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EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

ANNUAL EPIDEMIOLOGICAL REPORT ON COMMUNICABLE DISEASES IN EUROPE

REPORT ON THE STATUS OF COMMUNICABLE DISEASES IN THE EU AND EEA/EFTA COUNTRIES

EXECUTIVE SUMMARY

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FOREWORD TO THE FIRST ANNUAL EPIDEMIOLOGICAL REPORT ON COMMUNICABLE 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.

The Centre has produced the first ever comprehensive analysis of the threat posed by communicable diseases in the EU. As the ECDC Director points out in her Preface, much of the data has come from networks, funded by the European Commission over the past decade, that have conducted surveillance on specific diseases or groups of diseases. The great value of this report is that data from numerous EU-level sources has been pulled together, standardised as far as possible, compared and analysed. The report is a remarkable document, the product of many thousands of hours of scientific work, and deserves to be read with care in ministries of health and public health institutes across the EU, as well as in the European Commission.

The epidemiological analysis contained in it will be a key tool for setting priorities on disease prevention and control for years to come. While for many of the 49 diseases examined the 10-year trend in the EU is either stable or declining, there are some clear pointers to challenges ahead. These need to be acknowledged – and acted on.

Perhaps the biggest challenge we face is the emergence of new microbes against which our defences are weak, or even non-existent. The threat of an influenza pandemic, which could be caused if one of the existing flu viruses were to mutate into a new super-virulent strain, has received much attention in the past two years. Rightly so. The world saw three such pandemics in the 20th century, and we know a 21st century pandemic could cause massive suffering and social disruption if we are not properly prepared. Pandemic preparedness is, and must remain, a priority for the EU. But deadly new microbes can also emerge in less spectacular ways. Healthcare-associated infections have become a major issue of concern in the EU, with many of these caused by new or emerging drug-resistant microbes. I note with concern that one in every 10 patients entering hospital in the EU will catch an infection there. Supporting action to address this problem will be a priority for the Commission and for ECDC in the coming year.

HIV/AIDS and tuberculosis must be priorities for health policy makers in the EU. While the incidence of these diseases across the EU is low by international standards, the overall number of infections for both runs to tens of thousands each year. New diagnoses of HIV are rising across the EU, while tuberculosis cases have risen among certain vulnerable groups. That is why, in March this year, I asked ECDC to develop an action plan on tuberculosis in the EU and to help the Commission and Member States identify good practice in HIV prevention.

The next few years will be important for the development of EU-level public health capacity. ECDC is set to more than double its staff over the next two years, with the new EU Public Health Programme becoming fully operational at the same time. New resources are available for the prevention and control of communicable diseases, and it is vital – both for the EU and its citizens – that these resources are used to maximum effect. This and future similar reports will help us ensure that.

Markos Kyprianou
European Commissioner for Health

PREFACE TO THE FIRST ANNUAL EPIDEMIOLOGICAL REPORT ON COMMUNICABLE DISEASES IN EUROPE

The European Centre for Disease Prevention and Control (ECDC) was established by the European Parliament and Council to identify, assess and communicate current and emerging threats to human health from communicable disease. This First Annual Epidemiological Report on Communicable Diseases in Europe will be one of a variety of mechanisms that we intend to use to better communicate our assessment of the emerging threats of communicable disease.

This report attempts to give a broader perspective of the present EU context, including crude trends of the main communicable disease determinants, such as the social and demographic contexts or the variability of surveillance systems. It also presents a brief epidemiological analysis of each of the main diseases, based on available data, and then provides a highlight of the main issues and threats. It concludes with our views on the broad actions required to deal with these issues in order to minimise their burden and impact.

Of course, this first ever report is still some way from what we would like to produce. One needs to bear in mind that while this report was being designed, created and prepared, ECDC was still in the process of developing a new centralised European surveillance database (the TESSy), we were focusing heavily on recruitment of a critical mass of surveillance personnel, organising the evaluation of the dedicated surveillance networks (DSNs) and working on managing the delicate transfer of their various databases to ECDC, not to mention many other start up activities that, once completed, will have a major influence on the contents, quality and layout of future editions of the Annual Epidemiological Report.

This report relied on data originally reported to the Basic Surveillance Network (BSN), but which was then confirmed by the national authorities, for the more detailed description for the year 2005, and from Eurostat for trend analyses for 1995–2004. These sources were complemented with data and information from several other sources, including the EU-funded dedicated surveillance networks and a number of publications from scientific journals. An extensive data validation exercise was also carried out with all the contributing countries to ensure that the base data used was as accurate as possible and for this I thank our country counterparts for their selfless efforts and serious commitment. Despite this, we recognise that the problem of producing reliable communicable disease data from all Member States at this time, that is valid for genuine comparisons, is longstanding and complex. The wide variability in the effectiveness of the present surveillance systems, the differences in prioritisation of resources for surveillance, but also in basic matters such as clinical traditions to obtain cultures (or similarly push for confirmation of diagnosis) from patients, make it meaningless today to try to directly compare these figures between countries. We know that countries with good, enhanced or mandatory surveillance systems in place often appear to have higher incidences of diseases, possibly putting their public health services in a poorer light when compared to other countries where the surveillance of disease is a lower priority activity and given less effort. Still, we present this data, as we feel that certain trends and conclusions are still very valid and should be carefully considered by epidemiologists, public health planners, health service managers, policy makers and politicians.

My team has invested many thousands of hours in producing this first report. We agree that this experience confirms that the surveillance of communicable diseases in the European Union must be improved. There are huge differences of accuracy – and therefore usefulness – of the reported data, both between diseases and between Member States. I believe that this is one of the main challenges for ECDC to address. We know that over the next few years we will see the overall public health capacity in the EU grow significantly. On our part I will ensure that ECDC will be investing significant resources to ensure that the EU-wide deficiencies with comparability of surveillance systems and their response capacity will be reduced to the benefit of us all. Apart from the obvious direct benefits of more reliable data for the countries themselves, these improvements will help at the European level and should become clearly evident to all in the improved scientific excellence of future editions of our Annual Epidemiological Report on Communicable Diseases in Europe.

Zsuzsanna Jakab
Director, ECDC
May 2007

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AMR	Antimicrobial resistance
BCG	Bacille Calmette-Guérin
CCHF	Crimean-Congo haemorrhagic fever
DSN	Disease-specific network
EARSS	European Antimicrobial Resistance Surveillance System
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EEA	European Environment Agency
EFSA	European Food Safety Authority
EFTA	European Free Trade Association
EISS	European Influenza Surveillance Scheme
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
EMEA	European Medicines Agency
ENIVD	European Network for Diagnostics of Imported Viral Diseases
ENTER-NET	International Surveillance Network for the Enteric Infections
EPIET	European Programme for Intervention Epidemiology Training
ESAC	European Surveillance of Antimicrobial Consumption
ESSTI	European Surveillance of Sexually Transmitted Infections
EU	European Union
EU IBIS	European Union Invasive Bacterial Infections Surveillance
EuroHIV	European Centre for the Epidemiological Monitoring of AIDS
EuroTB	Surveillance of Tuberculosis in Europe
EUVAC.NET	Surveillance Community Network for Vaccine Preventable Infectious Diseases
EWGLI	European Working Group for Legionella Infections
EWRS	Early Warning and Response System
FETP	Field Epidemiology Training Programmes
FSU	Former Soviet Union
GNP	Gross National Product
HAART	Highly active anti-retroviral therapy
HBV	Hepatitis B virus
HCAI	Healthcare-associated infection
HCV	Hepatitis C virus
Hib	Haemophilus influenzae type b
HIV	Human immunodeficiency virus
HPV	Human papilloma virus
IDU	Injecting drug users
IPSE	Improving Patient Safety in Europe
LGV	Lymphogranuloma venereum
MDR	Multi-drug resistance
MMR	Measles mumps & rubella
MRSA	Methicillin-resistant Staphylococcus aureus
PLHIV	People living with HIV
SARS	Severe acute respiratory syndrome
SARS-CoV	SARS-associated corona virus
STI	Sexually transmitted infection
TB	Tuberculosis
vCJD	Variant Creutzfeldt-Jakob disease
VHF	Viral haemorrhagic fevers
VPD	Vaccine preventable disease
VTEC	Verocytotoxin-producing Escherichia coli
WHO	World Health Organization
WHO EURO	WHO European Region
WNV	West Nile virus
XDR	Extensively drug resistant
YFV	Yellow fever virus

INTRODUCTION

The aim of this report is to give an overview of the situation of communicable diseases in 2005 in the 25 EU countries and the three EEA/EFTA countries (Norway, Iceland and Liechtenstein). The report also examines the social and demographic context over the last decade in order to make action proposals for decision makers to strengthen prevention, control and surveillance in the Europe. The core of this report is an epidemiological analysis, based on available data and indicators about the trends of the communicable diseases under EU-wide surveillance.

The European Centre for Disease Prevention and Control (ECDC) was established by the European Parliament and Council to identify, assess and communicate current and emerging threats to human health from communicable disease. The founding regulation of the Centre (851/2004/EC) stipulates that the ECDC shall 'provide the Commission, the European Parliament and the European Council with an annual evaluation of the current and emerging threats to health in the Community'. In the Work Programme set out for the Centre by its Management Board for 2005–06 the mandate is wider as one of the tasks is to 'produce an annual epidemiological report that summarises the trends in communicable diseases and the outcome of investigations for outbreaks of EU concern'.

Therefore, the epidemiological report will contain data, analyses and conclusions of the main trends from surveillance data as well as the results and implications of the monitored health threats. The report is mainly based on official data for the year 2005 reported by the countries, and from Eurostat for data on trends for the years 1995–2004. This information is complemented with data from several other sources, including EU-funded dedicated surveillance networks (DSNs)[1], and relevant articles from scientific journals. References to these sources are omitted in this executive summary, but are available in the full *Annual Epidemiological Report on Communicable Diseases in Europe*. Because the data comes from various sources, the decision was taken to only include confirmed cases where the status has been specified; otherwise the official total figure has been used.

The *Annual Epidemiological Report* should serve as a tool to harness the available data for action. This Executive Summary gives an overview and outlines the patterns and trends for the most important diseases in the 25 EU and three EEA/EFTA countries. All references to 'Europe' in this summary mean these 28 countries, unless otherwise specified.

The diseases are grouped under six major headings, each with a summary of the main findings and conclusions, followed by a brief overview of each disease. We refer those that would need more detailed information to the full *Annual Epidemiological Report*.

1 The DSNs that provided data to this report are: European Antimicrobial Resistance Surveillance System (EARSS), European Influenza Surveillance Scheme (EISS), European Network for Diagnostics of Imported Viral Diseases (ENIVD), International Surveillance Network for the Enteric Infections (ENTER-NET), European Surveillance of Antimicrobial Consumption (ESAC), European Surveillance of Sexually Transmitted Infections (ESSTI), European Union Invasive Bacterial Infections Surveillance (EU IBIS), European Centre for the Epidemiological Monitoring of AIDS (EuroHIV), Surveillance of Tuberculosis in Europe (EuroTB), Surveillance Community Network for Vaccine Preventable Infectious Diseases (EUVAC.NET), European Working Group for Legionella Infections (EWGLI), Improving Patient Safety in Europe (IPSE).

THE CONTEXT

Determinants of communicable diseases in Europe

The population of the 28 countries (EU25 and EEA/EFTA) has grown from 450 million in 1995 to over 466 million in 2005. The combination of low birth and death rates are contributing to the overall ageing of Europe, with implications for general immunity in the population and the likely increasing burden of diseases that mainly affect the elderly, e.g. influenza and invasive pneumococcal infections.

The increased immigration to Europe has supplemented the active working population, but also resulted in ethnic, cultural and language diversity, which need to be taken into account in designing prevention and control strategies against communicable diseases. There has been some concern over the risks involved following the influx of persons infective with communicable diseases via immigration. However, the experience so far has been that the main risk is the emergence of immigrant subpopulations that are more susceptible to outbreaks of epidemic infections.

Cities are the main environments for a majority of the European population. Over the last decades, urbanisation and migration have resulted in the emergence of impoverished inner-city areas in many European cities. Without active intervention, these areas can come to play a significant role in the outbreak and spread of many communicable diseases.

Tourism is one of the most important economic sectors in many European countries, contributing to both community and national development. However, the increased intensity and volume of travel has also resulted in greater vulnerability to the transmission of old, new, and re-emerging infectious diseases. Additionally, the steep increase in global travel will likely result in an increased importation of tropical and other infections via returning travellers. A specific risk group comprises European residents with roots in other parts of the world visiting friends and relatives in their native countries. Continued globalisation results in a broader exposure to various micro-organisms, and makes the prevention and control of food-borne diseases that much more difficult.

There is a very strong correlation between low socio-economic status and the risk of communicable diseases on both an individual and group level. Although Europe continues to become wealthier overall, inequalities persist, between as well as within the countries, and 15% of the EU citizens are regarded as being poor. Other important socio-economic determinants for communicable diseases are crowding (in homes and institutions), work-related stress, and homelessness. Interventions focused on socio-economic determinants of communicable diseases are likely to be effective also in the prevention of outbreaks and spread of communicable diseases. Nomadic and semi-nomadic populations, like the Roma, constitute a known vulnerable subpopulation at considerably higher risk of outbreaks of a variety of communicable diseases.

Environmental, ecological and climate changes contribute to the emergence, maintenance and transmission of vector-borne and other infectious diseases, some of them imported from regions where they are endemic. The effect of global warming on Europe in the years ahead could increase this danger. In particular, a growing concern is the potential for the reappearance of malaria in countries where it had long been eradicated, as the malaria vectors are still present in those areas, including Europe.

Surveillance, prevention and control of communicable diseases

The actions needed to deal with communicable diseases are numerous, and implemented on local, regional, national and EU levels. The basis for both prevention and control is an in-depth knowledge and understanding of disease patterns and trends over time and place.

Surveillance of communicable diseases is the concept of having routines in place for obtaining a birds-eye view of these diseases. Changing patterns of disease distributions (e.g. outbreaks) may not be obvious on a local or regional level but become evident on a national level. The international spread of communicable diseases may not be fully discernable at a national level, hence the need for European-level surveillance systems. A central feature of surveillance is ‘epidemic intelligence’, i.e. activities aimed at detecting outbreaks and other health events, rather than single cases. In practice, however, the differences between the performance and organisation of the national systems are often so large that direct comparisons of incidences are meaningless. Some simple measures, such as additionally reporting denominator data (number of samples) where relevant, would dramatically improve the comparability of data.

Vaccination is extremely cost-efficient, and has contributed more to the improvement in public health in the last 100 years than almost any other measure. The coverage of the general childhood immunisation programmes is generally good in the EU, although pockets of low vaccine uptake, e.g. for measles, poses a risk for substantial outbreaks. More needs to be done when it comes to adult vaccination, and the uptake of seasonal influenza vaccines is generally too low. With the licensing of a number of new, expensive vaccines, a resource discussion in the vaccine field is likely to occur in the coming years.

The national capacities and resources for these tasks are generally good in Europe. There is a very strong tradition of public health in the EU, with dedicated and highly professional epidemiologists and some of the best public health laboratories in the world. However, there are large differences between the

Member States when it comes to resource allocation, and the means are often lacking in those countries with the highest disease incidences. Differences in access to health services across socioeconomic groups may further prevent effective control of infectious diseases.

Secondary prevention activities are aimed at early detection, thereby increasing opportunities for treatment of the infection and decreasing the risk of secondary transmission. Screening is either aimed at the early detection of specific diseases, e.g. HIV infection and tuberculosis (TB), or aimed more generally at finding disease in vulnerable groups such as immigrants/migrants. The practices vary a lot between the Member States, reflecting both different traditions and different epidemiological situations.

Treatment is being increasingly hampered by the rapid emergence of antimicrobial resistance (AMR). AMR is a multi-factorial phenomenon, requiring multidisciplinary control measures. Effective control also requires close cooperation between laboratory scientists, epidemiologists and public health practitioners. Within the hospitals, strict enforcement of hygiene practices is imperative for the successful fight against healthcare-related infections that are often caused by multi-resistant bacteria. As AMR is immensely costly once established, there is much to gain by implementing counter measures at a very early stage.

The resources for outbreak investigation and control differ largely between the Member States, as does the quality of the outbreak investigations. There is an urgent need for better training in analytical epidemiological methods. National Field Epidemiology Training Programmes (FETPs) as well as the European Programme for Intervention Epidemiology Training (EPIET) have been very successful in creating a European cadre of well-trained field epidemiologists. However, the limited number of persons graduating from these programmes every year will not manage to meet the growing demand. Shorter courses aimed at regional and national epidemiologists are therefore needed to complement these existing programmes.

The increasing public concern about the importance of communicable diseases has also prompted a resurgence in research in this field within the EU countries. Overall, the scientific production and repercussion index of European Union research on infectious diseases experienced a notable rise during the last decade of the 20th century.

Information is imperative for communicable disease prevention and control activities. There is a great deal of interest in discovering the best way to communicate this information to society and the decision makers. Apart from the importance of working with mass media in our growing information society, and using available internet resources (e.g. institutional websites), new ways to increase public access to relevant information should be explored, together with appropriate ways to communicate risks. Experience on how the population could participate better in prevention, surveillance and control of communicable diseases and how to increase transparency in all these communication processes can be shared for the benefit of all.

European actions and resources

Initiatives by the European Commission in the field of communicable diseases are divided between providing grants to research within the research framework programmes, and funding public health activities within the public health programmes. Commission initiatives have been essential in bringing the countries together. Under Decision 2119/98 of the Parliament and the Council and subsequent Commission Decisions, a community network was created for the epidemiological surveillance and control of communicable diseases in the Community, bringing the Commission and the Member States together in an early warning and response system (EWRS), and setting standards for EU-level surveillance of communicable diseases (with a list of diseases, case definitions, and procedures for the dedicated surveillance networks). The public health programme has also funded important infrastructural networks such as the EPIET, the scientific publication *Eurosurveillance*, and the two regional networks EpiNorth and EpiSouth, bridging neighbouring countries. However, as this network structure was deemed insufficient to cope with major crises and health threats such as severe acute respiratory syndrome (SARS) and pandemic influenza, so the ECDC was formed to provide the necessary EU-level capacity in surveillance, preparedness and response, training, and scientific advice. ECDC collaborates actively with the European institutions and other EU agencies in related fields, such as food safety (EFSA), medicines (EMEA), the environment (EEA), and drug dependency (EMCDDA).

THE EPIDEMIOLOGICAL SITUATION

Main findings

One of the main purposes of this report is to identify those diseases or disease-specific areas where further work is needed in the EU to anticipate and counter rising trends. From the available data, it is possible to estimate where the main burden of infectious diseases now lies in the Union. In these areas, further concerted action is needed in order to decrease the burden on society, on public health and healthcare systems, and to reduce human suffering.

However, the present data on which to build such conclusions are far from perfect, and one important lesson to draw from this report is that surveillance of communicable diseases in the European Union must be improved. There are huge differences of accuracy, and hence usefulness, of the reported data, both between diseases and between Member States.

For some diseases there has been significant reduction in the incidence and number of cases through concerted prevention and control action by Member States (even though levels remain high in specific population segments and risk groups). For some of these diseases further joint actions (e.g. through vaccination and similar control measures) could lead to the EU, and eventually Europe, being declared 'free' of the disease. This would ensure that EU citizens, no matter where they live or travel in the EU, will be protected from the threat of that disease. The fact that this can be done with concerted, determined and joint action of many partners has been shown most recently by Europe being declared 'polio free' by WHO, with measles as the next candidate and success story. Until such time, strict vigilance is essential to ensure that the ever present threat of infection and resurgence to previously high levels does not materialise.

Why such vigilance is important can be deduced from the overview of trends for the 49 diseases under surveillance (table 2, see page 33). Of the 49 diseases, 21 have incidence levels that are in double or triple digits per million population with half of these 21 also having rising (or steady) trends. It is of concern that three of the six communicable diseases with the highest incidence in the EU belong to this group. Rising trends are also observed for the two diseases with the highest crude incidence rates in the EU (*Chlamydia* infection and campylobacteriosis) which could in part be due to improved surveillance. In 22 diseases the age groups most affected were under 24 years, indicating that more action is needed to protect the health of our future generations. Most of the remainder (apart from TB) affect the economically active population. Of the main disease groups, the 'Zoonoses' and 'Serious imported disease' groups had the lowest incidence rates and also show decreasing trends (except for avian influenza, AMR and malaria).

Taking the above trends and other factors (such as public health impact and emerging threats) into account, it can be concluded that at present the major communicable disease threats in the EU are the following:

- **Healthcare-associated infections, with or without resistant pathogens**. The most important disease threat in Europe is posed by the micro-organisms that have become resistant to antibiotics. Infections with such bacteria are a huge and rapidly growing problem in our hospitals, but also in more everyday infections in the community. Every year approximately three million people in the European Union catch a healthcare-associated infection, of whom approximately 50 000 die.

