Tuberculosis in the European Union and European Economic Area: a survey of national tuberculosis programmes

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Running head: TB control in the EU/EEA

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120-character summary: Need for national TB control plans and investment in human resources to work towards TB elimination across the EU/EEA.

Abstract

Question: How many European Union (EU) and European Economic Area (EEA) countries have national TB control plans/strategies, and what are the priority actions/populations and barriers to implementation?

Methods: Survey of EU/EEA national TB programme leads.

Results: The response rate was 100% (31 countries). 55% of countries reported having a national TB strategy, all of which were in implementation; five were preparing a strategy. 74% have a defined organisational TB control structure with central coordination, and 19% have a costed programme budget; few organisational structures included patient/civil society representation. The most frequently mentioned priority TB control actions were: reaching vulnerable population groups (80%); screening for active TB in high-risk groups (63%); implementing electronic registries (60%); contact tracing and outbreak investigation (60%); and tackling MDR-TB (60%). Undocumented migrants were the most commonly (46%) identified priority population. Perceived obstacles to implementation included barriers related to care recipients (lack of TB knowledge, treatment seeking/adherence), care providers (including need for specialist training of nurses and doctors) and health system constraints (funding, communication between health and social care systems).

Answer: This survey has provided an insight into TB control programmes across the EU/EEA which will inform the development of a TB strategy toolkit for member states.

Introduction

Tuberculosis (TB) incidence continues to decline across the European Union (EU) and European Economic Area (EEA), but projected trends show that a strengthening of efforts is needed if the WHO (World Health Organization) End TB vision to is to be realised by EU/EEA member states [1, 2]. Because of the specific TB epidemiology in low-incidence countries, programmes to work towards TB elimination in this context typically include interventions directed at vulnerable and high-risk groups alongside wider health system efforts to improve treatments, prevent resistance, and implement new technologies [2-5]. The WHO End TB Strategy [6] recommends that each country develops a national TB control plan or strategy [7]. Across the EU/EEA, support for national TB programmes is provided at supranational level through the ECDC (European Centre for Disease Prevention and Control) and WHO/Europe, taking into account social, economic and epidemiological heterogeneity between and within member states. One of the core indicators of the ECDC Framework Action Plan (2008) was the availability of a national TB control plan or strategy formally adopted by the respective national government [8]. A 2013 survey of European countries [9] found that only 15 EU/EEA countries had a national TB control plan [9], although this survey predated publication of the WHO End TB Strategy.

Here we report the findings of a survey which gathered information from national TB programme leaders across the EU/EEA regarding the availability, implementation and content of national TB control plans. The aim of the study was to obtain an up-to-date picture of national TB control plans and strategies, including prioritisation of action areas and barriers to the implementation of interventions for TB control and prevention.

Methods

This survey was conducted as part of the European Commission funded E-DETECT TB (Early Detection and Integrated Management of Tuberculosis in Europe) project, which aims to improve TB control efforts across Europe through translational research designed to reach high-risk groups in EU/EEA countries as well as the development of a practical toolkit to support national TB strategy development and implementation [10, 11].

The survey used an online questionnaire to collect data from national TB programme leaders or representatives across all 31 countries of the EU/EEA. The questionnaire was designed and tested at Public Health England (PHE) in collaboration with E-DETECT TB partners. The survey comprised 11 sections (see Box) including fixed and open questions (see Supplementary File 1) and was implemented using SelectSurvey (SelectSurvey.NETv4, ClassApps LLC, Kansas City, MO, USA). The methodology was consistent with that of a previous European survey [9], thereby allowing progress on some indicators to be evaluated.

