EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

FRAMEWORK ACTION PLAN TO FIGHT TUBERCULOSIS IN THE EUROPEAN UNION

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PREFACE

The European Union's (EU) Health Commissioner, Markos Kyprianou, called on the European Centre for Disease Prevention and Control (ECDC) in March 2007 to develop a proposal for an action plan to fight tuberculosis (TB) in the EU[1]. This initiative reflects the priority given to TB in the EU where this disease is a continuing public health threat. Many EU Member States show a positive evolution in TB trends[2] and will likely move towards a situation with low tuberculosis incidence rates. However, the epidemiological patterns are still very diverse between countries, and control efforts are challenged by problems such as multidrug-resistant (MDR TB) and extensively drug-resistant tuberculosis (XDR TB), TB/HIV co-infection and the concentration of cases within vulnerable groups.

Action needs to be taken to maintain and enhance the current achievements, addressing the different needs of Member States, with the aim of reducing and ultimately eliminating TB. This will not be possible without the political commitment to provide the necessary resources. In addition, the EU cannot ignore the TB situation in the wider European Region and in the rest of the world. Indeed, the WHO Regional Office for Europe has declared TB a regional emergency. At the Ministerial Forum held in Berlin in October 2007, ministers from all over Europe showed their concern and committed themselves to regularly monitor and evaluate the implementation of the agreed actions to control TB[3].

Between March 2006 and January 2007, ECDC experts in collaboration with Member States' and other experts have developed a Framework Action Plan to fight TB in the EU. This plan provides direction on what needs to be done in the EU Member States, Norway, Iceland and Liechtenstein (EEA/EFTA countries)[*], whether at national or at the Community level. It also considers the situation in certain non-EU countries from which a lot of European TB cases originate and highlights the need to support them in order to decrease the burden of TB in Europe and globally. It is in line with the United Nations' Millennium Development Goals[4] and the WHO Stop TB Strategy[5]. These goals and strategies have been developed and agreed internationally and form the basis for TB control and treatment efforts.

The EU Framework Action Plan is complementary to the 'Plan to Stop TB in 18 High Priority Countries in the WHO European Region 2007–2015'[6]. Five of these high-priority countries are direct neighbours of the EU (Belarus, Republic of Moldova, Russian Federation, Turkey and Ukraine) and another five are members of the EU (Bulgaria, Estonia, Latvia, Lithuania and Romania) and are therefore a target of the EU plan as well. Consequently, close collaboration between EU and WHO EURO will be essential in the development of activities and support specifically addressed to these countries.

Other plans, recommendations and guidelines published by Member States, WHO and other stakeholders with long-term experience in the field of TB have also been considered in the preparation of this document.

[*] Norway, Iceland and Liechtenstein belong to the European Economic Area (EEA) and European Free Trade Association (EFTA) and, for the purposes of the action plan, whenever the EU is mentioned these countries are included.

This framework plan offers a unique opportunity to start developing an EU approach to the fight against TB. Such a unified approach would aim at integrated care of patients with tuberculosis, while respecting the different needs of each country. The plan also explains the different ways in which countries can contribute to the common fight against TB. Some of these are crucial in tackling specific threats (e.g. multi-drug resistance) and will help a country not only to protect its own citizens but also contribute to the reduction of the international spread of TB cases.

The plan should also help to initiate an evaluation of the current situation regarding TB control in the various EU Member States that will highlight the specific needs of the individual countries. Developing national plans will also be an effort towards TB control and/or elimination, being an appropriate tool for countries with integrated health systems, as is the case for most Member States. The role of the EU institutions in that respect will be i) to assist those countries without such a plan to develop one soon; and ii) to support countries in the implementation of the plans and monitoring progress.

Furthermore, EU institutions will focus on actions with EU added value such as those that require coordination between countries. They should i) ensure that information on TB is channelled to the political level to maintain awareness of the issues; ii) provide scientific and technical support for countries in their efforts to fight TB, and fund projects for TB control within the remits of their respective mandates; and iii) develop mechanisms for collaboration with countries within and outside the EU, or improve the implementation of the existing ones, as appropriate. Priority will be given to Member States with the highest incidences of TB. The role of ECDC in that respect is to provide the technical support, scientific guidance and necessary information to facilitate action[7]. The European Commission is responsible for the regulatory functions and for supporting countries in areas of management. These are not limited to the health area but span other important policy areas (e.g. research, social or economic) which should be involved in order to be successful in the control and final elimination of tuberculosis.

It should be emphasised that main stakeholders in the field of TB will serve as valuable partners in providing essential contributions for the next steps which aim to further develop, implement and evaluate the Framework Action Plan. These are organisations such as WHO, Stop TB Partnership, non-governmental organisations, professional and scientific organisations, organisations of patients, and other relevant partners.

The current Action Plan is therefore the first step in an ongoing process with the following stages: i) development of a 'framework for national plans' recommending the elements that these should include in order to guide those countries that do not already have a plan in place; ii) definition of qualitative targets and specific indicators to monitor the progress made in improving TB control, and towards TB elimination at national and EU levels; iii) evaluation of national plans together with the Member States with the support of the Commission and ECDC and the collaboration of WHO; and iv) establishment of a mechanism of collaboration between EU institutions, the Member States and main stakeholders with regard to the Framework Action Plan for reporting back on the progress made, defining future priorities and planning actions related to the objectives established at national and EU levels.

Way forward

This Framework Action Plan will be developed to enable technical implementation at national and EU levels before 2013 in accordance with the established seven-year period for EU work programmes; the current one covering 2007–2013. Political agreement (European Commission and Member States) on the way forward needs to be established following discussion in the health working groups on the next steps to be taken. Based on the actions described in this document, ECDC will identify who is already doing what and gaps which need to be filled. Considering the potential contribution of EU institutions and other partners, a detailed road map will be drafted on activities that can be put forward at the Community level. Some of these activities are listed below.

2008

- Development of a 'framework for national plans' recommending, for the guidance of those countries without a plan in place, the elements that should be included, such as the definition of a set of specific indicators in order to monitor the progress made in improving TB control, and towards TB elimination at national and EU levels.
- Sub-regional meetings by the end of 2008. These will be organised by ECDC in collaboration with the Commission to present and discuss with Member States and stakeholders the proposed 'frame for national plans' and the set of indicators for monitoring progress. Neighbouring countries will be invited in order to help them in the fight against TB.
- Visit EU countries with high incidence of TB to asses their situation on TB control and identify priorities where ECDC, the Commission and other partners can provide support.
- Preparatory work with WHO EURO on the follow-up from the Ministerial Conference on TB in Berlin 2007. The outcome of the activities done during 2008 will feed back into the follow-up of the Ministerial Forum (June 2009).

2009

- Develop a mechanism for periodical feed-back between EU institutions, the Member States and main stakeholders as regards to the Action Plan. This will offer a platform to report back on the progress made, define future priorities and plan actions regarding the objectives at EU and national levels.
- Ensure that national plans of each country are available to all other countries. This will be a role of the Community institutions (ECDC and Commission), which will also work to identify good practices for TB control and elimination to be shared between the countries.
- Develop a mechanism to use the ongoing projects on laboratory strategies in the EU to help Member States with weak laboratory capacity.
- Common workshop with Directorates-General for External Relations, Health and Consumer Protection, ECDC and NGOs, and invite Member States and neighbouring countries as well as countries of origin of migrants, in order to give them information on the funds and help available from the EU (like the European Neighbourhood Policy funds) and NGOs organised by the Commission.