- **HIV infection**. 28 044 new cases of HIV 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.

- **Pneumococcal infections**. This is the main bacterial cause of respiratory tract infections, with high death rates (especially in young children and the elderly) when the infection is invasive (causing bacteraemia or meningitis). Effective vaccines against invasive disease are now available.

- **Influenza** (pandemic potential as well as annual seasonal epidemics). Each winter, hundreds of thousands of people in the EU become seriously ill as a result of seasonal influenza. Of these, several thousand will die in an average influenza season, often unnecessarily as effective vaccines are available for those most at risk.

- **Tuberculosis**. Nearly 60 000 cases of TB were reported in the 25 EU Member States in 2005. TB cases countinue to rise 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.

Two further diseases have very high incidence numbers, namely *Chlamydia* infection and campylobacteriosis, both with nearly 200 000 annually reported cases (known to be an undersestimate). Even though they do not cause such serious disease as the priority diseases above, the sheer number of cases presents a huge challenge.

The report also shows that across the EU there is heterogeneity in health services organisation, in the way communicable disease prevention and control are managed and the surveillance systems (with a consequential effect on the comparability of incidence data) not to mention inherent socioeconomic differences.

Whilst the main responsibility for action obviously lies with the Member States, ECDC can assist in providing the evidence base

for action, in identifying and sharing best practice, and in suggesting methods for follow-up of interventions made.

However, more and better data and scientific studies are needed to clearly understand the relative importance of the different disease areas. Part of the ECDC's remit over the coming years is to bring more clarity to actual figures for incidence, morbidity, mortality, cost, burden, etc., and to suggest effective evidence-based prevention actions.

Most of the information will continue to rely on data from routine surveillance in the Member States. In order to interpret these data properly, one must realise that the original function of national surveillance systems was the detection of outbreaks, not to produce data for more in-depth analyses of risk factors, determinants, or burden of disease. Furthermore, most routine surveillance systems are built on the paradigm that a person is infected, falls ill, goes to see a doctor, is diagnosed, and finally the case is notified. For a large number of diseases under EU-wide surveillance, this 'classical' view does not hold at all: HIV, *Chlamydia* infection, hepatitis C, toxoplasmosis, to name just a few, are often discovered by the laboratory in asymptomatic patients either by chance, as a more or less unexpected finding in a medical investigation, or as part of a screening programme. For many of the diseases discussed in this report, national incidence figures thus often reflect activity to find asymptomatic patients rather than reflecting the 'true' incidence of infection.

This shift from a 'clinic-based' to a 'laboratory-based' surveillance has important implications. One is that the laboratory capabilities of the Member States must be brought up to the same level, another is that we need 'denominator data' for a number of such asymptomatic infections; in other words the number of tests performed, not just the number of tests found positive.

The annual costs for the health services of treating communicable diseases are significant, as indicated by country-based estimates. For example, in England, from GP consultations and hospital admissions, the costs related to communicable diseases have been estimated at £4.4 billion, increasing to around £6 billion when the two major areas of HIV/AIDS and hospital-acquired infection treatment are included. Also, a recent study in the Netherlands has estimated annual costs based on both the direct health service costs and indirect costs (i.e. the impact on sectors other than health). This study has shown that for the Netherlands (population of 16 million) in 2004 the cost attributable to norovirus was € 25.0 million, to campylobacteriosis € 22.3 million, to rotavirus € 21.7 million and to salmonellosis € 8.8 million. Extrapolated to the EU level these country estimates indicate annual costs in the EU of the order of billions of euro.

Besides the direct and indirect annual costs, the last decade has seen high profile crises such as SARS and avian influenza. In a globalised world the overall consequences of communicable diseases can be very severe and instantaneous, affecting many countries and sectors other than health. The 2003 SARS outbreak cost some countries about 1% of their economies, primarily through lost tourism and travel revenues. In the case of pandemics, no part of society and no country is immune. Country-specific outbreaks (eg vCJD and avian influenza) have also shown the huge impact on specific sectors (especially the food and agricultural sectors) with costs around €10 billion per episode in some countries.

The visible impact of these communicable diseases on the:

- health of present and future generations;
- annual and continuing costs to the health and related sectors; and
- health and cost consequences of recent high profile outbreaks,

has given a new impetus, importance and urgency to effective disease surveillance, prevention and control: not only within countries but also to collaboration between countries and between the relevant and concerned sectors.

Antimicrobial resistance and healthcare-associated infections

Summary and conclusions

Antimicrobial resistance is one of the most serious public health problems, globally and in Europe. If the present rapid negative development is not halted, mankind will soon lose one of its most important weapons against infectious diseases. This is a huge area, and proper surveillance for AMR has only just started in the EU. Such data as exist indicate that in general the problem is somewhat lesser in northern Europe, and more serious in the southern and south-eastern parts of the Union.

The bacterium that has received prime attention is methicillin-resistant *Staphylococcus aureus* (MRSA), which has become a healthcare problem in most Member States. The incidence of MRSA is upwards almost everywhere; a larger and larger proportion of all invasive *S. aureus* infections are caused by MRSA, and only two Member States seem to have been able to reverse this trend. For most other bacteria under EU surveillance the overall trend is also very worrying, and AMR is a particular concern when it comes to the global killer diseases TB, malaria, HIV and pneumococcal infections. AMR data are currently collected via several surveillance networks, and coverage across and within countries shows a lot of variation. Further, there may be big regional differences within countries, which are not visible the way the data are presented. A prerequisite to be able to follow the trends of resistance patterns is that the methodology for sensitivity testing is the same in all laboratories, that it is reliable and quality assured.

A key factor in the development of AMR is the amount of antibiotic used. Data on antibiotic consumption are difficult to obtain and come from different sources. Yet in most countries it has been possible to differentiate antibiotic usage in hospitals and outpatient settings. It has been shown that the amount of antibiotic consumed per inhabitant varies three-fold between Member States, though it is difficult to understand why.

Even less is known about the size of the problem of healthcare-associated infections (HCAI) in Europe. Surveillance of HCAI is difficult. There are problems with standardisation of HCAI, but also with reporting compliance. Several Member States do not have a system for reporting HCAI and where there is such a system it is difficult to evaluate the completeness of the data. However, it is estimated that there are three million HCAI and 50 000 deaths attributable to these infections each year in the EU, and that one patient out of 10 in EU hospitals acquires such an infection. It is therefore important to find an acceptable system for reporting HCAI.

Antimicrobial resistance and antibiotic consumption

Since their discovery, antibiotics have revolutionised the way we treat patients with bacterial infections and have significantly contributed to reducing death and morbidity from bacterial diseases. They are also absolutely essential for modern medicine. Common procedures such as transplants, chemotherapy for cancer, and even orthopaedic surgery could not be performed without the availability of potent antibiotics. Unfortunately they have also been liable to inappropriate use, often unnecessarily prescribed for viral infections. Similarly, when diagnoses are not accurately made, more often than not broad-spectrum antibiotics, i.e. antibiotics that kill a large proportion of the normal bacterial flora and not only the disease-causing bacteria, are prescribed. These examples of misuse of antibiotics promote the emergence and selection of resistant bacteria.

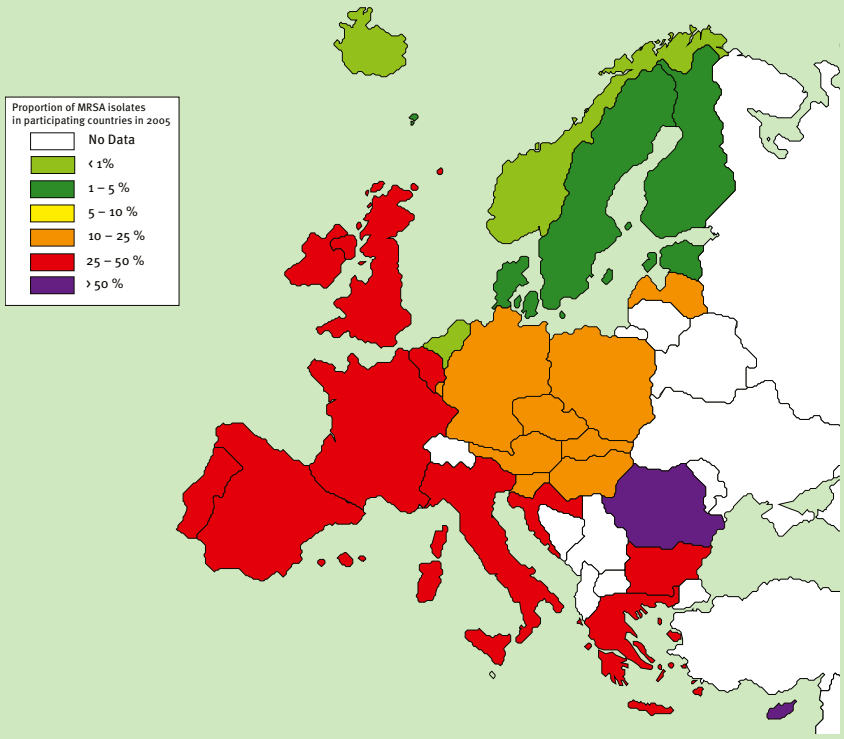
Resistance to antibiotics is a large problem in the community, but even worse in healthcare settings. Hospitals, especially intensive care units often have their own resident bacterial flora, which are often highly resistant to those antibiotics that are commonly used locally. Although not all HCAI are caused by resistant bacteria, a very large and increasing proportion is, intertwining the two problems of AMR and HCAI. Resistance has also evolved against viral (e.g. HIV, influenza), parasitic (malaria) and fungal infections, making AMR the most serious of all communicable disease threats.

Data on AMR show that in general the problem is somewhat lesser in northern Europe (Scandinavia and the Netherlands), and more serious in the southern and south-eastern parts of the Union. The bacterium that has received prime attention is methicillin-resistant *Staphylococcus aureus* (MRSA), which has become a healthcare problem in most Member States. A general increase in MRSA is occurring throughout Europe, and includes countries with high, medium, as well as low baseline figures (figure 1). However, two countries (Slovenia and France) have succeeded at significantly reducing the proportion of MRSA, thus demonstrating that this MRSA pandemic may not be irreversible.

For other bacteria under EU surveillance, such as the intestinal bacteria enterococci, *E. coli*, *Klebsiella pneumoniae*, *Campylobacter*, *Salmonella* and *Pseudomonas aeruginosa*, the overall trend is also worrying. For *Streptococcus pneumoniae* (pneumococcus), the most common bacterium causing respiratory tract infections and a major microbial cause of death in young children, the picture is more mixed, with decreasing penicillin-resistance in some highly endemic countries and increasing resistance to penicillin and other antibiotics elsewhere. Resistance is mainly confined to a few serogroups, all of which are included in the recently introduced conjugated vaccines. This suggests that vaccination of young children would represent an effective additional means of controlling antibiotic-resistant pneumococci in Europe.

The emergence of strains resistant to the two most effective agents against TB, isoniazid and rifampicin, (multi-drug resistance, MDR), as well as to other second line antibiotics (extensive drug resistance, XDR), poses a serious challenge to TB control today. Multi-drug resistant TB (MDR-TB) was present in 15–20% of cases reported by the Baltic Republics (Estonia,

Figure 1. Proportion of MRSA among invasive isolates of *Staphylococcus aureus*



Source: EARSS.

Lithuania and Latvia), but ranged from 0–6% in the rest of the countries. MDR is more frequent in previously treated cases, and in foreigners, especially those originating from the former Soviet Union. The wider participation of countries in surveillance of drug resistance is needed to ensure better monitoring of this public health concern.

AMR is a phenomenon that affects most, if not all, pathogens of importance to human health, and the demands on effective surveillance systems are therefore immense. The present EU surveillance networks are focused on a few key pathogens, but most pathogens are not covered and the system relies on voluntary reporting from a limited number of laboratories, sometimes disguising regional differences within countries. Ideally, surveillance of AMR should work on three levels:

- following trends of resistance in major important pathogens;
- detecting outbreaks and/or spread of different 'problem bacteria'; and
- spotting novel 'super strains' where each isolate requires immediate and forceful action.

Today, EU-level (and national) surveillance only covers the first of these three levels. Further developing surveillance of AMR is therefore a priority.

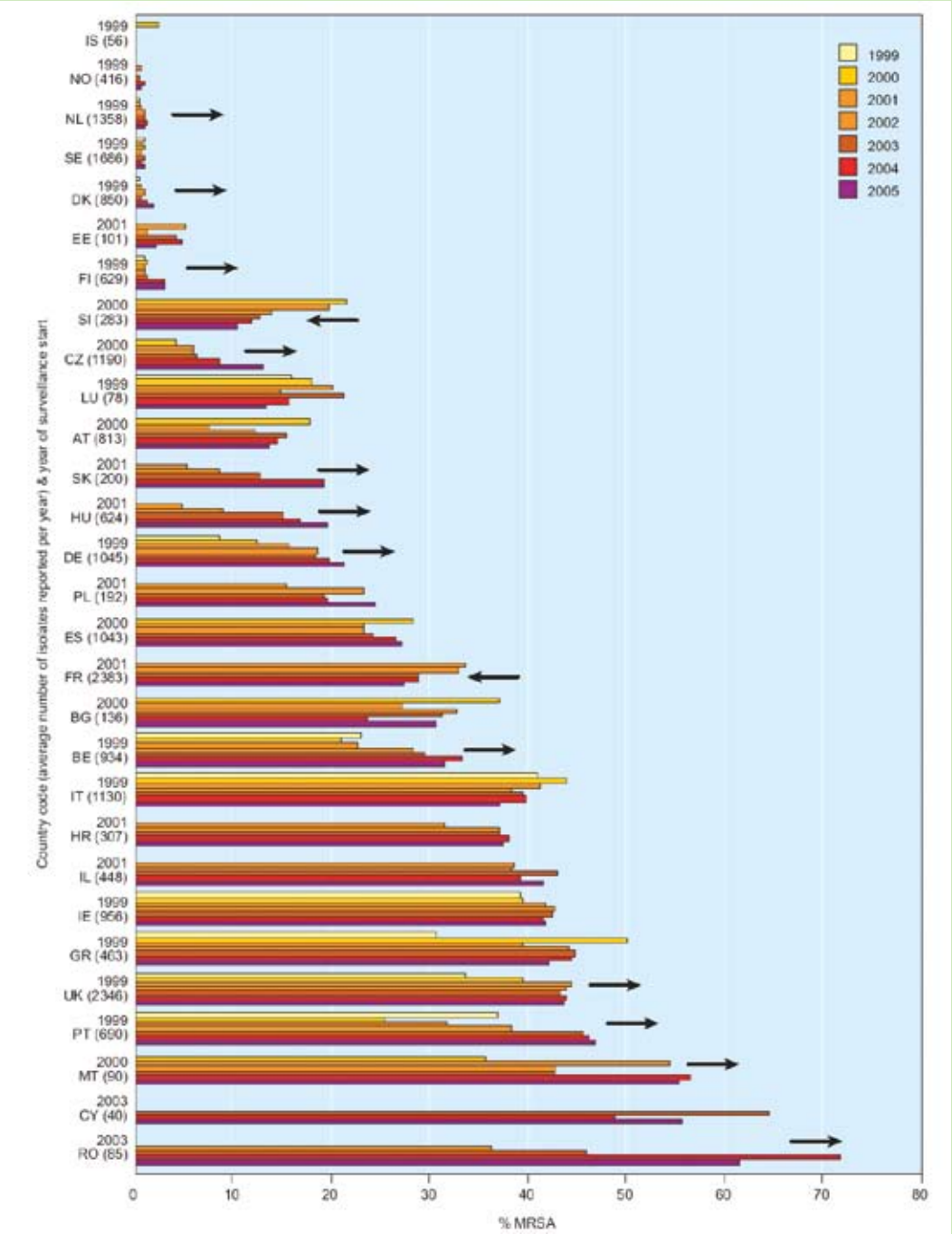
As for AMR, antimicrobial use shows a general gradient from low use in northern Europe to higher use in southern Europe; the highest user prescribing three times more antibiotics than the lowest. Additionally, there are marked differences in the type of antibiotics that are used. In the Nordic countries, a larger proportion of total use is still represented by older narrow-spectrum antibiotics, and newer broad-spectrum classes are seldom used on outpatients. This is the most likely reason for the low levels of resistance to these newer antibiotics classes in these countries. A consistent association between the level of use of specific antibiotic classes, and resistance to these classes has been reported.

Considering the mechanisms behind the emergence of AMR, the strategy for its containment in humans is rather straightforward: use fewer antimicrobials (i.e. only when they are really needed to treat patients); use them in the correct way; and block the spread of resistant strains between persons. The Health Council has provided recommendations to Member States to establish national strategies to contain AMR. Reliable and comparable data on both AMR and antibiotic consumption in combination provide evidence for action, but such action needs to be firmly established both on national and local levels, and be cross-disciplinary. There are many examples from across Europe of good practices and success stories.

Healthcare-associated infections

Healthcare-associated infections (HCAI), also referred to as nosocomial infections, are a huge public health problem in Europe. On the basis of recent surveys, the total number of patients acquiring a HCAI in the EU25 every year can be estimated at 3 000 000, and approximately 50 000 deaths occur every year as the consequence of the infection. The most frequent infections are urinary tract infections (28% of all HCAI), followed by respiratory tract infections (25%), surgical site infections (17%), bacteraemia (10%), and others (including diarrhoea, with the increasingly important *Clostridium difficile* 027). MRSA

Figure 2. Trends in *Staphylococcus aureus*: methicillin-resistance by country 1999–2005



Source: EARSS Annual Report. 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.

is isolated in approximately 5% of all nosocomial infections. Other major nosocomial pathogens are methicillin-sensitive *Staphylococcus aureus*, *Pseudomonas aeruginosa*, enterobacteriaceae (*E. Coli*, *Enterobacter*, *Klebsiella*), Enterococci, fungi (*Candida*, *Aspergillus*), and *Acinetobacter*. Of 87 000 patients staying more than two days in an intensive care unit, 7.2% acquired pneumonia, and 3.1% acquired bloodstream infections.

Approximately 20–30% of nosocomial infections are considered to be preventable by an intensive infection control programme that includes surveillance. National or regional surveillance is mostly performed in the context of a surveillance network of hospitals, whereby individual rates are compared to those of other participating hospitals and services as a measure of own performance using risk-adjusted infection rates. Since the latter requires the collection of risk factors and the involvement of clinicians, infection control staff and microbiologists, HCAI surveillance is labour-intensive and therefore targeted at specific high-risk populations (such as intensive care patients) or infection types (surgical site infections, bloodstream infections). Furthermore, several EU Member States still do not have a national surveillance network for nosocomial infections, since setting up such a programme usually involves important political decisions, specific legislation and a financial investment at both national and hospital levels in order to set up or reinforce infection control programmes with surveillance.

HIV infection, sexually transmitted infections (STI) and blood-borne viral infections

Summary and conclusions

HIV, other STI and blood-borne viral infections remain a priority in Europe. Even though available surveillance data have to be interpreted with caution, it is apparent that there have to be targeted approaches since each of the diseases has a different pattern in different countries.

An estimated 700 000 people were living with HIV infection in the EU in 2005. The majority of newly diagnosed HIV infections in the EU are 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 across the EU, albeit from very high levels in some of the new Member States. The HIV epidemic in the Baltic States is still driven by IDU, and the recent decline in the number of such cases most likely reflects a saturation of the IDU population.

Of the three sexually transmitted infections (STI) under EU-wide surveillance, syphilis and a particular strain of *Chlamydia* infection, lymphogranuloma venereum (LGV), are mostly spread between men who have sex with men, although rates have generally declined since the end of 1990s. The other STI, gonorrhoea, seems to have experienced a peak in incidence in most EU countries just after the turn of the millennium, and is now on a steady level or slowly declining. Only a few Member States report *Chlamydia* infection, but among these it appears that the incidence has been steadily increasing over the last 10 years. *Chlamydia* infection is different from the other STIs in that it mostly affects young people not belonging to any easily identifiable risk group. There is a need to improve data collection for STI, e.g. through screening programmes, in order to determine the full picture of these diseases. Best practices for preventive campaigns and screening programmes could be exchanged between Member States.

Infection with human papilloma virus (HPV) has received renewed interest through the introduction in 2006 of a vaccine, but is not a reportable disease in most Member States, and figures for prevalence or incidence are generally lacking.

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 IDU and people with multiple sex partners. Most of the EU Member States have included hepatitis B vaccine in their national vaccination programmes. Even before this could have had any noticeable effect, incidence of acute hepatitis B infection has been declining slowly in most countries.

