National Institute for Public Health
and the Environment
*Ministry of Health, Welfare and Sport*

# National *Tuberculosis* Control Plan 2016-2020

## Towards elimination

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RIVM Report 2016-0012

# Colophon



The photo on the cover is provided by KNCV Tuberculosis Foundation

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In collaboration with:

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- National Association of Municipal Health Authorities (GGD GHOR Netherlands)
- Netherlands Tuberculosis Control Policy Committee (CPT)
- Dutch Thoracic Society (NVALT)
- Association of Tuberculosis Control Physicians (VvAwT)
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# Synopsis


## National Tuberculosis Control Plan 2016-2020

The National Tuberculosis Control Plan 2016-2020 describes the changes required to optimise tuberculosis control in the Netherlands. The plan has been developed by the RIVM Centre for Infectious Disease Control together with the KNCV Tuberculosis Foundation and other organisations involved in tuberculosis control.

In 2014, the Netherlands endorsed the World Health Organization's Global End TB Strategy, which includes the objective to reduce tuberculosis incidence with 90 per cent by 2035. The National Tuberculosis Control Plan 2016-2020 sets out the interventions that are needed to achieve the interim-objectives of reducing tuberculosis transmission and case numbers in the Netherlands with 25 per cent over the next 5 years. The main new intervention to reach these targets is to screen new immigrants and asylum-seekers for latent tuberculosis infections and providing preventive treatment to those is detected.


Keywords: National plan, tuberculosis control

# Publiekssamenvatting

## Nationaal plan tuberculosebestrijding 2016-2020

Het Nationaal plan tuberculosebestrijding 2016-2020 geeft aan welke maatregelen de komende vijf jaar nodig zijn om de tuberculosebestrijding in Nederland verder te verbeteren. Het doel is om de overdracht van tuberculose en het aantal patiënten de komende vijf jaar met 25 procent terug te dringen. De belangrijkste nieuwe interventie om dat te bereiken is dat immigranten en asielzoekers die Nederland binnenkomen gescreend zullen worden op een latente tuberculose-infectie, en indien geïnfecteerd zo mogelijk worden behandeld.

Het plan is opgesteld door het Centrum Infectieziektebestrijding van het RIVM, in samenwerking met KNCV Tuberculosefonds en organisaties die betrokken zijn bij de tuberculosebestrijding. Het plan geeft invulling aan de doelstelling van de Wereldgezondheidsorganisatie (WHO) om het aantal mensen met tuberculose in 2035 met 90 procent terug te brengen. Deze doelstelling  is onderdeel van de Global End TB Strategy van de WHO, waarmee Nederland in 2014 heeft ingestemd.

Tuberculose is een meldingsplichtige infectieziekte die door een bacterie wordt veroorzaakt. In Nederland wordt tuberculose jaarlijks bij circa 800 à 900 mensen gediagnosticeerd. Mensen kunnen de bacterie lang bij zich dragen zonder er ziek van te worden. Later kan de ziekte alsnog optreden; dit is de reden voor de invoering van de screening op een latente tuberculose-infectie. Tuberculose is over het algemeen goed te behandelen, maar patiënten moeten daarvoor minimaal zes maanden dagelijks medicijnen innemen.

Kernwoorden: Nationaal plan, tuberculosebestrijding

# Contents

# 1 Introduction

In late 2014, the Ministry of Health, Welfare and Sport (VWS) commissioned the National Institute for Public Health and the Environment (RIVM) to prepare an update to the National Tuberculosis Control Plan (NTCP) 2011-2015, in conjunction with the KNCV Tuberculosis Foundation and other stakeholders, (1) covering the period 2016-2020 (Appendix 1).
The RIVM, the KNCV Tuberculosis Foundation, the National Association of Municipal Health Authorities (formerly GGD Nederland, now GGD GHOR Nederland) and the Health Care Inspectorate (IGZ) have frequently monitored the NTCP 2011-2015 and performed an interim evaluation with stakeholders in preparation for an international review. In March 2015, a kick-off meeting for the NTCP 2016-2020 was held. The meeting, which was attended by stakeholders and a former patient, concluded that 22 (65 per cent) of the objectives set out in the NTCP 2011-2015 had been realised; a further eleven (32 per cent) had been partially realised or could yet be realised, and one objective – that all tuberculosis patients should be tested for HIV – had not been realised (Appendix 2). The partially realised objectives related mainly to the changes to public tuberculosis control arrangements needed to ensure adequate quality standards. The objectives in question were developed into a project plan by GGD GHOR Netherlands in 2012. In April 2014, the Council of Directors of Public Health of GGDs decided to form four regional expertise centres (RECs), which were expected to be up and running by 2015. The process of setting up the centres was still in progress at the time of this report's preparation. Various other as yet unrealised objectives are closely linked to the centres coming into function.

In May 2014, the World Health Assembly (WHA) adopted the new Global End TB Strategy for the substantial reduction of tuberculosis (2). Developed by the World Health Organization (WHO), the strategy aims to bring a 90 per cent reduction in the incidence of tuberculosis by 2035. In its Tuberculosis Action Plan 2016-2020, the WHO European Region set an interim goal of achieving a 25 per cent reduction in the incidence of tuberculosis by 2020 (3). In 2014, the WHO also produced a framework towards elimination of tuberculosis in countries where the incidence is already low (≤ 10/100,000) (4). The Netherlands is one such country. This NTCP 2016-2020 brings the Netherlands into line with the global and regional ambitions and seeks to put the country on course to bring the incidence of tuberculosis below the pre-elimination level of one case per 100,000 people by 2035. Two main objectives are defined for the next two decades: to reduce tuberculosis transmission and case numbers substantially, for the next 5 years period with 25 per cent. To achieve these objectives the screening for latent infection and preventive treatment of risk groups, such as new immigrants and asylum-seekers, the contacts of contagious tuberculosis patients and patients with impaired resistance, will be enforced. At the time of writing the report, the Netherlands experienced a high of asylum-seekers. It was noted, that the epidemiology of tuberculosis in the Netherlands is significantly influenced by the numbers and origins of migrants and

asylum-seekers arriving in the country, together with the action taken to detect and prevent tuberculosis.

The following documents served as important points of reference in the development of the NTCP 2016-2020:

- European Centre for Disease Prevention and Control. Framework Action Plan to Fight Tuberculosis in The European Union. Stockholm: ECDC, 2008.
- National Tuberculosis Control Plan 2011-2015. Bilthoven: RIVM, 2010.
- Tuberculosis in the Netherlands 2014 - Surveillance report, including intervention monitoring report. Bilthoven: RIVM, 2015.
- Report of the joint WHO European Region and ECDC programme review of the national TB control programme in the Netherlands. 30 September - 4 October 2013.
- WHO End TB Strategy. Geneva: WHO, 2014.
- Framework towards tuberculosis elimination in low-incidence countries. Geneva: WHO, 2014
- WHO European Region Tuberculosis action plan 2016-2020. Copenhagen: WHO, 2015.
- The Global Plan to Stop TB 2016-2020. The Paradigm Shift. Geneva: Stop TB Partnership, 2015.

# 2 The organisation of tuberculosis control activities

Under the Public Health Act (Wpg), tuberculosis control is identified as a public health care task. Performance of that task is decentralised, with the municipalities having executive responsibility. The control activities are carried out by municipal health services ('GGDs'). The national government defines national policy and screening rules, organises national surveillance, funds some of the tuberculosis control activities and participates in international policy development.

At the municipal and regional levels, the GGDs maintain tuberculosis awareness amongst professionals, politicians and the general public. GGD GHOR Netherlands, the umbrella organisation, represents the interests of the 25 GGDs. At the national level, the KNCV Tuberculosis Foundation is the non-governmental organisation (NGO) that acts as lobby organisation and research centre for tuberculosis and tuberculosis control. The RIVM directs infectious disease control activities (including tuberculosis control) on behalf of the Ministry of VWS, working in collaboration with the KNCV Tuberculosis Foundation, the GGDs and medical microbiology laboratories.

The recommendations regarding the scaling up and concentration of care contained in the NTCP 2011-2015 remain valid for the coming period.

- Although the number of cases depends to a considerable extent on the inflow of migrants and asylum-seekers, the incidence is expected to decline further in the next five years, making the retention of knowledge and expertise more challenging. The maintenance of professional standards and quality criteria necessitates a certain case load. Hospitals, laboratories and GGDs will need to structure their organisations and activities in a way that ensures quality is maintained despite declining incidence.
- Two thirds of hospitals currently have specially trained tuberculosis coordinators. The organisation of designated tuberculosis coordinators should be maintained and strengthened.
- The NTCP 2011-2015 and several published international reviews have recommended the concentration of laboratory diagnosis in to maintain quality of services. The need for such concentration will remain in the coming five-year period (see Section 6).
- At the time of writing the report, the public health care RECs are still being set up. Four RECs are planned for the Netherlands: Northeast (the provinces of Groningen, Friesland, Drenthe, Overijssel and Gelderland), Northwest (Utrecht, North Holland and Flevoland), South Holland (South Holland) and South (Zeeland, North Brabant and Limburg) (5). RIVM-CIb has appointed four Regional Tuberculosis Consultants (RTCs) to liaise between the regions and RIVM-CIb.

In 2014, GGD GHOR Netherlands commissioned making a model of criteria for tuberculosis control in the period to 2025-2030. The resulting

document identified various developments of significance for tuberculosis control and described their expected influence on quality, efficiency and access to care (Appendix 3). One important question is whether the four-REC model, with municipal responsibility in regional GGDs, will remain appropriate and effective in the future. In the years ahead, the GGDs may have to consider forms of collaboration and scaling-up for certain tasks, and implement them after local political approval. Alternatively, tuberculosis control might be provided by a dispersed national network organisation with central authority (e.g. exercised by RIVM-CIb, as the obvious candidate at the present time).

*Objective/activity:*

2.1.a. In view of ongoing and anticipated developments in tuberculosis and tuberculosis control, under leadership of GGD GHOR Netherlands, consideration is being given to the necessity and desirability of further scaling up to create a single national expertise centre in the years ahead. The possibility of closer collaboration on certain matters with the GGDs' general infectious disease control programme is also being explored.

# 3 Tuberculosis control policy

In the Netherlands, practical tuberculosis control policy is developed and defined by the Tuberculosis Control Policy Committee ('CPT'). The CPT's role is to highlight and discuss relevant developments, to develop and define scientific guidelines and associated protocols, and to implement quality policy by making inspection visits to the GGD regions, assisted by representatives of the relevant professional associations. Guidelines are developed by multidisciplinary working groups. Some guidelines relating to tuberculosis control are defined by other professional associations and then submitted to the CPT for approval (Table 1).

