Avian influenza or “bird flu” is an infectious disease of birds caused by type A strains of the influenza virus. The disease, first identified in Italy more than 100 years ago, occurs worldwide. All the 15 HA types of influenza A virus are known to infect birds, thus providing an extensive reservoir of influenza viruses. All birds are susceptible to infection with avian influenza; domestic poultry flocks are especially vulnerable to infections that can rapidly reach epidemic proportions. The disease in birds causes a wide spectrum of symptoms, ranging from mild illness to a highly contagious and rapidly fatal disease resulting in severe epidemics which is known as “highly pathogenic avian influenza” (HPAI). This form is characterized by sudden onset, severe illness, and rapid death, with a mortality that can approach 100%. To date, all outbreaks of the highly pathogenic form have been caused by influenza A viruses of subtypes H5 and H7.

Migratory waterfowl – most notably wild ducks – are the natural reservoir of avian influenza viruses, and usually only get asymptomatic infection. Domestic poultry, including chickens and turkeys, are particularly susceptible to epidemics of rapidly fatal influenza. Direct or indirect contact of domestic poultry with wild migratory waterfowl has been implicated as a frequent cause of epidemics. Live bird markets have also played an important role in the spread of epidemics.

Avian influenza viruses do not normally infect species other than birds and pigs. In 1997 in Hong Kong first documented infection of humans with avian influenza occurred. This epidemic due to H5N1 virus caused severe respiratory disease in 18 humans of whom six died. One of the striking features of the illness in humans was the development of primary viral pneumonia without underlying lung disease. The epidemic in humans coincided with an epidemic of HPAI in birds in Hong Kong also caused by H5N1 virus. The human cases occurred in two waves, 1st case occurred in May and rest of the 17 in November. It was established that the virus spread primarily from birds to humans especially in live bird markets. Though rare person-to-person infection was noted in health care workers but severe disease did not occur. To control the outbreak, about 1.5 million birds were culled to remove the source of the virus and thus a pandemic was averted.

In 1999 in China and Hong Kong infection due to avian influenza A (H9N2) was confirmed in two children, both patients recovered, and no additional cases were confirmed. The evidence suggested that poultry was the source of infection and the main mode of transmission was from birds to humans. Several additional human H9N2 infections were reported from mainland China in 1998-99.

Another alarm of avian influenza mounted in 2003 when two cases of avian influenza A (H5N1) infection occurred among members of a Hong Kong family who had recently traveled to southern China. One person recovered, the other died. How or where these two family members were infected was not determined. Another child in the family died during that visit, but the cause of death is not known.

In February 2003, the Netherlands reported outbreaks of influenza A (H7N7) in several poultry farms. Later, infections were reported among pigs and humans and 89 people were confirmed to have H7N7 influenza virus infection associated with this poultry outbreak. These cases occurred mostly among poultry workers. H7N7-associated illness included 78 cases of conjunctivitis only; 5 cases of conjunctivitis and influenza-like illnesses with cough, fever, and muscle aches; two cases of influenza-like illness only; and four cases that were classified as “other.” There was one death among the 89 cases in a veterinarian who visited one of the affected farms and developed acute respiratory distress syndrome and complications related to H7N7 infection. The majority of these cases occurred as a result of direct contact with infected poultry; however, Dutch authorities reported three possible instances of transmission from poultry workers to family members.

In December 2003 Korea reported sudden death of large number of chicken diagnosed with HPAI caused by H5N1 virus. In January 2004 In Kyoto Japan also an epidemic of avian Influenza due to H5N1 virus was reported. However both these epidemics were controlled and no human cases were reported. These 2 countries were able to contain the epidemic in birds as most of the poultry farms are commercial farms where outbreaks are readily detected and controlled.

In January 2004, health authorities in Thailand and Vietnam reported their first human case of infection with avian influenza, caused by the H5N1 strain of Influenza virus A. The cases in humans were directly linked to outbreaks of highly pathogenic H5N1 avian influenza in poultry which was being reported from seven Asian countries (Cambodia, China, Indonesia, Japan, Philippines, Thailand, Vietnam).

