Introduction
The 1990s and early 2000s have seen the emergence of some new diseases, such as Ebola and SARS, and the re-emergence of some older ones. This Geofile looks at the development of SARS and the reappearance of bird flu and the West Nile Virus.

SARS
SARS is a virus that in theory could kill millions of us: it may spread more slowly, but it is more lethal than the Spanish flu which killed up to 50 million people after the First World War. The SARS virus has now infected more than 4,000 people in five continents and has killed more than 250 people. Although SARS is unprecedented, increased air travel and the closer proximity of humans and animals means many more new viruses may emerge in the future.

Economic impacts of SARS
The reaction to SARS from companies, big and small, was immediate and severe. Many advised staff against travelling to and from many parts of Asia. On 2 April 2003 the World Health Organisation issued its first-ever travel alert, saying that infections had not yet peaked and that visitors should avoid Hong Kong and Guangdong province in southern China, where the disease was most virulent.

More than 100 Hong Kong restaurants closed because of SARS. Tourism, which accounts for 5% of Hong Kong’s economy, had virtually stopped even before the World Health Organisation and America’s State Department advised people not to visit. Hotels were largely empty. A 10% drop in passenger traffic cost Cathay Pacific HK$10m ($1.3m) in profits per day. Domestic airlines, such as China Southern and China Eastern, suffered even more.

The Canton trade fair in Guangzhou generated less than half the business it achieved in 2002. The Hong Kong stock market fell 35% by March.

SARS
SARS (Severe Acute Respiratory Syndrome) is a serious disease which first emerged in the Guangdong province of southern China in November 2002, although global alerts were not issued until March 2003. The World Health Organisation (WHO) was furious that Chinese officials had failed to alert them to early signs of an epidemic and later underplayed its seriousness. But in the southern Chinese province of Guangdong, it was to prove a major problem. Beijing alone accounted for a third of all China’s reported deaths from SARS. China’s cover-up of the spread of SARS caused the country’s biggest credibility crisis abroad since the crushing of the Tiananmen Square protests in 1989.

There have been SARS deaths in China, Hong Kong, Canada, Singapore, Vietnam, Thailand and Malaysia (Figure 2). Cases have been reported in 16 other countries, including the UK where there have been six cases.

What are the symptoms?
Symptoms include high fever, with a temperature of more than 38ºC, a dry cough, and breathing difficulties. Chest X-rays can suggest pneumonia. Its mortality rate, thought to be around 5%, is close to that of bacterial meningitis. However, epidemiologists in London believe the real figure could be as high as 15%.

How contagious is it?
It seems mainly to be spread through droplets, particularly via coughing and sneezing. Many of the early victims were close relatives, friends or hospital staff who might not have taken sufficient precautions when treating patients with what was an unknown threat.

What causes SARS?
The cause is a member of the coronavirus family never before seen in humans. It has probably sprung from close contact with animals. As in other regions of China, in Guangdong, animals and birds are kept in close proximity to dense populations of people. It is not clear where the virus first came from but genetic work suggests it is related to mouse hepatitis C, transmissible gastroenteritis in pigs, and the human coronavirus. Such links add weight to the belief that the disease originated in rural China, where humans and animals live in close contact, and then jumped to humans.

The most likely host species is the masked palm civet: evidence of SARS has been found in three species – palm civets, racoon dogs and Chinese ferret badgers – that are sold alive in food markets.

Researchers in Hong Kong have identified the masked palm civet, a small cat-like mammal that is considered a culinary delicacy in some parts of China, as the source of the SARS virus. The animals are common in China, India and Malaysia. It is unlikely that people were infected by eating civet, but the virus may have jumped to humans as the animals were raised, slaughtered, and cooked. Civet is one of the main ingredients in the exotic wildlife dish ‘dragon-tiger-phoenix soup’. The sale of civet is banned in Hong Kong, but people still cross into China to eat it, and other exotic animals.

What is the best treatment?
It is still too early to say whether SARS can be eliminated. Antiviral treatments and antibiotics have been used so far. Vaccines are typically expensive, so even when one is developed, it will probably be beyond the budgets of poorer nations. But these are the very countries the WHO fears could be devastated by SARS if it gets a foothold. All this means that developing a treatment is a high priority. It is likely to take over a decade.

How fast does it travel?
Very fast, due to air travel.

What precautions are being taken?
So far the best and only defence against SARS is containment. A number of countries set up quarantine precautions for people returning home from affected Chinese regions. WHO and the Foreign Office advised against travel there.

Surgical masks offer limited protection at best. Cycle masks against city pollution might be better. But simpler precautions, such as regular washing of hands, are probably a better bet since viruses can spread through contact with infected hands or surfaces.