*Table 1 Guidelines relating to tuberculosis and their authors*

| **Guideline** | **Author/owner** | **Year of approval** |
|---|---|---|
| Risk group policy (including health care workers and other risk/contact groups) | CPT | 2013-2015 |
| Source and contact investigation | CPT | 2014 |
| Travellers to tuberculosis-endemic regions | CPT | 2013 |
| Interferon Gamma Release Assays (IGRA) | CPT | 2010 |
| Treatment of latent tuberculosis infection | CPT | 2015 |
| Mycobacterial laboratory diagnosis, including IGRA | NVMM | 2015 |
| Treatment of tuberculosis | NVALT | 2014 |
| Tuberculosis and HIV | CPT/NVHB | 2013 |
| Rifampicin-resistant (including MDR/XDR) tuberculosis | CPT | 2015 |
| Tuberculosis and TNF (tumour necrosis factor)-alpha-blocking therapy | NVALT | 2014 |
| DOT (Directly Observed Treatment) | | Under development |
| BCG vaccination | CPT | Under development |
| Prevention of hospital infections | WIP | Under development |

The CPT is also advised by a number of standing committees:

- The Plenary Visitation Commission supports the programme of inspection visits to the GGDs' TB departments.
- The Risk Group Screening Monitoring Committee ('MSR') advises on screening policy.
- The Committee on Contact Investigation, Resistance and DNA Fingerprinting ('CORD') highlights developments in tuberculosis transmission.
- The Committee on Rifampicin-resistant tuberculosis (including MDR/XDR tuberculosis) discusses actual cases and other subjects.

The various guidelines are summarised in the Tuberculosis Handbook 2016 and the Tuberculosis Guidelines of RIVM-CIb's National Infectious Disease Control Coordination Committee ('LCI'). Both documents are updated annually with the latest epidemiological information and guidance formulated over the preceding year.

Dutch tuberculosis control policy is regularly evaluated by an international team. There have been three evaluations to date (in 2003, 2008 and 2013), the most recent one by a team from WHO Regional Office for Europe Region and ECDC (6). The purpose of such evaluations is to identify opportunities for further improving tuberculosis control. The recommendations that come out of the evaluations serve as input for the national tuberculosis control plans produced at five-year intervals.

*Objective/activity:*

3.1.a. In 2018, an international review of Dutch tuberculosis control will be conducted.

# 4 Epidemiological situation

Data on tuberculosis cases is recorded in the Dutch Tuberculosis Register ('NTR') for surveillance and scientific research purposes. The NTR is managed by RIVM-CIb. For tuberculosis control, it is important to analyse trends, identify risk groups, monitor transmission and evaluate interventions. RIVM-CIb publishes an annual report entitled Tuberculosis in the Netherlands, presenting all the relevant statistics and information about developments (7).

## 4.1 'Know your epidemic'

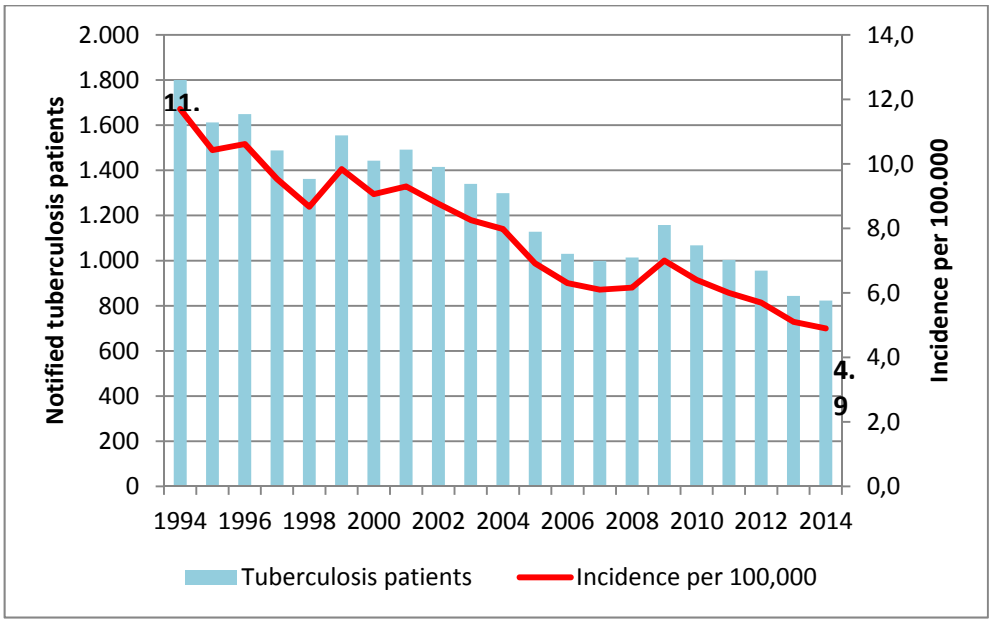


*Figure 1. Number of tuberculosis patients and incidence per 100,000 population, 1994-2014*

In 2014, the incidence of tuberculosis in the Netherlands declined to less than 5/100,000 for the first time (Figure 1). Within the Netherlands, two epidemics can be discerned, each developing almost independently of the other. The first is the epidemic in the indigenous population (27 per cent of cases in 2014). The second is the epidemic amongst immigrants and asylum-seekers (73 per cent of cases) (Figure 2). Three quarters of tuberculosis patients born in other countries had been living in the Netherlands for more than two years at the time of their tuberculosis diagnosis; half of them had been in the country for more than five years (Figure 3) (8). The existing (radiographic) screening of immigrants and asylum-seekers on arrival in the Netherlands is evidently not sufficient to prevent tuberculosis in those groups. A new approach is therefore needed to continue reducing the incidence of tuberculosis (see Section 5).

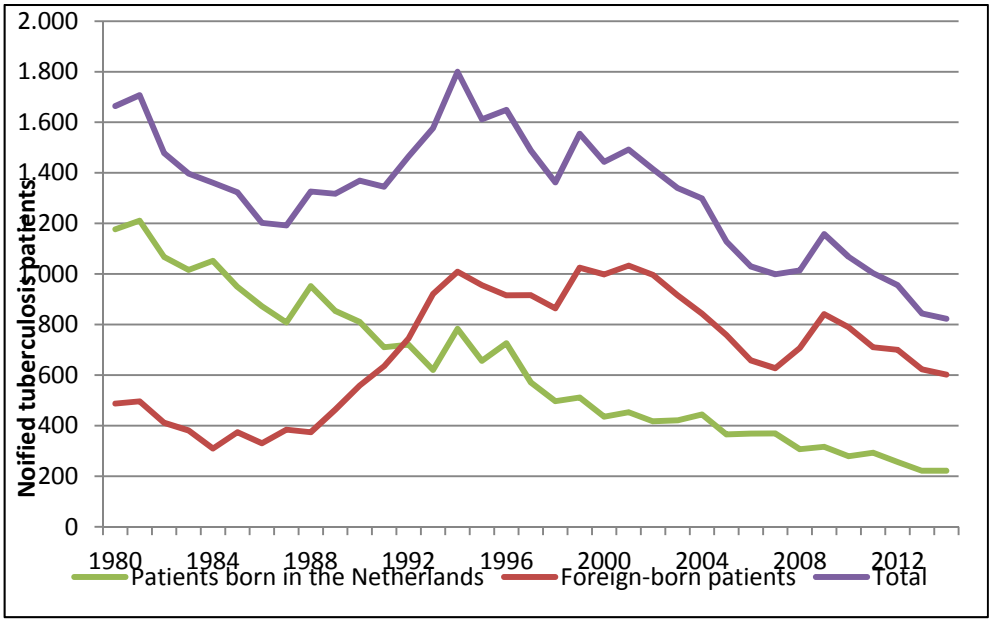


*Figure 2. Reported tuberculosis patients in the Netherlands, by patient's country of birth, 1980-2014*

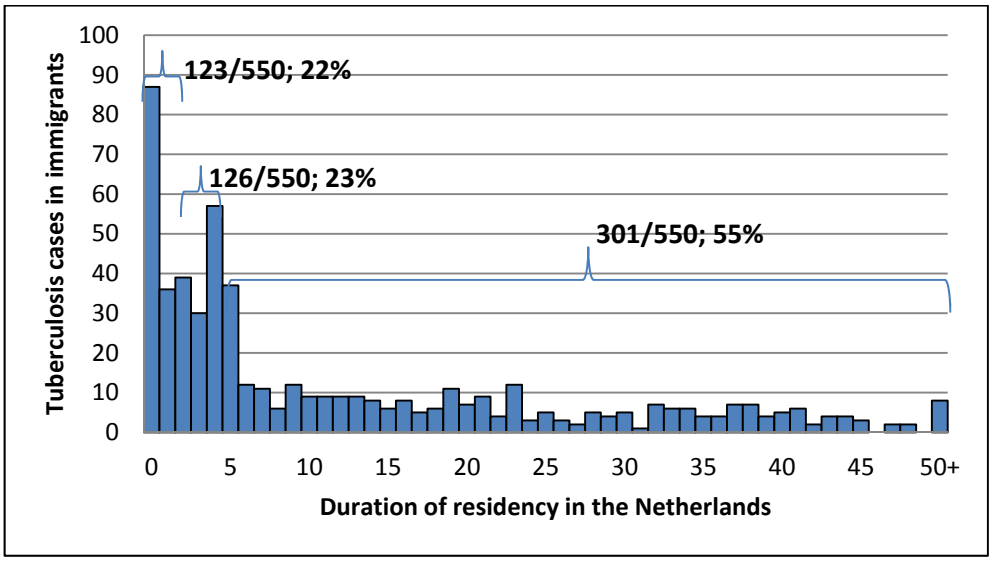


*Figure 3. Reported tuberculosis cases in immigrants, by duration of residency in the Netherlands, 2013*

*Ethnicity*

In the Netherlands, three patient categories may be distinguished: 1) indigenous people, 2) second-generation migrants and 3) first-generation migrants (7).

- In indigenous Dutch people, tuberculosis occurs mainly in people more than 65 years old. At 1.1/100,000, the incidence of tuberculosis in the indigenous population is already almost at the pre-elimination level. Amongst those aged 65 and younger, the incidence is now below the pre-elimination level. Over the coming decades, the incidence of tuberculosis in indigenous Dutch people is expected to fall further, due to the cohort effect, i.e. the

gradual disappearance, due to death, of the age group in which tuberculosis is relatively common.
- Relatively few tuberculosis cases are reported in second-generation migrants (incidence 4/100,000). The cases that do occur are due mainly to transmission within ethnic minority groups living in the Netherlands.
- Amongst first-generation migrants, most tuberculosis cases probably result from the reactivation of latent infections, typically acquired many years earlier in the migrant's country of origin. Other factors are recent transmission within ethnic minority groups living in the Netherlands and travel to the migrant's country of origin.

*Geographical distribution*
Within the Netherlands, there are considerable geographical differences in the incidence of tuberculosis (Figure 4). In some GGD regions, the incidence of tuberculosis is <2/100,000 people, while in the large cities it is 10-15/100,000. Large cities generally have larger populations of immigrants, who are at higher risk of tuberculosis (9). The numbers of tuberculosis cases reported in other risk groups, such as detainees, homeless people and drug addicts, have fallen over the last decade. Both the inflow of asylum-seekers and the number of them who have tuberculosis has varied considerably over time. Figure 4 shows that, in 2014, tuberculosis was diagnosed relatively often in the regions where large asylum-seekers' centres are located (Ter Apel in the North-eastern region, Overloon in the South-eastern region).

