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<td>Advocacy Communication and Social Mobilisation</td>
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<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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<td>ANC</td>
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<td>Community Health Worker</td>
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<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
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<td>DHIS</td>
<td>District Health Information System</td>
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<td>DM</td>
<td>Diabetes Mellitus</td>
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<td>DOCS</td>
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<td>GP</td>
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<td>Multi-Drug Resistant</td>
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<td>Non Tuberculous Mycobacteria</td>
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<td>National Tuberculosis Programme</td>
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<td>ODMWA</td>
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<td>OPD</td>
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PD  Permanent Disability
PHC  Primary Health Care
PICT  Provider Initiated Counselling and Testing
PLHIV  Persons Living with HIV
PMTCT  Prevention of Mother to Child Transmission
PTB  Pulmonary Tuberculosis
QA  Quality Assurance
QI  Quality Improvement
RMNCH  Reproductive Maternal Neonatal and Child Health
RR-TB  Rifampicin Resistant Tuberculosis
SA  South Africa
SADC  Southern African Development Community
SAG  South African Government
SANAC  South African National AIDS Council
SANTA  South African National Tuberculosis Association
SC IHDC  Soul City Institute for Health and Development Communication
SEQ  Socio-economic Quintile
SOP  Standard Operating Procedure
STI  Sexually Transmitted Disease
TAT  Turnaround Time
TB  Tuberculosis
TST  Tuberculin Skin Test
UNICEF  United Nations International Children’s Emergency Fund
URC  University Research Organisation
USAID  United States Agency for International Development
WB  World Bank
WC  Western Cape
WHA  World Health Assembly
WHO  World Health Organisation
XDR  eXtensively Drug Resistant
Executive summary
This desktop review of Tuberculosis in South Africa was commissioned by the Soul City Institute of Health and Development Communication (SC IHDC). The aim is to identify, collect, compile and synthesize the published and grey literature relating to the nature and extent of TB infection in the country, including policies and legislation.

The disease
The disease is caused by the bacillus Mycobacterium tuberculosis (MTB). Pulmonary tuberculosis (PTB) is the most common form of TB in humans occurring in over 80% of cases. Person-to-person spread occurs when an infected individual coughs, sneezes or speaks releasing minute droplet nuclei each containing between 1-5 TB bacilli, which are able to remain airborne in any indoor space for up to 4 hours. The tubercle bacillus is extremely sensitive to direct sunlight, but can survive in the dark for several hours. The infectious dose of tuberculosis is between 1 and 10 bacilli. Left untreated, a person with active TB can infect an average of 10-15 people each year.

Once an individual has been infected with the mycobacterium, progression to active tuberculosis depends on the person’s immune status. Disease will develop in only 10% of person’s with normal immunity; half the cases will occur within 2 years after infection. People at the extremes of life – children under the age of 5 years and the elderly – are most at risk. Conditions associated with immunosuppression and other factors e.g. HIV infection, diabetes mellitus, smoking, alcohol consumption, silicosis and certain workplace settings, also increase the risk of progression to active disease.

Primary infection occurs on first exposure to tubercle bacilli. Primary infection is usually asymptomatic and a positive tuberculin skin test (TST) 4-6 weeks after infection is the only evidence of infection. Secondary or post-primary TB occurs after a latent period of months or years following primary infection. It happens either through reactivation of latent bacilli or by re-infection with M. tuberculosis. Post-primary TB usually affects the lungs but can involve any part of the body. The main symptoms of pulmonary tuberculosis are:

- Persistent cough of 2 weeks or more or any duration if HIV positive. The cough may be productive of sputum which may be blood stained.
- Fever for more than 2 weeks
- Drenching night sweats
- Unexplained weight loss (more than 1.5 kg in a month)

A high index of suspicion is required because not all those with TB will have a cough and particularly those who are HIV positive may only have one of the above symptoms. All individuals suspected of having PTB should have at least one sputum specimen examined for bacteriological confirmation of TB disease using the rapid diagnostic tests.

Unlike many other infections that develop only when the CD4 counts falls below 200/mm³, the risk of TB is increased even in the first year of HIV infection and it may therefore happen that TB is diagnosed before HIV in co-infected patients. The clinical pattern of TB correlates with the patient’s immune status – when immunity is only partially compromised, the features are more typical of post-primary TB and as immune deficiency worsens, HIV-infected patients present with atypical pulmonary disease resembling primary TB or with extra-pulmonary TB or disseminated disease.
Extent of the problem

South Africa has the third highest burden of disease in the world, after India and China, with an estimated incidence of 450,000 cases of active TB in 2013, an increase of 400% over the last 15 years (WHO, 2014). An estimated 60-73% of the 450,000 incident cases have both HIV and TB infection. The incidence of multidrug-resistant (MDR) and extensively drug-resistant TB are increasing and South Africa has the second highest number of reported multi-drug-resistant TB (MDR-TB) cases globally (NDOH, 2014 and HST, 2014). TB remains the leading cause of death in South Africa, contributing to 12% of deaths in 2009 (StatsSA, 2014).

The number of TB cases (all types) starting treatment and recorded in the electronic TB register (ETR.Net) reached an all time high in 2009, at 411,724, but decreased by 6% annually, with 328,897 TB patients starting treatment in 2013. KwaZulu-Natal (KZN), Eastern Cape (EC) and Western Cape (WC) are the three provinces with the highest incidence of TB with 922; 782 and 730 cases per 100,000 population respectively whilst Mpumalanga (MP) at 467 cases per 100,000; Gauteng (GP) at 388/100,000 and Limpopo (LP) 354/100,000 are the three lowest ranking provinces in terms of TB incidence.

The South African incidence of new pulmonary smear-positive TB was 234.2 per 100,000 in 2012, and varied from a high of 364.9 per 100,000 in the Northern Cape to a low of 120.5 per 100,000 in Limpopo Province. With the exception of 10 districts (Amathole, Chris Hani, Cacadu and Joe Gqabi (EC), Harry Gwala, uMgungundlovu and uMkhanyakude (KZN), Frances Baard, Namakwa and Pixley ka Seme (NC), Central Karoo and Eden (WC), and Ekurhuleni (GP)), the incidence of new pulmonary smear-positive TB decreased in the last five years (2009-2013) (HST, 2014a).

The increasing cure rate for new pulmonary smear-positive TB patients, which was 75.8% in 2012, is encouraging. The NTP has prioritised decentralisation and integration of TB/HIV services into PHC services and improved access to new lines of therapy for MDR-TB. This has paid dividends in improving treatment outcomes for the most deprived quintile of the population where cure rates have improved from 50% in 2006 to 73% in 2012. (HST, 2014a).

The national defaulter rate for 2013 (6.2%) was above the national target of less than 5% set by the South African National TB Control Programme. The Eastern Cape had the highest defaulter rate at 8.5%, followed by the Western Cape at 7.9% (HST, 2014a). South Africa has the second highest number of reported MDR-TB cases globally.

Policy frameworks

In 2006, the World Health Organization (WHO) launched the Stop TB Strategy as the internationally-recommended approach to reducing the burden of TB in line with global targets set for 2015. Governments around the world have voiced their commitment to its key principles of achieving universal access to high-quality TB care, reducing human suffering, reaching out to vulnerable populations, protecting human rights and supporting the development and use of new tools. The strategy set as its goal: “To dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals (MDGs)and the Stop TB Partnership targets.”

In 2008, the WHO launched the STOP TB Policy Paper: contributing to health system strengthening which endeavoured to strengthen the existing Stop TB Strategy by emphasising the role of health system strengthening in national TB programmes. “Contribute to health system strengthening” (HSS)
was included as the 6th component of the STOP TB Strategy (WHO, 2008). The ‘Global Plan to Stop TB’ is an initiative of the Stop TB Partnership. It provides a roadmap for the fight against TB over either a five year or ten year period. The first plan covered the period 2001-2005 and the most recent plan is for the period 2016-2020.

In 2014 the World Health Assembly (WHA) passed a unanimous resolution approving the new post-2015 Global TB Strategy. The strategy aims to end the global TB epidemic, and has set targets to reduce TB deaths by 95% and to cut new cases by 90% between 2015 and 2035. It also endeavours to ensure that no family is burdened with catastrophic expenses due to TB. It sets interim milestones for 2020, 2025, and 2030 (WHO, 2014).

**SA Policies**

The National Department of Health (NDoH) established the National Tuberculosis Programme (NTP) in 1994. The NTP, in collaboration with provincial counterparts as well as international and local NGO technical and implementation partners, led the development of a number of policies and guidelines to direct the programme. All South African (SA) policies and guidelines are aligned to international (World Health Organisation) recommendations.

Recent key SA TB policies emphasise integration of TB/HIV into primary health care (PHC) services, decentralization of the management of multi-drug resistant (MDR) TB from specialized to lower levels of care and strengthening community-based care.

The National Strategic Plan for HIV, STIs and TB (2012-2016) provides the overarching vision, aims and strategy for the national response to the dual epidemics of HIV and TB. SA has adopted the following 20-year vision (2012 - 2032) in line with attaining the three zeros advocated by UNAIDS: zero new HIV and TB infections; zero new infections due to vertical transmission; zero preventable deaths associated with HIV and TB; and zero discrimination associated with HIV and TB. The NSP has two broad TB-related goals (to be achieved by 2016): reducing the number of new TB infections and deaths from TB by 50% and reducing self-reported stigma related to HIV and TB by at least 50%.

The South African National AIDS Council (SANAC) endorsed integrated TB/HIV services in 2009 and NDOH has prioritized ART availability at PHC level and integration with TB services since April 2010. The department developed *A practical to HIV/TB service integration at PHC level - a set of guidelines that deals specifically with integration of HIV and TB services into primary health care services and particularly, incorporation of these into maternal and child health services.*

In response to the growing body of evidence that implementation of a decentralised model of care would improve the efficiency and effectiveness of the TB control and management programme the DOH has revised the policy prescribing that all DR-TB patients be admitted for treatment in specialized hospitals. A framework for decentralized care provides guidance for health facilities and communities on how to manage MDR-TB (not XDR-TB) patients closer to their homes. *Multidrug resistant tuberculosis – a policy framework for decentralized and deinstitutionalized management for South Africa (2011) and Policy guidelines for the management of drug resistant TB (Updated 2013)*

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1 The Stop TB Partnership was established in 2000 as a global movement to accelerate social and political action to stop the spread of TB around the world. The Partnership’s goal is to eliminate TB as a public health problem and, ultimately, to secure a world free of TB.
The NDoH published updated guidelines in 2014 (National tuberculosis management guidelines 2014), which introduced new rapid diagnostic tests for drug susceptible and drug resistant TB, additional and new medicines for treating MDR and XDR-TB and scaling up ward based outreach teams as part of primary health care (PHC) re-engineering to provide care and support for patients at home and promote healthy lifestyle.

On 24th March (World TB Day) 2015, the Deputy President launched a comprehensive TB screening and testing campaign under the banner “Ending South Africa’s TB epidemic: Accelerating our response in Key Populations”. This life-long campaign will mobilize all South Africans, with a focus on key vulnerable groups with an elevated risk of TB infection, to be screened and tested for TB. Vulnerable groups include persons such as inmates in correctional facilities, mineworkers, communities in mining areas and children, especially those under five years. Government also identified six priority districts for the screening campaign: Lejweleputswa in the Free State, West Rand in Gauteng, Sekhukhune and Waterberg in Limpopo and Bojanala and Dr. Kenneth Kaunda in the North West.

People living with HIV and young children are at a high risk of exposure to drug-susceptible and -resistant TB when attending health facilities for care as are health workers. SA introduced a TB infection control programme in 2007 (National infection prevention and control policy for TB, MDRTB and XDRTB, 2007). Measures include administrative controls, environmental controls and the use of personal protective equipment (PPE) and should be implemented at all health facilities, during community household visits and when transporting patients.

TB has been a major health problem in the SA mining industry since its inception. The SADC heads of state have signed the Southern African Development Community (SADC) Mining Declaration 2012, which provides a framework for addressing TB in the mines at a regional level. It commits countries to the eventual elimination of TB and the improvement of practices and standards of environmental, health and safety in mining as a way of addressing TB in the sector. Six priority areas have been identified for urgent attention and action to improve TB, HIV, silicosis and other occupational respiratory diseases control in the mining sector.

**Key populations**

The following have been designated as vulnerable groups at risk for exposure or transmitting TB disease:

**Key populations at risk for exposure to or transmitting TB disease**

- Children
- People living with HIV
- Diabetics
- Smokers
- Alcohol and substance users
- People who are malnourished or have silicosis
- Mobile, migrant and refugee populations
- People living and working in poorly ventilated environments, including those living in informal settlements
Key populations at risk for TB-infection and re-infection

- Health care workers
- Miners
- Prisoners
- Prison officers
- Household contacts of confirmed TB patients

Diagnosis and management
Effective management of TB depends on finding (diagnosing) persons with the disease, initiating appropriate treatment early and preventing complications and spread of the infection.

Diagnosis
Traditionally, TB services have relied on passive case finding – where persons with TB symptoms present themselves to the health care facilities. New policies encourage active case finding to look for persons with TB through community or facility based interventions. The aim is to screen every person for TB annually. TB diagnosis depends on symptom screening of all patients presenting to a health or workplace facility, contacts of people with laboratory confirmed pulmonary TB disease and key population groups. All those who have symptoms of TB disease must be investigated for the presence of TB infection.

Until recently the primary method for rapid diagnosis of TB was through smear microscopy. In 2011, SA introduced Xpert MTB/RIF as a replacement for sputum smear microscopy for the diagnosis of pulmonary TB. Unfortunately this test cannot be used for monitoring treatment because it does not distinguish between live and dead bacilli.

Culture is more sensitive than smear microscopy, detecting a higher proportion of cases among patients with symptoms. However, it is an expensive and slow diagnostic technique, and results are only available within four to six weeks, depending on the bacillary load. A sputum culture and drug sensitivity are indicated in smear negative TB suspects (particularly if HIV-infected or sick), TB patients failing treatment or requiring retreatment, and TB patients that fail to convert their sputum from positive to negative at two or three months or those who convert from negative to positive during the treatment period. Other important testing methods include: drug susceptibility testing (DST) to determine whether the isolate is susceptible or resistant to the drugs tested and molecular testing using polymerase chain reaction (PCR) technologies - Gene Xpert (GXP) - useful for rapidly diagnosing TB and screen for Rifampicin resistance and line probe assay (LPA) - detects resistance to both Rifampicin and Isoniazid at the same time and reduces time to diagnosis of MDR-TB to 7 days.

Chest x-rays (CXR) are an adjunctive test, which do not show a radiographic pattern specific for TB. However, the presence of infiltrates, lymph nodes or cavities is highly suggestive of TB. They are useful in patients who cannot produce sputum or who have negative Xpert results and are HIV positive, and where extra pulmonary TB (such as pleural effusions and pericardial TB) is suspected.

Treatment
Early initiation of effective treatment - use of the correct drugs for the correct length of time - reduces individual morbidity and mortality and stops the spread of the disease. The aims of TB treatment are to:
- Cure the patient of TB
- Decrease transmission of TB to others
- Prevent the development of acquired drug resistance
- Prevent relapse
- Prevent death from TB or its complications

The NTP has developed three standardized treatment protocols with fixed dose combination (FDC) medicines for the treatment of TB:

- Regimen 1: for new and previously treated adults and children >8yrs/ >30kg
- Regimen 3A: for children < 8yrs and <30kg with uncomplicated TB disease
- Regimen 3B: for children < 8yrs and <30kg with complicated TB disease

The standard treatment regimen for all patients is made up of an intensive phase lasting 2 months and a continuation phase lasting 4 months. During the intensive phase 4 drugs (isoniazid, rifampicin, pyrazinamide, and ethambutol) are used to rapidly kill the tubercle bacilli. Infectious patients become less infectious within approximately 10-14 days of starting treatment and symptoms abate. However, the majority of patients with sputum smear-positive TB will become smear-negative within 2 months. In the continuation phase, 2 drugs (isoniazid, rifampicin) are used, over a period of 4 months. The sterilizing effect of these drugs eliminates the remaining bacilli and prevents subsequent relapse.

All TB be patients must be routinely assessed to monitor their response to treatment. This includes bacteriological monitoring by sputum smear examination and clinical monitoring. If there is poor response to treatment, drug resistance should be excluded through Xpert, LPA, culture and drug susceptibility testing.

*Patient compliance* is a key factor influencing treatment success. Adherence to treatment is influenced by a complex set of factors, which include socio-economic circumstances, health system issues, patient and treatment related factors as indicated in the table below. These must all be taken into account in the provision of holistic patient care and support. One way to improve compliance is to provide a treatment supporter to provide directly observed treatment (DOT) by watching the patient swallowing the tablets, in a way that is sensitive and supportive to the patient’s needs and motivate patients to continue treatment and to counter any factors that might result in treatment interruption.

National guidelines recommend that an HIV test should be offered during the diagnostic work-up for TB or soon after the initiation of TB treatment and likewise, TB symptom screening should be done as part of HIV counseling and testing (HCT). On completion of TB treatment all co-infected TB patients must be on ART.

**Drug resistant TB**

Patients with drug resistant TB are categorised by the resistance pattern of MTB organisms strains isolated in their sputum or other specimen. Prevention is the key to effective MDR-TB control - studies have shown that patients with active, untreated MDR-TB can infect large numbers of HIV positive individuals, leading to significant outbreaks of MDR-TB with high case-fatality rates. The following factors contribute, individually or in combination, to the development of MDR-TB: poor management of drug supply; poor quality of patient management and care; and poor patient adherence. The standardised adult MDR-TB treatment regimen is associated with poor cure rates. In order to improve cure rates of MDR-TB, clofazimine and linezolid has been made available and a bedaquiline access programme has been introduced.
**Prevention**

TB contact tracing is an important aspect of prevention of the disease. The aims of contact tracing in the context of a single index patient of drug susceptible TB are:

- To identify contacts with active TB disease and initiate treatment early
- To identify those at high risk of developing active tuberculosis/severe outcomes, i.e. young children and immune compromised persons, to prevent the development of TB by providing IPT.
- Identify all close household contacts of MDR/ XDR-TB, without active disease for monitoring for 2 years after disease onset in index patient
- To provide individual and family education on infection control and counseling

**Monitoring, evaluation and reporting**

The NTP has developed standardized monitoring tools to ensure uniformity in the way in which information is collected and undergoes periodic internal and external evaluations. Surveillance is conducted through the routine collection of epidemiological data (i.e. disease outcomes) and seroprevalence surveys.

Reporting - The NTP has developed an electronic recording and reporting system for drug-susceptible TB (ETR.net) and drug-resistant TB (EDR.net) as a programme management tool used at district and sub-district levels. Standardised definitions create uniformity to assist in reporting across all levels of the health care system (including workplace programmes) and to feed into global reporting mechanisms.

Specific data elements are exported to the district health information system (DHIS). The system is able to generate the following reports: TB patients registered, Sputum conversion, Treatment outcome and Facility profile.

There are, however, numerous challenges with the electronic recording and reporting systems. Challenges identified include inadequate numbers and high turnover of data capturers and poor-quality data entry; linking between these two systems; ensuring that hospital-diagnosed cases are captured adequately; multiple programme registers and repeated data entry at facility level; and lack of a unique health identifier to track patients who move between districts and across programmes.

**Leading practices**

Examples of local best practice described in the body of the report include:

- Human resource capacity building - increased funding for the TB control programme to employ additional nursing staff and to create two new cadres at most of the high-burden PHC facilities
- Systems strengthening - capacitating and empowering managers to monitor the implementation of the TB programme using participatory clinical audits
- Community contact tracing

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2 Contacts are defined as people who share the same air for prolonged periods of time (8 hours or more) with people who are coughing up the MTB into the air (smear or culture positive PTB) and are therefore at risk of getting infected. This applies not only to households but also to communal settings such as hostels, prison cells, boarding schools, and homeless shelters.
Isoniazid preventive therapy

The international best practices described focus on advocacy, communication and social mobilisation interventions that promote the integration of community-based programming into the predominantly medical and vertical health service delivery model that has traditionally been employed by TB control programmes.
Background

This desktop review of Tuberculosis in South Africa was commissioned by the Soul City Institute of Health and Development Communication (SC IHDC). The aim is to identify, collect, compile and synthesize the published and grey literature relating to the nature and extent of TB infection in the country, including policies and legislation.

The terms of reference called for particular attention to the following areas of interest to be included in the report:

1. Extent of the problem (epidemiological and socioeconomic impact) including multi-drug resistance
2. Incidence, prevalence, mortality
3. The populations most affected (geographic spread, age group, sex etc.)
4. Effects of alcohol consumption
5. The availability and access to services
6. Gaps in the management of the disease
7. Policy framework in the management of the disease
8. Determinants of the disease and the determinants of MDR TB
9. Best practice interventions (locally and internationally)
10. Key role players in South Africa TB work (Government and NGO’s)

Methodology

The literature reviewed included peer reviewed articles, grey literature and published reports on the subject. Medline and Google Scholar searches were conducted using the key words ‘tuberculosis’ ‘treatment, care and support’ ‘multi-drug resistance’ and ‘best practices’. Complete free-access articles were downloaded from peer-reviewed journals. The abstracts of relevant articles were used in cases where a subscription to a peer-reviewed journal was required. The websites of international organisations including the World Health Organisation (WHO), Stop TB Partnership, UNICEF were searched for international perspectives and practices, policy statements, recommendations and updates while local policy, guidelines, protocols and information regarding the SA programmes was downloaded from the National Department of Health and SA National AIDS Council (SANAC) websites. SA media articles from computerized archives – Independent Online (IOL) and Health Systems Trust (HST) and PlusNews – were also reviewed.