Source: adapted from The Guardian, 21 April 2003.
Figure 2: The Spread of SARS

Symptoms

Headache

Fever

Dry cough

Muscle ache

Breathing difficulties

Figure 3: The risks of bird flu in the UK

How do people catch avian flu?
This occurs by close contact with birds, especially on farms and at live animal markets.

Can it spread between humans?
There is no evidence that this latest flu can be spread between humans, but the potential is there. Birds, animals and humans can turn into gene “mixing vessels”, changing strains from different types of flu virus into a virulent person-to-person disease threatening a global pandemic.

Culling Hong Kong’s entire poultry population in 1997 probably averted a pandemic, but six people died and 12 others fell ill. In the Netherlands in 2003 a vet died and 83 other people fell ill as flocks were culled.

Is there a vaccine?
Trials have been conducted against similar avian flu. The UK’s Health Protection Agency is assisting the WHO in developing vaccines.

Would the health authorities spot avian flu if it arrived in this country?
They are confident they would.


2004 Update
In January 2004 China reported two suspected case of SARS, both in Guangdong. These cases, coming after a six-month break, appear to have panicked the authorities. A cull of thousands of civet cats and other mammals was ordered. Their link to the latest cases is unproven.

Avian or bird flu
Avian flu results from a type of virus in birds that is loosely related to the influenza virus in humans. Despite its similarities, though, avian flu very rarely jumps species and infects humans.

Since it was first discovered in 1959, there have been 20 or so large outbreaks of the disease among bird populations around the world; the last major outbreak happened in Holland in 2001. There are several strains of the avian disease, from viruses which cause few problems to ones which are highly contagious and lethal.

Once a bird is infected with a particularly virulent strain, it could well die very quickly. The WHO has already said that it is highly unlikely that the victims passed the latest strain, called H5N1, to each other; rather they are thought to have each caught the virus independently from infected chickens. Thought to be carried by migrating birds and a vast, live poultry trade, the virus has proved difficult to control, particularly because many countries appear to have covered up outbreaks for several months.

The disease has hit the southern parts of Vietnam hard – around two million chickens have already been killed in an effort to stop the spread of the virus. Traces of the strain of bird flu have now also been detected in pigs in Vietnam.

However, it is too early to say whether this species-jump of the H5N1 virus is a dangerous development, because so little is known about its effect on pigs. Fears were raised of a regional pandemic after Japan reported its first outbreak of the highly contagious disease for 80 years (Figure 4). Bird flu has now killed 18 people and tens of millions of birds in 10 Asian countries.

to a four-and-a-half-year low, and some economists predicted a renewed recession. Chinese officials feared an epidemic of SARS in the countryside. Should SARS become entrenched in the rural areas, it would pose risks for manufacturers who depend on cheap rural labour.

Ironically, some industries benefited from the SARS epidemic, such as DVD rentals, face masks, takeaway meals such as home delivery pizzas, sales of traditional medicines, and shopping websites.

Figure 4: Bird flu in SE Asia

![Map of SE Asia showing bird flu outbreaks](image)

Key
- Bird flu has been detected
- Imposed bans on poultry imports from affected countries (includes the EU)

Most of the cases among chickens in Vietnam surfaced in the provinces of Long An and Tien Giang, along the southern Mekong delta. Chicken is traditionally eaten to mark the lunar New Year holidays. The authorities in Ho Chi Minh City considered banning people from bringing poultry into the city ahead of the celebrations.

The risk of bird flu in the UK
The outbreak has raised two separate concerns: that the flu might spread to flocks in other countries, resulting in large-scale losses, and that it might have implications for human health.

Nowadays, retailers and manufacturers source their raw materials where they are cheapest. The British poultry industry has struggled to compete with prices from south-east Asia and Brazil where labour costs are much lower. The distances involved mean that little fresh meat on sale in the UK is sourced from Thailand, but poultry for ready meals and other processed foods such as nuggets is increasingly being bought frozen on the global market.

Modern food systems mean that animal diseases travel far and fast. Poultry is raised in intensive factory farms, with units of 30,000 to 50,000 birds being common. Once a virus gets into a flock it is virtually impossible to control except by mass culling. That means that economic losses are large, and it appears that the Thai government has been hiding its outbreak of avian flu for months to protect its export trade.

The epidemic of avian flu that struck Holland in 2003 showed how the disease can be hard to contain. Despite bans on movement of animals the disease spread through the country's intensive poultry industry, and more than 30 million chickens had to be killed. It spread from the Netherlands to Belgium and Germany before being contained.

West Nile virus
West Nile virus was first discovered in the blood of a feverish woman in Uganda’s West Nile district in 1937. It is a mosquito-borne disease that first spread to the US from Asia and Africa in 1999. Within three years it had caused eight deaths and 135 non-fatal cases; there have been indications of the disease in just about every state in the eastern half of the USA (Figure 5) and it is projected to affect the whole of the USA by 2006. West Nile virus causes vomiting and diarrhoea, progressing to fever, confusion, muscle weakness, paralysis – and sometimes death.