The barriers section was aligned with the SURE (Supporting the Use of Research Evidence) checklist of barriers to implementing health policy options [12], thereby generating a list of 44 factors which could impede TB control and prevention. These were grouped under four subheadings: recipients of care (6 factors); providers of care (5 factors); health system constraints (27 factors); and social and political constraints (6 factors). Invitations to complete the survey were distributed via email to national TB programme managers listed by WHO and ECDC on 17th May 2017. Survey questions were worded in accordance with terminology used in ECDC documents [8, 13] which are familiar to EU/EEA TB programme teams. In addition, the survey administrator (SC) was available by email, telephone and at the 2017 Wolfheze meeting in case clarification was needed.

E-DETECT TB Survey of EU/EEA national TB programme leaders	
National strategies, coordination and resources	
1	Availability and implementation of a national TB control plan or strategy
2	TB programme coordination and stakeholder representation
3	Resources (including budget, workforce development, and new tools for TB control and prevention)
4	Monitoring and surveillance
Finding and treating TB in the population	
5	TB in high-risk and vulnerable population groups
6	Clinical and technical (guidelines, laboratory quality assurance, contact tracing, vaccination)
7	Multidrug-resistant (MDR) TB
8	HIV/TB
Priorities and barriers	
9	Priority actions - which existing or new actions are most important or have the greatest urgency?
10	Priority populations - which groups have the highest unmet need for TB detection and treatment?
11	Barriers to TB control and prevention

Data were exported from SelectSurvey to Stata (Stata Statistical Software: Release 13. StataCorp LP, College Station, TX, USA). Data were analysed descriptively, tabulating frequency (%) of responses for each questionnaire item for all countries combined and separately for low (<10/100,000) and medium-high (≥10/100,000) TB incidence [1] countries. Questionnaire items which asked respondents to rate priorities or unmet need as high/medium/low were given an overall percentage score, which was calculated by dividing a weighted sum of individual responses (coded as low=0, medium=1, high=2) by the theoretical maximum score.

Results

Survey completion

The survey was completed by programme managers or their delegated representatives in all of the 31 countries (100% response rate). Responses were received between 17th May and 19th September 2017. Responses for Liechtenstein were provided jointly by representatives from Liechtenstein and Switzerland (a non-EU/EEA country), reflecting a unified approach to TB control and prevention in the two countries. We retained N=31 as the denominator for our analyses (not all questions were mandatory, hence some responses show a denominator <31). Survey responses not quantified in Table 1 or in the text are summarized in supplementary tables.

National strategies, coordination and resources

Availability and implementation of a national TB control plan or strategy

Just over half (17/31) of EU/EEA countries have a national TB control plan or strategy (**Figure 1, Table 1**). All of those with a plan had begun implementation, including six in 2015/2016, and five in 2011-2013. Thirteen plans covered periods of 3-9 (median 5) years' duration, typically beginning in 2011-2016 and ending in 2017-2020, and the remainder were open-ended (4 plans). Of the 14 countries without a national TB control plan or strategy, five were either preparing a plan or intended to prepare a plan, two of which were expected to be finalised in 2017 and one in 2019.

TB programme coordination

Three quarters (23/31) of countries reported having a clearly defined organisational structure, and about half of these were defined in the national TB control plan or strategy (**Table 1**). TB control and prevention was coordinated centrally by a national TB control board, committee or other formal body in 55% (17/31) of countries, and by other national bodies or regional control structures in 35.5% (11/31) of countries.

Stakeholder representation

The majority (>80%) of the 17 national TB control boards (or committees or other formal bodies) had Ministry/Department of Health and national public health department representation. More than half had clinical, laboratory, epidemiology, and local public health representatives, but professional bodies (41%), local TB control boards (35%), and nursing (29%) were less frequently represented. Non-governmental organisations, patients and civil society were represented on few (<5) control boards, as were pharmacies (2) and private health providers (1). Two of the 17 coordinating bodies met monthly, five met annually, five irregularly, and the remainder every 3-6 months. Specific funding had been allocated to 5/17 coordinating bodies, and 5/17 received regular reports from local (regional, district, state, provincial, etc.) TB control boards, committees or other formal bodies.