Presentation of the findings

The desktop review findings are set out according to 3 sections:

- Tuberculosis – the disease: provides a short description of the disease, its pathogenesis, the causal and associated predisposing factors (determinants) for disease progression - including alcohol consumption - and the development of drug resistance. This section also covers epidemiology including geographic spread, incidence, prevalence, as well as treatment outcomes in the general and key population groups.
• Policies frameworks: summarises global and national policy frameworks guiding the National TB Programme (NTP). It also provides a list of key population groups vulnerable to TB as well as roleplayers supporting the NTP through funding, policy development, technical support and implementation.

• TB management: this section provides a brief description of national efforts at finding, treating and preventing TB. Specific guidelines, gaps and challenges pertaining to various aspects of the programme are covered in the body of the report under the relevant sub-sections that comprise the complex task of TB management.

• Leading practices: this part of the report identifies local as well as relevant international promising practices in the prevention, control and care of TB, with a focus on MDR-TB
Tuberculosis – the disease

Tuberculosis (TB) is caused by infection with the bacillus Mycobacterium tuberculosis (MTB). The organism is transmitted via the airborne route and spreads from person-to-person when an infected individual coughs, sneezes or speaks. Tiny droplets each containing between 1-5 TB bacilli are released into the air and are so minute that they are able to remain airborne in any indoor space for up to 4 hours, and even longer in poorly ventilated buildings. The tubercle bacillus is extremely sensitive to direct sunlight, but can survive in the dark for several hours. The infectious dose of tuberculosis is between 1 and 10 bacilli. Left untreated, a person with active TB can infect an average of 10-15 people each year.

The following three key factors determine the likelihood of transmission of TB:

i. *The number of organisms expelled into the air* – the most infectious cases are those who are smear positive. Persons with latent TB and those with extra-pulmonary disease are not infectious.

ii. *The concentration of organisms in the air* – transmission is more likely to occur indoors, in dark, poorly ventilated spaces where droplet nuclei stay airborne for prolonged periods.

iii. *The period of exposure* - close contact and prolonged exposure to contaminated air increases the risk of transmission.

Once an individual has been infected with the mycobacterium, progression to active tuberculosis depends on the person’s immune status. Disease will develop in only 10% of person’s with normal immunity; half the cases will occur within 2 years after infection. People at the extremes of life – children under the age of 5 years and the elderly – are most at risk. Conditions associated with immunosuppression also increase the risk of progression to active disease.

Conditions associated with TB disease

A number of conditions predispose individuals who have been exposed to TB infection to developing active TB disease. Examples of these conditions include:

- **HIV infection**: 50-60% of HIV positive people infected with TB will go on to develop active disease. The annual risk of TB in an HIV positive person is 10% (from recent infection and reactivation of latent TB) compared to a lifetime risk of 10% in a healthy individual. HIV positivity also increases the rate of relapse and re-infection as well as the proportion of smear-negative TB. This can cause delayed diagnosis and initiation of treatment resulting in poor treatment outcomes. Therefore *rapid diagnosis and early initiation of treatment* is key to reduction of TB mortality in people living with HIV.

- **Diabetes mellitus (DM)**: The prevalence of TB is higher amongst persons with diabetes - the weak immune system associated with diabetes trebles the risk of developing TB amongst diabetics - compared to the general population. TB and other infections also complicate the management of blood sugar levels in diabetics. The regular interaction with health care workers during TB

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3 Although there are five different mycobacteria associated with tuberculosis. Mycobacterium tuberculosis causes the most common form of TB disease that occurs in humans. The five mycobacteria responsible for tuberculosis are: *Mycobacterium tuberculosis, Mycobacterium bovis, Mycobacterium africanum, Mycobacterium microti and Mycobacterium canetti.*
treatment provides an excellent opportunity for health education and counseling for better diabetes control to improve the general health status of the patient’ (NDOH, 2014)

- **Smoking:** Active and passive smoking is a risk factor for TB, independent of alcohol use and other socioeconomic factors. Active smoking is associated with recurrent TB and death due to TB disease. The risk of TB is also higher in children exposed to passive smoking.

- **Alcohol consumption:** High alcohol consumption (on average >40g alcohol per day) is associated with a three-fold risk of developing TB. Alcohol has a direct toxic effect on the immune system and the physical effects of alcohol abuse may impair the immune system. Excessive alcohol use is also associated with poor TB treatment adherence and a higher relapse rate.

- **Silicosis:** Exposure to silica dust is a risk factor for the development of pulmonary tuberculosis. Silica impairs the alveolar macrophages thus weakening the lung’s defence mechanisms against the tubercle bacillus. These can remain encapsulated within the silicotic nodules and can cause reactivation of tuberculosis in patients with silicosis.

- **Children:** In children, malnutrition, measles and whooping cough increase the risk of progression to active TB disease. BCG vaccination provides variable protection. The main benefit of BCG immunization is protection against the development of the serious forms of TB in children, such as TB meningitis and disseminated TB.

- **Certain workplace settings:** Workplaces with a large migrant workforce, such as mining companies and environments such as health centres and hospitals that treat patients with the disease pose an increased risk of exposure to TB.

**How does TB disease develop?**

The pathogenesis of the disease is described in two stages – primary infection followed by secondary (post-primary) disease in some individuals. Between these two stages is usually a latent phase lasting months to years.

**Primary infection**

Primary infection occurs on first exposure to tubercle bacilli. In environments where tuberculosis is endemic this usually occurs in childhood, but can occur at any age in a previously unexposed individual. TB bacilli inhaled in droplet nuclei activate the cellular immune response to induce an inflammatory area, usually in the upper lobe, called the Ghon focus. The bacilli in the primary focus gradually lose their viability and multiply less. The inflammatory area in the primary focus is replaced by fibrous scar tissue, sometimes with calcification, in which the macrophages containing bacilli are isolated and die. Some dormant bacilli in the primary focus can survive for months or years: these are known as “latent bacilli” and are not infectious.

Primary infection is usually asymptomatic and a positive tuberculin skin test (TST) 4-6 weeks after infection is the only evidence of infection. In a few cases, the immune response is not strong enough to isolate and prevent multiplication of bacilli and these may spread from the lymphatics into the bloodstream and throughout the body causing disease within a few months.

The possible outcomes of primary tuberculosis are summarized in the table below.

**Table 1:** Possible outcomes of primary tuberculosis
Possible outcomes of primary tuberculosis

<table>
<thead>
<tr>
<th>No clinical disease</th>
<th>Hypersensitivity reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Positive tuberculin skin test (usual outcome in 90% of cases)</td>
<td>• <em>Examples</em>: erythema nodosum, phlyctenular conjunctivitis, dactylitis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pulmonary and pleural complications</th>
<th>Disseminated disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <em>Examples</em>: tuberculous pneumonia, lobar collapse (bronchial compression), pleural effusion</td>
<td>• <em>Examples</em>: lymphadenopathy (usually cervical), meningitis, pericarditis, military disease</td>
</tr>
</tbody>
</table>

Source: SA national TB guidelines, 2014

Secondary or post-primary TB

Secondary or post-primary TB occurs after a latent period of months or years following primary infection. It happens either through reactivation of latent bacilli or by re-infection with *M. tuberculosis*. * Reactivation* occurs when dormant bacilli, persisting in tissues for months or years after primary infection, start to multiply because of immunosuppression as a result of HIV infection, diabetes or certain medications such as steroids. *Re-infection* occurs when a previously sensitized individual (a person who had primary TB) is exposed to an infectious contact.

Post-primary TB usually affects the lungs but can involve any part of the body. The characteristic features of post-primary PTB include upper lobe involvement with cavitation and extensive lung destruction. Sputum smears are usually positive.

Clinical picture

*Pulmonary tuberculosis* is the most common form of TB disease in humans occurring in over 80% of cases. Tuberculosis may, however, affect any part of the body. *Extra-pulmonary tuberculosis* (EPTB) is a result of the spread of mycobacteria to other organs, most commonly pleura, lymph nodes, spine, joints, urogenital tract, nervous system or abdomen.

The main symptoms of pulmonary tuberculosis are:

- Persistent cough of 2 weeks or more or *any duration if HIV positive*. The cough may be productive of sputum which may be blood stained.
- Fever for more than 2 weeks
- Drenching night sweats
- Unexplained weight loss (more than 1.5 kg in a month)

These main symptoms may be accompanied by one or more of the following: chest pain; loss of appetite and weight; tiredness; fever, particularly with a rise in temperature in the evening and night sweats; and shortness of breath. Coughing up blood (haemoptysis) may occur in complicated cases.

A high index of suspicion is required because not all those with TB will have a cough and particularly those who are HIV positive may only have one of the above symptoms. SA guidelines require every patient with a positive symptom screen to be investigated appropriately. A history of contact with a person with pulmonary TB (PTB) increases the likelihood of a TB diagnosis and symptoms such as
weight loss need to be investigated. All individuals suspected of having pulmonary tuberculosis should have at least one sputum specimen examined for bacteriological confirmation of TB disease using the rapid diagnostic tests.

*Extra-pulmonary TB* can present with non-specific symptoms such as unintentional weight loss (more than 1.5 kg in a month), night sweats and fever for more than 2 weeks. Other symptoms depend on the site or organ affected, for example, chest pain from tuberculosis pleurisy, enlarged lymph nodes and a sharp angular deformity of the spine are the most frequent signs. HIV positive patients particularly those with low CD4 counts may present with extra pulmonary disease; TB often affects more than one organ, and pulmonary and extra-pulmonary TB commonly coexist. The most common types of extra-pulmonary tuberculosis are:

- TB lymphadenitis (enlarged lymph glands)
- Tuberculous pleural effusion, which is usually single-sided (‘fluid on the lungs’)
- TB of the bones and joints
- Tuberculous pericardial effusion (‘fluid around the heart’)
- TB meningitis
- Disseminated or miliary tuberculosis
- Tuberculous empyema
- TB peritoneal effusion

*Disseminated tuberculosis and TB meningitis* are acute, severe, often fatal forms of the disease that can present soon after primary infection. They occur most commonly in children and young adults.

*TB in HIV positive patients* - Unlike many other infections that develop only when the CD4 count falls below 200/mm$^3$, the risk of TB is increased even in the first year of HIV infection and it may therefore happen that TB is diagnosed before HIV in co-infected patients. Pulmonary tuberculosis is the most common manifestation of tuberculosis in adults infected with HIV. The clinical pattern of tuberculosis correlates with the patient’s immune status – when immunity is only partially compromised, the features are more typical of post-primary TB and as immune deficiency worsens, HIV-infected patients present with atypical pulmonary disease resembling primary TB or with extra-pulmonary TB or disseminated disease. The table below compares the clinical picture, sputum smear results and radiographic appearance in early and late HIV infection.

**Table 2: Clinical picture, sputum smear results and chest X-ray appearance in early and late stages of HIV infection**

<table>
<thead>
<tr>
<th></th>
<th>Early HIV infection</th>
<th>Late HIV infection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical picture</strong></td>
<td>Resembles TB in HIV-uninfected person</td>
<td>Often extrapulmonary or disseminated, more rapid disease progression</td>
</tr>
<tr>
<td><strong>Sputum smear results</strong></td>
<td>Usually positive</td>
<td>Often negative</td>
</tr>
<tr>
<td><strong>Chest X-ray appearance</strong></td>
<td>Often cavities</td>
<td>Hilar lymphadenopathy, infiltrates, no cavities. Can be normal</td>
</tr>
</tbody>
</table>

*Source: SA national TB guidelines, 2014*
The extent of the problem in SA

South Africa has the third highest burden of disease in the world, after India and China, with an estimated incidence of 450,000 cases of active TB in 2013, an increase of 400% over the last 15 years (WHO, 2014). An estimated 60-73% of the 450,000 incident cases have both HIV and TB infection. The incidence of multidrug-resistant (MDR) and extensively drug-resistant TB are increasing and South Africa has the second highest number of reported multi-drug-resistant TB (MDR-TB) cases globally (NDOH, 2014 and HST, 2014). TB remains the leading cause of death in South Africa, contributing to 12% of deaths in 2009 (StatsSA, 2014).

Table 3: Epidemiological burden of TB in South Africa

<table>
<thead>
<tr>
<th></th>
<th>N (’000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>52,776</td>
</tr>
<tr>
<td>TB Mortality</td>
<td>25</td>
</tr>
<tr>
<td>HIV+ TB mortality</td>
<td>64</td>
</tr>
<tr>
<td>TB Prevalence</td>
<td>380</td>
</tr>
<tr>
<td>TB incidence</td>
<td>450</td>
</tr>
<tr>
<td>HIV+ incident TB cases</td>
<td>270</td>
</tr>
<tr>
<td>MDR-TB cases</td>
<td>69⁴</td>
</tr>
</tbody>
</table>

Source: Global Health Report 2014

The number of TB cases (all types) starting treatment and recorded in the electronic TB register (ETR.Net) reached an all time high in 2009, at 411,724, but decreased by 6% annually, with 328,897 TB patients starting treatment in 2013.

The relationship between HIV and TB is well documented and HIV remains a key driver of the TB epidemic. HIV-positive individuals in sub-Saharan Africa have a 20-times higher risk of developing TB than those individuals that are HIV-negative. Additionally, TB is the leading cause of death among HIV-infected patients. Disconnected (non-integrated) and inadequate services, particularly in resource-poor settings, have contributed to poor treatment outcomes in patients co-infected with TB and HIV as well as the development of drug-resistant TB (Corbett, 2003; Porco, 2007 and HST, 2014). It is encouraging that one of the main reasons for the decline in the number of TB cases is an increase in the number of people living with HIV and AIDS who are on antiretrovirals (ARVs) (HST, 2014).

Incidence – all TB

Figure 1 below ranks the incidence of TB (2013) in SA by province. KwaZulu-Natal (KZN), Eastern Cape (EC) and Western Cape (WC) are the three provinces with the highest incidence of TB with 922; 782 and 730 cases per 100,000 population respectively whilst Mpumalanga (MP) at 467 cases per 100,000; Gauteng (GP) at 388/100,000 and Limpopo (LP) 354/100,000 are the three lowest ranking provinces in terms of TB incidence.

Figure 1: Incidence of TB in SA by province (2013)

Incidence – new smear positive
Smear-positive TB patients are responsible for the transmission of TB and are therefore the focus of the National TB Control Programme. The South African incidence of new pulmonary smear-positive TB was 234.2 per 100 000 in 2012, and varied from a high of 364.9 per 100 000 in the Northern Cape to a low of 120.5 per 100 000 in Limpopo Province. With the exception of 10 districts (Amathole, Chris Hani, Cacadu and Joe Gqabi (EC), Harry Gwala, uMgungundlovu and uMkhanyakude (KZN), Frances Baard, Namakwa and Pixley ka Seme (NC), Central Karoo and Eden (WC), and Ekurhuleni (GP)), the incidence of new pulmonary smear-positive TB decreased in the last five years (2009-2013) (HST, 2014a). Figure 2 below demonstrates the incidence of new smear positive TB patients by province.
Cure rate – new smear positive

The increasing cure rate for new pulmonary smear-positive TB patients, which was 75.8% in 2012, is encouraging. However, the poor performance of three provinces is responsible for South Africa falling short of the South African National TB Control Programme target of 80% and the WHO target of 85%. The Eastern Cape, Northern Cape, and North West provinces reported cure rates of less than 70%. Of particular concern are the 3 worst performing districts (Buffalo City (EC), John Taolo Gaetsewe (NC), Dr Kenneth Kaunda (NW)). Dr Kenneth Kaunda is an NHI pilot district yet the cure rate plummeted from 69.9% in 2011 to 59.4% in 2012 (HST, 2014a). The figure below shows the new smear positive TB cure rates by province.

Figure 3: New pulmonary smear positive TB cure rate by province (2012)
Socioeconomic status and cure rate

Low socioeconomic status is associated with higher TB incidence because of factors facilitating spread of infection e.g. overcrowded, poorly ventilated living conditions and severity of the disease e.g. coexisting conditions that reduce immunity and poor access to quality health care.

The NTP has prioritised decentralisation and integration of TB/HIV services into PHC services and improved access to new lines of therapy for MDR-TB. This has paid dividends in improving treatment outcomes for the most deprived quintile of the population where cure rates have improved from 50% in 2006 to 73% in 2012. By comparison cure rates in the least deprived segment of the population improved from 71% to 79% in the same period. These results are illustrated in Figure 4 below and show that the cure rate in new smear-positive patients has significantly increased in the lowest socioeconomic quintile (SEQ). There has also been a reduction from 40% in 2006 to 10% in 2012 in the difference in outcome between the most deprived and least deprived groups in terms of socioeconomic status (HST, 2014a).

Figure 4: Median TB cure rate (new smear positive patients) by SEQ
Defaulting on treatment

Breaks in continuity of treatment contribute to treatment failures and the development of drug resistant strains of MTB. Figure 5 below shows the TB treatment defaulter rate for new smear positive patients. Only two provinces (KZN – 4.9% and LP – 4.8%) were successful in 2013 at achieving the national defaulter rate target of below 5%.

Figure 5: TB defaulter rate (new pulmonary smear positive) by province (2013)
The national defaulter rate for 2013 (6.2%) was above the national target of less than 5% set by the South African National TB Control Programme. The Eastern Cape had the highest defaulter rate at 8.5%, followed by the Western Cape at 7.9% (HST, 2014a).

**Increased reporting of MDR**

South Africa has the second highest number of reported MDR-TB cases globally. As illustrated in Figure 6 below, there has been a rapid increase in the number of patients with MDR-TB and, even though not as rapid, of XDR-TB (HST, 2014a). Besides the real increase in the number of MDR-TB cases, the sharp increase in reported cases of MDR-TB between 2010 and 2012 might be a result of improved diagnosis due to the introduction of the rapid TB testing (Gene-Xpert) programme rolled out in 2011.

*Figure 6: Reported cases of TB, MDR-TB and XDR-TB*

![Figure 6: Reported cases of TB, MDR-TB and XDR-TB](source: District Health Barometer 2013/14)
Policy frameworks to address TB

The SA Government (SAG) has made various commitments and issued several policy directives in an effort to combat TB in the country. The national Minister and MECs of Health in the nine provinces have committed, through the Negotiated Service Delivery Agreement (NSDA), to combat HIV and AIDS and decrease the burden of disease from TB, through improving the TB cure rate from 64% in 2007 to 85% in 2014 (NDOH, 2013). The National Development Plan (NDP) sets out 9 goals to achieve by 2030; the second of these is to progressively improve TB prevention and cure. The Department of Health has also outlined 6 priority programmes, which include HIV/AIDS, TB and maternal and child health (MCH). Inclusion of TB goals into all of the country’s highest overarching policy frameworks are an indication of the priority the fight against TB enjoys.

Global policy frameworks and strategies
South Africa’s response to TB is aligned to international policy recommendations, best practices, goals and targets. The following are key international policy frameworks that guide South Africa’s response to TB.

STOP TB Strategy and Policy Paper
In 2006, the World Health Organization (WHO) launched the Stop TB Strategy as the internationally-recommended approach to reducing the burden of TB in line with global targets set for 2015. Governments around the world have voiced their commitment to its key principles of achieving universal access to high-quality TB care, reducing human suffering, reaching out to vulnerable populations, protecting human rights and supporting the development and use of new tools. The strategy set as its goal: “To dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals (MDGs)and the Stop TB Partnership targets.” The Strategy has six major components (WHO, 2006):

- pursue high-quality DOTS expansion and enhancement;
- address TB/HIV, MDR-TB, and the needs of poor and vulnerable populations;
- contribute to health system strengthening based on primary health care;
- engage all care providers;
- empower people with TB, and communities through partnership; and
- enable and promote research.

Table 4: Summary of the Stop TB Strategy

<table>
<thead>
<tr>
<th>Vision</th>
<th>A TB free world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td>To dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals and the Stop TB Partnership targets</td>
</tr>
<tr>
<td></td>
<td>✓ Achieve universal access to high-quality care for all people with TB</td>
</tr>
<tr>
<td></td>
<td>✓ Reduce the human suffering and socioeconomic burden associated with TB</td>
</tr>
<tr>
<td></td>
<td>✓ Protect vulnerable populations from TB, TB/HIV and drug-resistant TB</td>
</tr>
<tr>
<td></td>
<td>✓ Support development of new tools and enable their timely and effective use</td>
</tr>
<tr>
<td></td>
<td>✓ Protect and promote human rights in TB prevention, care and control</td>
</tr>
<tr>
<td>Target</td>
<td>✓ MDG 6, Target 6c: Halt and begin to reverse the incidence of TB by 2015</td>
</tr>
<tr>
<td></td>
<td>✓ Targets linked to the MDGs and endorsed by the Stop TB Partnership:</td>
</tr>
</tbody>
</table>
In 2008, the WHO launched the *STOP TB Policy Paper: contributing to health system strengthening* which endeavoured to strengthen the existing Stop TB Strategy by emphasising the role of health system strengthening in national TB programmes. "Contribute to health system strengthening" (HSS) was included as the 6th component of the STOP TB Strategy (WHO, 2008). The Policy advocates for national TB programmes to contribute to health system strengthening through:

- helping to analyse general health system weaknesses;
- identifying opportunities offered and the challenges posed by ongoing and planned health sector development processes; and
- joining health system partners in addressing barriers, challenges and opportunities while safeguarding core TB functions.
Global Plan to Stop TB 2016-2020
The ‘Global Plan to Stop TB’ is an initiative of the Stop TB Partnership. It provides a roadmap for the fight against TB over either a five year or ten year period. The first plan covered the period 2001-2005 and the most recent plan is for the period 2016-2020.

