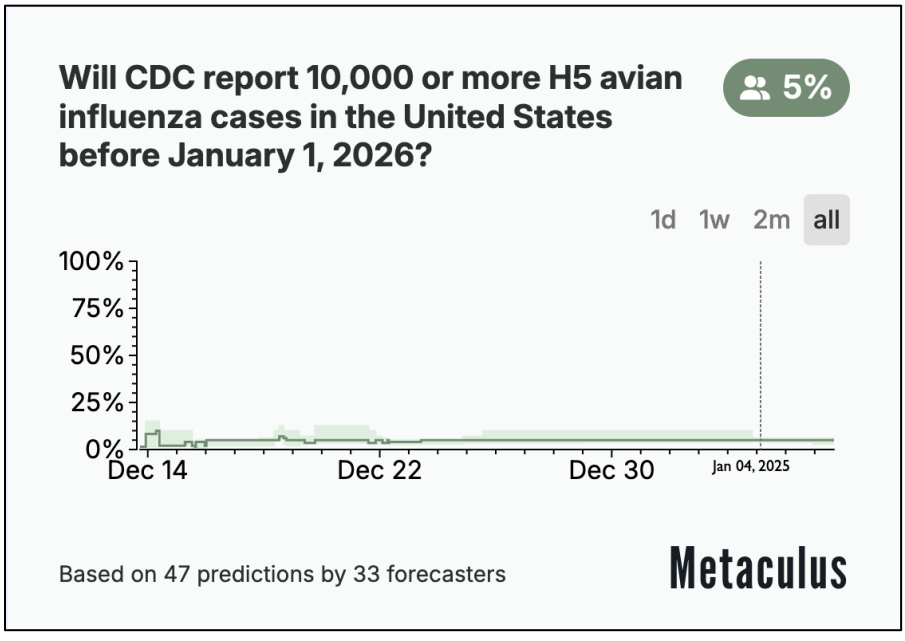
We don't know the "true" mortality rate, but as we learned during Covid-19, even a small percentage of a large number of people is a large number. If H5N1 turned into a pandemic, it could be devastating.

Why are experts so concerned?

In the past year, H5N1 has taken up a *lot* of brain space for epidemiologists, virologists, and veterinarians alike. As Dr. Michael Osterholm said to *STAT*, "Any time you're dealing with H5N1, you sleep with one eye open."

There are a few reasons for the continued anxiety:

1. ***Low probability, high consequence event.*** The probability of a pandemic in any given year is 2%. Spillovers happen all the time, but very few become pandemics because many unlucky things must occur in sequence. The situation unfolding with H5N1 has increased the probability. CDC placed the potential risk of H5N1 to humans as "moderate," and Metaculus (who hosts a CDC-sponsored respiratory disease forecasting tournament) places the probability of a pandemic in the next year at 5%. In May 2024, I wagered 5%. I now think it's 7-9% given that H5N1 continues to spread largely unchecked.



2. ***It's flu season.*** If the same person is infected with seasonal influenza, H5N1 could "swap" genes, causing a mutation that sends human-to-human transmission.

3. ***New mutations.*** The Louisiana patient developed new H5N1 mutations, which increased its ability to bind human cells. This isn't surprising (viruses change) but shows what the virus can do.

4. ***Lack of urgency*** in the U.S. government, particularly USDA. The time to stop a pandemic is now, and it needs to be stopped at the source—that's animals. This is USDA's lane, but priorities, agility, experience, and politics differ from those of the agencies dealing with human health. We are *still* flying blind. The Department of Health and Human Services (HHS) finally allocated $306 million to bolster the nation's human preparedness for H5N1, including giving $183 million to regional, state, and local programs.

5. ***Unanswered questions.*** Of course, like with any outbreak, there are endless questions: *Do these severe cases have a more severe strain than others? What is causing the H5N1 spikes in wastewater? Will the stockpile of vaccines be effective?*

But should *you* be concerned?

Experts' anxiety has percolated to the public. I tell my friends and family: H5N1 is something to watch, but don't let it take up too much headspace yet. Risk lies with agriculture workers and those in contact with sick birds. (Raw milk can potentially cause severe disease, but there have been no cases yet.)

