Transportation and the Global Spread of Infectious Disease

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Abstract

Our world if not flat is certainly interconnected. A century ago it took over a year to circumnavigate the globe. In 1933, the aviator Wiley Post flew around the world in slightly less than 7 days and 19 hours. Today a modern passenger aircraft can accomplish this feat in about 45. A clipper ship required 25 to 30 to sail from the UK to New York hours. Today modern ships complete this journey in about one fifth of the time. Transportation makes possible and sustain the modern global economy and commerce. However, it also greatly enhances the potential for the rapid worldwide spread of infectious disease. The vessels and aircraft that transport people, goods, and materials also can micro organisms that cause infectious diseases and vectors capable of transmitting disease. As a result, emergent disease can explode into a global pandemic. Recent experience with SAR-CoV-2 now officially known as COVID-19 underscores this fact. Indeed, a disease can spread across the world before the full extent of itas morbidity and mortality is recognized.

An extensive literature on systems of differential equations modelling the progression of infectious disease within a population is place. Surprisingly enough, basic models created almost a hundred years ago are still analyzed by public. While such models can describe circulations of the disease with a local population and to a certain extent assess the efficacy of various control or intervention strategies, they do not describe how a disease spreads across a region much less its spread across international boundaries and continents and the role transport plays in enabling this process. This talk will address these modelling issues within the context of the recent COVID-19