The third Plan, Global Plan to Stop TB 2006-2015, was reviewed and revised in 2010 and culminated in the Global Plan to Stop TB 2011-2015. The implementation component of the Plan delineates how to transform TB control within the period 2011-2015, through scaling up existing interventions for the diagnosis and treatment of TB and introducing new technologies, notably new diagnostic tests. Four major elements are identified: DOTS expansion and enhancement; drug-resistant TB; TB/HIV integration; and laboratory strengthening. The Research and Development component of the plan is an addition to the 2006-2015 plan and outlines actions required to develop new tools that are required to revolutionize the prevention, diagnosis and treatment of TB, as the basis for the elimination of the disease. The following five major topics are covered in this component: fundamental research; new diagnostics; new drugs; new vaccines and operational research (WHO, 2011).

The End TB Strategy
In 2014 the World Health Assembly (WHA) passed a unanimous resolution approving the new post-2015 Global TB Strategy. The strategy aims to end the global TB epidemic, and has set targets to reduce TB deaths by 95% and to cut new cases by 90% between 2015 and 2035. It also endeavours to ensure that no family is burdened with catastrophic expenses due to TB. It sets interim milestones for 2020, 2025, and 2030 (WHO, 2014).

The key pillars of the strategy are:

✓ INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION
  - Early diagnosis of tuberculosis including universal drug-susceptibility testing, and systematic screening of contacts and high-risk groups
  - Treatment of all people with tuberculosis including drug-resistant tuberculosis, and patient support
  - Collaborative tuberculosis/HIV activities, and management of co-morbidities
  - Preventive treatment of persons at high risk, and vaccination against tuberculosis

✓ BOLD POLICIES AND SUPPORTIVE SYSTEMS
  - Political commitment with adequate resources for tuberculosis care and prevention
  - Engagement of communities, civil society organizations, and public and private care providers
  - Universal health coverage policy, and regulatory frameworks for case notification, vital registration, quality and rational use of medicines, and infection control
  - Social protection, poverty alleviation and actions on other determinants of tuberculosis

✓ INTENSIFIED RESEARCH AND INNOVATION
  - Discovery, development and rapid uptake of new tools, interventions and strategies

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5 The Stop TB Partnership was established in 2000 as a global movement to accelerate social and political action to stop the spread of TB around the world. The Partnership’s goal is to eliminate TB as a public health problem and, ultimately, to secure a world free of TB.
Research to optimize implementation and impact, and promote innovations

Integrating HIV, TB and Malaria
TB and HIV co-infection, as well as malaria, remain priority global health challenges. Integration of the three priority diseases with prevention, care and treatment of other health concerns has been proven to enhance coverage for all three of these priority diseases. There are multiple entry points along the reproductive, maternal, neonatal and child health (RMNCH) continuum of care to integrate HIV, TB and malaria strategies, and opportunities exist to strengthen health systems and community structures. Evidence points to integration of HIV, TB and malaria and RMNCH interventions across the continuum of care as a best practice to addressing critical service delivery gaps and extending coverage. Programme evaluations show an improvement in antenatal care (ANC) uptake, provider-initiated HIV testing and counselling (PITC), prevention of mother-to-child transmission (PMTCT) and antiretroviral therapy (ART) adherence when an integrated approach is applied in routine reproductive, maternal and neonatal health care (AU, 2013).

South African Policy Frameworks, Policies and Guidelines

National Strategic Plan on HIV, STIs and TB (NSP)
The National Strategic Plan (NSP) for HIV, AIDS and STI is the cornerstone of the fight against HIV and AIDS. It provides a multi-sectoral overarching guide for government, private sector and civil society. Previous NSPs focussed specifically on HIV and AIDS, with TB covered in a separate strategic plan. This resulted in poor alignment between the two plans, although efforts to this effect were made.

The current National Strategic Plan for HIV, STIs and TB 2012-2016 (NSP) has integrated HIV and AIDS and TB and provides strategic direction to national, provincial, district and community-level stakeholders when developing implementation plans. It is also used by SANAC as the framework to coordinate and monitor implementation by sectors, provinces, districts and municipalities. The NSP takes into account the country’s international and regional obligations, commitments and targets related to HIV, STIs and TB, as well as aligning itself with the broader development plans of government. These include:

- The Constitution of the Republic of South Africa;
- Universal Access to Comprehensive Prevention Programmes, Treatment, Care and Support;
- The Millennium Declaration and the Millennium Development Goals;
- UN General Assembly Special Session (UNGASS) Political Declaration on HIV/AIDS: Intensifying our Efforts to Eliminate HIV/AIDS, June 2011;
- UNAIDS 2011–2015 Strategy: Getting to Zero;
- World Health Assembly (WHA) Resolutions on TB Control (WHA 60.19; WHA 58.14. and WHA 62.15);
- African Union commitments;
- Southern African Development Community commitments;
- International human rights agreements that South Africa has ratified;
- International trade agreements;
- International Labour Organisation (ILO) Recommendation on HIV and AIDS and the World of Work, 2010;
- Joint WHO-ILO-UNAIDS policy guidelines on Improving Health Workers’ Access to HIV and TB Prevention, Treatment, Care and Support Services;
- International Conference on Population and Development, 1994;
- Convention to End Discrimination Against Women (CEDAW);
- Beijing Platform of Action; and
- UN Convention on Persons with Disabilities.

The NSP has set a 20-year vision, adapted from the UNAIDS Three Zeros; strategic objectives aligned to the 20-year vision; and core impact indicators to measure the overall impact of NSP implementation. Key populations that are most likely to be exposed to or to transmit HIV and/or TB have been identified, and should be targeted for specific prevention, care, treatment and support interventions based on risk and need.

**Key populations**

The NSP identifies the following key populations at higher risk for exposure to or transmission of TB and/or HIV:

**Key populations at risk for exposure to or transmitting TB disease**
- Children
- People living with HIV
- Diabetics
- Smokers
- Alcohol and substance users
- People who are malnourished or have silicosis
- Mobile, migrant and refugee populations
- People living and working in poorly ventilated environments, including those living in informal settlements

**Key populations at risk for TB-infection and re-infection**
- Health care workers
- Miners
- Prisoners
- Prison officers
- Household contacts of confirmed TB patients

**Key populations at risk for exposure to or transmitting HIV**
- Young women between the ages of 15 and 24 years
- People living close to national roads and in informal settlements
- Young people not attending school and girls who drop out of school before matriculating
• People from low socio-economic groups
• Uncircumcised men
• Persons with disabilities and mental disorders
• Sex workers and their clients
• People who abuse alcohol and illegal substances
• Men who have sex with men and transgender persons

**Key roleplayers supporting the National Tuberculosis Programme**

Although the NDOH has the primary responsibility for the implementation of the NTP it enjoys the support of a number of local and international partners who support policy development, research and innovation as well as programme implementation. The list of partners includes roleplayers from both government and nongovernment sectors:

**Government – national, provincial and district levels**

• Department of Health: Development of policy, guidelines and implementation of National TB Programme; and administration of the Occupational Diseases in Mines and Works Act (ODMWA)\(^6\)
• Department of Labour: Compensation for Occupational Injuries and Disease Act (COIDA)\(^7\)
• Department of Correctional Services: Guidelines for the management of Tuberculosis, Human Immunodeficiency Virus and Sexually-Transmitted Infections in Correctional facilities 2013
• Department of Mining and Energy Resources (DMER): Guidelines for TB Control Programmes in the Mining Industry; and Mine Health and Safety Act
• Municipalities

**International funders and technical support partners**

• United States Agency for International Development (USAID)

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\(^6\) ODMWA is over 100 years old and was last amended in 1994. The Act provides compensation for occupational lung diseases in miners and ex-miners only. The Medical Bureau for Occupational Disease (MBOD), which falls under the Department of Health Chief Directorate: Non Communicable Diseases, administers the Act and is responsible for benefit medical examination of miners and ex-miners. ODMWA provides for post mortem benefits (through the National Institute for Occupational Health’s Pathology Section) for miners if an occupational disease is found, even if it was not the cause of death. ODMWA pays lump sum benefits based on the level of impairment and does not make any further pension provision. The lower limit for lung function loss is 35% for compensation to be paid out. All medical expenses including follow-up related to the treatment of the lung disease is paid by the mine owner(s).

\(^7\) COIDA was promulgated in 1993 and is administered by the Department of Labour. The Act is consistent with International Labour Organisation (ILO) Convention 1964 (No.121), on Employment Injury Benefits. It covers occupational injuries and diseases in all industries including those from the mining sector that are not covered by ODMWA, for example noise-induced hearing loss. COIDA pays lump sums for permanent disability (PD) below 30% and pensions if the PD is determined to be greater than 30%. The level of impairment required for compensation is 20%. This Act is generally considered to be more generous in terms of compensation payouts. The Act, however, does not make provision for post-mortem diagnosis but would still consider a case for compensation if an occupational disease is found at post mortem or if it is the cause of death.
• World Bank
• Global Fund (GF)
• Stop TB Partnership
• World Health Organisation

Nongovernmental organisations – local implementing partners
• University Research Company (URC)
• Aurum
• Right to Care
• SA HIV Clinicians Society
• South African National Tuberculosis Association (SANTA)
<table>
<thead>
<tr>
<th>Vision</th>
<th>Goal</th>
<th>Objective</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Zero new HIV and TB infections</td>
<td>o Reduce new HIV infections by at least 50% using combination prevention approaches</td>
<td>o Address social and structural barriers to HIV and TB prevention, care and treatment – the primary objective is to address societal norms and behaviours through structural interventions to reduce vulnerability to and to mitigate the impacts of HIV and TB</td>
<td>o Percentage of young women and men aged 15–24 years who are HIV positive</td>
</tr>
<tr>
<td>o Zero new infections through vertical transmission</td>
<td>o Initiate at least 80% of eligible patients on antiretroviral treatment (ART), with 70% alive and on treatment five years after initiation</td>
<td>o Prevent new HIV, STI and TB Infections – the primary objective is to ensure a multi-pronged approach to HIV, STI and TB prevention which includes all biomedical, behavioural, social and structural approaches in order to reduce new HIV, STI and TB infections</td>
<td>o Percentage of key populations who are HIV positive</td>
</tr>
<tr>
<td>o Zero preventable deaths associated with HIV and TB</td>
<td>o Reduce the number of new TB infections as well as deaths from TB by 50%</td>
<td>o Sustain health and wellness – the primary objective is to ensure access to quality treatment, care and support services for those with HIV, STIs and/or TB and to develop programmes to focus on wellness, inclusive of both physical and mental health</td>
<td>o Number and percentage of HIV-exposed infants testing HIV positive at six weeks and 18 months post-partum</td>
</tr>
<tr>
<td>o Zero discrimination associated with HIV and TB</td>
<td>o Ensure an enabling and accessible legal framework that protects and promotes human rights in order to support implementation of the NSP</td>
<td>o Ensure protection of human rights and increase access to justice – the primary objective is to address issues of stigma, discrimination, human rights violations and gender inequality</td>
<td>o Prevalence and incidence of TB</td>
</tr>
<tr>
<td></td>
<td>o Reduce self-reported stigma related to HIV and TB by at least 50%</td>
<td></td>
<td>o Percentage of adult mortality due to HIV and TB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>o Trends of stigma</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>o Retention on ART</td>
</tr>
</tbody>
</table>
Table 4: Summary of objectives and proposed interventions in the NSP 2012-2016

<table>
<thead>
<tr>
<th>Strategic objective</th>
<th>Sub-objectives and Interventions</th>
</tr>
</thead>
</table>
| A. **Addressing social and structural factors that influence HIV, STI and TB.** | Eight sub-objectives have been identified:  
1. Mainstreaming HIV and TB into the core mandate of all government departments. All government departments will analyse how their work is related to HIV and TB and make relevant policy decisions and interventions. Issues relating to gender rights will also be considered.  
2. Addressing social, economic and behavioural drivers of HIV, STIs and TB. This includes dealing with challenges affecting access to social services in informal settlements, and rural and hard-to-reach areas. It also includes strategies to address the vulnerability of migrant and mobile populations, and those who abuse alcohol and other substances.  
3. Implementing interventions to address harmful gender norms and gender-based violence.  
4. Lessening the impact of HIV, TB and STIs on orphans, vulnerable children and youths. This includes ensuring that vulnerable children have access to the social services they need, including basic education.  
5. Reducing the vulnerability of young people to HIV infection by ensuring that they stay in school until Grade 12. Post-school education and opportunities should also be provided.  
6. Reducing stigma and discrimination. This includes the implementation of a stigma-reduction framework. This framework and the People Living with HIV Stigma Index will be implemented nationally.  
7. Strengthening community systems to expand access to services. This includes developing HIV and TB plans at district level.  
8. Supporting all efforts aimed at strengthening poverty reduction and food-security programmes. |
| B. **Preventing new HIV, TB and STI infections.** | The seven sub-objectives that have been identified are:  
1. Ensuring everyone in South Africa is voluntarily tested for HIV and screened for TB every year. They must then be enrolled in wellness and treatment, care and support programmes.  
2. Integrating sexual and reproductive health services into primary health care (PHC) and ensuring that these services are also available to key populations. The package of services should include (but not be limited to) medical male circumcision, provision of male and female condoms, provision of other forms of contraception and screening, and treatment for cervical cancer. |
### Strategic objective

**MTCT and the transmission of TB.** Combination prevention\(^8\) efforts will be focused in those geographical areas in which the transmission of HIV is highest. They will cover the general population, but be focused on particular key populations e.g. women aged between 15-24 years, people living or working along national roads and highways, people living in informal settlements, migrant populations, young people who are not attending school.

### Sub-objectives and Interventions

3. Reducing MTCT to less than 2% at six weeks after birth and less than 5% at 18 months by 2016. This includes strengthening the management, leadership and coordination of the Prevention of Mother-to-Child Transmission (PMTCT) programme and ensuring its integration with maternal and child health programmes. TB screening will be integrated into the PMTCT programme.

4. Implementing a comprehensive national social and behavioural change communication strategy with a focus on key populations. This must be aimed at increasing people’s use of services, as well as promoting constructive values, attitudes, norms and behaviour. Social and cultural norms (particularly around gender) and behaviour that puts people at risk of HIV and TB must be challenged.

5. Preparing for the future implementation of new HIV, TB and STI prevention and treatment strategies. This includes investigating the use of microbicides and antiretroviral therapy (ART) to prevent HIV transmission.

6. Preventing TB infection and disease. This includes improving the finding of new TB cases; TB infection control; workplace policies on TB and HIV; preventive therapy with the drug isoniazid; TB immunisation; prevention of drug-resistant TB; reducing TB-related stigma; and tackling undernourishment, alcohol consumption and smoking.

7. Addressing sexual abuse and improve services for survivors of sexual assault, including post-exposure prophylaxis.

### C. Sustaining health and wellness.

The key objective is to ensure access to quality treatment, care and support services for those with HIV, STIs and/or TB and to develop programmes that focus on wellness. It focuses on achieving a significant reduction in deaths and disability attributable to HIV.

### Three core strategies

1. Reducing disability and death resulting from HIV and TB. This includes annual testing/screening for HIV, STIs and TB, particularly for key populations; improved contact tracing; increased access to high-quality drugs; early diagnosis and rapid enrolment onto treatment; specific strategies for treating children, adolescents and youths; initiation of all HIV-positive people with TB onto ART; design of a patient-centred package to support HIV-positive people who do not yet require treatment; immediate referral of all complicated cases;

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\(^8\) The term ‘combination prevention’ refers to a mix of interventions or activities that will have the greatest impact on reducing HIV, TB and STI transmission. They may be biomedical, behavioural, social and/or structural interventions used in synergy. These interventions will also help reduce susceptibility and vulnerability to HIV, TB and STIs.
<table>
<thead>
<tr>
<th>Strategic objective</th>
<th>Sub-objectives and Interventions</th>
</tr>
</thead>
</table>
| and TB. This will be achieved by universal access to accessible, affordable and good-quality diagnosis, treatment and care. PHC re-engineering will expand community health services including a school health programme, the introduction of district clinical specialist teams and a ward-based PHC outreach programme to extend the quality and coverage of health and wellness services. | appropriate screening for cryptococcal infection; screening and treatment of those with cervical cancer; and syphilis screening and treatment for all pregnant women.  
2. Ensuring that people living with HIV, STIs and TB remain within the healthcare system and adhere to their treatment. This includes an expanded role for ward-based PHC teams and the development of an identification system (unique identifier) to identify and track patients across all services.  
3. Ensuring that all services are responsive to the needs of people living with HIV, STIs and TB. This includes ensuring HIV and TB services are integrated within the chronic-care system (to deliver long-term care), expanding clinic operating hours and the development of a simple register for all diseases at PHC level. |

**D. Protecting human rights of people living with HIV and improving access to Justice**  
The major objective is to end stigma, discrimination, human rights violations and gender inequality. There is a need to continuously assess barriers to access to services and instances of stigma and discrimination, and provide the framework for addressing such issues.  

It has three sub-objectives:  
1. Ensuring that rights are not violated when the interventions under the other three strategic objectives are implemented, and that functioning mechanisms for monitoring abuses and vindicating rights are established  
2. Reducing HIV and TB discrimination, especially in the workplace  
3. Reducing unfair discrimination in access to social services.  

Targeted interventions, which are identified in respect of each of these sub-objectives, may have to be implemented in different spheres or at different levels. In respect of government entities, this may be at the national, provincial and/or local sphere of government. In respect of civil society, business, private sector and non-governmental sectors, this may be at a sectoral, organisational and/or community level.  

Sub-Objective 2.6:
Prevent TB infection and disease

A combination prevention approach is also necessary for an effective response to TB infection and disease. The following interventions combine behavioural, social, structural and biomedical approaches.

Intensified TB case finding
This will be achieved through annual TB symptom screening and testing (for those with a positive symptom screen) through testing campaigns (see Sub-Objective 2.1). These will take place in community campaigns, schools, universities, workplaces, the military, places of worship, taxi ranks and shebeens; with focused screening of all health facility attendees and at-risk populations (TB-exposed infants and children, people living with HIV, contacts of people with sensitive and drug-resistant TB, pregnant women, health care workers, mine workers, prisoners and prison staff). TB screening must be linked seamlessly with accessible TB diagnosis for all identified with TB symptoms, and effective treatment for all found to have drug-sensitive and resistant TB disease. Interventions that focus on prompt diagnosis and treatment for smear-negative TB and extra-pulmonary TB are particularly important for people living with HIV.

TB infection control
Instilling a culture of cough hygiene is essential to achieve better respiratory infection control in the community. A greater emphasis on TB and respiratory infection control is needed in households, schools, health care facilities, prisons, and other congregate settings to ensure a safe environment. TB infection control requires a combination of administrative, environmental and personal respiratory infection interventions. This should be delivered in the context of broader infection control standards, e.g. hand washing. All health facilities providing HIV and TB care must be assessed annually against a set of quality standards for infection control. This also requires each health facility to have an infection control plan and officer. Respiratory infection control should also be prioritised in prisons, high-risk industries (mines, textiles, construction, agriculture), single-sex hostels, long-distance public transport (such as taxis, buses and trains), schools (including preschool facilities), homeless shelters and repatriation centres. Infection control should be considered to be a component of health impact assessment for all new government and private-sector projects and programmes, in particular in developing minimum standards for buildings that take into consideration airborne infection control. Annual risk assessments should be carried out and 90% of high-risk institutions (health facilities, schools, prisons and mines) should achieve a basic infection control standard.

Workplace/occupational health policies on TB and HIV
All high-risk workplaces should have clear management policies on confidentiality, discrimination, routine medical screening and testing of employees, respiratory infection control, treatment, sick leave, psychosocial support, and job modification/alternative placement, where necessary. All workplace wellness programmes should address HIV, STIs and TB in an integrated manner and aligned with rational standards.

Isoniazid preventive therapy (IPT)
The implementation, monitoring and evaluation of IPT must be scaled-up for adults and children living with HIV (with clear recommendations for ages 5–15 years), asymptomatic child contacts of people with infectious TB and mine workers.

Immunisation
Ensure 100% BCG vaccination for all eligible infants at birth. There is a need to fast-track the development of new TB vaccines that are effective in all children and people living with HIV through advocacy for investment, public–private partnerships, accelerated and novel licensing mechanisms and rapid uptake and implementation of effective candidate TB vaccines.

Prevent drug-resistant TB
Specific measures to prevent further development and spread of drug-resistant TB include: improvement in identifying and curing drug-susceptible TB and early detection and effective treatment of all MDR-TB cases (reduce time from suspicion to starting standard second-line treatment – five working days, 100% of confirmed MDR-TB cases treated as per national guidelines with at least 60% success rate) and XDR-TB cases. Ensure guaranteed supply of and adherence to quality assured first- and second-line therapies in fixed-dose combinations.

Reduce TB-related stigma, malnutrition, alcohol consumption and smoking
Interventions reducing stigma are important to facilitate health-seeking behaviour and treatment adherence. Malnutrition, diabetes, smoking and alcohol consumption are significant risk factors for TB infection. Interventions to address these issues include supporting food security, reducing obesity, social and behaviour change communication, enforcing legislation aimed to regulate the use of cigarettes and the development of legislation to regulate the availability of alcohol.

