

# Report

## Joint ECDC/WHO Regional Office for Europe Tuberculosis country visit

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Norway  
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## EXECUTIVE SUMMARY

Norway has a demonstrated historical strength in tuberculosis (TB) prevention and control, showing success in the past decades, in bring the incidence-level to a minimum. The country has a favourable legal policy environment with a functional triad of an infectious disease act, TB regulation and TB guidelines that support the implementation of a strong TB programme.

TB control systems in the country demonstrate an effective distribution of responsibilities, with a key function of the TB coordinators in keeping the best of the patient a priority. TB care is fully integrated within the health care system and the TB control programme ensures strong ownership among public health, regulatory and clinical stakeholders.

Norway is exemplary in the feasibility of implementing universal access to TB care and of assuring patient-friendly services with full compliance to treatment through the Directly Observed Treatment (DOT) strategy.

High level of expertise is available through the national advisory bodies for TB as well as for MDR-TB. This further enables effective, evidence-based decisions for new approaches to TB control in the country.

Norway, along other EU/EEA Member States, has the opportunity of taking the lead in demonstrating that the elimination of TB is achievable in a globalized context. The first step towards this goal is developing and maintaining a strong TB control programme that is adapted to a low-incidence setting. Norway demonstrates excellence in this area, with political, economical and social commitment to TB control. The development of a National TB Strategy aiming at elimination would further secure this commitment and should be considered as a strategy by the Norwegian authorities.

The overall findings from the country visit, of the strengths of, and the adapted, Norwegian TB control programme, show the importance of maintaining awareness and commitment to TB control within a low-TB-incidence country. This is an essential aspect to ensuring the further elimination of TB. It will be essential to maintain this awareness and commitment in the future.

### Key suggested follow-up action

The National Institute of Public Health should strongly consider the development of a National TB Elimination Strategy to further streamline and maintain TB control activities and allocation of resources. Such a strategy would define the goals, objectives and targets of TB prevention and control in Norway for future years and ensure further commitment to TB control. The Norwegian approach to TB control will be pivotal to supporting other countries as they reach the elimination phase, and this in turn will in the future guide the way to the ultimate goal of global TB elimination.

These approaches include:

- Fundamental recognition that even in the context of foreign-born TB, good TB control can be achieved by eliminating possibilities of TB transmission within the national borders.
- New approach to TB elimination by eliminating transmission and addressing the pool of latent TB infection as a key elimination strategy.

## **TB COUNTRY VISIT OBJECTIVES AND TERMS OF REFERENCE**

Upon discussion with relevant national authorities, the European Centre for Disease Prevention and Control (ECDC) and the WHO Regional Office for Europe (WHO/EURO) proposed to carry out a tuberculosis (TB) country visit in collaboration with the Norwegian technical counterparts.

The overall purpose of the visit would be to examine the present TB programme in Norway and give strategic and technical advices on the way forward.

The visit was conducted with the below terms of reference.

### **Objectives**

- To carry out an analysis of the current TB control situation.
- To identify, in cooperation with National counterparts, strengths, challenges and possible actions for progress towards TB Elimination in Norway.
- To identify possible areas of interaction between ECDC, WHO/EURO and Norway for the control of TB in Norway as well as in the EU/EEA.

### **Technical areas covered during the visit**

- Tuberculosis strategy and financing; including human resources and training.
- Tuberculosis surveillance and reporting.
- Tuberculosis prevention and control; including case-finding, management and control, as well as screening, prophylactic treatment and BCG vaccination.
- Tuberculosis diagnosis; including laboratory activities and implementation of new diagnostic tools.
- Tuberculosis in vulnerable populations; including migrants, asylum seekers and children.
- Progressing towards elimination: the use of new tools and approaches.

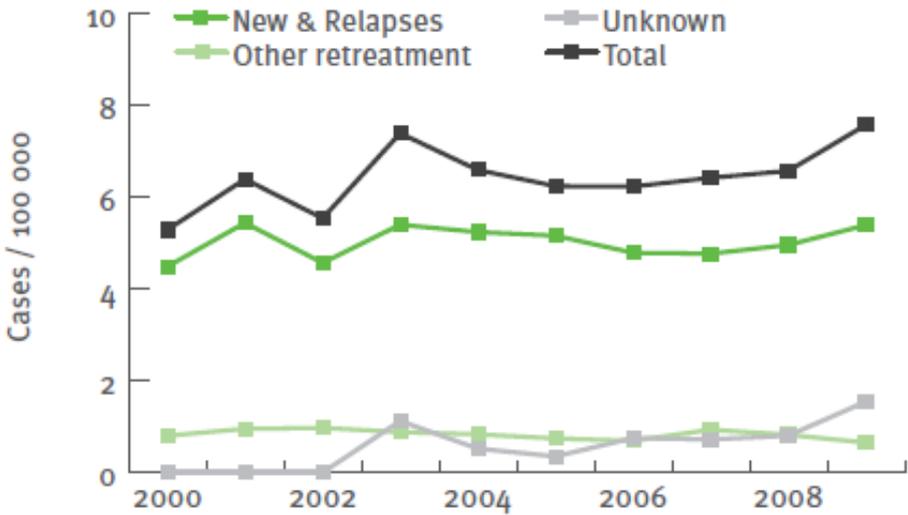
# EPIDEMIOLOGY

## TB notifications and trends

The overall TB-notification in Norway is low with a decreasing trend among the native population and a slight increase among patients of foreign origin. Below follow figures depicting the TB epidemiologic situation in the country. More detail may be obtained from the national TB surveillance report as well as the ECDC / WHO Euro Joint report, Tuberculosis Surveillance in Europe, 2009<sup>1</sup>.

Figure 1: Tuberculosis notification rates by previous treatment, 2000-2009<sup>1</sup>

### Tuberculosis notification rates by treatment history, 2000–2009\*

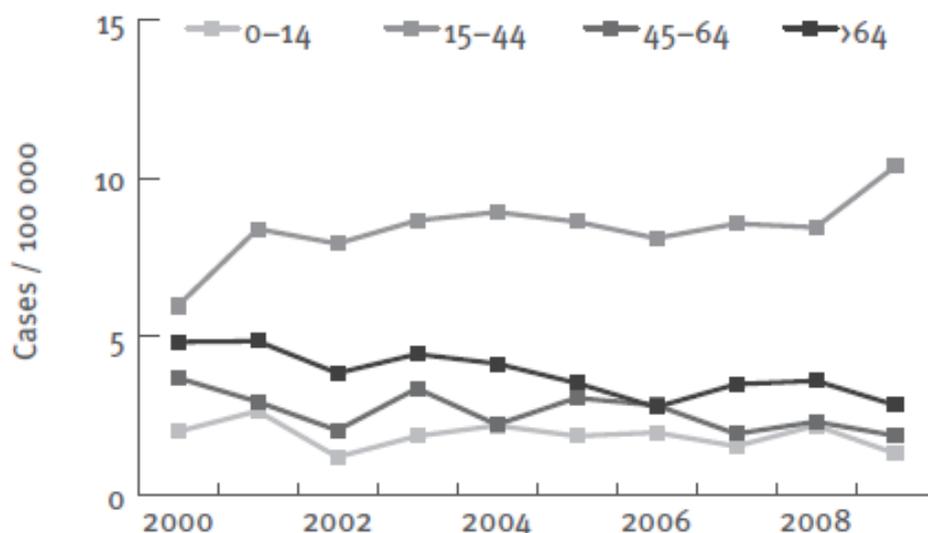


\* Distribution of cases by previous diagnosis

<sup>1</sup> European Centre for Disease Prevention and Control / WHO Regional Office for Europe. Tuberculosis surveillance in Europe 2009.

Figure 2: Tuberculosis notification rates by age group 2000-2009<sup>1</sup>

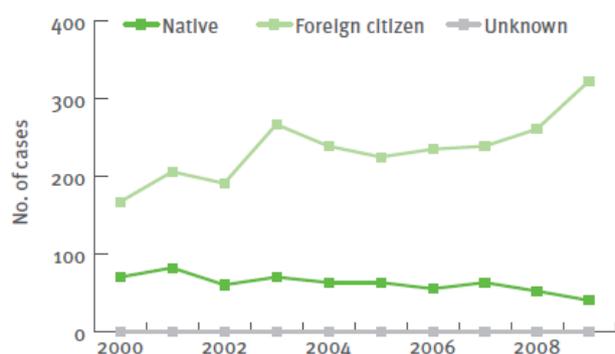
### Tuberculosis notification rates by age group, 2000-2009



### Origin of TB cases

Figure 3: TB cases by origin (2000-2009)<sup>1</sup>

#### Tuberculosis cases by geographical origin, 2000-2009



### Drug resistance

Table 1: Multidrug resistant tuberculosis (MDR-TB) prevalence; 2000-2009 (%)<sup>2</sup>

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Nr MDR TB cases	3	5	7	3	4	3	3	3	4	8
total culture positive cases with DST results	170	214	192	272	246	214	224	242	225	283
% MDR TB cases	1.8	2.3	3.6	1.1	1.6	1.4	1.3	1.2	1.8	2.8

Due to small number of patients, interpretation of MDR-TB trends is difficult.

### TB/HIV co-infection

Norway has to date no legal authority to collect data on HIV-status among TB cases. As a result the extent of TB/HIV co-infection is unknown. Many TB patients of foreign origin in the country originate from countries of high HIV-prevalence.

<sup>2</sup> European Centre for Disease Prevention and Control / WHO Regional Office for Europe. Tuberculosis surveillance in Europe 2009.

## Treatment Outcome monitoring

Table 2: Treatment Outcome for previously not-diagnosed, culture-confirmed, pulmonary TB cases diagnosed in 2007 and 2008<sup>2</sup>

Year	Success	Died	Failed	Defaulted	Still on treatment	transferred or unknown	Total
Outcome, cases diagnosed 2007	103	3	0	0	4	4	114
(%)	90.4%	2.6%	0.0%	0.0%	3.5%	3.5%	100.0%
Outcome, cases diagnosed 2008	88	6	0	0	4	7	105
(%)	83.8%	5.7%	0.0%	0.0%	3.8%	6.7%	100.0%

Norway has successfully kept the treatment default rate at zero percent, as a result of intensified efforts. On the other hand, the percentage of patients transferred out is doubled from 3 to 6.7%, as well as the case fatality rate from 2.6% to 5.7%.

