



Scientific Facts on Global Public Health Threats

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Level 2 - Details on Global Public Health Threats

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This Digest is a faithful summary of the leading scientific consensus report produced in 2007 by the World Health Organization (WHO):
"A safer future: global public health security in the 21st century, 2007"

The full Digest is available at: <http://www.greenfacts.org/en/global-public-health-threats/>



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1. Introduction: Health Risks in a Globalized World

Over the last two centuries, science has made huge progress in the fight against infectious diseases. But the biggest battles may still be to come. With tens of thousands of people taking planes every day, contagious illnesses have unprecedented opportunities to spread farther and faster. Antibiotics that once cured diseases like tuberculosis now do not always have an effect. Old enemies like polio refuse to go away. Others like smallpox threaten a devastating comeback if released. Since the 1970's new diseases have been identified at the unprecedented rate of one or more per year, and scientists are warning of a possible worldwide epidemic involving a killer virus that they believe does not even exist yet. These and other threats are explored in the following report by the World Health Organization, which recommends ways countries can cooperate more closely to protect global public health.

Global public health security is defined as the activities required to prevent and respond to threats that endanger the collective health of people across different regions and nations.

Lack of global public health security may also have consequences in terms of economic or political stability, trade, tourism, access to goods and services and demographic stability.

Global public health security covers a wide range of complex and daunting issues, including health consequences of human behavior, climate change and weather-related events, infectious diseases, natural catastrophes and man-made disasters.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Overview, p.6-9 [see <http://www.who.int/whr/2007/overview/en/index.html>]

2. What steps were taken to contain disease outbreaks in the past?

Throughout history, humans have struggled to protect themselves against illnesses that have spread and caused death at unprecedented scales.

Until relatively recent times, the only way to control the spread of infectious diseases was to separate the sick from the healthy population. It is only since the 19th and 20th centuries, that advances in scientific knowledge have made it possible to contain some outbreaks with improved sanitation and the discovery of vaccines.



Plague doctor from Rome, engraving by Paul Fürst, 1656

Microbes reproduce and adapt quickly. They can change the way they pass from one person to another and become resistant to drugs. Human behavior has also changed and with increased air travel and commerce, changing climate, wars, poverty and famine, the risk of disease outbreaks has increased.

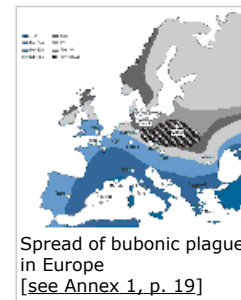
Today, not only can infectious diseases spread faster, but they appear to be emerging more quickly than ever before. So although current methods of disease control are effective, they need to be adapted and reinforced to face the challenges to come.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 1: Evolution of Public Health Security, p.1-2 [see <http://www.who.int/whr/2007/chapter1/en/index.html>]

2.1 How effective was quarantine against the plague?

Since ancient times, various civilizations have tried to contain the spread of infectious diseases by isolating the sick from the healthy.

In the 14th century, the authorities in many Mediterranean ports isolated (quarantined) people arriving from plague-infested areas for at least 40 days. The incomers were only allowed to mix with the rest of the population if they showed no sign of disease in that time. Such public health measures became widespread during the following centuries.



However, the crude quarantine measures in place during the Middle Ages were ineffective against some diseases such as the bubonic plague which is usually transmitted by infected fleas carried by rats. A devastating outbreak of plague swept through Europe in the 14th century, killing millions. There were regular outbreaks of the disease until the 17th century and one of these outbreaks decimated England in 1665 and 1666 despite quarantine measures that forced all ships to wait for forty days at the mouth of the river Thames

In recent years, the most serious outbreak of plague occurred in 1994 in five states in India. It was under control within 2 months, but had catastrophic economic consequences with an estimated cost of approximately US\$ 1.7 billion in lost trade and tourism. Since then, there have been a number of smaller outbreaks of the bubonic plague in countries such as Algeria, the Democratic Republic of the Congo, Malawi and Zambia.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 1: Evolution of Public Health Security, "Plague and quarantine", p.2-3 [see <http://www.who.int/whr/2007/chapter1/en/index.html>]

2.2 How can sanitation prevent the spread of cholera?

Until the 19th century, it was not known how cholera was transmitted. Scientists at the time believed that it spread through poisonous vapours but in the 1850s John Snow, a British doctor, showed that cholera was transmitted through contaminated water. His work eventually led to improvements in sanitation in the United Kingdom that reduced the threat of the disease.

Nonetheless, cholera continues to be a major health risk all over the world.

Latin America had been free of cholera for over a century until 1991, when boats with cholera-infested bilge water contaminated seafood off the coast of Peru. The disease spread rapidly across the continent with devastating human and economic consequences, infecting more than 1 million people and causing over 10 000 deaths in 16 countries by 1995. In addition to human suffering and death, the outbreak provoked panic, disrupted social and economic structures, and cost the region as much as US\$ 1.5 billion.

The need to ensure safe water and hygiene remains a huge challenge today in developing countries. Currently 1.1 billion people have no access to safe drinking water and 2.6 billion people lack access to proper sanitation. As a result, many people die from easily preventable diseases and suffer from poor health, weakened productivity and missed opportunities for education.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007),

Chapter 1: Evolution of Public Health Security, "Cholera and sanitation", p.4 [see <http://www.who.int/whr/2007/chapter1/en/index.html>]

2.3 How was smallpox eradicated and why is it still a threat?

Smallpox is one of the oldest and deadliest known human diseases. In the 18th century, Edward Jenner discovered a vaccine for smallpox, but at the beginning of the 20th century it was still present in almost all countries of the world. In the early 1950s, an estimated 50 million cases occurred globally each year leading to approximately 15 million deaths. In 1967, a world-wide 10-year campaign of vaccinations began. The programme was very successful: the number of cases of smallpox and the deaths caused by the disease dropped rapidly to about one fifth, and by 1979 smallpox was eradicated.

