

National Guidelines for Tuberculosis Infection Control

Second Edition, 2017

National Tuberculosis and Leprosy Program (NTLP)

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October, 2017

FOREWORD

TB and HIV are overlapping epidemics whereby HIV infection weakens the immune system, hence fueling the TB epidemic among people living with HIV (PLHIV), and on the other hand, TB is the main opportunistic infection and leading cause of deaths among PLHIV. The intertwined relationship between TB and HIV suggests that neither of the epidemics can be effectively controlled without regard to the other. In 2010, the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) developed Guidelines for Tuberculosis infection control in health care settings.

The revision of the Guidelines follows evidence that has been generated globally from best practices, guidelines from other countries, WHO guidelines and National TB and HIV guidelines.

The revised guidelines demonstrate the commitment of the Ministry to fight TB infection and provide the basis for action in collaborative TB/HIV activities by the National TB and Leprosy Programme (NTLP), the National AIDS Control Programme (NACP), and other stakeholders to work synergistically to reduce the burden of TB/HIV co-infection.

The Ministry engaged a wide range of stakeholders that participated in a lengthy process to revise the guideline. The evidences presented here reflect the substantial input, informed expert opinions and quality of work that were contributed by all of the stakeholders throughout this process.

The Ministry is satisfied that this document reflects national and international standards for policy guidelines. Because of the extensive process to involve a wide range of stakeholders and various organizations, the Ministry is confident that the appropriate implementation of the policy guidelines will bring the anticipated positive impact for people affected by TB and HIV epidemics.

It is important to note that this guideline is just one dimension of the Government of Tanzania's efforts to combat TB and should not be regarded as a panacea to the TB and HIV epidemics. Other dimensions that the Government of Tanzania is considering include increasing the availability of resources to implement the policy, supporting the organisational structure through which the policy guidelines will be practiced, developing the overall management system of collaborative TB/HIV activities, and supporting a system of policy implementation as well as actual service delivery.

Finally, it is the hope of the MOHSW that every one of the stakeholders will effectively comply with the policy guidelines.



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October 2017

ABBREVIATIONS

| | | |
|----------------|---|---|
| ACH | : | Air Changes perHour |
| AFB | : | Acid-Fast Bacilli |
| AIDS | : | Acquired Immuno-Deficiency Syndrome |
| ART | : | Anti-Retroviral Therapy |
| BCG | : | Bacille Calmette-Guérin |
| BSC | : | Biological Safety Cabinet |
| CHMT | : | Council Health Management Team |
| CTC | : | Care and Treatment Clinic |
| CPT | : | Cotrimoxazole Preventative Therapy |
| DACC | : | District AIDS Control Coordinator |
| DMO | : | District Medical Officer |
| DNA | : | Deoxyribonucleic Acid |
| DTHC | : | District TB/HIV Coordinator |
| DTLC | : | District TB and Leprosy Coordinator |
| DOT | : | Directly Observed Therapy |
| DST | : | Drug Susceptibility Test |
| HEPA | : | High-Efficiency Particulate Air |
| HIV | : | Human Immunodeficiency Virus |
| HMT | : | Hospital Management Team |
| HW | : | Health Worker |
| IC | : | Infection Control |
| ICU | : | Intensive Care Unit |
| IPT | : | Isoniazid Preventative Therapy |
| LTBI | : | Latent Tuberculosis Infection |
| MDR TB | : | Multi-Drug-Resistant Tuberculosis |
| MGIT | : | Mycobacteria Growth Indicator Tube |
| MTB | : | Mycobacterium Tuberculosis |
| NACP | : | National AIDS Control Programme |
| NAP | : | Negative Air Pressure |
| NTLP | : | National Tuberculosis and Leprosy Programme |
| OPD | : | Out-patient department |
| PEP | : | Post-Exposure Prophylaxis |
| PITC | : | Provider-Initiated Testing and Counselling |
| PLHIV | : | People Living with HIV/AIDS |
| RCH | : | Reproductive & Child Health Clinic |
| RHMT | : | Regional Health Management Team |
| RMO | : | Regional Medical Officer |
| SOP | : | Standard Operating Procedures |
| TB | : | Tuberculosis |
| XDR -TB | : | Extensively Drug-Resistant Tuberculosis |

SUMMARY

These guidelines, provides recommendations for infection control for health care facilities, congregate settings and other settings. The guidelines call for the TB/HIV Committee, designated TB IC officer quality infection control teams, Regional/District medical officers (RMO/DMO) and Health Management Team (HMT) to develop a TB IC plan of the HF and guide its development for other settings under their catchment areas and monitor its implementation. The TB infection control plans should base on administrative and environmental control measures and use of personal protective equipment.

