

MICROBES WITHOUT BORDERS: KEY FACTS ON INFECTIOUS DISEASES IN EUROPE

**Highlights from ECDC's annual report
on infectious diseases in Europe**



“Ever since it became operational in May 2005 one of the key tasks of ECDC has been to provide the European Commission and Member States with the high quality scientific evidence they need in order to make good policy decisions. This report is a major delivery of scientific evidence from ECDC.”

Markos Kyprianou, European Commissioner for Health

“This report analyses ten years’ worth of surveillance data from across the European Union (EU) and although it is clear that the systems themselves need strengthening to improve the data, a number of challenges are clearly evident. The ECDC – with the involvement of its many partners at both national and EU level – will work hard to ensure that these challenges are met.”

Zsuzsanna Jakab, Director of ECDC

ECDC AND EU-WIDE DISEASE SURVEILLANCE

This brochure, and the full *Annual Epidemiological Report* on which it is based, analyses data on infectious diseases reported to different EU disease surveillance networks, to the Statistical Office of the European Communities (Eurostat) and directly to ECDC. The full report analyses the trends for the 49 most important diseases in the 25 countries that were EU Member States in 2005 and the three EEA/EFTA countries (Iceland, Lichtenstein and Norway). This brochure gives a summary of the key findings. The full *Annual Epidemiological Report on Communicable Diseases in Europe* is available on ECDC's website (see address below).

Surveillance of infectious diseases has been going on for decades, even centuries, in most European countries. However, the involvement of the EU in this area is comparatively recent. The first EU-funded surveillance network was established in 1984 to produce Europe-wide data on the spread of HIV, the virus that causes AIDS. The success of the EuroHIV network led to the creation of networks to conduct Europe-wide surveillance on other infectious diseases.

By 2005, when the data used in this report was generated, there were 17 EU-funded networks carrying out such surveillance. The growth of EU-wide data collection and surveillance on infectious diseases has indeed been one of the success stories of EU public health policy. But by the beginning of the 21st century, it was also becoming apparent that this surveillance needed to be put on a firmer footing, and the variability of the quality of some of their data properly addressed. Rather than having networks funded as a series of projects looking at individual diseases, or groups of diseases, a central agency was needed to coordinate all the activities and take a strategic view of how they should develop. This was one of the main reasons why ECDC was created. One of ECDC's core tasks is to put in place a more systematic approach to European-level disease surveillance, and to ensure that full use is made of the results of European-level surveillance. Work is underway on both.

A number of the activities carried out by the networks are being integrated into ECDC, and from 2007 Member States will report their data into a single EU-level surveillance database hosted by ECDC. In terms of ensuring that European-level data is made use of, this document and the longer report on which it is based, aim to make the accumulated data from the past 10 years accessible and understandable to a wide audience.

About ECDC

The European Centre for Disease Prevention and Control is an EU agency tasked with reinforcing Europe's defences against infectious disease by identifying, assessing and communicating current and emerging threats to human health. In carrying out its mission, ECDC works closely with national disease control organisations, EU-level authorities and international organisations, encouraging cooperation and the pooling of knowledge. Key areas of activity are providing scientific advice, strengthening Europe-wide disease surveillance and supporting preparedness and response to disease outbreaks. ECDC became operational in May 2005 and has its headquarters in Stockholm.

Postal address:
ECDC, 171 83 Stockholm, Sweden

Visiting address:
Tomtebodavägen 11A
Karolinska Campus,
Solna, Sweden

Phone: +46(0) 8 5860 1000
Fax: +46(0) 8 5860 1001
info@ecdc.europa.eu
www.ecdc.europa.eu



WHAT THREAT DO INFECTIOUS DISEASES POSE TO PEOPLE IN EUROPE?

Infectious diseases are caused by micro-organisms – such as bacteria, viruses or fungi – that invade the human body and multiply inside it. Micro-organisms can infect people via a number of different routes. They can be present in the air we breathe, the water we drink or the food we eat. People can pick up micro-organisms from contact with other people, animals, plants or even from the invisible dirt on everyday objects.