And, for the general public, *there's not much you can do*. Don't drink unpasteurized milk. Don't touch wild birds. And if livestock animals look sick, stay away. (If you have backyard poultry, check out this last YLE post, which includes using PPE.)

When should alarm bells go off? A DEFCON 1 YLE email will land in your inbox. But, more seriously, concern should rise when your risk rises. That will happen if we see human-to-human transmission.

More subtle signs of changing risk include:

- H5N1 starts spreading among pigs (they are great mixing vessels and could cause a mutation more quickly)

- Worrisome mutations spreading among animals

Question Grab Bag

We continue to get a lot of great questions on H5N1. Here are some answers not touched on above:

- ***Flu is spreading right now. How do we know that some of these cases aren't H5N1?*** Unfortunately, rapid Flu A tests cannot differentiate between a positive for seasonal flu or H5N1. We rely on clinicians to decide whether more testing is necessary, usually triggered through symptoms (like red eyes for H5N1) or history (like exposure to sick animals). While it is possible that some of the flu cases are H5N1 infections that we're missing, it's not particularly likely (for now).
- ***Do I need to "prep" for a pandemic this year, like stocking up on Tamiflu?*** Tamiflu does work against H5N1, but please don't stockpile. We are in peak respiratory flu season—people need access to antivirals.
- ***Do seasonal flu vaccines work against H5N1?*** The short answer is we don't know. H5N1 has some important similarities to H1N1 (seasonal flu) proteins, so some antibodies and T-cells could cross-protect.

But other lab studies show it's imperfect. If H5N1 did become a public health emergency, we would almost certainly need H5N1 vaccines. About 4 million are stockpiled, but we don't know how well they will work in the real world, especially if H5N1 mutates. mRNA vaccines are being developed as we speak.

- ***Can this affect my pets?*** Domestic animals—cats and dogs—*can* get H5N1 if they contact (usually eat) a dead or sick bird or even its droppings. The current cow outbreak revealed another infection pathway: unpasteurized milk. Fifty percent of cats that drink raw milk died.
- ***What about bird feeders?*** Birds that gather at feeders (like cardinals, sparrows, and bluebirds) do not typically carry H5N1. The USDA does not recommend removing backyard bird feeders for H5N1 prevention *unless* you also care for poultry. The less contact between wild birds and poultry (by removing sources of food, water, and shelter), the better.

Additional Q and A from "More of your H5N1 questions answered" article, January 9, 2025:

Outbreak/response questions

1. ***If human-to-human transmission started, what would the most prominent transmission pathways be (e.g., surfaces, viral suspension in aerosols, droplets, etc.), and would the kinds of N95 masks used for COVID prevention be more/similarly/less effective for H5N1?***

   Right now, H5N1 is spreading predominantly through surfaces and direct contact with sick animals (see more in #3).

   However, historically, flu strains start as GI infections in birds and become respiratory infections in humans as part of natural selection once they mutate.

   So, if this becomes a pandemic, odds are it would look like Covid-19 and other flu pandemics—spread in the air. Contaminated surfaces are a possible source of infection, but less probable.

   So, a mask would help, especially the kind that filters our viruses in the air, like N95 masks, as well as ventilation and physical distance. Since H5N1 has also frequently caused eye infections, eye protection may be needed.

2. ***Do you know why we aren't vaccinating our farm and livestock workers?***

   The U.S. has a stockpile of 4.5 million H5N1 vaccines (although they are based on an old mutation formula, and it's unclear how well they would work). Other countries, like Finland, have started vaccinating farmworkers.

