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Zoonotic Diseases: Heightened Risks to Industry and Government

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Pandemic and epidemic risks appear in the headlines every day. Whether it's Zika, SARS, MERS or measles, the damages due to pandemics and epidemics are higher in both number and total cost than those due to wars or natural catastrophes. Calculations show costs vary from a relatively modest 450 million US dollars (due to the 2013 Enterovirus 71 outbreak in China) to the staggering sum of 77 billion US dollars (due to a large 2012 case of foodborne illness in the US).

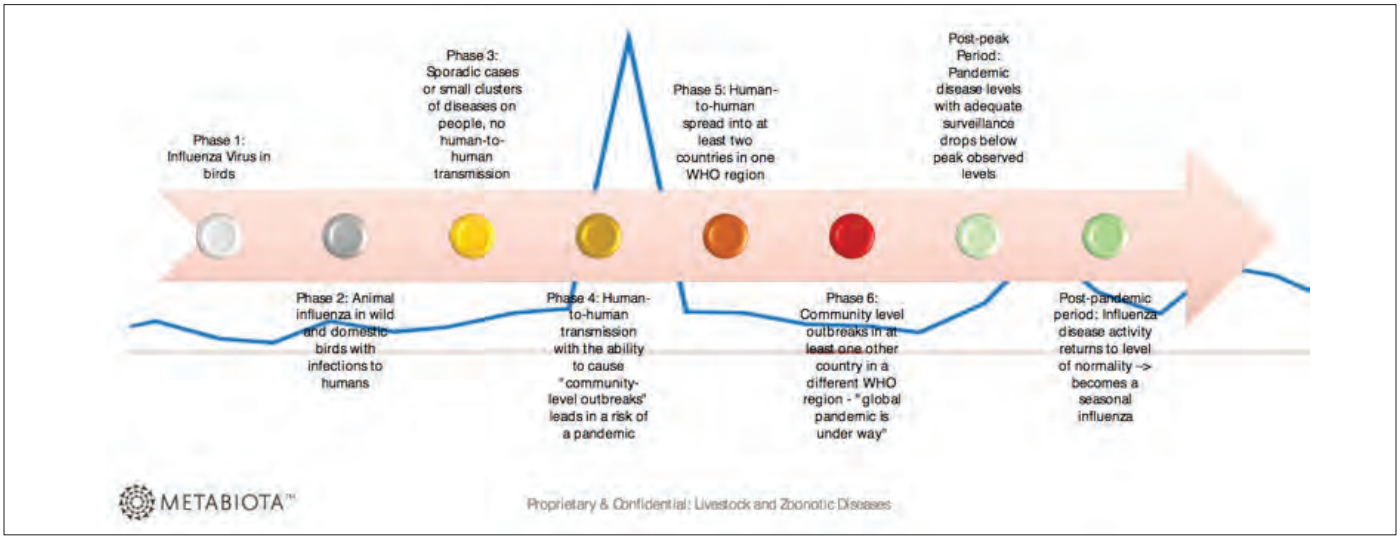
The number of cases or deaths in outbreaks is not always a good predictor of the extent of the associated economic damages. Other factors also play a significant role. As an example, the costs of Ebola between 2014 and 2016 in Guinea, Sierra Leone and Liberia were relatively modest at 2.8 billion US dollars, as the victims of that epidemic in those regions tended to either die or recover rather quickly. On the other hand, the persistent foot-and-mouth epidemic in the United Kingdom in 2001, resulted in damages of 11.7 billion US dollars after 10 million cows and sheep needed to be culled in order to prevent the highly contagious disease from spreading beyond the 2,000 reported cases.

Globally, there have been over 400 high priority human disease outbreaks within the past 10 years, causing significant economic loss, the bulk of that uninsured. The World Bank estimates that infections from Zika virus cost the world nearly 3.5 billion US dollars last year; while regional losses due to the 2015 Ebola outbreak were moderate, global losses exceeded 32 billion US dollars; and the MERS 2008 loss in South Korea cost approximately 8.2 billion US dollars. Such economic losses will continue to escalate due to the fact that the underlying factors driving the emergence of infectious disease are individually and collectively increasing.