## ORGANISATION OF TB CONTROL

Tuberculosis control is an integral part of the Norwegian Health System, and falls under the Act on Communicable Diseases. The state-governed, specialised health care (through the Health Trusts / hospital) is responsible for; receiving and diagnosing referred individuals suspected of TB; providing initial hospital-care upon TB diagnosis; developing and prescribing treatment regimens (only infectious disease specialists, lung specialists and paediatricians are remitted for this); and ensuring medical follow-up of patients during treatment. The municipals, through the TB coordinators, the medical officer, public health officers and other involved parties, are responsible for the continued, home-based treatment of all TB patients in their municipality; this includes providing Directly Observed Treatment (DOT) and patient support.

Key players in TB prevention and control in Norway are the:

- Ministry of Health and Care Services
- Directorate of Health
- National Institute of Public Health
- Board of Health Supervision
- Regional health authority (hospital trust)
- Municipality and municipal medical officer
- Tuberculosis coordinators
- Non-Governmental Organisation (NGOs)

The roles and responsibility are clearly defined and described in the National TB guidelines<sup>3</sup>. Below follows a brief description of the function of different bodies responsible for TB prevention and control.

The Norwegian Institute of Public Health (NIPH) is responsible for, and coordinates, TB surveillance at the national level, it hosts the National Reference Laboratory, provides training of staff, and it revises and publishes National TB guidelines. The NIPH further convenes the National TB committee, an

<sup>3</sup> *Tuberkuloseveilederen som e-bok:*

[http://www.fhi.no/eway/default.aspx?pid=233&trg=MainArea\\_5661&MainArea\\_5661=6034:0:15,5092:1:0:0:::0:0](http://www.fhi.no/eway/default.aspx?pid=233&trg=MainArea_5661&MainArea_5661=6034:0:15,5092:1:0:0:::0:0)

advising committee to the NIPH consisting of TB experts, for expert advice on new approaches and improvements in TB control.

The Health Supervision Board at the Ministry of Health and Care Services functions as an inspectorate to ensure TB control activities are performed according to the national standards, guidelines and regulations.

Regional TB control activities are based at the Hospital Trusts. Patients are referred to these hospitals for diagnosis, hospitalisation (and isolation) and initiation of treatment. The hospitals also provide counselling to the patients as well as performing training activities and contributing to the surveillance/case notification system.

Municipal Medical Officers are responsible for TB control among the population of their municipalities. There are 430 municipalities in Norway covering populations ranging from 500 individuals to 600,000 people. The Municipal Health services refer individuals suspected of TB to specialists. Within the municipality, the Officers are responsible for; ensuring DOT during the ambulatory phase of treatment; screening; contract tracing upon diagnosis of a TB patient; vaccination and training of personnel; and protection of vulnerable populations.

Since 2002, due to changes in the TB Regulation, it became compulsory for the Hospital Trusts to appoint TB coordinators. This was done to secure an effective follow-up of TB patients during the full duration of treatment. Focussing on the needs of the TB patient, the coordinators contribute to the smooth process of patient referrals, acting as focal points for communication with the different levels of health services. The key role of this unique system with TB coordinators is to; create a bridge between municipal health services and the Hospital Trust; establish individualised treatment plans for patients and coordinate individual support and treatment; monitor the incidence of TB in the health region; and participate in the training of personnel. By 2011, there were 30 TB coordinators (nurses) positioned in all hospitals treating TB. The number varies depending on the size of hospital, ranging from 0.2 to three.

Non-governmental Organisations (NGOs) play an important role in TB control in Norway. There are several civil society organizations, with the Norwegian Heart and Lung Association (LHL) being the largest organisation (<http://www.lhl.no/en/stop-tuberculosis/>). LHL supports patients and provides information for the general public, TB patients and their close ones as they provide research funds.

## **STRATEGY and FINANCING**

### **National Strategy for TB control**

Norway currently holds national TB guidelines and a robust set of health regulations related to TB that ensures optimal TB prevention and control. However, there is currently no up-to-date national TB strategic plan for TB control. A national TB strategy was prepared in 1998 and formed the basis for the regulations that were issued in 2002 and updated in 2009 by the Government. The National TB guidelines were developed by the NIPH in 2002 and updated in 2010 in the format of an e-book; it is both a textbook and guidelines, and includes diagnostic, treatment and contact tracing guidelines. It further contains information on TB regulations and TB MSIS information system.

Norway has shown an outstanding implementation of the basics of TB control, supported by a high level of social and economic support. The TB guidelines that are now in the format of a live ebook

([Tuberkuloseveilederen som e-bok](#)) are an efficient resource and tool for health care workers to access the required procedures when a TB patient is met.

Norway is currently in a pre-tuberculosis elimination phase, in which the epidemic is fading out of the Norwegian ethnic population, but is sustained in the foreign-born. Norway has taken a lead in showing that with efficient and effective TB control measures and political and social commitment, increasing numbers of imported TB cases are not a threat to the population residing in the country. With effective case-finding and case-management, TB-transmission within the country is effectively prevented, as has been demonstrated in numerous studies within the country (*Dahle, U. (2007), Dahle, U (2003)*).

As described in the [Follow-up of the TB Action Plan to fight TB in the EU](#) (ECDC, Stockholm, 2010), TB elimination can be defined in two separate steps; the prevention and elimination of transmission in a setting, as a first step to elimination, and consequently the ultimate elimination of TB, globally defined as a TB-incidence of less than one case per million population (*Stop TB Partnership & WHO. Global Plan to Stop TB 2006–2015. Geneva, WHO; 2006 (WHO/HTM/STB/2006.35)*). Whilst the latter can only be achieved on a global level, the former can be achieved locally/nationally and be used as a proxy indicator for the progress towards TB elimination.

Norway has recently adopted the new approach towards Latent TB Infection (LTBI) control, providing prophylactic treatment to infected individuals. The national surveillance system has been collecting data on patients starting treatment for LTBI since 1996 (*Heldal, E. Rønning, K, Mannsåker, T. Dahle, U; Tuberculosis in Norway 2008-2009; Norwegian Institute of Public Health, May, 2011*), presenting an opportunity to assess the effectiveness of LTBI-control in overall TB control, as well as to assess LTBI control as a strategy for TB elimination.

The overall findings from this country visit; of the strengths of, and the adapted, Norwegian TB control programme, show the importance of maintaining awareness and commitment to TB control within a low-TB-incidence country. This is an essential aspect to ensuring the further elimination of TB. It will be essential to maintain this awareness and commitment in the future.

### **Suggested follow-up actions**

The National Institute of Public Health should strongly consider the development of a National TB Elimination Strategy to streamline TB control activities and allocation of resources. Such a strategy would define the goals, objectives and targets of TB prevention and control in Norway for future years and ensure further commitment to TB control. The Norwegian approach to TB control will be pivotal to supporting other countries as they reach the elimination phase, and this in turn will guide the way to the ultimate goal of global TB elimination. These approaches include:

- Fundamental recognition that even in the context of foreign-born TB, good TB control can be achieved by eliminating possibilities of TB transmission within the national borders.
- New approach to TB elimination by eliminating transmission and addressing the pool of latent TB infection as a key elimination strategy.

### **Financing**

TB care is fully covered by the state and thus provided free-of-charge to all patients. Furthermore, patients are provided social and economical support during treatment; if the patient is working, 100% sick leave is given with a provision of their full income salary for a full year. If patients are unemployed, social welfare and housing is provided by the municipal authorities.

All specialised health care in Norway is financed and governed by the state. The budget for specialized health services is not performance-based and hospitals receive block grants as well as activity-based payments. In the past, this consisted of a 40% block grant and 60% activity-based grant and currently, as a result of reforms, this changed to 60% block grants and 40% activity based funding. Treatment and management of TB patients is limited to the remit of specialised health services and specifically to paediatricians, infectious disease specialists and lung specialists.

## **HUMAN RESOURCES - training**

### **Findings**

Pre-service training of health care students includes tuberculosis; however, this is only a minor section as TB has a low prevalence in Norway.

In-service, continuous education is provided by the Norwegian Institute of Public Health, TB coordinators, the Hospital Fund as well as civil society organizations and NGOs. Training materials have been recently updated. Numerous materials are available online, including the TB national guidelines' ebook ([Tuberkuloseveilederen som e-bok](#)).

The NIPH uses the TB coordinators' annual meetings as an opportunity to refresh staff knowledge on TB.

### **Suggested follow-up actions**

- In-service training of staff is crucial. Developing interactive web-based training and video-conference facilities could further support healthcare staff that does not frequently see TB patients.
- Organization of specific training/orientation of physicians on early diagnosis and treatment of TB is recommended.

## **SURVEILLANCE and RECORDING & REPORTING**

### **Findings**

Norway has a well-established and strong surveillance system for reporting TB cases. Tuberculosis belongs to the disease group A (54 diseases with obligatory case reporting) in the Norwegian Surveillance System for Communicable Diseases (MSIS).

TB case-registration started in 1900 with the TB Control Act, stating that it is obligatory to notify infectious TB to the municipal doctor. In 1964, the Central Tuberculosis Register (NTR) was founded. The current TB registration system is based under the law of health registers (2002) and was last revised in 2009.

The NTR was integrated into the Norwegian Surveillance System for Communicable Diseases (MSIS) in 2009, a system hosted and run by the National Institute for Public Health. The NTR contains a large number of variables on TB diagnosis and treatment (approximately 50), including molecular surveillance data. All surveillance variables are compulsory; the specific data dictionary of the NTR is not publicly available. It was noted that the staff working with TB surveillance has been reduced in recent years and since 2008 staff consists of a full time nurse performing data collection and entry, a doctor responsible for TB as one of several areas, and a 20% doctor dedicated to working with TB.