Zsuzsanna Jakab
Director ECDC

ACKNOWLEDGEMENTS

Following Commisioner Kyprianou's call, this Framework Action Plan has been developed by the ECDC Tuberculosis Disease Programme with the extensive contribution of other experts from ECDC, the EuroTB network, EU and other EEA Member States, WHO and other key stakeholders, including various branches of the European Commission who provided input to the three drafts of the document. The ECDC Advisory Forum discussed the document at its meeting in Stockholm in September 2007. The national correspondents of EuroTB, the European tuberculosis surveillance network, together with laboratory experts provided input during the EuroTB annual meeting in Stockholm, also in September 2007, and the experts in the coordinating hub at the Institut de Veille Sanitaire participated actively in the drafting of the document. The Portuguese Presidency of the EU organised a Round Table on Health Strategies in Europe. Held in July 2007, a specific session was devoted to MDR TB as an input to the Plan. All the work was done in close collaboration with the European Commission's Directorate-General for Health and Consumer Protection (C3 Unit), which gave very valuable comments at different steps of the process. DG Research also provided valuable input. Experts from WHO EURO and WHO Headquarters contributed actively to the two first drafts of the document.

A draft of the Plan was presented for the first time by ECDC Director, Zsuzsanna Jakab, at the Ministerial Forum organised jointly by WHO EURO and the Ministry of Health of Germany in Berlin on 22 October 2007.

Between 4 December 2007 and 15 January 2008, a wide consultation was undertaken. In addition to national experts in the Member States (channelled through the ECDC Management Board) the following NGOs, scientific, professional and other organisations were consulted: Aeras Global TB Vaccine Foundation, European Academies Science Advisory Council, European Respiratory Society, European Federation of National Organisations working with the Homeless, European Public Health Association, European Public Health Alliance, European Society of Clinical Microbiology and Infectious Diseases, Federation of European Microbiological Societies, Foundation for Innovative New Diagnostics, Global Alliance for TB Drug Development, Global TB Vaccine Foundation, International Union against Tuberculosis and Lung Diseases, Stop TB Partnership for Europe, Global Stop TB Partnership and Tuberculosis Foundation. After the compilation of comments and suggestions the final version was produced.

ECDC gratefully acknowledges all the contributions.

LIST OF ABBREVIATIONS

AIDS	Acquired immune deficiency syndrome
BCG	Bacillus Calmette-Guérin vaccine
CDC	US Centers for Disease Control and Prevention
DOTS	Directly observed treatment, short course
DRS	Drug-resistance surveillance
DST	Drug sensitivity testing
EC	European Commission
EEA	European Economic Area
ECDC	European Centre for Disease Prevention and Control
EFTA	European Free Trade Association
ENP	European Neighbourhood Policy
ERS	European Respiratory Society
EU	European Union
FSU	Former Soviet Union
GAVI	Global Alliance for Vaccines and Immunisation
GFATM	The Global Fund to fight AIDS, Tuberculosis and Malaria
HAART	Highly active antiretroviral therapy
HIV	Human immunodeficiency virus
IUATLD	International Union against Tuberculosis and Lung Diseases
KNCV	Tuberculosis Foundation
MDR TB	Multidrug-resistant tuberculosis
MSF	Médecins Sans Frontières
NGO	Non-governmental organisation
STBE	Stop TB Partnership for Europe
TB	Tuberculosis
USAID	US Agency for International Development
WHO	World Health Organization
WHO EMRO	WHO Regional Office for the Eastern Mediterranean
XDR TB	Extensively drug-resistant TB

1. INTRODUCTION

Background

TB is a serious infectious disease in humans, most commonly acquired following inhalation of bacteria in droplets produced by a person with pulmonary disease. Some factors lowering immune response such as human immunodeficiency virus (HIV) infection increase the chances of getting the disease following infection, while preventive medication reduces this risk. The Bacillus Calmette-Guérin (BCG) vaccine has been available since 1921, and though it is effective in limiting severe disease in childhood, it has no effect on transmission. Tuberculosis control relies mainly on the detection of infectious patients and treatment for at least six months with a combination of several antibiotics. Although TB is a disease for which effective treatment exists, and therefore must be clearly acknowledged to be preventable, inadequate treatment or insufficient compliance may result in failure of cure, early relapse or the development of drug-resistant TB.

In the EU the incidence of TB has declined steadily over the past decades. Figures from the EU 27 are among the lowest in the world although higher than in other industrialised countries like the USA and Australia[2,8]. There is no room for complacency, however, as a similarly favourable epidemiological situation was described in several countries decades ago, resulting in a decrease in awareness and the reduction of resources and services for TB prevention and control. Consequently there was a re-emergence of the disease fuelled by the HIV epidemic and the development of MDR TB. This required renewed efforts in both control programmes and activities to ensure early diagnoses, availability of appropriate therapy, and completion of treatments. It also prompted actions targeted at specific groups and settings[9,10,11].

Although the epidemiological picture within the EU is generally favourable, diverse problems need to be tackled. Some Member States are steadily progressing towards the elimination threshold, albeit still far from the rate of one active case per million population[12,13,14]. Their strategies are focused on preventing new infections; sustaining technical expertise to keep up case detection and appropriate care; maintaining awareness among professionals, policy makers and the general public; and addressing actions to vulnerable populations at increased risk of infection or unfavourable outcome, including higher frequency of complicated forms of the disease such as MDR TB.

In other countries, where the incidence of TB remains unacceptably high, resistance to the most effective TB drugs is a problem (MDR- and XDR TB) and public health capacity needs further investment. Strategies in those countries are essentially aimed at controlling the disease.

As mentioned, TB is increasingly found among vulnerable populations. These include immigrants from countries with a high TB incidence, prisoners, HIV-seropositive persons, residents of hospital wards, nursing homes and homeless shelters, the elderly, and household contacts of recent TB cases[13]. The most vulnerable and excluded groups are the ones that

carry the most significant burden of the disease and which have the poorest access to services. It is important to note that undocumented persons have particular difficulty accessing diagnosis and treatment[15]. Tackling the TB situation in these vulnerable populations must be a key element in any comprehensive strategy to reduce and eventually eliminate TB.

The characteristics of the vulnerable populations vary across the EU and within Member States. For instance, it is clear that the proportion of cases attributable to populations originating from, or with close links to, high-prevalence countries (foreign-born including immigrants and other new entrants) is increasing. However, evidence on how this might be affecting the epidemiology of TB within the indigenous population has not been categorically determined[16]. This is an important aspect to emphasise when undertaking control measures in order to avoid deleterious stigmatisation of the affected populations[17,18]. The situation should be fully acknowledged and the needs of people in these vulnerable groups taken into account, both within the countries and across the EU.

Tuberculosis is a global problem. Nearly nine million new cases develop every year in the world[8], mostly affecting people in the productive years of their life and usually in socially and economically less-advantaged countries or population groups. It is estimated that one third of the world's population has a latent infection[7], meaning that there is a large human reservoir. Therefore, progress towards elimination is only achievable if the global burden can be decreased. Cooperation with key partners and with countries beyond the EU is vital and therefore strategies developed within and outside the EU should be complementary to the greatest extent possible.

Goals of the Framework Action Plan

The long-term goal of the TB Framework Action Plan is to control and ultimately eliminate TB in the EU[12]. Most of the activities aimed at the reduction of the burden of tuberculosis rely on national efforts, with the EU institutions supporting the Member States in their work. To be successful in this task and to direct strategies appropriately, it is essential to consider the heterogeneous epidemiological picture in the EU and to recognise the different needs of those countries with high, and those with low, TB incidences.

The aims of the plan are to:

- increase political and public awareness of TB as a public health issue in the EU;
- support and strengthen EU Member States' efforts against TB in line with the national epidemiological situation and challenges;
- contribute to the control of TB in the EU, by supporting those countries from which imported cases originate.