SOURCE: National Strategic Plan on HIV, STIs and TB 2012-2016.
A Practical Guide to HIV/TB Service Integration at PHC level

The South African National AIDS Council (SANAC) endorsed integrated TB/HIV services in 2009 and NDOH has prioritized ART availability at PHC level and integration with TB services since April 2010. At the time TB services were relatively accessible at PHC facilities whereas ART was mainly provided through hospital and secondary level health care facilities. To address this, the department developed a set of guidelines that deals specifically with integration of HIV and TB services into primary health care and particularly, incorporation of these into maternal and child health services. SA has played a leading role in evaluating strategies to integrate TB and HIV services, such as the PALSA PLUS intervention.9

The objectives of integration of TB/HIV services into primary health care services are:

- To decrease TB and HIV transmission
- To decrease morbidity and mortality from TB and HIV
- To decrease morbidity and mortality from other HIV-related illnesses
- To improve the efficiency of healthcare services
- To create a patient-centred approach for the management of TB/HIV co-infected patients

The benefits of this integrated approach to the TB, HIV and maternal and child health (MCH) programmes are summarized and presented in the table below.

Table 5: Specific objectives of TB/HIV integration at PHC levels and expected benefits to the HIV, TB and Maternal and Child Health programmes

<table>
<thead>
<tr>
<th>Specific Objective</th>
<th>Programme Benefit</th>
</tr>
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<tbody>
<tr>
<td>Intensified (ICF) case-finding</td>
<td>▪ TB symptom screening is performed at every clinical visit in all PLWHA</td>
</tr>
<tr>
<td></td>
<td>▪ Earlier diagnosis of smear-negative pulmonary TB in PLWHA is achieved through</td>
</tr>
<tr>
<td></td>
<td>appropriate use of smear negative algorithm by trained clinicians</td>
</tr>
<tr>
<td></td>
<td>▪ Earlier diagnosis of extra-pulmonary TB (EPTB), including in children</td>
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<tr>
<td></td>
<td>▪ Screening of TB contacts for active TB</td>
</tr>
<tr>
<td></td>
<td>▪ HIV testing and counseling (HCT) is offered to all TB patients including pregnant</td>
</tr>
<tr>
<td></td>
<td>women</td>
</tr>
<tr>
<td></td>
<td>▪ All children of HIV-positive adults are tested for HIV</td>
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<td></td>
<td>▪ Newborns and infants of HIV positive women have access to DNA PCR testing</td>
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<tr>
<td></td>
<td>for early infant diagnosis (EID) of HIV infection</td>
</tr>
<tr>
<td>Improved access to care and treatment for TB and HIV</td>
<td>▪ Prompt TB treatment for all those diagnosed</td>
</tr>
<tr>
<td></td>
<td>▪ Prompt use of Cotrimoxazole preventive therapy (CPT) in all PLWHA who are</td>
</tr>
<tr>
<td></td>
<td>eligible (WHO stage ≥ 2, and CD4 &lt; 500 cells/mm³)</td>
</tr>
<tr>
<td></td>
<td>▪ Prompt initiation of ART in all PLWHA who are eligible including pregnant</td>
</tr>
<tr>
<td></td>
<td>women and children</td>
</tr>
<tr>
<td>Improved outcomes related to TB treatment and ART (including PMTCT)</td>
<td>▪ Comprehensive health care delivered by trained, competent HCWs</td>
</tr>
<tr>
<td></td>
<td>▪ Use of patient-centered adherence support measures (already in place for ART)</td>
</tr>
<tr>
<td></td>
<td>to improve adherence and reduce TB and ART defaulter rates</td>
</tr>
<tr>
<td></td>
<td>▪ Adherence support offered by trained community health worker (CHW)</td>
</tr>
<tr>
<td></td>
<td>▪ Standardized approach to treatment and monitoring (already in place in the TB</td>
</tr>
<tr>
<td></td>
<td>programme)</td>
</tr>
<tr>
<td></td>
<td>▪ Convenient access to healthcare services which are closer to patients’ homes</td>
</tr>
<tr>
<td></td>
<td>▪ A ‘one-stop service’ for patients co-infected with HIV and TB</td>
</tr>
</tbody>
</table>

9 The PALSA PLUS guideline was originally developed from the World Health Organisation’s Practical Approach to Lung Health (PAL) strategy to equip nurses to diagnose and manage respiratory diseases including tuberculosis in primary care settings. It was expanded to include HIV by the Knowledge Translation Unit at University of Cape Town’s Lung Unit.
| Prevention of new cases of active TB | • Trace all TB contacts and provide child contacts < 5 years with 6 months of IPT once active disease is excluded  
  • Appropriate use of IPT in PLWHA  
  • Implementation and enforcement of TBIC measures in health facilities  
  • Increased accessibility to ART |
|-------------------------------|------------------------------------------|
| Prevention of new cases of HIV infection | • Promote and provide condoms  
  • Increased access to measures to prevent mother-to-child transmission (PMTCT)  
  • Counseling opportunity for those already infected with HIV in order to prevent transmission of HIV to others  
  • Counseling of HIV negative TB patients to ‘stay negative’ |
| Improved delivery of health care services | • Increased efficiency of services by reducing workload  
  o Task shifting and task sharing  
  o Time saving avoiding duplication of clinical and administrative tasks  
  o Integration of data collection materials  
  • Improved community based services – CHWs to assist with:  
  o Prevention, case finding, care and treatment of TB and HIV  
  o TB and defaulter tracing  
  o MCH related services, infant feeding  
  o Non-communicable diseases e.g. diabetes and hypertension  
  o Violence and injury  
  • Institutional and individual collaborative responses |

Source: A Practical Guide for TB and HIV Service Integration at Primary Health Care Facilities - 2011

Multidrug resistant tuberculosis – a policy framework for decentralized and deinstitutionalized management for South Africa (2011) and Policy guidelines for the management of drug resistant TB (Updated 2013)

A clinical audit and WHO led review of the TB programme in 2009 revealed a number of challenges. These included: delayed initiation of treatment; inadequate hospital bed capacity; poor infection control in hospitals; and poor adherence to treatment, often caused by prolonged periods of hospitalisation where patients are forced to relinquish work and home responsibilities. In response to the growing body of evidence that implementation of a decentralised model of care would improve the efficiency and effectiveness of the TB control and management programme the DOH has revised the policy prescribing that all DR-TB patients be admitted for treatment in specialized hospitals. A framework for decentralized care provides guidance for health facilities and communities on how to manage MDR-TB (not XDR-TB) patients closer to their homes.

The framework describes:

- The model for decentralization\(^{10}\) and deinstitutionalization of drug-resistant tuberculosis (DR-TB) care and treatment, which is expected to decrease patient admissions to facilities by 30%\(^{11}\).
- The organizational structures and human resources requirements for successful implementation;
- Expected functions of each level of operations i.e. PHC, hospitals, district, and province; as well as

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\(^{10}\) Decentralised management of DR-TB refers to the transfer of responsibility for treating MDR-TB patients to lower levels of the system on condition that they meet specific criteria

\(^{11}\) This represents the proportion of smear negative, culture positive MDR-TB patients in SA health facilities. The previous policy dictated that ‘all laboratory diagnosed MDR-TB and XDR-TB patients be hospitalised in centralized units until they have two consecutive smear negative cultures taken at least 30 days apart.’
The monitoring and evaluation with a focus on the level and content of recording, reporting and monitoring indicators.

The decentralized model of care involves shorter stays in centralized hospitals (NDOH guidelines 2009 stipulated a 6 month hospitalization period), decentralization of care by transferring the responsibility for treating MDR-TB patients to lower levels of the system on condition that they meet specific criteria and deinstitutionalizing care by increasing community based care. These changes are expected to result in reducing the period between diagnosis and treatment initiation, increasing treatment coverage, reducing transmission, and enable treatment closer to home thereby increasing social acceptability and decreasing defaulters. The success of decentralized care is premised on two principles:

- Clear definitions of the functions and expectations from each level of the health care system and functional referral pathways between these.
- Effective linkages to the entire health system – the decentralized DR-TB management system needs to be closely linked to the overall TB control and management programme and the PHC outreach teams. Health workers at all facilities must increase case finding and have a high index of suspicion that patients who do not respond to first line therapy might be drug resistant and manage them appropriately. The risk of nosocomial infection must be mitigated and every co-infected patient (70% of MDR-TB patients) should be assessed, monitored, managed and followed up for both conditions. All decentralized MDR-TB sites must be accredited ART sites. These referral pathways are illustrated and the roles and responsibilities of role-players at each level of the health system listed in the section (Clinical Picture) describing multi-drug resistant (MDR) TB.

National tuberculosis management guidelines 2014

An independent review of the NTP conducted in 2013 found that although there was rapid treatment initiation for patients diagnosed with TB, defaulter tracing interventions were not widespread and there was no guidance for community caregivers on handling defaulters and no systems for reporting or managing side-effects. The NDoH published updated guidelines in 2014 which ‘introduced new rapid diagnostic tests for drug susceptible and drug resistant TB, additional and new medicines for treating MDR and XDR-TB and scaling up ward based outreach teams as part of primary health care (PHC) re-engineering to provide care and support for patients at home and promote healthy lifestyle.’

The aims of the revised TB management guidelines include:

- To reduce transmission of infection in the communities - targeted screening interventions to increase detection
- To diagnose drug sensitive TB (DS-TB) and DR-TB early - the use of Xpert MTB RIF in diagnosing pulmonary and extra pulmonary TB
- To initiate treatment in all patients diagnosed with TB early - the revised definitions and treatment regimens for retreatment patients
- To retain patients in treatment and care until completion of treatment – including management of adverse drug events
- To prevent TB in people living with HIV by initiating all eligible HIV positive people on ART and Isoniazid preventive therapy (IPT) - ART initiation and follow up of patients on both ART and TB medicines.
Mass TB screening and testing campaign – launched March 2015

On 24th March (World TB Day) 2015, the Deputy President launched a comprehensive TB screening and testing campaign under the banner “Ending South Africa’s TB epidemic: Accelerating our response in Key Populations”. This life-long campaign will mobilize all South Africans, with a focus on key vulnerable groups with an elevated risk of TB infection, to be screened and tested for TB. Vulnerable groups include persons such as inmates in correctional facilities, mineworkers, communities in mining areas and children, especially those under five years. Government also identified six priority districts for the screening campaign: Lejweleputswa in the Free State, West Rand in Gauteng, Sekhukhune and Waterberg in Limpopo and Bojanala and Dr. Kenneth Kaunda in the North West.

The roll out of the campaign will be staggered over 3 years. In the first year the campaign will screen at least 135 000 inmates in correctional facilities and up to half a million mineworkers. Nine inspectors have been appointed to assist the Department of Health to oversee the provision of TB services by the mines. In the six selected districts, the aim is to screen five million community members and 1.2 million children in schools, early childhood development (ECD) centres and creches.

In the second year of the screening campaign, there will be an additional focus on metropolitan councils and in the third year, government will add the provinces of the Eastern Cape, Gauteng, KwaZulu-Natal and the Western Cape on its target list (SA News, 2015 and SAG, 2015).

Southern African Development Community (SADC) Mining Declaration, 2012

TB has been a major health problem in the SA mining industry since its inception in the late 1800s. The SADC heads of state have signed the SADC Mining Declaration, which provides a framework for addressing TB in the mines at a regional level. It commits countries to the eventual elimination of TB through improvement of practices and standards of environmental, health and safety in mining as a way of addressing TB in the sector.

Six priority areas have been identified for urgent attention and action to improve TB, HIV, silicosis and other occupational respiratory diseases control in the mining sector. These are listed in the Declaration as:

- Strengthening accountability, coordination and collaboration at national and regional levels
- Promoting a supportive policy and legislative environment
- Strengthening programmatic interventions
- Strengthening disease surveillance systems
- Strengthening programme monitoring and evaluation
- Strengthening financing of interventions in the mines

A follow up Regional Ministerial Meeting on Harmonizing the Response to TB in the Mining Sector was held on 25th March 2014 in Johannesburg. As the name implies, the purpose was to discuss a standardised approach to TB management in the mining industry across Lesotho, Mozambique, South Africa and Swaziland and agree on a regional strategy to bring down the TB rate among mineworkers, currently at 10 times the level that the WHO classifies as an emergency. An innovative multi-sectoral, multi-country, public private partnership for addressing TB in the mining sector, will pave the way for a new approach to regional health intervention. Partners supporting the initiative include the World Bank (WB), the Stop TB Partnership, and the Global Fund to Fight AIDS, Tuberculosis and Malaria.
Some donors are supporting local SA and regional mining sector efforts to control TB in terms of advocacy and resource mobilization. The USAID funded TB CARE II project, launched in October 2014, provides targeted support to high priority districts, defined as those with high TB burden and below average performance indicators to assist them to achieve the targets set out in the National TB and HIV Strategic Plan (2012 – 2016). TB CARE II also strengthens the role of the private sector engaging employers, private health practitioners, the mining sector, correctional services, and schools in TB and DR TB prevention and control efforts. The programme also supports advocacy, communication, and social mobilization (ACSM) activities to increase awareness of and demand for TB services (USAID, 2014) [http://tbcare2.org](http://tbcare2.org). DFID’s Global Development Partnerships Programme to strengthen the World Bank’s effort and ensure that good practice being established through collaboration with government and mining companies in South Africa is expanded to other worst affected countries in SADC starting with Swaziland, Lesotho and Mozambique (DFID, 2013).

### TB Management

The three pillars of TB control include **finding, treating and preventing** TB in order to reduce transmission and avoid TB-related mortality. The National TB Programme (NTP), since its inception in 1994, has made great strides in strengthening the three core pillars of TB control, as highlighted in Table 6 below.

#### Figure 6: National TB Programme milestones (1994-2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity or Milestone</th>
</tr>
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| 1997 | Phased implementation of DOTS  
Establishment of DTDs |
| 1999 | Introduction of fixed-dose combination drugs  
Establishment of TB and HIV pilot districts |
| 2000 | MDR-TB guidelines endorsed  
Establishment of MDR-TB treatment facilities  
Four-drug fixed-dose combination tablets introduced |
| 2001 | National Drug Resistance Survey conducted |
| 2002 | Launch of the MTDP, 2002 - 2005  
Guidelines for IPT for TST-positive, HIV-infected persons |
| 2003 | TB declared an emergency and TB crisis plan launched  
Introduction of electronic TB register |
| 2005 | Minister of Health signs ‘Declaration of TB as an emergency in AFRO region’ |
| 2006 | Development of MDR-TB and XDR-TB action plan |
| 2007 | Launch of the National TB Strategic Plan 2007 - 2011  
Development of infection control guidelines for TB |
| 2008 | Introduction of Hain MTBDR-plus as a rapid test for MDR-TB  
First SA TB conference held |
| 2009 | ‘Health in South Africa’ series published in *The Lancet*, including recommendations for TB/HIV  
WHO review of the NTP |
| 2010 | 6-month IPT for all HIV-infected persons, regardless of TST status  
ART for TB patients living with HIV with CD4+ counts <350 cells/μl |
| 2011 | Introduction of Xpert MTB/Rif as a replacement for sputum smear microscopy  
National HIV/TB campaign  
Management of DR TB policy guidelines approved |
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
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</table>
| 2012 | Decentralised management of MDR-TB introduced.  
SA President signs SADC declaration on 'TB in the mines'  
ART for all HIV-infected TB patients  
Streptomycin removed from retreatment regimen |
| 2013 | NDoH guidelines for managing TB/HIV in prisons issued  
IPT for at least 36 months for TST-positive, HIV-infected persons  
National drug resistance survey conducted  
Independent WHO-led Review of NTP |
| 2014 | Updated National TB Management Guidelines |
| 2015 | Launch and roll out of mass TB screening programme |

**Finding**

Diagnosing TB involves a set of factors which include: self-presentation of persons with TB symptoms to a health care facility; high index of TB suspicion among health care professionals; TB screening practices in health facilities; sensitivity and specificity of diagnostic tests used; turnaround time (TAT) for delivery of laboratory results; and the capacity to trace people with positive results and start them on treatment. This process of diagnosis is summarised in the figure below.

*Figure 7: Required action for the diagnosis of TB*
Access to TB services

TB services have been relatively accessible at PHC facilities, as part of the Primary Health Care Package. There are no consultation fees in the public sector and all diagnostic tests and treatment for TB are free of charge. At health facility level SA has opted for an integrated ‘one stop service’ approach where TB and HIV services are provided at a single facility at the same time and located within both curative services and preventative maternal and child health services. This implies that patient centred care should be provided by a single service provider implementing the existing guidelines for TB case management, TB infection control, HIV/ART and PMTCT. Review findings (2013) substantiate that TB screening in persons living with HIV (PLHIV) and in people counselled and tested for HIV (HCT, pre-ART, ART, ANC) has been scaled up in most places and is generally well implemented. Good practices of integrated TB screening within general outreach activities have also been reported, such as in the case of mobile teams that work in remote areas and community health workers and NGOs doing door-to-door health visits (NDOH, 2014b).

According to the PHC package, PHC staff should diagnose TB on clinical suspicion using sputum microscopy, provide IEC and active screening of families of patients with TB, promote voluntary HIV testing, treat, dispense and follow-up using DOT, and complete the TB register (NDOH, 2000). In 2011, 4 203 facilities were providing TB treatment in South Africa and according to the 2011/2012 PHC facilities audit, 93% of PHC facilities were providing TB treatment (WHO, 2012 and HST, 2012). Most facilities provide community-based directly observed therapy (DOT) and patients are provided with monthly or weekly treatment supplies. National TB treatment guidelines were developed in 2009,
algorithms and standard operating procedures (SOPs) are utilised and patients are on the correct regimen. Patients return for care every 1-2 weeks in the intensive phase, and every 2-4 weeks in continuation phase (NDOH, 2014a).

TB diagnosis depends on symptom screening of all patients (including HIV positive patients) presenting at a health facility, as well as contacts of people with laboratory confirmed pulmonary TB disease. The new TB Management Guidelines stipulate that all those who present with symptoms of TB disease MUST be investigated for TB. Once an individual is suspected of having pulmonary tuberculosis, they should have at least one sputum specimen examined for bacteriological confirmation of TB disease using the rapid diagnostic tests (NDOH, 2014a).

Traditionally, TB services have relied on passive, self presentation of persons with TB symptoms to the health care facilities. However, this can result in delayed diagnosis. Increasing community awareness of TB symptoms will increase the number of self-referrals with TB symptoms presenting earlier to a health care facility for investigation. Identification of persons with TB can also be attained through active, community or facility based interventions such as community outreach events to schools, places of work, or through screening or investigating persons who have had contact with someone with recently diagnosed TB. The aim is to screen every person for TB annually.

**Diagnosing TB**

The diagnosis of TB historically relied on the identification of acid fast bacilli through microscopic examination of stained sputum smears. Smear microscopy has good specificity for TB but has very low sensitivity in detecting TB in patients with non-cavitary pulmonary disease or low bacillary load in sputum e.g. HIV positive patients. Culture is more sensitive than smear microscopy, detecting a higher proportion of cases among patients with symptoms. Further identification is performed on positive cultures to distinguish TB from non-tuberculosis mycobacteria (NTM). However, it is an expensive and slow diagnostic technique, not accessible to some patients. Time to positive results depends on bacillary load and should be positive by 4 weeks in most cases; however a culture is only reported as negative at the end of 6 weeks incubation. Culture is however an important diagnostic tool in patients with paucibacillary tuberculosis, such as HIV positive patients with smear negative pulmonary tuberculosis and children.

- **Smear microscopy** requires approximately 10 000 TB bacilli per ml of sputum to be detected i.e. for a positive smear result.
- **Culture** can be positive with only between 10 - 100 TB bacilli per ml of sputum
- **Gene-Xpert** requires approximately 130 TB bacilli per ml of sputum for a positive result

The prevalence of TB in pregnancy has increased exponentially since the onset of the HIV epidemic and ranks third as a cause for the overall maternal mortality after sepsis and hypertensive disorders. Seventy five percent of the TB cases were infected with HIV-1 and the relative risk of death was increased 3.2 fold in women with HIV-1 co-infection than in those without coinfection. Perinatal outcomes of infants born to women with tuberculosis were significantly worse especially when the diagnosis is confirmed late in pregnancy and where adherence to treatment is poor. Occasionally, the diagnosis is only detected after the disease is confirmed in the newborn. All pregnant women should be screened for TB symptoms using the TB screening tool. Some women may be asymptomatic or may
not present with a cough but other symptoms of TB such as loss of weight (or failure to gain weight in pregnancy), night sweats and fever. Therefore if any one of the symptoms is present, investigations for TB must be conducted. If a persistent cough is present sputum examination and a chest x-ray, if safe to do so, should be performed immediately. If extrapulmonary TB is suspected appropriate investigations based on the suspected site of disease may be conducted. The tuberculin skin test (TST) is unhelpful in adults. Women with confirmed tuberculosis during pregnancy without knowledge of their HIV status and the high risk pregnant women should be offered a HIV test with provider initiated counseling and testing (PICT). Co-infection with HIV provides an indication for commencing ART regardless of CD4 count. Therefore patients diagnosed with TB before ART initiation must be started on TB treatment first and ART must be commenced within 2 – 8 weeks irrespective of the CD4 count. In HIV positive pregnant women who are on ART at the time of TB diagnosis, TB treatment should be commenced as soon as the diagnosis of tuberculosis is confirmed.

