



## Editorial

# What the Pandemic Zoonoses has Taught Us?

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After World War II it was widely believed that human-kind was winning the battle with the microbial world due to discovery of effective antimicrobials. In 1969, an American surgeon (William H. Stewart) even declared to the congress that: "it is time to close the book on infectious diseases, declare the war against pestilence won..."<sup>1</sup> But, today mankind is burdened and threatened not with its own infectious diseases, but also with the diseases imported from animals. The diseases and infections, which are naturally transmitted between the vertebrate animals and human beings, are called zoonotic diseases and this phenomenon is called zoonosis. More than 1400 pathogens are known to cause disease in human being. Of these, approximately 64 % are of zoonotic origin.<sup>2</sup> Zoonoses with a wildlife reservoir are in most cases caused by various bacteria, viruses, prions, parasites and fungi and are considered as a major public health problem occurring on all continents.

The occurrence of the pandemic H1N1 flu, and potential pandemic H5N1 avian flu, severe acute respiratory syndrome (SARS), Ebola-virus, West-Nile virus with human fatalities during the recent years led to an increased focus on zoonoses. In Bangladesh, we have observed H1N1 pandemic in 2009 and a large outbreak of hepatitis E in Rajshahi district in 2010.

Microbial pathogens target a limited number of animal species. Some pathogens can be transmitted to humans either directly (rabies and brucellosis) or through a vector (Lyme disease,

Plague, West-Nile fever). Only very few infectious agents from animal reservoirs infect people, and even fewer are capable of further human-to-human transmission. This is attributed to as a so-called 'species barrier. To cross the "species barrier" that is to infect humans; pathogens require some adaptive modification such as receptor interactions, and genetic adaptation or reprogramming. To cause a pandemic, a zoonotic agent would require further modifications so that they are able to obtain human-to human transmission capability.<sup>3</sup>

Some major pandemics caused by zoonotic agents are still remembered. The Justinian Plague ((42-590 AD) and The Black Death/The Great Pestilence (1347-1351) is believed to be caused by *Yersinia Pestis*-a Gram negative bacteria transmitted by rat flea.<sup>4</sup> Three avian influenza pandemic outbreaks are known from the 20th century; in 1918, 1957 and 1968. Such major influenza A epidemics show no predictable pattern or periodicity. It is believed that virus subtypes with human-to-human transmission capability arise from two mechanisms; genetic re-assortment with animal influenza A viruses or genetic mutations.<sup>5</sup> The theory that pigs represent the so-called 'mixing vessel' where the genetic re-assortment may occur<sup>6</sup> have been proved by the latest H1N1 pandemic. Spanish influenza pandemic (1918-1919) is termed "The mother of all pandemics" and the causative agent was H1N1-virus from birds.<sup>7</sup> The pandemic traversed the world in 3 months and caused an estimate of 30-50

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million deaths. H1N1 pandemic of 2009 was due to a “quadruple reassortment” influenza virus; which was derived from two unrelated swine influenza viruses, one avian and one human influenza virus. One of the swine influenza viruses involved in 2009 pandemic was a derivative of the 1918 human virus.<sup>8</sup>

“The Plague”, the masterpiece novel by Albert Camus, has explored the nature of human being during an epidemic of plague in the Algerian city of Oran. One of the key characters of the novel, Tarrou, describes his view on plague- “What’s natural is the microbe. All the rest - health, integrity, purity (if you like) — is a product of the human will, of a vigilance that must never falter...”

Can we maintain adequate vigilance, a vigilance that never falters, against the pandemics? Middle age European civilization was devastated by few rats; will the rocket age human civilization be shattered by few birds or few swine?

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