Metabiota has made it our business to carefully track both animal and human infectious diseases, collating and analyzing data on hundreds of pathogens that threaten human health. We place a particular emphasis on those with the potential to cause pandemics or emerge as novel threats to human health.

Zoonotic diseases—or those bacteria, fungi, viruses, and parasites that can transmit from animals to humans—are at the forefront of those pathogens which can cause devastating pandemics. Currently, approximately 1,400 species of human pathogens are known, however, an increasing number of the over 50,000 reported animal diseases are managing to make the jump to humans. Once a pathogen becomes zoonotic and humans are infected in a number of countries, a pandemic status has been reached (represented in Phases 2–6 in Figure 1).

Figure 1
Pandemic Alert—Influenza Phases (WHO)



Source: World Health Organization; example portrayed, Avian influenza.

Changing patterns of humans' interaction with animals are increasing the risk that zoonotic pathogens will emerge in human populations. A number of behavioral and environmental changes have driven these changes, as well as the burgeoning threat of release of genetically modified bioterror agents (see Figure 2). As humans become increasingly clever in their attempts to improve upon nature, new sorts of epidemic and pandemic risk arise..

While epidemics in humans and livestock may appear inherently stochastic, they rather demonstrate distinct patterns, just as other natural catastrophes do. This means that their risks can be quantified, analyzed, and used to insure against their impacts, despite their substantial diversity.

MEASLES

For years, measles has been seen as a relatively rare disease in the United States and certain European countries. But times have changed. Nine European countries, including Austria, Belgium, France, Germany, Hungary, Italy, Romania, Spain, and Switzerland, have reported a total of more than 7,500 cases since the beginning of 2016 with 25 deaths.

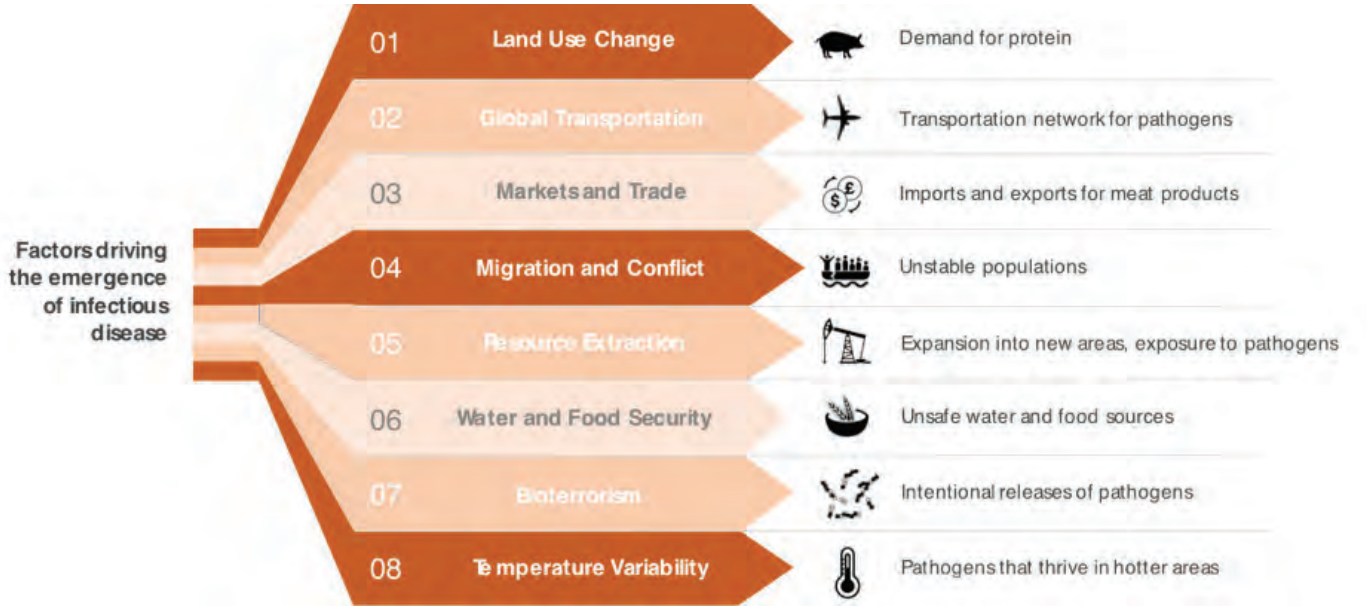
Romania is most affected, with approximately 3,800 cases and 17 deaths from September 2016 to March 17, 2017. Of reported cases, 96 percent occurred in individuals who had not been vaccinated. Additionally, Italy has reported 700 cases thus far in 2017—more than three times the number of cases in the same period last year. On March 24 of this year, a measles-related death of a young man was reported in the Swiss press. While this man's death was attributed to a weakened immune system resulting from the leukemia treatment he was receiving, Switzerland has experienced 52 cases thus far in 2017—a tenfold increase from the prior year.