EU countries have generally been very successful in fighting infectious diseases. Standards of hygiene are high in EU countries, compared to most international counterparts. Member States have good public health systems. National vaccination campaigns have controlled, and in some instances nearly eliminated, various diseases.

Infectious diseases – the major threats

- The most important disease threat in Europe is from micro-organisms that have become resistant to antibiotics. Infections with such bacteria are a huge and rapidly growing problem in our hospitals. They are also a growing problem outside hospitals, as people are catching them in the wider community. Every year, around three million people in the EU catch a healthcare-associated infection, of whom approximately 50 000 die.
- Over 28 000 new cases of HIV/AIDS were reported in EU countries in 2005. The total number of people living with HIV in the EU is estimated to be around 700 000. Of these people, some 30% – around 200 000 – do not know they have HIV.

Doctor and patient look at X-ray on lightbox. Chest X-rays are used to diagnose tuberculosis.



For most of the 49 diseases looked at by ECDC for this report, rates of infection have either fallen or remained stable over the past 10 years, and the majority of deaths in EU countries are caused by non-infectious diseases such as cancer and heart diseases.

That said, the threat posed by infectious diseases cannot be underestimated. Every year in EU countries infectious diseases cause tens of thousands of deaths, many millions of lost work days and untold pain and suffering. Moreover, micro-organisms adapt and change, with the result that new diseases can and do emerge. We saw this with HIV/AIDS in the 1980s, variant Creutzfeldt-Jakob Disease in the 1990s, and SARS in 2003.

- Nearly 60 000 cases of tuberculosis (TB) were reported in the 25 EU Member States in 2005. TB cases are rising among vulnerable groups such as migrants and HIV-positive people. Cases of drug resistant TB, which are very difficult or even impossible to treat, are being seen across the EU, but particularly in the Baltic States.
- Each winter, hundreds of thousands of people in the EU become seriously ill as a result of seasonal influenza. Of these, several thousands will die in an average influenza season, often unnecessarily as effective vaccines are available for the risk groups.
- Pneumococcus, a bacterium causing pneumonia and meningitis (but also milder infections), is another major killer. Effective vaccines are available against pneumococcus.

ANTIMICROBIAL RESISTANCE AND HEALTHCARE-ASSOCIATED INFECTIONS

Antimicrobial resistance is one of the most serious public health problems, globally and in Europe. If the current rise in drug resistance among microbes is not halted, mankind will lose one of its most important weapons against infectious diseases. The problem of drug resistance is complex and results from the over-use or inappropriate use of antibiotic and antiviral drugs; the spread of drug-resistant microbes, particularly in hospitals, clinics and care centres; and a shortage of new antibiotic drugs

