Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Topic 18: Infections Related to Travel and Migration

PS18.01 (371)

Predicted Global Spread of SARS-CoV-2 Alpha Variant of Concern via Air Travel

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Purpose: To predict the global spread of SARS-CoV-2 Alpha Variant of Concern (VoC) from England via air travel and compare against observed importation.

Methods & Materials: Risk models were used to estimate a country's likelihood of importing at least one traveller infected with the Alpha VoC from England by January 19, 2021.

First, the prior 60-day incidence of Alpha VoC associated with each English airport was estimated using cumulative Alpha VoC cases reported by Public Health England between September 20, 2020 – January 4, 2021 proportionately allocated to each airport. Each airport's catchment population was derived from a probabilistic Huff model. Next, the prevalence of the Alpha VoC for each airport was derived from the estimated incidence to represent the probability that at least one departing traveller was infected with the Alpha VoC for each English airport. The prevalence and forecasted flight volumes were used to estimate the likelihood of each destination airport receiving at least one infected traveller from England. Forecasted flight volumes were based on historical passenger volumes data from the International Air Transport Association and prospective flight schedules from CIRIUM. All airport-level likelihoods were aggregated to the country-level.

Each country's predicted likelihood was compared against observed cases of Alpha VoC by January 25, 2021, collected by cov-lineages.org and a manual search of online sources.

Results: Among 211 countries, the median likelihood was 1.6% (interquartile range: 17.5%) and the mean was 13.9% (SD: 23.5%). In total, 28.9% (n=55) of countries had observed importation of the Alpha VoC by January 25th. Fifteen of 16 countries with a predicted likelihood of importation greater than 50% had reported at least one case (kappa = 0.88), while 31 of 39 countries with a predicted likelihood lower than 1% did not detect a case (kappa = 0.92).

Conclusion: Risk models based on air travel to inform public health preparedness accurately identified most potential destinations at highest risk of importing the SARS-CoV-2 Alpha VoC.

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Topic 19: Influenza and Other Respiratory Infections

PS19.01 (432)

Seasonality of Human Influenza and Co-Seasonality with Avian Influenza in Bangladesh, 2010-2019

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Purpose: Seasonality and periodicity of influenza in human and animal populations is not well characterized in tropical and subtropical regions globally. In Bangladesh, where over 90% of poultry products are marketed through live poultry markets, avian influenza is prevalent in poultry and epidemics of influenza occur in humans. We sought to empirically examine the timing and intensity of influenza seasonality in humans and avian influenza in poultry in Bangladesh using time series methods.

Methods & Materials: We evaluated 8,790 cases of human influenza occurring between January 2010 and December 2019 obtained from 32 hospital-based sentinel surveillance sites across Bangladesh. Avian influenza positive samples (n=2,274) were obtained from environmental surveillance across 106 live poultry markets in Dhaka between January 2016 and December 2019. We applied wavelet analysis to determine influenza periodicity, and conducted Poisson regression with harmonic terms adjusting for trend and an offset for samples tested to estimate the average timing and intensity of the primary influenza peak in each population. We examine co-seasonality by estimating the time lag between the annual influenza peak in humans and the annual avian influenza peak in poultry.

Results: Over the 10-year period there was consistent annual periodicity of influenza in humans with peak incidence occurring in early July (peak calendar-week: 27.3, 95%CI: 27.0-27.5) and intense seasonality (amplitude: 14.7, 95%CI: 13.4-16.2). Large metropolitan centers displayed earlier epidemic timing, with epidemic spread following a spatial diffusion pattern based on geographic proximity. Comparatively, avian influenza displayed weak seasonality, with moderate year-round transmission and only a small peak in late March to early April (peak calendar-week: 13.5, 95%CI: 11.5-16.8; amplitude: 1.5, 95%CI: 1.3-1.7). Peak avian influenza preceded peak human influenza by 13.8 calendar-weeks (95%CI: 10.7-15.5).

Conclusion: Our findings suggest that while influenza epidemics in humans are highly seasonal and take off faster in metropolitan areas, avian influenza in poultry does not display a strong seasonal trend in Bangladesh. Although influenza peaks do not coincide, endemic avian influenza continues to pose a risk for viral reassortment throughout the year. These co-seasonality results provide evidence for more quantitative risk assessments of viral reassortment and inform timing of sequencing-based surveillance.

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