Budget

One fifth of countries (6/31) had a costed budget for a national TB programme, with 17 of the remaining 25 countries having budgets for parts of a TB programme and/or providing for TB-related activities within their national, federal or municipal healthcare systems. Half of countries (16/31) had conducted an impact assessment or other financial or health economic assessment of the likely impact of TB control.

Workforce training and development

One fifth of countries had a strategy for training and developing a specialist TB workforce (coordinated at a national level in 14/16 countries). The parts of the TB workforce with the greatest perceived need for training and development were: community/primary health workers, 59.3% (16/27); specialist nurses, 51.9% (14/27); specialist doctors, 37.0% (10/27); microbiologists 33.3%, (9/27); epidemiologists, 33.3%, (9/27); surveillance scientists, 18.5% (5/27). Five countries mentioned other needs for workforce training and development, including: general practitioners (3 countries); radiologists, pulmonologists and specialist radiologists (1 country); and immigration and

prison services (1 country). Five respondents commented that low TB incidence in their country led to low knowledge and experience of TB because healthcare professionals encountered few cases - a further two stated that there is a need for knowledge updates among healthcare workers and general practitioners (GPs).

New tools for TB control and prevention

One fifth of countries had a strategy for introducing and implementing new tools for TB control and prevention, including: rapid diagnostic tests, 85.7% (12/14); treatment observation, 71.4% (10/14); infection control, 57.1% (8/14); drug susceptibility testing, 57.1% (8/14); surveillance, 50.0% (7/14); microbiology, 50.0% (7/14); contact tracing, 35.7%, (5/14); outbreak investigation, 28.6% (4/14).

Monitoring and surveillance

All countries had a national TB case registry, and three quarters (23/31) had a strategy for monitoring and evaluation of TB control and prevention, half of which (11/23) were documented in the national TB control plan/strategy. The median number of full-time equivalent (FTE) staff assigned to TB surveillance in national offices was 2, with a range from 0.5 to 8.5 FTE.

Finding and treating TB in the population

Raising awareness of TB

Twenty-one (67.7%) countries had programmes for raising awareness of TB at community or primary care level, of which four were documented in the national TB control plan/strategy. The community or primary care groups reached by these programmes included: primary care doctors/GPs, 95.2% (20/21); primary care health workers, 76.2% (16/21); social workers, 66.7% (14/21); and general public, 57.1% (12/21). Other groups for awareness-raising included: services for people living with HIV; prisons; schools; and non-governmental organisations working with vulnerable groups.

Active and latent TB in high-risk and vulnerable groups

A number of vulnerable population groups were identified as being at higher risk of having latent or active TB: asylum seekers (88.5%), prisoners (84.6%), refugees (76.9%), documented migrants (69.2%), undocumented migrants (57.7%), and people with drug problems (57.7%). Screening for active TB was conducted among asylum seekers in 77.4% of countries, refugees in 71.0% and current prisoners in 74.2%. Point-of-entry and post-entry screening for active TB among documented migrants was conducted by 32.3% and 41.9% countries, respectively. Two countries conducted screening for active TB in social care institutions and for people entering shared community accommodation. A strategy for TB control in prisons was in place in 77.4% of countries, of which nine were documented in the national TB control plan/strategy. The groups most commonly identified for latent TB infection (LTBI) screening were asylum seekers (33.3%), refugees (26.7%) and current prisoners (26.7%). Point-of-entry and post-entry screening for LTBI in documented migrants was conducted by 20.0% and 16.7% of countries, respectively.

Contact tracing

Contacts of cases were tested for LTBI in 86.7% (26/30) of countries, and the majority (83.9% (26/31)) had a strategy to implement and ensure comprehensive contact tracing, of which half (13/26) were documented in a national TB control plan/strategy. Recommended approaches to tracing included: household contacts, 96.2% (25/26); workplace contacts, 92.3% (24/26); healthcare facility contacts, 92.3% (24/26); and community contacts, 80.8% (21/26).