Administrative control measures should be implemented to prevent generation of infectious droplet nuclei containing *Mycobacterium Tuberculosis* bacilli in order to reduce exposure of health workers (HW) patients and visitors to airborne *M. Tuberculosis*. These measures include early identification of TB suspects (presumptive TB) or have confirmed TB disease, regular health education to patients and family members about TB infection control and use of posters instructing patients to report prolonged cough to the patient registration desk, active identification of TB suspects at every visit at the registration desk, Any TB suspects identified at registration desk should be referred to laboratory immediately for TB diagnosis and not to the TB clinic, to avoid the risk of being exposed to potentially infectious TB patients. Furthermore, to any TB suspects/patients should be offered Provider Initiated Testing and Counselling (PITC).

Environmental control measures aims at reducing concentration of droplet nuclei in the air. It involves maximizing use of natural ventilation and mechanical ventilation as well as ultraviolet germicidal irradiation and High-Efficiency Particulate Air (HEPA) filtration. Environmental control measures builds on administrative control measures.

The use of personal protective equipment's aims at protecting HCW from inhaling infectious droplets. Such infection control measures involve wearing of surgical or procedure masks for presumptive TB and untreated patients and respirators for HCW's. Respiratory protection alone will not provide adequate protection for the HCW from infection of *M. tuberculosis*; rather, respirators merely reduce the number of droplet nuclei inhaled by the wearer. It is important that the three levels of TB infection control measures (administrative, environmental and personal protective) are applied concurrently for them to be effective.

The TB infection control measures described in these guidelines apply to health facilities, military, national service, mining, refugee camps, police remand cells, prisons, training institutions and public transport.

1. INTRODUCTION

Transmission of *Mycobacterium tuberculosis* from individuals with Tuberculosis (TB) to other patients and health workers (HWs) is a well-documented nosocomial hazard (1, 2, 3). The risk of nosocomial transmission of *M. tuberculosis* is even greater with the increased attendance of people living with HIV/AIDS at health care facilities. This transmission is preventable through implementation of best infection prevention and control practices.

TB Infection Control (TB-IC) is a combination of measures aimed at minimizing the risk of TB transmission within populations. It is a sub-component of the WHO's updated "End TB Strategy" and is one element of the WHO's 12 collaborative activities for TB/HIV. It is also part of the WHO's "Three I's for HIV/TB" that also includes TB Preventive Therapy (TPT) and Intensified Case Finding (ICF). TB-IC both requires and complements the implementation of core activities in TB, HIV and health systems. This facilitates the delivery of high quality health care for patients and a safe working environment for healthcare workers.

Tanzania has a national HIV prevalence of 5.1% and average 64,000 new cases of tuberculosis notified every year, Tanzania estimated that 34% of the TB cases were co-infected with HIV in 2016 and that up to 50% of hospital beds are occupied by patients with HIV/AIDS-related conditions (4, 5, 6, 8).

The risk of infection is related to the prevalence of TB in the community as well as the degree of contact with TB patients. Therefore implementation of infection control measures can result in significant decline in TB transmission among patients attending health facilities (HF) and among HCWs (7, 8)

Objectives of TB Infection Control

Overall objective of the TB Infection Control guideline

The overall objective of TB-IC guidelines, in conformity with the definition of TB-IC, is to reduce transmission of TB in health facilities, congregate settings, households (in particular of DR-TB) and in communities.

Specific objectives of TB infection control are to;

1. Strengthen coordination for implementing appropriate TB-IC.
2. Reduce the generation of aerosols and thereby the exposure to droplet nuclei.
3. Reduce concentrations of infectious particles
4. Reduce inhalation of infectious particles.

The set of interventions that will lead to achieving the objectives are categorized according to the IC hierarchy which are;

1. Administrative controls,
2. Environmental controls and
3. Personal protective measures

These guidelines are developed to provide a co-ordinated approach to the prevention and management of transmission of *Mycobacterium tuberculosis* in health facilities and community settings. The guidelines aims at strengthening TB infection control in Health facilities, congregate settings, household level and in the community at large. However, the measures that are described in this document aim in general to prevent aerosol spread of infectious material.