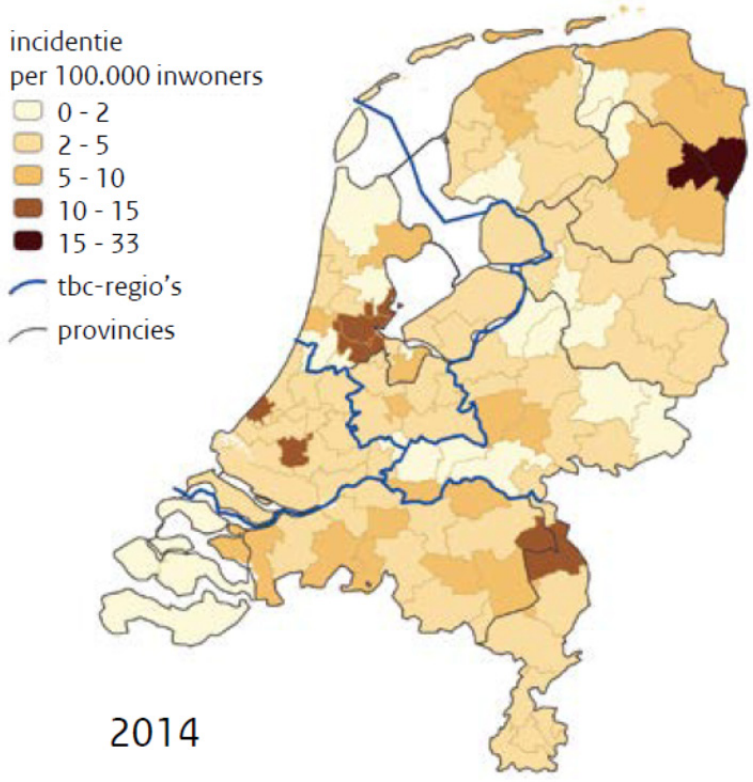


*Figure 4. Incidence of tuberculosis, broken down by patient's home address, 2014*

*Clinical risk groups*
Tuberculosis is more common in people suffering from conditions associated with impaired immunity, such as HIV infection and renal insufficiency requiring haemodialysis, and in patients receiving medication that reduces resistance to infection, such as anti-TNF (tumour necrosis factor)-alpha-therapy (given to rheumatoid arthritis patients and others), or receiving immunosuppressant medication to prevent rejection following an organ transplant. In the Netherlands, more than 8 per cent of tuberculosis cases involve impaired resistance due to such conditions or medications. In such cases, tuberculosis is often manifest in serious forms, such as meningitis tuberculosa or disseminated tuberculosis. It is therefore important to prevent tuberculosis by the early detection and treatment of latent tuberculosis infection (LTBI).

*Developments in the incidence of tuberculosis*
The incidence of tuberculosis in the Netherlands is closely linked to the inflow of immigrants and asylum-seekers, and to the action taken to prevent tuberculosis in those groups (see Section 5). The incidence also depends on the effectiveness of interventions in the Netherlands aimed at controlling transmission and preventing tuberculosis in people who are at higher risk of disease, e.g. due to impaired immunity.
In order to realise a 90 per cent reduction in the incidence of tuberculosis within 20 years, an annual reduction of 10 per cent is required. That is more than twice the average reduction achieved over the last ten years (4.5 per cent; Figure 5). The WHO European Region has set an interim target of cutting the incidence of tuberculosis by 25 per cent over the next 5 years.

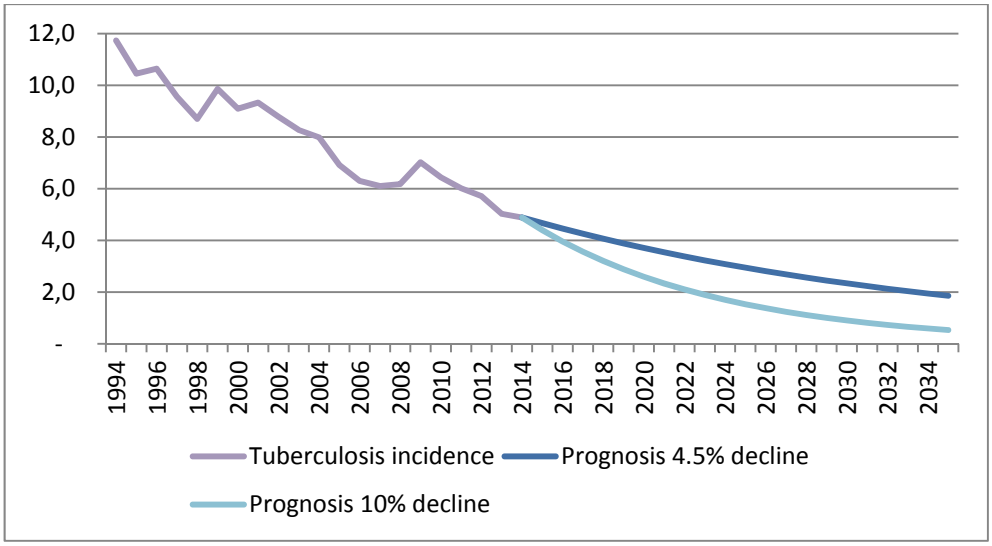


*Figure 5. Incidence of tuberculosis 1994-2014 and prognosis for period to 2034, based on current and targeted rate of decline*

*Objective/activity:*
4.1.a. By 2019, the incidence of tuberculosis should be 25 per cent lower than in 2014. Calculated with a 5 per cent confidence interval, the incidence in 2019 is expected to be between 3.4 and 4.0 per 100,000 people.

## 4.2 Enhanced surveillance

In the pre-elimination phase, tuberculosis surveillance will need to focus on the early detection of emerging risk groups and on the adequacy of control activities aimed at known risk groups. Important questions include whether the defined policy is being implemented correctly and whether the guidelines remain an adequate basis for risk management. Surveillance must concentrate more on risk groups, must yield information quickly, and – where appropriate – must lead to action. That implies for example:

- When tuberculosis is diagnosed in a known HIV-positive patient, steps should be taken to find out whether the patient was screened for LTBI at the time of the HIV diagnosis.
- When tuberculosis is diagnosed in someone receiving anti-TNF-alpha therapy or immunosuppressant medication following organ transplantation, steps should be taken to establish whether the patient was screened for LTBI before therapy began (10).
- When tuberculosis is diagnosed in a child less than five years old who was not traced by contact investigation, steps should be taken to establish whether opportunities to prevent tuberculosis were missed (11).
- When tuberculosis is diagnosed in a health care worker, steps should be taken to establish whether the patient was infected at work and whether infection prevention measures were correctly implemented (12).
- When multidrug-resistant (MDR) tuberculosis is diagnosed, steps should be taken to establish whether the patient was infected in the Netherlands and whether public health was at risk.
- When a tuberculosis patient dies, steps should be taken to establish the cause of death (see Section 6).

*Objective/activity:*

4.2.a. The national surveillance system should set up in a way that allows additional action to be taken immediately whenever a case with certain characteristics is reported, so that missed opportunities are promptly identified. (2016)

## 4.3 Monitoring transmission

One of the aims of tuberculosis control in the Netherlands is to minimise transmission of the disease. Transmission can be measured either on a centripetal basis (inward, towards the source) or on a centrifugal basis (outward, from the source) (13).

DNA fingerprinting plays an important role in calculating the centripetal transmission index, i.e. the measure of (recent) infection among tuberculosis patients. Since 2004, a DNA fingerprint has been obtained from almost every *Mycobacterium tuberculosis* in the Netherlands by means of the variable number of tandem repeats (VNTR) method. Each fingerprint is then compared with earlier fingerprints. The results indicate where or when the patient was infected. By combining the findings with epidemiological information, patients can be classified as i) infected abroad, ii) infected in the Netherlands recently (in the last two years) or iii) infected in the Netherlands more than two years ago. If epidemiological information (e.g. regarding a known source) is available,

it is also often possible to establish with reasonable confidence whether transmission occurred recently in the Netherlands, even without DNA fingerprinting information of the bacterium.
A good way of measuring forward transmission (centrifugal or outward transmission) is to establish the number of people with LTBIs and the number of tuberculosis cases amongst the contacts of pulmonary tuberculosis patients. Other significant indicators of the risk of transmission include the number of pulmonary tuberculosis cases and the degree of contagiousness (positive microscopy or only culture-confirmation).

The centripetal transmission index is a measure of the infection pressure over the preceding two years resulting in disease. The centrifugal transmission index is a measure of forward infection pressure and of the effectiveness of intervention measures to prevent spread, such as contact investigation and preventive treatment.

In the Netherlands, disease attributable to *Mycobacterium bovis* is relatively rare. About ten cases a year are reported. The VNTR types of *M. bovis* bacteria found in people and animals shed light on transmission between humans and animals (zoonosis) (14).

Objectives/activities:
4.3.a. By 2019, the transmission of tuberculosis is to be 25 per cent lower than in 2014.
4.3.b. All recent cases that share a DNA fingerprint (clustered cases) and have a known epidemiological link to an index patient in the Netherlands, but have not been detected by source and contact investigation, are to be systematically investigated to establish why they have not been prevented. (All years)
4.3.c. All *M. tuberculosis* complex isolates (mainly *M. bovis*) from humans and animals are to be classified using the VNTR method and compared, with a view to monitoring transmission between humans and animals. (All years)

# 5 Prevention and screening

## 5.1 BCG vaccination

In the Netherlands, the children of parents from countries where the incidence of tuberculosis is >50/100,000 people are vaccinated with Bacillus Calmette-Guérin (BCG). In 2011, the Health Council recommended continuing that policy and including the vaccination in the National Immunisation Programme ('RVP') (15). The IGZ recently observed that there was no clearly defined system for inviting target group members for BCG vaccination, resulting in variable vaccination rates (16). The IGZ has also monitored the level of coverage over a prolonged period, but the data are not reported at the national level.

*Objectives/activities:*

5.1.a. A nationally uniform system for inviting children for BCG vaccination is to be adopted. (2016)

5.1.b. The annual report 'Tuberculosis in the Netherlands' is to include data on and analysis of the level of coverage provided by BCG vaccination.

## 5.2 Screening

The existing screening undertaken in the context of tuberculosis control has two purposes:

- The detection of disease by means of radiographic screening, followed by treatment;
- The detection of LTBIs by means of tuberculin skin testing (TST) or Interferon Gamma Release Assay (IGRA) testing, followed by preventive treatment.