Mothers must be encouraged to breastfeed their babies whilst on TB treatment. All the TB drugs are safe for use during breastfeeding. If the mother is infectious (both smear-positive and smear-negative/culture positive PTB) surgical masks must be used to protect the child from infection.

All confirmed TB patients must be offered HIV counselling and testing. In children under 12 years of age, parents or the legal guardian of the child should be counselled and asked to provide consent for the test. Ideally, the offer of an HIV test should take place during the diagnostic work-up for TB or soon after the initiation of TB treatment. The benefits of knowing the HIV status include:

- Early diagnosis and management of other HIV-related illnesses.
- Opportunities for prevention of other infections (e.g. using cotrimoxazole).
- Access to ART
- Access to HIV care (psychosocial, nutritional, medical)
- Decreased HIV transmission and re-infection through condom use.

All individuals who present with symptoms of pulmonary TB should have at least one sputum specimen examined for bacteriological confirmation of TB disease. Rapid tests for confirmation of drug resistant TB such as Xpert or line probe assay (LPA) are recommended for early triaging and treatment initiation for patients with DR-TB (NDOH, 2014a).

SA has an established network of microscopy centres and diagnostic laboratories which perform culture and drug susceptibility testing using the Mycobacterial Growth Indicator Tube (MGIT) liquid culture system. In 2011, SA introduced Xpert MTB/RIF\(^{12}\) as a replacement for sputum smear microscopy as the first line diagnostic test for the diagnosis of pulmonary TB. Test result turn-around times (TAT) have also improved in many facilities to an average of 48 hours (NDOH, 2014b). Between March 2011 and April 2013 >1.3 million Xpert MTB/RIF tests were done in SA, which accounted for more than half of the global usage of Xpert MTB/RIF (Churchyard, 2014b). Culture and drug sensitivity testing (DST) are still used to confirm MDR-TB and resistance to second line drugs, and smear microscopy is used for monitoring progress on treatment Figures 8 and 9 illustrate the Xpert diagnostic algorithm (NDOH, 2014a).

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\(^{12}\) Xpert also detects resistance to both Rifampicin and Isoniazid
The implementation of Xpert MTB/RIF is not without challenges. Some of the challenges include: poor adherence to the Xpert algorithm - diagnostic algorithms are not always followed resulting in Gene-Xpert RIF positive patients remaining on treatment without confirmation using drug DST; need for simplification of the algorithm for monitoring treatment response and investigation of HIV-positive Xpert-negative persons with suspected TB - there was no systematic training provided for the roll out of the Gene-Xpert algorithm in all facilities which led to a widespread perception of complexity in implementing the algorithm; not all forms or registers (paper and electronic) are yet designed or updated to capture the Gene-Xpert test results which generate confusion and incomplete registration resulting in suboptimal recording and reporting of Xpert results; line probe assay (LPA) results may take a longer time and the delivery of results can often be delayed due to lack of internet access; and need to ensure an uninterrupted supply of cartridges for global demand (Churchyard, 2014b and NDOH, 2014b).

Constraints in TB screening and diagnosis:
Numerous factors impede TB screening and diagnosis. Long travelling distances in remote areas and long waiting times in PHC clinics are key barriers to access. Other factors include (NDOH, 2014b):

- Outreach TB detection services such as mobile health teams and door-to-door health visits by CHWs and NGOs are not applied systematically for those in need;
- TB screening practices and documentation in general OPDs and hospital wards are not standardised and systematic;
- Several different screening tools are used - recording is inconsistent and data on the screening and diagnostic cascade are not sufficiently analysed and used to inform quality improvements and strategic planning;
- Early diagnosis of TB in people with diabetes is important and special attention should be paid to this risk group within the scope of intensified TB case detection in health facilities, focusing first on those already diagnosed and undergoing diabetes care;
- Contact tracing is done only at PHC level and the extent of this varies between and within districts - community or other active case finding is curtailed by human and financial resource constraints. Some districts have DOTS supporters, each of whom has a DOT supporter supervisor who ensures contact tracing in their area. Hospitals do not perform contact tracing)
- Contact investigation practices are sketchy and heterogeneous. The definition of an index case that should undergo contact investigation seems flexible. In some areas, only children under the age of five years are targeted for contact investigation;
- The IPT coverage and adherence in children under five is not consistently recorded and reported;
- The role and division of labour between health care workers in PHC facilities and community health workers for contact investigation is unclear;
- There is no standardised monitoring system to assess coverage and yield of contact investigation; and
- There is no clear policy and practice for TB screening in health care workers.

Figure 8: Algorithm for Xpert diagnosis (positive)
All people with symptoms of TB
Collect ONE spot specimen (sputum, gastric washing/ lavage, lymph node fine needle aspirate, pleural biopsy, cerebro spinal fluid).
Sputum collection must be under supervision

Xpert positive
Rifampicin susceptible
Treat as Drug Susceptible TB
Start on Regimen 1

If patient has Pulmonary TB
Collect ONE spot sputum specimen for microscopy
Follow up the microscopy results and record them in the patient’s treatment record

If smear positive
Conduct contact screening/ source investigation

Xpert positive
Rifampicin unsuccessful
Treat as Drug susceptible TB
Start on Regimen 1

Collect ONE spot specimen for microscopy, LPA, or culture and DST
Follow up the laboratory results and record them in patient’s treatment record

If drug susceptible TB and smear positive
Record results
Continue treatment
Conduct contact screening/ source investigation

If Drug resistant TB, smear/ culture positive
Refer to MDR-TB treatment initiation site
Conduct contact screening/ source investigation

Source: National Tuberculosis Management Guidelines 2014
ALL PEOPLE WITH SYMPTOMS OF TB
Collect one specimen (sputum, gastric washing, lavage, lymph node fine needle aspirate, pleural biopsy).
Sputum collection must be under supervision

Xpert negative

Consider the HIV status of the patient

If HIV positive
• Re-assess the patient clinically
• Do a chest x-ray (if available)
• Collect another specimen for culture and LPA or DST

X-ray findings consistent with TB
Treat as Drug susceptible TB
Start Regimen 1

X-ray findings normal (Or x-ray not available)
• Treat with antibiotics
• Monitor response to treatment after one week

Follow up and review LPA/ DST results

If drug susceptible TB
• Continue treatment
• Start treatment if not already on treatment
• Conduct contact screening/source investigation

If drug resistant TB
• If on Regimen 1, stop treatment
• Refer to MDR-TB treatment initiation Site
• Conduct contact screening/source investigation

If HIV negative
Treat with antibiotics

Re assess the patient after one week

If well and asymptomatic
• No further follow up is required
• Advise to return when symptoms recur

If still symptomatic and sick
• Consider other diagnosis
• Refer to hospital for further investigation

If HIV negative
Treat with antibiotics
TB patient classification

The diagnosis of TB refers to the recognition of active TB disease due to Mycobacterium tuberculosis in a patient. Beyond making the diagnosis of TB, it is also necessary to categorise TB patients for appropriate treatment and to evaluate the treatment outcomes in a standardised manner. Defining the different registration classifications of patients is essential for proper notification, standardisation of the treatment for the registration types, evaluation of trends in notifications and cohort analysis of treatment outcomes. The registration type is determined by site of the disease, bacteriology, severity of TB disease and history of previous treatment of TB (NDOH, 2014a).

The purpose of classifying patients according to previous TB treatment is to identify those patients at increased risk of acquired drug resistance and to manage them appropriately. This is also important for monitoring of the TB epidemic and programme performance. The different categories are tabulated in Table 6 and are as follows:

**Table 6: TB patient classifications**

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New</strong></td>
<td>A patient who has never had treatment for TB or who has taken antituberculosis drugs for less than 4 weeks. They may have Xpert, smear, culture positive/ negative PTB or EPTB.</td>
</tr>
<tr>
<td><strong>Previously treated (Re-treatment)</strong></td>
<td>A patient who has taken TB treatment for 4 weeks or more in the past and either relapsed, defaulted or had treatment failure. They may have positive or negative Xpert, smear and culture PTB or extra pulmonary TB disease.</td>
</tr>
<tr>
<td><strong>Relapse</strong></td>
<td>A patient who received treatment and was declared cured or treatment completed at the end of the treatment period and has now developed TB again. These patients could be true relapses or have a new episode</td>
</tr>
<tr>
<td><strong>Re-treatment after failure</strong></td>
<td>A patient who received treatment and remained or became smear or culture positive at the end of the treatment period.</td>
</tr>
<tr>
<td><strong>Re-treatment after default</strong></td>
<td>A patient who completed at least one month of treatment and returns after interrupting treatment for two months or more.</td>
</tr>
<tr>
<td><strong>Other previously treated</strong></td>
<td>A patient who was previously treated but the outcome of previous TB treatment is unknown.</td>
</tr>
<tr>
<td><strong>Patients who do not fit any of the above categories are classified as “unknown previous TB treatment”</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Transfer in</strong></td>
<td>A patient who has been diagnosed and registered for treatment in a facility in one district and is transferred to a facility in another district to continue treatment. The smear conversion and treatment outcome for this patient must be reported back to the facility that transferred the patient.</td>
</tr>
</tbody>
</table>

Electronic TB register case definitions: These are used mainly for the ETR, to clearly define cohorts at district level and avoid duplication of patient records and double counting.

| **Newly Registered**               | A patient who is diagnosed and registered for treatment in a facility                                                                           |
| **Moved in**                       | A patient who is diagnosed and registered for treatment in one facility and is referred to another facility within the same district to continue treatment. The smear conversion and treatment outcome for this patient must be reported by the receiving facility |
| **Moved out**                      | A patient who is referred from a facility where the diagnosis and registration for treatment was made, to another facility, within the same district to continue treatment. This is not an outcome but serves to match patients moving within a district in order to prevent double counting. |
**Contact tracing**

The investigation of people exposed to patients with infectious tuberculosis is one of the priorities of the TB control programme. Close contacts of people with active pulmonary tuberculosis are at increased risk of infection, developing active disease and spreading it. Timely identification and adequate treatment of those with active pulmonary tuberculosis reduces the risk of exposure of community members. As a result, the incidence of tuberculosis will be diminished, as the prevalence of infection with MTB declines over time (NDOH, 2014a).

The aims of contact tracing in the context of a single index patient of drug susceptible TB are:

- To identify contacts with active TB disease and initiate treatment early;
- To identify those at high risk of developing active tuberculosis/severe outcomes, i.e. young children and immune compromised persons, to prevent the development of TB by providing IPT;
- Identify all close household contacts of MDR/ XDR-TB, without active disease for monitoring for 2 years after disease onset in index patient; and
- To provide individual/ family education on infection control and counselling

Every new patient diagnosed with laboratory confirmed PTB should trigger a contact investigation. Only patients with infectious pulmonary tuberculosis warrant the initiation of contact tracing. They should be interviewed promptly after diagnosis to assess the need for, and the urgency of contact investigation based on infectiousness and whether they have drug susceptible TB or drug resistant TB (NDOH, 2014a).

The urgency of contact investigation will depend on the degree of infectiousness of the index patient, whether they have DS-TB or DR-TB and the immunity of contacts. The following situations should receive priority for contact tracing:

- Where the index patient is “sputum smear-positive” - have the highest potential of being transmitters.
- Where the index patient has MDR-TB
- Where there are children or immune compromised people among household contacts

The key achievements of TB screening and contact investigation include: TB screening in PLHIV and in people counselled and tested for HIV (HCT, pre-ART, ART, ANC) has been scaled up in most places and is generally well implemented. Some good practices of integrated TB screening within general outreach activities is evident, such as mobile teams to remote areas and community health workers and NGOs doing door-to-door health visits (NDOH, 2014b).

**Treating TB**

The key to stopping the spread of TB in a community is to start treating patients who are coughing up live TB bacilli as soon as possible. Apart from the public health imperative, effective treatment reduces
individual morbidity and mortality. For treatment to be effective, it is essential that the correct drugs are given for the correct period of time. PTB and EPTB are both treated in the same way.

The aims of TB treatment are to:

- Cure the patient of TB
- Decrease transmission of TB to others
- Prevent the development of acquired drug resistance
- Prevent relapse
- Prevent death from TB or its complications

Standardised treatment protocols with fixed dose combination medicines are used for TB treatment.

There are now three treatment regimens:

*Regimen 1*: for new and previously treated adults and children >8yrs/ >30kg

*Regimen 3A*: for children < 8yrs and <30kg with uncomplicated TB disease

*Regimen 3B*: for children < 8yrs and <30kg with complicated TB disease

The standard treatment regimen for all patients is made up of an intensive phase lasting 2 months and a continuation phase lasting 4 months. During the intensive phase 4 drugs (isoniazid, rifampicin, pyrazinamide, and ethambutol) are used to rapidly kill the tubercle bacilli. Infectious patients become less infectious within approximately 10-14 days of starting treatment and symptoms abate. However, the majority of patients with sputum smear-positive TB will become smear-negative within 2 months. In the continuation phase, 2 drugs (isoniazid, rifampicin) are used, over a period of 4 months. The sterilizing effect of these drugs eliminates the remaining bacilli and prevents subsequent relapse.

Six months treatment is as effective in extra-pulmonary as in pulmonary disease. In some instances of severe or complicated disease (meningitis, TB bones/joints, miliary TB) treatment may need to be extended to nine months. The intensive phase remains two months and the continuation phase is prolonged to seven months – 2(RHZE)/ 7(HR) (NDOH, 2014a).

A review of the NTP conducted in 2013 identified the following strengths in the treatment of TB: availability of treatment supervision through community health workers (CHW) who are either supported with a stipend by the Department of Health (DOH) or through non-governmental organisations (NGOs); use of mobile clinics to access hard-to-reach communities such as in some farming areas; efforts to enhance defaulter tracing through the use of CHWs; increasing cross-border communications and collaboration; provision of social protection and grants to TB through social workers, facility boards and referrals by community health workers for housing, nutrition and grants; development of a migrant population tracer card in some facilities e.g. Leratong Hospital to improve the tracking of migrants (NDOH, 2014b).

Some of the challenges in providing TB treatment are: absence of a system to monitor CHWs or systematic supervision of CHWs; most patients self-medicate and funding for community DOT is not secure in the long-term; defaulter tracing interventions are not widespread, there is no guidance for CHWs on handling defaulters and no system for reporting or managing side-effects; the link and impact of the social grant schemes in improving treatment outcomes is unknown and there are
speculations of perverse incentives for the social grants for treatment outcome; the policy and process of assessing eligibility criteria for social support and grants are not standardised and patients reportedly face administrative barriers; migration for job seeking to other districts and provinces hampers effective defaulter tracing (NDOH, 2014b).

**Drug resistant TB (DR-TB)**

Patients with drug resistant TB are categorised by the resistance pattern of MTB strains isolated in their sputum or other specimen. The table below provides the category and definition of drug resistant TB patterns.

**Table 7: DR-TB patient categorisation**

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rifampicin Resistant TB (RR-TB)</strong></td>
<td>Resistance to rifampicin, with or without resistance to other TB medicines. This maybe mono, poly, multi or extensive drug resistance.</td>
</tr>
<tr>
<td><strong>Multi Drug Resistant TB (MDR-TB)</strong></td>
<td>Resistance to at least both rifampicin and isoniazid</td>
</tr>
<tr>
<td><strong>Extensive Drug Resistant TB (XDR-TB)</strong></td>
<td>Resistance to any fluoroquinolone and to at least one of the three second line injectable drugs (capreomycin, kanamycin and amikacin), in addition to multi drug resistance.</td>
</tr>
<tr>
<td><strong>Mono resistance</strong></td>
<td>Resistance to one of the first line TB medicines (rifampicin, isoniazid, pyrazinamide or ethambutol)</td>
</tr>
<tr>
<td><strong>Poly Drug Resistant TB (PDR-TB)</strong></td>
<td>Resistance to more than one first line TB medicines. This excludes resistance to both rifampicin and isoniazid.</td>
</tr>
</tbody>
</table>

Prior to 2011, treatment for DR-TB patients was centralised. Policy dictated that all laboratory diagnosed MDR- and XDR-TB patients be hospitalised in centralised MDR- and XDR-TB units until they have two consecutive negative TB cultures taken at least 30 days apart. Consequently, patients were hospitalised for long periods of time and waiting lists for patients needing admission to the centralised units were long, delaying the initiation of treatment in some provinces for three or four months. This often resulted in several patients dying before starting treatment. Recognising the challenges of a centralised system, the DOH advocated for a reduction in the length of time that MDR-TB patients are required to stay in centralised DR-TB hospitals, and decentralising and deinstitutionalising services. This culminated in the development of the *Multi-Drug Resistant Tuberculosis: A Policy Framework on Decentralised and Deinstitutionalised Management for South Africa*. The framework identified a need for decentralised TB Units within districts, over and above the centralised TB Hospitals (Centre of Excellence) within provinces. These units may consist of whole hospitals, wards or sections of existing provincial, district or sub-district level hospitals. Patients diagnosed with MDR-TB who are smear microscopy positive are hospitalised at the decentralised DR-TB units for up to eight weeks or until they become smear negative on two consecutive tests. After the assessment and initiation of MDR-TB therapy at a centralised or decentralised DR-TB unit, patients may be referred to a satellite MDR-TB unit where they can receive treatment and be monitored daily. Nurses, with the support of a doctor based at the centralised or decentralised DR-TB sites should monitor the health of the patient. Satellite units may be based at district or psychiatric hospitals, community health centres, or correctional services facilities. An improvement in the patient’s medical condition (e.g., weight gain, no fever, no cough, etc.) indicates that he/she is tolerating all MDR-TB drugs and HAART and is smear negative,
and can thus be discharged to the community and continue receiving treatment either from the mobile team or their nearest primary health-care facility. PHC facilities treating MDR-TB patients are supported by the nearest decentralised DR-TB unit or the centralised DR-TB unit/provincial centre of excellence if it is closer to the facility (NDOH, 2011).

Figure 10: Decentralised management of MDR-TB


The introduction of rapid diagnostic tools for rifampicin resistant TB (RR-TB) and MDR-TB has drastically reduced the time to diagnosis. It is important to always evaluate the clinical condition of the patient and not rely solely on a laboratory result, because there could be errors due to administrative factors or contamination of the sample. If a laboratory result is not consistent with the clinical picture, the test should be repeated.

Although the DR – TB treatment initiation sites have the key responsibility for the treatment of MDR-TB, primary health care facilities have an important role to play in:

- Ensuring early diagnosis of DR-TB in patients
- Refering all confirmed DR-TB patients for treatment immediately
• Conducting screening and testing of all DR-TB contacts
• Providing on-going care post discharge from the MDR-TB treatment initiation sites
• Providing counselling and support to patients with DR-TB, their families and contacts

On discharge from MDR hospital, patients will continue treatment at the PHC facility and be evaluated monthly by the MDR unit:

• mechanisms for feedback on patient follow up and adherence monitoring should be established between the MDR unit and PHC facility prior to discharge
• the PHC facility should receive MDR drugs from the MDR hospital on a patient name basis and provide these to the patient through clinic DOT or home based care
• Adequate records of individual patient progress as well as hospital registers are required to monitor overall response to treatment and track treatment outcomes

Extremely drug resistant TB (XDR-TB) is extremely difficult and expensive to treat. It has very high mortality, with rates of over 90% recorded amongst HIV co-infected XDR patients in Tugela Ferry, KwaZulu-Natal. Prevention is key to the control of XDR-TB. Just as good case management of new and retreatment cases will prevent MDR-TB, good case management of MDR-TB will prevent XDR-TB. There is probably no difference in the spread of XDR-TB to any other form of TB (NDOH, 2014a and Alcorn, 2015). The national rollout of Xpert MTB/RIF has enabled rapid diagnosis of rifampicin resistance. As a result SA is in the process of withdrawing the use of streptomycin for retreatment TB. Rifampicin-susceptible retreatment TB cases are treated with a first-line regimen, and rifampicin-resistant retreatment cases are managed according to MDR-TB guidelines (Churchyard, 2014b).

According to the 2013 review of the TB programme, strengths of the MDR-TB programme include: decentralisation of care for patients with MDR-TB throughout all levels, including community-based care in some districts; increased number of sites initiating MDR-TB treatment, from 11 in 2009 to 45 in 2013; well-established continuum of care for patients with MDR-TB, and health services are well organised to provide patient care from in-patient, OPD to community in several settings including palliative care; mechanisms exist to ensure the availability of appropriate medication such as Bedaquiline for the treatment of pre-XDR-TB in all provinces; national guidelines and procedure are followed and standardised treatment regimens are provided for patients; innovative interventions exist in some of the provinces, such as community based injection teams in KZN, EC, WC and nurse initiated MDR-TB treatment being piloted in KZN (NDOH, 2014b).

Numerous challenges are still experienced in managing MDR-TB which include: insufficient resources to ensure decentralisation of MDR-TB services country-wide, treat pre/XDR cases (including limited availability of appropriate second-line drugs and paediatric formulations) and to ensure consistent nutritional support; inadequate bed capacity; poor infection control; poor treatment outcomes with high death rates and loss to follow up (high initial loss to follow-up of MDR-TB patients, with approximately 40% of patients not initiating appropriate treatment), which will be a key challenge for achieving the 2016 target of treatment success rate of 60% (a significant proportion of mortality occurs after discharge from hospital before the patient enters the PHC system); poor management of XDR-TB treatment failures due to diagnostic and therapeutic challenges; poor communication between facilities and the MDR-TB unit, whereby some facilities are not aware when the patients are discharged from the unit, and that they have to supervise oral treatment and record side effects (a
disconnect exists between responsibility for contact tracing at local facilities and the impact of non-contact tracing at referral treatment centres); poor adherence to treatment; inadequate oversight of decentralised sites by the centre of excellence in line with the South African guidelines for decentralisation (NDOH, 201b and Churchyard, 2014b).