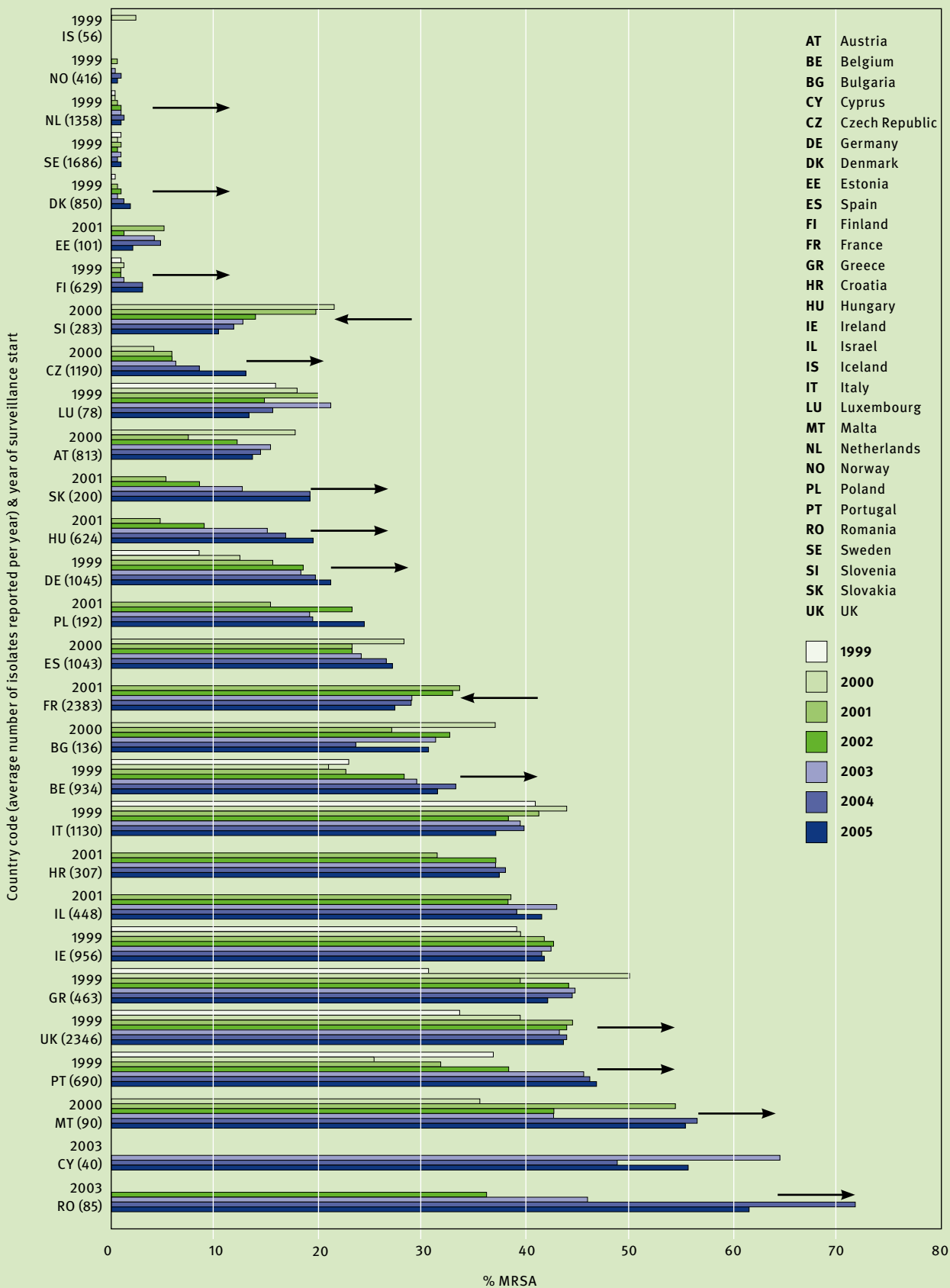
The drug-resistant microbe that has received most attention in recent years is methicillin-resistant *Staphylococcus aureus* (MRSA), which has become a healthcare problem in most Member States. MRSA is on the rise almost everywhere. An increasing proportion of all serious *Staphylococcus aureus* infections are caused by the drug-resistant strain of the microbe (i.e. MRSA), and only two Member States seem to have been able

to reverse this trend. However, drug resistance has become a major problem in a number of other diseases, including the big global killers HIV, tuberculosis and malaria. New drug-resistant microbes have also emerged, such as drug-resistant strains of the microbe *Clostridium difficile*.

A key factor for the development of antimicrobial resistance is the amount of antibiotics being used. Detailed data on antibiotic usage and consumption patterns can be difficult to obtain. Nonetheless, it is difficult to understand why the amount of antibiotics consumed per inhabitant varies three-fold between Member States.

However, the problem with healthcare-associated infections is larger than the resistance problem, and it is estimated that there are three million such infections and 50 000 deaths attributable to them each year in the EU.