Hepatitis C is the most common form of viral hepatitis in the EU. The epidemiological situation in the EU is largely unclear, due to a lack of good national surveillance data, in particular their inability to distinguish between acute and chronic infections. The disease is mainly an IDU problem, and studies show that these are generally infected within one year of their first injection. An increase in long-term complications such as liver cirrhosis and cancer, which often occur only after 25–35 years, is likely. There is a need to establish EU-wide surveillance for hepatitis B and C.

HIV infection

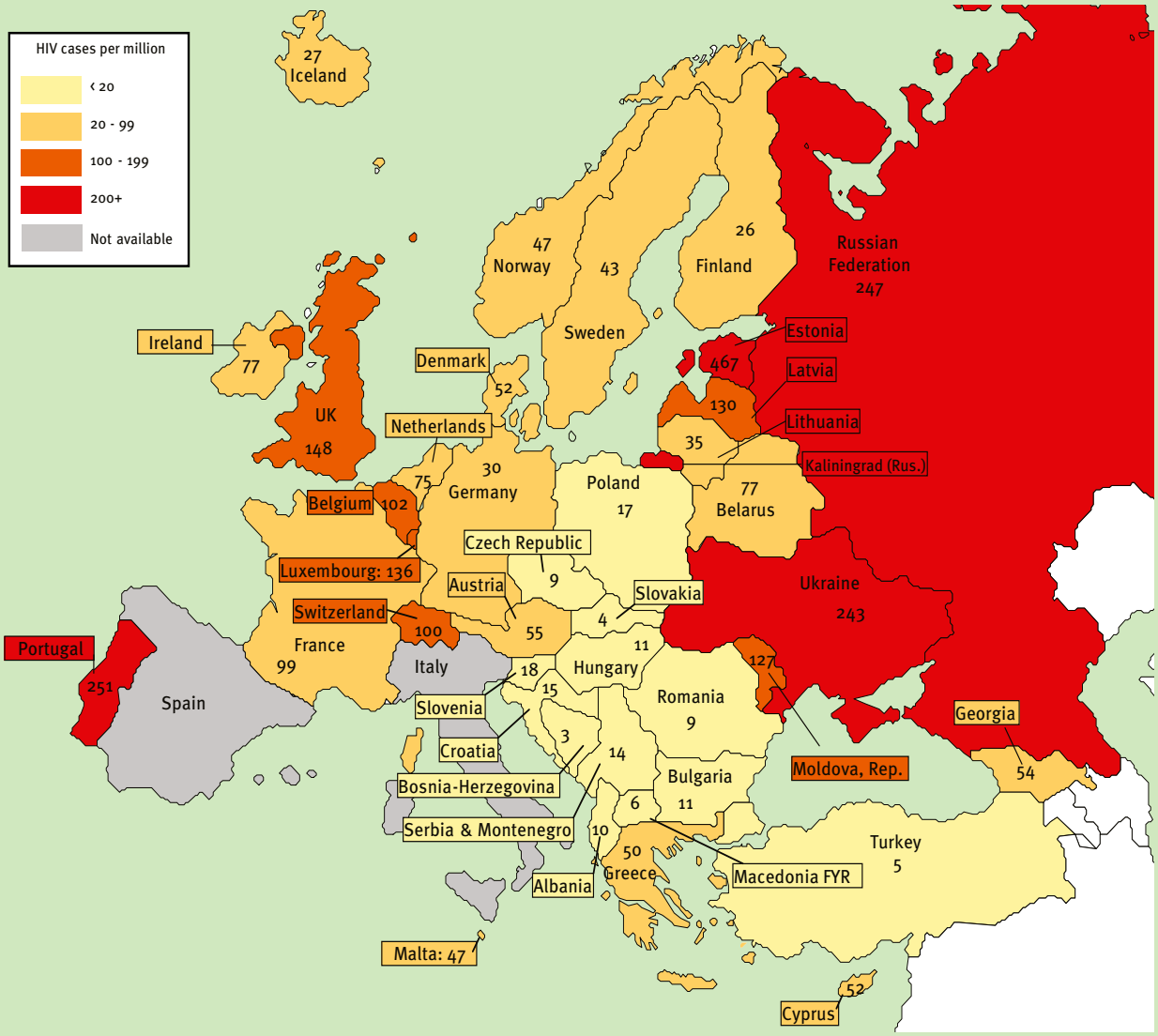
Human immunodeficiency virus (HIV) is a retrovirus, which attacks the immune system and may lead to severe illness following a long incubation period. The end-stage of the infection, acquired immunodeficiency syndrome (AIDS), results from the destruction of the immune system. AIDS is defined by the presence of one or more opportunistic illnesses. Infection with HIV occurs through transfer of infected blood, semen, vaginal fluid, or breast milk. HIV is spread by sexual contact with an infected person, by sharing needles or syringes (primarily in drug injection) with someone who is infected, or, less commonly (and now very rarely in countries where blood is screened for HIV antibodies), through transfusions of infected blood or blood clotting factors. Babies born to HIV-infected women may become infected before or during birth or through breast-feeding.

Effective antiretroviral combination therapies introduced in the mid-1990s and widely used in industrialised countries, have had a profound effect on the course of HIV infection, improving the quality of life and delaying the onset of AIDS and death in HIV-infected individuals, although intolerance to side effects and emergence of resistant strains remain cause for concern. AIDS surveillance is therefore no longer relevant to assess the spread and burden of HIV but is solely of historical interest. HIV reporting has become the key instrument for monitoring this epidemic in Europe.

HIV remains one of the most important communicable diseases in Europe. In western and central Europe, it is estimated that 720 000 persons were living with HIV/AIDS at the end of 2005 and that about 15 000 individuals are becoming infected each year.

Surveillance data on HIV/AIDS are collected by the EuroHIV surveillance network in the 53 countries of the WHO European Region, including the data from the EU and EEA/EFTA countries (figure 3). The epidemic exhibits very different patterns in the different EU Member States in terms of magnitude, trends, and affected populations. In the EU15 countries, the epidemic is older and mature, with the highest rates found in Portugal. Among the other most affected countries, HIV data are not available in Italy and Spain, and have only become available recently in France. Where data are available, the number of new HIV diagnoses has been observed to increase again in recent years in a number of countries, with a particularly marked increase seen in the UK and in the Netherlands.

Figure 3. New HIV reports per million population, WHO European Region, 2005



Source: EuroHIV.

The epidemic in the new Member States is again diverse. In the Baltic States, the number of HIV diagnoses, which had been extremely low until then started to rise abruptly in the late 1990s, peaked in 2001 or 2002, and then declined. Estonia has, by far, the highest rate. In the other new Member States, although the number of new HIV diagnoses is increasing, the rise is slow and the epidemic remains a low-level one.

Much of the overall rise in the number of new HIV diagnoses in the EU is due to a steady increase in HIV infections diagnosed in persons believed to have been infected through heterosexual contact: from 2 314 cases in 1996 to 6 386 in 2004. This increase is largely due to the rising number of diagnoses in persons originating from high-prevalence countries outside Europe. The HIV diagnoses in men who have sex with men declined until around the year 2000, and then started to rise again, from 2 615 cases in 2001 to 4 151 in 2004. The number of newly diagnosed cases of HIV among IDU account for a low proportion of total cases, and has declined since 2001 (from 1 491 to 860 cases in 2004), although data are unavailable for Estonia, Italy, Spain and Portugal, where severe epidemics among injecting drug users have been reported in the past.

In contrast to HIV diagnoses, AIDS incidence has been declining since 1995, when the AIDS incidence peaked in Europe. Similar trends are observed in most EU countries. Exceptions are Portugal and the Baltic States, where the HIV epidemic is much more recent and access to antiretroviral treatment likely to be less than in other countries.

In 2005, 28 044 HIV diagnoses were reported by 26 countries. Previous trends have generally continued throughout 2005, i.e. a rise in diagnoses in men who have sex with men and persons infected through heterosexual contact. Heterosexual contact accounts for the largest proportion of HIV infections diagnosed overall and in most countries, but reflecting the diversity of the epidemic across Europe, men who have sex with men is the largest transmission group in several countries (Czech Republic, Denmark, Germany, Greece, Hungary, the Netherlands,

Slovenia), and IDU the largest group in Latvia, Lithuania and Poland (no data by transmission available from Estonia). With 171 cases reported in 2005, mother-to-child transmission accounts for less than 1% of all new HIV diagnoses.

EuroHIV collects information on the country of origin of the case, rather than on the possible location of infection. Overall, nearly half (47%) of the newly diagnosed cases of HIV infection believed to have been acquired by heterosexual contact were among persons originating from countries with more generalised epidemics, ranging from 17% in Portugal to 80% in Iceland. Data from several countries suggest that the majority of these persons were infected in their country of origin, although transmission within the host EU country does occur.

It is estimated that 30% of the people living with HIV (PLHIV) in the EU are unaware of their infection. There is evidence to suggest that this group may be contributing disproportionately to the spread of the disease. Strong efforts must be made to increase testing uptake, and ECDC has started work to provide guidance on this issue for Member States. As for prevention, action should continue to target the populations at highest risk. These are the high-incidence countries, where an integrated national effort is needed; men who have sex with men, where new methods are needed to implement the prevention messages; and migrants from high-risk countries, where research is needed on how to successfully approach these groups in society.

Immediately following diagnosis, PLHIV will need to receive life-long treatment, care and support. Currently 90% of infected persons in the EU receive highly active anti-retroviral therapy (HAART). More work is needed to improve accessibility of this therapy to PLHIV. Counselling and support is of paramount importance to PLHIV and vulnerable populations at higher risk of infection and therefore best practices will have to be reviewed on how to improve these services in the EU.

Other sexually transmitted infections (STI)

Chlamydia infection

Chlamydia infection, caused by the bacterium *Chlamydia trachomatis*, is often asymptomatic, but can lead to severe long-term complications such as ectopic (outside the uterus) pregnancy and infertility. A specific variant of the bacteria, LGV, gives a more severe systemic disease. In many European countries, chlamydia infection is the most commonly reported STI, but in several countries the infection is not notifiable. Comparisons between reporting countries are also inhibited by differences in data collection. Screening studies in Europe have shown that between 1.7% and 17% of women with no symptoms are infected. Fourteen countries reported data for the full period (a further four reported for part of the period), and of those, quite dramatically increasing trends over the period 1995–2004 have been observed in the Nordic countries, Belgium, the United Kingdom and Ireland, while the opposite is seen in Estonia, Latvia and Slovakia (Lithuania shows a stable trend). In 2005, 203 691 cases of *Chlamydia* infection were reported by 17 countries, with almost 96% of cases from (in descending order) UK, Sweden, Denmark and Norway. The highest incidence rate was reported by Iceland with 552.45 per 100 000, followed by Denmark with 441.29 per 100 000. Available data show that the disease is most common in the age group 15–24 years, and that infection is reported more often in women than in men (female to male ratio, 1.5:1). Since 2004, LGV infection has been noted in several large European cities among men who have sex with men.

Gonorrhoea

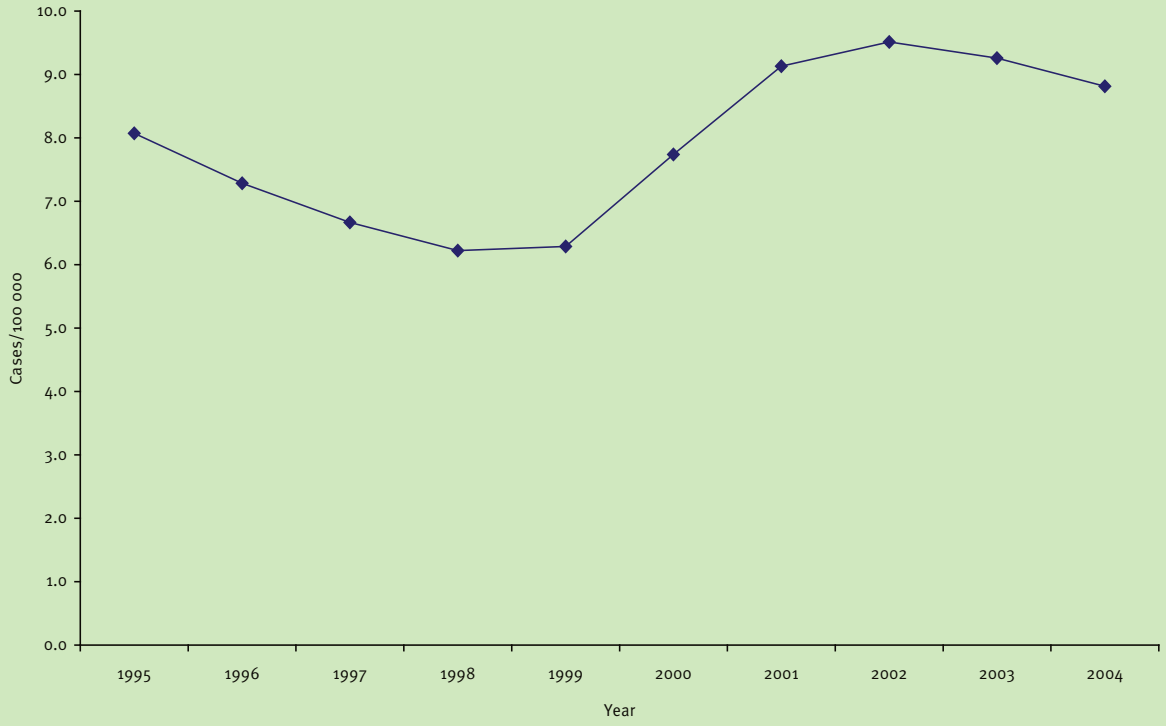
Gonorrhoea is caused by the bacterium *Neisseria gonorrhoea*. The extent of infection can range from genital infection to a variety of systemic symptoms. In the last 10 years, the Baltic States (Estonia, Latvia and Lithuania) saw a steady decrease from levels of up to 200 cases per 100 000 per year in 1995, to below 40 per 100 000 per year in 2004. In the low-incidence countries in central Europe (Slovakia, Poland and Hungary) gonorrhoea incidences declined steadily to very low levels in 2001–03. In the southern European countries, gonorrhoea has been decreasing since 1995, while in the UK, Belgium and Sweden the incidence appeared to decline during 1996–97 (and Norway in 1998), but has risen steadily since then (figure 4). In 2005, a total of 27 537 cases were reported by 22 countries. The highest incidence rate was observed in the UK (33.98 per 100 000), followed by Latvia (30.09 per 100 000) and the lowest in Luxembourg (0.22 per 100 000), followed by Spain and Portugal (both with 0.42 per 100 000). However, different surveillance systems operate in these countries making direct comparisions inappropriate. The highest incidence rates were observed in the age group 15–24 years, and incidence was 4.5 times higher in men than in women.

Syphilis

Syphilis is a sexually transmitted infection (STI) caused by the bacterium *Treponema pallidum*. The clinical picture is characterised by a primary lesion (primary syphilis), a secondary eruption involving palms and soles (secondary syphilis) and long periods of latency (latent syphilis). If untreated, tertiary syphilis (with inner organ and neurological involvement) can occur many years after the initial infection. Syphilis significantly declined after World War II thanks to the widespread use of penicillin. However, a considerable resurgence of syphilis occurred in the late 1980s in the industrialised countries.

In the last 10 years, the incidence decreased steadily after 1996 from just under 3.5 to 2.2 per 100 000 per year in 2000, but has been rising steadily since then to 3.1 per 100 000 per year in 2004, mainly due to outbreaks in large cities involving men who have sex with men. In the Baltic States (Estonia, Latvia and Lithuania) where syphilis incidence was very high in the early 1990s (over 60 cases per 100 000 per year in 1995), a sharp decrease in incidence has been observed from 1996 to 2004. In some central European countries (Slovakia, Slovenia and Poland) syphilis incidence remained below 10 cases per 100 000 per year and the overall trend is decreasing. In 2005, 12 945

Figure 4. Trends in reported gonorrhoea incidence in the EU25, Norway and Iceland, 1995–2004



Source: Eurostat.

syphilis cases were reported by 24 countries. The highest incidence rates were still recorded in Latvia (19.21 per 100 000), Lithuania (8.61 per 100 000) and Estonia (8.24 per 100 000), and the age group 25–44 years was most affected. Incidence was higher in men than in women (male to female ratio, 4.4:1).

Blood-borne viral infections

Hepatitis B

Hepatitis B is an infection of the liver caused by hepatitis B virus (HBV). HBV can result in either asymptomatic or symptomatic infection. As for other types of acute viral hepatitis, acute infection may vary from mild to severe symptoms, and HBV infection in children usually goes with few or no symptoms. Conversely, the fatality rate can reach 2% in elderly people. A significant proportion of those chronically infected can develop liver cirrhosis (25%) or cancer (5%), and patients with chronic infection serve as a reservoir for continuing HBV transmission. Hepatitis B has to be considered increasingly as an STI, although there is evidence that common practices (tattooing, beauty treatments, etc.) are still important in spreading HBV infection. HBV vaccination is currently the most effective way to prevent HBV infection.

Almost 180 000 cases of Hepatitis B were reported in Europe during the last 10 years, with an overall decreasing trend from 6.6 to 2.6 cases per 100 000 per year over the period. However, this pattern is not consistent across Europe (see full report), and some countries report an increasing incidence since the late 1990s. Of the 6 977 cases reported in 2005 by 26 countries. The highest incidence rates were reported by Iceland (11.24 per 100 000), followed by Latvia (7.37 per 100 000). The availability of HBV vaccines that are safe and effective for universal vaccination requires a thorough epidemiological analysis, but data available on an EU level do not yet provide a reliable enough baseline for vaccination policies. Incidence was higher in men than women (male to female ratio, 2.3:1).

Hepatitis C

Hepatitis C is caused by the hepatitis C virus (HCV), for which no vaccine is available. Up to 90% of HCV infections are asymptomatic. A high proportion of those infected develops a chronic infection and many of those go on to develop liver cirrhosis or cancer. Injecting drug use is the dominant mode of transmission. Sexual transmission seems to be infrequent. After 1994 transmission via blood transfusion and use of plasma-derived products became rare, as routine HCV tests became more available.

After a relatively stable period during 1995–2000, the incidence in Europe has increased steadily from 7.0 per 100 000 per year in 2001, to 7.9 per 100 000 per year in 2004, but this increase may possibly be a surveillance artefact. In 2005, more than 29 000 hepatitis C cases were reported by 24 countries. The highest incidence rates per 100 000 per year were reported by Ireland (34.99), Sweden (28.96), and the UK (17.54). However, due to the nature of the disease (mainly chronic, asymptomatic infections) and the relatively recent introduction of HCV infection to the list of diseases under surveillance at national level, the currently available data do not permit a clear picture of the HCV trend in Europe.

Respiratory tract infections

Summary and conclusions

The threat of avian influenza, and its potential for starting a pandemic was a main concern in 2005. Starting in late summer, the avian influenza virus A/H5N1 was detected in birds ever closer to Europe, with human cases as close as Turkey, but no human cases in Europe. The seasonal influenza strain of the 2004–05 and 2005–06 winter seasons was mainly of type A/H3N2, just like in previous years, and both epidemics were of 'medium' size in the EU. Coverage of influenza vaccine in the risk groups (primarily those over 65, and patients with chronic heart or lung disease) was found to vary greatly between EU Member States. For influenza, the main challenges are further pandemic preparedness planning, and to increase coverage with the 'normal', seasonal vaccine.

TB incidence is declining in the indigenous populations in almost all Member States. It is now mostly a disease of old people, where the infection is re-activated after a primary infection many decades ago, and of vulnerable and disadvantaged groups in society. This decline is also seen in the 10 new Member States, although starting from a higher level than in the EU15 countries. However, immigrants to the EU from high-prevalence countries retain their risk of developing TB even after moving to Europe. Even if tuberculosis is slowly declining in the EU right now, there are areas with high levels of drug-resistant tuberculosis, mostly due to incomplete or ill-designed treatment regimes. The overall decline in incidence also implies that several of the countries that still have a programme for general BCG vaccination of children could consider switching to vaccination of high-risk groups. Since the vaccine is not without adverse effects, there is a break point where the number of serious adverse reactions caused outweighs the few infections prevented.

The expanding use of cooling towers in European cities and the parallel development of mass tourism have resulted in several large outbreaks of Legionnaires' disease (legionellosis). The incidence of legionellosis increased steadily between 1996 and 2002, but has remained stable since. Legionellosis affects mostly elderly men. A tighter control of the risk from cooling towers could be reached through specific programmes, which include hygiene standards regulations, cooling tower registry, regular inspections and law enforcement, including the power to close high-risk towers if necessary. Exchanging information between public health authorities from the tourist's origin and destination countries and with the tourism industry is a milestone for enhancing the efficiency of current surveillance.