**Decentralisation of MDR-TB treatment in KZN and NWP**

The USAID TB Program in SA is assisting the NDOH to implement the DR-TB Patient-Centred Model of Care to increase case detection and improve DR-TB treatment outcomes, thereby reducing further DR-TB transmission. The model is based on the understanding that good clinical practice, consistent documentation of data, and two-way communication between operational and clinical managers, leads to improving the quality of DR-TB programs.

In January 2015, a launch event celebrated the official opening of functional decentralized DR treatment sites in Bojanala and Ngaka Modiri Molema districts in North West Province. North West is only the second province, after KwaZulu-Natal, to achieve full realization of DR TB decentralization. In November 2014, the first 90 stable MDR TB patients were down referred to the Job Simankane Tabane Hospital, Rustenburg in Bojanala District. The hospital is also now currently initiating newly diagnosed MDR TB cases onto treatment. In Ngaka Modiri Molema District, 43 MDR TB patients were down referred to the decentralized site at Gerlukspan Hospital. A ceremony was held for these patients, welcoming them to the new site closer to their homes and to encourage them to adhere to treatment. The decentralization process includes identification and training of doctors, facility readiness assessments and development of quality improvement (QI) plans and district workshops to develop standard operation procedures (SOPs) for activating decentralization sites (Stop TB Partnership, 2015).

**Treatment success rate**

South Africa’s treatment success rate amongst smear-positive and smear-negative/extrapulmonary TB has improved. The treatment success rate in 2010/2011 was reportedly 79% for new smear-positive (and/or culture positive), and 76% for new smear-negative extra-pulmonary patients. The improvement is largely attributable to an increase in cure rates and a decline in the treatment default rate as a direct result of the introduction of community-based tracing teams (WHO, 2012; WHO, 2013 and Churchyard, 2014b). The NSP set a target of a cure rate ≥75% by 2011, and the Global Plan to Stop TB set a target of 90% by 2015 (NDOH, 2007 and WHO, 2012). The treatment success rate among retreatment cases remains poor at 66.3%. Of concern, up to 25% of sputum smear-positive TB cases are lost to follow-up before treatment initiation, which may contribute to ongoing transmission and an increased risk of death (Churchyard, 2014). Generally, there has been a steady increase in the treatment success rates for new smear-positive cases (with spikes) since 1999; and a steady decrease for retreatment as well as new-smear-negative cases since 2006 (NDOH, 2014b).

**New treatment modalities for drug resistant TB**

In order to improve cure rates of MDR-TB, clofazimine and linezolid has been made available and a bedaquiline access programme has been introduced (Churchyard, 2014a). RIFAQUIN is a unique TB trial investigating both shortening and simplifying treatment, and used higher doses of Rifapentine than other studies that have looked at shortening TB treatment using Fluroquinolones. Results of further trials will be available in 2018 (Jindani, 2014).
Preventing TB

The third pillar of TB control, prevention, has been a neglected aspect of TB control. Global TB prevention strategies include: treatment of latent TB infection among high-risk persons; case finding to detect and treat infectious TB earlier, reducing the duration of infectiousness and transmission; early ART for people living with HIV; and TB vaccination strategies. In 2002, SA adopted the ‘3Is’ policy, namely Isoniazid preventive therapy (IPT), Intensified case finding, and Infection control as its TB prevention strategy (Churchyard, 2014b).

IPT

The IPT guidelines for tuberculin skin test (TST)-positive people living with HIV were initially incorporated into the SA ART guidelines in 2005. In 2010, due to poor uptake of IPT, largely due to TST creating a programmatic barrier to implementation and concerns of generating isoniazid resistance, SA revised its national IPT guidelines, in line with the WHO recommendations, and removed TST as a requirement to initiate IPT. The uptake of IPT increased dramatically and more than 375 000 South Africans living with HIV were started on IPT in 2011 and 2012, respectively, making the IPT programme one of the largest in the world. However, uptake of IPT among people living with HIV in care remained low, including among pregnant women. The SA IPT guidelines were re-issued in 2013 and recommend at least 36 months of IPT for TST-positive HIV-infected persons, including people on ART; 6 months of IPT for those whose TST status is unknown, regardless of whether they are on ART or not; and 12 months of IPT for persons on ART if their TST is negative (Bristow, 2012; NDOH, 2013a and Churchyard, 2014). Clinical guidance on the treatment of latent TB in individuals with silicosis includes utilisation of TST to guide treatment of latent tuberculosis and the increase of the duration of INH treatment to 36 months (de Jager, 2014).

A recent study (Thibela TB study) conducted a trial of mass (community wide) INH preventive therapy for TB control among gold miners in SA. The research evaluated an intervention to interrupt tuberculosis transmission by means of mass screening that was linked to treatment for active disease or latent infection. Mass screening and treatment for latent tuberculosis had no significant effect on tuberculosis control in South African gold mines, despite the successful use of isoniazid in preventing tuberculosis during treatment – at the individual level, community-wide IPT reduced TB incidence among gold miners, however, at the population level, community-wide IPT did not improve TB control in gold mines (Chihota (undated); and Churchyard, 2014b).

ART reduces the risk of TB infection by 65% overall, and across all CD4+ strata, whilst IPT given with ART is safe and further reduces the risk of TB by 37%, regardless of TST status (Suthar, 2012 and Rangaka, 2012). The suggestion is that scaling up the provision of IPT to patients on ART and simultaneously striving to achieve high coverage of ART and considering initiating ART earlier, including in pregnant women, will maximize the contribution of the ART programme to TB control in the country (Suthar, 2012).

Intensified case finding

TB screening of high-risk persons or groups may contribute to reduced deaths and TB transmission. The WHO recommends that people living with HIV are systematically screened for TB at each contact with the health service, using a symptom screen. In 2012, 949 800 HIV-positive South Africans were screened for TB, which is still substantially below the total number of people living with HIV (WHO, 2012). In 2011, a national multifaceted TB screening programme was developed and implemented.
with a focus on high-burden districts. The programme includes household contact tracing, HIV counselling and testing campaigns, community mobilisation, door-to-door enquiry in areas with a high burden of smear-positive TB, and screening of high-risk populations. According to an unpublished report, during 2011, >150 000 household contacts were screened for TB and >3 000 new cases, which would not have been detected through routine means (Churchyard, 2014). This report also states that challenges to the sustained implementation of household-based case finding include funding, human resource constraints and lack of customised recording and reporting tools. In March 2015, the NDOH launched a mass TB screening campaign focused on key population groups.

TB has been a major health threat in the SA mining industry since its inception in the late 1800s. SA gold miners have one of the highest TB incidence rates in the world, currently estimated at 3 000/100 000 population (Churchyard, 2014a). In a historic move, the Minister of Health, Dr Aaron Motsoaledi, along with the ministers of health of Lesotho and Swaziland and others, initiated the development of a Southern African Development Community (SADC) declaration signed by the heads of state that provides a framework for addressing TB in the mines at a regional level. This constitutes the first ever comprehensive multidisciplinary regional response to TB in the mines (Churchyard, 2014 and SADC, 2012).

TB is also a major health problem in SA prisons due to overcrowding. The prevalence of undiagnosed active TB is estimated at 2.4% (Telsinghe, 2011). Effective case-finding strategies linked to early treatment initiation to ensure cure are needed. In 2013 the NDoH and the Department of Correctional Services (DCS) launched the new Guidelines for the management of Tuberculosis, Human Immunodeficiency Virus and Sexually-Transmitted Infections in Correctional facilities 2013 for the effective control of TB in prisons (Churchyard, 2014b and NDOH, 2013b).

Infection control

The third “I” in government’s TB prevention strategy refers to infection control. People living with HIV, young children and health care workers are high risk groups of exposure to drug-susceptible and -resistant TB when attending health facilities for care and nosocomially. It is thus pivotal to stringently implement infection control policies in order to reduce transmission of drug-susceptible and -resistant TB in healthcare facilities and other congregate settings (O’Donnel, 2010 and Churchyard, 2014b). South Africa introduced a TB infection control programme in 2007 and the Council for Scientific and Industrial Research (CSIR) developed minimum standards for health facilities (NDOH, 2007). In spite of policy directives and strategies, infection control remains sub-optimal in health facilities. There is adequate compliance to use of masks, ultraviolet lights and extractor vents and sections for non-converters and converters in special MDR clinics, but there is limited infection control in general TB services. Infection control focal point persons have been appointed at facility level, but there are few infection control committees or formal risk assessments done as per recommendations. Infection control has been integrated into the Quality Assurance (QA) programme and regular QA meetings are held. Infection prevention and control (IPC) policies, SOPs, IPC plans and risk assessment tools generally exist and copies of the latest infection control guideline are available. Patient triage occurs and health workers have adequate knowledge on triage and fast tracking patients with cough. Collection of sputum samples is done in well-ventilated areas outside wards and consultation rooms and TB isolation wards exist. Pre-screening is performed for new employees, and at exit. Open door and open window policy is practiced widely and structured safe biohazard disposal mechanisms are in place. Constraints to infection control include: facility waiting areas with poor infection control.
design; absence of TB and HIV surveillance of health care workers in spite of high incidence; absence of facility infection control plans and facility risk assessments; staff perceptions of facilities infrastructure limitations being a barrier to implementing effective infection control measures; difficulty effecting ventilation-related renovations due to involvement of other departments such as public works; non-standardised QA monitoring checklist leading to lack of monitoring of airborne infection control; absence of a clear policy and practice for systematic TB screening in healthcare workers (facilities apply different approaches, ranging from no regular screening to six monthly screening, usually using the 4-symptom screening tool) (NDOH, 2014b).

It is extremely important that health facilities be monitored regularly to ensure consistent and standardised implementation of infection control guidelines. Infection control measures in other congregate settings, such as correctional service facilities, community halls, schools and public transportation (taxis and buses), should also be adhered to and monitored (Churchyard, 2014b).

**Management of children with TB**

The national guidelines for the management of paediatric TB were published in 2013. These state that “All services that provide maternal and child health care at primary and secondary level must screen children at high risk of TB and mothers for TB, initiate TB treatment early in those diagnosed with TB, offer TB preventive therapy to those who are eligible and antiretroviral treatment to TB/HIV co-infected children and mothers. In addition families and communities must be educated on general infection control and cough hygiene to prevent further transmission in households and places of congregation.” (NDOH, 2013c).

High risk groups which should be screened include:

- Children who live in the same household with a person diagnosed with smear and/or culture positive PTB (infectious TB),
- HIV positive children
- Children less than five years
- Children with severe malnutrition

Risk factors for the progression from infection to TB disease in children include:

- **Age of the child:** Young children especially those under 2 years of age have the highest risk of developing disease. Another high-risk age group is adolescents who get infected for the first time during adolescence. Children going to primary school have the lowest risk.
- **Immune suppression:** HIV infected children, severely malnourished children, especially those with kwashiorkor, and following a bout of measles.
- **Recent infection:** most children who progress to disease do so within 12 months of being infected.

### Danger signs that require immediate referral to hospital as they indicate serious, life-threatening forms of TB:

- Headache (especially if accompanied by vomiting), irritability, drowsiness, neck stiffness and convulsions (signs of TB meningitis);
- Meningitis not responding to treatment, with subacute onset or raised intracranial pressure;
- Enlarged liver and spleen (signs of disseminated TB);
- Distended abdomen with ascites; Breathlessness and peripheral oedema (signs of pericardial effusion);
Severe wheezing not responding to bronchodilators (signs of sever bronchial compression); and
Acute onset of angulation (bending) of the spine.

Source: Guidelines for management of TB in children

The treatment principles are the same as for adults. Treatment is comprises of 2 phases: an intensive
phase of 2 months with 3/4 drugs and a continuation phase of 4 months with 2 drugs. In severe/
complicated TB disease the treatment may be given for a longer time by prolonging the continuation
phase to 7 months (instead of 4 months). The drug dosages depend on the body weight of the child
and should be adjusted as weight changes during the course of treatment. Parents and caregivers
should be counselled about TB and the importance of adherence to treatment and of good nutrition –
nutritional supplements may be used if necessary.

Adverse events caused by TB drugs are much less common in children than in adults (NDOH, 2013c).

Treatment outcomes for childhood TB show a positive trend, with 82% of cases successfully treated
in 2010 (WHO, 2013). Notable advances in childhood TB include changing the age and disease
categories for reporting, simplifying contact management of TB-exposed children and children living
with HIV; integrating management of childhood TB with HIV and other child health services such as
the Expanded Programme on Immunisation (EPI) and Maternal and Child Health (MCH) (Churchyard,
2014b). Many challenges persist for management of childhood TB, including: TB screening and contact
tracing activities mainly focus on children under-five years of age, leading to missed opportunities for
identifying cases among older children in the household of index cases; the perception of TB diagnosis
as a challenge and misplaced confidence on BCG vaccination pose further impediments for
investigation and early detection of TB among children; health workers also lack confidence in
managing a child with HIV associated TB who is usually referred to specialists for further management,
often in the absence of mechanisms of follow up; similarly, few children are identified and managed -
for example, in one review, three out of 156 children at Nelson Mandela MDR facility were identified
and managed, which suggests missed opportunities to identify such cases in health facilities
particularly at the lower level of the health system. There is also: a lack of fixed-dose combinations for
first-line drugs; limited child-friendly second-line drug formulations (syrups); poor implementation of
IPT in HIV-infected child contacts; non-standardised diagnosis of paediatric TB and EP-TB; gaps in
recording and reporting of childhood TB (absence of detailed data on the diagnostic process in
children); weak health systems to manage paediatric TB; and poor linkage to care, particularly from
the hospital to the community (NDOH, 2014b and Churchyard, 2014b).

TB and alcohol

High alcohol consumption (on average >40g alcohol per day) with or without an alcohol use disorder
is associated with three fold risk of developing TB. Low to medium alcohol consumption is not
associated with an increased risk of TB disease. Alcohol use disorders are associated with clinical
conditions that may impair the immune system and alcohol has a direct toxic effect on the immune
system. Excessive alcohol use is also associated with poor TB treatment adherence, and a number of
studies have found higher relapse rate among heavy drinkers and those with alcohol use-related
health disorders (NDOH, 2014a). TB patients must be asked about history of or current alcohol use.
The Alcohol Use Disorders Identification Test (AUDIT) will help identify people with hazardous/ risky
drinking, harmful drinking and alcohol dependence. As alcohol-use disorders can cause the
deterioration of living conditions and impact negatively on TB treatment outcomes, appropriate
measures should be routinely offered to those screened positive for harmful drinking and alcohol dependence. The appropriate interventions based on the AUDIT scores are summarized in the table below (NDOH, 2014a).

**Table 8: AUDIT interventions**

<table>
<thead>
<tr>
<th>Scores</th>
<th>Category</th>
<th>Intervention</th>
</tr>
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<tbody>
<tr>
<td>0-7</td>
<td>Low risk</td>
<td>Alcohol education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1) Inform the patient about the screening results</td>
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<td></td>
<td></td>
<td>2) Identify risks and discuss consequences</td>
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<tr>
<td></td>
<td></td>
<td>3) Provide medical advice</td>
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<tr>
<td></td>
<td></td>
<td>4) Solicit patient commitment to reducing/stopping alcohol use</td>
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<tr>
<td></td>
<td></td>
<td>5) Identify goal (reduced drinking or abstinence)</td>
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<tr>
<td></td>
<td></td>
<td>6) Give advice and encouragement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7) Provide educational materials</td>
</tr>
<tr>
<td>8-15</td>
<td>Excessive</td>
<td>Simple advise and patient education</td>
</tr>
<tr>
<td>16-19</td>
<td>Harmful and hazardous drinking</td>
<td>Simple advise, brief counselling and continued monitoring</td>
</tr>
<tr>
<td>20-40</td>
<td>Alcohol dependence</td>
<td>Referral to specialist for evaluation and treatment</td>
</tr>
</tbody>
</table>

SOURCE: National Tuberculosis Management Guidelines 2014

**TB and Silicosis**

Silicosis is an occupational lung disease caused by inhalation of silicon dioxide in crystalline forms such as quartz, cristobalite or tridymite. Workers at greatest risk are those that blast rock and sand such as miners, quarry workers and stone cutters. There are three forms of silicosis - classic/chronic, accelerated and acute. Silica dust is a risk factor for the development of pulmonary tuberculosis. Silica impairs the alveolar macrophages thus weakening the lung’s defence mechanisms against MTB. The bacilli can remain encapsulated within the silicotic nodules and can cause reactivation of tuberculosis in patients with silicosis (NDOH, 2014a).

Silica and Silico-tuberculosis in exposed workers is a compensable disease according to the Occupational Diseases in Mines and Works Act, 1973. The Act covers mine and quarry workers diagnosed with pulmonary TB whilst in employment or within 12 months of leaving such employment. If the patient has pre-existing silicosis, the claim can be submitted irrespective of when the patient left employment. Such claims should be submitted to the Medical Bureau of Occupational Diseases (NDOH, 2014a).

**TB and Diabetes**

Diabetes prevalence is increasing in South Africa, and diabetes is a risk factor for TB. TB in people with diabetes may constitute a significant proportion of the burden of TB, especially in the HIV-negative population. Moreover, diabetes can complicate the treatment of TB and is associated with higher TB death and relapse rates (NDOH, 2014b). The same treatment regimen as for all other patients is followed for TB patients with diabetes. However, TB treatment may be extended to nine months in patients who have severe TB disease. Pyridoxine (10-25mg/day) should be added to the treatment in order to prevent INH induced neuropathy as diabetic patients are at higher risk of developing peripheral neuropathy. Monthly blood glucose monitoring must be conducted during TB treatment. There should also be optimal glycaemic control by ensuring compliance to treatment, and education of the patient about lifestyle changes – diet, physical activity (NDOH, 2014b).
Monitoring and Evaluation (M&E)

At a macro level, the achievement of TB outcomes, as articulated in the NSP, will be monitored through the NSP M&E Framework. The M&E Unit within the SANAC Secretariat is responsible for implementing the M&E framework at national level. The M&E units within the Provincial AIDS Councils and sectors, in turn, assume the same responsibility at provincial and sectoral levels, to ensure continuous feedback of relevant and accurate information (NDOH, 2011).

At a departmental level, the Department of Health has developed an M&E framework to monitor the implementation of the National TB Control Programme. Table 7 outlines the core indicators used to monitor the implementation of the TB programme.

At a facility level, a cascade analysis of the data from suspicion to treatment outcome must be conducted on a monthly and quarterly basis. This will help to identify leakages or gaps in patient management within the facility and enable the facility to implement strategies to address them timeously, and thus prevent adverse treatment outcomes.

The electronic TB register (ETR.net) is a programme management tool used at sub/district level. The information submitted to the sub/district is entered into the electronic register and data is validated and analysed using ETR.net. Data is then transmitted electronically from the sub/district level to the provincial level where it is aggregated and analysed before it is transferred to the national level. Specific data elements are exported to the district health information system (DHIS) at sub/district level.

The indicators and definitions used in the NTP are attached as annexures
Best practices in TB prevention, control and care

National good practices

Human resources strengthening and M&E
Impediments in effectively controlling TB are both systemic and client-related. One component of TB control is increasing demand for services. However, this has to take place concurrently with improved services (supply) to accommodate increased demand. Hence health system strengthening remains a key recommendation and strategy in global TB policies and initiatives. During 2004-2009, the cure rate for new smear-positive clients in Cape Town increased from 67% to 80%, with one sub-district improving from 52% to 78%. This significant improvement was largely attributed to i) increased funding for the TB control programme to employ additional nursing staff and to create two new cadres at most of the high-burden PHC facilities (i.e. TB clerks responsible for programme administration and TB assistants who conduct home visits to recall sputum-positive TB suspects and trace defaulters); ii) improved M&E with quarterly HIV/TB/STI reviews attended by sub-district and facility staff (routine data were used to identify and support poorly performing facilities); iii) increased training and mentoring on local protocols, and increased resources through linkages with the ART programme brought about by enforcing integration of HIV and TB services at the point of patient care; iv) prioritising the TB programme through implementing performance management for sub-district managers (this encouraged sub-district managers responsible for implementing the TB programme at sub-district and facility level, to actively manage the TB programme) (Scott, 2012).

Capacitating and empowering managers to monitor the implementation of the TB programme is a key success factor in TB control. Conducting clinical audits using the Integrated HAST Evaluation tools improved the management of TB at facilities offering TB treatment in Cape Town. The following are success factors of the participatory audit process (Scott, 2012):

- The audit validated and supplemented the routine data (routine data is limited in scope and open to errors in transcription from folder to paper register and then to electronic database). In instances where major gains in cure rates were reported, leading to sub-district managers assuming that the target of 85% success rate was within reach, the audit provided detailed information of access to and quality of the TB programme, and identified gaps in effectiveness that needed to be addressed.
- The audit introduced treatment commencement time (TCT) as a useful indicator at facility and sub-district level, where facility and sub-district managers could identify local health system interventions to reduce delays.
- The audit promoted early case detection in HIV-positive patients, and highlighted gaps in access for child contacts.
- The audit reinforced the treatment guidelines and standard operating procedures, and provided HAST coordinators with a mentoring opportunity.
The audit resulted in quality gains in HIV care for co-infected patients, BMI calculation and contraception assessment rates.