Trends in *Staphylococcus aureus*: methicillin-resistance by country 1999–2005

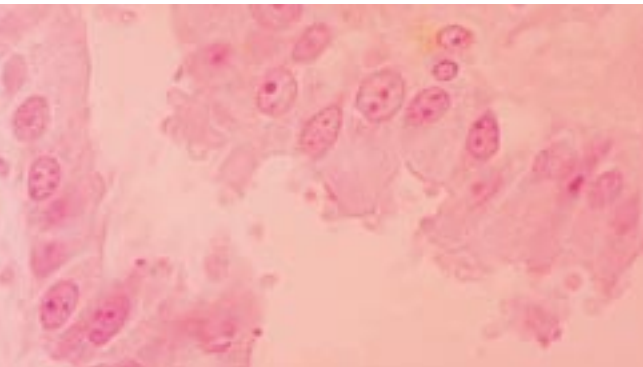


Note: Data from all 31 countries reporting to the EARSS network. Only the countries that reported 20 isolates or more per year for at least three years were included. The arrows indicate the significant trends.

Source: EARSS

HIV INFECTION, SEXUALLY-TRANSMITTED INFECTIONS (STI) AND BLOOD-BORNE VIRAL INFECTIONS

An estimated 700 000 people were living with HIV in the EU in 2005. The majority of newly diagnosed HIV infections in the EU were seen in immigrants from countries with a generalised HIV epidemic (mainly in sub-Saharan Africa) and in men who have sex with men. Infection through injecting drug use (IDU) seems to be declining slowly in all EU countries, albeit from very high levels in some of the new Member States. It is estimated that 30% of those currently infected with HIV in the EU are unaware of their infection. Strong efforts must therefore be made to encourage more people to take HIV tests.



Histopathology of a patient with AIDS

Gonorrhoea incidence seems to have peaked in most EU countries just after 2000, and is now on a steady level or declining slowly. Syphilis is mostly spread between men who have sex with men, and rates have generally increased since the end of 1990s. Only around half of the Member States currently report Chlamydia infection, but in these it seems that incidence has been going up over the last decade. Chlamydia is different from the other STIs in that it mostly affects young people not belonging to any easily identifiable risk group.

Rates of hepatitis B have declined in the EU over the past 10 years. The infection remains concentrated in migrants from high-prevalence countries and in people whose activities place them at high risk of becoming infected, such as injecting drug users and people with multiple sex partners. Hepatitis C is the most common form of viral hepatitis in the EU. The epidemiological situation in the EU is largely unclear, due to lack of comparable national surveillance data. The disease appears to be mainly a problem among injecting drug users, but some spread in hospitals has also been observed. An increase in long-term complications such as liver cirrhosis and cancer, which often only occur 25–35 years after infection, is likely. There is a need for better EU-wide data on hepatitis B and C.

New HIV diagnoses per million population, WHO European Region, cases reported in 2005



RESPIRATORY TRACT INFECTIONS

The threat of avian influenza and its potential for starting a pandemic was a main concern in 2005, with human cases reported in Turkey, one of the EU's next door neighbours. However, there have not yet been any human cases of H5N1 actually within the EU or EEA/EFTA countries.

The epidemics of seasonal influenza in the 2004–05 and 2005–06 winter seasons were of 'medium' size in the EU. Coverage of influenza vaccine in high-risk groups (basically those aged 65 years or older, and patients with chronic heart or lung disease) seems to vary greatly between EU Member States. For influenza, the main problems are the further pandemic preparedness planning, and the need to increase coverage with the 'normal', seasonal vaccine.