These guidelines is based on the best available current evidence and built on existing WHO and international policies and guidelines, reports as well as systematic reviews on TB infection control. It provides a basis for healthcare workers and healthcare facilities to develop detailed TB-IC plans for TB infection prevention and control specific to their local settings.

The guideline is targeted to:

Community Level

- Ward health committees
- Village health committees
- Household

Health Facility level

- Quality improvement Team
- Health Facility Management Team (Hospital Management Team, Health Centre Management Team)
- CTC staff
- Reproductive Child Health (RCH)staff
- TB staff
- Hospital directors
- Outpatient department (OPD)staff
- Inpatient department (IPD)staff

District level

- Council Health Management Teams CHMTs)
- District TB/HIV Committee
- District Infection Control Committee
- District TB and Leprosy Coordinator (DTLC)
- District AIDS Control Coordinator (DACC)
- District TB/HIV Coordinator
- District Medical Officer(DMO)

Regional level

- Regional Health Management Team(RHMT)
- Regional TB/HIV Committee
- Regional Infection Control Committee
- Regional TB and Leprosy Coordinator (RTLTC)
- Regional AIDS Control Coordinator (RACC)
- Zonal TB/HIV Coordinator
- Regional Medical Officer (RMO)

National level

- MOHCDGEC–Director Hospital Services
- National TB and Leprosy Programme (NTLP)
- National AIDS Control Programme (NACP)
- TB, HIV and TB/HIV stakeholders who support health service provisional facility level and or provide technical assistance to NACP and NTLP (e.g. USG partners)
- President’s office regional administration and local government (PORALG).

2. PATHOGENESIS AND TRANSMISSION OF TB

Tuberculosis (TB) is mainly caused by an organism called *Mycobacterium tuberculosis*. It is carried in air borne particles, or droplet nuclei, that are generated when persons with TB cough, sneeze, or speak etc.

2.1 Transmission and pathogenesis of *Mycobacterium tuberculosis*

Important facts to understand the risk of (nosocomial) transmission of TB:

- The infectious droplet nuclei are approximately 1-5 micrometres in diameter, and normal air currents can keep them suspended in air for days.
- Infection, which is usually asymptomatic, occurs when a susceptible person inhales droplet nuclei containing *M. tuberculosis* and the organisms reach the alveoli of the lungs
- Once in the lung, the organisms are taken up by the alveolar macrophages and may further spread throughout the body
- Disease, which is usually accompanied by focal and generalized symptoms, may develop soon after infection, but usually within 2-10 weeks after infection an immune response is generated that limits further multiplication and spread of the tubercle bacilli
- Some of the bacilli may remain dormant and viable for many years (i.e., latent infection with *M. tuberculosis*)
- Persons with latent infection do not have symptoms of active TB and are not infectious
- Not everyone who is exposed to an infectious TB patient become diseased.
- TB infection means that *M. tuberculosis* organisms are in the body but the immune system is keeping them under control.
- TB disease develops when the immune system cannot keep the organisms under control and they begin to multiply.
- TB disease can develop very soon after infection or many years after infection.
- Infection with the human immune deficiency virus (HIV) is presently the most important risk factor for developing TB disease following infection because the virus kills T-helper cells (CD4+cells) reducing the infected individual's defence against *M. tuberculosis*.

The source of TB infection is a person with active pulmonary TB. Patients with bacteriological confirmed TB, spread TB bacilli in the community. The infectious tuberculosis patient expel microorganism into the air in tiny droplets when coughing, talking laughing or sneezing. These tiny droplets typically contain tubercle bacilli and usually evaporate and cause the volume of water droplets to diminish in size, become droplet nuclei and remain suspended in the air for several hours and even days. If inhaled, a droplet nucleus is small enough in size (<5µm) to reach an alveolus in the lung. A person who breathes in air including droplet nuclei containing tubercle bacilli may become infected.

2.2 The difference between TB infection and TB disease

- TB infection is the state of having a low number of *M. tuberculosis* bacteria in the body which are unable to multiply due to competent immune system. The bacteria are inactive, but remain alive in the body and can become active when the immune is compromised. This condition is also referred to as latent TB infection (LTBI).
- TB infection does not cause person sick usually present with neither symptoms nor signs.
- A tuberculin skin test is the main method used to diagnose TB infection. A positive result usually means that TB infection is present but persons with HIV positive and other diseases

causing immune suppression can have a false negative TB skin test even with TB infection. Also, persons who have received BCG vaccination may have a false positive skin test.