### **TB case registration:**

- The diagnosing doctor sends each TB case's TB notification form (Annex 2) to the NIPH, the municipal doctor and the TB coordinator. The NIPH collects all forms from involved parties on case-based data and enters the data into MSIS. All diagnosed TB cases as well as persons started on LTBI treatment should be notified (Figure 4).
- The treating specialist shall report results on treatment to the NIPH with a copy to the municipal doctor and the TB coordinator (Annex 3).
- The municipal doctor sends a report (Annex 4) of the contact tracing results to the TB coordinator and the NIPH.
- For the notification of laboratory findings, the laboratories report on sputum smear microscopy, culture, species and drug-susceptibility testing result. These results are reported to the treating clinician and the NIPH. All laboratories should send patient isolates to the NIPH's reference laboratory.
- Previously, the NTR sent annual reports to the WHO and EuroTB. An NIPH data manager is now appointed and trained to prepare the TB database and to upload it to ECDC TESSy.

All core data are included in the TB Surveillance System, with the exception of TB patients' HIV status.

Overall, TB data validation and data quality controls are implemented, including data linkage with the population registry. The NTR is designed as a person-based registry, meaning that all personal data of a newly reported TB case on same patient has to be re-entered.

In addition to independent reports from the TB clinicians and the TB laboratories, the pharmacies with rights to provide TB drugs (12 in total), have to report all TB drug-prescriptions directly to the NTR (by name and date of birth/person registry number). This three independent registration system ensures the high registration coverage of TB cases.

### **Achievements**

- A countrywide TB registration system for all doctors was established in 1962 (computer based since 1964), has been stable over the years and is given high priority in the Norwegian health system.
- The TB register has reported anonymised, case-based TB notification data to European surveillance since the start of the registry.
- In addition to active TB case notification and treatment monitoring, initiation of latent TB Infection (LTBI) treatment must also be notified; however the exact coverage and treatment results are unknown.
- Molecular surveillance data have been notified and successfully used for outbreak management.
- Automatic web page reports of TB data are available by counties, the data are updated on a daily basis.
- Regular annual overviews and reports based on surveillance data are an integral part of the TB surveillance activities.

### **Challenges**

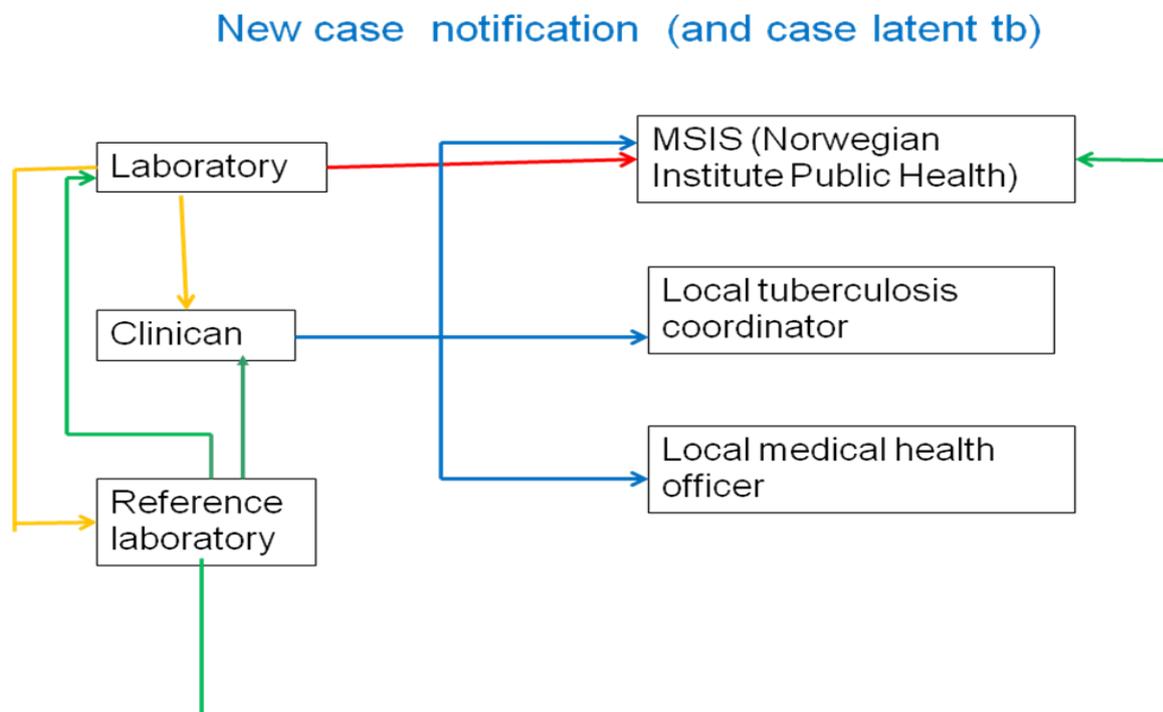
- Although the TB surveillance system is a comprehensive one, which includes LTBI registration and molecular epidemiology data, the system does not collect information on TB/HIV co-infection. This is not available in individualised case-based format or in aggregated format.

- In order to distinguish treatment relapses and previous failures/defaulters in the NTR, a consideration might be to specify previous treatment data definitions/reporting.
- The existing paper-based registration system causes some registration delays on the national level. This results in the local TB Coordinators not always being regularly updated on the status of their area of coverage.
- TB registry data are not routinely linked with vital statistics (cause of death registry) to compare deaths from TB. The two registries were last linked in 2009, at which point there were almost twice as many deaths in the death registry as compared to the TB registry.

### Suggested follow-up actions

- In accordance with, and within the boundaries of, individuals' right to data privacy and protection, approaches can/should be developed to get full insight on TB-HIV co infection levels.
- Enhancing the electronic TB registration system with web-based registration and granting access, to the extent of their responsibility, to the TB coordinators and Medical Municipal Officers, should be considered.
- Improved linkage between the TB case-based data and existing vital statistics data would enhance the data registration completeness.
- Implementation of Standard Operating Procedures for the TB registry would further improve the sustainability of TB surveillance; for example, when personnel of the registry changes.

Figure 4: Overall structure of reporting New TB case to MSIS



## CASE FINDING and LABORATORY

### Case finding

#### Findings

Comprehensive Norwegian national guidelines outline the procedures for passive and active case finding. Measures for passive finding include access to free diagnosis and treatment, while active case finding is undertaken through contact tracing, migrant screening and until recently, screening of those with social risk factors with a mobile x-ray unit.

#### Achievements

- **Passive case finding:** Access to free-of-charge diagnosis and treatment for all means that, in the absence of patient-related delay factors, cases presenting to health services are diagnosed promptly. The Norwegian universal access to diagnosis and treatment is therefore an excellent measure for tuberculosis control.
- **Active case finding:**
  - All the data presented suggest that a robust contact investigation programme is operational. This allows the detection of latent and active tuberculosis according to national guidance and is widely implemented nationally.
  - A comprehensive programme for case finding exists, where all migrants are screened with a chest x-ray and are recommended to have screening for latent tuberculosis.
  - Screening other, internationally recognized, high risk groups such as the homeless and drug users was undertaken but discontinued due to the lack of yield. Further epidemiological surveillance to date supports this decision, as there are very few active TB cases reported from these populations.

#### Challenges

As this system appears to be operating optimally, there are limited areas where improvement might be made. Key among these is:

- The follow-up of those with an abnormal chest x ray following migrant screening. Data presented on asylum seeker screening (Harstad et al. (2009); Harstad et al. 2010) shows that a significant proportion of suspected TB cases identified through x-ray are lost to follow-up. While it is unlikely that these cases present a risk to the general population (as shown by DNA fingerprinting), earlier diagnosis might avert transmission within the migrant population in Norway.
- Although risk assessment is generally undertaken to inform which incidents require more extensive contact investigation, opportunities remain to enhance this process.

#### Suggested follow-up actions

- Further develop TB screening activities among migrants aiming at improving and securing the activities and case follow-up beyond the point of entry (arrival reception centres).
- Continue with the planned revision and implementation of a risk-based approach to contact investigation.
- An assessment of the role of latent tuberculosis screening, including which migrant groups (level of tuberculosis incidence in their country of origin) should be undertaken. Such a review needs to assess the potential contributions of this approach, as possibly one of few means available to reduce the number of active cases, but also needs to consider the difficulties associated with administering latent TB screening on a large scale. Of note here, is

also the need to consider whether elimination (redefined in realistic terms) may be a goal that the national programme would consider.

## Laboratory

### Findings

#### Organization of laboratory network

Norway has a well functioning, quality-assured and reliable network of laboratory diagnostic centres for the detection of *Mycobacterium tuberculosis*, fully integrated within primary and hospital care as well as TB surveillance. The TB laboratory network ensures high-level TB diagnostic services and is organised according to the three levels of general health services:

**Level 1: 8 laboratories:** Sputum smear AFB microscopy. Samples are sent to Level 2 laboratory for further testing.

**Level 2: 7 laboratories:** Sputum smear AFB microscopy, MTBc PCR on samples (some laboratories send samples to another laboratory for direct PCR), culture, some perform rapid MTBc ID on culture. Cultures are all sent to the NIPH National Reference TB Laboratory for further testing.

**Level 3: 3 laboratories:** Sputum smear AFB microscopy, direct MTBc PCR, culture, MTBc ID on culture, DST 1<sup>st</sup> line drugs, species identification. Cultures are sent to NIPH National Reference TB Laboratory for further testing and strain collection.

Some level 2 and all level 3 laboratories perform IGRA-testing (QFT).

The laboratory network consists of 19 clinical microbiology laboratories associated with county hospitals and university hospitals performing diagnosis of mycobacteria (Table 3).

**Table 3: Clinical microbiology laboratories associated with county hospitals and university hospitals performing TB diagnosis.**

Laboratory method	Nr of laboratories
AFB microscopy on sputum smear	18
Genetic detection of MTBc in clinical sample	5
Mycobacterium culture of clinical sample	10
Complex ID of cultured MTBc strains	6*
Species ID (genetic) of cultured MTBc strains	2*
Phenotypic DST 1 <sup>st</sup> line drugs	3*
Genotypic Rif(+INH) resistance	4*
Phenotypic DST 2 <sup>nd</sup> line drugs	1*
IGRA: QFT	6
IGRA: T-SPOT TB	1*

### **Reference laboratory functions**

Reference laboratory services for tuberculosis are performed by the Norwegian Institute of Public Health (NIPH) in Oslo. The National Reference TB Laboratory (NRL) is a separate unit in the Dept. of Bacteriology and Immunology, Division for Infectious Diseases of the NIPH. It performs:

- Identification and verification of clinical isolates
- Detailed strain characterization (genotypic and phenotypic)
- Drug Susceptibility Testing (1<sup>st</sup> and 2<sup>nd</sup> line drugs)
- Surveillance (reporting)
- National strain collection
- National quality assurance (external quality assurance - EQA) and supervision of laboratory diagnosis
- Research and development
- Information, training and feedback
- Supply of reagents and strains
- National advisory groups on TB control and MDR-TB
- International collaborations

All diagnostic centres in the country are quality-assured by the NRL for their laboratory methods on mycobacteria. Once a year, several simulated sputum samples with mycobacteria are included in the bacteriology panel that are distributed as part of the national quality assessment. Some laboratories also join the international UK National External Quality Assessment Service (NEQAS) EQA. Quality assurance for DST is performed using the panel from the WHO/IUATLD Supranational TB Reference Laboratory Network, distributed by NRL.