Four principles

This proposal is based on four principles: ensure prompt and quality care for all; strengthen capacity of health systems; develop new tools; and build partnerships and collaboration with countries and stakeholders. The eight areas for strategic development described in this document are organised around these principles.

Ensure prompt and quality TB care for all

Equal access to prompt, quality TB diagnosis, care and support should be in place across the EU. Challenges such as MDR TB, XDR TB and TB/HIV co-infection need to be addressed properly while focusing on vulnerable populations and supporting patients and their families to guarantee protection against social and economic disruption brought on by TB.

Strengthen health systems

Health systems delivering care, prevention and control activities are basic components of TB control. Therefore they should be strengthened EU-wide in a manner tailored to address the international, national and local challenges and diverse epidemiological situations. National health services should be strong, with an infrastructural network coordinating local, regional and national levels and engaging public and private care providers.

Develop and assess of new tools

The EU is one of the most potent stakeholders in attempts to improve diagnosis and treatment in the field of medicine. Therefore, all partners in the EU are involved in continuing efforts to create synergies and encourage innovation through research and development of new vaccines, drugs and diagnostic facilities for TB. Furthermore, innovation should be sought in enhancing the operational components of TB control, optimising accessibility to quality TB care for all strata of the EU population.

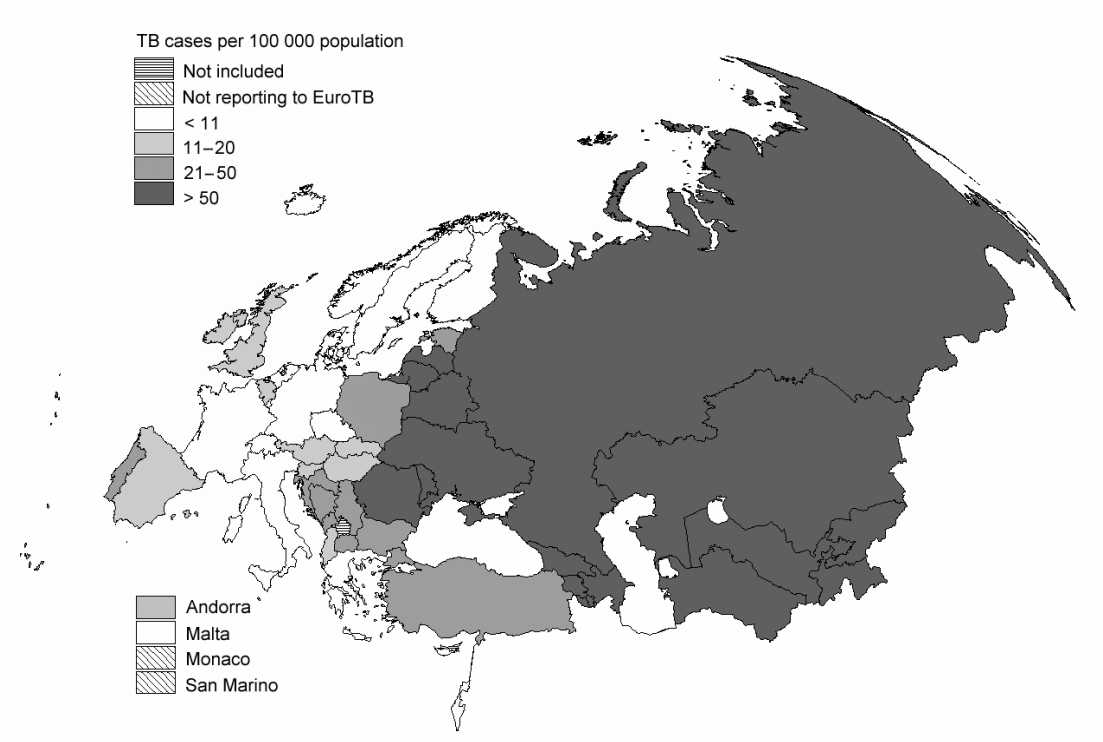
Build partnerships and international collaboration

Partnership is a powerful approach in the health area. Partnership invites commitment, shares resources and perspectives, and encourages feelings of ownership, responsibility and pride. It can help people to recognise problems clearly and enable them to find the best solutions. In order to strengthen Europe's defences against communicable diseases, strong and efficient partnerships should be developed and operational links forged within the EU institutions (ECDC and EC), with the EU Member States, WHO, NGOs, civil society, community representatives, health and social workers, other stakeholders and also with countries outside the EU from which the imported cases originate.

2. FEATURES OF THE EPIDEMIOLOGICAL SITUATION OF TB IN THE EU PRESENTING KEY CHALLENGES TO ITS CONTROL

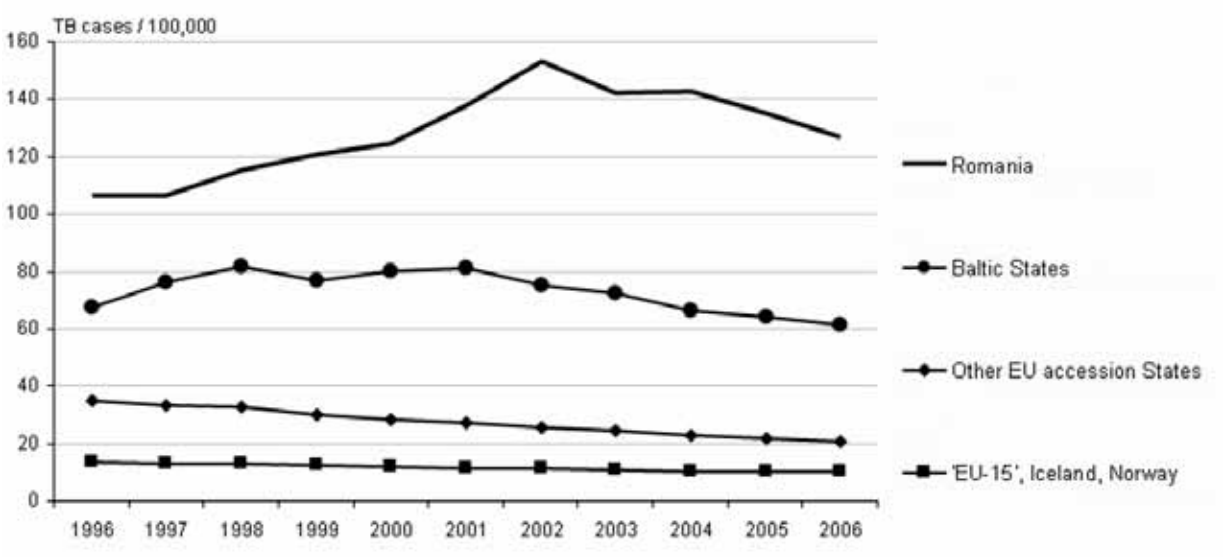
In 2006, a total of 88 113 tuberculosis cases were reported in the 27 EU countries plus the EEA/EFTA countries[2]. The overall mean TB notification rate in these 30 countries was six times lower than that in the 12 eastern republics of the Former Soviet Union (FSU) (Figure 1). Despite a wide range of notification rates within the EU, most countries have experienced a decline in the last five years (Figure 2), with 22 reporting less than 20 cases per 100 000 in 2006 and 13 countries having less than 10 per 100 000 (Table 1). This follows a period of increase or stagnation in rates observed into the early 1990s in several western European countries and until more recently, in the Baltic States and Romania. Rates peaked in young adulthood, a consequence of high TB frequency among migrants, as well as in the elderly (Table 2). Cases of foreign origin represented 0 – 81% of all cases reported, depending on the country (median: 33%). Most cases of foreign origin were from Africa, Asia or from another country within the WHO European Region itself. In countries like the United Kingdom and Sweden, an incremental trend in recent years is largely due to increase in TB cases of foreign origin. Mortality rates for TB were higher in the Baltic States (Estonia, Latvia and Lithuania) and Romania than in the rest of the EU.