Measles outbreaks highlight the classic "spark and spread" nature of infectious diseases. As a case in point, an infected traveler brought measles to Disneyland-USA in 2014 (the spark), and the virus was transmitted (the spread) to over 120 people in three countries. Therefore, mitigating the risk of disease involves understanding both the risk of introduction of disease as well as the cultural and demographic factors associated with transmission, vulnerability and preparedness.

Figure 2

Why Are Epidemics and Pandemic Risks of Concern?

What are the triggers of disease risks that threaten people and animals, such as the Zika virus or SARS? There are many points of contact between people and nature which present viruses with opportunities to find new hosts.



Avian Influenza

Losses in poultry production and related businesses due to avian influenza are estimated at 309.9 million US dollars in greater Minnesota, according to a newly released emergency economic impact analysis from University of Minnesota Extension. Poultry production and processing is a 3 billion US dollars industry in the state; overall, poultry growers represent about 7 percent of the agricultural and forestry economy.

The cost of the birds lost to avian influenza, according to economist Thomas Elam of the Indiana-based consulting group FarmEcon, was 1.57 billion US dollars. However, the additional costs associated with businesses that support farms (i.e., egg and poultry wholesalers, food service firms) pushed the total loss to 3.3 billion US dollars. In addition, the US Department of Agriculture committed 500 million US dollars to emergency efforts to block the disease, and paid out 190 million US dollars to farmers whose birds were destroyed.

A study conducted by the University of Minnesota focuses on the state's 80 non-metro counties, where nearly all poultry production occurs. Among the findings:

- The industry that produces feed for poultry and other animals will be hardest hit by poultry production losses. For every $1 million of lost poultry production, nearly 230 thousand US dollars of demand for poultry feed is lost.
- For every 100 jobs lost due to reduced poultry processing, nine are in the trucking industry.

It's been almost a month since a case of avian influenza was detected in poultry in the central United States. Therefore, one might draw the conclusion that the epidemic (which, over several months, caused the destruction of 49.5 million chickens and turkeys) can safely be considered over. In fact, it may have only taken a break. If it returns, as some experts predict it will, what one government official calls "the largest animal-health emergency in this country's history" may turn out to be just an opening act. At risk, the next time, will be not just the egg and turkey farms of the Midwest, but the billions of birds being raised in the poultry-producing centers on the east and west coasts—effectively, most of the poultry economy of the United States.

Business interruption due to employee absenteeism

Insurers should understand the preparedness of a country, and its neighboring countries to handle business interruption such as due to employee absenteeism for an event with a 20-to-50-year return period. The Metabiota Preparedness Index gives insurers deep insight into where each country sits relative to the world and to the region (see Figure 3).