The NRL is a partner of the ECDC-coordinated European Reference Laboratory Network for TB (ERLN-TB); a network aimed at methods harmonisation within the EU, at providing external quality assurance schemes for TB diagnostics methods, and capacity-building within TB reference laboratories in the EU. It also participates in large-scale EU funded projects such as the “European network for study and clinical management of TB drug resistance”.

### **Human resources and facilities**

The NRL in Oslo is manned with 10.5 staff, of which:

- 1 senior medical officer (clinical microbiologist), Head of laboratory
- 1 scientist on molecular epidemiology (vacant position)
- 3 scientists dedicated specific research project (2 ext. funding)
- 6 medical technologists (one part-time, one temporary employed)

There is an adequate training programme for the staff, and excellent practice routines are enforced in a fully equipped and well designed BSL-3 laboratory. All necessary action to provide a safe working environment has been taken in accordance with international recommendations (including a negative pressure system and appropriate, well-maintained laboratory equipment, and specific training of laboratory personnel working in BSL-2 and -3 facilities).

The workload in the laboratory appears adequate for supporting clinical diagnosis of TB in Norway. However, we identified the need to put in place a human resource plan for future sustainable laboratory staff recruitment, temporary replacements, and development.

The laboratory uses electronic data storage and reporting systems. Through the electronic reporting system, responsible clinicians have direct access to the laboratory results within the main hospitals to which the laboratory is connected.

The national registry compares notifications of TB diagnosis made by clinicians, anti-tuberculosis drug prescriptions by pharmacies, and positive *M. tuberculosis* cultures reported by laboratories.

### Achievements

- The laboratory system is a well-integrated part of the surveillance system with a well functioning national reporting and notification system.
- Efficient and well-equipped laboratories ensure fast and quality-controlled TB diagnosis.
- In the visited reference laboratory in Oslo and in Trondheim (St. Olav Hospital), optimal laboratory procedures and biosafety/infection control measures are used to conduct the established and novel tests.
- The NIPH fully operates in its functions of National Reference TB Laboratory offering high quality laboratory services and supporting the diagnostic network.
- National collection of *M. tuberculosis* isolates is established in the reference laboratory at the NIPH.
- Rapid molecular tests for the diagnosis of *M. tuberculosis* and drug-resistance testing are available at the NRL in Oslo (NIPH), as well as in four other centres in the country.
- Guidelines for the use of rapid molecular methods for diagnosis of *M. tuberculosis* and drug-resistance are already included in the national TB guidelines' ebook, and are part of the routine diagnostic scheme.
- A national EQA program is established for the laboratories on sputum smear microscopy. National and international EQA programs, including participation in EQA schemes of the ERLN-TB, are established for DST and culture-based methods.
- There is a systematic use and analysis of molecular fingerprinting (spoligotyping and MIRU-VNTR) of all *M. tuberculosis* clinical isolates for assessing clustering and transmission within Norway as a measure of programme performance.
- Participation in high-quality research and collaborations with international partners, focussed on further developing and assessing new diagnostic tools for TB. This includes partnership in the FP7 TB-PANNET project on MDR-TB.
- Demonstrated scientific excellence (publications in main scientific journals and reviews).

### Challenges

- There are currently no formally adopted national guidelines on the use and interpretation of the new tools performed in the laboratories, in the clinics / for clinical staff.

### Suggested follow-up actions

- An increasing number of migrants from high-incidence countries justifies continued support to the laboratory network, and in particular to the implementation of molecular typing methods in the epidemiology of TB. Molecular surveillance is an effective proxy for public health outcome, and tool to monitor the rate of transmission on a national scale as well as within special groups. Its efficacy in routine outbreak identification and management has been demonstrated and should be sustained in the future.
- Extended offer of IGRA tests, accompanied by an EQA-system for these, should assure optimal performance and availability of the assays.

- While the national guidelines for TB control, available in the format of an ebook, are a strong resource for guiding clinicians in the use of new tools (the guidelines providing details on IGRAs and molecular methods), the development and formal endorsement of national policies for new tools would further strengthen their use and discourage inappropriate use, as well as identify the areas of health care responsible for their implementation.

## CASE MANAGEMENT

### Findings

An effective and well-functioning system for securing TB case management is in place in Norway, with an effective distribution of responsibilities and a key role ascribed to the TB coordinators. The treating specialist is responsible for prescribing the treatment regime; the municipal public health officer is responsible to ensure TB patients initiate and adhere to treatment; public health nurses may be delegated the responsibility of securing patient treatment compliance and DOT; and the TB coordinator coordinates the development of the treatment plan between all involved.

Patients with drug-susceptible TB receive standardized treatment regimens recommended by the World Health Organization. The treatment of patients follows Directly Observed Treatment (DOT) for the majority of patients. Treatment for most patients includes appropriate isolation in hospital for two weeks and after that treatment in the primary health care services of municipalities. Treatment success for new sputum smear positive patients diagnosed in 2008 was 83.8% and 5.7% died, 3.8% still on treatment, 6.7% transferred or unknown. Among all TB patients diagnosed in 2008, treatment outcomes were; 80.9% success, 5.7% died, 5% still on treatment, 8.5% transferred or unknown. These results are indicators of the effectiveness of TB control activities in Norway.

The TB coordinator is the focal point for developing individualised treatment plans for each TB patient, adapting the plan in dialogue with the patient and all entities involved (treating physician, public health nurses, the municipality, social services etc). Following the first two weeks of treatment in hospital, the TB coordinator organises a treatment plan meeting to develop the most effective and patient-adapted system of DOT. The following persons take part in the meeting:

- Patient
- Relatives
- Interpreter
- Physician and nurse from the ward
- Public health officer
- Public health nurse
- Ambulant homecare nurse from the municipality
- TB-coordinator

TB coordinators further also link with the social workers and the municipal health services. This system is an excellent example of patient-centred approaches. In 2009, approximately 120 patients were on treatment in Oslo. DOT was the most frequently used method when performing the treatment. This service is delivered by the Municipal home nurses, mostly as a daily visit to the patient's home. Around 7% had self-treatment for the whole treatment period, 76% had DOT for the full treatment course, 8% had weekly dosets under supervision of the home nurse, 8% had DOT in the first part of treatment, combined with weekly dosets and supervision in the later stage of treatment.

As per the TB regulations set in 2002, all MDR-TB patients are treated in the hospital appointed by the regional health enterprise, which is commonly the regional hospital, with MDR-TB patients' treatment being managed by the infectious disease departments. The 2002, regulation further required the establishment of the National MDR-TB technical group, with the mandate of following and discussing the management of all MDR-TB cases diagnosed in the country.

### **Achievements**

- Full implementation of universal access for TB care and of DOT.
- TB care is fully integrated, with strong ownership among both public health, health regulatory and clinical stakeholders.
- The TB coordinators' function for coordinating treatment plans and communication between patient and health care services is pivotal to securing patients' adherence to treatment as well as providing support to the patients.
- It is very encouraging to see that despite the low TB incidence, Norway has kept its matrix structure of vertical and horizontal TB services.

### **Suggested follow-up actions**

- Overall, the success in DOT and treatment outcomes indicates the TB coordinators play a pivotal role, and therefore support their strengthened role in TB case management. Evaluating the role of the TB coordinators in contributing to improved treatment compliance and treatment success, with cost-effectiveness and cost-benefit analyses, would elucidate and establish the overall added-value of such a system for DOT.
- Consider different modalities of DOT including visits to a general practitioner office or the use of internet via webcam for patients who have such access . DOT should be offered in a way that ensures the patient compliance. As the Norwegian colleagues highlighted, awareness is needed that having a municipal home nurse visiting every day is not welcomed by all patients. DOT should be adapted to the individual needs.

## **MDR-TB /XDR-TB and TB/HIV CO-INFECTION**

### **MDR/XDR-TB in Norway**

#### **Findings**

Levels of drug-resistant TB remain are low in Norway. In 2009, 14.5% (41 cases) of all TB cases were resistant to any of the first line anti-TB drug; 2.8% (eight cases) were MDR-TB and no XDR-TB cases were reported (*ECDC & WHO/EURO. Tuberculosis Surveillance in Europe 2009. Stockholm, ECDC, 2011*). However, as presented by colleagues from the MDR-TB clinic at Ullevål Oslo University Hospital, the number of drug-resistant and MDR-TB cases has tripled in the last 10 years. Using molecular typing investigation, these cases are shown not to be a result of transmission within the country.

As per the TB regulations set in 2002, all MDR-TB patients are referred to and treated in the hospital appointed by the regional health enterprise, which is commonly the regional hospital and treatment is managed by the infectious disease departments. The 2002 regulation further required the establishment of a National MDR-TB technical group, with the mandate of following and discussing the management of all MDR-TB cases diagnosed in the country. Within the committee, the following members are included; infectious disease or chest medicine specialist from each of the regions,

thoracic surgeon, paediatrician, TB coordinator, NIPH-representative from the epidemiology and microbiology department.

The committee meets once a year and maintains close communication throughout the year to discuss difficult/challenging MDR-TB cases. The committee's terms of reference are:

- To advise the NIPH on issues related to MDR-TB surveillance and prevention
- To act as forum for exchange of experiences and strengthening competence for patient-oriented work with MDR-TB in Norway.
- To remain updated on the national and international MDR-TB situation
- To represent special competence regarding diagnosis, treatment and infection control
- To contribute to the establishment and implementation of good national routines.
- The group should meet once per year, but problematic cases should be discussed when needed between the meetings by phone, email or in other useful ways.