Almost 30 years after its successful eradication, smallpox is once again a significant public health concern as some countries and terrorist groups are accused of storing the smallpox virus for deliberate release. If an outbreak is not controlled quickly, smallpox could again become endemic and this would undo one of the greatest achievements in terms of public health. This potential bioterrorist threat is causing major concern in many industrialized countries and work is under way on a new and safer vaccine.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 1: Evolution of Public Health Security, "Smallpox and immunization", p.5-6 [see <http://www.who.int/whr/2007/chapter1/en/index.html>]

2.4 Why were International Health Regulations established and strengthened?

Responding to the need for international coordination of public health strategies, the World Health Organization (WHO) was created in 1948. In order to contain diseases through control measures at international borders, the International Health Regulations (IHR) were adopted in 1969 .

In the globalized world of the 21st century, borders alone cannot stop the international spread of diseases. With increased air-travel and trade, an outbreak or epidemic in any part of the world is only a few hours away from becoming a threat somewhere else. Another challenge when coping with public health threats is the spread of panic through instantaneous modes of communication, such as mobile telephones and the internet.

Responding to these new global challenges, Member States of the United Nations (UN) agreed on a new set of regulations, which came into force in June 2007. The focus of the 2005 International Health Regulations is not to control diseases at borders but to quickly tackle any outbreak at its source.

The 2005 International Health Regulations address public health threats such as infectious diseases, as well as the accidental or intentional release of chemicals, radioactive materials and of any microorganism that may cause health effects and sickness.

The WHO responds to incidents reported by official sources or which are detected by its own networks.

Examples of such networks are GOARN and ChemiNet.

- The Global Outbreak Alert and Response Network (GOARN) can quickly identify and respond to disease outbreaks of international importance. Even in extreme environments, systems have been established to stockpile and distribute vaccines, drugs and special equipment to deal with haemorrhagic fevers, influenza, meningitis, smallpox and yellow fever. In addition, GOARN surveys many other vaccine-preventable diseases. The Organization continues to strengthen specialized surveillance networks for dangerous microorganisms that can cause disease, including dengue, influenza and plague.
- The Chemical Incident Alert and Response System was established by the WHO to detect and respond to chemical incidents and other environmental health emergencies, including those related to the disruption of environmental health services, such as water supply and sanitation, as well as radiological events. An integral part of the system is ChemiNet, which pools human and technical resources for detecting, verifying and responding to environmental health events, which might be of international public health concern.

Thanks to the spectacular advances in medicine and public health during the first half of the 20th century it is now possible to prevent, control or treat most infectious diseases. However, world wide epidemics, referred to as pandemics, are still likely. They represent a huge threat to public health security, for two main reasons: firstly, some infectious diseases continue to thrive in developing countries and could spread internationally at great speed, and secondly, some microbes that infect animals are crossing the species barrier. They become infectious to humans resulting in the emergence of new diseases for human populations which could spread internationally. Therefore, international measures to prevent the spread of infectious diseases are still essential in the 21st century.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 1: Evolution of Public Health Security, "Fostering international cooperation", p.6-14 [see <http://www.who.int/whr/2007/chapter1/en/index.html>]

3. How is human behavior undermining collective health?

The behavior of individuals at all levels – political leaders, policy-makers, military commanders, public health specialists and the general population – can have major health consequences, both negative and positive.

Threats to public health security such as natural disasters, epidemics of infectious diseases, chemical and radioactive emergencies or other health events, can have one or more causes. The causes may be natural or man-made, environmental or industrial, accidental or deliberate, and in many cases related to human behaviour.

Public health is undermined not only by human action but also by the lack thereof. For instance, complacency and a false sense of security can tempt governments to reduce spending on public health and to scale down prevention programmes - with potentially disastrous consequences for collective health.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 2: Threats to Public Health Security, p.17 [see <http://www.who.int/whr/2007/chapter2/en/index.html>]

3.1 What can be the consequences of a false sense of security?

Times when there are no outbreaks of infectious diseases can give rise to a false sense of security and inadequate investment in public health. For example, as a result of large-scale insecticide spraying campaigns, by the late 1960s most of the important diseases carried by insects were largely under control. They were considered to remain a problem only in sub-Saharan Africa and control programmes were discontinued. However, within 20 years many of these diseases carried by insects emerged in new areas or re-emerged in areas previously affected.



See also the GreenFacts Digest on AIDS [see <http://www.greenfacts.org/en/aids/index.htm>]

Urbanization, increasing international trade and travel have contributed to the rapid spread of viruses and insects that carry them. For instance, dengue caused an unprecedented pandemic in 1998, with 1.2 million cases reported to the WHO in 56 countries. Since then, dengue epidemics have continued and have affected millions of people from Latin America to South-East Asia. Globally, the average annual number of cases reported to WHO has nearly doubled in each of the last four decades.

Surveillance is crucial for public health security and without it, it is impossible to detect and respond to emerging health threats. For instance, HIV/AIDS had perhaps been occurring for many years in Africa and Haiti but had not been detected due to inadequate surveillance and health systems in these developing countries. This new disease was only brought to international attention when the first few cases appeared in the United States. Even then, the disease was not detected by surveillance systems but by chance, when epidemiologists noticed an unusual number of orders for drugs to treat a rare infection that is common in AIDS cases.