Tuberculosis incidence is declining in the indigenous populations in almost all Member States. In these countries, it is now mostly a disease of old people, being re-activated after a primary infection many decades ago. This decline is also seen in the 10 Member States that joined the EU in 2004, although starting from a higher level than in the EU-15 countries. However, migrants to the EU from countries with a large tuberculosis problem (for example, sub-Saharan Africa, parts of Asia and eastern Europe) retain their risk of developing tuberculosis

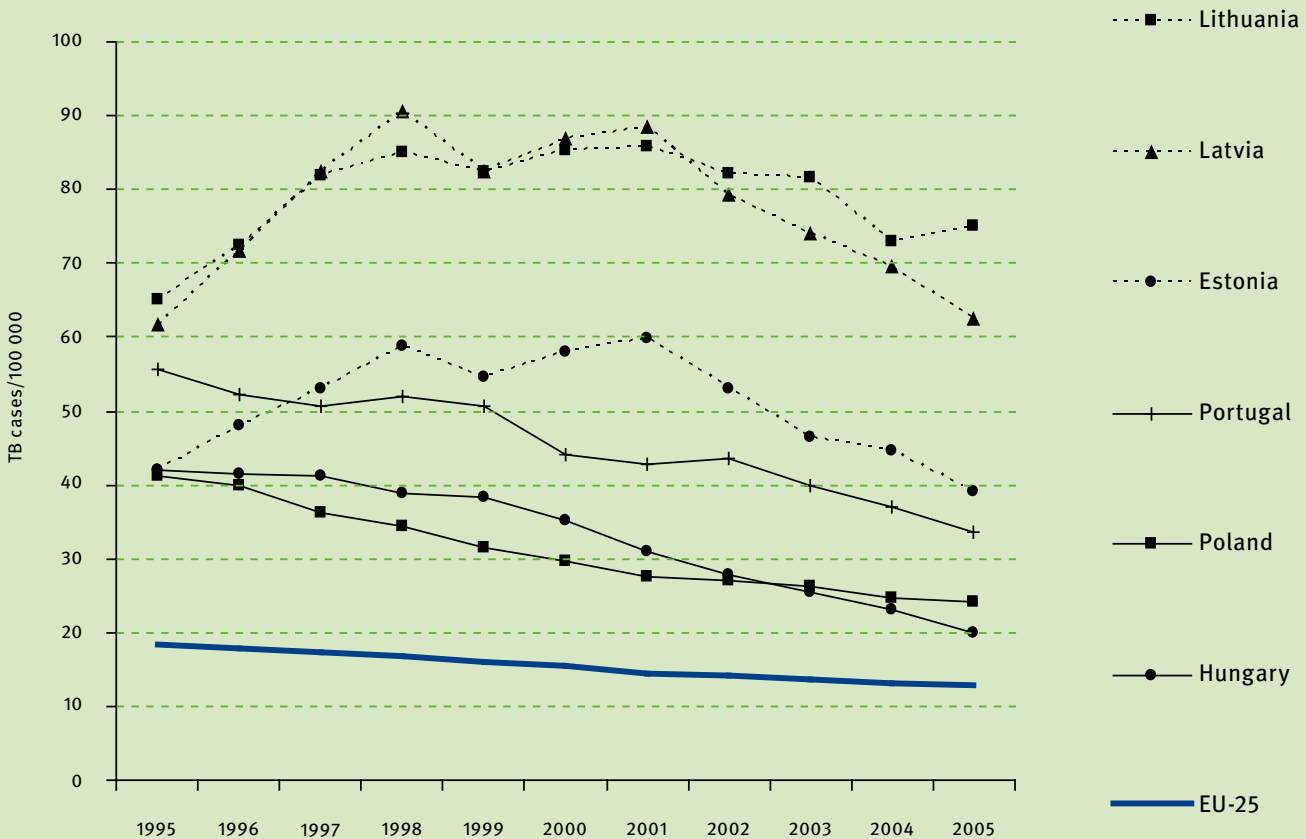


Respiratory infections can be spread by airborne droplets when people sneeze

even after moving to the EU. Although tuberculosis is slowly declining in the EU, there are some countries with high levels of drug-resistant tuberculosis. These countries are acting to address the problem.