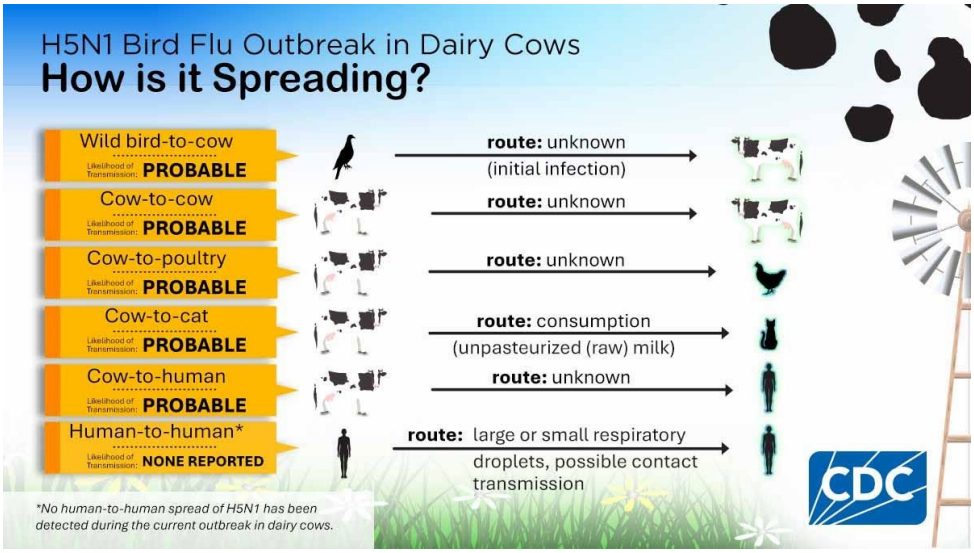
   Three main reasons why we haven't started in the U.S.:

   - ***Disease***. Most vaccines are better at preventing severe disease than transmission, and we haven't seen severe disease in farm workers. (The two severe cases in the U.S. were from backyard poultry and an unknown source.) Sick workers are provided with Tamiflu, which also helps with severe disease.
   - ***Potential downsides***. For example, there may be rare but real side effects of the vaccines, like Guillain Barre Syndrome.
   - ***Uptake considerations.*** Any vaccine program would be voluntary, and with limited trust in government among high-risk groups, it's unclear how many would get vaccinated. Also, H5N1 vaccines are two doses, and getting a second dose to a transient population would be challenging.

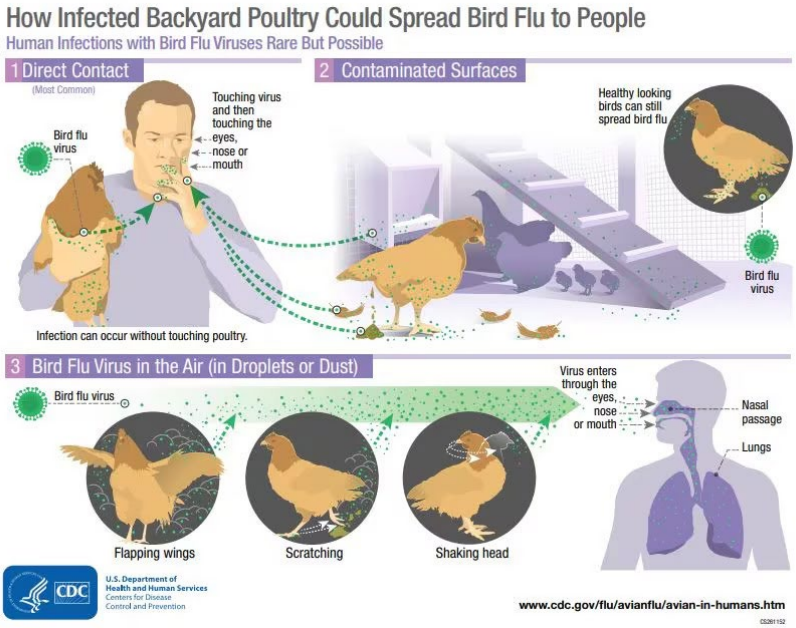
   What would trigger us to use vaccines? It's unclear, but I assume severity of illness and human-to-human transmission.

3. ***How is H5N1 spreading to different dairy herds? Is it through wild birds, chickens, farmers acquiring infected cows, or another way?***

Mainly through milking equipment and the physical movement of cattle. Genomic data show there has been only one spillover event thus far, meaning that cows aren't generally getting it from wild birds. The cows, however, are spreading it to other animals, as shown in the figure below.