Early efforts to control the AIDS epidemic were hampered by a lack of proper data on sexual behaviour and sexually transmitted diseases, whether in Africa, Haiti, the United States or other industrialized countries. In the industrialized world, information was out of date by the time AIDS appeared as a major public health threat, and in the developing world it was non-existent. Even today, the poor understanding of HIV/AIDS in the context of sexuality in the developing world raises problems.

Even with effective surveillance and prevention programmes in place, unexpected policy changes in public health systems can have deadly and costly repercussions. For example, the Nigerian government suspended polio vaccinations in parts of its territory in 2003 because of unfounded claims that the vaccines were unsafe. Following this decision, there was a large outbreak of poliomyelitis across northern Nigeria that paralyzed thousands of children and spread to 19 polio-free countries in Africa, Asia and the Middle East. The response to the outbreak across these countries cost more than US\$ 450 million. In July 2004, polio immunization started again throughout northern Nigeria, as a result of a tremendous collaborative effort between Nigerian authorities and traditional and religious leaders, supported by the African Union, the Organization of the Islamic Conference and others.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 2: Threats to Public Health Security, "Inadequate investment" and "Unexpected policy changes" p. 18-21 [see <http://www.who.int/whr/2007/chapter2/en/index.html>]

3.2 How can armed conflict weaken health systems?

Wars and other armed conflicts often result in the destruction or weakening of health systems, leaving them less able to detect, prevent and respond to infectious disease outbreaks. For instance, the 27-year civil war (1975–2002) in Angola left the country with a severely damaged health infrastructure. As a result, the country was incapable to control the outbreak and spread of the Marburg haemorrhagic fever in 2004–2005, which killed 90% of the 200 people affected. The Angolan authorities, with the support of the international community, launched a massive effort to rebuild its infrastructure, but despite their best attempts, 70% of the population is still without basic health care.



Some 50 000 Rwandan refugees died of cholera in a crowded camp in 1994

Wars, conflicts and natural catastrophes often force large numbers of people to migrate to other countries. These people often have to live in crowded, unhygienic and poor conditions, which, in turn, increase the risk of infectious disease epidemics. Such conditions were the cause of the cholera epidemic in the Democratic Republic of the Congo, in the aftermath of the crisis in Rwanda in 1994. In July of that year, between 500 000 and 800 000 people crossed the border to seek refuge in the outskirts of the city of Goma. The only source of water available to them was a lake that was contaminated with the cholera virus, and they did not have proper housing and sanitation. The resulting outbreak of combined cholera and shigella dysentery killed nearly 50 000 refugees within one month of their arrival.

The problems associated with people living in crowded environments also arise in cities, which are now home to over half the world's population. Rapid and uncontrolled urbanization is characterized by the growth of informal settlements such as slums. More than one third of those who live in cities – one billion people – dwell in cramped conditions, without access to safe water, sanitation, safe food, decent shelter or meaningful employment.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 2: Threats to Public Health Security, "Public health consequences of conflict" p.21-22 [see <http://www.who.int/whr/2007/chapter2/en/index.html>]

3.3 Why is antibiotic resistance a growing concern?

Antibiotics are widely used as medication against disease-causing bacteria. However, some strains of bacteria are resistant to particular antibiotics and others can acquire resistance through genetic changes. The widespread use of penicillin and other antibiotics since 1942 has brought about great advances in public health, but with an unfortunate side-effect: a growing number of varieties of bacteria, including some causing tuberculosis, are now resistant to antibiotics and other drugs.

The selection and spread of these varieties are facilitated by improper use of antibiotics, for instance:

- over-prescription of drugs
- insufficient prescription of drugs,
- patients not taking the recommended doses,
- unregulated sale by non-health workers and
- treatment of diseases in plants and animals with the same antibiotics that are used to treat humans.

Besides bacteria, also parasites and viruses develop resistance to drugs, which makes the treatment of diseases such as malaria and HIV/AIDS increasingly difficult.

Many organisms are resistant to several drugs. This makes antibiotic-resistant infections more expensive to treat and more likely to cause the death of the patient. In addition, fewer new antibiotics are reaching the market and it is unlikely that a new antibiotic treating a wide range of illnesses will appear soon. However, new drugs are being developed for diseases such as tuberculosis and malaria.

The spread of drug resistance worldwide is one reason why it is so important to detect and respond to outbreaks of infectious diseases as quickly as possible, to strengthen health systems and communications, improve water and sanitation, and reduce changes in the environment. It is also crucial to use drugs appropriately so that the strains of organisms that become more common are those that can be treated with existing drugs.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 2: Threats to Public Health Security, "Microbial evolution and antibiotic resistance", p.22-23 [see <http://www.who.int/whr/2007/chapter2/en/index.html>]

3.4 How can rearing animals lead to disease transmission?

Feeding and rearing animals under improper conditions can have serious health consequences. For instance, starting in the United Kingdom in the 1980s, processed cattle meat was fed to cows. Cattle carcasses infected with bovine spongiforming encephalopathy (BSE) were also added to livestock feed and this led to an epidemic commonly called "mad cow disease" that had immense economic consequences for the United Kingdom. The epidemic in cows soon became of concern to human health as cases of variant Creutzfeldt-Jakob disease, a human form of "mad cow disease", begun to emerge mainly in the United Kingdom, but also in other countries in Europe and America. The most likely cause of variant Creutzfeldt-Jakob disease was eating contaminated meat. Some people have developed the disease after receiving transfusions of contaminated blood.