The expanding use of cooling towers in European cities and the parallel development and steady growth of mass tourism have resulted in several large outbreaks of Legionnaires' disease (legionellosis). Legionellosis incidence increased steadily between 1996 and 2002, but has since stabilised. Legionellosis affects mainly elderly people and men.

Tuberculosis in countries with more than 20 cases per 100 000 per year and overall figures for the EU-25 countries, 1995–2005



Source: EuroTB

VACCINE-PREVENTABLE DISEASES

Several of the most serious vaccine-preventable diseases (VPD) are now almost eliminated from the EU. There have been no cases of polio occurring in the EU since 1992, only a few cases of diphtheria are still being reported from a few Member States and reported tetanus rates are around one per million or lower.

Measles and rubella continue to show a steady decline in the EU, but mumps has been rising since 2002. The MMR vaccine, which protects infection from these three diseases, has not had uniform coverage. Serious infections with *Haemophilus influenzae* type b has declined in most countries that have introduced this vaccine. For pertussis (commonly known as whooping cough), incidence seems to be rising slightly across the EU as a whole, and there are indications that the vaccination programmes may not be having the intended effect of preventing death in small infants.

There are two serious bacterial infections for which vaccines are available, but not routinely used in most Member States – invasive pneumococcal infection and meningococcal meningitis. Rates for invasive pneumococcal infection seem to have remained stable across the EU, but this is a serious infectious disease causing several thousand deaths each year, primarily in the very young and the very old.



All EU countries have national vaccination programmes, and these have been successful in reducing the incidence of many diseases

Meningococcal disease (often with meningitis) is a very serious infection receiving high public attention. Good vaccines are only available for one of the two main types commonly seen in Europe, but these vaccines are still being introduced in some Member States. The vaccines are generally very efficient, and the national vaccination programmes across the EU – even if they differ in the way they operate – are all designed to give good protection.

A number of new vaccines have recently been licensed, or are near to being licensed. These include vaccines against varicella (chickenpox), human papilloma virus (HPV), and rotavirus. Decisions will need to be taken on whether and how to use these vaccines. Where they are introduced, their impact on public health will need to be monitored and evaluated. The main challenge for all these diseases is to further improve vaccine coverage even in hard-to-reach groups of the population.

Measles trends in EU-25, Norway and Iceland, 1995–2004



Source: Eurostat

FOOD- AND WATERBORNE INFECTIONS

Mass catering, intensified farming, industrial food production, and a largely international food market have created new, wide-ranging pathways for disease. Large transnational food-borne outbreaks are difficult to prevent and control. Effective prevention and control require close collaboration between all public health officials, including public health, veterinary, and food safety authorities.

Campylobacter is the most commonly diagnosed food-borne bacteria in the EU, and appears to be increasing over time. For two other important infections – salmonellosis and shigellosis – there seems to be a general downward trend in the EU. Although the majority of people who become ill with Campylobacter and Salmonella infections do not require any drug treatment, some serious infections do occur. Hence, the monitoring of antibiotic resistance is important and should be included in the surveillance. Cryptosporidium has caused waterborne outbreaks in several Member States.

Besides these, there are several food- or waterborne infections that are either mainly of regional concern (brucellosis, echinococcosis, trichinellosis), or that are usually not dangerous to healthy adults, but which may cause serious infections in the immuno-compromised, in the foetus or in the very young

(listeriosis, toxoplasmosis). Indications are that listeriosis has been increasing since the late 1990s, but for toxoplasmosis the data are quite unreliable.

Hepatitis A is declining in the EU, but this also means that more and more people remain susceptible to this virus, and smaller outbreaks are still seen in several countries.

Norovirus and rotavirus infections are not reportable in the EU, but both are significant causes of gastroenteritis across the region. It may be that outbreaks caused by norovirus in schools, hospitals and cruise ships are increasing. The true size of this problem is difficult to ascertain: even the best national surveillance systems miss the majority of cases – namely those patients who do not seek health care for their gastroenteritis. Gathering data on these diseases remains important, to discover and – in the best case – stop an outbreak. Even more importantly, there is a need to identify weaknesses in food (and water) processing and handling that could guide future improvements.