- Only 1 out of 10 people with TB infection and a normal immune system will develop TB disease in their lifetime. For persons with HIV infection, 1 out of 10 each year will develop TB disease.
- Treatment for TB infection with isoniazid can reduce the chance of progressing to TB disease.
- Most of the disease occurs in the lungs. In people living with HIV majority are affected with extra pulmonary TB.
- A person with TB disease of the lungs usually has cough and sometimes coughs up blood.
- General symptoms of TB disease include; fever, excessive sweating at night, loss of appetite, weight loss, and fatigue.
- With standard treatment, TB disease can be cured even in persons with HIV infection.

Similarities and differences between TB infection and TB disease

| | TB Infection | TB Disease (in the lungs) |
|---------------------------------|--|--|
| Bacteria | M. tuberculosis in the body | M. tuberculosis in the body |
| Tuberculin Skin Test | Positive | Positive |
| Symptoms & Signs | None | Cough, fever, night sweats, weight loss, coughing blood. |
| Chest x-ray | Usually normal | Abnormal |
| Sputum Smear and Culture | Negative | Usually positive* |
| Infectious | Not infectious | Often infectious before treatment |
| Classification | Not TB disease | A TB disease |
| Treatment | Initiate TB preventive therapy for PLHIV and children under-fives in contact with TB patients | Need treatment with TB medicines |

* Sputum smears more often negative in HIV-infected TB cases

2.3 The risk of progression from TB infection to TB disease

The risk of progression from infection to active disease depends on the status of the individual's immune system. Only 10% of HIV-negative people infected with TB will eventually develop active disease in their Lifetime because their immune system is strong enough to suppress multiplication of bacilli. Their TB infection therefore remains in the "dormant state". Other groups of people have an increased risk of developing active TB disease following infection. These include

- People with TB/HIV co-infection have an annual risk of 5-10% and a lifetime risk 20-30 times higher for developing TB disease.
- People with diabetes have a 1.5 times higher risk of developing TB disease than people without diabetes mellitus.

Other risk factors for developing TB disease include:

- Malnutrition.
- Recurrent infections of any kind.
- Substance abuse (alcoholism, drugs).
- Silicosis.

- Smoking.
- Age (very young or advanced).
- Long-term use of steroids and other immunosuppressive therapies.
- Poverty.
- Cancers

Moreover, HIV infected infants and young children are at greater risk of developing the disease than adults because they have immature immune system.

2.4 TB transmission

TB transmission has been associated with close contact with persons who have infectious TB. The performance of certain procedures (e.g. sputum induction and aerosol treatments that induce coughing, endotracheal intubation and suctioning, open abscess irrigation and autopsy) are associated with high risk of TB transmission and thus HCWs are at increased risk.

Factors contributing to Tuberculosis transmission in resource limited countries include:

- Economic factors which may cause delays in patients seeking treatment or affect the health system's ability to provide timely and appropriate diagnosis and treatment
- Diagnostic delays of both TB disease and drug resistance
- Delayed initiation of treatment resulting in prolonged infectiousness
- Ineffective TB infection control measures at HF
 - Under estimation of risk by HWs due to misconception about prior infection and BCG protection
 - Unnecessary hospitalization
 - Caring for patients in crowded clinics and wards
 - Lack of adequate ventilation in the HF.

2.5 Determinants of TB Transmission

The chance that a person who is exposed to *M. tuberculosis* will become infected depends primarily on:

- The **concentration** of infectious droplet nuclei in the air, which is influenced by the number of organisms generated by the TB patient and the amount of ventilation in the area of exposure
- **Duration** of exposure to the infectious droplet nuclei
- **Proximity** to source of infectious droplet nuclei
- Prevalence of TB in the community. The higher the prevalence of TB in the community, the higher the risk of exposure and infection.

2.6 Risk for TB infection

The risk of TB transmission is influenced by patient factors, environmental factors and host (or recipient) factors.