### **Achievements**

- The formation of the MDR-TB advisory forum ensures a strong programmatic system of rapidly referring MDR-TB patients' and ensuring optimal treatment, follow-up and prevention of transmission. This is shown by the low levels of MDR-TB transmission that has been seen in the country.

## **TB/HIV co-infection in Norway**

### **Findings**

Norway has to date no formal/legal basis for data collection on HIV-status among TB patients. As a result, the extent of HIV co-infection among TB patients is unknown. A high proportion of TB patients in Norway are of foreign origin and from countries of high HIV-prevalence. It would be important to gain insight over the extent of HIV/TB co-infection so that appropriate interventions and activities may be implemented and adapted to the setting. Introducing a system of reporting and monitoring TB/HIV co-infection in the country is therefore of importance.

Furthermore, close monitoring of the co-epidemic would represent a valid sentinel system for early identification of epidemic changes in particularly vulnerable and high risk population.

### **Challenges**

- Due to the legal system, the collection of data on HIV-status in TB cases is not possible in Norway. HIV-status of TB patients has not been available even in aggregated form.

### **Suggested follow-up actions**

- Investigate the extent and impact of TB/HIV co-infection – this could be done in an anonymous survey and would provide more knowledge for policy development.

This could occur following two distinct approaches, or in a combination of both:

#### **Collection of HIV data in TB patients**

- In other countries, software that enables the hiding of personal identifiers in the data collection databases is available. Adopting these would enable the reporting of HIV-status in the national TB register.
- In accordance with, and within the boundaries of, individuals' rights to data privacy and protection, approaches can/should be developed to gain full insights on TB/HIV co-infection in Norway.

### **Matching of HIV and TB registers**

- To gain insight in the current situation on the basis of data collected over recent years, matching of available HIV clinical registers (or any other source of available HIV patients recording at local level) with TB registers could be an interim solution. This would require either adapting and using previously tested matching algorithms (for example, the United Kingdom matching software) or alternatively bespoke algorithms may be developed at the NIPH.

## **VULNERABLE POPULATIONS**

### **Asylum seekers**

#### **Findings**

Asylum seekers are provided TB screening only one time, upon entry to Norway, even if they remain for several years before their paperwork is finalized (acceptance or rejection).

There are three arrival transit reception centres in Norway, to which asylum seekers are transferred upon arrival to Norway; Refstad (the largest), Hvalstad (for minors) and Torshov. Commonly, asylum seekers remain at the arrival centre for only a short time (5-10 days) and are then referred to the Transit referral centre (average stay a few weeks), followed by transfer to the standard referral centre, where the average length of stay is one year. It is not mandatory to go to refugee center and some asylum seekers settle directly in the Municipalities; however most go to the refugee centre for the services provided there.

Upon entry into Norway, the arrival transit reception centre in Refstad organizes TB screening with X-ray (all above 15 years of age), PPD skin test for all under 40 years of age and symptomatic check-up. Commonly, asylum seekers remain at the centre for only a short time (5-10 days), whilst others may stay longer at which point it is possible to do TB checking. In case asylum seekers do not come to the transit referral centre or the ordinary referral centre, the municipal health services are responsible to perform the PPD and X-ray testing.

Upon TB screening, the following steps are taken:

- Positive chest X-ray – the individual is directly referred to the TB referral centre, Kasper, for follow-up and further TB-diagnostic work up.
- Positive PPD (> 15 mm) – Referral to the TB referral centre, Kasper, for follow-up and further TB-diagnostic work up (including IGRA).
- PPD between 6 – 14 mm – Referral to Municipal Reception centre for follow-up.

Overall, in 2010, 6629 asylum seekers were screened for TB at the Refstad center, and 677 asylum seeker minors in Hvalstad were screened. Data on the number screened at the Torshov transit reception centre were not available. Overall, 6947 X-rays were performed of which 147 were referred to the Kasper TB referral Centre for follow-up. A total of 7 824 PPD tests were performed, of which 889 tested >15 mm. It was stated during the visit that up to 202 individuals were incompletely screened for TB. Only 30% of those with suspect TB chest X-rays were fully followed-up.

Directly Observed Treatment (DOT) used to be provided in the Refstad centre. However, as of 2010, all TB diagnostic follow-up and treatment for asylum seekers entering Norway was moved to Kasper. Due to distance (if asylum seekers are already located in the Municipal referral centres), patients will be referred to the Region's Hospital, as per normal TB-diagnosis guidelines.

There are about 5000 to 30000 illegal residents in Norway, a majority residing in Oslo. The right to health services is ensured based on a clear regulatory system stating the rights of illegal migrants to TB services, without risk of deportation before TB diagnosis is confirmed and/or TB treatment is fully completed.

### Achievements

- Well-functioning TB screening system upon asylum seekers' entrance into Norway.
- Balanced framing of the "imported/migrant TB" issue with a conducive legal environment preventing stigmatization of TB among migrants and protective of the individual patient right to diagnosis and treatment.
- All asylum seekers are provided health care upon entry into Norway and throughout the process of the asylum application.
- A 2010 Immigration regulation states that anyone under examination for TB or treatment for TB should not be expelled before results are proven negative and/or full treatment is completed. This regulation also covers illegal migrants residing in the country, granting rights to basic housing and conditions so as to be able to receive full TB treatment.
- LTBI screening and treatment has been recently expanded in Norway.

### Challenges

- Enhanced case finding among migrants is limited to screening at the point of entry. Beyond the level of screening at the arrival travel centres, data indicates that there is a loss of follow-up to TB screening beyond the point of entry. A study in by *Harstad, I et al*, in Trondheim indicated that up to 32% of all asylum seekers with abnormal chest Xrays had not been followed up during the first 3 years of arrival.
- Upon entry and TB screening, asylum seekers are provided a health care identity number. However, this number is not linked to the general healthcare system and thus individuals will be provided a new, separate number upon referral to the Municipal Health Services. This challenges the possibility of assessing the overall screening activities as patient data cannot be linked.
- Individual and patient data are decentralised between the arrival transit centres, the transit centres and the municipal referral centres, and the MSIS national reporting system. This further challenges the possibility of assessing the overall screening activities as well as the overall incidence of TB in this vulnerable population.
- TB screening is compulsory to all asylum seekers and migrants (including family reunifications) from high TB prevalence countries. Whilst these screening activities function well at the arrival reception centres, challenges in reaching individuals not referred to the centres (for example individuals coming for family reunification etc.) exist.

### Suggested follow-up actions:

- Strengthening follow-up systems for migrants with a positive chest x-ray. Involving the TB coordinator might enhance the process. For example, TB coordinators should receive notification of all abnormal x-rays in their area and work with local services to ensure that the diagnosis of tuberculosis is excluded or confirmed. In addition, the effort might be better targeted, if migrants from countries with very high incidence are prioritized.
- Consider more regular check-up of asylum seekers for TB (possibly on annual basis until five years after settling in Norway in case of arrival from high TB endemic countries).

- Consider working with community leaders to more easily reach out to the community of asylum seekers for early diagnosis and treatment and to ensure DOT for all the patients (e.g. mobile team providing DOT).

## Children

### Findings

The incidence of TB in children under the age of 15 is low in Norway. In 2009, the overall incidence rate among the population below 15 years was reported to be 1.4 per 100 000 child population, representing 3.6 % of all notified TB cases in 2009 (*ECDC & WHO/EURO. Tuberculosis Surveillance in Europe 2009. Stockholm, ECDC, 2011*). As shown in a recent study by *Krogh, K et al (2010)* on childhood TB in Oslo between 1998 and 2009, childhood TB cases are concentrated in Oslo, and the majority of cases are among children of foreign-origin or with parents of foreign origin. In 2009, all childhood TB cases diagnosed in Oslo were of foreign origin; either having been infected in their country of origin or by close family contacts in Norway. The index source of infection could not be identified for a small proportion of the childhood TB cases.

The low rates of TB among children suggest that there is a robust system in place to rapidly identify TB in this vulnerable group and provide treatment. Again in the study by *Krogh, K et al. (2010)* the median time from onset of symptoms to diagnosis in Oslo was six weeks (range 10 days to 4 months). TB in children in Norway further reflects the overall TB setting in the country, with cases being concentrated in individuals of foreign origin from countries of high TB incidence. The incidence rates of TB in children of non-Western origin are higher relative to the overall national incidence of childhood TB, with children of Somali origin being at the highest risk of being infected and developing disease.

As described in the *Follow-up to the Action plan to fight TB in the EU*, levels of TB in children can be used as an indicator of ongoing, recent transmission in a setting; this is especially so in young infants. The maintained low levels of childhood TB in Norway are therefore a further indication of the strong TB programme in place, able to rapidly identify TB cases, provide appropriate treatment and secure full treatment completion.

### Achievements

- The sustained low levels of childhood TB cases reflects the strong TB programme in place in Norway, able to identify and treat all TB cases, thereby preventing transmission within the setting, including children. The achievement of 80% culture-confirmation of childhood TB cases at Ullevål hospital is recommendable and demonstrates the strength and dedication of this health service in diagnosing TB in children.
- The sustained low levels of childhood TB further suggest that TB and health services are able to rapidly identify and treat childhood TB; maintaining awareness among health care workers of the vulnerable populations. All childhood TB diagnosis and treatment is referred to and under the charge of paediatricians.

### Other vulnerable populations

A limited number of TB cases have over the years been identified in hard-to-reach groups (e.g. intravenous drug-users, homeless). The key vulnerable population, towards which the largest efforts are needed, is migrants from high-incidence settings. As described in the section(s) above, the

Norwegian TB guidelines, practices and services are optimally developed to target this vulnerable group.

Oslo has an estimated 6000 to 8000 intravenous drug users (IDUs). Previous active case-finding by mobile x-ray units did not show additional case finding in this population, and has since been interrupted (only 1 additional case was identified through this intervention).

Among the estimated 1600 homeless people, 2% are thought to be truly homeless (homeless commonly residing with friends). In the last five years, only five homeless TB patients were notified among homeless individuals.

## **OUTBREAK MANAGEMENT and INFECTION CONTROL**

### **Outbreak management**

#### **Findings**

National guidelines on contact tracing provide detailed algorithms for investigating all age groups and outline the investigations required (tuberculin skin test, interferon gamma release assay and or investigation to rule out active tuberculosis). Similarly, outbreaks appear to be few and are managed according to internationally recognized principles.