The emergence of new organisms that cause diseases has serious public health consequences. For example, between September 1998 and April 1999 there was an outbreak in Malaysia of a new disease caused by the Nipah virus, a previously unknown virus that causes an inflammation of the brain, and which kills up to 75% of the people that it infects. Initially there was some confusion as to the cause of the disease, which delayed the effective treatment and control measures. Eventually it was recognized that the disease was transmitted among pigs and then from pigs to humans. The outbreak ended once more than 1 million pigs were killed. There is some evidence that since 1999, the virus may have become more harmful for humans: people who are not in contact with pigs can now get it, and it can spread easily from human-to-human, especially in medical facilities. This makes the disease more difficult to control as killing pigs alone is no longer effective for containing an outbreak. Moreover, fruit bats infected with Nipah have now been found in various countries.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 2: Threats to Public Health Security, "Animal husbandry and food processing", p.24-25 [see <http://www.who.int/whr/2007/chapter2/en/index.html/>]

3.5 How can changes in climatic conditions threaten public health?

Climate change, especially the increase of extreme weather events, together with other environmental and social factors, is changing the exposure of populations to infectious diseases. In such rapidly changing conditions, prevention is of the greatest importance; where prevention has failed, identifying and responding to epidemics becomes even more important.

For example, in 1997 there was a higher than average rainfall in East Africa, in combination with the warm phase of El Niño, which increased the breeding sites of mosquitoes. This resulted in a large outbreak of the Rift Valley fever, a disease that has serious complications for humans and can cause death. The disease spreads easily as it is transmitted to animals as well as humans, and female mosquitoes can pass on the infection to their offspring. To prevent epidemics, animals have to be vaccinated before an outbreak starts. After the 1997–1998 outbreaks, a system was put in place that uses satellite images and weather forecasts to predict outbreaks of the Rift Valley fever. Animals can then be vaccinated before the onset of an outbreak in order to prevent an epidemic. The same method may be useful for predicting outbreaks of other viruses such as the ones causing dengue, West Nile fever and yellow fever.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 2: Threats to Public Health Security, "Weather-related events and infectious diseases", p. 25-26 [see <http://www.who.int/whr/2007/chapter2/en/index.html/>]

3.6 What are the consequences of disasters like Chernobyl or Bhopal?

Reliance on chemical processing and nuclear energy calls for public health security measures. Facilities and their products are a potential danger to public health because there is always the possibility of chemical spills, leaks, dumping and nuclear melt-downs as a result of accidents or human and mechanical errors.



One of the world's worst chemical accidents occurred in 1984 in Bhopal, when a deadly cloud of toxic gas spilled from a large pesticide plant, killing thousands of people and harming hundreds of thousands more. Following the accident, the emergency and local health services were overwhelmed; the population of Bhopal, the government of India and the industries concerned fell into a long crisis; and the health, economic and environmental consequences of the catastrophe are still felt today.

Chemical production and use has increased nearly tenfold worldwide over the last 30 years, particularly in developing countries, so a similar incident could happen again. Some countries have taken measures to prevent and prepare for major chemical accidents. However some poorer nations, or countries where industrialization is occurring very quickly, cannot ensure that their chemical plants operate safely.

In 1986, explosions at reactor No. 4 of the nuclear power plant at Chernobyl in Ukraine, led to the release of huge amounts of radioactive materials into the atmosphere. These materials were deposited over various countries in Europe, but especially over large areas of Belarus, the Russian Federation and Ukraine. The accident led to an increase in the number of cases of thyroid cancer and it had long-term consequences on mental health as a result of evacuation, relocation, and stigmatization of local populations.

In 1986, large numbers of people were poisoned as a result of a natural event, when 1.6 million tons of carbon dioxide gas were suddenly released from Lake Nyos, in Cameroon. In less than half an hour a thick cloud of gas covered a distance of 20 km, suffocating up to 1800 people and thousands of animals. Although such sudden natural events are rare and would seem unavoidable, it is possible to prevent their occurrence and to make populations less vulnerable to their effects.

In 1997–1998, Indonesia suffered prolonged and uncontrolled forest fires. They caused a dense haze containing tiny particles and toxic and irritant gases that affected over 200 million people in Indonesia and neighboring countries. In the areas reached by the smoke,

there was an increased number of respiratory problems and the long-term effects on health from exposure to the haze are yet to be determined.

Although chemical and biological attacks are rare, some individuals, groups and governments are ready to release chemical or biological agents deliberately. The largest chemical weapons attack against a civilian population in modern times occurred in 1988, when Iraqi military forces used mustard gas and other chemicals against Kurds in northern Iraq.

In 1979, in Sverdlovsk, 1400 km east of Moscow, anthrax spores were accidentally released from a Soviet military microbiology facility. As a result, more than 350 people were infected and 45 to 100 of them died in a matter of days after inhaling the spores. This accident shows that microorganisms could be used as weapons of biological warfare or bioterrorism

The majority of deaths and illness related to chemical incidents are caused by the many medium-sized and small-scale events that take place every year around the world. Nevertheless, from larger scale incidents the world has learned better how to prevent and respond to chemical and radioactive threats through industrial advances and diplomatic relations. To mitigate the adverse effects of such events it is essential to have a global response network for effective surveillance and early warning.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 2: Threats to Public Health Security, p.26-32 [see <http://www.who.int/whr/2007/chapter2/en/index.html/>]