2.6.1 TB Patient Characteristics

Characteristics of the TB patient influence the number of organisms generated and thereby increasing the risk of transmission. Such characteristics include:

2.6.1.1. Number of Infected Patients

Large numbers of TB patients cared for in a health facility, particularly those not yet diagnosed and not receiving treatment, are associated with an increased risk of nosocomial transmission. These numbers vary from facility to facility and depend upon the prevalence of TB in the facility's catchment area.

2.6.1.2. Infectiousness of the Patient

The infectiousness of a patient is determined by the number of viable bacilli in the lungs. Thus a patient who is bacteriological confirmed will infect many more close contacts than a patient who is clinical diagnosed.

The following characteristics of a patient with TB increase the risk of infectiousness:

- Presence of cough or other forceful expiratory symptoms; patients who cough persistently are more infectious because they expel more infectious droplets
- Failure of the patient to cover the mouth and nose when coughing or Sneezing (cough etiquette and respiratory hygiene).
- Cough inducing procedures
- Extensive lung destruction with pulmonary cavitation on chest x-ray, often a feature of patients presenting with a delayed diagnosis
- Positive AFB sputum smear, Molecular test and culture results
- Disease in the lungs, airways or larynx (i.e. Laryngeal TB)
- Sputum-smear and/or culture positive TB patients with undiagnosed DR-TB
- Untreated or insufficient anti-tuberculosis treatment

2.6.1.3 Duration of Exposure

The risk of transmission increases with close and prolonged contact with an infectious TB patient. Early intervention with appropriate treatment reduces the time of infectiousness.

NOTE

- Patients with drug-susceptible TB usually become non-infectious within a short period of time after initiating appropriate treatment. Thus, health providers may contribute to TB transmission by:
 - Delaying initiation of therapy
 - Failing to initiate treatment with adequate dosage
 - Performing procedures that can induce coughing or cause aerosolization of M. tuberculosis (e.g., sputum induction, bronchoscopy, etc.)
- Patients with drug-resistant TB may respond to treatment more slowly and may remain smear-positive longer than other TB patients, thereby extending the period of time they may infect their contacts. The most important objective measure of improvement is conversion of the sputum smear and culture to negative.

2.6.2 Environmental factors

Various environmental factors increase the risk of TB transmission, including:

- Exposure in relatively small, enclosed or poorly ventilated spaces
- Inadequate ventilation which result in the insufficient dilution or removal of infectious droplet nuclei

- Re-circulation of air containing infectious droplet nuclei
- Inadequate cleaning and maintenance of equipment such as fixtures for ultraviolet germicidal irradiation (UVGI) and electrical fans
- Improper procedures when handling specimens.

2.6.3 Host (recipient) characteristics

The characteristic of the persons exposed to *M. tuberculosis* that increases the chance of progressing to TB diseases includes;

- Severe immune suppression due to HIV infection. HIV is the strongest known risk factor for progression from TB infection to TB disease
- Use of tobacco
- Mining activities due to exposure to silica dust
- Alcohol abuse or illegal drugs
- Chronic diseases for example malnutrition and diabetes
- Elderly and children under five.

2.7 Risk of TB for Health Care Workers

HCWs are particularly at high risk of acquiring *M. tuberculosis* due to:

- Work which entails regular, direct patient contact in healthcare settings where the risk of TB transmission is not assessed and
- Ineffective implementation of TB-IC
- High-risk activities which include cough-inducing procedures (sputum induction, bronchoscopy), autopsy, morbid anatomy and pathology examination, and laboratory procedures such as the handling of cultures of *M. tuberculosis*.

2.8 Bacille Calmette-Guérin (BCG) vaccination and TB infection

BCG vaccine has existed for more than 80 years and is one of the most widely-used childhood vaccines. BCG has a documented protective effect against severe forms of TB such as meningitis and disseminated TB in children. The WHO recommends that in countries with a high prevalence of TB like Tanzania. BCG should be given to all neonates immediately after birth, regardless of HIV status. The possible benefits of BCG outweigh the possible disadvantages. However BCG should not be given to children who present with clear signs and symptoms of HIV disease or AIDS.

3. TB INFECTION CONTROL MEASURES, PRACTICES AND PROCEDURES

TB infection Control measures aim at preventing TB transmission in health facilities, congregate setting, and house-holds and in the community. The TB infection control programme is based on a three-level hierarchy of control measures that includes administrative control, environmental control, and the use of personal protective measure.