Figure 1. Regional gradient in TB rates (cases/100 000), Europe 2006



Source: EuroTB

Figure 2. TB notification rates, European Union, Iceland, Norway, 1996–2006



Source: EuroTB (December 2007)

* Non-standardised rates per general population in country or country group.
Baltic States: Estonia, Latvia, Lithuania; Other EU accession States: Bulgaria, Cyprus, Czech Republic, Hungary, Malta, Poland, Slovakia, Slovenia (excluding Baltic States and Romania); 'EU-15': EU Member States before 2004–07 expansions.

MDR- and XDR TB

The emergence of strains resistant to the two most effective anti-TB agents — isoniazid and rifampicin (MDR) — as well as to second-line antibiotics (XDR)[19] poses a serious challenge to TB control. Multidrug-resistance was present in 15 to 19% of cases tested in 2006 in the Baltic States, but ranged from 0 to 2% in the rest of the countries. MDR is generally more common in patients of foreign origin, especially those originating from the FSU. With the expansion of the EU border eastward, the likelihood of MDR TB being imported into the EU is expected to increase. It should also be remarked that, in most instances, vulnerable groups within the EU (e.g. prisoners and injecting drug users) share risks for MDR TB at the highest rate in the world. By 1 May 2007, 17 out of the 30 EU and EEA/EFTA countries had reported MDR cases with additional resistance to second-line drugs fitting the definition of XDR[8,19]. Moreover, four other FSU countries also reported XDR cases.

TB/HIV co-infection

The contribution of HIV to the TB case-load differs between EU countries. While 14% of TB patients in Portugal were HIV positive, prevalence was much lower in other countries. Important increases have been registered in the United Kingdom associated with recent migration, and in Estonia and Latvia, linked to increases in HIV-prevalence among the autochthonous population. Among AIDS patients, TB cases accounted for 21% of initial-AIDS-

defining conditions reported in 2006[20] (range: 0–59% in 26 of 30 countries with data on AIDS opportunistic diseases).

Treatment success

Only seven countries achieved or exceeded the World Health Assembly global target (85% treatment success in new TB cases) in 2005. The likelihood of having a successful treatment outcome decreased with age as risk of dying increased, although ageing TB patients die from other causes than TB. Cases of foreign origin were more likely to be lost to follow up. Between 2001 and 2005, a slight improvement in treatment success ratio was noted in a few countries, including Portugal and Romania which have larger case loads.

Current epidemiological patterns in the EU

Following the recent expansion of the EU, three broad epidemiological patterns can be discerned with respect to TB:

1. Low TB rates and mortality, disease increasingly aggregating in foreign-born population, in vulnerable groups and in risk settings associated with poverty and lowered immunity. In those settings, TB rates match those of countries with high incidence[13]. Drug-resistance is low but usually higher in cases of foreign origin. The proportion of TB patients who are also infected with HIV varies from low to high. These countries are mostly western European countries.
2. High TB rates, high TB mortality, low proportion of TB in patients of foreign origin with high levels of drug-resistance and increasing levels of HIV infections among TB patients. This pattern is mostly found in the Baltic States.
3. Moderate to high TB rates that are on the decline, and cases of foreign origin, TB/HIV co-infection and drug-resistance are as yet uncommon. These countries are central European states which joined the EU from 2004; several are bordering FSU countries.

3. EIGHT AREAS FOR STRATEGY DEVELOPMENT

Area 1. TB control commitment, TB awareness and capacity of health systems

Background and justification

The control infrastructure and services that were functioning during the 1960s and 1970s were gradually lost throughout the 1980s and 1990s as a result of the decrease in TB morbidity and mortality. When a re-emergence of TB became evident, the strengths and capacities of TB control programmes and plans were gradually reconstituted to face the renewed challenge but these still vary greatly across the EU and within Member States.

Although there are examples of good TB services integrated within the health systems, these are not consistent within the EU or even within countries. Political commitment and human resources development are needed and it is crucial that TB is considered in the planning for health services.

Capacity to face the renewed challenge of TB control should be built taking a multi-sectoral approach (i.e. including prison authorities, local community services, NGOs, social workers, etc.) and addressing appropriate TB services to vulnerable populations. Health systems should be adaptable to changing social conditions, recognising the need for multicultural approaches – such as in dealing with foreign-born populations – to optimise control interventions.

TB control and elimination in the EU will rather be achieved through the commitment from countries to support the capacity of health infrastructures and TB awareness considering both public and private healthcare providers. The first step in this direction is to allocate time, personnel and resources to TB control. The development of national plans for TB control is crucial for the identification and implementation of appropriate actions to fight against TB. These plans are needed both in countries with high and countries with low incidence[10] of TB, though naturally they face different challenges. Plans should be tailored to the epidemiological situation in the country and be in line with the most recent internationally-recognised recommendations for TB control.

EU institutions will play a role supporting the Member States in order to overcome obstacles in the development, implementation and evaluation of their national plans, especially in those countries which have the biggest problems in controlling TB. The contribution of WHO and other key stakeholders in areas related to their respective missions will be essential (e.g. mobilising national delegates to promote policy development at national level, contributing to the training of clinicians and laboratory experts in TB field).

Objectives

1. To increase Member States' political and resource commitment to plans for TB control as part of the overall public health strategies.
2. To strengthen the capacity of Member States' health systems to carry out activities for TB control and elimination.

Strategies / actions

1. Increase Member States' political and resource commitment

- Increase awareness and encourage commitment among policymakers to support and prioritise plans for the control of TB so that control can be improved and elimination can follow.
- Develop and implement national TB plans in those EU countries that don't already have them.
- Regularly assess the TB situation in every country and set up or enhance the necessary systems to respond accordingly.
- Fund TB activities to achieve and maintain the necessary expertise and tools required for the prevention and control of TB.

2. Strengthen the capacity of Member States' health systems

- Raise awareness of the disease among health professionals, improving their ability to recognise, and provide appropriate care and treatment to, patients with latent TB infection or active TB, and enable them to deliver an adequate public health response tailored to the specific situation in their countries.
- Ensure the availability of human resources and infrastructure in Member States to provide and maintain the functions described above.

Area 2. Surveillance

Background and justification

Well-performed surveillance is an instrument for informing healthcare workers, public health experts and decision makers in order to guide and prioritise their action. It is a basic component in the control and elimination of TB and provides information on the epidemiology of the disease, the evolution of trends and the description of those groups in the population at increased risk of TB and unfavourable prognosis. It is an essential element in monitoring the effectiveness of interventions aimed at control and elimination of the disease. At the EU level, surveillance can provide an added value by detecting international clusters of TB, by studying the effect of certain risk factors on data across different countries, by providing a picture of the spread of the disease, and by comparing markers of TB epidemiology and treatment effort between countries[21]. TB surveillance should include data from laboratories as they play a pivotal role in TB diagnostics and case ascertainment; this will help to ensure completeness of reporting.

Surveillance of TB should address the current challenges of the disease. In that sense, surveillance of drug resistance and treatment outcome monitoring[22] are essential tools for the evaluation of TB control[23]. Reliable case-based notification systems are available in most EU and EEA/EFTA countries but in 2006, only 19 out of the 30 performed culture and routine drug-sensitivity tests (DST) providing representative data linked to the notification of TB cases[2]. Analysis and interpretation of treatment outcome allow for focused interventions (e.g. better drug prescription or case management). A total of 23 countries out of 30 reported data on treatment outcome to EuroTB in 2005.

Surveillance should also be enhanced for vulnerable groups. The collaboration with organisations and agencies working with those groups will be valuable in identifying and describing them.