#### **Achievements**

- A well functioning contact tracing system is in place based on national guidance. Local units visited appear to follow these guidelines.
- A well established molecular epidemiology programme exists. This was established over a decade ago using Restriction Fragment Length Polymorphism (RFLP) and now moving to universal MIRU VNTR typing. Extensive public health and research use of the data has been demonstrated with several high impact publications as well as policy / communication outputs.
- Very few outbreaks as shown by DNA fingerprinting data indicates that the system is working optimally.

#### **Challenges**

- National guidelines cover most public health and clinical issues but explicit recommendations on outbreak management are not described.
- Data on DNA fingerprinting are provided promptly to the national surveillance centre, but better electronic linkage and transfer of information may enhance public health response.

#### **Suggested follow-up actions**

- It may be useful for national guidelines to describe what constitutes an outbreak and the key principles for outbreak management including how management decisions will be undertaken during an outbreak/incident, the need for multi-disciplinary input into the management of outbreaks, risk communication plans and to link these to the excellent algorithms in the national guidelines.
- Consider the potential use of MIRU VNTR to inform the investigation of small clusters potentially preventing them from enlarging into outbreaks. This may require the use of electronic linkage and prompt transfer of information from the reference laboratory to public health staff.

## Infection control

### Findings

TB infection control is mentioned in the guidelines and TB regulations and the tertiary hospitals have state-of-art negative pressure facilities. The team could however not document that staff are well aware of respiratory protection in outpatient clinics visiting infectious patients. No triage system to identify and separate patients with cough could be documented in the TB outpatient facilities. TB coordinators are trained on TB-infection control and there are ongoing activities to improve knowledge and practices of staff on TB-infection control.

### Suggested follow-up actions

In the view of low prevalence of TB, it is important to keep health care workers aware and ready to deal with infectious TB patients/suspects. These precautions include administrative controls (continuous education and training, patient triage, rational patients flow), environmental control (directional air-flow, natural or mechanical) as well as personal protection devices for staff.

## PROGRESS TOWARDS ELIMINATION: USE OF NEW TOOLS AND APPROACHES

### Findings

The Norwegian tuberculosis programme is highly adaptable and well organised to allow the introduction of new tools and approaches for TB control. This is clearly shown by the introduction of several new tools over the last decade, including:

- The introduction of molecular typing to support epidemiologic surveillance in the country as well as for programmatic evaluation. This programmatic activity has been successfully running since its introduction in the 1990's. Norway has been a lead in scientific outputs assessing the use of molecular typing for tracing ongoing and recent transmission within the country. These studies show that transmission in Norway is minimal and thus that the national TB control programme is effective, rapidly identifying cases of active TB and preventing transmission to the community (*Dahle, U. (2007), Dahle, U (2003)*).
- New, rapid PCR-based molecular methods for the identification of *M. tuberculosis* and diagnosis drug-resistance are readily in place and part of the overall national TB guidelines and procedures for the diagnosis of TB. The methods are in place at several levels of the health care system that provide TB diagnostics, and support from the NIPH and NRL ensure training of health care workers.
- The recent introduction of the interferon gamma release assays (IGRAs) to support the diagnosis of latent TB infection in TB screening activities. The process of introducing these assays show the strong system in place, in which the scientific evidence was collected, assessed and presented to the Tuberculosis Advisory Group prior to national implementation of the assays.
- Norway has adopted the new approach towards Latent TB Infection (LTBI) control, providing prophylactic treatment to infected individuals with high risk of developing active TB. The national surveillance system has been collecting data on LTBI treatment since 1996, presenting an opportunity to enable assessment of LTBI-control effectiveness in overall TB control, as well as assessment of LTBI control as a strategy for TB elimination.

## Achievements

- An efficient and quality-based system is in place for assessing and introducing new tools for TB control: the National Advisory Group supporting the assessment of new tools and the live national guidelines in the form of an e-book allow quality-based, rapid and efficient introduction of new diagnostic methods and approaches. The system in place further allows assessment of the effectiveness of the new tools and approaches.
- Excellence demonstrated in assessing TB transmission within Norway as a measure of programme performance: systematic use and analysis of molecular fingerprinting for assessing clustering and transmission.
- The National Reference Laboratory is active in key international research projects for the development and assessment of new TB diagnostic methods and approaches.
- The national TB programme is up to date and open to assessing new tools to further strengthen TB control in the country and contribute to the elimination of TB globally. These experiences provide support to other low-incidence countries and national TB control, showing the importance of maintaining a strong TB programme, adapted to the TB epidemiologic setting.
- Recognition and implementation of LTBI-control and use of preventive treatment as a programmatic component.

## Suggested follow-up actions

- Assess and evaluate the feasibility and need of the new rapid diagnostic tools for TB control. The WHO recently endorsed the Gene Xpert platform for the rapid identification of *M. tuberculosis* and rifampicin-resistance. In a low-TB setting like Norway, in which other effective molecular methods are already optimally implemented, it will be important to evaluate the need of this new method, its cost-effectiveness, as well as the level of implementation in the health care system in order to maximise its efficacy and contribution to the diagnosis of TB in the country.

## ANNEXES

### Annex 1: Country information and Norwegian Health System

#### Country information

**Box 1: Country information** (source: <sup>a</sup>Statistics Norway 2011. <sup>b</sup>Norwegian Directorate of Health, 2009. <sup>c</sup>HIV/AIDS Surveillance in Europe, 2009 <sup>d</sup>Tuberculosis Surveillance in Europe, 2009)

<b>Political system</b>	Constitutional monarchy, Parliamentary government
<b>Currency</b>	Norwegian Krone
<b>Official Language</b>	Norwegian (Bokmål and Nynorsk), Sami
<b>Capital City</b>	Oslo
<b>Total Area<sup>a</sup></b>	384,186 km <sup>2</sup>
<b>Population<sup>a</sup></b>	4,920,305
<b>Population Density<sup>a</sup></b>	16.0 inhabitants per km <sup>2</sup> (in 2010)
<b>Total number births<sup>a</sup></b>	61 442 (in 2010)
<b>Total number deaths<sup>a</sup></b>	41 449 (in 2010)
<b>Crude birth rates<sup>a</sup></b>	12.5 / 1000 inhabitants
<b>Crude mortality rate<sup>a</sup></b>	8.4 / 1000 inhabitants
<b>Foreign born population<sup>a</sup></b>	9.5 % (in 2010)
<b>Life Expectancy<sup>a</sup></b>	83 years of age for females, 79 for males (2010)
<b>Number of Doctors<sup>a</sup></b>	9.5 / 1000 inhabitants (2009)
<b>Number of Public health nurses<sup>a</sup></b>	4.2 / 1000 inhabitants (2008)
<b>Total fertility rate<sup>a</sup></b>	1.98 born child/woman (in 2009)
<b>Infant Mortality rate<sup>b</sup></b>	3.7 deaths/1000 live births (in 2007)
<b>HIV incidence<sup>c</sup></b>	5.8 / 100, 000 (2009)
<b>TB incidence (all) cases<sup>d</sup></b>	7.6 / 100,000 (2009)

#### Health system

##### *General health service structure*

The Norwegian health services are based on the Public Health Act of 1860 which includes eight separate Acts on specific areas of infectious disease. The Act on Communicable Diseases was updated in 1994. A National Health Plan of Norway was forwarded to the Parliament for approval at the time of this visit.

The Norwegian health care system is a public, tax-based system, providing health care to the entire population regardless of income. Eighty-five percent of the health care system is financed through the public tax system and 15% is privatised; the majority (99.5%) of hospitals are owned by the state.

The health system is organised in a three-tier system with a clear division of responsibilities between national authorities, counties and local authorities. Primary health services are run by the municipalities (430 in total), dental care is run by the counties (19 in total), and specialist health services are governed by the State.

Primary health care is provided by the local authorities with strong national laws and regulations stating the responsibility of the health institutions as well the patients' right to health care. General Practitioners operate as private entities; however they function as a public health service through contracts with the municipalities. The municipalities have autonomy with regard to the organisation of primary health care, provided the laws and regulations are followed.

Specialised health care in Norway is governed by the state and is organised into 4 regional health authorities (RHA), in which there are 30 local hospital trusts. Each RHA owns the local hospital trusts of the region and each hospital trust is an independent legal body. Each of the four regional health authorities is responsible for ensuring specialized health care within their region. Services can be provided through public or contracted private hospitals, and through contracted private specialists. The majority of hospitals (99.5%) are public, state-owned.

In response to the identified health inequalities and growing social inequalities among the Norwegian population, a new National Health Plan (2011-2015) has been developed and, at the time of the visit, been delivered to parliament for approval. The key steps in the National Health Plan are to highlight:

- A clearer role for the patient
- A new and strengthened municipal role emphasising prevention, early intervention efforts
- Changing the funding system into municipal co-funding of the specialist health care services
- Developing the specialist health care services to enable them to apply their specialised competence to a greater extent and to support the municipalities
- Facilitating better-defined priorities

#### *MOH structure<sup>4</sup>*

The Ministry of Health and Care Services (HOD) has the mandate of providing quality and equal health and care services to the Norwegian population. This is ensured through comprehensive legislation, annual budgetary allocations, and through a number of governmental institutions.

The HOD consists of seven different departments, each of which is led by a director general:

- Public Health
- Municipal Health Services
- Specialist Health Services
- Hospital Ownership
- Health Legislation
- Administration
- Budget and Financial Affairs

The Department of Public Health is the coordinating body for all aspects related to health promotion and preventive medicine; health surveillance and health registers; nutrition and food safety; and alcohol and drug addiction issues. The protection against infectious diseases and the prevention of HIV/AIDS are one of the several areas of responsibility within the Department. The department is also responsible for the management and supervision of medicines' production, import and distribution, with a particular emphasis on legislative and financial measures.

The Norwegian Institute of Public Health, in charge of infectious disease prevention and control, is one of the administrative health bodies operating under the Ministry of Health and Care Services.