Each control operates at a different level in the TB transmission process:

- Administrative control measures reduce the chances of exposure for both HCWs and uninfected patients
- Environmental control measures include airborne infection control and other transmission-based precautions as elaborated in Infection Prevention and Control Guidelines (WHO guidelines 2009). It reduce the concentration of droplet nuclei in the air
- Personal protective equipment protects HCWs from inhaling infectious droplet nuclei in areas where the concentration of droplet nuclei cannot be adequately reduced by administrative and environmental controls.

Table 3.1: TB-Infection Control measures at each level of the hierarchy

| SN | TB-Infection Control measures |
|----|---|
| | Administrative Controls |
| 1 | Promptly identify persons with symptoms suggestive of TB (triage) |
| 2 | Separate or isolate potentially infectious patients |
| 3 | Control the spread of pathogens (cough hygiene) |
| 4 | Minimise time spent in healthcare facilities by persons with symptoms suggestive of TB |
| 5 | Provide a package of HIV prevention, TB screening, (preventive) treatment and care interventions for staff. |
| | Environmental Controls |
| 1 | Ensure sufficient air exchange and control airflow direction by using natural and mechanical ventilation systems |
| 2 | Inactivate TB bacilli in suspended droplet nuclei by using upper-room air Ultra Violet (UV) Light units, in combination with slow-moving ceiling fans |
| | Personal Protective Equipment |
| 1 | Reduce the inhalation of infectious particles by breathing air which has been effectively filtered to 0.3 microns with a particulate respirator |

3.2 Administrative Control Measures

The first and most important level of the hierarchy, administrative control measures, is intended primarily to reduce the exposure of health workers and patients to droplet nuclei containing *M.tuberculosis* in health facilities. Administrative control measures should take priority over all other interventions to reduce TB transmission in all health facilities, congregate settings and communities at large. Without effective administrative control measures, environmental control measures and personal protective equipment (respiratory protection) are of limited value.

Administrative controls consist of a combination of appropriate and applicable measures to identify persons with respiratory symptoms, separate them into an appropriate environment, educate them on cough hygiene, fast-track them through the health facility to reduce their exposure time to others and diagnose/treat them with minimal delay. Hospitalization should be reduced or avoided to the greatest extent as possible.

These measures include:

- Developing a written TB infection control plan
- Coordinating efforts with the Council and Regional Health Management Teams
- Assigning responsibility for TB infection Control at the facility; it is a duty of All HCWs to ensure the implementation of the HF's TB Infection Control Policies
- Using appropriate signage to advise patients of cough hygiene
- Prompt detection of persons who have suspected TB–Prompt separation or isolation of Infectious TB patients and prompt treatment
- Ensuring the timely availability of laboratory services
- Implementing effective work practices for the management of patients with suspected or confirmed TB disease.
- Training and educating HCWs
- Ensuring proper cleaning and sterilization or disinfection of potentially contaminated equipment.

3.2.1 Development of a TB Infection Control Plan

All health care settings need a TB infection control plan designed to ensure prompt detection, and treatment of persons who have suspected or confirmed tuberculosis (TB) disease or prompt referral of persons who have suspected TB disease. In all health care settings, particularly those in which health workers and clients who receive care are at high risk for exposure to M.tuberculosis; policies and procedures for TB infection control should be developed reviewed annually, and evaluated for effectiveness.

3.2.2 Coordination of TB infection Control by Council and Regional Health Management Teams

The quality improvement focal person in collaboration with the TB/HIV Committee at the regional level is responsible for overseeing the implementation of TB IPC measures at all HFs in the region as well as the implementation of TB IPC measures in congregate settings and communities in general in the region.

The existing quality improvement focal person and TB/HIV Committees at district level should be responsible for:

- Overseeing the implementation of TB infection control measures at the district hospital, Health Centre, dispensary level, congregate settings and community in general.
- Developing a written TB infection control plan tailored to the specific health setting.
- Identify a TB infection control officer in charge (MO/ AMO/CO/Nurse) or a member of the TB/ HIV staff or a member of the HIV/CTC staff or any other assigned staff within the facility who will be responsible for:
 - o Conducting baseline infection control assessment using a checklist available in **Annex 1**. This assessment guides the development of facility-specific plans.
 - o Developing facility TB IPC plan in coordination with the Hospital Management Team (HMT) and the Regional/ District Medical Officer (RMO/DMO), using the guide provided in **Annex 2** and **Annex 3**.