ECDC and WHO EURO are collaborating closely and will continue the surveillance of TB jointly for the entire WHO European Region by sharing the data sent by the 53 states, and by conducting activities deriving from the collection, validation, analysis and dissemination of information. These and other tasks related to surveillance and monitoring of tuberculosis will be further developed.

Objectives

1. Evaluate the epidemiological characteristics and the spread of TB in the population over time and geography, both within the Member States and across Europe as a whole.
2. Monitor the performance of TB control activities and feed this information into the decision-making cycle to allow for appropriate interventions to upgrade the national and European TB plans.
3. Identify and describe vulnerable populations at increased risk of TB and unfavourable prognosis to which targeted public health activities should be addressed.

Strategies / actions

1. Evaluate the epidemiological characteristics and spread of TB in the EU

- Strengthen nationwide surveillance systems and other sources of data collection, if appropriate, and reinforce the use of standard reporting and definitions including MDR- and XDR TB cases in order to gather reliable data that are comparable within and between countries, and over time.
- Develop the use of enhanced laboratory techniques such as DNA fingerprinting and molecular typing to evaluate the spread of MDR- and XDR TB cases and identify outbreaks.
- Integrate laboratory, clinical and epidemiological data on TB cases, at local and national levels.
- Create algorithms for the detection of local, national and international outbreaks and clusters.

2. Monitor TB control activities

- Expand drug-resistance (MDR- and XDR TB) surveillance activities to monitor and improve case management.
- Collect TB cases with laboratory information on HIV status to improve joint management of TB/HIV co-infected patients.
- Enhance the collection of information on treatment outcomes, particularly for groups at higher risk of unfavourable outcome and patients with long treatment, together with information on late outcomes, in order to monitor and improve case management.

3. Identify and describe vulnerable populations for TB

- Analyse routine surveillance data and perform ad hoc surveys to identify vulnerable populations.
- Enhance or implement TB surveillance in migrants, prisoners and other vulnerable populations according to the particular situation in the country.

Area 3. Laboratory services

Background and justification

The availability and quality of laboratory services to support clinical and public health needs is critical to TB control and this should be recognised in the EU. The high prevalence of drug resistance in some Member States, particularly MDR TB, the occurrence of cases of XDR TB, and co-infection with HIV underscores the need to recognise laboratories as a key element of TB control policies. A commitment to develop standards for TB laboratory-based diagnostic procedures and new (rapid) diagnostic tools (i.e. smear microscopy, bacterial culture, DST, molecular diagnosis), ensuring appropriate and safe infrastructures, and providing adequate numbers of sufficiently-trained staff to perform the work are high priorities[24, 25]. New tools are much needed, but while these are being developed and introduced, priority should be given to ensure better implementation of smear microscopy and culture of acceptable quality. Rapid identification of bacteriologically positive cases remains the best method of identifying the most infectious cases, implementing infection control and ensuring timely treatment of those cases with the highest risk for severe morbidity and mortality.

These requirements are technologically feasible in the EU, but will clearly need investment and continued support for those laboratories that may not initially have the financial capacity to implement improvements. Moreover, provision of adequate human resources will require both funding and strong recruitment and training planning in order to be able to supply accurate and timely results at whichever level of activity is performed in the laboratories (i.e. routine culture techniques versus state-of-the-art molecular techniques for drug-sensitivity testing).

Although it is a Member State's responsibility to set up a national network of TB laboratories, access to quality-assured diagnoses, including drug-sensitivity tests, will require EU-wide strengthening of laboratory services. The contribution of EU institutions is to support, in collaboration with WHO, the use of good laboratory practice and the application of standards for TB control[26].

Objectives

1. Develop and implement high quality modern laboratory services which support clinical, public health, and research needs in TB.
2. Ensure safe, accurate, quality laboratory services and appropriately trained staff to perform the work.
3. Ensure investment in sustaining laboratory services long term.

Strategies/actions

1. Develop and implement high quality laboratory services

- Establish an EU network of reference laboratories for TB, with representation from most Member States, with a clear remit and detailed plans for training, standards for diagnostics methods and step-by-step implementation of developed guidelines.
- Improve universal access and use of routine DST including testing for second-line drugs where appropriate.

- Support surveillance for routine reporting, for outbreak detection and also optimise case detection and identification of antimicrobial resistance and understand the spread of resistance in various settings.
- Identify needs and priorities to foster and co-ordinate both operational research (clinical research, programme management in the context of laboratory services), and development and application of new tools (i.e. diagnostic methods, new treatments, and prevention tools).

2. Ensure quality, accuracy and safety of laboratory services

- Support the application of appropriate national and international quality assurance schemes with agreed-upon testing panels as a key component of laboratory strengthening.
- Meet specific technical training needs in standard operating procedures.
- Set standard criteria for laboratory biosafety for working with patient specimens and mycobacterial cultures.

3. Ensure sustained laboratory services in the long term

- Train a sufficient number of staff in provision of TB laboratory procedures.
- Develop a group of qualified laboratory staff to provide support to countries in the EU and broader European context.

Area 4. Prompt and quality TB care for all

Background and justification

Ensuring prompt, quality care for all TB patients remains the core of any TB plan. Equity in accessing proper diagnostic and treatment services is particularly important in the EU where cases are often concentrated in vulnerable populations. These populations may vary between Member States but often comprise migrants, prisoners and the homeless. Even where TB services are widely available, patients from vulnerable populations are not only at an increased risk of being infected and developing the disease but also of not accessing services and of poor adherence to treatment. The risk for poor diagnostic access and poor treatment outcome is even greater among undocumented migrants in whom both health-seeking behaviour and access to healthcare are limited.

In order to address this situation, proper public health interventions need to be implemented, thus cutting the chain of TB transmission as early and effectively as possible. This will reduce transmission in the community, while meeting individual rights to effective care. Health systems should be able to orientate towards ensuring easy access and flexible facilities for vulnerable populations[27].

EU institutions in collaboration with partners can support the identification and dissemination of good practice models in TB control. Furthermore, it is expected that EU institutions play a role in facilitating cross-border coordination for tracing contacts and ensuring high rates of treatment compliance in mobile populations.

Objectives

1. Promptly diagnose all cases and ensure proper TB treatment and care.
2. Tailor interventions to specific epidemiological situations and vulnerable populations to ensure maximum effectiveness in TB control at all levels.
3. Achieve consistent application of outbreak management measures.
4. Ensure that individual health needs of all TB patients are met.

Strategies/actions

1. Prompt and adequate diagnosis and care

- Develop and/or strengthen systems to rapidly channel suspected TB cases to the appropriate services within the health system.
- Effectively engage targeted social workers and all care providers in the detection, diagnosis, referral and care of suspected TB cases and patients.
- Develop good practice models of TB service delivery specific to the various settings that can be encountered throughout the EU Member States.
- Ensure completion of treatment and minimise deaths by evaluating and reporting the treatment outcome of each individual patient. For undocumented migrants, asylum seekers or other populations which might be deported, appropriate mechanisms to ensure completion of treatment should be in place and widely available.
- Offer TB clinical care based on evidence and in line with the principles outlined in the 'International Standards for TB Care'[28].

2. Tailor interventions to vulnerable populations

- Develop and disseminate models of evidence-based approaches in the detection and care of TB patients in vulnerable populations.
- Secure intensified case finding in high-incidence groups.
- Assess BCG vaccination policies in light of local epidemiological situations, carefully evaluating the potential efficacy of selective vaccination programmes.