Vaccination

Two thirds of countries (20/30) had a strategy to provide and promote BCG vaccination, of which half (9/20) were documented in the national TB control plan/strategy. The proportions of BCG vaccination strategies that included universal infant, high-risk infant and high-risk adult BCG vaccination were 42.1% (8/19), 57.9% (11/19) and 21.1% (4/19), respectively. Of the 10 countries

that did not have a BCG vaccination strategy, two vaccinated infants born to immigrant parents from high TB incidence countries and three would vaccinate selectively in high-risk situations.

MDR and XDR-TB

The majority of countries (80% (24/30)) had a strategy to tackle drug-resistant TB, of which 58% (14/24) were documented in the national TB control plan/strategy. Measures to tackle drug-resistant TB included: using directly observed treatment, 87.5% (21/24) - including video-observed in 4/21; patient-centred MDR-TB case management, 79.2% (19/24); concentrating expertise in MDR-TB treatment centres, 79.2% (19/24); infection control in health facilities, 75.0% (18/24); multidisciplinary MDR-TB case management, 66.7% (16/24). All of the countries with a drug-resistant TB strategy routinely conducted first-line drug susceptibility testing.

HIV/TB

An integrated approach to TB and HIV control was reported by 61.3% (19/31) of countries, of which 58% (7/19) were documented in the national TB control plan/strategy. TB patients were routinely tested for HIV in 77.4% (24/31) of countries, and people living with HIV were screened for TB in 74.2% (23/31) of countries; 61.2% (19/31) of countries did both. The majority of countries (80.7% (25/31)) monitored TB/HIV coinfection at national level.

Guidelines and professional networks

National TB control and prevention guidelines were available in 80.7% (25/31) of countries, and laboratory diagnostic services were subject to external quality assurance in all countries. Forms of professional and clinical support available to clinicians included: clinical guidelines, 90.3% (28/31); specialist training, 74.2% (23/31); infection control guidelines, 74.2% (23/31); clinical networks, 54.8% (17/31); research meetings, 45.2% (14/31); and local multidisciplinary teams, 41.9% (13/31). Expert group meetings for clinicians managing difficult and MDR/XDR-TB cases were mentioned by 4/31 respondents.

Priorities and barriers

Priority actions: "In relation to TB control in your country, which existing or new actions do you think are most important or have the greatest urgency?"

Of the 18 pre-specified action areas, the five most frequently rated as high priority were: reaching vulnerable population groups (80.0%); screening for active TB in high-risk population groups (63.3%); implementing electronic TB case registries (60.0%); contact tracing and outbreak investigation (60.0%); and MDR-TB (60.0%). The two most frequently rated as low priority were BCG vaccination (56.7%) and establishing or managing local TB control boards (43.3%). Several countries indicated other high priority action areas, including mobile outreach, increasing TB expertise and experience in health care professionals, and broader social support for vulnerable groups. Weighted scores based on high, medium and low priority ratings are show in **Figure 2**.

Priority populations: "In relation to TB control in your country, which population groups do you think have the highest unmet need for TB detection and treatment?"

Respondents most frequently identified a high level of unmet need for TB detection among undocumented migrants (46.7%); unmet need for TB detection was rated as low or medium among other vulnerable/high-risk groups. Unmet need for TB treatment was ranked as medium/high for homeless people by 61.3% of countries, and for undocumented migrants by 66.7%. Weighted scores based on high, medium and low ratings of unmet need are show in **Figure 3**.

Barriers: "Which of the following factors impede TB control in your country?"

Three barriers among service users were identified by a majority of countries: people in vulnerable/high-risk groups lacking knowledge about TB (74.2%); low motivation to adhere to treatment among vulnerable/high-risk groups (70.0%) and low motivation to seek treatment among vulnerable/high-risk groups (58.1%) (**Figure 4**). Only one 'provider of care' factor was identified by

a majority of countries: the need for specialist training for nurses in TB patient care (56.7%). 'Social and political' constraints were perceived by only 19-36% of countries impeding TB control. Four health system constraints were selected by more than 40% of respondents: numbers of specialist TB nurses (45.2%); funding of national TB control and prevention programme (43.3%); funding in the wider healthcare system (43.3%) and communication between the health care and social care systems (41.9%) (**Figure 5**).