Agar-filled Petri dish with microbiological probes

Trends for campylobacteriosis in EU, 1995–2004



Source: Eurostat

OTHER DISEASES OF ZONOTIC AND ENVIRONMENTAL ORIGIN

The most important of the diseases in this group are tularaemia, puumala virus infections, borreliosis and tick-borne encephalitis (TBE). Of these, only tularaemia is currently under EU surveillance. This is a disease mainly transmitted by contact with wild animals (e. g. hares, rabbits) and is seen in northern and sparsely populated areas of central Europe. Outbreaks are generally intermittent and trends are difficult to describe. Puumala virus infection (nephropathia epidemica) could also have a haemorrhagic outcome, but is seldom reported as such to the EU.



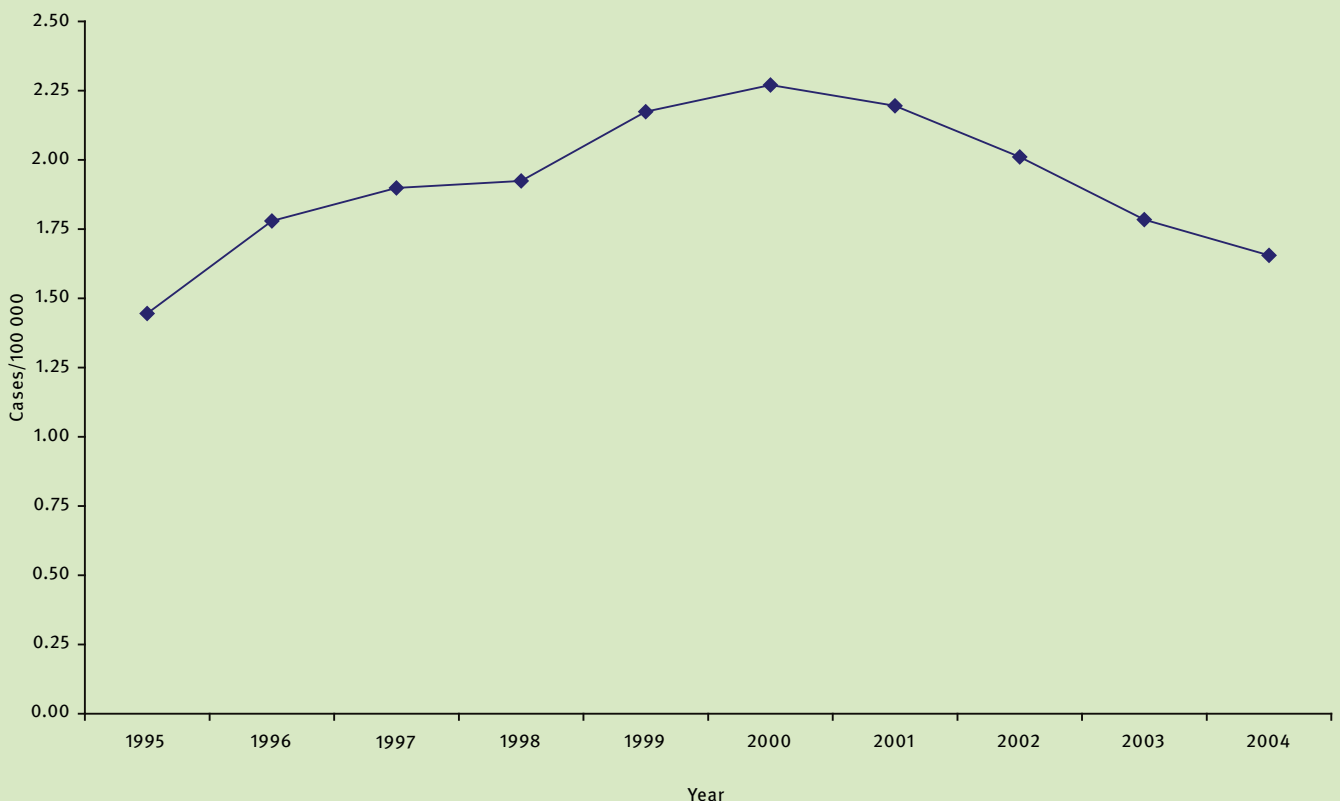
Anopheles funestus (pictured drinking blood from a human) is one of the mosquito that spreads malaria