3. Outbreak control and management

- Promote the use of state-of-the-art techniques as adjuncts to epidemiological investigation of outbreaks and contact tracing, so as to optimise the use of preventive treatment in contacts, taking into consideration the different requirements of specific settings.
- Ensure cross-border coordination and action to optimise both the tracing of patients lost to follow-up, and outbreak control where individuals in more than one Member State might be affected.
- Allocate resources and efforts to strengthen source identification, particularly in cases of childhood TB and drug-resistant TB in previously untreated patients.

4. Patient support

- Ensure patient support and facilitate access to TB care regardless of legal and/or residence status.
- Develop patient-friendly care delivery settings to ensure that cultural, social and economic differences do not represent a barrier to access to care.
- Ensure that child-friendly TB services are made available where paediatric TB is prevalent.
- Ensure the availability of outreach services or the use of Directly Observed Therapy (DOT) as appropriate, to support adherence to treatment.
- Provide social and psychological support services to TB patients and their families.
- Widely adopt the 'Patients' Charter for TB Care'[29] by developing models of collaboration with professional societies, private and public practitioners in order to ensure that its provisions are adopted and used by all.

Area 5. MDR- and XDR TB

Background and justification

Drug-resistant tuberculosis (MDR- and XDR TB) is the result of poor programmatic and individual care performance[30,31,32,33]. Drug-resistance surveillance (DRS), as part of TB surveillance, allows the evaluation of the quality of TB treatment in each country, the early identification and treatment of MDR- and XDR TB cases and the identification of high-risk population groups. Although DRS at the European level has been in place since 1998, the representativeness of data is still limited in many countries[2, 34, 35, 36].

Similarly, TB laboratories are of crucial importance in support of a strategy against MDR- and XDR TB. Access to drug-sensitivity testing plays a vital role in the individual care and management of TB patients. The recent emergence of XDR-TB requires intensified work in the field of standardisation of second-line drugs sensitivity testing.

Access to second-line drugs is another key factor in achieving care of patients and control of the spread of MDR- and XDR TB. EU stakeholders as well as Member States need to engage with manufacturers to ensure the production of high quality and affordable second-line drugs. National governments in particular should be encouraged to regulate first and second-line drugs, procurement methods and management of drugs in the supply chain, in order to ensure the availability of treatment. Measures should cover areas such as registration and fast-track approval.

In the development of strategic actions to control MDR- and XDR TB it should be emphasised that the best preventive strategy is still to ensure the proper management of ALL TB cases with particular attention on adherence to treatment and the use of proper quality regimens.

MDR- and XDR TB within the EU need to be addressed in cooperation with neighbouring and other countries that currently face epidemics of TB drug-resistance.

EU institutions in collaboration with WHO and other partners can play a crucial role in ensuring and supporting EU-wide surveillance of resistance to TB drugs. They can also contribute to the strengthening of laboratory services and create an EU-wide forum to promote exchange of expert opinion in the management of MDR- and XDR TB.

Objectives

The following objectives are addressed to all Member States but special attention should be paid by those countries where the problem of MDR- and XDR TB is greatest.

1. Optimise and strengthen surveillance and monitoring of MDR- and XDR TB.
2. Specifically improve TB drug-sensitivity testing services within the EU in the context of strengthened TB laboratory services.
3. Improve care and management of patients with MDR- or XDR TB including infection control and contact tracing/prophylaxis practices.
4. Improve access to, and availability of, first and second-line drugs, ensuring a rational use of TB drugs.

Strategies/actions

1. Optimise and strengthen surveillance and monitoring of MDR- and XDR TB

- Enhance drug-resistance surveillance (DRS) at national and European levels by:
  - strengthening links between the public health sector laboratories and clinicians at local and national levels;
  - evaluating and optimising national DRS systems;
  - implementing data collection of second-line drugs testing among MDR TB cases.
- Enhance molecular surveillance of MDR- and XDR TB by:
  - ensuring genotyping analysis for all MDR TB cases and including this information when reporting epidemiological data;
  - improving timeliness of reporting data on clusters;
  - developing guidelines on investigation of international clusters.

2. Specifically improve TB drug-sensitivity testing services

In the context of an overall strategy for strengthening TB laboratory services (as described in Area 3 of this document), specific actions are suggested that will support a coordinated strategy against MDR- and XDR TB:

- Develop a well-functioning network for external quality control in Europe.
- Ensure standardisation of DST for second-line drugs.
- Ensure access to culture methods and DST for first and second-line drugs with proper implementation of new diagnostic tools.

3. Improve care and management of patients with MDR- or XDR TB

- Promote the implementation of the International Standards for Tuberculosis Care[28] and the Patient Charter[29] at EU level to ensure proper care and management of all TB patients to prevent the emergence of drug resistance.
- Ensure that a risk assessment is carried out for all TB patients to assess the likelihood of their compliance with the treatment regimen.
- Identify good practices in the management and care of patients with XDR- and MDR TB in the EU and recommend their application in suitable contexts.
- Develop and disseminate strategies for involvement of all healthcare providers in sound TB control. MDR TB and XDR TB control must be conducted in specialised centres.
- Create an expert forum for the exchange of opinion on matters related to MDR- and XDR TB and to promote shared case management across the EU.
- Review evidence and develop guidance on infection control measures and contact tracing/prophylaxis, particularly in relation to settings where MDR- and XDR TB are prevalent.

4. Improve access to, and availability of, first and second-line drugs

- Make assessments on the availability and patterns of use of second-line TB drugs in the public and private sectors.
- Make the best use of already existing mechanisms (or develop them where they don't exist) for the registration of first and second-line drugs and their fast track approval.
- Mobilise the manufacturers to increase production of affordable second-line TB drugs.
- Help Member States and neighbouring countries to make the best use of NGOs that provide drugs.

Area 6. TB/HIV co-infection

Background and justification

There is an interaction between TB and HIV that tends to worsen both conditions among co-infected individuals[37]. HIV increases the risk of either primary or reactivated TB and this risk is markedly increased with advancing HIV disease[38]. Active TB has been associated with an increase of HIV vireamia and CD4 depletion which may lead to a faster evolution to profound immuno-suppression[39]. In addition, both infections are concentrated in some common high-risk groups and this association can lead to a dramatic increase of co-infection in these segments of the population[40,41]. Information on HIV sero-status of TB patients varied widely in the EU because of differences in testing policies and data collection[2,20].

Even though highly active antiretroviral therapy (HAART) reduces the likelihood of developing active TB by 70–90% among HIV-infected individuals compared with those who remain untreated, this risk is still higher among HIV-infected persons than in the general population. Moreover, adverse side effects of each treatment, drug interactions and pill burden can lead to failure in treatment adherence and hence drug resistance[42,43].

Treating latent TB among HIV-infected persons appears to reduce the risk of developing active TB infection by 60% in the short term. However, the duration of the protective effect remains unknown[39]. All these issues need to be further investigated and there is also a need to define an optimal strategy for the clinical management of patients co-infected with TB and HIV[40].

Objectives

1. Decrease the burden of TB/HIV co-infection in the EU by strengthening the collaboration between TB and HIV/AIDS plans or the appropriate services within the health system.
2. Promote research activities and clinical studies at the EU level related to TB/HIV co-morbidity.

Strategies/actions

1. Decrease the burden of TB/HIV co-infection in the EU by strengthening the collaboration between TB and HIV/AIDS control plans

- Promote TB and HIV prevention to decrease the burden of each disease and the prevalence of the co-infection in the EU.
- Enhance TB/HIV surveillance to identify the proportion of HIV-infected persons among TB patients, measure outcomes of treatment and guide prevention and control actions.
- Provide a high quality of care, taking an integrated approach to care and support services for all patients with TB/HIV co-infection in accordance with the international guidelines and recommendations[40]. This can be achieved by providing HIV testing and counselling to all the TB patients diagnosed in the EU, promoting active TB case finding among HIV-infected persons, providing treatment both for latent TB and active TB, and ensuring universal access to HAART for HIV-infected individuals.