The audit engaged staff in problem solving to identify constraints and plan improvement in service delivery.

The participatory nature of the audit process involving facility and sub-district staff in self-and peer-review, and generating facility and sub-district results, fostered a quality improvement process that was local and relevant.

The audit workshops and quarterly M&E sessions created opportunities for sharing best practices amongst managers and staff.

Community contact tracing

Facility-based active TB case finding in people living with HIV (PLHIV) and provider initiated HIV counselling and testing (HCT) for people with TB have become routine practice. However, TB contact tracing within high burden settings remains a low priority, in spite of the lack of awareness of TB and HIV status being an obstacle to accessing care and thus resulting in preventable morbidity, mortality and continued transmission (Deery, 2014). In 2012, the WHO released recommendations for investigating contacts of TB cases in low and middle-income settings, which encompassed contact investigations for index cases with smear-positive TB, MDR-TB, PLHIV and children under 5 years, and prioritising contacts with symptoms suggestive of TB, children under 5 years and PLHIV\(^3\). Visiting households of index TB cases in high TB and HIV prevalence settings, and screening their contacts for TB and HIV, provide high yields of TB, particularly in the under 5 age category, as well as high yield of new HIV diagnosis. Household TB contact tracing programmes also facilitate assessment for TBPT and improves efficiency of both TB and HIV services due to the integration of contact training within the same programme (WHO, 2012a).

TB preventive therapy

Latent TB Infection (LTBI) refers to individuals infected with M. tuberculosis but harbour the organism in a latent state, characterised by slowed or intermittent metabolism and replication below the level necessary to produce clinical illness (WHO, 2012a). The lifetime risk of reactivation of latent infection in healthy HIV-uninfected individuals is 10%, with 5% developing TB during the first 2 - 5 years after infection. The risk is greatly increased by HIV infection, with the WHO estimating that in countries with a generalised HIV epidemic, HIV-infected persons have a 20 - 37-fold greater risk of developing TB than HIV-uninfected persons (WHO, 2012a). Antiretroviral treatment (ART) reduces the risk of TB by approximately two thirds, yet TB remains a common cause of morbidity and a leading cause of early mortality in individuals on ART (Badri, 2002; Lawn, 2010; Lawn 2008 and Churchyard 2014).

There is substantial evidence to support isoniazid preventive therapy (IPT) use, particularly continuous IPT (cIPT), in HIV-positive people as part of a combination of TB prevention strategies to reduce individual risk of TB and to contribute to TB control. The South African IPT guidelines were re-issued in 2013 and recommend at least 36 months of IPT for tuberculin skin test (TST)-positive HIV-infected persons, including people on ART; 6 months of IPT for those whose TST status is unknown, regardless of whether they are on ART or not; and 12 months of IPT for persons on ART if their TST is negative (Bristow, 2012; NDOH, 2014a; and Churchyard, 2014).
A study conducted in Botswana revealed that among HIV-infected participants who received 36 versus 6 months of IPT, TB incidence was reduced by 43% overall and among TST-positive participants, TB incidence was reduced by 74% (Samandara, 2011). In a South African study, the incidence rates of TB or death among TST-positive, HIV-infected SA adults were similar between participants who received cIPT or 6 months of IPT in the intention-to-treat analysis[34], whereas the incidence of TB or death was reduced by 58% in the cIPT arm of the study compared with the 6 months of IPT arm of the study in the per protocol analysis (Martinson, 2011 and Churchyard, 2014).

Mathematical modelling has suggested that high coverage of IPT, particularly if it is given continuously and in combination with other treatment and prevention strategies, will contribute to TB control and accelerate progress towards elimination of the disease (Chihota, 2012 and Dye, 2013). Therefore, as a preventive strategy, IPT is safe, does not generate isoniazid resistance, and reduces the risk of TB among persons living with HIV, particularly if given continuously to those with evidence of TB infection. Churchyard et al (2014) recommends continuous IPT use in combination with other TB treatment and prevention strategies as a mechanism to contribute to TB control.

**International best practices**

The fifth component of the Stop TB Strategy: “Empower people with TB, and communities through partnership”, is largely implemented through Advocacy, Communication and Social Mobilization (ACSM) interventions, which albeit a new technology, have contributed to a positive outcome of tuberculosis (TB) control. A significant element that sets ACSM strategies apart is their focus on patient and community empowerment. This element promotes the integration of community-based programming into the predominantly medical and vertical health service delivery model that has traditionally been employed by TB control programmes.

The ACSM model is a critical tool for augmenting the efficacy of the overall TB control activities, especially as pertaining to vital goals such as:

- improving the rate of early case detection and treatment adherence
- combating stigma and discrimination against TB patients
- creating an enabling environment to empower people affected by the disease, and
- mobilizing political commitment and resources to address TB.

Table 11 summarises some of the good practices that have been documented in the implementation of ACSM interventions in TB programmes.
### Brazil

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Outcomes</th>
<th>Lessons Learned</th>
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<tbody>
<tr>
<td>Intensive training and engagement of community health agents to both work directly in the community to provide TB services, and to build social support networks for patients and families.</td>
<td>• Treatment success rate increased from 70% in 2003 to 86% in 2007, and the treatment defaulter rate was 3.9%.</td>
<td>• A high degree of trust is created by using community agents from within communities in which they work, resulting, among other positive outcomes, in potential patients approaching the community agents for guidance, thus aiding early detection and subsequent care.</td>
</tr>
<tr>
<td>Forty (40) community agents were trained to provide the following comprehensive package of DOTS, under the leadership of two nurses:</td>
<td>• A high degree of trust is created by using community agents from within communities in which they work, resulting, among other positive outcomes, in potential patients approaching the community agents for guidance, thus aiding early detection and subsequent care.</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
<tr>
<td>• collection and storage of sputum samples (diagnostic and follow-up), safe transport to the lab located outside Rocinha and feedback of results to patients</td>
<td>• Contact tracing within households and peer communities (e.g. friends, work, bar, school, etc.)</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
<tr>
<td>• contact tracing within households and peer communities (e.g. friends, work, bar, school, etc.)</td>
<td>• Prophylaxis for contacts &lt; 5 years old and HIV positive</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
<tr>
<td>• prophylaxis for contacts &lt; 5 years old and HIV positive</td>
<td>• Follow-up with patients to ensure that they go to their monthly medical check at the TB dispensary outside Rocinha, with arrangement of transport, if needed</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
<tr>
<td>• follow-up with patients to ensure that they go to their monthly medical check at the TB dispensary outside Rocinha, with arrangement of transport, if needed</td>
<td>• Provision of directly observed therapy (DOT) at the homes of patients who cannot come to receive daily DOT at the health centre</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
<tr>
<td>• provision of directly observed therapy (DOT) at the homes of patients who cannot come to receive daily DOT at the health centre</td>
<td>• Updating patient treatment cards</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
<tr>
<td>• updating patient treatment cards</td>
<td>• Additional care as needed (e.g. food, treatment for side effects, socio-emotional support, with special efforts made in the case of patients suffering from alcohol and drug problems) to ensure treatment adherence.</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
<tr>
<td>• additional care as needed (e.g. food, treatment for side effects, socio-emotional support, with special efforts made in the case of patients suffering from alcohol and drug problems) to ensure treatment adherence.</td>
<td>In addition, the community agents also undertake a wide range of health education activities in the neighbourhood, such as visiting day-care centres, schools, churches and community organizations.</td>
<td>• The community agents offer each patient and family information about national social support policies for impoverished, unemployed and/or disabled Brazilians. This instruction has resulted in patients receiving considerably enhanced financial support when they start their treatment, a major factor in the low defaulter rate and higher quality of life.</td>
</tr>
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</table>

In addition, the community agents also undertake a wide range of health education activities in the neighbourhood, such as visiting day-care centres, schools, churches and community organizations.
<table>
<thead>
<tr>
<th>Country</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Lessons Learned</th>
</tr>
</thead>
</table>
| Burkina Faso | In addition to distributing informational pamphlets and promotional materials, they perform puppet theatre and participatory Information, Education and Communication (IEC) and coordinate health campaigns in collaboration with local radio and television stations, which provided free airtime. Mobilization of civil society and community organizations to implement an integrated programme of community education and community-based case management to achieve improved case detection and treatment completion. Eleven (11) local organizations were selected to both implement activities directly and to support the efforts of nearly 300 associations to reach the most vulnerable populations. Once trained, the participating associations – with the support of 18 diagnostic and treatment centres – were able to implement BCC activities. One of the most important interventions was a series of TB sensitization activities that, while applicable to the entire population, was particularly targeted at such vulnerable populations as PLHIV, nomads and urban slum dwellers. Also promoted the participation of traditional healers, home-care providers and community leaders, seeking to utilize their links in the community to encourage referral of suspects and to promote better awareness of TB within their networks. | - Sputum checked 6670 TB suspects, of which 580 (8.7%) tested positive for TB.  
- Psychosocial support such as home visits and provision of meals provided to 4184 TB patients  
- Contact tracing was implemented through community case management, with 170 contacts agreeing to be tested and 77 (45%) testing smear positive. | - Contributions of communities to case detection can yield impressive results where contagious smear-positive cases are concerned.  
- Involving communities in contact tracing as part of community-based case management can also produce a high yield of new smear-positive cases.  
- Community associations were ability to adapt their materials and communication strategies for each particular target group which increased reach  
- The use of a partner approach to engage relevant stakeholders and effective coordination between government and civil society groups increased the effectiveness of the intervention. |
| Cambodia | The project aimed at mobilizing community pharmacies – who an overwhelming number of individuals use as the first line of health care and thus serve an unusually important role in Cambodia’s health care sector – to get directly involved in the identification and referral process of clients with signs and symptoms of TB. A key | - 1573 private providers, 520 DOTS health centres and 38 referral hospitals were recruited  
- All private providers signed memoranda of understanding | - It was vital that the government upheld its responsibility to report on activities to ensure that non-follow-up levels were kept low, and that communications with the private |
Country | Element in the feasibility of this process was the willingness of the pharmacy owners to take part in the referral process without expecting any payment, and with the full knowledge that their participation would potentially result in lost revenues. This sense of charity owes to them being community-minded and also, to an extent, from the Buddhist belief in “making merit” or doing good deeds to achieve good karma.

The pharmacy owners’ and their staff members’ TB assessment skills were enhanced and so too were the mechanisms that enable them to effectively refer people with signs and symptoms of TB to DOTS health centres and referral hospitals. The project also worked to increase the ACSM capacities of the National TB Programme staff at all levels enabling them to design, implement, and monitor site-specific ACSM plans.

One other goal was to strengthen both the public and private sectors in TB case management. In the public sector this was achieved through various ACSM interventions that provided the health staff at all levels with better understanding of their clients and their needs, and strengthened their communication skills resulting in improved client-provider interactions and client satisfaction. The Cough-to-Cure Pathway model was used to help the health staff to identify barriers at all stages of the continuum of care where their clients have greater opportunity to drop out and develop appropriate interventions. This further resulted in the increased numbers of referrals reported reaching the DOTS services.

Dominican Republic | Build strategic partnerships within a coalition of local HIV/AIDS-focused NGOs to implement community-based activities in order to raise TB comprehension and foster proactive anti-TB efforts at the grassroots level.

Promoters have assisted with case finding by seeking out TB suspects during their IEC activities. In the period 2006-2008, 2838 people were referred to health centres for TB testing, of whom,

- Local organizations with community mobilization capacity – even those with limited TB experience – can be harnessed to effectively and...
16 NGOs and CBOs that already had significant experience in the HIV/AIDS area formed a coalition and were trained in general aspects of TB, identification of suspects and principles of DOT. The project sought to increase case detection rates, to improve access to treatment and treatment adherence and to decrease the stigma associated with TB and the discrimination against affected people.

Once they were trained, the coalition organizations in turn trained community health workers (or health promoters) in general aspects of TB, identification of suspects and principles of DOT support in order to enable them to carry out health education and behaviour-change projects and TB patient care. The groups also supplemented promoters’ activities by helping to provide rights-based health advocacy services at the local level, to secure enhanced nutritional support, flexible clinic schedules and more patient-friendly services. They also assisted with the development and distribution of high-quality education materials based on the results of previous formative research efforts.

To engage the entire Kichwa community – through their local farmer or peasant organizations and village health workers – in active case finding and treatment support. The ACSM solution was designed to help meet the local needs for earlier and more effective detection of TB and improved treatment outcomes in areas where coverage of public health services is deficient.

Awareness-raising was achieved through meetings with community assemblies headed by local leaders (who are also head of households), where chronic coughs were discussed. The meetings helped achieve a community-wide commitment to addressing the issue, which is followed up by Foundation Alli Causai (FAC) action. Specifically, FAC

<table>
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<tr>
<th>Country</th>
<th>Intervention</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Ecuador</td>
<td>16 NGOs and CBOs that already had significant experience in the HIV/AIDS area formed a coalition and were trained in general aspects of TB, identification of suspects and principles of DOT. The project sought to increase case detection rates, to improve access to treatment and treatment adherence and to decrease the stigma associated with TB and the discrimination against affected people.</td>
<td>2715 were tested and 164 (6% of this figure) were diagnosed as smear-positive for TB. An additional 440 contacts were also referred for testing.</td>
<td>sustainably identify suspects and promote early detection efforts at the community level. The scope of their work can be increased in remote areas, where they have exhibited the capacity to provide badly needed treatment support to patients. Advocacy power created by a coalition of NGOs and CBOs can be effective in promoting improved care and enhanced access to local and national resources.</td>
</tr>
<tr>
<td>Ecuador</td>
<td>To engage the entire Kichwa community – through their local farmer or peasant organizations and village health workers – in active case finding and treatment support. The ACSM solution was designed to help meet the local needs for earlier and more effective detection of TB and improved treatment outcomes in areas where coverage of public health services is deficient.</td>
<td>In the period 2006-2008, 406 sputum examinations and 380 cultures were performed on 247 patients. Of those tested, 26 were identified as smear-positive for TB. All TB patients received treatment and, although one patient died, 25 out of 26 were successfully treated, resulting in a 96.6% treatment success rate. Strong community partnerships together with a local technical NGO can support effective TB control and treatment amongst poor rural populations living in small, isolated and geographically disparate communities, with coordinated follow-up ensuring a nearly 100% treatment success rate. Involving leaders of community organizations from the very start – the TB case finding, holding and awareness-raising</td>
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</table>

Awareness-raising was achieved through meetings with community assemblies headed by local leaders (who are also head of households), where chronic coughs were discussed. The meetings helped achieve a community-wide commitment to addressing the issue, which is followed up by Foundation Alli Causai (FAC) action. Specifically, FAC
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| Ghana  | medical teams – composed of a doctor and technical auxiliaries (from communities and trained by FAC) – go to the villages and accompanied by their local health workers, examine all members of the families previously concentrated in a communal house by the community leader(s), while taking sputum samples of suspects for microscopy and cultures. The results are given in presence of all families of the community, and the patient and his or her family makes a public commitment to complete the treatment. The village health workers are trained to provide DOT, undertake contact tracing and administer prophylaxis, and the technical auxiliary teams conduct monthly follow-up visits to the relevant communities. Subsequently, the doctors visit the patient during the transition from the intensive to the continuous phase of the process, as well as at the end of treatment. Health education is conducted throughout the visits, with the specific topics dictated by the patient, his/ her family and the rest of the community. Throughout the process, FAC and community leaders or village health workers prepare and use data monitoring sheets to document surveillance information an individual patient outcomes and use individual family cards for case holding. Enlisting traditional community leaders as advocates to communicate correct messages about TB and TB/HIV as a mechanism to overcome the negative effects of TB stigma and non-treatment related to the region’s heavy reliance on traditional customs and superstition. Traditional leaders with high status in their communities were engaged to influence local beliefs and behaviours – including those related to TB and HIV – while also

- Contributed to a 30% increase in the treatment success rate within the 2006-2008 period, helping the Central Region to attain the target rate of 85%.
- Contributed to the successful reduction of the defaulter rate, from 19.8% to 9.1%, as well as an increase of cases detected from 871 cases in 2004 to 1302 in 2006.
- Innovative use of influential stakeholders from traditional social structures can overcome high sociocultural barriers to early TB diagnosis and proper treatment.
- Case finding and treatment support activities benefit greatly from political support, resulting in higher efficacy at lower cost of time and money than would have been achieved by creating new organizations to address the TB problem. |
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<tr>
<th>Country</th>
<th>Intervention</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>India</td>
<td>disseminating appropriate information on basic TB issues and the importance of strict adherence to treatment.</td>
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<td>in higher general acceptance of TB-HIV services.</td>
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<td>In addition to utilizing traditional moral authorities to advance awareness of TB issues and education, the project also sought to mobilize community volunteers and train them on TB and HIV issues through sensitization and training activities. This component was aimed at increasing community participation in such TB-HIV activities as identifying TB suspects and using education to reduce the stigma and discrimination against people affected by both illnesses. Community case finding was also carried out by community-health volunteers to ensure a cohesive model of TB care, supported by information and education activities.</td>
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<td>In addition to supporting the leaders’ advocacy efforts, they conducted home visits and provided TB services, including case detection, DOT supervision, defaulter tracing, follow-up and referral, TB education and, if needed, sputum collection. These volunteers reached over 900 000 people.</td>
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<td>Another component of the ACSM programme was to build alliances with regional health staff, which was necessary for proper monitoring and evaluation of activities. Regional committees, with representation from community leaders and regional health departments, provided technical direction as well as monitoring support for this step, with district-level committees assisting in the planning and supervision of activities.</td>
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<td>To recruit community members, private healthcare providers and successfully treated patients to become DOT providers, DOT centres are established in their private shops or homes or clinics within the hard-to-reach urban slum areas, in order to increase case detection, reduce social stigma and ensure zero-default on treatment.</td>
<td>• In the period 2006-2007, the defaulter rate in project areas dropped from 5% to 3%, whereas for all other areas, it rose from 6% to 8%. • The community itself can play an active role in changing behaviour towards timely care seeking by those with TB symptoms, as well as in the TB treatment among some of the</td>
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<td>Malawi</td>
<td>The project worked to increase access to TB diagnosis and treatment in semi-rural areas by recruiting community volunteers to collect and transport sputum samples. These efforts were supported by systematic community IEC activities about TB/HIV co-infection, and the integration of TB treatment in home-based care. The project established community sputum collection points directly in project areas and provided bicycles and sputum-carrying containers for use by volunteers to transport samples. A joint office maintained a community chronic cough register, at which the details of all TB suspects and their sputum examination results were</td>
<td>• Participating community organizations have instituted integrated TB and HIV prevention, care and support services in the catchment area of 21 health facilities (as compared to no integrated services prior to the initiative). • 1741 TB suspects have submitted samples though the community sputum collection points, with 173 (10%) producing a smear-positive test result.</td>
<td>• Building linkages between the TB and HIV activities directly at the community level to create greater coordination for delivery of care and to improve support mechanisms for patients and people affected by both epidemics • The ACSM activities also mobilized the community to participate in integrated TB/HIV prevention, care and support to improve community knowledge on TB and HIV and to</td>
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intervention is complemented by communication activities to increase early case finding.

Because the slum residents typically provide DOT directly from their homes or shops (which are located in the midst of the communities and are therefore accessible to TB patients for a large part of the day), they greatly enhance access to treatment for residents who need to work. For all centres, drugs are received directly from the Revised National TB Control Programme (RNTCP), which oversees distribution and inventory. Treatment follow-up services are provided by local government clinics to which people are referred as needed.

Other activities include extensive community outreach by trained counsellors. As the DOT centres do not provide diagnostic services, TB suspects identified through these outreach efforts need to be referred to a local clinic or hospital. Upon receiving a confirmed TB diagnosis, patients can choose whether to receive DOT at the clinic or directly at the nearest community-managed DOT centre.