A number of exotic diseases, such as viral haemorrhagic fevers, malaria and plague should be reported to the EU network, but on the rare occasions that cases of these diseases are found in the EU they are almost all imported. Few of these diseases pose any major public health threat to the EU citizens – at least if they stay at home – but some of them are outbreak-prone. Outbreaks in other parts of the world, or individual cases imported in the EU, usually attract significant media attention. It is therefore important to investigate these cases and understand how infection occurred in order to give adequate information to EU citizens.

Environmental, ecological and climatic changes contribute to the emergence and transmission of vector-borne diseases (e. g. diseases carried by ticks or mosquitoes), some of them imported from regions where they are endemic. The effect of global warming on Europe in the years ahead may increase this danger.

Imported cases through travel need to be monitored, in particular regarding diseases such as malaria, chikungunya and yellow fever, where there is some risk of them becoming established in the EU, and highly infective diseases such as ebola and other viral haemorrhagic fevers.

Trends for malaria in EU-25, Norway and Iceland 1995–2004



Source: Eurostat

CONCLUSION

The incidence of most of the 49 diseases analysed by ECDC when writing this report has either declined or remained stable over the past 10 years. Public health systems in the EU are generally good at fighting infectious diseases. For example, their vaccination programmes have succeeded in reducing the incidence of diseases such as measles and rubella. Some diseases, such as polio, have effectively been eliminated in the EU: there have been no cases occurring here since 1992. Diphtheria and tetanus have become very rare (incidence below 1 case per million).

Nonetheless there is no room for complacency. Not all the trends identified are positive. For example, the number of cases reported of certain gastric infections (e.g. *Campylobacter*, Norovirus) and certain STIs (HIV, Chlamydia) has increased. Our knowledge of how infections spread and what level of threat they pose is far from perfect. New infectious diseases can emerge without warning. Existing viruses and bacteria can adapt or mutate. This means that any let up in prevention and control efforts can allow diseases to re-emerge.

The key areas of concern highlighted in the ECDC report are:

- Rising rates of healthcare-associated infections and antimicrobial resistance (inside and outside the hospitals)
- The continued threat from tuberculosis in Europe
- The threat posed by influenza and pneumococcal infections
- Rising rates of HIV infection and other STIs

Healthcare-associated infections, particularly those caused by drug resistant microbes, are highlighted as possibly the biggest infectious disease challenge facing the EU. The EU and its Member States are acting to further strengthen prevention and

control of infectious diseases. ECDC was created specifically to facilitate this work. Among the key actions ECDC is taking are working with Member States and the European Commission to:

- Improve the quality and comparability of disease surveillance data
- Reinforce the EU's early warning systems against disease outbreaks
- Identify evidence-based good practice in disease prevention and control

Further information about infectious diseases

If you would like to read the full ECDC Annual Epidemiological Report – or if you would like a longer analysis of its key findings – please visit:

http://ecdc.europa.eu/Publications/2007_AER.html

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Postal address:
**ECDC – European Centre for
Disease Prevention and
Control**
171 83 Stockholm, Sweden

Visiting address:
Tomtebodavägen 11A
Solna, Sweden

Phone: +46(0) 8 5860 1000
Fax: +46(0) 8 5860 1001
info@ecdc.europa.eu
ecdc.europa.eu

An agency of the European Union
www.europa.eu



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