Radiographic screening has a number of drawbacks:

a) Only signs of active disease in the chest cavity are sought.
b) It provides only a snapshot of the situation at a particular time; someone whose radiograph is normal may subsequently become ill, due to the activation of a latent infection.
c) Radiography entails health risks.

LTBI also has drawbacks:

a) Not everyone with an LTBI will develop the disease if left untreated: disease becomes manifest in 10 per cent of people with a recent LTBI, in a far smaller percentage of those with older LTBIs and in a far higher percentage of those with impaired immunity.
b) The preventive therapy is prolonged and sometimes accompanied by serious adverse effects.

The main forms of screening intervention[1] in the Netherlands are:

1) Source and contact investigation

[1] Other risk groups to which tuberculosis screening policy applies include drug addicts, homeless people, travellers, health care workers and clinical risk groups.

2) Screening of immigrants
3) Screening of asylum-seekers
4) Screening of detainees

*Monitoring and evaluation of screening activities*
The Population Screening Act ('Wbo') requires that screening programmes are periodically evaluated. The KNCV Tuberculosis Foundation has evaluated the screening of immigrants three times (periods 1998-2002, 2003-2004 and 2005-2010) and source and contact investigation once (period 2006-2010) (17–20). GGD GHOR Netherlands produces an annual report on the screening of detainees and asylum-seekers. Screening policy is regularly revised in the light of the evaluation findings. Where radiographic screening evaluation is concerned, 2,000 is taken as the threshold number of people that need to be screened to detect one case of active tuberculosis. Table 2 summarises the findings of the screening evaluations. The screening of immigrants, asylum-seekers and detainees is intended to detect active disease (by radiography), while source and contact investigation is intended mainly to detect infections. Whenever an LTBI is detected, the patient is examined for signs of active tuberculosis.

*Table 2 Comparison of detected case numbers, screening detection rates and numbers needed to screen for various tuberculosis control interventions over various periods*

| Intervention | Evaluation period | Number of people screened | Number of detected tuberculosis cases | Screening detection rate (per 100,000) | Number needed to screen |
|---|---|---|---|---|---|
| Source and contact investigation (20) | 2006-2010 | 61,482 | 270 | 439 | 228 |
| Screening of asylum-seekers (21) | 2006-2010 | 51,907 | 286 | 551 | 181 |
| Screening of immigrants (22) | 2005-2010 | 117,389 | 108 | 92 | 1,087 |
| Screening of detainees (23) | 2006-2010 | 203,897 | 119 | 58 | 1,713 |
| Screening of asylum-seekers from countries with TB incidence of <50/100,000 | 2011-Sep 2015 | 45,133 | 12 | 26 | 3,787 |

The number needed to screen is the number of people that have to be screened in order to detect one tuberculosis case; it is inversely proportional to the screening detection rate.

Source and contact investigation is a very effective intervention of tuberculosis control in the Netherlands. In the period 2006-2010, more than 1 per cent of the close contacts of patients suffering from sputum microscopy-positive pulmonary tuberculosis were found to have tuberculosis and 13 per cent had LTBIs (20). In recent years, source and contact investigation has increasingly focused on screening for infection, also in people born abroad and typically vaccinated with BCG (24). The efficiency of contact investigation could be further improved by scaling up only where there is good reason to believe that transmission has occurred (20).

Where the screening of immigrants and asylum-seekers is concerned, in 2007 radiographic follow-up screening was restricted to people from countries where the incidence of tuberculosis was > 200/100,000. Since 1 January 2015, radiographic screening on arrival has been restricted to people from countries where the incidence of tuberculosis is >

50/100,000. The latter restriction does not (yet) apply to asylum-seekers.
Since 2011, the screening of detainees has been organised on the basis of triage, with the criteria tightened up in 2016. Roughly 40-50 per cent of the detainees now undergo radiographic screening.
Activities aimed at preventing tuberculosis in drug addicts and/or homeless people have declined, resulting in less tuberculosis being detected by the screening of those groups in recent years. City authorities have therefore revised their screening policies; some now selectively screen the target group for LTBIs, while others have stopped altogether.

*Objectives/activities:*
5.2.a. The annual report 'Tuberculosis in the Netherlands' is to include the results of screening programmes and related discussion.
5.2.b. Source and contact investigation activities and the screening of immigrants, asylum-seekers and detainees are evaluated once every five years. The next evaluation period is 2011-2015. On the basis of the findings, policy is to be revised as necessary. (2017)

*From screening for active disease to screening for latent infection*
LTBI intervention measures are already in place for the identification of people who have recently been infected (contact investigation) and people who are at elevated risk of tuberculosis due to impaired immunity (e.g. as associated with HIV infection or anti-TNF-alpha therapy) (8). The use of such measures should continue undiminished in the next five years in accordance with the relevant guidelines. Periodic evaluation will be required as well (see also Section 5).

Tuberculosis is most prevalent amongst first-generation immigrants. Such immigrants account for three quarters of all cases. The current policy of radiographic screening upon arrival plus follow-up screening has proved insufficient to prevent tuberculosis amongst first-generation immigrants in the short and long term (8). Moreover, the existing interventions are not capable of achieving the target of reducing the incidence of tuberculosis by 25 per cent within 5 years and by 90 per cent within 20 years. The alternative is to screen for infection (using TST and/or IGRA) and to treat people in whom LTBIs are detected. That approach is well-established in the USA, Sweden and Norway. The UK also adopted a policy of screening immigrants for LTBIs a few years ago. Over the last decade, in the context of various ZonMw-funded research projects, the Netherlands has made preparations for the LTBI screening of immigrants. The findings of those projects include the following:

- The current policy of radiographic screening of immigrants on arrival plus follow-up screening is not cost-effective, not even for immigrants from countries where the incidence of tuberculosis is 300/100,000 (25).
- Given the existing methods and the current cost of testing, LTBI screening of immigrants would not be cost-effective, but would be more cost-effective than the current radiographic follow-up screening of immigrants from countries where the incidence of tuberculosis is >200/100,000 (De Vlas, unpublished).

- Approximately 20 per cent of new immigrants to the Netherlands (between 18 and 25 years old) have LTBIs. That prevalence correlates to the incidence in the countries of origin (26).
- A feasibility study of the LTBI screening of immigrants found that such screening was practicable and feasible, but that attention needed to be given to public information, training and education (Van den Hof, unpublished).
- The LTBI screening of young children (less than five years old) from countries where the incidence of tuberculosis is >50/100,000 would be cost-effective (Erkens, unpublished).
- The majority of tuberculosis control physicians, nurses and medical technicians support the LTBI screening of immigrants (27).

Given the availability of new diagnostic tests (IGRAs) and new shorter-duration therapies for LTBI (28, 29), the poor (cost-)effectiveness of the radiographic screening of immigrants and the global goal of tuberculosis elimination, the next step in risk group policy is to focus tuberculosis control activities more on identifying and treating LTBIs. The target groups, the timing of testing, the test method and so forth will be decided by the CPT, with priority given to immigrants from high-risk countries who have recently come to the Netherlands and are expected to remain for the long term, and who can be given preventive treatment without suffering significant adverse effects. Screening will start off on a small scale, so that the organisational consequences can be addressed. Any subsequent widening of the screening to include other groups must be on the basis of scientific evidence. ZonMw has approved a proposal for a study entitled Tuberculosis Elimination in the Netherlands through Disease Prevention Optimalization (TB ENDPoint; scheduled to run December 2015 to December 2019), which will investigate how LTBI screening and treatment of immigrants and asylum-seekers can be optimised.

The mandatory screening of immigrants for tuberculosis and/or LTBIs will also create opportunities for various health-promotion interventions, e.g. the testing of high-risk immigrants for other infectious diseases (HIV, hepatitis B/C) and certain forms of vaccination. In recent years, several studies have looked at the possibility of adopting such an integrated approach.

*Objectives/activities:*

5.2.c. The radiographic screening of immigrants is to be gradually supplemented or replaced by LTBI screening. Priority is to be given to children and immigrants from high-risk countries (>200/100,000). (All years)

5.2.d. In 2018, the implementation, cost-effectiveness and impact of LTBI screening is to be evaluated and a decision made as to whether LTBI screening can be extended to other immigrants.

5.2.e. Working on a project basis, the regions are to develop an integrated package of infectious diseases control and health-promotion interventions for immigrants and asylum-seekers (migrant health).

# 6 Patient-centred tuberculosis care

## 6.1 Diagnosis

*Latent tuberculosis infection*
The diagnosis of LTBIs is one of the core activities of the GGDs' TB departments. Screening for LTBIs is implemented in for example source and contact investigation and provided for new immigrants where possible (Section 5). LTBIs are currently diagnosed using a two-stage procedure, in which a positive TST is normally followed by an IGRA confirmation test (30).

In recent decades, hospitals have placed increasing emphasis on LTBI diagnosis in clinical risk groups, in response to the rising number of patients with impaired immunity (e.g. due to HIV infection, anti-TNF-alpha therapy and other 'biologicals' or following organ transplantation). The screening and, where appropriate, treatment of at-risk patients is often handled by several specialist departments within a hospital. Coordination, e.g. by the tuberculosis coordinator, is desirable. 'Best practices' in certain hospitals can serve as examples for other hospitals. The implementation and outcomes of LTBI screening in hospitals require both local evaluation and national overview.

*Tuberculosis*
The diagnosis of tuberculosis in the Netherlands is generally well organised. However, as the incidence of tuberculosis declines, knowledge and expertise for tuberculosis will decline. The challenge is therefore to ensure that patients and doctors continue to consider the possibility of tuberculosis.

In 2015, the Dutch Association for Medical Microbiology (NVMM) defined new guidelines on the laboratory diagnosis of tuberculosis (31). In addition, RIVM-CIb and NVMM have drawn up safety instructions and quality requirements for laboratories (32). A 2014 IGZ report stated that all medical microbiology laboratories met the critical standards for BioSafety Level 3, but that fewer than 20 per cent met all the safety standards against which they were tested[2] (33). Furthermore, all medical microbiology laboratories that performed cultures participated in an audit, which involved M. tuberculosis complex strains circulated for testing. The IGZ's recommendation that the results should be made publicly available was not adopted by the NVMM. The NVMM did specify that each medical microbiology laboratory should perform at least 375 cultures per year. Finally, all laboratories that perform M. tuberculosis complex phenotypic drug susceptibility testing should take part in audits that involve the testing of a set of samples with a view to assuring the quality of the drug susceptibility tests.

[2] The requirements that were not met included the monitoring of negative air pressure in the BSL-3 laboratory and access portal, construction requirements such as the airtight sealing of windows, floors, walls and ceilings, and the emergency power supply requirements.

RIVM-CIb is the Netherlands' reference laboratory for tuberculosis. That implies that medical microbiology laboratories have to send *M. tuberculosis* complex isolates to RIVM-CIb for DNA classification and resistant *M. tuberculosis* complex isolates for verification of the resistance pattern and detailed drug susceptibility testing (31).

