How Human Activity Increases the Risk of Future Avian Flu Pandemic

Introduction

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Avian Influenza, or bird flu, is a zoonotic disease that primarily affects wild birds but has recently infected U.S. dairy and poultry workers through close contact with infected animals. Although the current public health risk is low, there is growing concern that human activities are increasing the chances of a future avian flu pandemic. Strains of this virus like H5N1 have already caused outbreaks in cows and a few human infections worldwide. The symptoms in humans can vary from mild fatigue and fevers to respiratory issues and seizures. Exposure to infected animals, touching surfaces with animal secretions, or eating uncooked or unpasteurized foods puts people at risk. Because humans have limited immunity to these viruses, if the virus develops a sustainable method of person-to-person transmission, it could lead to a pandemic .(CDC) Human activities like industrial farming practices, global domestic/wild bird trade, and climate change have made the possibility of an avian flu outbreak increasingly likely.

Increase of AVian Flu Risk Due to Farms Not Following Biosecurity Guidelines.

In modern industrial agriculture, mass production is prioritized over safety or health guidelines. While this increases profits for a business, neglecting biosecurity measures increases the risk of spreading avian flu, especially in poultry farms. In 2024, a study was published in Bangladesh that examined how variation in biosecurity practices in commercial chicken farms affected their AIV (Avian) infection frequency. From the 14 farm variables experimented —like flock size, sick bird isolation, and sanitation—as many as 11 showed significant effects on the prevalence of AIV in the observed farms. The study found Avian Flu risk increased by 5% to 50% when a live bird market was near, 6% to 42% with unrestricted visitor access, 7% to 42% with lack of isolation, 5% to 38% when transport vehicles entered the shed, and so on. (Islam et al.)

While these statistics highlight the correlation between weak biosecurity regulation and increased avian influenza risks, further research reveals that even intervention fails to produce real behavioral change –especially in less developed areas. Ethnographic data collected from Bangladesh villagers, before and after health intervention was provided, showed that health education did bring awareness about the bird flu to these farmers. However, over 70% of backyard poultry farmers didn't implement practices like isolation, hygiene, and not consuming infected birds. This is due to villagers justifying that there are already lower perceived risks and that implementing new practices would lead to financial loss, social pressures, and physical discomfort. Even with biosecurity guidelines and education in place, farmers tend to ignore these principles. Therefore, without isolating sick birds, having huge crowded flocks, not washing hands and equipment, letting people and vehicles enter the shed unchecked or unclean, and other unsanitary practices allow the virus to thrive and spread beyond its origin. (Rimi et al.)

Legal and Illegal Trade in Domestic and Wild Birds Leads to the Increased Spread of Avian Flu

Biosecurity failures allow a virus to thrive, but trade routes are the primary methods of H5N1 spreading into new ecosystems internationally. Legal and illegal trade of domestic and wild birds gives the virus opportunities to evolve, mutate, and spread across different bird populations. While this avian trade of birds gives a direct and cheaper way to access poultry and avoid health requirements and taxes, it mixes infected birds with healthy ones, allowing for virus transmission. In a 2007 study in Hanoi, it was found that over 60% of bird vendors sold both

wild-caught and captive-bred birds, mixing species that may be infected. Despite this, 91.3% of vendors stated they thought there was no risk of H5N1 infection, continuing trade. In fact, 50% of vendors still had hidden birds, actively selling them even with a new policy outlawing the transport or sale of ornamental or wild birds. (BrooksMoizer et al.)

While governments tend to implement laws to ban wild bird trade, there still seems to be an enforcement gap allowing this trade to be a major risk in an avian flu pandemic. In a case study about Chinese hwamei, known global agreements like CITES try to stop the bird trade, but much of it still continues illegally. This is possible because many laws have to be broken—from harvesting these birds to exporting from countries, avoiding regulation, transporting across provinces, and selling without permits. Weak enforcement of bird trade laws allows illegal markets to continue their economic activities, increasing how many wild birds that are captured and mixed with domestic birds. This creates ideal conditions for avian flu to spread, and as these birds keep moving through trade routes, they carry the virus—increasing the likelihood of a future pandemic.(Shepherd et al.)