Influenza

Seasonal influenza is an acute viral disease of the respiratory tract, caused by influenza virus A and B. Each year there are epidemics during the winter season, although sporadic cases do occur throughout the year. Seasonal influenza poses a considerable public health threat. Most EU Member States follow WHO guidance that recommends vaccination against human seasonal influenza be offered annually in the early autumn for three major risk groups (the elderly, healthcare workers and those with chronic medical conditions of all ages, such as diabetes or heart disease). There is a WHO target accepted by all European countries but this vaccine is currently underused in the EU. Some countries cannot routinely monitor their uptake even for the elderly, and for those that can, they are seemingly not meeting that WHO target. There is considerable potential for health gain in Europe. Not only by improving vaccination coverage in these selected groups, but also by adopting other effective measures that minimise virus transmission. In this sense, better application of the ECDC recommended personal protection measures (regular hand-washing, good respiratory hygiene, mask-wearing in healthcare settings during acute febrile period, early isolation of symptomatic personnel, etc.), would reduce the risk for all people.

The 2004–05 influenza season in Europe started in late December 2004 with the first influenza activity occurring in the northwest and southwest (Spain, United Kingdom and Ireland). The intensity of clinical influenza activity in 10 out of 23 countries was higher than during the 2003–04 season, but lower or equal to the 2003–04 season in the other 13 countries. The highest consultation rates were generally observed among children aged 0–14 years. In all, the peak consultation rates due to influenza-like illness or acute respiratory infection were not especially high when compared with historical data. The predominant virus strain was influenza A/H3N2, and similar to the vaccine strain for the season. Influenza B viruses were co-circulating with the A viruses during the whole influenza season in 11 out of 24 countries. Seven of these were located in the north-east of Europe and in these countries the proportion of B viruses was higher than in the rest of Europe.

In recent years, a new strain of avian influenza (A/H5N1) has spread globally among birds, and also occasionally infected humans. This virus in its present form is poorly adapted to humans, and no case has been detected in Europe. The human health issue is thus minor as long as the A/H5N1 virus stays in its current form. The risk of infection is almost entirely confined to people who own domestic poultry and so could have close and intense contact with sick birds or their droppings. They can protect themselves by applying the measures recommended by ECDC. People travelling to countries where A/H5N1 is prevalent can sometimes enter this category if they are staying with families with domestic poultry.

At irregular intervals new influenza A virus subtypes emerge, leading to an influenza pandemic which may last for six to eight months, and usually with a much higher disease and death rate than the seasonal variety. It is impossible to predict which will be the next pandemic strain, or when it will appear. Since 2005 there has been an extraordinary concerted effort by all EU countries to strengthen their readiness for a pandemic. However, much remains to be done and it is believed that another two to

three years of intense work is required by all Member States as well as EU institutions to reach an acceptable level of preparedness. Key areas where further work is especially needed are:

1. integrated planning across governments;
2. making plans operational at the local level;
3. interoperability at the national level;
4. stepping up prevention efforts against seasonal influenza;
5. extending influenza research.

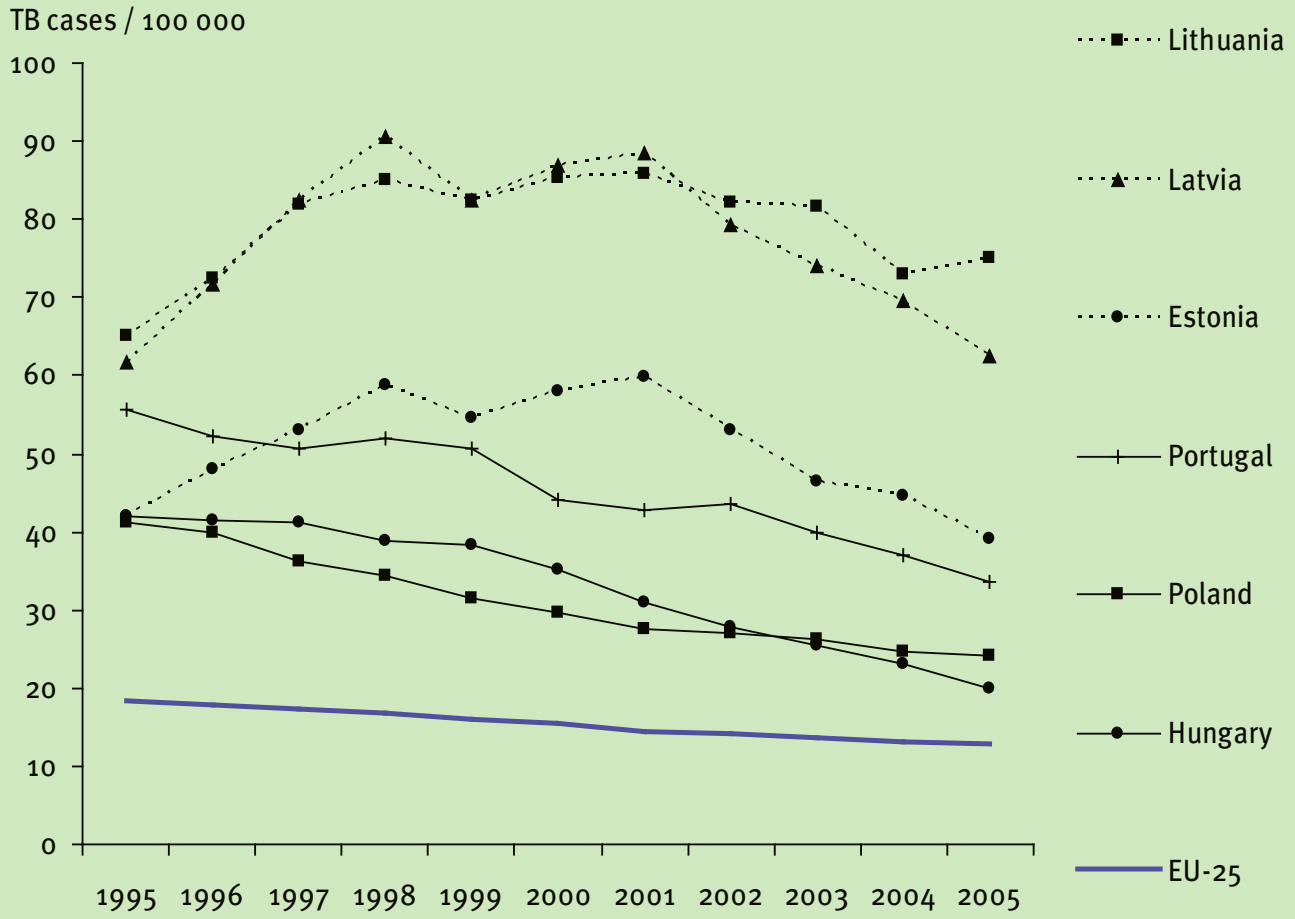
Future priorities in the work against influenza are to harmonise routine surveillance of influenza disease in the EU, and to support countries in preparing for a pandemic (e.g. model plan for surveillance in a pandemic), including improving EU influenza laboratory capacity. It is important to note that pandemic preparedness planning also greatly contributes to the overall generic preparedness in Europe.

Tuberculosis

TB is a bacterial disease, which affects the lungs as well as many other organs. It is most commonly acquired via inhalation of bacteria belonging to the *Mycobacterium tuberculosis* complex in droplets produced by another person with pulmonary disease, and less frequently through ingestion of contaminated milk or through laboratory contamination. Only 10% of persons infected develop active TB. HIV infection increases the likelihood of progression, while preventive therapy reduces this risk. The BCG vaccine may be effective in limiting severe disease in childhood, but has no effect on transmission. Therefore, TB control relies mainly on the detection of infectious patients and treatment for at least six months with a combination of antibiotics. Inadequate treatment may result in failure of cure, early relapse or the development of drug-resistant disease (see section on antimicrobial resistance, above).

Recent demographic, political and socioeconomic changes in Europe, like increased immigration and the upheaval that followed the collapse of the former Soviet Union leading to a poorer control of the disease, have been major determinants of the tuberculosis situation in Europe. Trends show a continuous decline, at least in the western countries, but the general pattern has changed. In the EU, TB is more prevalent in migrants, the homeless, prisoners and drug users than other sectors of the population.

Figure 5. TB notification rates in countries with more than 20 cases per 100 000 per year and overall rate for the EU25 countries, 1995–2005



Source: EuroTB.

In the early 1990s, a number of EU countries experienced an increase or stabilisation in their TB notification rates. Subsequently, rates declined in most countries and have reached very low levels in recent years. This is the result of the sustained efforts of public health authorities. In many EU countries it is becoming a rare disease and many Member States are heading towards elimination. In the Baltic States, by contrast, rates increased in the late 1990s, but have similarly decreased since 2002 (figure 5). In Sweden and the United Kingdom, however, overall rates increased substantially between 2001 and 2005, largely as a result of TB in immigrants. With the exception of the Baltic States, Hungary, Poland and Portugal, rates have remained below 20 per 100 000 per year since 2001 in all countries.

The EU countries today fall into three broad patterns with respect to TB:

1. Industrialised countries with westernised economies where TB rates are low and disease increasingly aggregates in sub-populations and settings associated with poverty and lowered immunity. Prevalence of HIV and drug-resistance among TB cases is low to moderate.
2. The Baltic States, characterised by high TB rates, low migrant TB and high frequency of drug resistance and where HIV is low but steadily increasing among TB patients.
3. Countries in central Europe which joined the EU in 2004, where TB rates are moderate, cases of foreign origin rare, and levels of HIV and drug resistance low.

In 2005, the 25 EU countries plus Iceland and Norway reported 59 497 TB cases corresponding to an overall rate of 13 per 100 000 per year, with a countrywide range from four to 75. Five countries (France, Germany, Poland, Spain and United Kingdom) had more than 5 000 cases each, between them accounting for 62% of all cases reported. With the EU expansion in 2007, Romania will be the country with the highest notification rate (135 per 100 000 per year in 2005) and will effectively increase total notifications in the EU27 by one half.

TB is more common in males (male to female ratio, 1.7:1). Cases aged over 64 years accounted for 22% of the cases overall, while children under 14 represented 4%. Mean age is lower in western countries like Denmark, the Netherlands, Sweden and United Kingdom, where foreign-born individuals nowadays represent the majority of notified cases. In persons of foreign origin, TB concentrates in young adulthood, while in the indigenous population rates increase slowly with age and are highest in the elderly. Cases of foreign origin accounted for 30% of all cases reported in the 25 countries (range 0–78%). Most cases of foreign origin were from Africa, Asia or from another country within the European Region itself. In countries with higher overall rates, the proportion of foreigners was lower in general, suggesting that local transmission was relatively important.

In the EU in 2005, 22% of AIDS cases had TB as the initial AIDS-indicator illness. The contribution of HIV to the TB caseload differs between countries. While 15% of TB cases in Portugal were HIV positive, the prevalence was much lower in other countries with data. However, a doubling in prevalence has been registered in the UK in 2000–03 (from 4.2% to 8.3%) associated with recent migration. HIV prevalence among TB cases has also increased since 2000 in Estonia and Latvia, reaching 6.4% and 3.5%, respectively in 2005. When Bulgaria and Romania join the EU in January 2007, the current border with the FSU will enlarge further and migration from the neighbouring countries may thus be expected to increase.

In the coming years there is a need to improve surveillance on risk groups and drug resistance and to better link laboratory results with epidemiological surveillance data. Guidance on interventions for specific risk groups, including guidelines for prevention and control of TB in immigrants, needs to be promoted.

Legionnaires' disease (legionellosis)

Legionnaires' disease is a respiratory disease caused by the bacteria *Legionella pneumophila*, which can give severe pneumonia with high case fatality rates, especially among elderly and immuno-compromised individuals. Sporadic cases and outbreaks occur worldwide. The most common mode of transmission is airborne and the reservoirs are aquatic systems like cooling towers, evaporative condensers, humidifiers, decorative fountains, etc. In most cases Legionellosis can be treated effectively with antibiotics. Prophylactic measures include regular cleaning and maintenance of the various water systems.

The incidence of legionellosis was increasing between 1996 and 2002 in the EU. Since 2002, the incidence has remained stable at around one per 100 000 per year. In 2005, a total of 4 189 human legionellosis cases were reported by 23 countries. The highest incidence of 3.36 per 100 000 per year was seen in Spain, followed by Iceland with 2.38 per 100 000 per year. In 2005, 746 cases of travel-associated Legionnaires' disease with onset in 2005 were reported to the EWGLINET surveillance scheme by 15 Member States, Iceland and Norway. Ninety-three new clusters were identified, 36.6% of which would not have been detected without the EWGLINET scheme. One hundred and twenty-two accommodation sites were investigated and the names of nine sites were published on the EWGLI website. Six outbreaks of legionellosis were monitored by ECDC in 2005.

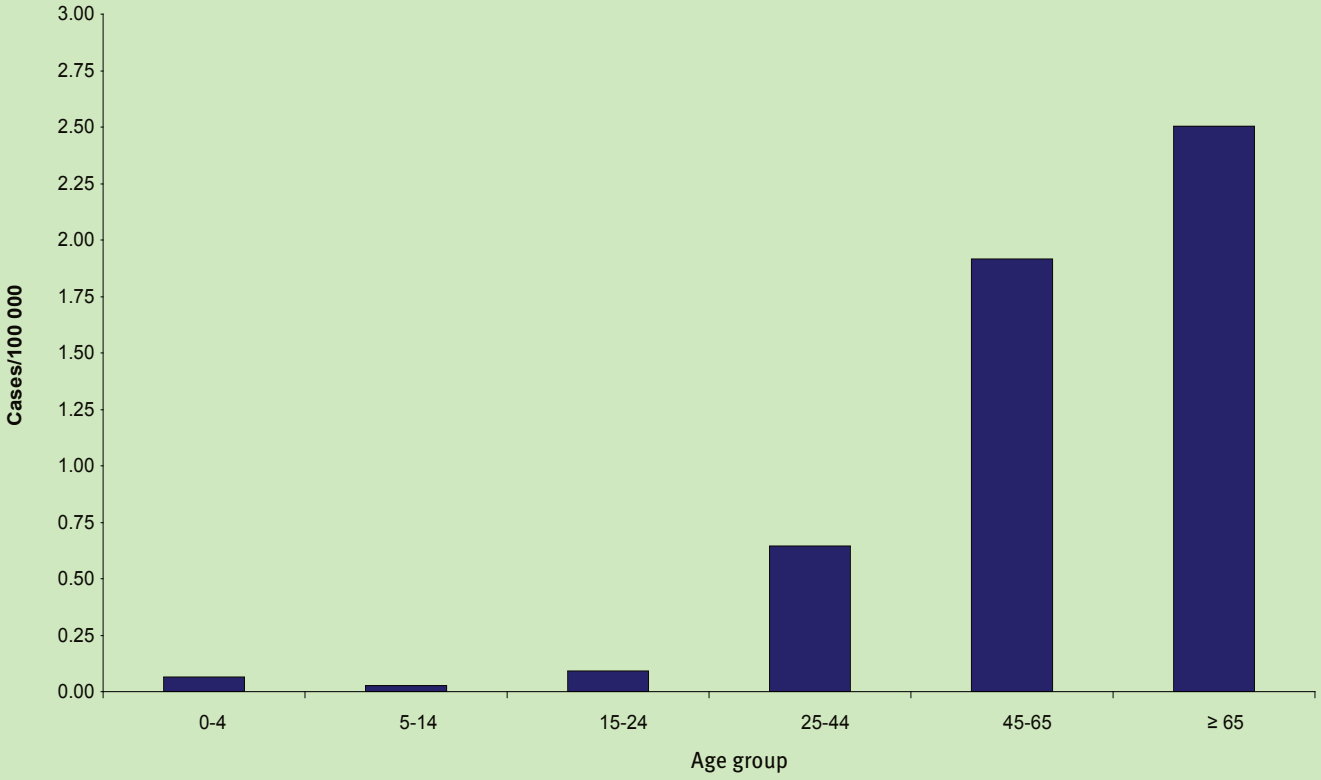
Severe acute respiratory syndrome (SARS)

SARS is a viral respiratory illness with high fatality rate, caused by a corona virus, the SARS-associated corona virus (SARS-CoV). The main way that SARS seems to spread is by close person-to-person contact, through respiratory droplets produced when an infected person coughs or sneezes.

SARS was first recognised as a global threat in mid-March 2003 in East Asia. By July 2003, the international spread of SARS-CoV had resulted in 8 098 SARS cases in 26 countries, with 774 deaths. In addition to the direct impact on health services, the epidemic caused significant social and economic disruption in areas with sustained local transmission of SARS and in the international travel industry. Although sporadic imported cases of SARS also appeared in Europe in 2005, EU was largely spared from the infection. No SARS cases were reported in the world in 2005.

Today, the most likely sources of infection with SARS-CoV would be exposure in laboratories where the virus is used or stored for diagnostic and research purposes, or from animal reservoirs of SARS-CoV-like viruses. It remains very difficult to predict when or whether SARS will re-emerge in epidemic form. The resurgence of SARS leading to an outbreak remains a distinct possibility, and in the inter-epidemic period, all countries must remain vigilant for its recurrence and maintain their capacity to detect and respond to the re-emergence of SARS should it occur.

Figure 6. Age-specific incidence of legionellosis as reported by 19 countries, 2005, n = 3 204



Source: Country reports.

Vaccine-preventable diseases (VPD)

Summary and conclusions

Several of the serious vaccine-preventable diseases are now almost eradicated from the EU. There have been no endemic cases of polio since 1992, only a few cases of diphtheria are still being reported annually from a couple of Member States, and reported tetanus rates are around one per million or lower.

All diseases covered by the MMR vaccine (measles, mumps and rubella), continue to show a good decline in the EU (apart from mumps in recent years), even though vaccine coverage is not uniform, with one large Member State reporting almost three quarters of all EU measles cases. The same downward trend is seen for invasive infection with *Haemophilus influenzae* type b in the countries that have introduced this vaccine. For pertussis, the picture is somewhat more complex: overall EU incidence seems to be rising slightly, and there are indications that the programmes do not have the intended effect of preventing death in young infants, which is one of the main objectives of a pertussis programme.

There are two invasive bacterial infections for which vaccines are available for some of their strains but that are still not routinely used in most Member States. These are invasive pneumococcal infection and meningococcal meningitis. Rates for invasive pneumococcal infection seem to remain stable across the EU at between five and six cases per 100 000 per year, but this is a serious infectious disease causing several thousand deaths each year, especially in the very young and the very old. Meningococcal meningitis is one of the diseases for which surveillance figures are most reliable: it is a serious and very characteristic disease receiving high public attention. Annual rates remain relatively stable at between one and two cases per 100 000 per year. Good vaccines are only available for one of the two types commonly seen in Europe, but are being introduced in some Member States.

The vaccines available are generally very efficient, and the national vaccination programmes, despite the remarkable variety of such programmes across the Union, are all designed to give good protection. The main problem is to achieve better coverage even in the hard-to-reach groups of the population.

Other important challenges in coming years are to meet the goal of eliminating measles and congenital rubella and maintaining the polio-free situation. Most of the childhood diseases that are now preventable by vaccination have been decreasing in number over the past few years as a result of effective childhood vaccination programmes. Yet, despite all the efforts, outbreaks still occur in vaccinated population subgroups where vaccination uptake remains poor. New vaccines have recently been, or soon will be, licensed (against varicella (chickenpox), human papilloma virus (HPV), and rotavirus) which raises the question as to whether they should be included in vaccination programmes, and if yes, how to monitor the impact and the adverse effects at the EU level following the immunisation.

Vaccination coverage

Although Europe has maintained high vaccination coverage and even increased it, there have been areas of decline in the uptake of certain vaccines, with important consequences for the re-emergence and outbreaks of certain diseases. Examples are diphtheria during the 1990s in the Russian Federation and the former Soviet Republics and Baltic States (particularly in Latvia). Also some western European countries have had to cope with a decrease from previously attained vaccine coverage levels. Political and socioeconomic changes that followed the collapse of the former USSR, and population density and deprivation in specific inner urban areas, were both strongly correlated with lower vaccination uptake.

High vaccination coverage does not exhibit a direct relationship with the wealth of a country, but with proper public health policies. For example, there is a cluster of countries under the GNP threshold, but with over 95% measles vaccine coverage, most of these use in the new eastern Member States (figure 7).