*Tuberculosis and HIV*
According to the CPT's guideline Tuberculosis and HIV, all tuberculosis patients should be offered HIV tests (34). One of the objectives identified in the last NTCP was that all tuberculosis patients should be tested for HIV. However, despite a great deal of effort, that objective has not been realised. In 2014, the HIV test status of only half of tuberculosis patients was known (7). This is a missed opportunity, because the prompt detection of HIV infection can prevent avoidable mortality from HIV-related conditions. Moreover, tuberculosis patients have a right to know their HIV status, so that they can be treated promptly when necessary. The WHO strategy also says that all tuberculosis patients should know their HIV status (35). Although a data field has been added to the NTR so that information can be entered of whether an HIV test has been performed, offered or refused in each case, the HIV status of some tuberculosis patients remains unknown. The reason for that needs to be investigated (see Section 9).

*Objectives/activities:*
6.1.a. All hospitals are to have an approved protocol for the diagnosis and treatment of LTBIs and tuberculosis in clinical risk groups. (2018)
6.1.b. Data relating to LTBI screening policy in hospitals are to be collected and analysed at national level.
6.1.c. RIVM-CIb and NVMM are to define a laboratory network structure, including arrangements as to what tests can be performed at what levels by which laboratories. Quality assurance arrangements are also to be made (including circulation of samples for phenotypic and molecular drug susceptibility testing; publication of these quality assurance test performance results). (2016)
6.1.d. All tuberculosis patients are to be offered HIV tests and the results recorded in the NTR. (All years)

## 6.2 Treatment

The treatment of tuberculosis takes considerable time and involves a lot of drugs. The outcome of treatment in every tuberculosis case is recorded in the NTR. For the last few years, it has been recommended that the recording of treatment outcomes should distinguish between rifampicin-resistant tuberculosis (incl. M/XDR tuberculosis) and rifampicin-sensitive tuberculosis (36). Globally, the target is a 90 per cent success rate in the treatment of rifampicin-sensitive tuberculosis (2). In the Netherlands, the success rate in diagnosed cases of rifampicin-sensitive tuberculosis was 91 per cent in 2013 (37). In the period 2000-2009, the treatment of M/XDR tuberculosis was successful in 79 per cent of all cases and 86 per cent of cases in which treatment actually started (38). Only a small number of cases of rifampicin-resistant tuberculosis (including M/XDR tuberculosis) are diagnosed each

year, so treatment outcomes need to be assessed over a longer period. In recent years, the success rate has fluctuated around 75 per cent (7).

As the incidence of tuberculosis has declined, drugs has become less readily available due to pharmaceutical manufacturers ceasing production in the Netherlands. Isoniazide is no longer available in tablet form and also other medications are sometimes available only by importation.

Because patients with tuberculosis-related symptoms can present in any hospital and any GGD, it is important that pulmonologists, infectious diseases specialists/HIV-specialists, other clinical specialists and GGD tuberculosis control physicians remain alert to the possibility of tuberculosis and make tuberculosis diagnoses when appropriate. For quality reasons, it is advisable that treatment is concentrated, e.g. with one or two specialists per hospital. Some complex clinical tuberculosis pictures are sufficiently rare that their treatment should preferably take place in specialist tuberculosis centres or under the supervision of pulmonologists of such centres.

In the WHO End TB Strategy and the WHO Tuberculosis Action Plan 2016-2020 for the European Region, tuberculosis mortality is one of the three main indicators requiring monitoring. Tuberculosis mortality in the Netherlands is low: there are approximately ten fatal cases due to tuberculosis each year (7). Nevertheless, mortality remains an important indicator in the Netherlands, which requires monitoring as a basis for improving insight into the causes of mortality and action of possible ways of preventing mortality.

*Objectives/activities:*

6.2.a. Treatment is to be successful in at least 90 per cent of cases of rifampicin-sensitive tuberculosis[3]. (All years)

6.2.b. Treatment is to be successful in at least 85 per cent of cases of rifampicin-resistant tuberculosis in which treatment is started (calculated over at least three years). (All years)

6.2.c. The medication required for the treatment of (resistant) tuberculosis must remain available despite the declining incidence. (All years)

6.2.d. Medical specialists and tuberculosis control physicians are to hold discussions at the regional level regarding the scope for the concentration of care and are to make appropriate arrangements. (2017)

6.2.e. The treatment of serious clinical tuberculosis pictures such as multidrug-resistant tuberculosis and spinal tuberculosis is to take place in – and under the supervision of pulmonologists from – one of the two tuberculosis centres. (All years)

6.2.f. The treatment of meningitis tuberculosa is to be carried out in collaboration with one of the two tuberculosis centres. (All years)

6.2.g. Patients with tuberculosis and HIV infection are to be treated by specialists with expertise in both conditions or by teams of

[3] Treatment outcomes should also be evaluated for risk groups separately.

specialists in which expertise in both conditions is assured. (All years)

6.2.h. In the Netherlands, all fatal cases due to tuberculosis are to be discussed in mortality audits. (All years)

## 6.3 Support and supervision

All tuberculosis cases are supervised by a GGD tuberculosis public health nurse during therapy. HIV patients with tuberculosis are often supervised by a public health HIV nurse, after consultation and coordination with the tuberculosis public health nurse. The intensity of the supervision varies, from monthly check-ups to daily check-ups by the tuberculosis public health nurse, or by a home care service nurse when medication is to be taken directly observed (DOT). The relationship between the sort of and intensity of (nursing) support and the treatment outcome has not been well-researched in the Netherlands. A DOT evaluation was previously planned (NTCP 2011-2015), but did not take place because the research proposals were rejected (see Section 9 Research and innovation).

New e-health supervision methods have not yet been widely used for the support and supervision of patients, although they can be patient-friendly and are likely to gain in value as the number of patients continues to decline and the average geographical distance between the patient and the tuberculosis public health nurse consequently increases.

If a patient chooses or is obliged to leave the Netherlands while treatment is in progress, there is a significant risk that treatment will not be completed. The Wolfheze Workshops accordingly produced a set of recommendations regarding cross-border TB control (39). Because departing patients are destined for a wide variety of other countries, central coordination is desirable for patients who leave the Netherlands voluntarily or otherwise. The aim of such coordination should be to maximise the likelihood of treatment continuing in the destination country and to ensure that information about the outcome of treatment is returned to the Netherlands. The KNCV Tuberculosis Foundation is the obvious body to take on such a coordinating role.

The international review recommended that (former) tuberculosis patients be involved in the development of public information material, guidelines and protocols. In 2015, the process of implementing that recommendation was set in motion with the establishment of a patients' platform, in which context former patients indicated their willingness to help think through various aspects of tuberculosis control and, for example, to tell their stories to a wider audience, e.g. via the KNCV website or to contribute to peer forum.

*Objectives/activities:*

6.3.a. In the Netherlands, criteria are to be defined regarding the manner and intensity of the supervision provided for tuberculosis patients and people with LTBIs, taking account of the needs of the new target group for LTBI of recent immigrants. (Former) patients are to be explicitly involved in defining the criteria. (2017)

6.3.b. The criteria are to be evaluated two years after implementation, again with input from (former) patients. (2019)
6.3.c. In the Netherlands, coordinated efforts are to be made to ensure that patients who leave the country voluntarily or otherwise are transferred to the care of treatment providers in their destination countries, with a view to maximising the likelihood of treatment continuing. (All years)
6.3.d. (Former) patients are to be involved in the development of public information materials, education and the formulation of guidelines and protocols. (All years)

# 7 Multidrug-resistant tuberculosis

Multidrug-resistant (MDR) tuberculosis is caused by a strain of M. tuberculosis that is resistant at least to isoniazide and rifampicin, the two most potent tuberculosis medications currently available. Extensively drug-resistant (XDR) tuberculosis is also resistant to at least one of the fluoroquinolones and one of the injectable second-line tuberculostatics. The treatment of M/XDR tuberculosis is a lengthy process involving expensive drugs that has numerous adverse effects and these drugs are sometimes difficult to obtain. In recent years, two new medications (bedaquiline, delamanid) have been registered by the European Medicine Agency (EMA) for use in the treatment of M/XDR tuberculosis. Internationally, a lot of attention has focused on introduction of the new drugs to pre-XDR and XDR treatment programmes and on the careful monitoring of adverse effects (pharmacovigilance). In the Netherlands too, a cautious approach to using these new drugs is advisable.

Ten to fifteen people a year are diagnosed with M/XDR tuberculosis in the Netherlands. Treatment starts in one of the tuberculosis centres (Beatrixoord and Dekkerswald) and is supervised through to its conclusion by pulmonologists at the relevant centre. The successful treatment of M/XDR tuberculosis is facilitated by early diagnosis, appropriate therapy selection, including therapeutic drug monitoring, and support of the patient. The Rifampicin-resistant tuberculosis Working Group considers the policy and discusses cases of rifampicin-resistant (rifampicin mono-/poly-resistant, MDR and XDR) tuberculosis.

*Objective/activity:*

7.1.a. The CPT's Rifampicin-resistant tuberculosis Working Group is to consider and monitor the effects and adverse effects of new drugs. (All years)

# 8 Human resources

Four professional groups are involved in tuberculosis control: tuberculosis control physicians, nursing specialists, tuberculosis public health nurses and medical technicians. The professional associations representing those professionals – respectively, the Association of Tuberculosis Control Physicians (VvAwT), the Dutch Nursing Society (V&VN/Tuberculosis Committee) and the Medical Technicians' Agency (MTMBeVe) – are involved in capacity planning, training and continuous eduction. In hospitals, pulmonologists, infectious disease specialists, medical microbiologists, occupational health physicians and infection prevention experts all play a significant role in the prevention, diagnosis and treatment of tuberculosis. Tuberculosis is just one of many diseases for these specialists working in clinical care, whereas tuberculosis is most often the only disease for professionals working in the public health tuberculosis control sector. Some of the professional associations that represent specialists, such as the NVALT and the NVMM, have defined specific training requirements for tuberculosis and organise their own tuberculosis training. Several other specialists, such as paediatricians, neurologists and orthopaedic surgeons are occasionally involved in tuberculosis care. However, it is common practice that, once a diagnosis has been made in the secondary or tertiary sector, the patient is treated by the pulmonologist or infectious disease specialist.

Table 3 lists the professional associations, educational programmes and additional training provision for a number of the professions involved in tuberculosis control or care. Many local initiatives are also organised with a view to promoting expertise.