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By March 2004 23 human cases were reported from Vietnam with 16 deaths and 12 from Thailand with 8 deaths. By mid-March 2004, no countries other than Thailand and Vietnam had reported human cases. The outbreaks in poultry in Vietnam and Thailand rapidly extended to all parts of the countries including rural areas as in these countries most of the poultry farms are backyard farms in small villages. By February 2004 H5N1 outbreaks in poultry became historically unprecedented as never before HPAI had caused such wide spread outbreaks in so many countries at one time. In this outbreak >120 million birds died or were destroyed within three months. Control measures had some impact and outbreaks declined by March 2004 except in Thailand where sporadic outbreaks continued through April. New human cases also ceased and last case was reported in mid-march in Vietnam.

Despite the comparatively small number of human cases reported the situation had features of public health concern that warranted careful monitoring. Of foremost concern was the risk that conditions present in parts of Asia could give rise to an influenza pandemic.

WHO then activated pandemic preparedness plan reacting to this increased risk of an imminent pandemic. WHO mapped out a response plan which included control of outbreak in humans and prevention of further cases and to carry out research to characterize H5N1 viruses at molecular level and development of pandemic vaccine strain. Prerequisites for the start of an Influenza pandemic include:

1. Emergence of a novel virus subtype to which general population has no or little immunity
2. New virus must be able to replicate in humans and cause severe illness
3. New strain must be efficiently transmitted from humans to humans. Efficient transmission is expressed as sustained chain of transmission causing community wide outbreaks.

The H5N1 epidemic was only lacking in the 3rd requisite. In August of 2004 however, fresh outbreaks of avian influenza in poultry were reported from Cambodia, China, Indonesia, Thailand, Vietnam, and also Malaysia got involved. The outbreak was smaller, affected only 1 million poultry; however, human cases started reappearing and from August to October 2004, four cases from Vietnam and five from Thailand were reported with eight deaths. Thailand also reported first probable case of human to human transmission in a family cluster. There were two striking features of human illness; (i) most of the cases were in healthy children and young adults and (ii) there was a high mortality.

A 3rd wave of Avian Influenza outbreaks was reported in December 2004. In this wave, starting in late December 2004, as per WHO data, Vietnam has identified, as of 11th March 2005, 24 cases with 13 deaths. This had resulted in forced culling of more than 1.5 million fowls in 35 cities and provinces in Vietnam. Thailand has not reported any human case and one case has been reported from Cambodia who died. As of 25th March 2005 one additional case and death has been reported each from Vietnam and Cambodia. The total tally of human cases since Dec 2003 is 71 cases with 48 deaths; Vietnam accounting for 52 cases and 34 deaths, Thailand 17 cases and 12 deaths and Cambodia 2 cases both have died.

Of the 15 avian influenza virus subtypes, H5N1 is of particular concern for several reasons. H5N1 mutates rapidly and has a documented propensity to acquire genes from viruses infecting other animal species. Its ability to cause severe disease in humans has now been documented on two occasions. The H5N1 virus has been slowly evolving since 1997 and has recombined with other avian viruses to acquire some of their internal genes. At present ‘Z’ genotype of virus is circulating. There are many features of the new H5N1 strain, it has become more pathogenic and this may favour start of a pandemic. The virus has found a new ecological niche in poultry in Asia and is more deadly in poultry. It has found new hosts in mammals and is infecting besides humans other mammalian species like cats and tigers. In addition, laboratory studies have demonstrated that this virus has a high pathogenicity and can cause severe disease in humans. The 2004 virus survives longer in environment than the 1997 virus and is also excreted for longer periods (10 days) in birds thus facilitating spread at live poultry markets and among migratory birds. Normally wild waterfowl are natural reservoir of all 15 HA types of Influenza A viruses and have low pathogenicity in them. New H5N1 strain is being detected in dead migratory birds. Domestic ducks have been found to excrete large quantities of virus without any symptoms and thus go undetected. These migrating ducks can spread the disease from one to another poultry farm. The spread of infection in birds increases the opportunities for direct infection of humans. If more humans become infected over time, the likelihood also increases that humans, if concurrently infected with human and avian influenza strains, could serve as the "mixing vessel" for the emergence of a novel subtype with sufficient human genes to be easily transmitted from person to person. Such an event would mark the start of an influenza pandemic.

In the present situation, the risks to human health remain so long as H5N1 continues to circulate in domestic poultry. Assessment of the risk to humans needs to be based on a risk assessment of the disease situation in poultry that considers the prevalence of highly pathogenic avian influenza and the adequacy of the surveillance system. A reliable system of review and verification is needed to ascertain that poultry are disease-free in an area or country. Also it is important to have a robust surveillance system for human respiratory illness which may signal transmission of H5N1 infection to humans.