2. Promote research activities and clinical studies at the EU level

- Identify risk factors for TB among HIV-infected people in order to implement targeted preventive actions.
- Develop guidelines, agreed upon across the EU, for the clinical management of TB/HIV co-infected patients in order to define the optimal case management in terms of treatment and preventive measures.

Area 7. New tools for TB control

Background and justification

125 years after the aetiological agent causing TB was first described by Robert Koch[44, 45], European scientists are still contributing significantly to the global TB research movement. However, the existing control measures have not progressed far from those of the late nineteenth and early twentieth century. The need for new vaccines, drugs and diagnostic methods, in addition to new approaches to the implementation of existing and upcoming tools ('retooling'), are obvious and urgent. This is especially so in the context of the increasing burden of MDR- and XDR TB and TB/HIV co-infection, and other areas of increasing importance, such as TB in children[46].

Trends in funding patterns have significantly improved since the early 1980s[39] with a noticeable impact in the later 1990s and early 21st century, but to successfully translate research results into field applications, and to retool for TB control, will require further synergy between individual researchers and large interdisciplinary European and global consortia. Therefore, it has been estimated that at least a five-fold increase in investment from the less than 400 million US dollars (ca. EUR 270 million[†]) to two billion USD per year (ca. EUR 1.34 billion)[44] will be needed over the coming decade. A global commitment will be crucial to raise these funds, to coordinate research across multiple sectors, and to engage stakeholders to gain the political support needed to achieve these aims.

The EU and its institutions are in a position to be at the forefront in defining research needs and supporting the achievement of global TB research goals; be it basic research, applied research for product development, or the clinical and operational assessment of new tools.

Objectives

1. Set priorities for basic, applied and operational research in the EU.
2. Provide funding and coordination.

Strategies/actions

1. Set priorities for research in the EU

- Develop a strong profile of priority research needs for development of new vaccines, diagnostics and treatments, and the optimisation of currently available technologies ('retooling') in line with the global aims in TB research.
- Set priorities for operational research to optimise programme management including research on social factors and stigma reduction, diagnosis and case finding, treatment, monitoring and support.
- Identify and address key areas in the EU context for basic, applied, and operational research.

[†] Euro conversions (0.6725 Euro = 1 USD) as of 1 February 2008.

2. Funding and coordination

- Have a clear overview of the current and planned investments in TB research activities at national, EU, and global level to avoid duplications and to identify weak or neglected areas.
- Use the existing communication and dissemination tools to underline the importance of TB research in the distribution of public funds.
- Ensure sufficient engagement with the research community and organise training for future generations of TB experts and researcher-clinicians.
- Increase investment and streamline procedures to accelerate the translation of research and development results into applications in the field.
- Help maintain funding and continuity of projects that are key platforms for applied research.

Area 8. Build partnership and collaboration with countries

Background and justification

Public health is a shared competence in the European Union. Developing country collaboration and working in partnership towards TB control and elimination is especially important in a globalising world and can offer huge advantages to the Member States, agencies and organisations involved. In protecting the health of European citizens there is often an international dimension to many of the challenges that arise. Forging an effective response to TB requires cooperation between EU-level and national bodies, as well as with international stakeholders and non-EU countries.

Nine countries are the immediate geographic neighbours of the EU. Looking at the 16 European Neighbourhood Policy (ENP) countries and Russia, four of them are immediate EU neighbours while a further three are on mainland Europe. The remaining 10 are in Africa and the Middle East. Half of the 18 WHO EURO priority countries are either EU Member States or immediate neighbours. TB rates in these countries are among the highest in Europe. The estimated rates for MDR TB in the Former Soviet Union countries are the highest in the world and the joint impact with high and rising HIV rates cannot be underestimated. Furthermore, although definitive data are lacking, the rates for XDR TB will probably also be high. In the list of the world's top 25 priority countries for MDR TB (and therefore estimated XDR TB), four are immediate EU neighbours. A large number of the remaining 21 are the countries of origin of key ethnic groups in many EU countries. These have continuing links with Europe, with regular visitors to and from these countries.

There has been a considerable response to the above TB situation from all the high-burden TB countries, the international donor community, the EU, agencies (e.g. GFATM, WHO) and national and international civil society groups. National TB control programmes and action plans have been developed and are being implemented with resources from national and international (e.g. GFATM, GAVI), bilateral and multi-lateral (e.g. EU, KNCV, CDC, USAID, MSF, DGIS) sources.

The EU countries and the European Commission have many mechanisms and opportunities that can be used to further support and enhance the high-burden countries' own efforts, and the efforts of existing partners and agencies, to control and eliminate TB. The EU social cohesion and poverty reduction initiatives will remain an important element in the efforts to control and eliminate TB (e.g. the Open Method of Coordination on Social Inclusion and Social Protection). There is considerable scope for cooperation between the Directorates-General for Health and Consumer Protection, and Employment, Social Affairs and Equal Opportunities, and ECDC. The synergies around poverty reduction, tackling health inequalities and public health policy need to be fully explored. The launch of the 'Stop TB Partnership for Europe and central Asia' in 2006 provided a European mechanism and alliance working together to secure and accelerate social and political action to tackle TB.

Objectives

1. Ensure that TB remains high on the political, technical and research agenda of EU and national public institutions, bearing in mind competing priorities for limited resources.

2. Help remove stigmatisation, ensure early and rapid detection of TB, MDR TB and XDR TB and encourage people to come forward to be treated in line with the TB Patients' Charter for Tuberculosis Care[29].
3. Ensure that the subsequent treatment is available, accessible, affordable, appropriate and — most importantly — successful.
4. Further develop collaboration and coordination jointly between ECDC, EC, individual countries, WHO and other stakeholders.

Strategies/actions

1. Ensure that TB remains high on the political, technical and research agenda of EU and national public institutions

- Focus attention and political commitment through the candidate/accession process and ENP dialogues. For countries outside these groups, individual EU countries could be encouraged to use their bilateral and historical relationships.
- Support the importance of coordinated actions by the many bilateral and multi-lateral actors, especially at country level (e.g. for the EU countries with GFATM funding consider how best to strengthen the Country Coordinating Mechanisms).

2. Help remove stigmatisation, ensure early and rapid detection of TB, MDR TB and XDR TB and appropriate treatment

- Exchange information, educational and training material and good practice (from EU and non-EU countries) that could be used in countries, acknowledging their high incidence and limited resources.
- Enhance the existing support of EU-based institutions (especially laboratories) to support the high-burden countries' (who are also eligible to request support from a number of EU programmes) efforts to fight TB, MDR TB and XDR TB (e.g. access for diagnostics, training and support for national labs).

3. Ensure that the subsequent treatment is available, accessible, affordable, appropriate and most importantly successful

- Encourage and where possible support the countries' efforts to develop national TB control plans and identify specific areas for action that could be supported through bilateral and multi-lateral EU and non-EU mechanisms.
- Involve non-EU countries in EU-funded research projects (e.g. Directorate-General for Research) and give priority to projects that build on existing efforts to develop rapid, effective and affordable detection, vaccines and treatment of TB, MDR TB and XDR TB.

4. Further develop collaboration and coordination jointly between ECDC, the Commission, individual countries, WHO and other stakeholders

- Further develop joint political cooperation as it is very powerful for advocacy and can strengthen commitments to tackle TB, raise its profile and decrease stigmatisation.
- Further enhance operational coordination and collaboration between the EU and Member States in areas such as joint surveillance, missions to countries, development of guidelines, educational and training material, exchange visits and contact tracing in the event of outbreaks. This last is especially important in the light of the International

Health Regulations (IHR) (2005) that came into force in 2007, and the recent high-profile cases of MDR/XDR TB in travellers.