- o Assigning designated health workers (e.g. MO/AMO/CO/nurse working at CTC, TB clinic, Reproductive and Child Health Clinic, Out Patient Department, ward or HCW working at dispensary level) responsible for monitoring the plan implementation in each unit.
- o Monitoring the implementation of the IPC plan at the health facility level
- o Evaluating the facility IPC plan implementation on a quarterly basis and revising it on an annual basis.
- Identify a congregate and community TB infection control officer in charge who will be responsible for the following;
 - o Conducting baseline infection control assessment using a checklist available in **Annex 1**. This assessment can be adopted to guides the development of congregate and community specific plans.
 - o Developing congregate and community TB IPC plan in coordination with the congregate and community Management Team (HMT) by adopting the framework provided in **Annex 2**.
 - o Assign designated officer at the congregate setting and community in general responsible for monitoring implementation plan in congregate and community.
 - o Monitoring the implementation of the IPC plan at congregate and community.
 - o Evaluating the congregate and community IPC plan implementation on a quarterly basis and revising it on an annual basis.

3.2.3 Infection control monitoring and report at facility level

The quarterly monitoring of the health facility by the designated TB infection control officer in charge should be conducted using the checklist in **Annex 1**. The information obtained using this checklist should guide the designated TB infection control officer in charge on the actions to be taken to ensure proper implementation of the TB infection control measures in the HF. The designated TB infection control officer in charge at every level (regional hospital, district hospital, Health Centre and dispensary) is respectively accountable to the regional/district TB/HIV committees

In consultation with the Regional/District TB/HIV committee, the designated TB infection control officer in charge at Health Facility level and the Regional/District Tuberculosis and Leprosy Coordinator (RTL/DTLC) should prepare the quarterly report, using the standard TB quarterly report updated with the TB infection control component. The quarterly report should be submitted to the National Tuberculosis and Leprosy Programme (NTLP) and copied to the Regional and District TB/HIV committees and the National AIDS Control Programme (NACP).

- The extensive checklist to assess the implementation of TB infection control measures shown in **Annex 4** should be used by the National TB and Leprosy Control Program and NACP during annual review of the TB infection control plan or by any external review.
- The standard NTLP supervisory checklist updated with the TB infection control component should be used during the routine supervisory visits, to assess the implementation of the TB infection control measures at HF level

Formation of regional/district TB/HIV Committees should not prevent the implementation of TB IC measures at HF level: every HF can implement TB IC activities independently and in strict compliance with the procedures described in the guidelines

Note: In congregate settings and community the monitoring should be done by the DTLC in collaboration with other stakeholders implementing TB/HIV activities.

3.2.4 Early identification of TB suspects at the health facility level

To promptly identify persons with symptoms suggestive of TB who have come into a facility. This is a very important strategy in health facilities due to existence of risky environments for TB transmission, which include:

- Crowded waiting area, especially closed room (e.g. registration desk at the entrance of the HF, OPD waiting areas, drug dispensing window etc.)
- CTC waiting area: where TB droplet nuclei can easily be transmitted from a TB/HIV co-infected patients when coughing towards PLHIVs who already have low immunity against infections.

The early identification of TB suspects at the health facility level is based on introducing the following work practices, as applicable and appropriate for the specific setting:

- The use of posters displayed at the entrance of each unit, instructing patients on cough hygiene as depicted on **Annex 5**, signs and symptoms of TB as shown on **annex 6** ((Dalili za kifua kikuu) and information about access to TB investigations and treatment
- Active identification of presumptive TB cases among all clients attending health facilities at every registration desk and in all other units, by administering TB screening questionnaire.
- The regular education on signs and symptoms of TB and information about access to TB investigations and treatment, to patients accessing health services in health facilities; and family members especially of people living with HIV.
- Explain to persons with symptoms suggestive of TB why they are being selected for special attention.
- Explain to other patients in the waiting area why persons with symptoms suggestive of TB are prioritised
- Direct persons with symptoms suggestive of TB to the sputum collection area first, to provide a sputum sample
- Monitor the triage process daily, to ensure that each coughing person is screened. Better screening should show an increase in the numbers of diagnosed TB patients. The three strategies can further be explained as follow:-

I. Information Education and Communication materials on TB IC

Posters on cough hygiene and signs and symptoms of TB should be displayed at entrances of the HF and in waiting areas of the OPD, TB clinic, CTC, RCH, IPD, general registration desk, diabetes clinic and other strategic places (e.g. elevators, radiology and laboratory), Congregate setting and community. Poster on cough hygiene includes the following education messages:

- Covering the mouth and nose with the hands napkin or a handkerchief when coughing/sneezing
- Avoid indiscriminate spitting
- Proper disposal of waste
- Hand washing
- Open the windows

Poster on TB suspects 'self-referral describes the five signs and symptoms of tuberculosis and encourages those with one or more signs and symptoms of TB to report to the HF for TB screening.