Climate Change Alters Bird Migration, Overlapping Wild Birds and Domestic Expanding the Virus Gene Pool

In our generation, climate change is seen as a growing concern for the future and the health of our planet. But what if it also plays a major role in the likeness of a bird flu pandemic? As temperatures change, bird migration patterns shift—affecting when and where birds move and how birds of different species and age groups mix. In a climate change study, it was tracked that in 2006, due to a climate trigger, mute swan populations experienced abnormal migration, fleeing to cold seas near the Caspian Sea. As they moved, they spread H5N1 to western Europe due to the effect of global warming.(Gilbert et al.)

Studies also report that avian viruses have evolved with migratory birds, showing traits adapted to seasonal bird movements. These viruses are transmitted through fecal–water–oral routes and can survive long periods in cold water. For example, avian viruses were found in lakes in Siberia even after birds had migrated away—showing the virus can last in subarctic breeding areas and remain until birds come back in spring and fall. When birds gather in large numbers before migration, especially below the subarctic breeding zone, conditions are perfect for virus transmission.(Gilbert et al.)

Another climate change study concluded that the risk of H5N1 outbreaks positively correlated with spring temperature and winter precipitation–both are direct effects of climate change. These outbreaks are more common in countries with these conditions. This proves how climate change directly increases the future pandemic risks. While climate change conditions don't necessarily mean the virus survives longer, they can lead to different bird gathering patterns increasing outbreaks. Climate change not only drives the spread of avian viruses but also creates perfect conditions for the virus to spread. (Mu)

Conclusion

Avian Flu may not seem like an urgent issue, but it's becoming a threat. Public health officials, agriculture policy makers, and environmental leaders need to step up for our national security . Industrial poultry avoids biosecurity guidelines, illegal and legal bird trade still continues, and climate change migration effects are not an isolated problem. All these factors could start an avian flu pandemic. As leaders with the responsibility to create health or safety policies, they have the ability to take initiative. Strengthening biosecurity enforcement,

suppressing illegal bird trade, and investing in climate-resilient disease surveillance is necessary action for national security. It's time to act before the out-break occurs, not when it begins.

References

[1] BrooksMoizer, F., et al. “Avian Influenza H5N1 and the Wild Bird Trade in Hanoi, Vietnam.” *Ecology and Society*, vol. 14, no. 1, Resilience Alliance Inc., 2009, https://doi.org/10.2307/26268028. JSTOR.
[2] CDC. “Avian Influenza Type a Viruses.” *CDC*, 11 June 2024, www.cdc.gov/bird-flu/about/index.html.
[3] Gilbert, M., et al. “Climate Change and Avian Influenza.” *Revue Scientifique et Technique (International Office of Epizootics)*, vol. 27, no. 2, Aug. 2008, p. 459, pmc.ncbi.nlm.nih.gov/articles/PMC2709837/.
[4] Islam, Ariful, et al. “Farm Biosecurity Practices Affecting Avian Influenza Virus Circulation in Commercial Chicken Farms in Bangladesh.” *One Health*, vol. 18, June 2024, p. 100681, https://doi.org/10.1016/j.onehlt.2024.100681.
[5] Mu, Jianhong. “Climate Change and the Risk of Highly Pathogenic Avian Influenza Outbreaks in Birds.” *British Journal of Environment and Climate Change*, vol. 4, no. 2, Jan. 2014, pp. 166–85, https://doi.org/10.9734/bjecc/2014/8888.
[6] Rimi, Nadia Ali, et al. “Understanding the Failure of a Behavior Change Intervention to Reduce Risk Behaviors for Avian Influenza Transmission among Backyard Poultry Raisers in Rural Bangladesh: A Focused Ethnography.” *BMC Public Health*, vol. 16, no. 1, Aug. 2016, https://doi.org/10.1186/s12889-016-3543-6.
[7] Shepherd, Chris R., et al. “International Wildlife Trade, Avian Influenza, Organised Crime and the Effectiveness of CITES: The Chinese Hwamei as a Case Study.” *Global Ecology and Conservation*, vol. 23, Sept. 2020, p. e01185, https://doi.org/10.1016/j.gecco.2020.e01185.