4. Which new health threats have emerged in recent years?

A number of new health threats have emerged since the year 2000, partly due to the great changes that the world has experienced in recent times. These threats include bioterrorism, the emergence of new diseases and the large-scale dumping of waste as an element of global trade.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 3: New health threats in the 21st century, p.35 [see <http://www.who.int/whr/2007/chapter3/en/index.html/>]

4.1 How did Anthrax letters reveal a new bioterrorist risk?

For years, the United States and other industrialized countries had lived with the fear of an attack involving biological weapons, which a number of countries held in stock. The United States Government was so concerned about potential anthrax attacks that in 1990, during the first Gulf War, more than 100 000 soldiers and in 1998, a programme was started to vaccinate all military personnel. From 1997 on, there were frequent hoaxes and alerts when suspect powders were sent to abortion clinics, government offices and other facilities. By 2001, most American state governments and authorities of large cities had begun to develop plans to deal with bioterrorism.

In September 2001, within the United States, four letters sent by mail were found to contain anthrax, 22 people were infected and five of them died. The attack caused massive disruptions of the postal services in many countries around the world and had huge economic, public health and security consequences. Emergency drugs were given to the 32 000 people who could potentially have been exposed and about 3.75 million antimicrobial tablets were distributed. Public health laboratories had to test a vast number of samples and if the country had not been so well prepared, such a large-scale testing would have overwhelmed the nation's facilities. After the attack, the United States invested millions of dollars to prevent the distribution of hazardous substances through mail.

The anthrax attack showed that bioterrorism has the potential to cause not only death and disability, but also huge social and economic disruption at international levels. In addition to anthrax, other microorganisms could be used as biological weapons. Perhaps the most devastating of these would be an attack involving smallpox, a disease that is often deadly and has no specific cure. An outbreak of smallpox would spread uncontrollably because, since its eradication, people have no longer been vaccinated against it.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 3: New health threats in the 21st century, "The anthrax letters", p.35-37 [see <http://www.who.int/whr/2007/chapter3/en/index.html>]

4.2 How vulnerable are we to emerging diseases such as SARS?

SARS (Severe Acute Respiratory Syndrome) is a new, pneumonia-like disease which represents a threat to public health and economic security of international scale. It is deadly, killing around 10% of those infected, especially hospital staff. It is passed on directly from person to person, it survives anywhere on Earth, and the infection is difficult to diagnose initially.

The ways in which nations and people interact globally have made us more vulnerable to diseases such as SARS, which can spread easily along the routes of international travel, placing every city with an international airport at risk. This is a serious problem in a world where airlines carried an estimated 2.1 billion passengers in 2006, where financial markets and businesses are intricately linked, and where information is instantly accessible.

The 2003 epidemic of SARS in Asia could potentially have become a global pandemic resulting in the death of millions. However, infections were limited to 8422 people, 11% of which died. The actual number of SARS cases was relatively small but the epidemic provoked a high degree of public anxiety. The fear of transmission caused foreign tourists to choose other destinations. Travel to affected areas in Asia was brought to a virtual standstill and this drained billions of dollars from economies across entire regions. The local population felt safer avoiding restaurants and other public places, and people spent less on non-essential items. As a result, the estimated cost of the epidemic to Asian countries was approximately US\$ 20 billion in terms of GDP, which breaks down to over US\$ 2 million per person infected.

Thanks to strong leadership and coordinated international public health action, the 2003 epidemic did not become a pandemic and its spread was stopped in approximately three months. If the outbreak lasted over a year and affected the entire world, as had been predicted, the long-term consequences in terms of job loss and bankruptcy would have continued to produce hardship for many years. If a larger proportion of the world's population had been infected, the global economy could have shut down. The spread of SARS was halted in about three months after it was first recognized as an international threat. In a world still struggling to cope with HIV/AIDS, if SARS had become permanently established the consequences for global public health security would have been disastrous.

The SARS outbreak brought to light the risk posed by emerging diseases and also highlighted the fact that they represent a worldwide threat. Even the wealthiest countries, with the best standards of living and healthcare, are not automatically protected from either the arrival of a new disease on their territory or the subsequent disruption this can cause.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 3: New health threats in the 21st century, "SARS: vulnerability revealed", p.37-40 [see <http://www.who.int/whr/2007/chapter3/en/index.html>]

4.3 How can the transport and dumping of wastes endanger public health?

The global movement of products, particularly the international movement and disposal of hazardous waste, has serious health consequences.

In August 2006, over 500 tons of chemical waste were unloaded from a cargo ship and illegally dumped by trucks at different sites around Abidjan in Côte d'Ivoire. Exposure to the waste caused nose and throat irritation, breathing difficulties, headaches, nausea and vomiting. In the most severe cases people had trouble breathing, were dehydrated and suffered from nose and intestinal bleeding. One month after the dumping, 69 people had been admitted to hospital and eight deaths were attributed to the event. More deaths are suspected to have occurred due to the worsening of pre-existing medical conditions such as asthma, respiratory conditions or cardiovascular disease.

This incident had important public health, social and economic consequences:

- It occurred in a climate of social unrest and political instability that intensified when people demonstrated in the streets and caused violent incidents on a daily basis.
- Because of the growing anxiety, tens of thousands of people arrived at medical centres with either health complaints or fears about the future consequences of exposure to the chemicals. This stretched the public health system to its limit and left it unable to provide the medical care required by the population
- In addition, there was increasing local and international concern about potential water and food contamination. Some rubbish dumps that were contaminated had to be closed, and domestic garbage began piling up in different areas of the city that had to be closed for security reasons. Neighbouring countries were concerned that rivers and the sea would be polluted and they remained on the alert

The situation called for governmental intervention at the highest level as well as the support of national and international organizations.