Bacterial infections

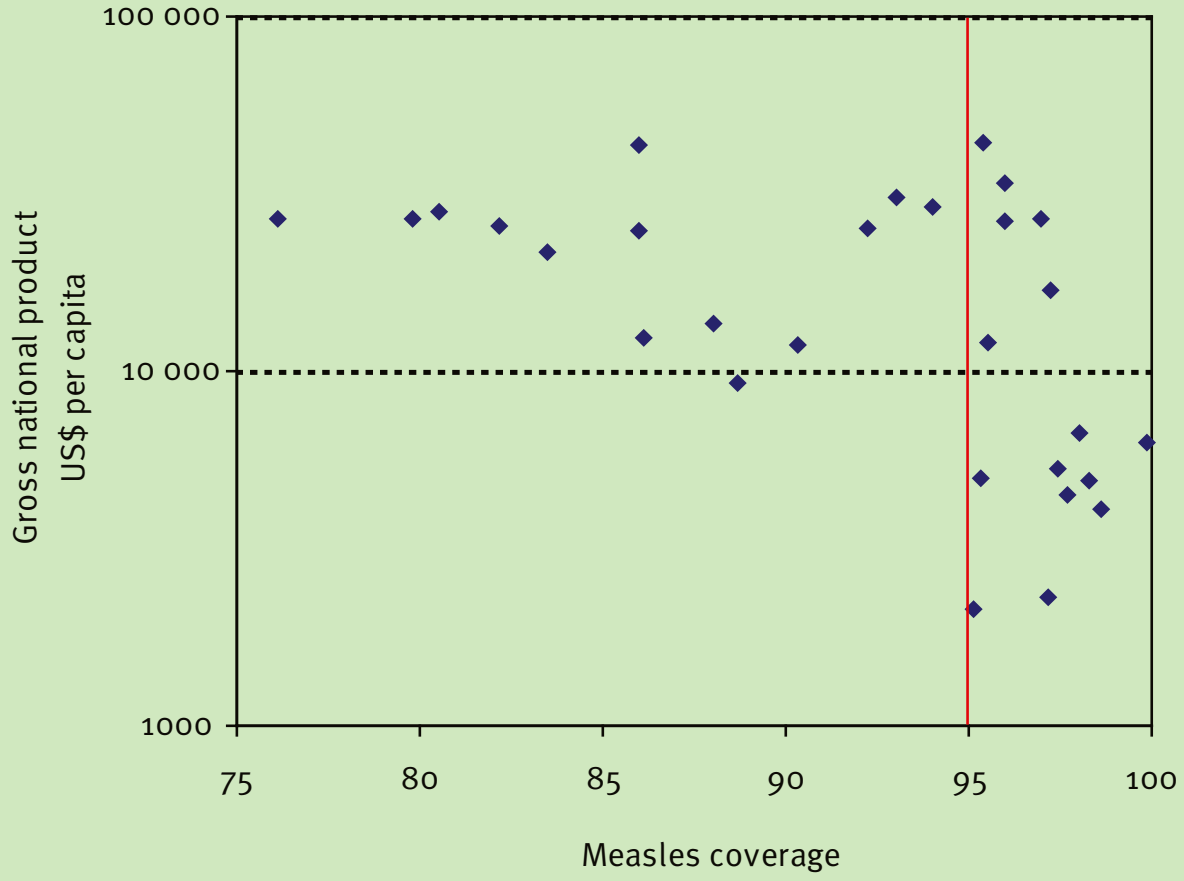
Invasive pneumococcal infections

Infection due to *Streptococcus pneumoniae* (pneumococcus) mainly affects the youngest and oldest individuals, and is the main cause of bacterial respiratory tract infections in all age groups, but is also common as asymptomatic carriage in the nasopharynx of young children. Invasive infections (meningitis and sepsis) carry a high death rate, and this bacterium is a major cause of infection-related death in young children. Unlike the older 'polysaccharide' vaccines, a new generation of 'conjugated' vaccines provide good protection against invasive disease even in very young children. As these vaccines also protect against the carriage of the bacteria, they have a potentially important role in preventing the spread of antibiotic-resistant pneumococci in the child population. The effect of the older polysaccharide vaccine in the elderly and in patients with chronic diseases (cardiopulmonary disease, diabetes, malignancies) has recently been assessed by ECDC.

The trends of invasive pneumococcal infections over the last 10 years were stable in most countries, with the exception of Denmark (declining) and the UK (increasing). In 2005, a total of 19 665 invasive pneumococcal infections (5.83 per 100 000 per year) were reported by 19 countries. Sweden (15.76 per 100 000) followed by Belgium (15.45 per 100 000) reported the highest incidence rates. Incidence rates were highest in the over 65s (15.3 per 100 000), followed by the under fours (14.1 per 100 000), while the incidence rate in the five to 24 year-olds remained low. After 25 years of age, the incidence rates increased with age.

A dramatic decrease in the incidence of childhood invasive pneumococcal disease (and a secondary decrease in the elderly) was reported in the USA after the introduction of conjugated pneumococcal vaccine to the childhood immunisation programme in 2000. In the EU, this vaccine was registered in early 2001, and 12 European countries have now introduced it

Figure 7. Coverage of measles vaccinations versus GNP per capita in 29 European countries (each dot represents one country)



Source: WHO

as a universal vaccine in their childhood vaccination schemes, while several others recommend it for at-risk children. As the vaccine does not cover all serotypes of pneumococci, there is a need for enhanced surveillance both of the occurrence of the disease and the distribution of serotypes.

Invasive meningococcal disease

Invasive meningococcal disease, caused by the bacterium *Neisseria meningitides* (meningococcus), is most common in young children, with a secondary peak in disease incidence among teenagers. The death rate from invasive disease (meningitis and sepsis) remains high (around 8%) and survivors may suffer from serious complications, including deafness, neurological problems and even amputations. Most disease in Europe is caused by serogroups B and C. Since 1999, several countries have introduced vaccination programmes against serogroup C disease, using a new conjugated vaccine, but to date there is no vaccine against serogroup B disease.

Since 1999, countries that experienced high incidence, such as Iceland and Ireland, show a sustained decrease possibly due to the introduction of the meningococcal C vaccine in high-risk populations. In the other countries, the reported incidence varied below two per 100 000 per year with stable trends or even with a slight decrease in the past few years after the introduction of the vaccine. In 2005, a total of 5 494 cases were reported by 26 countries. Ireland (with 4.94 per 100 000) and Malta (2.73 per 100 000) reported the highest incidence rates.

Invasive infection caused by *Haemophilus influenzae* type b

Haemophilus influenzae type b (Hib) is a respiratory tract bacterium, capable of causing meningitis and other severe systemic infections in young children. Effective vaccines are available against invasive Hib infection, and there has been a clearly declining trend in Europe over the last 10 years (most markedly in 1996–2001). Most countries had a stable incidence rate over the past five years, but a slow increase was observed in the Netherlands, Ireland and the UK. In 2005, 1 145 cases were reported by 25 countries. Estonia reported the highest incidence rate, with 1.48 per 100 000, followed by Sweden (1.31 per 100 000). Hib vaccination is now included in all immunisation schedules in the EU countries except in Poland, Romania and Bulgaria.

Pertussis

Pertussis is an acute bacterial infection of the respiratory tract caused by the bacterium *Bordetella pertussis*. The disease is characterised by an irritating cough that may last up to two months or even longer. Complications include pneumonia, weight loss, hernia, seizures, encephalopathy and death. There is an effective vaccine.

In the last 10 years, an overall higher incidence has been observed in the northern countries: Estonia, Finland, the Netherlands, Norway and Sweden. A dramatic decrease was observed in Sweden at the beginning of this period and in the UK and Ireland over the whole period. For the other countries, the general incidence was lower. A slight decrease was observed between 1995 and 2000, but after 2002, some countries are showing increasing trends. A very high proportion of cases are reported among the youngest age groups (0–14 years).

In 2005, a total of 13 207 cases were reported by 24 countries. The highest rate by far was reported by the Netherlands (40.17 per 100 000), with Norway reporting a rate of 19.10 per 100 000. By contrast, the overall incidence rate in the EU was 4.10 per 100 000 per year. Pertussis, although known to be preventable by vaccine, thus still affects several European countries, and in some cases quite dramatically. Close monitoring in all EU countries is needed to better assess the real burden and risk of transmission of pertussis in order to refine control measures.

Diphtheria

Diphtheria is an acute disease with inflammation of the mucal surfaces of the upper respiratory tract caused by a toxin from the bacterium *Corynebacterium diphtheriae*. Diphtheria is transmitted from person to person through small droplets, and the disease is preventable by vaccination. Since 1995, the Baltic countries, in particular Latvia, have been most affected. The incidence in Latvia peaked in 1995 (15 per 100 000 per year) with a second peak in 2000 (11 per 100 000 per year). In Estonia and Lithuania the incidences in 1995 were about one tenth of that of Latvia, and have gradually decreased over the period. In the other EU countries, cases are only observed sporadically. In 2005, only Latvia reported cases (20) with an incidence of 0.87 per 100 000.

Tetanus

Tetanus is induced by an exotoxin of the bacterium *Clostridium tetani*. The disease is characterised by painful muscular contractions primarily of the facial muscles. Generalised spasms can occur. The case fatality rate ranges from 10% to over 80% with the highest risk in infants and the elderly. Tetanus is mostly seen after contaminated injuries, and the infection is not transmissible between humans. There is an effective vaccine available.

An overall decreasing trend is seen over the last 10 years, with a slight increase from 2001–03. The incidence rates were always below 0.2 per 100 000 per year in the EU15 states, except for Italy and Portugal in 1995. In the new Member States, tetanus incidence rates were below 0.35 per 100 000 per year, except for Slovenia where incidence peaked at 0.45 per 100 000 per year in 2000 (nine cases) and for Malta with a peak at 0.5 per 100 000 per year in 2002 (two cases). In 2005, altogether 137 cases were reported by 21 countries. Italy reported almost 50% of all cases and the highest incidence rates were in Malta (0.25 per 100 000), followed by Italy (0.11 per 100 000).

Viral infections

Measles

Measles is an acute illness causes by morbillivirus. The main clinical picture is fever, rash, cough, coryza and conjunctivitis. The disease is preventable by a vaccine that provides life-long immunity. The elimination of measles by 2010 (interruption of indigenous measles transmission) is part of the strategic plan for measles and congenital rubella infection in the European Region of WHO.

Due to the two-dose vaccination policy the incidence of measles in Europe has decreased dramatically over the last 10 years from almost 35 per 100 000 per year before 1997 to less than 10 per 100 000 per year after 1998 (figure 8).

This drop is mainly due to a sharp decrease in the number of cases in France and in Italy, but the incidence has decreased greatly in most of the countries over the 10-year period. A recrudescence of measles was observed in the Netherlands (1999–2000), Spain (2003), Poland (1998) and Lithuania (2002). Since 2000 a significant number of cases are still being observed in France, Germany and Italy. The incidence in these countries has fluctuated between five and 42 per 100 000 per year. In the other countries, incidence has fluctuated between one and 10 per 100 000 per year since 2000.

In 2005, a total of 1 291 cases were reported by 25 countries, with more than 50% of cases (776) from Germany. The overall incidence in the EU was 0.28 per 100 000 per year and the highest rates per 100 000 were reported by Ireland (2.26) and Germany (0.94). Eradication has not yet been achieved, and few countries were able to maintain an incidence rate below one per 1 000 000 per year during the past few years.

Mumps

Mumps is caused by the mumps virus. It occurs as an acute illness characterised by fever and swelling of one or more salivary glands. Inflammation of the testicles (orchitis) in post-pubertal males, respiratory symptoms in children, mild pancreatitis and asymptomatic meningitis are the most common complications of the infection. Encephalitis is believed to occur in one per 10 000 cases. Mumps is preventable by a vaccine.

In the last 10 years, there was a generally decreasing trend until 2002, but since then the number of cases has again been steadily increasing. Various countries experienced peaks in incidence over this 10-year period, notably Poland in 1998 and 2004, Estonia in 1998, France in 1995–96, Italy in 1995–96 and 1999–2000, Latvia in 2000–01, Lithuania in 1999, Malta in 2000, Portugal in 1996–97 and Spain in 1996 and 2000.

In 2005, a total of 52 918 cases were reported by 23 countries. The UK, followed by Iceland, reported the highest incidence rates (77.24 and 28.95 per 100 000, respectively). In those countries, mumps mainly affected young adults. The overall

Figure 8. Trends in reported measles incidence in the EU25, Norway and Iceland, 1995–2004

Source: Eurostat.

incidence in the reporting countries was 17.65 per 100 000 per year.

Rubella

Rubella is a mild febrile rash illness affecting both adults and children. The most serious consequence of rubella results from infection during the first trimester of pregnancy, when rubella infection can cause miscarriage, foetal death or severe birth defects. The overall trend of rubella in the last 10 years is declining, with two peaks seen in 1997 and 2001. However, recrudescence has been observed, particularly in Poland in 1997 and 2001, in Latvia in 1996 and 2002, in Lithuania in 1995 and 1999–2000, Czech Republic in 1998 and 2002, Italy in 1996–97 and 2001–02, Iceland in 1996 and Spain in 1996.

In 2005, a total of 1 498 cases were reported by 22 countries. The overall incidence was 0.51 per 100 000 per year, with Lithuania (3.44 per 100 000) and the Netherlands (2.23 per 100 000) reporting the highest rates. The age and sex distribution varied across countries, and may reflect a variation in the vaccine coverage by sex (some vaccination programmes started in women first) together with a variation in notification (more attention is given to rubella in girls and women).

Polio

Polio is caused by poliovirus, which infects the gastrointestinal tract and spreads to regional lymph nodes, but can also spread to the central nervous system. Polio causes flaccid paralysis in less than 1% of cases, and the majority of infections are asymptomatic. Childhood immunisation has been an effective preventive measure. In Europe, the last case of flaccid paralysis caused by wild polio was reported by Turkey in November 1998, and in June 2002 the WHO European Region was declared polio free. However, poliovirus imported from endemic countries remains a threat, as demostrated in 1992–93 when imported polio caused an outbreak of 71 cases with two deaths in an unvaccinated community in the Netherlands.

Food- and waterborne infections

Summary and conclusions

Mass catering, intensified farming, industrial food production, and a largely international food market have created new, wide-ranging pathways along which infectious disease agents can spread. Changes in consumer behaviour (and, consequently, in the production and distribution of foods) have led to the situation that one contaminated part of food can affect a large number of individuals, often in geographically distant areas. Large multinational food-borne outbreaks are much more difficult to prevent and control. Effective surveillance of this group of diseases is restricted by variations in reporting systems and different degrees of coordination between food, animal and environmental control authorities. Effective prevention and control requires close collaboration not only between microbiologists and epidemiologists in public health, but also with veterinary and food safety authorities. At the EU level, besides ECDC, the Commission, EFSA and WHO EURO are important players.

For several of these diseases surveillance has improved considerably in many Member States over the last decade, and it is difficult to decide whether an increase in reported incidence reflects a genuine increase or simply the improved detection. However, for two important infections, salmonellosis (including typhi and paratyphi) and shigellosis, there seems to be a declining trend in the EU. *Campylobacter* is the most commonly diagnosed food-borne bacteria in the EU, and may be slightly increasing over time, while *Cryptosporidium* has caused waterborne outbreaks in several Member States. Although the majority of the symptomatic *Campylobacter* and *Salmonella* infections don't require any drug treatment, invasive infections do occur. Hence the monitoring of antibiotic resistance is important and should be included in the surveillance.

Besides these important infections, there are several food- or waterborne infections that are either of regional concern (brucellosis, echinococcosis, trichinellosis), or that are of main concern in the immuno-compromised, for the foetus or in the very young (listeriosis, toxoplasmosis). Indications are that listeriosis may be declining, but for toxoplasmosis the data are quite unreliable.

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

Cholera is exclusively an imported disease to the EU, with almost no secondary domestic cases seen in recent years.

Norovirus and rotavirus infections are not reportable in the EU, but are both important causes of gastroenteritis all over the Union. It may be that outbreaks caused by norovirus in confined places, such as schools, hospitals and cruise ships are on the increase, but it should be noted that methods for laboratory diagnosis have really been available only in the last decade.

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 symptoms of gastroenteritis. Surveillance of these diseases remains important, not only to discover and, ideally, stop an outbreak, but even more importantly, to identify weaknesses in food (and water) processing and handling in order to make informed improvements in the future. An enhanced surveillance for all food-borne diseases (covering all the diseases, but also enhancing the information collected, including antibiotic resistance where appropriate) is therefore a priority. Such a system should integrate laboratory data, in particular from molecular sub-typing. The list of diseases currently under surveillance needs to be reviewed with regard to food-borne viruses, and rapid information exchange platforms should be established for all food-borne diseases.

Bacterial infections

Campylobacteriosis

Campylobacteriosis is a disease caused by the bacterium *Campylobacter* with severe abdominal pain, fever and watery or bloody diarrhoea. The most frequent route of transmission is consumption of contaminated food (mainly chicken) or water. Other risk factors include outdoor swimming and direct contact with infected animals.

The incidence of campylobacteriosis showed a steadily increasing trend from 85 000 cases in 1995, to 180 000–190 000 more recently, though this increase could be a result of better reporting (figure 9). The most affected age group is children under the age of five years, and the disease shows a characteristic seasonality with the highest reported numbers in the summer. A disturbingly high proportion of the *Campylobacter* isolates are now resistant against commonly used antibiotics such as fluoroquinolones and tetracycline.

In 2005, more than 200 000 cases were reported, with the highest incidence reported by Czech Republic (296.15 per 100 000), followed by the UK (87.95 per 100 000). Campylobacteriosis is the most commonly reported enteritis in the EU, but the high degree of under-reporting known to occur in many countries makes direct comparisons between them very difficult. Furthermore, the proportion of imported cases varies considerably between the countries with 99% domestic cases in Czech Republic, Lithuania and Slovakia, whereas in Sweden and Finland, 61% and 52%, respectively, of reported cases were imported.

Salmonellosis

Salmonellosis is a diarrhoeal disease caused by the bacterium *Salmonella*. Poultry, pigs, cattle, and other animals such as reptiles serve as its reservoirs. The most frequent route of

Figure 9. Trends in reported human campylobacteriosis incidence in the EU25, Norway and Iceland, 1995–2004

Source: Eurostat.

transmission is the consumption of contaminated food. After a peak in 1995, the incidence of salmonellosis in Europe has remained high, although exhibiting a decreasing trend.

Despite the generally decreasing trend, some countries have reported an increase from 2004 of more than 5%: Czech Republic, Denmark, Estonia, Finland, Latvia and Lithuania. This could be due to improved surveillance systems (particularly in the new Member States), but also to the occurrence of outbreaks. A global epidemic of egg-related *Salmonella Enteritidis* infections has heavily contributed to the European salmonellosis epidemiology, and this serotype has been by far the most common in Europe, and more dominant here than in most parts of the world.

In 2005, a total of 181 876 human salmonellosis cases were reported by 27 countries, with the highest incidence reported in Czech Republic (322.16 per 100 000), followed by Slovakia (223.67 per 100 000). The highest incidence was reported in the age group 0–4 years (27% of cases), decreasing steadily in the older age groups. Some countries, notably Sweden, the Netherlands and Norway had a very high proportion of imported cases (77–87%).

Alternative sources of standardised information, i.e. returning travellers used as sentinels, indicate a very large under-reporting of cases in some of the Member States.

Typhoid fever / Paratyphoid fever

Typhoid/paratyphoid fever is a potentially life-threatening systemic disease caused by the bacteria *Salmonella* Typhi and *Salmonella* Paratyphi. The disease is characterised by fever, headache, malaise, non-productive cough, and sometimes diarrhoea. The symptoms are milder in paratyphoid fever. Typhoid and paratyphoid fever occur worldwide and humans are the only reservoir for these bacteria. The mode of transmission is the consumption of contaminated food and water. Preventive measures include good personal and food hygiene.

The overall incidence rate of typhoid/paratyphoid fever has been steadily declining since 1995. The highest proportion (31%) of all reported cases (n=20 746), was reported by Italy between 1995 and 2004 (6 440 cases). In 2005, a total of 1 364 human typhoid/paratyphoid cases were reported by 26 countries. Norway, with 0.87 per 100 000, reported the highest incidence rate, followed by the UK (0.79 per 100 000).

Shigellosis

Shigellosis is a disease caused by the bacterium *Shigella* with the only reservoir in humans. The clinical picture is mainly characterised by diarrhoea accompanied by fever, vomiting, and abdominal cramps. Transmission occurs directly from person to person or indirectly via contaminated food or water. General hygiene measures are crucial, and proper hand-washing is the most effective individual way to prevent the spread of disease. However, an outbreak of shigellosis in Germany was described

linking the cause to sexual contacts between men who have sex with men.