*Table 3 Professions involved in tuberculosis control of care and associated training provision*

| | **Tuberculosis control physicians (GGD)** | **Public health tuberculosis nurses (GGD)** | **Medical technicians (GGD)** | **Pulmonologists (hospital)** | **Medical microbiologists (hospital)** |
|---|---|---|---|---|---|
| Professional association | VvAwT | V&VN/Tuberculosis Committee | MTMBeVe | NVALT | NVMM |
| Education/ curriculum | Public health physician (4 years) TB control profile NSPOH | Public health nurse (15 months) - NSPOH | Physician assistant | | |
| Speciali-sation | | Nursing specialist (two years) | | Masterclass for TB Coordinator (2 days) | |
| Courses | See curriculum | See curriculum, including KNCV e-learning module | Basic course for medical technicians – KNCV (6 days) | Short training courses (3 days) | Public health care course, bacteriology-internship |

| | **Tuberculosis control physicians (GGD)** | **Public health tuberculosis nurses (GGD)** | **Medical technicians (GGD)** | **Pulmonologists (hospital)** | **Medical microbiologists (hospital)** |
|---|---|---|---|---|---|
| Continuous education | VvAwT study days (2 days/year) | V&VN/Tuberculosis Committee study days (2 days/year) | refresher training day (1 day/year) | VvAwT study day (1 day/year) | NTDD days (2 days/year) |
| Specific courses | Contact investigation, MDR tuberculosis, DNA fingerprinting – KNCV (1-2 days) | | | | |
| | OSIRIS | OSIRIS | OSIRIS | | |
| | LRCB | - | LRCB | | |
| Regional training | Regional multidisciplinary training (1-2 days/year) – GGD regions | | | | |

In recent years, various tasks have been centralised, with a view to ensuring that knowledge of and expertise in tuberculosis control is maintained at an appropriate level. One example is the appointment of tuberculosis coordinators in hospitals, to act as a central point of contact for tuberculosis-related matters. Specialisation combined with the concentration of activities is necessary to meet the quality standards defined by the professional associations. Human resources in the tuberculosis control of the public health sector requires thoughtful planning to ensure that the required personnel capacity is available and that sufficient trainees enter the training programmes. Now that the RECs are close to being operational and further scaling-up is under consideration (objective 2.1.a), it seems appropriate that capacity planning is done by the RECs, in conjunction with the professional associations and other stakeholders.

*Objectives/activities:*

8.1.a. GGD GHOR Netherlands is to work with the RECs, professional associations and other stakeholders to estimate the personnel capacity required nationally in the next five to ten years and the level of inflow to the professional training programmes needed to deliver the required capacity. (2016)

8.1.b. The training for professionals involved in tuberculosis control and care is to be adapted to the changing requirements and the increasing levels of concentration and specialisation. (2017)

# 9 Research and innovation

On 25 June 2015, the research priorities for the next five years were discussed at a national research meeting, on the basis of three themes: laboratory diagnosis, patient-centred and clinical care, and public health.

*Laboratory diagnosis*
Over the last two decades, the laboratory diagnosis of tuberculosis has improved considerably. Furthermore, many promising developments are in progress, such as the emergence of point-of-care testing (40). Tests are now available that, within hours, can exclude the possibility of resistance with a high degree of certainty. Research is needed to determine the most appropriate position for and value of the new tests within the diagnostic algorithms, their relationship with the treatment outcomes and their impact on quality of life.
Research is also needed to identify the biomarkers and patient characteristics that can predict the risk of disease in people with LTBIs. Whole genome sequencing (WGS), i.e. mapping the entire DNA sequence of an organism, can be very useful in the context of tuberculosis control. Over the next four years, RIVM-CIb will start a research project to assess the added value of WGS. The research will focus particularly on the accuracy (sensitivity and specificity) of WGS for the classification of epidemiological links. The technique also has promise for subspecies identification and the selection of M. tuberculosis complex isolates for drug susceptibility testing. The hypothesis is that WGS screening may replace part of the phenotypic drug susceptibility testing. The cost-effectiveness of WGS in comparison with the current tests also needs to be investigated, against the background of a sharp fall in the cost of WGS in recent years (41).

*Patient-centred and clinical care*
Given that the incidence of tuberculosis is falling towards the (pre-)elimination level, it is important to continue studying the risk factors/characteristics and to analyse the adequacy of current interventions and the possible need for new forms of intervention.
In order to assure the quality of care and to maintain quality standards, tuberculosis care (particularly treatment) must be concentrated. Research to test the assumption that patients want local care provision is desirable, in order to determine the consequences of concentration for patients and care providers.
Evaluation of the nursing supervision of tuberculosis patients and people with LTBIs is desirable, with a view to establishing what forms of support, including e-health, is effective. It is essential that (former) patients are involved in the research.
Another issue that requires investigation is the reason for the HIV status of tuberculosis patients often being unknown (see also Section 6). Furthermore, not enough is yet known about the practice and volume of LTBI screening and the treatment of risk patients in hospitals. Research into hospital screening policies would be valuable.
Finally, it is important to consider whether factors such as deductibles in health insurance policies may impede access to care. Access issues are particularly pertinent in relation to the diagnosis and treatment of LTBIs,

but are also relevant in relation to active tuberculosis. The ZonMw project TB ENDPoint will examine the effectiveness of screening for and treatment of LTBIs where these financial thresholds have been removed.

*Public health*
Now that tuberculosis control focuses increasingly on risk groups, such as immigrants from high-incidence countries, and use is made of methods that are common in general infectious disease control, such as blood testing, it is desirable to investigate the possibility of a more integrated approach to the control of infectious diseases in (high-risk) migrant groups and other risk groups.
The ZonMw project TB ENDPoint will examine possible ways of optimising LTBI screening and treatment in immigrants, asylum-seekers and certain ethnic groups. The research will also cover the use of diagnostic algorithms, cost-effectiveness and impact on the tuberculosis situation. At the European level, there are plans to compare the various screening programmes for immigrants with a view to ultimately arriving at a more uniform, shared approach. The Netherlands has an important contribution to make in that context.
Finally, great importance is attached to best practice-focused implementation research, with a view to facilitating the introduction of new tuberculosis control policies and guidelines.

*Objective/activity:*
9.1.a. In the period to 2020, research is to be carried out to determine how existing tests and interventions may be used and new tests and interventions may be introduced quickly and flexibly with a view to improving tuberculosis control.

# 10 Dutch contribution to international tuberculosis control

The Netherlands has a strong international reputation in the field of tuberculosis control. It is desirable that Dutch knowledge and expertise are made available to the international community, for the following reasons:

- The incidence in the Netherlands depends to a considerable extent on the inflow of immigrants. It is therefore also in the Netherlands' own interest that countries with serious problems receive support with the prevention and control of tuberculosis.
- International collaboration reinforces the knowledge available in the Netherlands and thus enhances the national tuberculosis control programme.
- Collectively, the various parties involved in tuberculosis control in the Netherlands possess a wide portfolio of high-level expertise and skill. That in turn means that the Netherlands is well placed to secure funding from international programmes.
- The knowledge and expertise that the Netherlands will acquire in the (pre-)elimination phase can contribute to implementation of the WHO End TB-Strategy in countries with a low incidence of tuberculosis.

In the years ahead, international collaboration in the field of tuberculosis will tend to focus on support for tuberculosis programmes in countries where the incidence of tuberculosis is average to high, on participation in the tuberculosis networks of ECDC/WHO Euro, on contribution to the development of European and WHO guidelines, on European tuberculosis trainings and on organisation of the Wolfheze conferences (a platform for European tuberculosis control professionals, researchers and advocates). Through the Ministry of Foreign Affairs, the Netherlands supports initiatives such as the Global Fund to Fight AIDS, Tuberculosis and Malaria, the Global Partnership to STOP TB and the WHO.

*Objective/activity:*

10.1.a. In the period 2016-2020in line with the priorities of the WHO Regional Office for Europe and the ECDC, , RIVM-CIb, KNCV Tuberculosis Foundation and other organisations are to realise international collaboration in the field of tuberculosis and provide technical support to countries where the incidence of tuberculosis is average to high.

# 11 Cost of tuberculosis control and national plan

The total cost of tuberculosis control (prevention, diagnosis, treatment and policy development) in the Netherlands has previously been estimated to be 33 million euros. Most costs are incurred by the GGDs (nearly 18 million, 61 per cent of the total) or are linked to hospital admissions (nearly 8 million, 25 per cent of the total) (42). The costs incurred by the national organisations engaged in tuberculosis control, such as the GGD Nederland, KNCV Tuberculosis Foundation and RIVM-CIb were approximately 2.5 million euros (8 per cent of the total). A new estimate based on data from 2014 indicates that the total cost has fallen to approximately 28 million euros. Costs have fallen because there are fewer cases, fewer hospital admissions and less expenditure on personnel and other items by the GGDs and national organisations.

The cost of tuberculosis control is covered by health insurance and by funding from the municipal authorities and the national government. For the screening of asylum-seekers and detainees, GGD GHOR Netherlands has signed contracts with the Central Agency for the Reception of Asylum Seekers (COA) and the Custodial Institutions Agency (DJI).

The cost figures cited above do not include the indirect costs incurred by clients and patients. Since 2008, health insurance policy holders have had to pay a deductible towards the cost of care. The compulsory deductible has gradually increased from 150 euros at the time of introduction, to 385 euro in 2016.[4] The deductible is payable in respect of, amongst other things, the diagnosis and treatment of tuberculosis. Unlike the situation in neighbouring countries, therefore, there is a considerable financial threshold to tuberculosis care in the Netherlands. It is not known whether the existence of a compulsory deductible deters people from consulting their doctors. The Ministry of VWS has previously indicated that there is no scope for exempting tuberculosis care from the compulsory deductible as long as there is no evidence that the deductible is an obstacle to treatment. Against that background, it is important to share and investigate any indications of such an effect.

Implementation of this National Tuberculosis Control Plan 2016-2020 can be funded from the normal tuberculosis control funding sources. The major change foreseen by the plan is the introduction of the screening of immigrants for LTBIs. As indicated in Section 5, it is advisable that such screening is introduced gradually. Any further extension of LTBI screening will be on the basis of evaluation of the implementation and cost-effectiveness.

[4] The compulsory deductible applies to, for example, the cost of IGRA testing if the TST is positive, the cost of additional diagnostics, hospital admission and medication. Children younger than eighteen years old do not have to pay a compulsory deductible. The compulsory deductible does not apply to the cost of a GGD consultation, since GGD services are regarded as equivalent to GP care, to which the compulsory deductible does not apply. Asylum-seekers do not have to pay a compulsory deductible.
People on low incomes can qualify for benefit to cover their health insurance premiums and compulsory deductible sums.
See also: https://www.rijksoverheid.nl/onderwerpen/zorgverzekering/inhoud/zorgverzekering-in-nederland

Finally, the international review committee recommended that financial data relating to tuberculosis control should be systematically collected so that allocative efficiency can be regularly analysed in a standardised manner. Such information is needed for decision-making regarding the allocation of financial resources.