This incident shows how globalization has made the movement and disposal of hazardous wastes more dangerous.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 3: New health threats in the 21st century, "Dumping of toxic chemicals", p. 40-43 [see <http://www.who.int/whr/2007/chapter3/en/index.html>]

4.4 What is the role of the media in our perception of health risks?

The mass media have a powerful influence on people's perception of risks, whether from a new epidemic disease, deliberate attacks or natural catastrophes. The Internet, television, radio, newspapers and magazines are the most influential sources of everyday information on risks to health.

In covering health issues, the media often use government press releases, scientists and international scientific journals as a source of information that they then present to the public in lay terms. At the same time, they also need to reflect the concerns of the general public.

Mass communication can either increase levels of anxiety or provide reassurance at times of public health crises. Authorities such as governments may use the mass media to reassure the public. However, they need to strike a balance between saying too much, which could

cause an overreaction; and saying too little, which could make them appear complacent or may spark the media to search for information elsewhere and create or heighten a sense of anxiety.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 3: New health threats in the 21st century, "Box 3.2 The role of the mass media in risk perceptions", p.41 [see <http://www.who.int/whr/2007/chapter3/en/index.html>]

5. Why is influenza the most worrisome potential global health emergency?

A worldwide outbreak of influenza, or flu, is the most feared potential public health emergency of international concern. The world is already preparing for such a pandemic by strengthening the capacity of individual nations to respond to a crisis and by coordinating efforts at the international level. Measures may prevent the threat becoming a reality and may also be useful to combat other emerging health threats such as the spread of poliomyelitis and drug-resistant tuberculosis.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 4: Learning lessons, thinking ahead, p.45 [see <http://www.who.int/whr/2007/chapter4/en/index.html>]

5.1 How many people are affected by seasonal influenza?

Seasonal influenza is caused by viruses of two main types: A and B, and the deadliest virus for humans is a subtype of influenza A. Every year, human influenza rapidly spreads around the world in seasonal epidemics, resulting in an estimated three to five million cases of severe illness and between 250 000 and 500 000 deaths. Most deaths in industrialized countries occur among people over 65 years of age

The influenza viruses change frequently, so every year it is necessary to change the composition of influenza vaccines so that they are effective for the virus in circulation. Some years, a new subtype of virus spreads, infecting a large part of the population, and potentially killing millions. This could lead to a pandemic, like the "Spanish flu" of 1918-1919 that killed an estimated 50 million people.

For the past 50 years, a wide surveillance network has been gathering information on the constantly changing strains of circulating influenza viruses. The Global Influenza Surveillance Network and FluNet guide the annual composition of recommended seasonal influenza vaccines. In addition they operate as a global early warning system because they can pick up any new influenza virus with pandemic potential and any outbreak of unusually severe illness and rapid spread.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 4: Learning lessons, thinking ahead, "Pandemic influenza: the most feared security threat", p.45-46 [see <http://www.who.int/whr/2007/chapter4/en/index.html>]

5.2 What has been the response to the new threat of avian influenza?

Avian influenza, also called bird flu, is an emerging epidemic disease that is highly contagious, spreads quickly and easily between domestic and wild birds, and it occasionally infects humans, although it is not passed on between humans. It presents a major threat to life, economies and security. It was first identified in Hong Kong in 1997 and since then there have been 310 reported human cases that have resulted in 189 deaths.



Avian influenza forced the slaughter of millions of domesticated birds.
Source: Jan Tabery

In Viet Nam and Thailand in 2003 and 2004 there was an outbreak of human cases of avian influenza caused by the H5N1 virus, as well as huge outbreaks in poultry. Over the following days and months, more cases of human avian influenza appeared. Most were caused by the H5N1 virus, but there were also some human infections with H7 and H9 avian influenza viruses. Tens of millions of domestic birds in many countries were destroyed to control the outbreak but, by the end of 2004 it was clear that in large parts of Asia, the virus was firmly established in poultry. In humans, 72% of the people infected with H5N1 had died by the end of 2004. Those most frequently infected were previously healthy children and young adults who had been in contact with sick or dead chickens.

In 2005, the virus passed from domestic birds to wild birds, and that gave it the ability to move over long distances. In July 2005, H5N1 reached the African continent, Central Asia, Europe and the Eastern Mediterranean Region. By 11 April 2007, 12 countries in Asia, the Middle East and Africa had reported human cases and deaths from H5N1 infection. In 2007 there were 28 cases including 14 deaths. The outbreaks in poultry continued, as did occasional cases in humans, but a virus that could be passed on from human to human did not emerge. Nevertheless, scientists agree that the threat of a pandemic persists although it is not possible to predict when it will occur, how severe it will be or which avian influenza virus will cause it.

If a fully transmissible pandemic virus emerged and it affected 25% of the world's population as some experts have predicted, the economic and social disruption arising from so many people becoming ill at the same time throughout the world, would be disastrous.

Risk reduction measures are already in place. The most important of these is the control of H5N1 in chickens because, as long as the virus is present in chicken populations, the threat of a pandemic exists. If these measures failed and if an avian influenza virus should mutate into a form that is transmitted from human to human, the international stockpiles of anti-viral drugs would be used to treat an early focus of human-to-human transmission.