The incidence has been declining over the last 10 years with a slight peak in 2001. In 2005, a total of 7 425 human shigellosis cases were reported by 26 countries. The European incidence rate was 1.82 per 100 000, with Lithuania (13.43 per 100 000) followed by Slovakia (9.51 per 100 000) reporting the highest incidence rates. The highest incidence was in the under fives (3.5 per 100 000), representing 10% of all cases. As shigellosis is highly endemic in many parts of the world visited by European tourists, information about recent travel would be important to monitor for the future.

Verocytotoxin-producing *Escherichia coli* (VTEC)

Verocytotoxin-producing *Escherichia coli* (VTEC) causes an enteric infection, with often non-specific watery or bloody diarrhoea that in some cases may proceed to a severe disease with renal failure and haemorrhages: haemolytic uremic syndrome (HUS). HUS is the leading cause of acute renal failure in children, and 3–5% of patients die. The main reservoir is cattle but the bacterium has also been found in goats, sheep, pigs and wild game. The most frequent route of transmission is the consumption of contaminated food (especially beef and raw milk), or contaminated water. Direct contact with infected animals and swimming outdoors in contaminated surface waters have been shown as a possible route of acquiring the infection. Controls of VTEC infections at the farm level are important in preventing the introduction of the bacterium into the food chain. In addition, good hygiene practices in meat processing and food handling are essential preventive measures.

In the last 10 years, the incidence has more than doubled, rising from 1995 to 2002 and levelling off in more recent years. However, this data may in some countries and for some of the years include both *E. coli* and VTEC. The most affected age group appears to be 0–4 years. In 2005, a total of 5 218 cases were reported by 25 countries. Czech Republic (16.72 per 100 000) followed by Sweden (4.27 per 100 000) reported the highest incidence. A total of six outbreaks were monitored in 2005, with beef, lettuce and camembert cheese identified as the sources.

Yersiniosis

Yersiniosis is caused by the bacterium *Yersinia* (species other than the plague-causing *Yersinia pestis*). The clinical presentation includes fever, diarrhoea and abdominal pain that may mimic appendicitis. The infection is sometimes complicated by chronic arthritis and a skin rash (erythema nodosum). Yersiniosis occurs worldwide, but mostly in the northern hemisphere. Pigs and cattle are known reservoirs. Infection is often acquired by eating contaminated, particularly raw or undercooked, pig meat. Other sources of infection have been vegetables kept in chilled stores for long periods.

In the last 10 years, the incidence rate of reported cases has been relatively stable, but clear peaks were seen in 1998 and 2002. In 2005, 23 countries notified a total of 9 564 cases of human yersiniosis with Lithuania (14.63 per 100 000) followed by Finland (12.2 per 100 000) reporting the highest incidence rates. The overall incidence in the EU was 2.23 per 100 000 per year, with children under five years old having the highest incidence (30.4 per 100 000 per year).

Listeriosis

Listeriosis is a disease caused by the bacterium *Listeria monocytogenes*. The infection is mostly mild and self-limiting, but may lead to abortion in pregnant women. In immuno-compromised or elderly persons, listeriosis may take a severe course with meningitis, encephalitis, or septicaemia. *Listeria* is ubiquitous in the environment, and food-borne outbreaks have been detected worldwide. Many animals carry the organism in their faeces, and consumption of contaminated food is the principal route of transmission. Control measures are directed at the farm and food-processing level to prevent the contamination of food products. Preventive measures include providing appropriate information for consumers about the risks.

The annual incidence in Europe decreased between 1995 and 1998, but since then has shown a sustained increasing trend. The incidence in 2004 (0.28 per 100 000 per year) was similar to that for 1995. Twenty-six countries reported 1 491 cases in 2005. Denmark (0.85 per 100 000), followed by Finland (0.69 per 100 000) reported the highest incidence rates. More than half the reported cases occurred in individuals over 65 years of age. In 2005, 96 listeriosis cases were associated with pregnancy. These were reported by Germany (56 cases), France (37 cases) and Denmark (three cases).

Brucellosis

Brucellosis is caused by bacteria of the genus Brucella. The reservoirs for these bacteria are sheep, goat, swine and cattle. Humans become infected by direct or indirect contact with animals or animal products (including milk and dairy products) or by inhalation of aerosols. Control measures to prevent the disease in humans include controlling and eliminating the disease in animals by vaccination and/or the test-and-slaughter of infected animals and proper pasteurisation of dairy products. The number of cases has been steadily decreasing from 1999 (just under 4 000 cases (0.87 per 100 000)) to 2004 (1 743 cases (0.38 per 100 000)). Twenty-six countries reported 1 429 cases in 2005, with an overall incidence of 0.31 per 100 000. Portugal (1.40 per 100 000), followed by Ireland (1.29 per 100 000) reported the highest incidence rates.

Botulism

Botulism is a rare but serious paralytic illness caused by a nerve toxin produced by the bacterium *Clostridium botulinum*. Eating food that contains the botulism toxin causes food-borne botulism, and wound botulism is caused by toxin produced from an infected wound. Botulism appears to be a serious problem in only a few countries in Europe, and the trend of the disease seems to have been stable over the years. Over the 10-year

period Poland reported the most cases. In 2005, a total of 152 cases were reported by 22 countries but only five reported 20 or more cases, with Lithuania reporting the highest incidence (0.15 per 100 000).

Cholera

Cholera is an acute enteric infection, with vomiting and watery diarrhoea though most cases are mild. The disease is caused by the bacterium *Vibrio cholerae*. Humans are the only important reservoir, even though the bacteria can survive for a long time in contaminated coastal waters, transmitting diseases through infected seafood. Cholera is not an endemic disease in Europe. The number of imported cases has remained small; a peak of 40 cases was observed in 1998 but subsequently dropped to lower levels. In the last 10 years, 237 cases were reported (<0.01 per 100 000 per year). In 2005, 34 cases were reported by 20 countries, of which twenty were from the UK.

Viral infections

Hepatitis A

Hepatitis A is a viral disease of the liver caused by hepatitis A virus (HAV). The clinical symptoms vary from mild disease, with no or very few symptoms, to severe hepatitis. Up to 90% of HAV-infected young children do not have any symptoms. Transmission is through close contact with an infected person, or through ingestion of contaminated food, though recently sexual transmission among men who have sex with men has been described. A very effective vaccine is available. Almost 210 000 cases have been reported in Europe between 1995 and 2004, and during this period a steady decrease was observed from a peak in 1996–97 to 2000 and has since remained stable. In 2005, 6 695 cases were reported by 25 countries. Slovakia (9.81 per 100 000) and Latvia (6.29 per 100 000) are the only countries with incidences of more than five per 100 000 per year. The highest incidence was seen in children under the age of 15.

Parasitic infections

Toxoplasmosis

Toxoplasmosis is caused by the protozoan parasite *Toxoplasma gondii*. The infection is asymptomatic in most humans, but can be life-threatening in immuno-compromised individuals. Infections in pregnant women can cause congenital toxoplasmosis, with varying degrees of foetal damage. The definitive host of *T. gondii* is cats. Humans are usually infected through direct exposure to faeces from infected cats or from inadequately washed contaminated fruits or vegetables, but can also become infected from the ingestion of raw or undercooked meat.

There is wide variation in the consistency of reporting, as well as in the reporting criteria. Reporting from most countries in Europe started in 1996, following the highest incidence observed in 1995 (1.68 per 100 000 per year), and has shown a steadily decreasing trend since then. In 2005, 1 519 toxoplasmosis cases were reported by 14 countries, with Lithuania (6.86 per 100 000), followed by Slovakia (4.85 per 100 000) reporting the highest incidence. As toxoplasmosis is a very common infection in humans and animals, the reported cases only reflect a minute proportion of all cases, and very few conclusions can be drawn from the data.

Giardiasis

Giardiasis is a parasitic infection caused by *Giardia intestinalis*, causing both acute and chronic diarrhoea. Infants and children are at particular risk. Domestic and wild animals carry the parasite, although the major reservoirs are contaminated surface waters and humans. Infection occurs after ingestion of contaminated food or water, and several large waterborne outbreaks have occurred in Europe. As for many diseases, large differences between surveillance systems make comparisons between countries very difficult. However, the available data suggest a relatively stable trend over the last 10 years. In 2005, some 15 103 cases were reported by 18 countries. Estonia (24.28 per 100 000), followed by Iceland (14.65 per 100 000) reported the highest incidence rates.

Cryptosporidiosis

Cryptosporidiosis is a parasitic disease caused by *Cryptosporidium*, infecting many species of large and small animals. The parasite can cause profuse and watery diarrhoea, and humans can be infected from other persons or from the environment. Cryptosporidiosis can be life-threatening in immuno-deficient patients. Outbreaks have been reported in child day-care centres, in families, from lakes and swimming pools and through contaminated drinking water. Cryptosporidiosis is not reportable in many countries, and trend data are scanty. In 2005, almost 8 000 cases were reported by 16 countries, with Ireland (13.75 per 100 000) and the UK (9.26 per 100 000) reporting the highest incidence rates. The majority of cases occurred in the age groups under 15 years. Comparisons between reporting countries are complicated due to differences in the surveillance systems.

Echinococcosis

Echinococcosis is a zoonotic parasitic disease, caused by the larval stage of the tapeworm *Echinococcus*. Humans are infected through close contact with infected animals (sheep, cattle, goats, horses, pigs) or through ingestion of undercooked infected food. The number of reported cases has been steadily decreasing since 1996. In 2005, altogether 337 cases were reported by 22 countries. Lithuania (0.44 per 100 000), followed by Slovenia (0.30 per 100 000), reported the highest incidence rates. The real number of cases is probably considerably higher than those reported given the slow progression of the disease over many years.

Trichinellosis

Trichinellosis is a zoonotic disease caused *Trichinella*. The first symptoms are diarrhoea and abdominal cramps, but following larval invasion to the muscles, muscular pain and fever become characteristic symptoms. The main source of human infection is the consumption of raw or undercooked meat products from

pigs, wild boar and horses. As a preventive measure, all slaughtered pigs and horses undergo an investigation for *Trichinella* larvae in meat inspection in the EU. The risk remains higher in imported and wild animal meat and consumption of such undercooked or raw meat should be avoided.

In the last 10 years, the incidence of trichinellosis in Europe has shown an overall decreasing trend despite peaks in Slovakia, France and Italy in 1998, in Poland 1999, in Latvia in 2000, and in Lithuania in 2001. Since 2000, the incidence has been relatively stable. In 2005, 153 cases were reported by 25 countries. Latvia (2.12 per 100 000), followed by Lithuania (0.35 per 100 000) reported the highest incidence rates. The two most affected age groups are children 5–14 years of age and adults 45–64 years of age.

Prion diseases

Variant Creutzfeldt-Jakob disease (vCJD)

Variant Creutzfeldt-Jakob disease (vCJD) is a novel form of human spongiform encephalopathy (prion disease), which has been causally linked to bovine spongiform encephalopathy (BSE). The clinical picture is characterised by psychiatric symptoms followed by progressive neurological deterioration. The disease is fatal, with a mean survival of about 14 months. The main suspected route of transmission is through past consumption of infected beef products, although recently human-to-human transmission has been described through blood transfusion. Preventive measures include ensuring that the BSE prions do not enter the human or animal food chains, and that blood or tissue for transplants from potentially infected persons are not used in medical care.

The transmission of vCJD through prions in the food chain has had profound political, social and economic implications. Because of the long incubation period, extending to years or even decades, there has been uncertainty about the likely extent of a future outbreak of variant CJD in the UK and in other countries. Current data are relatively reassuring, as the number of deaths from vCJD in the UK has declined over recent years from a peak in 2000. However, uncertainty remains about the possibility of increased numbers of cases in the future, particularly as there is now evidence of transmission of vCJD through blood transfusion.

Since 1995, vCJD has been detected mainly in the UK but has also been seen in six other European countries. The highest reported annual number of cases (30) was in 1999. Since 1999, the number of reported cases declined steadily until 2004 (table 1).

In 2005, a total of 21 cases were reported by 18 EU Member States. Slovakia reported 11 cases, however, the criteria for reporting these cases may have been different from those used in the other countries. Six cases reported by France, two by Ireland and one each from Estonia and the Netherlands make up the remainder of the cases reported.

Table 1. Number of reported vCJD cases by year of clinical onset in seven EU countries, 1995–2004

*Country**	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
UK	10	11	14	17	29	24	17	14	5	9
France**	0	1	0	0	0	1	1	3	0	2
Ireland					1					2
Italy							1			
Portugal										1
Spain										1
Netherlands									1	
Total	**10**	**12**	**14**	**17**	**30**	**25**	**19**	**17**	**6**	**15**

*Source: EuroCJD. * 'Country' is defined as the country of normal residence at the time of disease onset. One of the French cases and two of the Irish cases had lived in the UK for extended periods between 1980 and 1996.*

*** Source of French data is official country reports.*

Other diseases of zoonotic and environmental origin

Summary

This is a very heterogeneous group of diseases that fall into two broad categories:

1 Diseases present in Europe (tularaemia, puumala virus infection, borreliosis, tick-borne encephalitis, Q fever, leptospirosis, anthrax, rabies, and West Nile virus infection). Some of these diseases have the potential to be used as a bioterrorism threat (anthrax and tularemia). At present, these diseases have a low number of cases, are often geographically confined, and have to be seen in relation to certain animal reservoirs. Surveillance has not been established for all of them in all countries. For each of these diseases there is a need to develop tailored monitoring, establish surveillance of outbreaks, monitor risk factors and to standardise laboratory methods.

2 Diseases imported to Europe (malaria, viral haemorrhagic fevers (VHF), and plague). For these diseases it is important to have sufficient laboratory capacity for rapid diagnoses in travellers returning from endemic countries.

The most important of the above diseases are tularaemia, puumala virus infections, borreliosis and tick-borne encephalitis (TBE). Of these, only tularaemia is under EU surveillance. This is a disease mainly seen in the north and in sparsely populated areas of central Europe. It appears in outbreaks at intervals of several years, and any actual trend is difficult to describe. Puumala virus infection (nephropathia epidemica) could be classified as VHF, but is seldom reported as such to the EU.

A number of exotic diseases, such as VHF, malaria and plague should be reported to the EU network, but these cases, if any, are almost all imported. The main reason for surveillance of malaria is not to discover any transmission in the EU, but rather to ensure that recommendations for prophylaxis remain valid. Few of these diseases actually pose any major public health threat to EU citizens. Some of these diseases are prone to outbreaks, which always attract a great deal of media attention. It is important to follow their epidemiology in order to give adequate information to the EU public.

Environmental, ecological and climate changes contribute to the emergence, maintenance and transmission of vector-borne and other infectious diseases, some of them imported from regions where they are endemic. The effect of global warming on Europe in the years ahead could increase this danger.

This is a wide range of diseases with different modes of transmission and with varying relevance to European public health. More systematic surveillance data are needed in order to allow for a more coordinated approach in terms of prevention and control. Imported cases through travel need to be monitored, in particular where there is the potential for autochthonous transmission (malaria, chikungunya, yellow fever, etc.), high infectivity (most VHF), etc. Considering the type of diseases and their possible impact, we need to be able to ensure rapid diagnoses for each of them, as well as for unknown pathogens.

Diseases present in Europe

Tularaemia

Tularaemia is a zoonosis, caused by the bacteria *Francisella tularensis*. Natural reservoirs include wild rabbits, hares and muskrats, as well as some domestic animals. Human infection occurs through a variety of mechanisms such as 1) bites from infected ticks; 2) direct contact or ingestion of water, food, or soil contaminated by rodents; 3) handling animal tissues or fluids or undercooked infected meat; and 4) inhalation of infective aerosols. Human-to-human transmission has not been documented. The symptoms and signs are dependent on the mode of transmission, but can include high fever, body aches, swollen lymph glands, difficulty in swallowing, pneumonia and sepsis. A vaccine is available to protect laboratory personnel routinely working with the bacterium. The pathogen has been considered as an agent with the potential for intentional release.

In the last 10 years the reported number of cases in the EU has been very variable, but the overall trend appears to be stable. Finland and Sweden were the countries reporting the most cases over the last 10 years and trends for both countries appear to be increasing, but more so in Sweden. In 2005, 508 cases were reported by 21 countries. Sweden (2.73 per 100 000), followed by Hungary (0.86 per 100 000) reported the highest incidence rates.

Puumala haemorrhagic fever with renal syndrome

Puumala haemorrhagic fever with renal syndrome, also called 'nephropathia epidemica', is caused by puumala virus, and occurs mainly in northern Europe and Russia. Transmission to humans occurs through the inhalation of the virus in aerosols contaminated with the excreta of infected rodents. Up to 80% of infections may be asymptomatic. Clinical illness results in haemorrhagic fever with renal syndrome, with a death rate of less than 0.5%. This disease is the most common haemorrhagic fever in Europe. In the past 10 years, there has been an increase of cases every third year. The year 2005 saw one of these peaks, with more than 2 500 cases reported by Finland and 330 from Sweden. Higher than usual incidences were also noted in France, Germany, Belgium, Austria, and Luxembourg.

Q fever

Q fever is a zoonosis caused by *Coxiella burnetii*, characterised by an acute febrile illness. It varies greatly in severity and duration from very mild to systemic infection, with complications from many organs and a chronic course. The natural reservoirs are sheep, cattle, goats, cats, dogs, birds and some wild animals. Humans are usually infected by direct inhalation of aerosols during parturition of infected animals, or from the dust of

contaminated premises. European-level surveillance data are incomplete, but in the last 10 years the overall trend appears to be rather stable with the rate varying between 0.2 and 0.5 cases per 100 000. In 2005, 958 cases were reported by 21 countries. Germany and France reported the highest incidence rates (0.49 per 100 000 and 0.48 per 100 000, respectively). This is a typically under-reported disease due to its unspecific clinical features.

Leptospirosis

Leptospirosis is a zoonotic disease with a wide clinical spectrum, caused by *Leptospira* bacteria. The death rate is low, but increases with advancing age and may reach 20% or more, predominantly due to liver and kidney failure, massive haemorrhages or cardiac arrhythmias due to myocarditis (inflammation of the heart muscle). Humans acquire the disease by occupational or recreational contact with water, soil or other material contaminated with the urine of infected animals. Infection in humans may follow direct or indirect exposure to an infected animal's urine or contaminated fresh water.

The overall incidence was stable in the EU during the period 1995–2004, ranging from 0.1 to 0.22 cases per 100 000. The lowest number of cases in recent years (687) was reported in 2004. France continues to report a high number of cases, partly related to higher incidence in its overseas departments. In 2005, 900 cases were reported by 24 countries, with Estonia (0.82 per 100 000) followed by France (0.77 per 100 000) reporting the highest incidence.

Anthrax

Anthrax is a zoonotic disease caused by the bacterium *Bacillus anthracis*. Reservoirs are usually domestic and wild herbivores, and the spores can survive in the environment for decades. Anthrax is endemic in some regions in the world, including southern and eastern Europe. Humans become infected directly or indirectly from infected animals. Symptoms can appear with three clinical presentations: cutaneous anthrax is transmitted through cuts or open sores; inhalational anthrax, giving fever, respiratory symptoms that may progress to shock and death (death rate around 75%); and gastrointestinal anthrax, transmitted through contaminated food, giving gastrointestinal symptoms that may progress to sepsis and death. Control measures include the correct disposal of animal carcasses, correct disinfection, decontamination and disposal of contaminated materials and the environment. The use of suitable protective equipment and vaccination of exposed susceptible animals and humans at occupational risk is required. Vaccine is limited to occupational, military and laboratory staff. *B. anthracis* has been recorded as a biological warfare agent since 1941.

Over the last 10 years, the overall incidence has been stable. Twenty-seven countries reported a total of 250 cases throughout the period (though only 24 countries reported for the whole 10-year period). The most cases were reported by Spain (65%), followed by Greece (14%). In 2005, 21 countries reported just 10 cases.

West Nile fever

West Nile virus (WNV) is related to other viruses causing encephalitis in humans. WNV is maintained in a cycle of wild birds and mosquitoes. Humans are mainly infected through mosquito bites, although infection through organ transplantation and blood transfusion has been documented, as has transplacental transmission from mother to child. Since a first large outbreak in Romania in 1996, WNV infection has become recognised as a major cause of public health concern in Europe. The majority of symptomatic cases develop West Nile fever, with fever, headache and fatigue. Severe illness develops when the central nervous system is affected, causing West Nile meningitis and/or encephalitis. No treatment or vaccine is currently available, and the main preventive measure is to minimise the risk of mosquito bites, using mosquito repellent and protective clothing when outdoors.