• In communities or project areas, default rates dropped to 2%, while case notification nearly doubled. • Using recovered TB patients as support providers can help lower the paralysing fear of the disease, as well as the stigma TB patients face in society, thereby reducing an important barrier to lowering default rates and increasing detection rate.
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<th>Country</th>
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<tr>
<td>Mexico</td>
<td>An enhanced focus on patients, whereby this person-centred approach significantly contributed to lowering the stigma against TB patients, by humanizing people with TB in the eyes of both health care providers and the general population. Greater societal acceptance of TB patients has, in turn, encouraged greater participation of TB patients, who have a unique role to play in increasing detection and treatment adherence. The intervention’s television videos, radio spots and Photovoice (“Voices and Images of TB”) exhibitions formed a critical component of World TB Day which reached more than 500 000 people and was instrumental in a noticeable increase in the number of people submitting themselves for testing. It also was a major factor in the Secretary of Health for Baja California declaring that 2009 would be “The Year of TB control”.</td>
<td>- Another 278 people living with HIV have been referred for TB screening, 101 (36%) of which were found to have TB. &lt;br&gt; - In the period 2007-2009, there was a 79% increase in the number of Sonorans receiving microscopy at health centres &lt;br&gt; - The number of new cases detected rose from 45 in 2007 to 94 in 2009, a 108.8% increase. &lt;br&gt; - Treatment default rates in Sonora were reduced by more than 50% and the treatment success rate rose steadily, from under 34% in 2005 to 69.5% in 2006 and 84% in 2008.</td>
<td>- Innovatively harnessing the captive-audience nature of the state’s well-subscribed municipal documentation service, as well as Mexico’s generally high rates of church attendance, the project reached people it otherwise may well not have. &lt;br&gt; - The empowerment of TB patients helped that stakeholder group to more forcefully share the experience of living with TB with a wider audience. This process directly led to a reduced stigmatization of the disease by health providers and the general public, as well as enhanced levels of state support for preventative programmes.</td>
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| Moldova | The project implemented a two-pronged strategy in the 2004-2008 period, working to improve the knowledge and practices of public health-care givers while also conducting eight public awareness campaigns (PACs) throughout the country. In each intervention, PAS Centre tailored its messaging and information packages to the needs of the target audience in the nation’s different districts and regions. The PACs were conducted so that each one reached its audience with a specifically tailored message, while always making a central theme that “TB can be treated”. Some of the campaigns focused on primary health-care workers to help improve knowledge of DOTS and TB diagnosis and treatment, some targeted the general population in districts burdened by high prevalence of TB and HIV/AIDS, while others focused on reaching such vulnerable groups as Injection Drug Users (IDUs) and People Living With HIV/AIDS (PLWHA). | • The percentage of surveyed people who understood that coughing is a leading cause of transmission increased by 16.4 points to 78.2%.  
• The share of Moldovans who understood that TB can be treated more than trebled, rising from 12.9% of those surveyed to 39.3%.  
• The number of people who believed that the disease was untreatable or were unsure on the question dropped from 28.4% to only 11.6%. | • Well-designed and -executed ICE strategies can address a massive lack of public understanding of vital issues of TB (e.g. cause of transmission, likelihood of treatment success) in a short period.  
• Using the PAC to directly confront the leading obstacles to higher treatment success and detection rates (stigma and a belief that TB is necessarily fatal) was instrumental in changing public attitudes. |
| Philippines | Forming an “anti-TB task force” to undertake a coordinated programme aimed at strengthening TB control activities at the community level. Some of the task force’s specific mandates included fostering public policies that support local initiatives, and developing the skills of both health workers and community volunteers to detect cases of TB and to educate Bulacan locals in how to halt its spread. The task force, which they christened “the Barangay TB Patrol” (BTBP), consisted of a mix of community leaders and health workers who provide TB education and case finding services in areas marked by exceptionally low case detection. The task force members are charged with: 1) formulating TB health plans in coordination with municipal health offices; 2) educating clients (TB suspects and patients) on basic TB facts, misconceptions and DOT treatment protocols; 3) identifying and referring TB. | • Members of the BTBP visited 71% of the population in the project sites  
• More than 600 TB suspects were identified and referred. The pool of referred included 41 locals (6.8%) who were diagnosed as new smear-positive cases and who were started on TB treatment | • The task force approach serves as an important model for finding TB suspects and for encouraging early detection and adequate treatment. |
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<tr>
<td>Romania</td>
<td>The project worked to build capacity within Roma communities by training Roma peer educators to: improve TB-related knowledge; enhance community members’ ability to surmount the legal obstacles to accessing public health services; and develop capacity for community-led advocacy initiatives by building skills, mobilizing stakeholders and devising advocacy strategies that create a policy environment conducive to promoting Roma health. The project also worked to promote more receptivity towards the Roma (who often face discrimination throughout society) by doctors and nurses, in an effort to improve client-provider relations.</td>
<td>- The project identified 607 TB suspects who were helped to access diagnostic services, a process that often entailed accompanying them to a clinic, as the Roma have limited experience visiting health-care providers. Of those tested, 49 (8%) were found to be TB positive.</td>
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<td>25 Roma men and women were trained to serve as peer health educators (PHEs). The PHEs were trained to identify TB suspects and refer them to the nearest health facilities, and also to educate their community members about TB and DOTS. The awareness-raising activities included the preparation of informational materials – like educational films – tailored to meet the requirements of people with low literacy levels. The PHEs also conducted sensitization training with over 700 general practitioners and nurses working in the project areas to reduce discriminatory attitudes historically faced by the Roma.</td>
<td>- A multi-faceted, specially tailored strategy can achieve significant gains in case detection and treatment completion rates, even amongst a poor, historically disenfranchised population.</td>
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<td>An important element of the project included helping the Roma develop advocacy skills to obtain their health-care rights and overcome the bureaucratic impediments. These efforts included an initiative to assist them in lobbying local municipal authorities to streamline registration procedures so Roma could more easily receive their identification and/or social assistance papers, documents that are</td>
<td>- With training and consistent monitoring support, the Roma PHEs capably served as TB educators, case finders and community advocates.</td>
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<td>Country</td>
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<tr>
<td>Sudan</td>
<td>needed to register with a general practitioner. At the conclusion of the project, 12 PHEs from Neamt County formed a community-based organization known as the Centre for Community Development to continue health access improvement and advocacy efforts in their areas. The project strived to form key partnerships with existing civil society organizations, such as Women’s Union and a patient association, to provide socioeconomic support to improve case detection and treatment completion. The intervention also undertook advocacy and awareness-raising activities to attract government attention to the alarming spread of TB in the state, and to garner official support to halt it. Trained women, who typically enjoy a comfortable rapport with other females on the subject of health issues, carried out awareness raising activities with community women, conducting meetings, group discussion, visits to people’s homes and TB centre. The Sudanese TB Patients Association (STPA) organized orientation sessions with TB patients, including sessions in which they shared their experiences with the community. The association also conducted home visits to provide social and psychological assistance to TB patients, and offered microcredit support to help them generate income. Other project activities included efforts to provide a more comprehensive ACSM model, including the distribution of TB IEC materials through various outlets and community leaders, media advocacy, TB education campaigns in post-conflict areas and the broadcast of educational programmes over TV and radio. The groups also engaged in targeted advocacy efforts aimed at encouraging local health departments and politicians to increase the number of TB/DOTS centres.</td>
<td>TB was designated a priority in South Kurdufan. This helped generate an increase in the number of TB centres, from five in 2006 to 12 in 2008, and a 37.4% rise in number of cases notified, from 318 to 437, during the same period. Women’s associations are particularly logical partner candidates, as women usually serve as the de facto caretakers and represent an at-risk community, especially in the context of HIV. Engaging TB patients, a step that helps reduce local fears and stigmatization of the disease and TB affected persons, and the development of partnerships with CBOs were shown to be effective means of promoting timely diagnosis and treatment-seeking behaviour.</td>
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<td>Tajikistan</td>
<td>The development and implementation of a national TB communication strategy by members of an ACSM thematic working group under the NTP. The development of this strategy encouraged greater coordination among the stakeholder agencies involved in TB programming and built the capacity of key policymakers and implementing agencies through practical on-the-job training. The national TB communication strategy targeted a variety of audiences for communication training and included the coordination of several community oriented education activities. Those trained under the strategy included 40 TB hospital nurses (who received interpersonal communication/counselling skills training), as well as approximately 300 community volunteers and leaders, who were trained to carry out health education sessions for the general public. The project also entailed a programme under which trained nurses implemented an in-service counselling programme to support treatment providers. Project staff also developed IEC materials – including booklets, brochures, posters and video and radio PSAs – that were aimed at both TB patients and the population at large. The project also facilitated the creation of TB toolkits for use by patient education providers, including a diagnostic algorithm, a booklet on sputum collection, and a brochure on TB drugs’ side effects and how to treat them. To make presentations more effective, the initiative also developed flipcharts explaining optimal techniques for patient treatment and counselling. Additionally, community leaders were selected and trained to work with the general population to provide key messages on TB and to assist medical workers with DOT by</td>
<td>At the community level, 5780 community volunteers and leaders were trained, enabling them to effectively reach more than 700 000 people through coordinated IEC activities. Volunteers also assisted 1519 TB patients in DOT At the health facility level, 128 TB and primary health care (PHC) nurses were trained in interpersonal communication and counselling skills. The quality and effectiveness of reaching the general public with TB information through mass media was improved by training 104 journalists from national and oblast (regional) television and radio stations and print newspapers, exchanging relevant information on TB and its treatment. This intervention enabled the project to reach a sizable percentage of the country’s 6.7 million people. A population significantly better informed about the causes, effects and aspects of treatment of TB.</td>
<td>A consistent and coordinated ACSM programme conducted through a national strategy that is informed by a baseline assessment can make significant inroads in increasing TB knowledge.</td>
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Taking TB drugs to patients who were unable to travel to health facilities to receive their daily dosage.

The project also conducted a media programme, under which it developed and broadcast TB public service announcements on radio and TV. The media programme included annual workshops for journalists to promote coverage of TB issues, including an organised visit to a regional TB hospital to interview medical staff, patients and visitors. The programme resulted in 29 articles being published on TB problems and on the necessity of social mobilization.

In addition to improving the quality of DOTS, the project worked to establish a patient-oriented approach to providing TB and TB/HIV services among the most vulnerable groups. This intervention and a communications programme to counter a persistent anti-TB stigma amongst health workers were identified during a previously-applied assessment as likely high-impact activities in the strategic effort to improve patients' adherence to treatment.

All TB facility based providers were trained in interpersonal communication and counselling, including diagnostic testing and counselling for HIV, while Ukraine Red Cross Society (UCRS) nursing staff were further trained on DOTS treatment issues. Training also worked on reducing TB stigma and discrimination against TB patients by providers.

In close consultation with URCS and TB facilities, a system to guide communication and collaboration between and among facilities, patients and visiting nurses was established. URCS efforts to develop linkages and referral mechanisms to assist patients and their families who need social services (which patients often prioritize ahead of TB treatment) were also supported. This step included help in

- Preliminary cohort data suggests that default rates among TB patients were almost zero in the intervention sites, as compared to 10-20% in non-intervention sites.

- A patient-centred approach in TB services – particularly towards vulnerable and at-risk patients – can considerably reduce defaulter rate, especially when activities are undertaken in collaboration with partners who have experience working with and access to the relevant populations.
identifying local funding to support such needs as nutrition, clothing, shelter and transportation.

A joint monitoring tool to collect and evaluate the necessary data on patient outcomes was developed.

Source: World Health Organisation (WHO): Advocacy, Communication and Social Mobilisation for Tuberculosis Control

Key success factors that can be extrapolated from lessons learnt in implementing Advocacy, Communication and Social Mobilization (ACSM) interventions in TB control are highlighted in table 12 below:

Figure 12: Key success factors influencing ACSM interventions in TB control

<table>
<thead>
<tr>
<th>Success factor</th>
<th>Enhancing DOTS services</th>
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<tr>
<td></td>
<td>• Patient-centred approach: adapting health services to the needs of the patient</td>
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<td>• Improving quality of interpersonal communication at the health-service level</td>
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<td>• Increasing access to diagnostic services by facilitating sputum sample transport from community health centres</td>
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<tr>
<td>Empowering patients and communities</td>
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<td>Partnering with affected communities and civil society organizations</td>
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<td>Improving supportive communication methodologies</td>
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<td>Measuring the results</td>
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<td></td>
<td>• Link ACSM interventions to specific gaps in reaching case detection and treatment outcome targets and identify appropriate indicators for which anticipated improvements are expected</td>
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<td>• Ensure that proper baseline data on key indicators targeted by the intervention is collected before implementation begins</td>
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<td>• Understand the challenges inherent in measuring outcomes and institute plans to overcome them</td>
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<td>• Establish metrics to measure impacts of media outreach programmes</td>
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Source: World Health Organisation (WHO): Advocacy, Communication and Social Mobilisation for Tuberculosis Control
Conclusion

South Africa’s NTP has made significant strides since its inception in 1994. All policies are aligned with international recommendations and updated according to latest guidance. Declining incidence figures and improving cure rates indicate some success in the TB control programme. However, despite pockets of excellence, several challenges still remain and are summed up in the following statement from the 2013 African Union Conference – ‘It requires a combination of factors to be in place, namely, having adequate numbers of trained, qualified and motivated health workers in the right place, at the right time and with the right resources is paramount to the provision of essential services’ (AU, 2013).
Bibliography


### Annexures

#### Table 8: TB notification indicators

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DESCRIPTION</th>
<th>SOURCE</th>
<th>COLLECTION</th>
<th>LEVEL</th>
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<tbody>
<tr>
<td>TB case notification rate</td>
<td><strong>Numerator:</strong> Total TB patients reported in a year (x 1000,00)</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
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<td></td>
<td><strong>Denominator:</strong> Total population in the same year</td>
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<td>TB detection rate</td>
<td><strong>Numerator:</strong> Annual number of new TB cases notified</td>
<td>ETR.net</td>
<td>Annual</td>
<td>National</td>
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<td></td>
<td><strong>Denominator:</strong> Annual estimated number of new TB patients</td>
<td>Surveillance data</td>
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<td>Bacteriological coverage</td>
<td><strong>Numerator:</strong> Number of PTB patients diagnosed by bacteriological tests (Xpert, smear or culture)</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
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<td><strong>Denominator:</strong> Total PTB patients reported, excluding children 0-4 years</td>
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<td>Proportion smear positive PTB patients</td>
<td><strong>Numerator:</strong> Number of smear positive PTB patients</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
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<td></td>
<td><strong>Denominator:</strong> Total number of PTB patients</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sputum results turnaround time</td>
<td><strong>Numerator:</strong> Number of smear positive results received from the laboratory within 48 hours of the specimen being taken (spot specimen) including weekends and public holidays.</td>
<td>TB Case Identification &amp; Follow-up register</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of smears submitted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xpert positivity rate</td>
<td><strong>Numerator:</strong> Total number of positive Xpert results (MTB detected)</td>
<td>NHLS report</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of Xpert tests conducted over the same period</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### Table 9: Case holding indicators

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DESCRIPTION</th>
<th>SOURCE</th>
<th>COLLECTION</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to treatment initiation rate</td>
<td><strong>Numerator:</strong> Number of laboratory diagnosed TB patients started on treatment within 48 hours of diagnosis</td>
<td>TB Identification &amp; Follow-up register; TB register</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of laboratory diagnosed TB patients during the same period</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New smear positive conversion rates</td>
<td><strong>Numerator:</strong> Number of new smear positive patients that convert from smear positive to smear negative at 2 months</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of new smear positive patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retreatment smear-</td>
<td><strong>Numerator:</strong> Number of retreatment smear positive patients that convert from smear</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td>INDICATOR</td>
<td>DESCRIPTION</td>
<td>SOURCE</td>
<td>COLLECTION</td>
<td>LEVEL</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------------------------------------------</td>
<td>----------</td>
<td>------------</td>
<td>-------</td>
</tr>
<tr>
<td>positive conversion rates</td>
<td>positive to smear negative at 2 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of retreatment smear-positive patients</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 10: TB and HIV indicators**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DESCRIPTION</th>
<th>SOURCE</th>
<th>COLLECTION</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV positivity rate</td>
<td><strong>Numerator:</strong> Number of registered TB patients known to be HIV positive</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of registered TB patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV positive TB patients on CPT</td>
<td><strong>Numerator:</strong> Total number of registered HIV+ TB patients on CPT</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of registered TB patients known to be HIV positive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV+ TB patients on ART on completion of treatment</td>
<td><strong>Numerator:</strong> Total number of registered HIV+ TB patients on ART at the end of treatment</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of registered HIV+ TB patients</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DESCRIPTION</th>
<th>SOURCE</th>
<th>COLLECTION</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cure rates</td>
<td><strong>Numerator:</strong> Number of new smear-positive patients that are smear negative in the last month of treatment and on at least one other occasion at least 30 days prior</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of new smear positive pulmonary TB patients registered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment success rate</td>
<td><strong>Numerator:</strong> Total number of new smear positive patients that were cured and those that completed treatment but did not meet the criteria for cure or failure</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of new smear positive pulmonary TB patients registered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss to follow up rate</td>
<td><strong>Numerator:</strong> Number of new smear-positive patients that interrupted treatment for 2 consecutive months or more</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of new smear positive pulmonary TB patients registered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death rate</td>
<td><strong>Numerator:</strong> Number of new smear-positive patients that died during treatment</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of new smear positive pulmonary TB patients registered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment failure rate</td>
<td><strong>Numerator:</strong> Number of new smear-positive patients that are smear-positive at the end of treatment period</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Denominator:</strong> Total number of new smear positive pulmonary TB patients registered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer-out rate</td>
<td><strong>Numerator:</strong> Number of new smear-positive pulmonary TB patients registered that</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
</tbody>
</table>
**Not evaluated rate**

<table>
<thead>
<tr>
<th>Numerator: Number of new smear-positive patients that have no outcome at the end at the end of the treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denominator: Total number of new smear positive pulmonary TB patients registered</td>
</tr>
</tbody>
</table>

**Denominator:** Total number of new smear positive pulmonary TB patients registered

**Table 12: TB treatment outcome indicators - retreatment smear positive PTB patients**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DESCRIPTION</th>
<th>SOURCE</th>
<th>COLLECTION</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cure rates</strong></td>
<td><strong>Numerator:</strong> Number of retreatment smear positive patients that are smear negative in the last month of treatment and on at least one other occasion at least 30 days prior</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td><strong>Treatment success rate</strong></td>
<td><strong>Numerator:</strong> Total number of retreatment patients that were cured and those that completed treatment but did not meet the criteria for cure or failure</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td><strong>Loss to follow up rate</strong></td>
<td><strong>Numerator:</strong> Number of retreatment smear positive patients that interrupted treatment for 2 consecutive months or more</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td><strong>Death rate</strong></td>
<td><strong>Numerator:</strong> Number of retreatment smear-positive patients that died during treatment, irrespective of cause</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td><strong>Failure rate</strong></td>
<td><strong>Numerator:</strong> Number of retreatment smear positive patients that are smear-positive at the end of treatment</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
<tr>
<td><strong>Transfer-out rate</strong></td>
<td><strong>Numerator:</strong> Number of retreatment smear positive pulmonary TB patients registered that were transferred to another district and for whom the treatment outcome is unknown</td>
<td>ETR.net</td>
<td>Quarterly</td>
<td>All</td>
</tr>
</tbody>
</table>
### Table 13: TB treatment outcome indicators - all TB patients

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DESCRIPTION</th>
<th>SOURCE</th>
<th>COLLECTION</th>
<th>LEVEL</th>
</tr>
</thead>
</table>
| Treatment Success rate  | **Numerator:** Sum of number patients that were cured and those who completed treatment but did not meet the criteria for cure or failure  
**Denominator:** Total number of All TB patients registered | ETR.net    | Quarterly   | All    |
| Loss to follow up       | **Numerator:** Number of All registered TB patients that interrupted treatment for more than 2 consecutive months  
**Denominator:** Total number of All TB patients registered | ETR.net    | Quarterly   | All    |
| Death rate              | **Numerator:** Number of All registered TB patients that died during treatment, irrespective of cause  
**Denominator:** Total number of All TB patients registered | ETR.net    | Quarterly   | All    |
| Failure rate            | **Numerator:** Number of All registered TB patients that are smear/ culture-positive 5 months or later after initiating treatment or that are diagnosed as MDR-TB during treatment  
**Denominator:** Total number of All TB patients registered | ETR.net    | Quarterly   | All    |
| Transfer-out rate       | **Numerator:** Number of All registered TB patients registered that were transferred to district/ province/ country and for whom there is no treatment outcome information  
**Denominator:** Total number of All TB patients registered during the same period | ETR.net    | Quarterly   | All    |
| Not evaluated rate      | **Numerator:** Number of All TB patients that have no outcome at the end of the treatment and that did not complete the full course of treatment  
**Denominator:** Total number of All TB patients registered | ETR.net    | Quarterly   | All    |

### Table 14: Laboratory indicators (Xpert)

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DESCRIPTION</th>
<th>COLLECTION</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Xpert tests conducted</td>
<td>Total number of Xpert tests conducted during the reporting</td>
<td>Monthly</td>
<td>All</td>
</tr>
<tr>
<td>Number MTB detected</td>
<td>Number of test results that were positive</td>
<td>Monthly</td>
<td>All</td>
</tr>
<tr>
<td>Number MTB not detected</td>
<td>Number of test results that were negative</td>
<td>Monthly</td>
<td>All</td>
</tr>
<tr>
<td>Number of tests unsuccessful</td>
<td>Number of tests that did not have a result (due to failure of cartridge of machine)</td>
<td>Monthly</td>
<td>All</td>
</tr>
<tr>
<td>Number Rif susceptible</td>
<td>Number of positive test results that were Rifampicin susceptible</td>
<td>Monthly</td>
<td>All</td>
</tr>
<tr>
<td>INDICATOR</td>
<td>DESCRIPTION</td>
<td>COLLECTION</td>
<td>LEVEL</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------</td>
<td>-------</td>
</tr>
<tr>
<td>Number Rif resistant</td>
<td>Number of positive test results that were Rifampicin resistant</td>
<td>Monthly</td>
<td>All</td>
</tr>
<tr>
<td>Number Rif result inconclusive</td>
<td>Number of positive test results that did not have a clear result confirming Rifampicin susceptibility or resistance</td>
<td>Monthly</td>
<td>All</td>
</tr>
<tr>
<td>Number no Rif result</td>
<td>Number of positive test results that did not have a Rifampicin DST result</td>
<td>Monthly</td>
<td>All</td>
</tr>
</tbody>
</table>
| Sputum specimen rejection       | **Numerator:** Number of sputum specimen rejected for testing by the laboratory  
                                |            |       |
|                                 | **Denominator:** Total number of specimen received for testing by the laboratory during the same period | Monthly    | All   |