Responses to key items in relation to national TB incidence

Ten EU/EEA countries had TB incidence ≥10/100,000 according to ECDC estimates for 2006-2015: United Kingdom (10/100,000), Spain (12), Croatia (13), Estonia (18), Poland (19), Portugal (23), Bulgaria (24), Latvia (41), Lithuania (56), Romania (84). Of these 10 countries, 80% had a national TB control plan/strategy compared with 43% of countries with low TB incidence (**Table 2**). In terms of total annual numbers of incident TB cases (based on 2015 data), two countries with no national plan/strategy had <50 cases, three had 300-500 cases, four had 500-800 cases, and four had >1,000 cases. All countries with medium-high TB incidence had a clearly defined organisational structure and central coordination of TB control compared with 62% and 86% respectively in low-incidence countries. There were no differences in the proportions with central coordination or specific funding for TB control.

A higher proportion of countries with low TB incidence identified screening for active TB in migrants from high-incidence countries as a high priority action (67% compared with 30% of countries with high-medium TB incidence), whereas high-medium TB incidence countries were more likely to identify MDR-TB, HIV/TB as high priority (**Table 2**). Differences in responses to the question about unmet need for TB detection and treatment were apparent only for TB detection in undocumented migrants - 62% of low TB incidence countries reported high unmet need compared to 11% of medium-high incidence countries, and TB treatment in people with alcohol problems - 40%

of medium-high incidence countries reported high unmet need compared to 10% of low incidence countries. The median number of factors identified as barriers to TB control and prevention were similar in low and medium-high incidence countries (**Table 2).**

Discussion

This survey has provided an up-to-date picture of the availability, implementation and content of national TB control plans in EU/EEA countries, and insights into priority action areas, population groups, and barriers to programme implementation. It shows that just over half of EU/EEA countries have a national TB strategy, of which all have been or are being implemented. Although the majority of countries have a defined organisational structure, and half have central coordination, a minority have a costed programme budget, suggesting sub-optimal capacity to coordinate activities at the national level [14, 15]. Of note is that few national TB control boards included patient or civil society representatives.

A majority of respondents mentioned vulnerable population groups, screening for active TB in high-risk groups, implementing electronic case registries, and MDR-TB as priority actions. These were selected by respondents from a list of 18 action areas, which we specified under the tacit assumption that they are not 'more important' than ensuring the fundamentals of TB diagnosis and treatment within a universal healthcare system, or guaranteeing social protections and minimum socioeconomic conditions to prevent TB on a societal level [16]. Rather, they represent specific areas for new or scaled-up interventions as part of an overall strengthening of efforts to control and prevent TB. As might be expected, a higher proportion (62%) of low TB incidence countries identified undocumented migrants as having high unmet need for TB detection and treatment than did medium-high TB incidence countries (21%), reflecting the disproportionately high number of TB cases occurring in migrant groups in low TB incidence countries [2].

One third of respondents indicated a lack of government recognition of TB control as a public health priority, but the most commonly cited barriers related to recipients of care, care providers (mainly specialist training) and health system constraints. The perception that TB control can be impeded by factors related to recipients of care, namely lack of TB knowledge, seeking care and adherence, must be interpreted as a challenge to providers to address issues of awareness and stigma [17] and to develop and deploy evidence-based interventions [18]. The importance of good communication and coordination within the health care system and between health and social care systems has been demonstrated in reports of cases and outbreaks in EU/EEA countries [19, 20].