This figure does not include all the pathways from birds. Infected wild birds and poultry can infect humans and other animals.

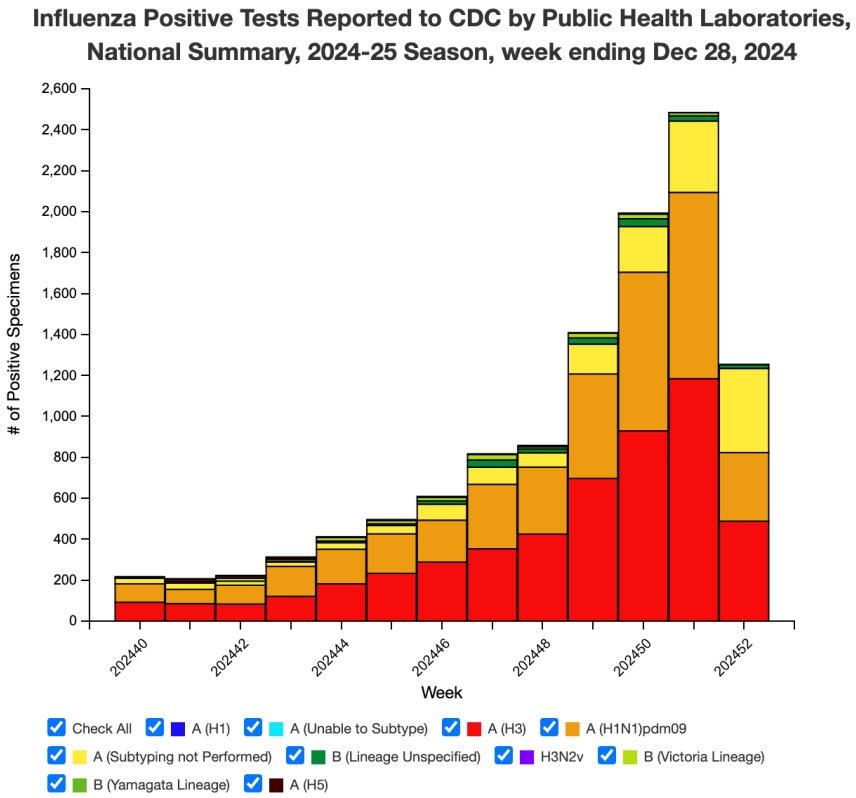


Source: CDC

4. ***Is CDC at least doing random sentinel testing of all Flu A samples for H5N1?***

   Yes, the U.S. already has a testing network set up (before H5N1 outbreak) because epidemiologists have always been concerned about a potential flu pandemic. CDC tests hundreds of flu samples a week randomly from around the nation.

   The latest data show that 1731 specimens of the Flu A tests sent to labs last week were randomly tested; 0 were positive for H5N1. This system isn't without limitations (sometimes it can feel like finding a needle in a haystack), but if H5N1 did start spreading, we would eventually see it here.



5. ***I just saw this wastewater figure on CDC's website. What is going on in California to cause this and what are they doing about it there?***

CDC wastewater collection sites. Purple= positive for H5N1 in wastewater

We're seeing a lot of virus in California's cows and birds. California is the number one state for dairy cattle, and so far, 703 herds have tested positive for H5N1. That's more than 2/3 of all the dairy farms in the state. Plus, 93 commercial or backyard poultry flocks, accounting for about 22 million animals, have also been infected.

Unfortunately, we don't have the wastewater testing capabilities yet to differentiate between humans and animals. A recent preprint showed wastewater is picking up viruses from animals (rather than humans) through milk dumping, animal sewage, and bird contamination. We are also relying on epidemiologists' accounts on the ground to sort through the signals.