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<sup>4</sup> <http://www.regjeringen.no/en/dep/hod/About-the-Ministry.html?id=426>

## Annex 2: Notification forms A-07 for reporting of tuberculosis to National Infectious Diseases / Tuberculosis Registry

Grafisk produksjon: Senter Grafisk AS, 3255 Larvik  
www.sentergrafisk.no



### MSIS-melding tuberkulose

Nominativ melding om tuberkulose

Side 1: Sendes MSIS, Nasjonalt folkehelseinstitutt  
Postboks 4404 Nydalen, 0403Oslo  
Side 2: Sendes tuberkulosekoordinator  
Side 3: Sendes kommuneoverlegen der pasienten bor  
Side 4: Sendes evt. bydelsoverlege  
Side 5: Arkiveres i pasientensjournal

<b>Etternavn</b> <input type="text"/>	<b>Kategori tuberkulose</b> <input type="checkbox"/> Tuberkulose for første gang <input type="checkbox"/> Tidligere tuberkulose, ikke medikamentelt behandlet <input type="checkbox"/> Tidligere tuberkulose, medikamentelt behandlet <input type="checkbox"/> Latent tuberkulose, forebyggende behandling
<b>Fornavn</b> <input type="text"/>	<b>Personnr eller DUF-nr</b> <input type="text"/>
<b>Adresse</b> <input type="text"/>	
<b>Mann</b> <input type="checkbox"/> <b>Kvinne</b> <input type="checkbox"/>	<b>Pasientens fastlege</b> <input type="text"/>
<b>Arbeidsplass evt. skole/barnehage</b> <input type="text"/>	
<b>Bokommune/-bydel</b> <input type="text"/>	<b>Fødeland</b> <input type="text"/>
<b>Mors fødeland</b> <input type="text"/>	<b>Fars fødeland</b> <input type="text"/>
<b>Innvandring, årsak</b> Botid i Norge <input type="text"/>	<b>Dato for behandlingsstart</b> <input type="text"/>
<input type="checkbox"/> Asylsøker/flyktning <input type="checkbox"/> Familiegjenforening <input type="checkbox"/> Adoptert	<input type="checkbox"/> Midlertidig opphold (arbeid, studier e.l.) <input type="checkbox"/> Ukjent <input type="checkbox"/> Annet <input type="text"/>
<b>Behandlingskombinasjon ved oppstart av behandling</b> <input type="checkbox"/> Isoniazid + Rifampicin + Pyrazinamid + Etambutol <input type="checkbox"/> Isoniazid + Rifampicin + Pyrazinamid <input type="checkbox"/> Isoniazid + Rifampicin (forebyggende behandling) <input type="checkbox"/> Isoniazid (forebyggende behandling) <input type="checkbox"/> Annet (spesifiser i felt for utfyllende opplysninger)	<b>Organ(er) rammet</b> <input type="checkbox"/> Lunge <input type="checkbox"/> Urinveier <input type="checkbox"/> Lymfeknute <input type="checkbox"/> Pleura <input type="checkbox"/> Ben/ledd <input type="checkbox"/> CNS utenom meninger <input type="checkbox"/> Columna <input type="checkbox"/> Menerger <input type="checkbox"/> Miljær/disseminert <input type="checkbox"/> Buk/tarm <input type="checkbox"/> Hilusglandler <input type="checkbox"/> Annet, spesifiser i felt for utfyllende opplysninger
<b>Indikasjon for undersøkelse</b> <input type="checkbox"/> Symptomer/tegn <input type="checkbox"/> Screening <input type="checkbox"/> Smitteoppsporing <input type="checkbox"/> Ukjent dødsårsak (obduksjon) <input type="checkbox"/> Annet (spesifiser i felt for utfyllende opplysninger)	<b>Antatt smittetidspunkt</b> <input type="text"/>
Innsykningsdato <input type="text"/> Evt. dødsdato <input type="text"/>	<b>Antatt smittested</b> <input type="text"/>
<b>Diagnosegrunnlag ved oppstart av behandling.</b> Kryss av <b>alle</b> positive funn	<b>Kjent smittekontakt, evt. navn?</b> <input type="text"/>
<input type="checkbox"/> Dir. mikroskopi <input type="checkbox"/> Screening <input type="checkbox"/> Smitteoppsporing	<b>Ved smitte i utlandet, angi årsak til utenlandsopphold</b> <input type="checkbox"/> Smitte for innvandring til Norge <input type="checkbox"/> Besøk i eget eller foreldres tidligere opprinnelsesland <input type="checkbox"/> Smitte ved arbeids-/studie-/langtidsopphold <input type="checkbox"/> Annet <input type="text"/> <input type="checkbox"/> Ukjent
<input type="checkbox"/> Dyrkning <input type="checkbox"/> Histopatologi <input type="checkbox"/> PCR	<b>Har pasienten arr etter BCG-vaksine?</b> <input type="checkbox"/> Ja <input type="checkbox"/> Nei <input type="checkbox"/> Ukjent
<input type="checkbox"/> Prøvemateriale: <input type="text"/>	<b>Utfyllende opplysninger</b> <input type="text"/>
<input type="checkbox"/> Prøvemateriale: <input type="text"/>	<b>Melders navn, adresse og telefonnummer</b> <input type="text"/>
<input type="checkbox"/> Prøvemateriale: <input type="text"/>	<b>Dato</b> <input type="text"/>
<input type="checkbox"/> Prøvemateriale: <input type="text"/>	
<input type="checkbox"/> Lungerøntgen (spesifiser funn i felt for utfyllende opplysninger)	
<input type="checkbox"/> Tuberkulinprøve, angi millimeter <input type="text"/>	
<input type="checkbox"/> Interferon gamma test	
<input type="checkbox"/> Sykdomsbilde	
<input type="checkbox"/> Sikker eksponering	
<b>Predisponerende faktorer</b>	
<input type="checkbox"/> Immunsvekkende sykdom	
Hvilken <input type="text"/>	
<input type="checkbox"/> Immunsvekkende behandling	
Hvilken <input type="text"/>	

IN 0300-21 05-1

Fastsatt av Helse – og omsorgsdepartementet september 2009

NB! Husk gjennomskriften. Bruk kulepenn og skriv hardt

Sendes MSIS, Postboks 4404 Nydalen, 0403 OSLO

## Annex 3: Notification form for reporting tuberculosis treatment outcome

Grafisk produksjon: Senter Grafisk AS, 3255 Larvik  
www.sentergrafisk.no



### MSIS-melding behandlingsresultat tuberkulose

Side 1: Sendes MSIS, Nasjonalt folkehelseinstitutt  
Postboks 4404 Nydalen 0403 Oslo  
Side 2: Sendes tuberkulosekoordinator  
Side 3: Sendes kommuneoverlegen der pasienten bor  
Side 4: Sendes evt. bydelsoverlege  
Side 5: Arkiveres i pasientens journal

Etternavn <input type="text"/>	
Fornavn <input type="text"/>	Person-nr eller DUF-nr <input type="text"/>
Adresse <input type="text"/>	
Bokommune/bydel <input type="text"/>	

**Status 6–9 måneder etter behandlingstart**

Er behandlingen fullført?  
 Ja (gå til felt A)  Nei eller ukjent (gå til felt B)

**A. Resultat av behandling**

Dato behandling avsluttet:

Behandlingskombinasjon siste fire måneder av behandlingen:  
 Rifampicin og Isoniazid  Annet, spesifiser

Behandlingsresultat:  
 Behandlingen ble fullført med negativ dyrkning. Dato for siste negative dyrkning   
 Behandlingen ble fullført, men det er ikke tatt dyrkning ved avslutning av behandling

**B. Årsak til ikke fullført behandling**

Pasienten døde, Dato  Dødsårsak:  Tuberkulose  
 Tuberkulose medvirkende dødsårsak  
 Annen årsak

Tuberkulose diagnose avkrefet. Behandling avsluttet. Dato:

Behandling avsluttet på grunn av bivirkninger. Dato:

Pasienten forsvant fra behandling Dato for siste kontakt med pasienten

Pasienten flyttet ut av kommunen/landet  Pasientens ønske  Bortvist fra landet  
Dato for flytting  Hvor:   
Oppfølgingsansvar overført til:

Pasienten er på grunn av behandlingsavbrudd eller annen årsak, fortsatt under behandling utover vanlig behandlingstid  
Angi årsak:   
Behandling forventes avsluttet, dato:

Annet, spesifiser:

<b>Utfyllende opplysninger</b> <input type="text"/>	<b>Melders navn, adresse og telefonnummer</b> <input type="text"/> Dato <input type="text"/>
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IN 0000-2/06-1

Sendes MSIS, Postboks 4404 Nydalen, 0403 OSLO

## Annex 4: Notification form for reporting tuberculosis contact tracing results



Meldingssystem for smittsomme sykdommer, MSIS  
 Nasjonalt folkehelseinstitutt  
 Postboks 4404 Nydalen, 0403 Oslo  
 Telefon: 21 07 66 43 www.fhi.no

### RAPPORT OM RESULTAT AV SMITTEOPPSPORING

Unntatt offentlighet etter offentlighetsloven § 5a.