*Objectives/activities:*

11.1.a. A mechanism for systematic financial data collection and analysis is to be introduced. (2017)

11.1.b. Stakeholders, including the Ministry of VWS, are to review the allocative efficiency of financial resources in tuberculosis control once every two years. (2018)

11.1.c. Case reports suggesting that financial aspects of the health insurance system may impede access to tuberculosis care are to be shared with KNCV Tuberculosis Foundation to support analysis and reporting. (All years)

# Appendix 1. Letter of commission from Ministry of VWS

Ministerie van Volksgezondheid, Welzijn en Sport

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**Kenmerk**
919060-147298-PG

**Uw brief**

**Bijlage(n)**
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*Correspondentie uitsluitend richten aan het retouradres met vermelding van de datum en het kenmerk van deze brief.*

Datum 16 FEB. 2016
Betreft vervolg Nationaal Plan Tuberculosebestrijding 2016-2020

Geachte heer Van Dissel,

In aansluiting op ons overleg in 2015 vraag ik u om in samenwerking met KNCV Tuberculosefonds en in overleg met betrokken partijen een vervolg op te stellen op het Nationaal Plan Tuberculosebestrijding 2011-2015 voor de periode 2016-2020. Het huidige Nationaal Plan heeft mijns inziens een wezenlijke bijdrage geleverd aan de verbetering van de Nederlandse tuberculosebestrijding en de afstemming tussen partijen die hierbij betrokken zijn.

Ik vraag u rekening te houden met een aantal zaken:

- In mei 2014 nam de World Health Assembly een nieuwe strategie aan om tuberculose vergaand terug te brengen: de Global End TB Strategy. Deze door de WHO ontwikkelde strategie heeft als doel om de tuberculose-incidentie in 2035 met 90% te verminderen.
- De WHO heeft tevens in 2014 een kader gemaakt voor de bestrijding in landen waar weinig tuberculose voorkomt (≤ 10/100.000). Nederland is een van deze landen en conformeert zich aan de wereldwijde ambities en beoogt met deze afname in 2035 uit te komen beneden het pre-eliminatieniveau van 1 geval per 100.000 inwoners.
- De WHO Europese regio heeft in het Tuberculoseactieplan 2016-2020 als tussentijds doel gesteld de tuberculose-incidentie in 2020 met 25% te verminderen.
- In 2013 hebben ECDC en de WHO een evaluatie uitgevoerd van het Nederlandse tuberculosebestrijdingsprogramma. Ik verzoek u om de aanbevelingen die uit deze evaluatie voortgekomen zijn mee te nemen bij het formuleren van de plannen voor de periode 2016-2020.

Ik vertrouw erop dat u met de betrokken partijen overeenstemming zult bereiken over de te stellen doelen en de benodigde acties om die doelen te bereiken. Houdt

u er s.v.p. rekening mee dat ik voor het opstellen van het Nationaal Plan en de implementatie ervan geen aanvullende financiering beschikbaar zal stellen, de activiteiten zullen daarom binnen de reeds beschikbare budgetten uitgevoerd moeten worden.

Graag ontvang ik te zijner tijd een exemplaar van het plan.

**Directie Publieke Gezondheid**
Crisisbeheer en Infectieziekten

**Kenmerk**
919060-147298-PG

Met vriendelijke groet,

de directeur Publieke Gezondheid

mw. dr. M.C.H. Donker

# Appendix 2. NTCP 2011-2015 objectives and results

| Objective | Current situation | Realisation |
|---|---|---|
| **Organisation of tuberculosis control** | | |
| BY 2013, there is to be efficient and effective national direction of tuberculosis control activities, matching the structures and responsibilities for the infectious disease control. | Division of responsibilities KNCV/RIVM defined (letter RIVM/KNCV 9-12-11); surveillance transferred to RIVM-CIb (summer 2012); a national Tuberculosis Coordinator and regional TB consultants (RTBCs) appointed from 1-1-2013.<br>The international review team nevertheless concluded that there is insufficient vertical coordination (including (financial) accountability, performance assessment, human resource planning). | |
| Until at least 2015, there will continue to be a tuberculosis control network with national coverage in public health care, under the responsibility of the municipalities and operated by the GGDs. | Network with national coverage was present. Regionalisation (RECs) and task redistribution must address this. | |
| It is recommended that, by 2013, public tuberculosis control is divided into 4 or 5 regions. | Decision in favour of 4 RECs taken by the Council of Directors of GGDs, April 2014. | |
| By 2013, each region is to have a Regional Tuberculosis Control Expertise Centre (or similar) for tuberculosis control in public health care. | Establishment of the RECs is currently in progress. The target of realisation by 1-7-2015 was missed. | |
| By 2015, resources such as ICT and MRUs are to be centrally coordinated and managed. | Addressed in GGD GHOR Nederland project plan, which provides for more central management and/or direction. | |
| By 2015 there is to be adequate digital transmission of X-rays, so that they can be viewed in the four to five regions. | Addressed in GGD GHOR Nederland project plan, which provides for more central management and/or direction. | |

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| By 2015, there is to be regional clustering of intramural care for tuberculosis cases. | The NVALT Board spoke out in favour of the clustering of care, but clustering has not yet been realised. | |
| By 2015, every hospital is to have a clinical tuberculosis coordinator who matches the profile and meets the quality criteria of the Dutch Thoracic Society (NVALT). | Six tuberculosis masterclasses have been organised for clinical TB coordinators; 76 per cent of hospitals have a trained clinical tuberculosis coordinator. | |
| By 2015, each of the four to five regions is to have at least four tuberculosis specialists with appropriate profiles in public tuberculosis control, taking account of geographical size, volume of work and the complexity of the cases. | The current situation is as described. | |
| By 2015, clinical tuberculosis coordinator is to be a formalised role, with accreditation/training. | NVALT supports the creation of this role, but it has not yet been formalised. | |
| By 2015, each of the four to five regions is to have at least one tuberculosis nurse with a competence level equivalent to 'nurse practitioner'. | The GGDs in Twente, Groningen and Utrecht have nursing specialists. Other GGDs/regions have experienced nurses. The status and duties of the nursing specialist have not yet been clearly defined.x | |
| By 2013, each region is to run an annual training programme for medical technicians (MTMs), with consideration given to the specific context and arrangements within the region. | Professional association (MTMBeVe) has been established. It provided MTM training since 2013, with support from KNCV. Regional (multidisciplinary) training programmes take place in all regions. | |
| By 2011, GGDs will be able to recover the cost of IGRA, sputum analysis and bacterial identification/resistance testing from health insurers. | Under Policy Regulation BR/CU-7082, GGDs can now recover the expenses. Disadvantage is that costs are passed on to the patient, because the compulsory deductible applies. | |

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| By 2013, RIVM-CIb will be able to recover the cost of diagnosis necessary for the treatment of patients (bacterial identification and additional resistance tests from a health insurer acting as a service desk for the other health insurers. | RIVM-CIb recovers the cost of diagnostic procedures from the sending laboratory. Approximately 30 per cent of the isolates are no longer submitted for drug susceptibility testing; all isolates are sent for DNA fingerprinting. A number of medical microbiology laboratories (MMLs) do their own drug susceptibility testing; there is no quality control; national oversight of drug-resistance is less precise. | |
| By 2011, the tuberculosis centres are to have reached agreement with the health insurers regarding the treatment of patients with tuberculosis, particularly MDR/XDR tuberculosis. | The tuberculosis centres have reached agreements with health insurers. Costs have been allocated to the negotiable B segment. Outcome is unsatisfactory for tuberculosis centres. | |
| **Surveillance** | | |
| By 2012, there is to be clearly defined, efficient national surveillance of tuberculosis, consistent with national and international obligations. | Transfer of disease surveillance (NTR) from KNCV to RIVM realised with effect from 1/7/12. | |

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| **Laboratory diagnosis** | | |
| By 2011, only laboratories that operate under bio-safety level (BSL) 3 conditions are to culture *M. tuberculosis*. | All MMLs that culture tuberculosis satisfy the six critical BSL-3 standards; only five of the thirty-three met all the BSL-3 standards (IGZ report). | |
| From 2011, all laboratories that undertake diagnostic tests on *M. tuberculosis* are to participate at least once a year in the testing of samples circulated by the Foundation for Quality Assurance in Laboratory Testing for Medical Diagnosis (SKML). | All MMLs participate in the tests (IGZ report). | |
| **Improving control** | | |
| By 2013, the average diagnostic delay is not to be greater than in 2008 (31 per cent of the patients with pulmonary tuberculosis no cough, 34 per cent less than three months with a cough, 5 per cent more than three months and 30 per cent delay/symptoms unknown). | See report 'Tuberculosis in the Netherlands 2012' (published in 2014). Section 2 specifically addresses this objective. Conclusion: no increase in delay. In 87 per cent of pulmonary tuberculosis cases, delay was less than three months in 2008; in 2012, the corresponding figure was approximately 91 per cent. | |
| At least once every two years, the KNCV Tuberculosis Foundation, NVALT and RIVM-CIb are to organise a joint conference for professionals working in tuberculosis control in order to evaluate objectives and (practical) targets and formulate new ones. | In March 2013, discussions were held, partly in preparation for the International Review. | |
| By 2015, the tuberculosis training included in the medical doctors' basic training will be coordinated and organised in such a way as to ensure that it is of a uniform, satisfactory level. | KNCV has revised its handbook and will translate it into training modules for universities in 2015. | |

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| By 2015, tuberculosis training for pulmonologists (including clinical tuberculosis coordinators) and tuberculosis control physicians are to have been revised to reflect the changes in the respective competency profiles. | A tuberculosis masterclass and in-service training modules have been organised. No job profile changes have been made, mainly because no substantive changes have yet been made to the public health care structure. | |
| By 2015, tuberculosis training for tuberculosis public health nurses is to have been revised to reflect the changes in the competency profile. | The Netherlands School of Public & Occupational Health (NSPOH) has taken over the training for public health nurses from Leiden University.<br>The KNCV Tuberculosis Foundation has developed an e-learning module on practical tuberculosis control for tuberculosis public health nurses. | |
| In the period 2011-2015, each tuberculosis control region is to receive at least one inspection visit from the CPT's Plenary Visitation Committee. | All regions were visited. | |
| In 2011, the position and tasks of the clinical consultants (in the tuberculosis centres) for the period ahead are to be discussed. | NVALT approved a new competency profile for the clinical consultants. | |
| **MDR/XDR tuberculosis** | | |
| By 2012, the WHO guidelines on monitoring treatment outcomes in MDR/XDR cases are to have been implemented in the Netherlands. | Workshops on MDR tuberculosis were held in 2012 and 2014. Guidelines on MDR tuberculosis was approved by CPT. | |
| In the period 2011-2015, RIVM-CIb is to handle laboratory diagnosis of MDR/XDR tuberculosis. | That has been done. See also Guidelines. | |
| In the period 2011-2015, all MDR/XDR tuberculosis cases are to be treated under the supervision of a tuberculosis centre. | That has been done. See also Guidelines. | |