Survey findings in the context of other studies

A 2013 survey of 38 European national TB programme representatives found that, of 26 countries also included in our survey, 15/26 had a national TB control plan [9]. In our study this proportion was unchanged, but three additional countries now indicated that they had a plan (for 2007-2016, 2013-2018 and 2015-2020) and three countries that previously had a plan responded as follows: one had a formalised TB programme during 2007-2009 which was finished to limit the number of vertical plans and committees in public health, although the framework was still in place and a new programme was planned for 2017-2020; one has a federal structure with legally-established local, regional and national responsibilities and a coherent approach to TB control and prevention which was considered to replace the need for a national programme; and one has a plan scheduled for 2019-2021. The availability of a (costed) national TB control plan which has been formally adopted by the national government is one of the core indicators for the Framework Action Plan to Fight TB in the EU [8]. Our survey results indicate that two thirds (20/31) of EU/EEA countries will have implemented a national TB control plan before 2020.

The single most important priority for stakeholders was TB control amongst vulnerable, particularly migrant populations. This perception of need may in part be attributed to recent experience of large

refugee movements across continental Europe. Barriers to accessing services [21] and the large numbers of people affected [22] would make it likely that there is a significant unmet need in these population groups, but robust evidence for the effectiveness of targeted TB interventions is surprisingly scarce and urgently needed. Other under-served populations have been frequently mentioned as priority groups, and TB control among these groups remains a challenge [17]. A key part of our survey was to identify perceived barriers to strategy implementation. Here, an important observation was that clinical, particularly tertiary services were felt to be prioritised compared to public health and prevention opportunities in some settings. Whilst it is uncertain to what extent this represents respondents' personal views, a perceived under-prioritisation of public health services is cause for concern.

Strengths and limitations

The main strength of this study is that it achieved a 100% response rate from TB programme leads or their delegates in the 31 EU/EEA countries. It can therefore be seen as a representative view of key TB control stakeholders in the EU/EEA, thereby allowing comparison of previous survey results [9]. Questions were kept similar to validated frameworks and piloted among a small but key group of professionals, including two national TB programme leaders and the head of the ECDC TB Programme. The main limitation is that some responses may reflect personal opinions of respondents, particularly responses to questions asking about priorities and barriers. We did not ask whether respondents had sought the views of colleagues, but we know that a number of respondents did consult within their programmes to provide correct and consensus responses to the survey. Although survey questions were worded in accordance with ECDC terminology [8, 13], the survey was available only in English and linguistic differences might cause ambiguities in the interpretation of questions. Also, some terms may overlap or mean different things in different countries (or to the same groups of people at different points in their journeys), for example, asylum seekers, refugees,

and ‘documented/’undocumented’ migrants. To pre-empt these issues, telephone and email support was provided for the duration of the survey, and face-to-face at the 2017 Wolfheze meeting. For the current paper, we did not attempt an evidence synthesis based on free text comments which accompanied some of the survey responses, but we did inspect any such comments to ensure the validity of our descriptive analyses and to provide additional detail where relevant.

Implications and recommendations for TB policy and practice in EU/EEA countries

Progress in the availability of national TB strategic plans has been slow, with half of EU/EEA countries not having a plan in place at the time of this survey despite publication of the WHO End TB Strategy in 2015 [6]. Whether recent international meetings such as the Global Ministerial Conference on Ending TB in the Sustainable Development Era (Moscow, November 2017) and the UN High-Level Meeting on TB (New York, September 2018) will increase government commitment to, and prioritisation of, TB control and elimination across the EU/EEA remains to be seen. Clearly, having a plan is only the first step - implementation requires centralised coordination, sufficient funding and evidence-based interventions.