Personen som foranlediget smitteoppsporingen:

Etternavn:	Fornavn:
Bostedsadresse:	Bostedskommune/bydel:
Fødselsnummer:	UDI-nr.:

Denne rapporten skal  
 kommunelegen sende:  
 Side 1: MSIS, Nasjonalt folkehelseinstitutt  
 Postboks 4404 Nydalen  
 0403 Oslo  
 Side 2: Tuberkulosekoordinator  
 Side 3: Til arkiv

Grupper undersøkt	Totalt antall undersøkte	Henvist til lungepoliklinikk/ diagnosestasjon	Oppfattet som nysmittet	Satt på forebyggende behandling som nysmittet	Satt på behandling for tuberkulose
Husstand					
Familie/omgangs- krets					
Arbeidssted					
Skole					
Helsepersonell					
Medpasienter					
Andre, spesifiser:					
Andre, spesifiser:					
<b>Totalt antall</b>					

**Kommentarer til smitteoppsporingen:**

Dato, navn, adresse inkl. kommune, telefon

## Annex 5: Participants and Programme

Name	Title/ function	Email address
Dr Davide Manissero	ECDC - TB team leader	<a href="mailto:Davide.manissero@ecdc.europa.eu">Davide.manissero@ecdc.europa.eu</a>
Dr Emma Huitric	ECDC, Scientific Officer for TB	<a href="mailto:Emma.huitric@ecdc.europa.eu">Emma.huitric@ecdc.europa.eu</a>
Mr Vahur Hollo	ECDC TB epidemiology	<a href="mailto:Vahur.hollo@ecdc.europa.eu">Vahur.hollo@ecdc.europa.eu</a>
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Dr Karin Rønning	NIPH - Senior medical officer	<a href="mailto:Karin.ronning@fhi.no">Karin.ronning@fhi.no</a>
Dr. Bernardo Guzman-Herrador	NIPH EPIET fellow	<a href="mailto:begu@fhi.no">begu@fhi.no</a>
Dr. Tore W. Steen	Oslo municipality - Public health officer	<a href="mailto:Tore.steen@hev.oslo.kommune.no">Tore.steen@hev.oslo.kommune.no</a>
Mr Jon-Olav Aspås	MOH - Director General	<a href="mailto:Jon-olav.aspaas@hod.dep.no">Jon-olav.aspaas@hod.dep.no</a>
Dr. Geir Stene Larsen	NIPH - Director General	<a href="mailto:Geir.stene-larsen@fhi.no">Geir.stene-larsen@fhi.no</a>
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Dr. Turid Mannsåker	NIPH - Leader National TB ref.lab	<a href="mailto:Turid.mannsaaker@fhi.no">Turid.mannsaaker@fhi.no</a>
Mr Ulf R. Dahle	NIPH - Researcher, molecular epidemiology	<a href="mailto:Ulf.dahle@fhi.no">Ulf.dahle@fhi.no</a>

Mr Fredrik Oftung	NIPH - Researcher TB ref. lab	<a href="mailto:Fredrik.oftung@fhi.no">Fredrik.oftung@fhi.no</a>
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Dr. Jon Ørstavik	Oslo Municipality - Senior med. Off. Oslo Emergency center	<a href="mailto:Jon.orstavik@lva.oslo.kommune.no">Jon.orstavik@lva.oslo.kommune.no</a>
Dr. Ingunn Harstad	St. Olav hospital - Senior med off	<a href="mailto:Ingunn.harstad@stolav.no">Ingunn.harstad@stolav.no</a>
Dr. Bent von der Lippe	Ullevål hospital - Senior med off	<a href="mailto:Bent.vonderlippe@ulleva.no">Bent.vonderlippe@ulleva.no</a>
Ms Hege Bjelkarøy	Vestre Viken hospital - TB coordinator	<a href="mailto:Hege.bjelkaroy@vestreviken.no">Hege.bjelkaroy@vestreviken.no</a>
Ms Ane-Helene Stang	Ullevål hospital - TB coordinator	<a href="mailto:Ane-helene.stang@ulleva.no">Ane-helene.stang@ulleva.no</a>
Ms Ann Iren M Olsen	Haugesund hospital - TB coordinator	<a href="mailto:Ann.iren.muren@helse-fonna.no">Ann.iren.muren@helse-fonna.no</a>
Ms Mona Drage	LHL	<a href="mailto:Mona.drage@lhl.no">Mona.drage@lhl.no</a>

**Monday 9<sup>th</sup> May****Venue NIPH/ SMAO**

09.00-10.00	Opening session	Jon-Olav Aspås
	Mutual presentations	Davide Manissero
	Purposes and goals of the Country Visit	Geir Stene-Larsen Hanne Nøkleby
10.15-10.45	Norwegian health care system	Jan Berg
10.45-11.10	Regulation of infectious diseases	Katrine S. Edvardsen Espantaleon
11.10-11.30	Regulation of TB	Preben Aavitsland
11.30-12.00	The history of tuberculosis and its control in Norway	Ulf Dahle

**12-13 Lunch at Myrens kjøkken**

13.00-13.25	Organisation and policy of tuberculosis prevention and control in Norway	Preben Aavitsland
13.25-13.50	Surveillance systems and current epidemiology of tuberculosis in Norway	Einar Heldal
13.50-14.20	Laboratory network and contributions to surveillance	Turid Mannsåker
14.20-14.45	National guidelines for tuberculosis prevention and control: process and contents	Karin Rønning
14.45-15.05	BCG vaccination in Norway: history, strategy and current policy	Synne Sandbu
15.05-15.30	Municipal TB control	Tore Steen
15.30-16.00	<i>Coffee break</i>	
16.00-18.00	<i>Discussions</i>	
ECDC/ WHO Euro team	Davide Manissero	

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	Emma Huitric
	Vahur Hollo
	Masoud Dara
	Diego Zallocco
	Ibrahim Abubakar
Norwegian team	Jan Berg
	Karl-Olaf Wathne
	Katrine S.E. Espantaleon
	Kirsten M. Pedersen
	Tore Steen
	Karin Rønning
	Bernardo Guzman

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**Tuesday 10<sup>th</sup> May Team 1 Trondheim**

<b>Venue</b>	<b>St Olav Hospital Meeting room AHM 12</b>
	<b>On arrival in the reception of “Akutt-Hjerte-Lungesenter” ask for Ingunn Harstad</b>

9.30-10.30	General orientation about St. Olavs Hospital	
	Presentation of the visiting group	Diego Zallocco Ibrahim Abubakar
	Information about the different department`s responsibilities in tuberculosis care, and about the number of TB cases and cases of treated latent TB recent years	Grete F. Holme and Ingunn Harstad
10.30-11.15	Visit to clinic, information about MDR-TB treatment	Raisa Hannula
	Visit bronchoscopy unit and sputum room, orientation about follow-up of screening results and routines for diagnosis of pulmonary TB	Ingunn Harstad

**11.45-12.30**

**Lunch**

12.30-12.50	Paediatric TB, about contact tracing and how the department handles them/ treatment of latent TB in children	Henrik Døllner
12.50-13.20	Presentation of PhD project: "Tuberculosis infection and disease among asylum seekers in Norway. Screening and follow-up in public health care".	Ingunn Harstad
13.20-13.40	Visit to laboratory, orientation about TB-PCR	J.E. Afset
13.40-14.00	Municipality of Trondheim: co-operation between municipality and hospital related to TB	Eli Sagvik
14.00-14.30	Final summary, discussions	

Participants:

ECDC/ WHO Euro team	Diego Zallocco Ibrahim Abubakar
Norwegian team	Karl-Olaf Wathne Jan Berg Tore Steen

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*Departure to Trondheim on 10th May leaving at 07.00. - SK 0330 - arrival at 07.55*

*Return to Oslo on 10th May leaving at 16.15 - SK 0371 - arrival at 17.10*

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**Tuesday 10th May Team 2 Oslo**

<b>Venue</b>	<b>Refstad Reception Centre for Refugees, Sinselveien 76, 0586 Oslo</b>
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09.00-11.45	Presentation of reception centre, screening for TB	Anette Jeppesen Jon Ørstavik
	Health care and legal rights for immigrants	Karin Rønning
	Handling of Dublin convention	

**12-13 Lunch at Myrens kjøkken****Venue NIPH/SMAO**

13.00-13.25	National Advisory Group of TB control National Advisory Group of MDR-TB	Einar Heldal
13.25-13.50	MDR in Norway	Einar Heldal
13.50-14.20	Screening and treatment of LTBI	Karin Rønning
14.20-14.45	Study of treatment of LTBI	Ann Iren Muren Olsen
14.45-15.10	Implementation/ policy of TST/ IGRA in Norway	Karin Rønning
15.10-15.30	Investigation of "Cluster 91"	Bernardo Guzman-Herrador
15.30-16.00	<i>Coffee break</i>	
16.00-18.00	<i>Discussions</i>	
ECDC/ WHO Euro team	Davide Manissero Emma Huitric Vahur Hollo Masoud Dara	
Norwegian team	Katrine S.E. Espantaleon Kirsten M. Pedersen Karin Rønning Bernardo Guzman-Herrador	
Norwegian resources	Turid Mannsåker Einar Heldal	

**Wednesday 11<sup>th</sup> May****Team 1 Visit to TB reference laboratory**

Venue	NIPH/ Lindern
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09.00-11.45	Presentation of methods, research, Molecular surveillance. Visit to BSL 3 lab	Ingeborg Aaberge Turid Mannsåker Ulf R. Dahle Fredrik Oftung Carol Holm-Hansen
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ECDC/ WHO Euro team	Masoud Dara Ibrahim Abubakar Diego Zallocco Emma Huitric
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Norwegian team	Karl-Olof Wathne Tore Steen
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**Team 2**      ***Norwegian surveillance system (MSIS) for infectious diseases and TB***

Venue	NIPH/ SMAO
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09.00-11.45	Presentation of MSIS and MSIS TB registry Counselling of health care providers TB co-ordinator network Contact tracing TB international travel Daily work with the MSIS and TB database	Hans Blystad Karin Rønning Kari Åse Eide Kirsten Konsmo
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ECDC/ WHO Euro team	Vahur Hollo Davide Manissero
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Norwegian team	Jan Berg Katrine S.E. Espantaleon Kirsten M. Pedersen Tore Steen Bernardo Guzman-Herrador
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**12-12.45**      **Lunch at NIPH/ Lindern Old Library**

Venue	Oslo University Hospital Ullevål, Kreftsenteret
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13.00-15.10	Round at clinics	
	TB in children	Astrid Rojahn
	Outpatient clinic	Petter Brandzeg
	TB/ HIV	Ingvild Nesthus Ly
	MDR-TB	Bent von der Lippe
	TB co-ordinators work at OUS	Ane-Helene Stang
15.10-15.30	LHL TB work in Norway	Mona Drage
	Clinic for illegal migrants	

Venue	NIPH/ Lindern
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15.45-16.15 *Coffee break*

16.15-18.00 *Discussions*

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**20.00** **Dinner at Ekeberg restaurant**

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**Thursday 12th May**

<b>Venue</b>	<b>NIPH/ SMAO</b>
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09.00-10.00	TB co-ordinator system	Ane-Helene Stang
	DOT policy and practice in Norway	Hege Bjelkarøy
	Contact tracing in Norway	Karin Rønning
10.00-12.00	Debriefing	ECDC/ WHO Euro team Norwegian team
<b>12.00-13.00</b>	<b>Lunch at Myrens kjøkken</b>	
13.00-14.45	Closing discussions	ECDC/ WHO Euro team Norwegian team  Jon-Olav Aspås Hanne Nøkleby

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