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| In the period 2011-2015, the training given to tuberculosis nurses is to cover the supervision of MDR/XDR patients. | Half a day was devoted to MDR tuberculosis for nurses during their continuous education. A combined e-learning module and training on MDR tuberculosis was conducted in December 2014. | |
| **Tuberculosis and HIV** | | |
| By 2013, all tuberculosis patients are to be tested for HIV; if the test is positive, patient is to be referred to an HIV treatment centre. | Policy established; more patients are now tested, but still less than 50 per cent; issue is taken up by regional tuberculosis consultants (RTCs). | |
| **Research and innovation** | | |
| By 2015, the following studies are to have been carried out:<br>• (Cost-effective) basis of the screening definition<br>• Active detection of LTBIs in certain risk groups<br>• Evaluation of the nurse intervention DOT<br>• Accessibility, quality and effectiveness of tuberculosis control in a different organisational structure<br>• Study comparing the organisation of tuberculosis control in the Netherlands with that in neighbouring countries | A number of studies are in progress (screening definition, active detection of LTBIs) or have been completed (ZonMw; pilot screening for LTBIs); others have not started or were not approved (e.g. rejection of ZonMw evaluation nurse interventions proposal; DOT). | |
| **Tuberculosis control after 2015** | | |
| In line with the priorities of WHO and ECDC, RIVM-CIb, the KNCV Tuberculosis Foundation and other institutes are to realise international collaboration in the field of tuberculosis in the period 2011-2015 and are to make technical tuberculosis control support | Both institutes have undertaken various activities in the field of research and collaboration in Europe.<br>In 2013 and 2015, the Wolfheze workshops were organised by the KNCV Tuberculosis Foundation in collaboration with WHO Euro and the ECDC. | |

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| available to low and medium prevalence countries in Europe. | | |
| By 2013, an external review of Dutch tuberculosis control is to have been carried out. | Carried out in 2013; report available (reference 6) | |
| By 2013, a think tank involving RIVM-CIb, GGD Nederland, the KNCV Tuberculosis Foundation and NVALT is to have produced a policy document outlining the advantages and disadvantages of various organisational models for tuberculosis control in the period to 2025. Possible scenarios are to include: retention of the existing model with municipal responsibility and regionalisation on the basis of cooperation amongst municipalities, a model in which GGDs operate as regional back offices to perform a decentralised national government task in consultation with the other GGDs in the region, with the option of assigning (parts of) tasks to clinical specialists or infectious disease physicians. | Paper by De Goeij GGD Nederland (Appendix 3 to this plan) | |
| By 2014, decisions are to have been made regarding the organisation of tuberculosis control on the basis of the findings of the external review and the scenario analysis. | Decision-making on organisational issues deferred due to delayed establishment of RECs. | |

Colour key

No action is planned for realisation of the objective. The objective may not be realised.

Action undertaken for realisation of the objective. Objective is likely to be realised in full or to a large extent.

Objective realised.

# Appendix 3. Model criteria for the organisation of tuberculosis control

*Introduction*
One of the objectives set out in the National Tuberculosis Control Plan 2011-2015 was that public tuberculosis control should be concentrated in four to five regions. That objective is likely to be realised this year, with the formation of four regional expertise centres (RECs). Under the new organisational model, the municipal authorities retain responsibility for public tuberculosis control, while knowledge and expertise is pooled by regionalisation on the basis of cooperation amongst municipalities.

The question is whether the new organisational model will remain appropriate for the evolving tuberculosis situation in the Netherlands. If the tuberculosis threat does not increase, but diminishes, it could be that a different model of tuberculosis control is more appropriate for the period to 2025.

In spring 2014, in connection with implementation of the National Tuberculosis Control Plan 2011-2015, a committee of GGDs and other stakeholders[5] chaired by Hans de Goeij formulated a set of design criteria, against which the organisation of tuberculosis control can be tested.

The number of procedures is an important factor
The number of client-related procedures has a major impact on how tuberculosis control is organised.
A decline in the number of procedures influences:
- the quality of the control (are professionals still competent?);
- the efficiency of the control (are the costs still reasonable in relation to the benefits?).

The number of procedures therefore has implications for:
- the personnel capacity required.

The nature of the procedures determines:
- the expertise required.

The number and content of the procedures is influenced by various developments. The main developments are as follows:
1. Developments in the incidence of tuberculosis, which are linked to the global tuberculosis situation and the inflow of immigrants and asylum-seekers to the Netherlands
2. Policy developments, including changes to screening policy in response to developments in the incidence of tuberculosis and in diagnosis
3. Developments regarding the national contracts for the screening of asylum-seekers and detainees, caused by fluctuations in the inflow of asylum-seekers, changes to the policy on the screening of detainees and economisation

[5] Association of Netherlands Municipalities (VNG), the relevant professional associations, KNCV Tuberculosis Foundation, RIVM, the CPT and GGD GHOR Netherlands

4. Developments in the clinical picture, including increasing resistance issues

Another important field of development is the application of new technology, including ICT. Such technology will make new ways of working possible and will therefore have a major impact on the future organisation of tuberculosis control. New technology should be regarded as an opportunity.

*3. Design criteria*
The design criteria for the organisation of tuberculosis control are as follows:

1. An organisation that is appropriate for the volume of procedures undertaken: the personnel capacity must be in proportion to the number of procedures, in the interests of both the quality of care (retention and maintenance of expertise) and the efficiency and cost-effectiveness of control. This criterion applies equally to laboratories and hospitals.
   Other factors that influence personnel capacity requirements are: the nature of the procedures and the use of new ICT.

   NB: There is a critical minimum capacity level. As long as there is a tuberculosis threat, tuberculosis control must remain a public task and there must be sufficient capacity ('permanent dyke maintenance' is not very popular when there have been no floods, but remains essential).

   NB: On its own, the number of client-related procedures cannot serve as an indicator of the personnel capacity required. There must also be capacity for other activities: surveillance, training, interdisciplinary consultation, participation in guideline development, etc.
2. An organisation in which knowledge and expertise are assured.
3. A organisation that
   - operates within a network of services across the country, which includes regional facilities and national and specialist knowledge and treatment centres; and
   - acts as the nation's single point of contact for international cooperation with and within the WHO infectious disease control system.
4. An organisation that is regionally/locally well established and assured (knows the way): knowledge of the local situation, including knowledge of tuberculosis locations and social issues, is needed for proper performance of the preventive task.
5. An organisation that has the flexibility (personnel and financial capacity) to cope with (temporary) increases in tuberculosis. Mutual backup and/or compensation will require reconsideration.
6. An organisation that provides local 'fire-fighting capability' to handle outbreaks.
7. An organisation that ensures easy access for the public: access to care must be low-threshold and proximate.
8. An organisation with an appropriate, modern model for oversight and funding.

Hans de Goeij & Chantal Laurent, GGD GHOR Netherlands, June 2014

# Consultation group

On 2 July and 17 September 2015, drafts of this plan were discussed with a consultation group made up of people from the organisations and professions involved in tuberculosis control.

*Membership of the consultation group:*

- Jaap van Dissel, Director, Centre for Infectious Disease Control, RIVM, chair
- Aura Timen, Head of the National Coordination Centre for Communicable Disease Control, RIVM, deputy chair
- Kitty van Weezenbeek, CEO, KNCV Tuberculosis Foundation
- Ton van Dijk, Director of Public Health, GGD Haaglanden, tuberculosis control portfolio holder, GGD GHOR Nederland
- Martin Boeree, pulmonologist, University Medical Centre Radboud (Dekkerswald), representing the Dutch Thoracic Society (NVALT)
- Ineke van Haeften, pulmonologist, GGD Utrecht Region, representing the Dutch Thoracic Society (NVALT)
- Maurits Verhagen, tuberculosis physician, GGD Limburg-Noord and Chair of the Netherlands Tuberculosis Control Policy Committee (CPT)
- Wieneke Meijer, tuberculosis physician and Head of Tuberculosis Control, GGD Amsterdam, representing the Association of Tuberculosis Control Physicians (VvAwT)
- Maarten Scholing, medical microbiologist, Amsterdam district laboratory, representing the Dutch Association for Medical Microbiology (NVMM)
- Marrit Broersma, tuberculosis public health nurse, GGD Utrecht, representing the Dutch Nursing Society (V&VN), Tuberculosis Committee
- Chantal Laurent, Policy Officer, representing GGD GHOR Nederland
- Yvonne Irving, Medical Technician, GGD Noord- en Oost-Gelderland, representing the Medical Technicians' Association (MTMBeVe).

# Glossary of abbreviations

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| BCG | Bacillus Calmette-Gúerin |
| BSL | Biosafety level |
| CIb | Centre for Infectious Disease Control of the RIVM |
| COA | Central Agency for the Reception of Asylum Seekers |
| CORD | Committee on Contact Investigation, Resistance and DNA Fingerprinting |
| CPT | Netherlands Tuberculosis Control Policy Committee |
| DJI | Custodial Institutions Agency |
| DNA | Desoxyribonucleic acid |
| DOT | directly observed treatment |
| ECDC | European Centre for Disease prevention and Control |
| EMA | European Medicines Agency |
| GGD GHOR | Nederland umbrella organisation GGDs |
| GGD | Municipal Health Service |
| GHOR | Regional Medical Assistance Organisation |
| Health Council | Health Council of the Netherlands |
| HIV | human immunodeficiency virus |
| IGRA | Interferon Gamma Release Assay |
| IGZ | Health Care Inspectorate |
| LCI | National Coordination Centre for Communicable Disease Control of RIVM-CIb |
| LRCB | National Reference Centre for Population Screening |
| LTBI | latent tuberculosis infection |
| MDR tuberculosis | multidrug-resistant tuberculosis |
| Ministry of VWS | Dutch Ministry of Health, Welfare and Sport |
| MRU | Mobile X-Ray Unit |
| MSR | monitoring of screening of risk groups |
| MTMBeVe | medical technicians' agency |
| NGO | non-governmental organisation |
| NTCP | National Tuberculosis Control Plan |
| NSPOH | Netherlands School of Public & Occupational Health |
| NTR | Dutch Tuberculosis Register |
| NVALT | Dutch Thoracic Society |
| NVHB | Dutch Association of HIV Specialists |
| NVMM | Dutch Association for Medical Microbiology |
| Osiris | registration system for infectious diseases whose reporting is mandatory |
| PCR | Polymerase Chain Reaction |
| REC | Regional Expertise Centre |
| RIVM | National Institute for Public Health and the Environment |
| RTC | regional tuberculosis consultants |
| RVP | National Immunisation Programme |
| SKML | Foundation for Quality Assurance in Laboratory Testing for Medical Diagnosis |

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| TB ENDpoint | Tuberculosis Elimination in the Netherlands through Disease Prevention Optimalization |
| TST | tuberculin skin test/Mantoux test |
| TNF | tumour necrosis factor |
| V&VN | Dutch Nursing Society |
| VNTR | Variable Number or Tandem Repeats |
| VvAwT | Association of Tuberculosis Control Physicians |
| Wbo | Population Screening Act |
| WGS | Whole Genome Sequencing |
| WHA | World Health Assembly |
| WHO | World Health Organization |
| Wpg | Public Health Act |
| XDR tuberculosis | extensively drug-resistant tuberculosis |
| ZN colouring | Ziehl-Neelsen colouring |
| ZonMw | Netherlands Organisation for Health Research and Development |

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