Despite these measures, the world remains poorly prepared in case of an avian influenza pandemic. The world's capacity to produce influenza vaccines needs to be increased to create, maintain, fund and use an H5N1 vaccine stockpile effectively. Work needs to continue to develop new vaccines which could be used to prevent infection or severe illness and which, together with anti-viral drugs, might be useful to contain a worldwide outbreak.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 4: Learning lessons, thinking ahead, "Pandemic influenza: the most feared security threat", p.46-51 [see <http://www.who.int/whr/2007/chapter4/en/index.html>]

5.3 How does WHO prepare for a worldwide outbreak?

To help countries prepare for a worldwide influenza outbreak, the WHO developed a strategic action plan with five key action areas.

- Reducing human exposure to the H5N1 virus
- Strengthening the early warning system
- Intensifying rapid containment operations
- Building capacity to cope with a pandemic
- Coordinating global scientific research and development

By 1 May 2007, nearly all countries had a plan to prepare for an avian and human pandemic. In addition, the WHO has assisted countries that have experienced outbreaks of human cases of avian influenza, by helping to collect and test samples, infection control, medical treatment, surveillance and general organization.

It is important that animal and human health sectors cooperate at national and international levels as over 70% of new and emerging diseases originate in animals.

The response to the threat of a worldwide outbreak of influenza would be considerably stronger if several United Nations agencies worked together. For this reason, the United Nations System Influenza Coordination (UNSIC) was established in 2005 to respond to government requests for coordinated and sustained international support to implement avian and human influenza programmes.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 4: Learning lessons, thinking ahead, "WHO's strategic action plan for pandemic influenza", p.52 [see <http://www.who.int/whr/2007/chapter4/en/index.html>]

6. Why is drug-resistant tuberculosis a growing public health concern?

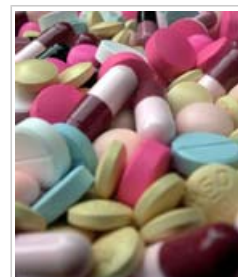
The emergence of drug-resistant tuberculosis is a man-made problem caused by inadequate health systems that do not treat tuberculosis cases promptly enough and which do not ensure that patients follow the entire treatment.

Beyond the immediate consequences to the individuals affected by drug-resistant tuberculosis, the global public health concern is that drug-resistant tuberculosis seems to be as transmissible as the treatable forms of the disease. As of 1 May 2007, the most dangerous of all forms of drug-resistant tuberculosis has been confirmed in 37 countries, not only in the developing world but also in wealthy countries, including all G8 countries.

An additional complication comes from the combination of drug-resistant tuberculosis with HIV. In the presence of HIV, tuberculosis that is not treated properly, will cause death within weeks.

Patients attending clinics to obtain HIV treatment with antiretroviral drugs are at particular risk of catching tuberculosis, unless hospitals control the transmission of airborne infections. Health-care workers who are in close contact with patients and do not tell their supervisors that they are infected by HIV, may also be putting their own lives at increased risk.

It is very important that all tuberculosis infections are identified and treated promptly, and that patients take all the drugs they have been prescribed. Drugs used to control infections have to be used appropriately to avoid the emergence of forms of tuberculosis that are resistant to more than one drug at the same time. The existing cases of multi-drug resistant



Affected patients can be unresponsive to one or several drugs.
Source: Adam Ciesielski



See also the GreenFacts Digest on AIDS [see <http://www.greenfacts.org/en/aids/index.htm>]

tuberculosis have to be dealt with quickly, strongly and urgently, at both national and international levels.

To prepare for outbreaks of drug-resistant tuberculosis laboratories and staff that can diagnose the disease are needed and there must be a supply of the necessary high-quality drugs. It is also essential to monitor the spread of drug-resistant tuberculosis to inform the public and health-care staff.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 4: Learning lessons, thinking ahead, "Extensively drug-resistant tuberculosis", p.52-53 [see <http://www.who.int/whr/2007/chapter4/en/index.html>]

7. Why is polio still a threat?

Polio is a disease that has lifelong health consequences for those infected. The poliovirus is of particular concern to public health because it spreads easily - it can circulate without causing symptoms for weeks, and so can travel great distances, entering polio-free areas by land, sea or air travel.

Although the world was hoping to eradicate polio through vaccination programmes, the disease has re-emerged because of inadequate control. In 2003, the government in Nigeria decided to stop vaccinating children in parts of the country. This resulted in a large outbreak of polio that spread not only throughout Nigeria but also to previously polio-free countries in Africa, Asia and the Middle East. Outbreaks continued to emerge until 2006.



Vaccinations and close monitoring has nearly succeeded in eradicating polio

To minimize the risk of polio entering their territory, countries are protecting themselves by vaccinating most or all of their population and by remaining alert. Polio, along with smallpox, SARS, and new influenza subtypes, is one of the four internationally notifiable diseases named in 2005 international health regulations and every single case of poliomyelitis caused by poliovirus not derived from a vaccine must be reported. In addition, there is a wide network that surveys the world to pick up any outbreak. The polio network is also used to analyse other diseases that are likely to cause epidemics but can be prevented through vaccination. Examples include influenza, measles, meningitis, rubella, and yellow fever.

A safer world, therefore, needs all countries to remain alert and ready to respond to any outbreak effectively and in a coordinated way. This is vital to rid the world of polio and to guard against the accidental or deliberate release of the virus once it is eradicated in nature.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 4: Learning lessons, thinking ahead, "Managing the risks and consequences of the international spread of polio", p.54-55 [see <http://www.who.int/whr/2007/chapter4/en/index.html>]

8. Conclusion: strengthening global health security

8.1 What strategy would strengthen global health security?

With rare exceptions, threats to public health are generally known and manageable. Some public health emergencies, however, such as outbreaks of AIDS, dengue and other infectious diseases, could have been prevented or better controlled if the health systems concerned had been stronger and better prepared.