The EU/EEA has favourable indices for determinants of trends in TB incidence such as economic growth, human development and public resources [23], and annual rates of decline for the region (4.3% during the period 2007-2016) are faster than all other regions [1]. However, this downward trend is still unlikely to meet the WHO target of TB elimination by 2050 in European low-incidence countries [24]. A key issue with regard to recommendations for policy and practice in the EU/EEA is the considerable social, economic and epidemiological heterogeneity between and within countries. As our survey has shown, EU/EEA countries which carry a high burden of TB in their native population, e.g. Romania accounted for almost one quarter of reported cases in 2016, are understandably much less concerned about cases in foreign-born population groups than countries where these represent the vast majority of reported cases, e.g. 90% in Sweden and 96% in Malta [1].

However, commonalities (and common borders) exist which provide potential for EU/EEA-wide and local interventions. Several such areas were highlighted in the most recent ECDC/WHO TB monitoring and surveillance report for Europe [1], and it is instructive to match these with responses to our survey and with evidence for effective interventions.

Identifying and treating TB cases of foreign origin, and ensuring good access to healthcare for migrants and other vulnerable population groups, is clearly a priority in countries where these are foci for the majority of cases. Limited evidence for the effectiveness of interventions in vulnerable populations [18] and for active and latent TB screening in migrants [25, 26] should give impetus to rigorously-conducted large-scale evaluations of different approaches to addressing this issue, given that any successful approach is likely to be generalizable across low TB incidence EU/EEA countries, and many migrants cross internal EU/EEA borders in journeys from their ports of arrival.

Prisons are a focus of higher TB and MDR-TB incidence in most countries [27] and, although three quarters of countries in our survey have a strategy for TB control in prisons, only half rated this as a priority area. Data on TB in prisons in EU/EEA countries is scarce, with only 18 countries providing monitoring data in the years to 2016 [1]. We echo the ECDC/WHO recommendation that all EU/EEA countries collect information to support accurate monitoring of TB in prisons at EU/EEA level, and again, we would advocate for evaluations to provide an evidence base for interventions that are likely to be effective regardless of country.

Our survey highlighted a perceived need for investment in human resources/expertise. This indicates a need in higher TB incidence EU/EEA countries to expand specialist training for clinical staff, whilst low TB incidence countries can contribute collaboratively through guideline development, providing technical assistance, exchanging technology, and strengthening research capacity. Indeed, cross-border collaboration between high and low TB incidence countries is one of 8 priority action areas within the WHO/European Respiratory Society framework towards TB elimination [28]. This will also address the issue in low TB incidence EU/EEA countries of clinicians having insufficient

first-hand experience to manage TB cases, with TB being so rare in some countries that there is a danger of losing local knowledge and expertise [29].

'Inadequate systems for TB control programme monitoring and evaluation' was identified as a factor impeding TB control by only one quarter of survey respondents, and three quarters of countries had a strategy for monitoring and evaluation, yet the ECDC/WHO report indicated that only 14 of 26 WHO targets could be effectively monitored based on data from EU/EEA countries, with reporting of LTBI, HIV status and treatment outcomes as areas requiring most improvement [1]. Monitoring EU/EEA-wide treatment outcomes is important given an apparent decline in success rates (from an average of 77% during 2011–2013 to 74% in 2014-2015), substantial between-country variation and success rates for both MDR and XDR TB that are far below WHO targets [1]. Benchmarking and identifying differences is essential if countries are to disseminate and share best clinical practice. At an epidemiological level, a common strategy enables monitoring of emerging threats, such as the increasing proportion of XDR TB among MDR TB cases (from 14% in 2012 to 21% in 2016) [1].

We note that routine collection of complete data from all countries for the wide range of indicators included in ECDC/WHO report, which could be gradually expanded to collect data on, for example, palliative care for XDR-TB and comorbidities such as diabetes and mental health, largely obviates the need for future one-off surveys. In the meantime, we trust that our survey findings will serve to inform the development of an evidence-based toolkit which EU/EEA and other countries can use to design national TB strategies [11], thereby supporting these countries to work collaboratively towards TB elimination.