In the past 10 years, indigenous WNV outbreaks have been documented in Czech Republic (1997) and France (2003) affecting five and seven cases respectively. In addition, sporadic imported cases have been reported in several European countries. The origin of infection of most imported cases is the USA, where an increasing number of infections have been reported since 1999.

Rabies

Rabies is a disease caused by a rhabdovirus. It is mainly a disease of animals and it occurs worldwide in warm-blooded mammals. The transmission normally occurs through a bite from, or direct contact with saliva of, an infected animal. The disease is fatal as soon as typical symptoms appear. Prevention is possible by vaccination (before or after exposure). Preventive veterinary measures include proper vaccination of cats and dogs. Oral vaccinations to wild animals have proven effective in preventing the spread of disease within wild animal populations. In the last 10 years no more than seven cases per year were reported across the EU (total 21 cases). In 2005, five cases of rabies were reported by 22 countries; four of them from Germany and one from the UK. There is a risk of re-introduction of rabies in the EU via travelling or by the cross-border movements of infected animals.

Mainly imported diseases

Malaria

Malaria is caused by the parasite *Plasmodium*, and is transmitted to humans by mosquitoes. During the 20th century, malaria was eradicated from many temperate areas, including the whole of the EU. As a result, the disease is now essentially limited to tropical countries. The potential for malaria re-introduction in countries where it has been eradicated is of growing concern partly due to global climate change, as the malaria vectors are still present in previously endemic areas, including Europe.

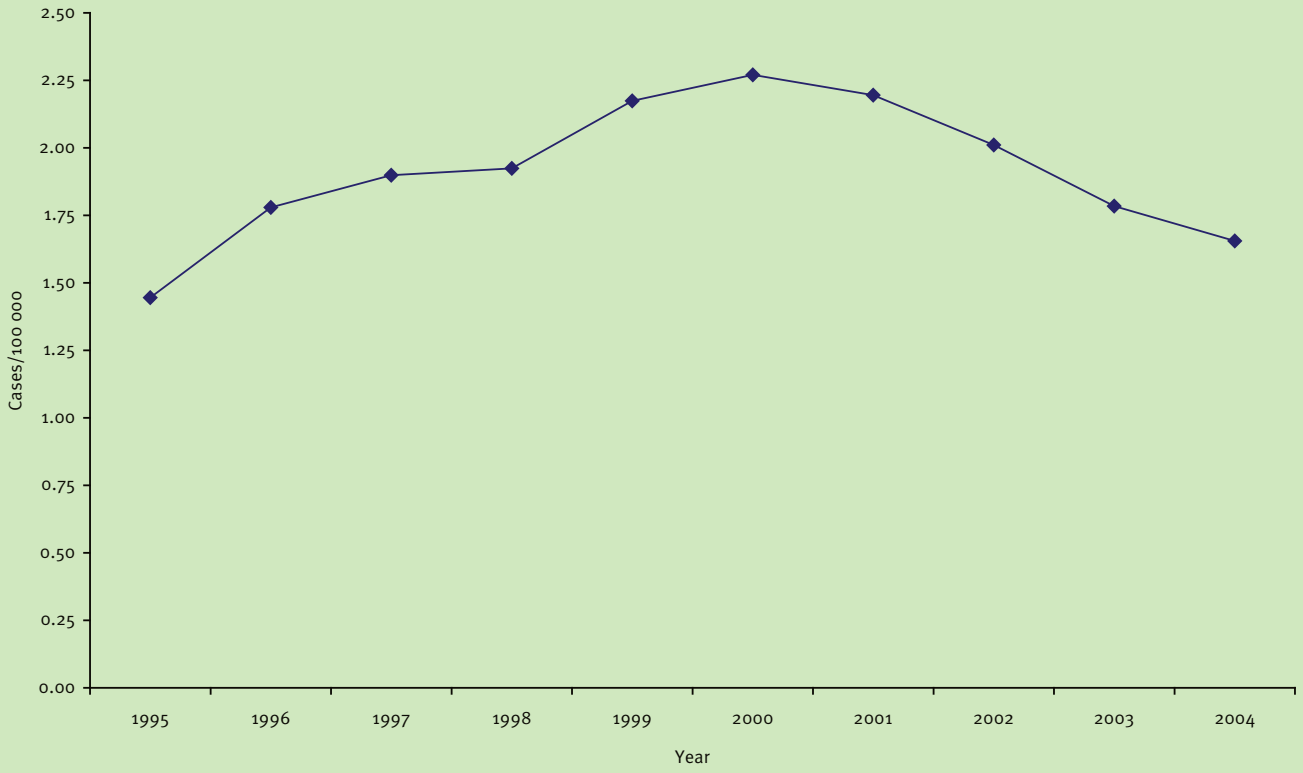
'Airport malaria' is sometimes reported in relation to the inadvertent transport of infected mosquitoes from endemic areas. Due to the large number of imported cases in Europe, malaria surveillance is focused on travellers' health.

Since 1995, France has accounted for a large proportion of the imported malaria cases to Europe, mainly through its close ties with several African, highly endemic, countries. Over the period, the overall incidence rates have ranged from 1.45 to 2.27 per 100 000 per year, with a steady decrease since 2000 (figure 10).

course (see above), with more than 2 500 cases is the main VHF endemic in Europe. The risk for infection with other VHF viruses is mainly limited to international travel.

Only those infections for which cases were reported in returning European travellers, or which have been identified as a threat in 2005, are discussed below. The quality and availability of data on VHF differs from country to country. Some Member States' annual reports document data on VHF in general, some on virus-specific infections, while others do not report VHF at all.

Figure 10. Trends in reported malaria incidence in the EU25, Norway and Iceland, 1999– 2004



Source: Eurostat.

In 2005, 4 306 malaria cases were reported by 26 countries (France not reporting). The favourable trend in recent years contrasts with the increasing numbers of malaria seen in endemic countries. That the trend of malaria cases in returning travellers is in decline despite the ever-growing numbers of Europeans travelling, suggests that travel prophylaxis recommendations are being applied with increasing success. Still, the risk for travellers to highly endemic areas remains significant.

Viral haemorrhagic fevers

Viral haemorrhagic fever (VHF) refers to a serious multi-system syndrome with internal and external bleeding, caused by viruses belonging to several different virus families. The main reservoirs for these viruses are rodents and insects. The clinical presentation of VHF ranges from a mild flu-like illness to a very severe disease like Ebola haemorrhagic fever with a death rate of up to 88%. Puumala haemorrhagic fever with a milder

Dengue fever is endemic in Asia, the Pacific, the Caribbean, the Americas and Africa. Humans are infected with Dengue virus through mosquito bites. After an incubation period of 8–10 days, a mild and usually self-limited flu-like illness develops. Current scientific evidence indicates that sequential infection increases the risk of the more serious Dengue haemorrhagic fever (DHF). In several Asian countries, DHF has become a leading cause of morbidity and death, mainly in children. Imported cases of Dengue fever are not uncommon, and in recent years Germany has reported annually some 120–220 cases, the UK around 200–250 cases, and Belgium and Sweden 25–60 cases. According to available data, no cases of DHF have been reported in 2005.

Lassa fever is endemic to West Africa. Rats are the reservoir of lassa virus, and humans become infected through contact with their excreta. While about 80% of the infections are asymptomatic, the remaining patients develop severe multi-system dis-

ease and up to 15% of the hospitalised cases may die. Individual short papers in *Eurosurveillance* reported on a total of five imported cases of Lassa fever in Europe in the past five years: two cases in the UK from Sierra Leone (2000 and 2003), one case in the Netherlands in 2000, also from Sierra Leone, and two cases in Germany in 2000 from Ghana or Côte d'Ivoire and Nigeria. No cases were reported in 2005.

Crimean-Congo haemorrhagic fever (CCHF) is endemic in several countries of Africa, the European continent and Asia. The virus is transmitted to humans through the bites of ticks. There is no specific treatment or vaccine available, and up to 30% of the patients may die. In recent years, outbreaks have been reported in Turkey, Kosovo and Albania. *Eurosurveillance* reported one imported case of CCHF in the UK, in a traveller returning from Zimbabwe. No cases were reported in 2005.

Ebola and Marburg haemorrhagic fevers are caused by the ebolavirus and marburgvirus respectively, both belonging to the same filoviridae family. Both are rare diseases, but have potentially high death rates. Transmission of the viruses occurs from person to person through close contact with blood or body fluids. Clinical illness starts as a flu-like syndrome, rapidly evolving to severe disease with haemorrhagic signs. No treatment or vaccine is available for either disease. No Ebola or Marburg haemorrhagic fever cases have been reported in Europe in the past 10 years.

Yellow fever

Yellow fever virus (YFV) has caused large epidemics in Africa and in the Americas, and is endemic in some tropical areas of these regions. The virus is transmitted through bites of mosquitoes, which are the reservoir as well, ensuring transmission from one year to the other. A large proportion of YFV infections occur with no symptoms, but those with clinical symptoms may develop severe disease with liver failure, and haemorrhages. For half of these patients, death occurs within 10–14 days. No specific treatment is available for yellow fever, but prevention is possible through administration of a highly effective vaccine.

Yellow fever has not caused any outbreaks in Europe for more than a century. Only sporadic cases have been reported in travellers returning from endemic regions. In the last 10 years, one case was reported by Germany in 1999 (imported from Côte d'Ivoire), one from Belgium in 2001 (imported from Gambia), four from the UK in 1998, 2001 and 2005, and two cases from Ireland in 1998 and in 1999 (but there is no information on the source country of the UK and Irish cases).

Plague

In Europe no human plague cases have been reported for a long time. Given the severity of the disease and its clinical characteristics, it is unlikely that cases have been missed. Though relatively rare, the disease has a worldwide distribution and in the most recent years, a growing number of cases are being reported to WHO. Presently, its only implication for European health systems is to counsel international travellers and be prepared to diagnose and treat the disease in returning travellers.

BURDEN OF COMMUNICABLE DISEASES: RESULTS OF A PILOT STUDY

A pilot study was carried out in collaboration with RIVM in the Netherlands to illustrate the potential application of the disease burden concept to communicable diseases per se, to recommend future studies and to stimulate debate. The disease burden of seven communicable diseases (campylobacteroisis, EHEC infection, HIV infection, influenza, measles, salmonellosis and tuberculosis) was estimated using the composite measure of Disability Adjusted Life Years (DALYs)[1]. The relative comparison of the burden between diseases can be useful as one element in the difficult and sensitive, but necessary task of indicating where and for which diseases additional actions are a priority.

The pilot has identified a considerable number of limitations with regard to the generally available data and their quality. Despite this the results do show that the relative impact of diseases as measured by disease burden (DALYs) differs from the relative impact as measured by just incidence or mortality data. The need to further develop standardised methods and techniques to improve the quality of these reports is evident. Once the procedures have been consolidated, a full burden of disease study for infectious diseases in Europe could be commissioned, working together with other international efforts in this field.

ACTIONS TO STRENGTHEN PREVENTION, CONTROL AND SURVEILLANCE IN THE EUROPEAN UNION

The actions needed have been grouped in accordance with strengthening of basic public health functions throughout the EU. In practice such actions are necessarily taken at more than one level (and by different sectors) since it is only in this combined fashion that diseases, which do not after all respect national or sector boundaries, can best be tackled. As this is the first EU-wide comprehensive public health report devoted specifically to communicable diseases, only some selected EU-level actions are indicated. For the health system the main competencies lie with the Member States. There is a shared competence, however, for public health issues. This presupposes a close collaboration, coordination and interaction between the Member States, the Commission and ECDC. As the ECDC is an independent agency with a main role in risk assessment: to detect the health threats through surveillance and epidemic intelligence, to build up evidence to facilitate and promote a sound decision-making process and give independent scientific advice at the request of MS and/or the Commission and also at on its own initiative and also to promote preparedness and response in the EU, the risk management responsibilities lie with the Member States, coordinated by the Commission.

This complexity highlights the responsibility that each Member State has regarding the protection of its own population from communicable disease. The other responsibility concerns the fact that an infectious disease problem in one EU country today may well spread to its neighbour or the whole EU tomorrow. Thus, as regards prevention and control of communicable diseases, the need for solidarity and effectiveness in action among EU Member States is quite different from other elements of health protection.

For such effectiveness to materialise, it is indispensable that the Member States reach a substantial level of agreement on overall approaches and technical methods

Strengthening the surveillance systems

A strong integrated European surveillance system that covers all relevant diseases to the required level of detail will go a long way towards improving comparability and timeliness. In particular, laboratory data, including that from molecular sub-typing need to be integrated into the present EU surveillance systems. Disease-specific surveillance should be further developed to help scrutiny at the EU level (e.g. hepatitis B and C) in line with any future review of the current diseases under EU surveillance.

As an integral part of the EU surveillance system, regular and continuous data quality controls need to be considered. These include standardised case definitions and collection of the data; inclusion of health-seeking behaviour data; and the clinical protocols and decision trees taken by physicians for when to submit patient samples for a laboratory diagnosis. Estimating 'true incidence' will require assessing under-reporting and under-ascertainment for all diseases, taking into account existing efforts of the Member States.

1 This measure attempts to combine mortality, incidence and the sequelae due to an infectious agent into one composite measure, taking the duration and severity of the disease into account

The timeliness of reporting is essential for the early recognition of outbreaks of communicable diseases. While point source outbreaks are usually detected at the local level in the Member States, other outbreaks or more subtle changes in trends may be detected earlier or only after pooling data from the Member States.

Enhancing the scientific basis for prevention and control

Sharing the evidence in such areas as intervention methods and technologies, understanding communicable disease determinants, and methods for forecasting future threats would assist the development of the guidelines, risk assessments and scientific advice that are provided for the EU institutions, Member States and the general public. Estimating the burden of infectious diseases in the EU would help to enhance knowledge of their health, economic and social impact. A first attempt indicates the potential and simultaneously points out the data prerequisites for any future analysis.

The rapid developments in molecular biology and other biomedical fields open up new possibilities for understanding better the pathogens, their mode of transmission, and the scope for preventive and therapeutic interventions. Also good surveillance and response to emerging threats rely heavily on the information that is provided by microbiological laboratories and a more harmonious approach and closer collaboration and coordination would represent an important step to improve the overall EU response to communicable diseases.

Many Member States possess impressive communicable disease-related research capacity. Much could be gained from a catalytic, comprehensive and sustained effort to identify the priority needs for new scientific knowledge from an EU-wide, public health point of view. Further, support should be promoted for such research from EU structures, international foundations and research bodies and institutions.

Increasing the EU's capacity to confront threats

The EU will have to be ready to face different communicable disease threats in the years to come. Some of them (e.g. an influenza pandemic, the intentional release of biological agents, the appearance of diseases of unknown origin) could threaten any or all countries. As in most cases, early and forceful interventions are essential to limit the health impact of new threats, early detection, identification, monitoring and intervention are essential – not only for the population first attacked, but also for the protection of the wider EU. This means that it is crucial that a strong EU-level system for early warning and epidemic intelligence is mirrored in the Member States and in neighbouring countries, the rest of Europe and globally in the context of IHR implementation.

Substantial efforts, led by ECDC, have been undertaken during the last two years to develop a more unified and coordinated approach to threat detection, to outbreak investigation and response, as well as to preparedness, throughout the EU. Further refinement and improvement will be based upon experience including specific simulation exercises involving all the Member States, the Commission and other stakeholders such as WHO.

Building stronger human resources for communicable disease prevention and control

Well educated and trained professionals are the key to success in all aspects of disease prevention and control and while many good training programmes exist in Member States, the current situation varies across the EU. Development of the EU capacity (and also of Member States) could benefit from their networking in order to provide a more systematic sharing of experience, pooling of expertise for training, development of inspirational guidelines, and joint organisation of training programmes in some selected areas of communicable disease prevention and control.

Providing better information on prevention and control to different target groups

A great deal of information is available on communicable diseases in Europe. However, problems can arise due to the great multiplicity of information sources, the occasional lack of systematic updating, the failure to tailor the information to specific target groups, and the absence of systematic quality control.

Recent experience has shown the importance of authoritative and independent scientific and technical information to professionals and the coordination of public health messages between EU institutions, Member States and other stakeholders to the media and public (e.g. avian influenza).

Creating synergy through stronger partnerships in Europe

All EU Member States, the EU institutions and several of its agencies, international and non-governmental organisations, as well as many institutions at country level undertake actions that in various ways help protect European citizens from communicable disease. Sometimes their efforts are well coordinated, but other times not, in which case their impact falls far short of their potential. Closer partnerships and more systematic exchange of successes and failures between Member States could substantially help to meet the full potential of concerted EU action.

The cooperation between ECDC and WHO has been substantially strengthened over the last two years and will continue to be extensive and close in the years to come.

Much could also be achieved, including improving the control of communicable disease determinants, through a close cooperation with other sectors (such as food and agriculture) other EU agencies (such as EFSA, EMEA) and several European Commission programmes and Directorates (such as DG Sanco, DG Research, European Neighbourhood Policy). Partnerships also need to be developed with other actors such as international governmental organisations, non-governmental organisations, industry and the research community at large.

The actions outlined above will take concerted effort and time especially as many require international and multi-agency efforts that build on and support Member States efforts to strengthen the EU national systems for prevention, control and surveillance of communicable disease. Solid national systems in all Member States are essential pre-requisites for a strong EU system consisting of an EU-wide:

- communicable disease surveillance system operating with unified reporting methods, computerised data transmission and exchange and well focused specific analyses;
- coordinated, and rapidly responding alert and response system for emerging threats from communicable diseases or diseases of unknown origin;
- scientific support function capable of marshalling European and other institutional resources towards the development of better approaches to prevention and control of communicable diseases, including a more 'up-stream' control of communicable disease determinants.

Table 2. Summary of general trends (1995–2005), EU incidence (2005), main age groups affected (2005), and major threats detected (2005) for diseases reported on EU-level

Disease	General 10-year trends	EU incidence per 100 000 (2005)	Main age groups affected (2005)	Major threats monitored/detected (2005)
Antimicrobial resistance (AMR) and healthcare-associated infections (HCAI)				
AMR	↑	Not applicable	No data	0
Nosocomial infections	No reliable data	Not applicable	No data	0
HIV, sexually transmitted infections (STI) and blood-borne viral infections				
HIV	↑	7.4	20–29	0
AIDS	↓	1.5	30–39	0
Chlamydia infection	↑	99.4	15–24	0
Gonorrhoea	↔	9.5	15–24	0
Syphilis	↔	3.5	25–44	0
Hepatitis B	↓	1.5	25–44	1
Hepatitis C	↑	8.6	25–44	0
Respiratory tract infections				
Influenza	↔	No data	0–14	1
Avian influenza	↑	0	Not applicable	1
Tuberculosis	↓	13	65+	1
Legionnaires' disease (legionellosis)	↑	1.1	65+	6
SARS	Not applicable	0	0	0
Vaccine-preventable diseases (VPD)				
Invasive pneumococcal infection	↔	5.8	0–4, 65+	0
Invasive meningococcal disease	↓	1.2	0–4	2
Invasive infection caused by *Haemophilus influenzae* type b	↓	0.3	0–4	0
Pertussis	↓	4.2	0–4, 5–14	0
Diphtheria	↓	<0.1	0–4	0
Tetanus	↓	<0.1	65+	0
Measles	↓	0.3	0–4	3
Mumps	↓	17.7	5–14, 0–4	0
Rubella	↓	0.5	0–4	0
Poliomyelitis	↓	0	0	4
Smallpox	Not applicable	0	0	0
Food- and waterborne infections				
Campylobacteriosis	↑	45.1	0–4	0
Salmonellosis	↓	39	0–4	13

Table 2. (cont.) Summary of general trends (1995–2005), EU incidence (2005), main age groups affected (2005), and major threats detected (2005) for diseases reported on EU-level

Disease	General 10-year trends	EU incidence per 100 000 (2005)	Main age groups affected (2005)	Major threats monitored/detected (2005)
Typhoid/paratyphoid fever	↓	0.3	0–4	1
Shigellosis	↓	1.8	0–4	0
Verocytotoxin-producing *Escherichia coli* (VTEC)	↑	1.2	0–4	6
Yersiniosis	↔	2.2	0–4	0
Listeriosis	↑	0.3	65+	1
Brucellosis	↓	0.3	45–64, 25–44	2
Botulism	↔	<0.1	45–64, 25–44	1
Cholera	↓	<0.1	15–24	6
Hepatitis A	↓	1.7	5–14	3
Giardiasis	↔	5.2	0–4	0
Cryptosporidiosis	↓	2.8	0–4	0
Echinococcosis	↓	<0.1	65+	0
Trichinellosis	↓	<0.1	5–14, 45–64	0
Variant CJD	↔	<0.1	65+	2
Toxoplasmosis	↓	0.8	5–14	0
Other diseases of zoonotic and environmental origin				
Tularaemia	↔	0.1	45–64	0
Q Fever	↔	0.3	45–64, 25–44	0
Leptospirosis	↔	0.2	45–64	0
Anthrax	↔	<0.1	65+	1
West Nile Virus	Not applicable	<0.1	No data	1
Rabies	↓	<0.1	45–64	2
Malaria	↓	1.1	25–44	0
Viral haemorrhagic fevers (VHF)	Not applicable	Not applicable	Not applicable	7
Yellow fever	↓	0	0	2
Plague	↓	0	0	0

Table 3. Incidence of reported cases (per 100 000 per year) per country in 2005 (EU and EEA/EFTA Member States)
— = no available data; NC = countries reporting disease, but the cases are non-confirmed. The total incidence refers to reporting countries only.