Detecting more cases

6. ***I'm a primary care pediatrician and most of the Flu A cases I've been seeing oddly have mild conjunctival injection. What are the odds we are significantly underdiagnosing H5N1 in humans who don't work with cattle/poultry? How do we know it's not just limited to those with direct contact still? Simply the fact that severity of disease would be hitting much higher levels at this point if it truly was spreading?***

We are almost certainly missing cases from direct animal contact; we don't know how many, but studies have confirmed that some workers have antibodies but no known infections. People in the hospital with severe flu should get subtyped within 24 hours so we know what strain is infecting them. Quest and ARUP are offering testing now for outpatients, which is helpful.

We would know a pandemic was unfolding by triangulating many sources: abnormal hospital severity rates of flu, random lab testing (see #4 above), wastewater (see #5 above), syndromic surveillance (i.e., looking to see if there are more eye infections in the ED than normal), and more.

7. ***I'm surprised there were no screening questions at the hospital, such as "Have you recently been in contact with any birds or dairy cows?"***

Asking this question is part of the CDC's clinical testing guidance, but CDC needs to push it further so physicians are more aware.

Protecting self, family, and pets

8. ***We sometimes drink raw milk [...] but we're in New Hampshire, far away from any dairy herd outbreaks. I assume they would notice if their cows were sick? Or have a low probability of infection since they're far removed from affected herds?***

They should notice if their cows are sick. But the disease is less obvious in cows than in poultry, where they drop dead. The main symptom among cows is decreased milk supply.

Even though no positive herds have been identified in your state, that doesn't mean there aren't any. Given voluntary testing and reporting, we are largely flying blind. We simply don't know the full scope of the spread.

In December, a federal raw milk testing program started in 28 states representing 65% of the nation's milk production (results are not available yet): California, Colorado, Michigan, Mississippi, Oregon, Pennsylvania, Indiana, Maryland, Montana, New York, Ohio, Vermont, Washington, Alabama, Arizona, Delaware, Iowa, Georgia, Kansas, Minnesota, New Jersey, New Mexico, Nevada, Oklahoma, Rhode Island, Tennessee, Utah, and Virginia.

9. ***Bird poop, like on golf courses. How concerned should we be?***

Risk is dependent on two things: the amount of virus you're exposed to and the duration. For example, the severe H5N1 human cases have been from birds. The hypothesis is that they inhaled a massive dose of virus when handling a dead bird.

It's unlikely to get infected by a stray piece of bird poop on a golf course, for example. While bird poop can harbor high loads of viruses, it goes away over time. People are getting infected mainly by touching their faces with contaminated matter or breathing it in (#3 above). So wash your hands.

10. ***What is the risk to bird hunters and their retrieving dogs?***

Hunters are at high risk for H5N1, especially if they don't use PPE while handling dead birds. A Washington study showed that 2% (4/194) of hunting dogs tested positive for H5N1.

11. ***You mentioned exposure to H5N1 through raw milk; what about over-easy eggs?***

Birds have a high H5N1 mortality rate, so they are unlikely to produce eggs if sick. Given that H5N1 has been around for a while among birds, poultry farms also have a very rigorous detection and culling process. (It significantly impacts their bottom line!)

So your eggs are likely safe, but you should cook eggs nonetheless, given other risk factors. ;)

Your Local Epidemiologist (YLE) is founded and operated by Dr. Katelyn Jetelina, MPH PhD—an epidemiologist, wife, and mom of two little girls. During the day, Dr. Jetelina runs this newsletter and consults with several nonprofit and federal agencies, including CDC. YLE reaches more than 296,000 people in over 132 countries with one goal: "translate" the ever-evolving public health science so that people feel well-equipped to make evidence-based decisions. This newsletter is free to everyone, thanks to the generous support of fellow YLE community members.

Recommendations

1. Don't panic about avian influenza but don't ignore it.
2. Encourage non-partisan public health and emergency preparedness now utilizing valuable findings and recommendations from the COVID-19 pandemic. See https://americandemocracyandhealthsecurity.org/findings-recs/.

Sources

- https://yourlocalepidemiologist.substack.com/
- Center for Strategic and Internation Studies (CSIS). The United States Needs to Step Up its Response to Bird Flu. https://features.csis.org/US-bird-flu-response/
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