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Footnotes

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Supplementary Material

Supplementary File 1: Survey questionnaire

Supplementary File 2: Survey responses (Tables S1 - S5)

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Table 1: Availability and implementation of national TB control plan/strategy, and TB programme coordination in EU/EEA[†] countries

Question	Response	%
Do you have a national TB control plan or strategy?	Yes	54.8% (17/31)
(If yes) Has implementation of the plan or strategy started?	Yes	100.0% (17/17)
(If no) Is a national TB control plan or strategy being prepared?	Yes	14.2% (2/14)
If no) Do you intend to prepare a national TB control plan or strategy?	Yes	25.0% (3/9)
Does your national TB control and prevention programme have a clearly defined organisational structure?	Yes, as defined in national TB control plan/strategy	38.7% (12/31)
	Yes, but not defined in national TB control plan/strategy	35.5% (11/31)
	No	25.8% (8/31)
Is TB control and prevention coordinated centrally by a national TB control board or committee or other formal body?	Yes, as described in national TB control plan/strategy	32.3% (10/31)
	Yes, but not described in national TB control plan/strategy	22.6% (7/31)
	No, but other national bodies coordinate specific TB control and prevention tasks	35.5% (11/31)
	No	9.7% (3/31)
Has specific funding been allocated to the national TB control board?	Yes	29.4% (5/17)
Is TB control and prevention coordinated locally by local TB control boards or committees or other formal bodies?	Yes	47.1% (8/17)

[†] European Union (EU) and European Economic Area (EEA)

Table 2: Responses to selected questionnaire items in relation to national TB incidence

Questionnaire item	**Low TB incidence (<10/100,000)** (21 countries)	**Medium-high TB incidence (≥10/100,000)** (10 countries)
National TB control plan or strategy	9 (42.9%)	8 (80.0%)
Clearly defined organisational structure	13 (61.9%)	10 (100.0%)
Central coordination	18 (85.7%)	10 (100.0%)
Specific funding allocated to TB control	2 (28.6%)	3 (30.0%)
High priority actions		
Training and developing a specialist TB workforce	10 (47.6%)	5 (50.0%)
Introducing and implementing new tools for TB control	8 (38.1%)	6 (60.0%)
External quality assurance for laboratory services	7 (33.3%)	5 (50.0%)
Implementing electronic TB case registries	12 (57.1%)	6 (60.0%)
Staffing and expertise for national TB surveillance	9 (42.9%)	3 (30.0%)
Establishing or managing local TB control boards	4 (19.1%)	1 (10.0%)
Publishing and disseminating clinical guidelines	6 (30.0%)	5 (50.0%)
Raising awareness of TB at community/primary care level	8 (38.1%)	5 (50.0%)
Reaching vulnerable population groups	17 (81.0%)	7 (70.0%)
TB control in prisons	8 (38.1%)	6 (60.0%)
Latent TB infection screening in high-risk population groups	11 (52.4%)	4 (40.0%)
Screening for active TB in high-risk population groups	13 (61.9%)	6 (60.0%)
Ensuring continuity of TB drug supply	8 (38.1%)	6 (60.0%)
Screening for active TB in migrants from high-incidence countries	14 (66.7%)	3 (30.0%)
Contact tracing and outbreak investigation	13 (61.9%)	5 (50.0%)
BCG vaccination[†]	2 (9.5%)	2 (20.0%)
MDR-TB[†]	10 (47.6%)	8 (80.0%)
HIV/TB	7 (35.0%)	7 (70.0%)
Barriers to TB control and prevention	median (IQR)	median (IQR)
Recipients of care barriers (range 0 - 6)	3 (1 - 4)	3 (2 - 4)
Providers of care barriers (range 0 - 5)	2 (1 - 3)	1.5 (1 - 3)
Social and political constraints (range 0 - 6)	2 (0 - 3)	1 (0 - 2)
Health system constraints (range 0 - 27)	5 (2 - 7)	6.5 (2 - 10)

[†] BCG = Bacillus Calmette-Guérin; MDR = multi-drug resistant