Due to large differences between the national surveillance systems, the figures are not comparable between the countries. Low numbers could be due to genuinely few infections or a high degree of under-reporting and conversely, high numbers could be due to many infections and the consequence of a highly effective surveillance system. For several diseases, a large proportion of the reported diseases are imported. For details please refer to the full Epidemiological Report.

	Austria	Belgium	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherland	Poland	Portugal	Slovakia	Slovenia	Spain	Sweden	United Kingdom	Iceland	Liechtenstein	Norway
Anthrax	0	<0.1	0	0	0	0	—	—	0	<0.1	0	0	0	0	—	—	0	0	<0.1	0	0	0	0	—	0	0	—	0
Botulism	<0.1	0	0	<0.1	0	0	—	<0.1	<0.1	0	<0.1	—	<0.1	0	0.15	—	0	—	<0.1	<0.1	—	<0.1	0	<0.1	<0.1	0	—	0.1
Brucellosis	<0.1	<0.1	0.3	<0.1	0	0	<0.1	<0.1	<0.1	1.1	<0.1	1.3	1.2	0	0	0	0	<0.1	<0.1	1.4	0	0	0.5	0.2	<0.1	—	—	<0.1
Campylobacteriosis	62	65.9	0	296.2	68	9.2	76.4	3.3	75.3	—	82.1	43.9	0.6	0	20.3	42.6	22.6	23.1	0.1	—	40.9	51.9	12.9	75.4	88	46	—	57.2
Chlamydia inf.	3.7	20	0.1	—	441.3	189	—	—	—	—	5.8	—	—	27	16.4	—	12	—	0	—	2	11.5	0.3	367	196.5	552.5	—	433.4
Cholera	0	<0.1	0	0	0	0	—	—	—	0	0	—	0	0	—	—	0	<0.1	0	<0.1	0	0	0	<0.1	<0.1	0	—	<0.1
vCJD	0	0	0	0	0	<0.1	—	<0.1	—	0	0	<0.1	—	0	—	0	0	<0.1	0	0	0.2	0	0	0	—	0	—	0
Cryptosporidiosis	—	3.4	0	<0.1	—	0	—	—	1.6	—	0	13.8	—	0	0	—	1.5	—	0	—	0	0.5	0.3	0.8	9.3	—	—	—
Diphtheria	0	0	0	0-	0	0	—	—	—	0	0	0	0	0.9	—	—	0	0	0	0	0	0	0	—	0	0	—	0
Echinococcosis	0.1	<0.1	0.1	<0.1	—	0	—	<0.1	0.1	<0.1	<0.1	0	—	0.2	0.4	0	0	—	<0.1	<0.1	<0.1	0.3	0.2	0.1	<0.1	—	—	<0.1
EHEC / VTEC	0.7	0.5	0	16.7	2.9	1.4	0.4	0.2	1.4	..	<0.1	3.3	<0.1	0	0	1.8	1.2	0.4	<0.1	—	1.1	2.4	<0.1	4.3	2	0.3	—	0.4
Giardiasis	—	13.7	0.1	0.9	—	24.3	—	—	5.3	—	0.3	1.4	—	0.4	1.3	—	0.3	—	8.5	—	1.3	1.2	1.3	12.8	5.4	14.6	—	9.2
Gonorrhoea	8	4.2	2.1	8.4	8.2	21.4	4.5	—	—	—	8.4	—	0.7	30.1	12.6	0.2	5.7	—	1	0.4	2	2.3	0.4	7.7	34	6.5	—	6
Haemophilus influenzae type B (invasive)	<0.1	0.7	0	0.2	<0.1	1.5	—	0.8	<0.1	<0.1	<0.1	0.4	<0.1	0	0.6	0	0	—	0.2	0.1	0.1	0.3	<0.1	1.3	0.2	0	—	0.1
Hepatitis A	2	2.3	1.2	3.2	0.9	1.3	0.5	—	1.4	1.4	2.8	1.2	2.2	6.3	2.2	—	1.5	1.3	0.1	2.3	9.8	0.5	1.8	1	0.8	0.3	—	1.2
Hepatitis B	7	5.3	0.8	3.5	0.5	5.8	—	0.2	1.4	0.8	1.2	1.8	1.8	7.4	4.1	1.1	3	1.8	1.2	0.9	2.3	0.9	1	2.4	0.7	11.2	—	3.2

Table 3. (cont.) Incidence of reported cases (per 100 000 per year) per country in 2005 (EU and EEA/EFTA Member States)
— = no available data; NC = countries reporting disease, but the cases are non-confirmed. The total incidence refers to reporting countries only.

Due to large differences between the national surveillance systems, the figures are not comparable between the countries. Low numbers could be due to genuinely few infections or a high degree of under-reporting and conversely, high numbers could be due to many infections and the consequence of a highly effective surveillance system. For several diseases, a large proportion of the reported diseases are imported. For details please refer to the full Epidemiological Report.

	Austria	Belgium	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherland	Poland	Portugal	Slovakia	Slovenia	Spain	Sweden	United Kingdom	Iceland	Liechtenstein	Norway
Hepatitis C	10.9	8.9	0.5	8.3	5.7	6	—	—	9.5	0.1	0.2	35	—	4.8	2	4.4	2	0.2	7.9	0.9	0.5	0.5	0.6	29	17.5	15	—	0.7
HIV infection	5.5	10.2	5.2	0.8	5.3	46.7	2.6	9.9	3	5	1.1	7.7	2.1	13	3.5	13.6	4.7	7.5	1.7	25.1	0.4	1.8	—	4.3	14.8	2.7	—	4.7
Legionellosis	0.8	1.7	0	0.1	2.1	0.2	—	—	0.6	0.2	0.1	0.2	1.5	0	<0.1	—	1.2	1.7	<0.1	0.4	<0.1	1	2.2	1.2	0.6	2.4	—	1.9
Leptospirosis	0.1	0.1	0	0.5	0.2	0.8	<0.1	0.8	<0.1	0	0.3	0.4	<0.1	0.4	0.2	—	0.7	0.2	<0.1	0.3	0.7	0.4	0	<0.1	0.1	—	—	—
Listeriosis	0.2	0.6	0	0.2	0.9	0.2	0.7	0.4	0.6	<0.1	0.1	0.3	0.1	0.1	<0.1	0	0	0.6	<0.1	—	<0.1	0.2	0.2	0.5	0.4	0.3	—	0.3
Malaria	0.7	2.6	0.3	0.2	1.6	0	0.5	—	0.7	0.2	0	1.1	1.1	0.2	0.1	0.7	0.5	1.9	0.1	0.5	0	0.4	0.7	1.3	2.9	0	—	0.8
Measles	0.1	0.3	0.1	0	<0.1	0.2	—	<0.1	0.9	0.3	<0.1	2.3	0.4	<0.1	0	0	0.5	<0.1	0	<0.1	0	0	<0.1	0.1	0.1	0	—	0
Meningococcal inf. (invasive)	1.3	2.1	0.5	1	1.6	1	—	1.1	0.8	1.7	0.3	5	0.6	0.8	2.4	0.9	2.7	1.5	0.5	1.3	0.8	0.8	1.6	0.6	1.8	1.7	—	0.9
Mumps	0.3	0.7	0.7	17.6	0.2	2.2	—	—	—	<0.1	0.1	14.5	4.2	0.2	3	0.2	0.5	—	0.3	0.2	0.2	0.3	0.6	0.9	77.2	29	—	0.2
Pertussis	1.7	1.6	0.8	4	2.4	4.7	—	—	—	<0.1	0.2	2	1.4	0.7	1.9	0	0.7	40.2	4.2	0.7	0.3	3.8	0.3	15.1	0.6	2	—	19.1
Plague	0	0	0	0	0	0	—	—	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0	0	—	0	0	0
Pneumococcal inf. (invasive)	1.8	15.5	1.1	0.6	2	2.1	—	10	—	—	0.6	6.3	0.5	—	1.1	—	1.7	—	0.4	—	0.6	2.2	2.2	15.8	11.9	—	—	23.6
Polio	0	0	0	0	0	0	—	—	0	—	0	0	0	0	—	—	0	0	0	0	0	0	0	0	—	0	0	0
Q fever	—	0.1-	0	<0.1	—	0	—	0.5	0.5	<0.1	0.1	0.2	—	0	0-	0	0	<0.1	0.1	<0.1	0	0.2	0.3	<0.1	<0.1	—	—	—
Rabies	0	0	0	0	0	0	—	—	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0	0	0	0	0	0
Rubella	<0.1	—	0	<0.1	0	0.5	—	—	—	0	<0.1	0.4	0.5	1.5	3.4	0	0.7	2.2	<0.1	0	<0.1	0	1.1	0	<0.1	0	—	<0.1

Table 3. (cont.) Incidence of reported cases (per 100 000 per year) per country in 2005 (EU and EEA/EFTA Member States)
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Salmonellosis	68.4	47.1	7.9	322.2	33.2	23.2	47.3	9.4	63.3	9.4	77.4	8.5	13.7.	27.7	68.6	46.4	16.4	8.5	39.4	4.4	223.7	71	16.3	39.6	21.1	31	—	32.2
Shigellosis	1.4	4.1	0.1	2.8	3	7.3	2.2	1.3	1.4	0.2	0.8	0.9	—	8.1	13.4	1.3	0	2.6	0.2	<0.1	9.5	1.7	0.5	6.3	2.5	1.7	—	3.6
Syphilis	3.3	3.4	2.8	5.1	2.1	8.3	2.7	—	3.9	0	5.4	—	2.4	19.2	8.6	4.8	4	—	1.6	0.9	3.1	2	1.2	1.2	6.5	1	—	0.5
Tetanus	0	<0.1	0	0	0	0	—	<0.1	—	<0.1	<0.1	—	0.1	0	—	—	0.3	—	<0.1	<0.1	0	0.1	<0.1	<0.1	<0.1	0	—	0
Toxoplasmosis	—	—	0	3.4	—	0.4	—	—	—	0	1.1	1.1	—	0.1	6.9	—	2	—	0.8	—	4.9	1	0.1	—	0.2	—	—	—
Trichinellosis	0	—	0	0	—	<0.1	0	<0.1	0	0	0	0	<0.1	2.1	0.4	0	0	0	0.1	0	0	0	<0.1	0	0	—	—	0
Tuberculosis	11.6	11	4.4	9.9	7.8	39	6.9	8.6	7.3	6.9	20	11.1	7.1	62.5	75	8	5.7	7.1	24.1	33.7	14.1	14.1	18.2	6.3	14.2	3.7	—	6.3
Tularaemia	<0.1	0	0	0.8	—	0	—	<0.1	<0.1	0	0.9	0	0	0	0	0	0	—	<0.1	—	0.4	<0.1	0	2.7	—	—	—	0.4
Typhoid/ paratyphoid fever	0.2	0.6	0.7	<0.1	0.7	<0.1	—	0.2	0.2	0.2	<0.1	0.1	0.4	<0.1	0.1	0	0.3	0.2	<0.1	0.7	<0.1	0	0.1	0.3	0.8	0	—	0.9
Yellow fever	0	0	0	0	—	0	—	—	0	0	0	—	0	0	—	—	0	0	0	0	0	0	0	0	0	0	—	0
Yersiniosis	0	2.9	0	4.9	4.5	2.3	12.2	0.3	6.8	—	0.4	<0.1	—	2.2	14.6	0.2	0	—	0.3	—	1.2	1.4	0.8	8.2	0.1	—	—	2.8

Table 4. Reported number of cases in the EU and EEA/EFTA Member States 1994–2004

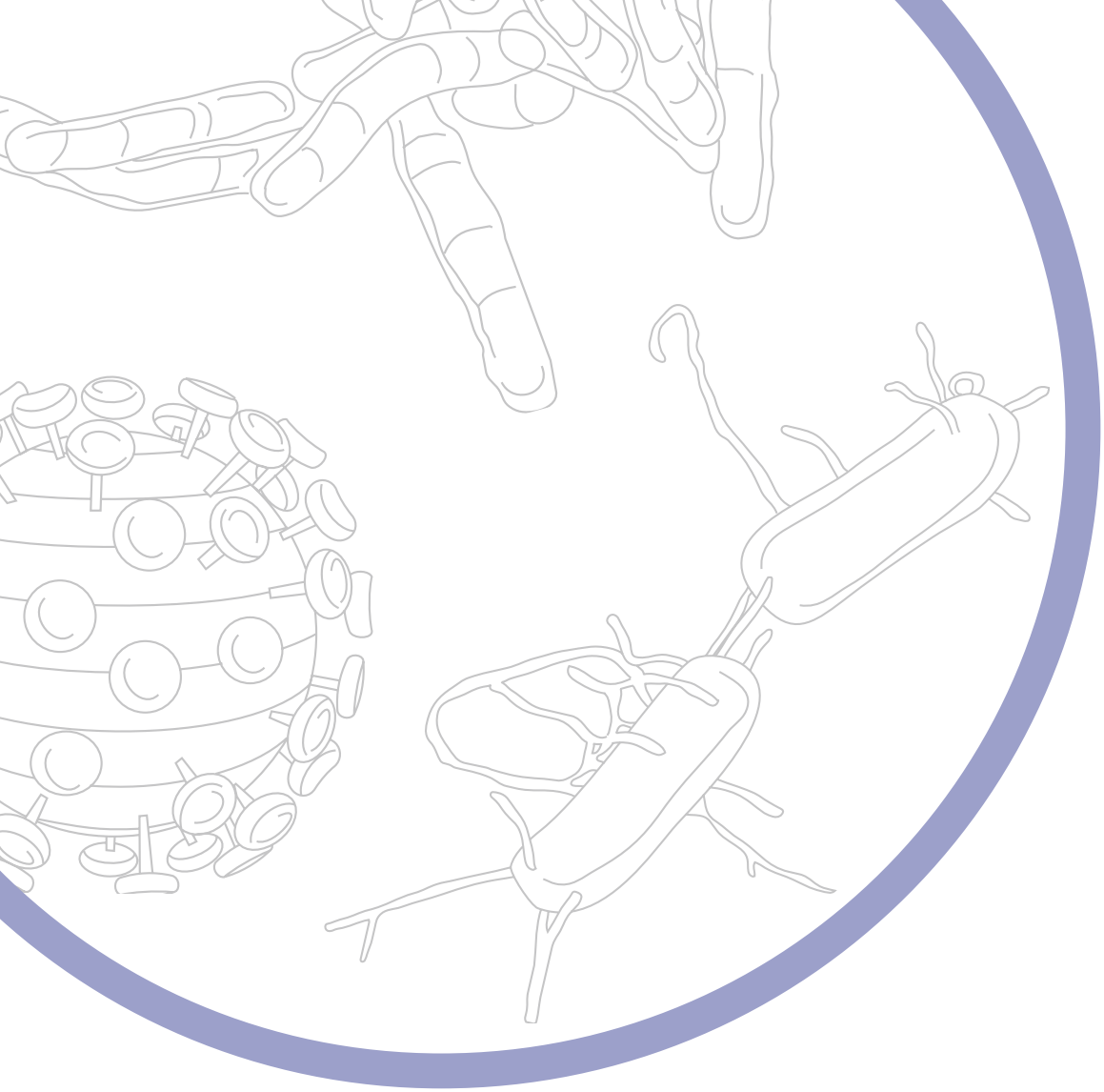
The numbers should be interpreted with caution, as increasing numbers could reflect both a true increase and improved performance in the surveillance systems. For several diseases, a large proportion of the reported diseases are imported.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Anthrax	23	8	25	21	33	38	28	28	19	27
Botulism	271	240	215	245	246	261	174	298	225	213
Brucellosis	2 909	3 152	4 088	3 771	3 971	3 022	2 667	2 387	1 705	1 743
Campylobacteriosis	85 130	91 285	105 797	149 561	152 617	170 065	193 708	186 780	170 218	182 598
Chlamydia infection	97 858	103 955	111 256	118 151	129 803	148 533	164 152	181 484	188 381	208 807
Cholera	36	30	25	40	18	18	21	12	14	23
vCJD	10	12	14	17	30	25	19	17	6	15
Cryptosporidiosis	6 814	4 760	5 724	5 163	6 456	7 833	6 389	4 940	8 413	6 164
Diphtheria	448	156	55	72	89	272	95	57	30	26
Echinococcosis	717	759	578	560	485	370	419	417	398	370
EHEC (VTEC)	3 209	3 046	3 714	3 597	6 893	6 847	8 675	9 196	9 170	9 773
Giardiasis	12 788	11 891	12 794	11 614	11 380	10 196	13 833	12 267	12 232	17 101
Gonorrhoea	35 602	32 197	29 525	28 270	28 474	35 328	34 258	34 306	33 556	31 133
HiB (invasive)	841	912	938	906	859	931	1 065	1 050	1 069	1 013
Hepatitis A	25 885	37 759	45 977	33 436	16 614	11 196	12 469	8 544	8 423	9 379
Hepatitis B	24 414	24 430	27 126	25 450	19 074	19 719	17 195	15 906	15 022	12 648
Hepatitis C	10 686	11 706	15 971	22 427	23 554	22 476	27 638	26 536	27 450	27 137
HIV infection	7 419	7 410	7 246	8 074	8 079	9 703	13 987	16 034	18 211	24 533
Legionellosis	588	817	1 233	1 462	2 263	2 421	3 763	4 791	4 503	4 635
Leptospirosis	451	783	752	826	856	750	900	1 022	696	688
Listeriosis	669	615	701	506	737	777	961	987	1 148	1 216
Malaria	6 533	8 062	8 619	8 750	9 907	10 366	10 050	9 198	8 238	7 680
Measles	114 209	118 724	129 222	29 617	26 051	14 632	15 975	28 747	24 692	5 944
Meningococcal inf. (invasive)	6 443	7 566	9 182	7 841	8 804	8 907	8 210	7 407	6 718	5 722
Mumps	225 811	197 621	189 001	274 197	169 324	94 358	70 370	63 460	108 669	160 783
Pertussis	33 792	23 702	24 283	21 519	19 920	23 322	19 381	19 775	13 817	27 041
Plague	0	0	0	0	0	0	0	0	0	0
Polio	4	4	0	2	1	1	1	0	0	0
Q fever	1 961	1 809	1 556	1 529	2 094	1 339	1 415	1 645	1 687	1 216

Table 4. (cont.) Reported number of cases in the EU and EEA/EFTA Member States 1994–2004

The numbers should be interpreted with caution, as increasing numbers could reflect both a true increase and improved performance in the surveillance systems. For several diseases, a large proportion of the reported diseases are imported.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Rabies	0	7	2	0	0	2	3	2	2	3
Rubella	96 693	133 753	180 765	59 429	37 210	51 994	91 979	53 334	13 105	5 807
Salmonellosis	362 872	329 318	320 881	316 227	280 495	244 370	243 415	225 330	213 184	197 050
Shigellosis	24 568	16 572	16 591	13 605	12 695	13 356	14 064	11 200	10 172	10 645
Pneumococcal inf. (invasive)	14 843	17 350	17 845	16 209	15 985	16 498	16 343	15 380	17 966	17 588
Syphilis	12 254	13 445	12 747	10 828	9 299	8 736	10 412	11 701	12 564	13 424
Tetanus	342	327	289	267	260	246	194	165	205	165
Toxoplasmosis	3 042	3 125	2 643	2 341	2 427	2 231	1 845	2 276	1 911	1 678
Trichinosis	618	341	283	1 243	435	218	259	153	151	254
Tuberculosis	82 674	80 826	78 608	76 621	73 270	70 991	66 557	63 074	18 173	82 674
Tularaemia	991	710	962	662	589	1 646	282	625	1 685	557
Typhoid fever	3 137	2 944	2 269	2 091	2 371	1 796	1 667	1 374	1 536	1 559
West Nile virus infection	0	0	5	0	0	0	0	0	7	0
Yellow fever	0	0	0	2	2	0	2	0	0	0
Yersiniosis	4 030	4 020	7 198	10 475	9 279	8 525	11 147	11 420	10 292	10 251



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