The strain of the virus which reached New York in 1999 is thought to have come from the Middle East or Africa, possibly from an insect or an infected human travelling by air. Once there, the virus was transmitted by a local mosquito, the northern house mosquito. Infected wild birds provided a reservoir for the virus – in 1999, half the wild birds in the north-east of the New York borough of Queens were infected.

The New York outbreak in 1999 caused a media frenzy, although only 62 people out of a population of 10 million were hospitalised, and only seven died. It is estimated that even in the affected areas, less than 1% of mosquitoes are potentially dangerous, and nearly 90% of people who actually get the virus will suffer no symptoms at all, and never know about it. The other 10% – mainly the old, chronically ill or HIV positive – get flu-like symptoms, and perhaps one in 200 develops the potentially fatal complication of encephalitis, swelling of the brain.

Americans are now simultaneously being advised not to go out near dawn or dusk, because of West Nile, not to go out in the heat of the day because of the dangers of sunstroke and pollution, and not to stay inside watching TV and eating junk food because of the dangers of obesity. They are beginning to run out of options!

West Nile virus in the UK
The government is stepping up surveillance for the West Nile virus in birds, mosquitoes and humans and preparing contingency plans for its arrival in Britain. Officials are considering the widespread emergency use of pesticides and insect repellent against mosquitoes.

The disease has infected more than 4,000 people in the United States since 1999, killing 272, and there have been outbreaks in humans and horses in parts of Europe since the 1960s. Most recent epidemics were in Bucharest, Romania, in 1996, Volgograd, Russia, in 1999, and in Israel in 2000.

Previous cases in Britain have only been among travellers and most people infected do not even display symptoms. Species of mosquito that carry the disease are present in Britain but up to now it has been

Figure 5: The spread of West Nile virus across the USA

![Map of the USA showing West Nile virus outbreaks](image)

Key
- 1999
- 2000
- 2001
- 2002
- Human deaths
thought that they are not numerous enough to pose a danger.

**The return of polio**

The largest epidemic of polio in recent years broke out in Nigeria, spreading across central and western Africa, threatening 74 million children with the paralysing disease. There were hopes that the disease would have been eradicated by the end of 2004.

According to the World Health Organisation the outbreak began in the Nigerian state of Kano. This followed doubts about the safety of the vaccine being used, and the suspension of immunisation in 2003 after religious leaders claimed that the vaccine would make women sterile, and rumours spread that it was a western plot to reduce the number of Muslims. In May 2004 Nigerian officials announced that they had received a safe vaccine from Indonesia, a Muslim country. As a result of the epidemic in Kano most local people wanted their children immunised.

Over 250 children were paralysed by the disease. Polio crossed neighbouring countries as far as Egypt and Sudan. It was not possible to stop travel between Nigeria and its neighbours. Those infected were largely in rural areas, and many travelled regularly across borders. The three most heavily reinfected countries are Chad, Burkina Faso and Ivory Coast. By the middle of 2004 22 countries were affected, compared with 10 in 2003. It also spread as far south as the Central African Republic, which borders the Congo, which had been one of the great successes of the polio eradication programme.

The number of polio cases increased sixfold between 2003 and mid-2004. Unfortunately, the spread into west and central Africa affected countries which had very weak immunisation programmes, reaching only 50% of the population.

Plans by Unicef for a huge synchronised immunisation drive across 22 African countries will require a lot of money, an additional £55m over its normal budget. Since 1988, nearly £2 billion has been spent on attempts to rid the world of polio. Britain contributes £14m annually to eradicate polio.

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**Conclusion**

Disease patterns are changing. This is due to a variety of factors such as environmental change, increased air travel, globalisation of the food industry, and high population densities, often in combination with high animal densities. The risks of certain diseases appear to be increasing, as is the risk of new diseases developing.

This Geofile has looked at some alarming new diseases. But meanwhile there are are many ‘old’ diseases which will not go away, either. Conditions of malnutrition, poverty and social deprivation will always be associated with disease. Programmes of mass vaccination have had some success – smallpox, for instance, once a deadly disease, is now unknown. Other diseases, however, remain, for instance polio (Figure 6). Even bubonic plague – the ‘black death’ of the Middle Ages – is still around.

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**Focus Questions**

1. Describe the spread of the West Nile Virus in the USA. Suggest reasons for this pattern.

2. Outline the factors which have led to the increased risk of avian (bird) flu.

3. ‘SARS is a timebomb waiting to explode’. Examine the demographic and economic implications of this statement.