Figure 3
The Metabiota Preparedness Index

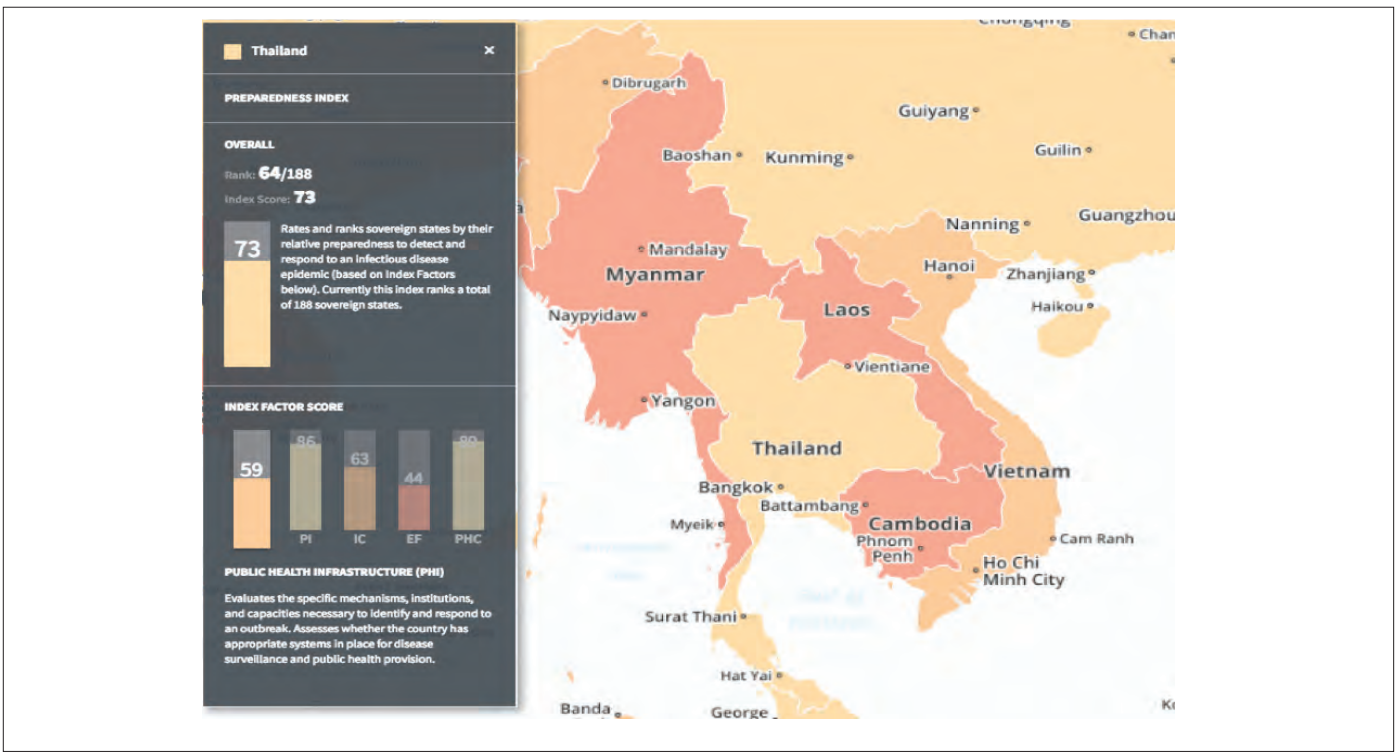


Figure 4
Case Study: Peak Absenteeism Rates

Note: Weekly Absenteeism rate = (number of people missing work as a fraction of the total workforce)

The platform enables (re)insurance companies to monitor their own exposure to infectious disease risk and thereby gauge their potential mortality shock from epidemic diseases of varyious types and sizes based on their own accumulation footprint and profiles. In Figure 4, we model the peak absenteeism rates for the 1957 influenza pandemic. This analysis enables the determination of the synergistic effects of multi-part triggers for business interruption resulting from employees not being present at work during an outbreak or epidemic event.

CONCLUDING THOUGHTS

Zoonotic diseases are not new phenomena; nor are pandemics. However, technological and social advances which have led to rapid increases in the international movement of people and goods have as a consequence that zoonotic diseases and pandemics are growing, even alarming threats to human well-being. We will need to devote a great deal more attention and resources to monitoring animal diseases and their potential spread to human populations in order to have a chance of minimising this threat. ■

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