- Ensure further coordination between the EU and WHO, particularly for the implementation of the WHO 'Plan to stop TB in 18 High Priority Countries in the European Region, 2007–2015'[6] and this EU Framework Action Plan.
- Place TB as a regular item on the EC–WHO Senior Officials' Meetings agenda, especially as this forum extends beyond the remit of WHO EURO, encompassing also WHO EMRO which includes many of the ENP countries.
- Work to define the role of the EU in global TB and how it should be involved in TB control outside of the EU, especially in high-burden countries.
- Provide information for travellers (and communities) visiting their countries of ethnic origin when these are high-incidence countries.

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5. ANNEX

Table 1: TB notification rates (cases/100 000), EU 27 plus Iceland and Norway, 1995–2006

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	17.2	18.4	17.3	16.1	15.4	15.1	13.3	13.2	12.0	13.0	11.6	10.5
Belgium	13.6	13.3	12.4	11.7	12.4	12.7	12.8	12.5	10.8	11.5	11.0	10.8
Bulgaria	39.1	37.8	42.1	50.8	43.8	41.9	48.6	42.3	41.7	41.5	42.7	42
Cyprus	4.9	3.2	6.2	5.9	5.0	4.2	5.0	2.5	4.3	3.6	4.4	4.4
Czech Republic	17.9	18.8	17.8	17.5	15.9	14.0	13.2	11.7	11.4	10.3	9.9	9.5
Denmark	8.6	9.2	10.5	10.0	10.1	10.3	9.5	7.8	7.3	7.1	7.8	6.9
Estonia	42.0	48.0	53.0	58.8	54.7	57.9	59.8	52.9	46.5	44.5	39.0	34
Finland	13.0	12.6	11.1	12.2	11.0	10.4	9.5	9.1	7.9	6.3	6.9	5.7
France	14.6	12.7	11.3	11.0	11.0	11.0	10.6	10.3	9.9	8.9	8.6	8.4
Germany	14.9	14.4	13.6	12.7	12.1	11.0	9.1	9.3	8.7	7.9	7.3	6.5
Greece	8.8	8.8	7.1	10.6	8.7	6.4	5.6	5.3	5.6	7.0	6.9	6.1
Hungary	42.0	41.5	41.2	38.9	38.2	35.2	30.9	27.9	25.4	23.1	20.0	18.8
Iceland	4.5	4.1	3.7	6.2	4.3	4.6	4.6	2.8	1.7	4.1	3.7	4.4
Ireland	12.7	11.9	11.3	11.4	12.5	10.6	10.5	10.4	10.2	10.6	11.1	10.8
Italy	9.1	9.0	9.0	8.3	7.7	8.2	7.8	7.3	7.8	7.3	7.1	7.5
Latvia	61.7	71.6	82.4	90.5	82.3	86.9	88.3	79.2	74.1	69.4	62.5	58
Lithuania	65.1	72.4	81.8	85.0	82.4	85.2	85.9	82.0	81.7	73.0	75.0	75.1
Luxembourg	7.9	8.8	9.1	10.4	9.8	10.1	7.3	7.2	11.9	6.8	8.0	7.2
Malta	2.6	7.6	2.9	4.1	5.7	4.6	4.1	6.1	1.8	4.8	5.7	7.4
Netherlands	10.5	10.8	9.5	8.5	9.7	8.8	9.0	8.7	8.2	8.3	7.1	6.2
Norway	5.4	4.9	4.6	5.5	6.1	5.3	6.4	5.5	7.4	6.6	6.3	6.3
Poland	41.3	39.8	36.1	34.4	31.5	29.7	27.6	27.1	26.2	24.6	24.1	22.5
Portugal	55.6	52.2	50.7	51.9	50.7	44.0	42.8	43.6	39.9	36.9	33.7	32.4
Romania	102.6	106.9	106.5	115.4	120.9	125.1	138.2	153.1	142.0	142.4	135.2	126.9
Slovakia	28.7	27.9	24.1	23.8	22.6	20.6	19.9	19.5	18.2	13.1	14.1	13.5
Slovenia	26.7	28.6	24.4	22.8	22.3	19.3	18.9	17.8	14.9	13.4	14.1	10.7
Spain	22.0	20.8	23.3	22.6	20.8	20.6	18.1	18.3	17.7	18.2	18.2	18.3
Sweden	6.4	5.6	5.1	5.0	5.6	5.2	4.8	4.6	4.5	5.1	6.3	5.5
United Kingdom	10.7	10.8	10.9	10.6	10.7	11.5	11.9	12.3	12.1	12.8	14.2	14
TOTAL	**22.6**	**22.3**	**21.8**	**21.9**	**21.2**	**20.8**	**20.6**	**20.8**	**19.7**	**19.2**	**18.6**	**17.7**

Table 2: TB notification rates by age group (cases/100 000), EU 27 plus Iceland and Norway, 2006*

	0–4	5–14	15–24	25–34	35–44	45-54	55–64	65+
Austria	7.4	3.3	8.2	11.3	10.4	13.1	10.9	14.6
Belgium	5.3	2.7	13	18.3	11.2	10.8	9.8	11.1
Bulgaria	18.8	18.9	33.3	43.9	51.3	54	47	44.2
Cyprus	6.1	0	4.6	9	7.4	0.9	3.4	3.8
Czech Republic	0.2	0.3	2.4	5.6	8.7	12.7	13.3	24.2
Denmark	2.8	1.9	9.6	8.8	10.7	9.4	4.1	5.9
Estonia	1.5	4.5	14.9	40.7	57	65.9	36.7	26
Finland	0	0.2	2.6	4.4	3.9	3.6	6.2	17.9
France	2.9	2.5	8	12	9.6	8.4	7.5	12.4
Germany	2.7	1.2	4.6	9.3	6.1	6.5	6.8	9.9
Greece	2.1	3.2	4.4	6.2	4.9	6.1	6.5	10
Hungary	0.6	0.6	6.4	10.1	22.9	35.8	30.1	28
Iceland	0	0	4.6	7	11.8	0	3.4	5.7
Ireland	3.2	2	9.6	16.7	12.8	9	11.7	18.1
Italy	3	1.5	8.7	11.7	8.1	5.8	5	8.9
Latvia	42.1	18.8	27.8	80.3	92.5	93.7	61.9	32.7
Lithuania	23.2	17.7	31.1	78.9	110.2	131.9	110.7	66.1
Luxembourg	0	0	5.5	12.5	7.6	6.1	8.4	12.3
Malta	0	2	13.6	11.5	5.9	3.4	1.9	14.7
Netherlands	1.9	1.4	7.6	11.1	7	5.7	4.6	7.7
Norway	1.8	2.9	10	12.8	7.6	4.3	3.9	4.8
Poland	0.6	1.4	7.9	15.2	27.1	36.8	34.9	42.9
Portugal	7	5.2	22.3	44.3	52.5	37.3	28	33.9
Romania	40.1	28.5	119	141.8	175.9	196.5	142	94.5
Slovakia	4.3	1.9	4.6	5	11.5	19.3	23.4	39
Slovenia	5.6	1.6	6.1	8.7	8.6	8	12.4	26.9
Spain	13	6.1	17.9	24.7	22.6	17.7	13.1	19.5
Sweden	1	2.3	5.9	11.5	6.4	3.2	2.2	7.8
United Kingdom	3.7	3.6	17	29.5	16.1	12.3	9.7	13.1
TOTAL	**5.8**	**3.9**	**16**	**23.4**	**21.1**	**22.8**	**17.7**	**19**

* Total of 83 113 TB cases of which 181 (0.2%) with age unknown.