Global public health security depends on all countries being well-equipped to detect, investigate, communicate and contain events that threaten public health security whenever and wherever they occur. However, some countries, mostly in sub-Saharan Africa and South-East Asia, are struggling to provide even basic health security to their populations because they lack resources, or because their health infrastructure has collapsed as a consequence of under-investment, shortages of trained health workers, conflicts and wars, or a previous natural disaster. These constraints pose significant challenges to all countries, WHO, and its partners in global public health security.

No single country – however capable, wealthy or technologically advanced – can alone prevent, detect and respond to all public health threats. Global cooperation, collaboration and investment are necessary to ensure a safer future. This involves not only cooperation between different countries but also between different sectors of society such as governments, industry, public and private financiers, academia, international organizations and civil society, all of whom have responsibilities for building a global public health security.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Chapter 5: Towards a safer future, "Managing the risks and consequences of the international spread of polio", p.57-65 [see <http://www.who.int/whr/2007/chapter5/en/index.html>]

8.2 What specific steps would improve global health security?

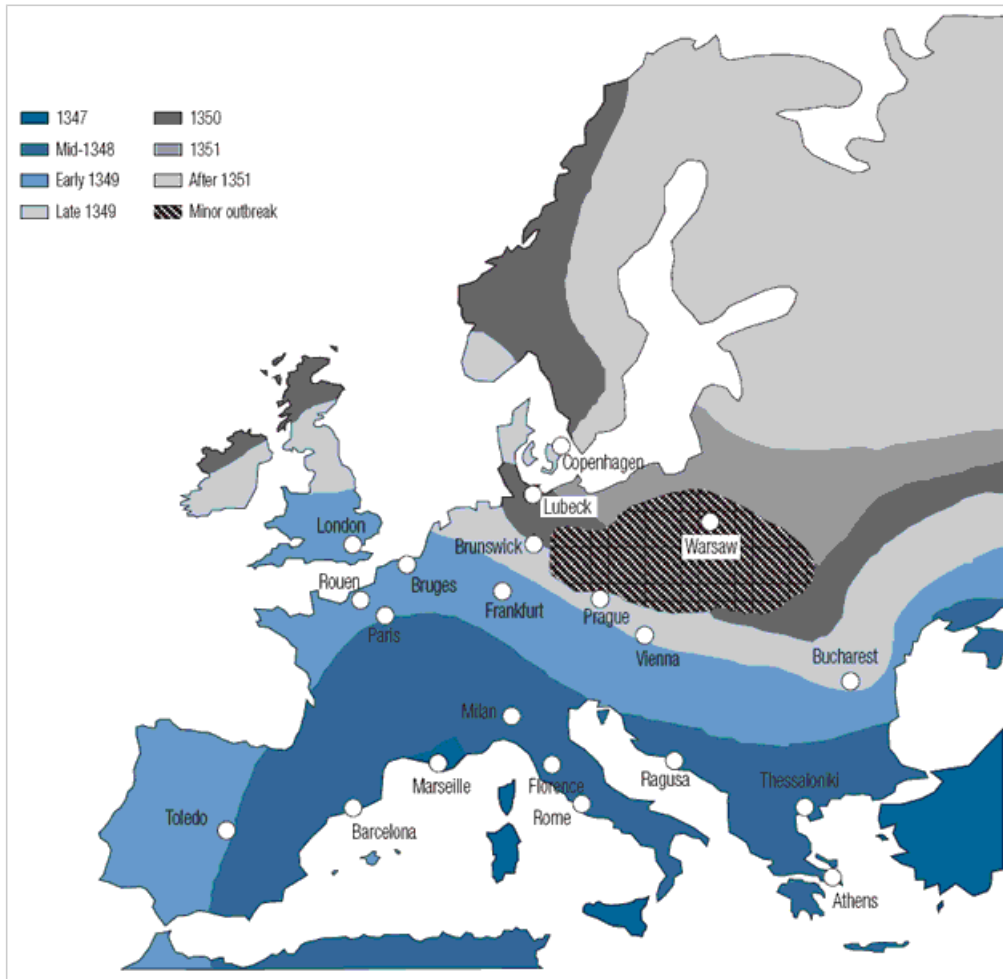
To make global public health security possible, the WHO makes the following recommendations:

1. Full implementation of the 2005 International Health Regulations by all countries.
2. Global cooperation in surveillance and outbreak alert and response between governments, United Nations agencies, and all stakeholders.
3. Open sharing of knowledge, technologies and materials, including viruses and other laboratory samples, necessary to optimize secure global public health.
4. Countries need to strengthen their own systems so that they can predict and respond to any emerging dangers. In addition, nations need to help improve the public health infrastructure of all countries.
5. Cross-sector collaboration within governments. The protection of global public health security is dependent on trust and collaboration between sectors such as health, agriculture, trade and tourism.
6. Increased global and national resources for the training of public health personnel, the advancement of surveillance, the building and enhancing of laboratory capacity, the support of response networks, and the continuation and progression of prevention campaigns.

This text is a summary of: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007), Conclusions & Recommendations, p.66-67 [see <http://www.who.int/whr/2007/conclusion/en/index.html>]

Annex

Annex 1: Spread of bubonic plague in Europe



Source: WHO, World Health Report 2007 – A safer future: global public health security in the 21st century (2007) [see <http://www.who.int/whr/2007/en/index.html>], Chapter 1: Evolution of Public Health Security, p.3

Partner for this publication

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