An example of a poster on cough hygiene and self-referral and a poster on intensified TB case finding is provided respectively in **Annex 7 and 9**.

These posters play an important role thus should be displayed in well visible positions to ensure that

clients/patients will see the immediately upon arrival to the health facility.

Additionally, posters on TB infection control should be displayed in all examination room and at the HWs corner of the ward to remind them on the main steps to ensure TB infection control in the examination room/ward and intensified TB case finding in particular. An example of a poster on TB infection control targeted to HCWs is provided in **Annex 7**.

II. Intensified TB Case Finding and Separation of Presumptive TB cases

At any unit such as the OPD, TB clinic, CTC, and RCH, the triage/registration health worker should actively ask the patient and his/her family members about TB symptoms by administering the TB Screening Questionnaire provided in **Annex 8** and entering them in the presumptive TB Register, if they have one or more symptom of TB regardless the HIV status. If a triage/registration health worker is not available or the procedure is not feasible, the identification of TB suspects should be conducted by a trained volunteer HW (e.g. Peer Educator) or by the clinician in the examination room.

HIV testing should be encouraged to all patients/clients with unknown status.

Particular attention should be paid to identify TB suspects among PLHIV attending the CTC and general population attending the OPD.

Those patients who have been coughing for more than two weeks or have at least one of the five signs/symptoms on the TB screening questionnaire (TB suspects) should be immediately referred to the laboratory for the collection of two sputum specimens for Acid Fast Bacilli (AFB) smears (according to the national TB policy). The triage/registration nurse should also instruct them on cough hygiene, advice to avoid close contact with the other clients/patients (in particular children, due to their immune-related vulnerability) in the waiting area and if available provide them with tissue/handkerchief to cover their mouth/nose.

TB suspects using a handkerchief should be instructed to wash it with soap and water and re-use it. Otherwise, if tissues are used, the TB suspect should be instructed to discard them in a bucket after use

The sputum request form should be available at the registration desk of every unit (e.g. OPD, CTC, and RCH) and in the ward. The triage/registration nurse at the registration desk and the nurse in the ward are responsible for filling in the form and referring the patient to the laboratory for an AFB test. Once a TB suspects returns from the laboratory after having collected the first sputum sample, he/she will be entitled to be seen by the physician with priority above patients who have subsequent numbers issued at registration. Therefore, the numbering system should be used by the triage/registration nurse to register patients.

Otherwise, whenever feasible, sputum should be collected directly at the unit (e.g. CTC/ OPD/RCH/ ward) and the specimen transported to the laboratory. Sputum cups should be made available at those units and a HCW should be trained in sputum collection procedures by the laboratory technician or the TB staff. Sputum collection should take place in a well-ventilated area, preferably outdoors.

The TB suspect should never be referred to the TB clinic for diagnosis (sputum test), to avoid the risk of exposing a person to potentially infectious TB patients queuing at the TB clinic.

If the laboratory is not available within the HF (e.g. at the dispensary level and some health centers), TB suspects should be instructed on cough hygiene and referred to the laboratory only after having seen the physician in the examination room. HFs without an on-site laboratory should have an established link with a TB diagnostic center to which symptomatic patients can be referred. Also, each facility should have a linkage with a TB treatment center to which those who are diagnosed with TB can be referred.

Any patient returning to the requesting unit of the HF with a positive sputum result, has to be instructed on cough hygiene, encouraged to use a tissue/handkerchief, put on top of the queue and attended by the clinician in the examination room as soon as possible, to minimize the contact with other patients/clients in the waiting area and start immediately the TB treatment.

III. Education of patients and community on TB and cough hygiene

Educating communities and patients to recognize symptoms of TB (cough, fever, excessive night sweats and weight loss) and to seek health care and further investigations should be routine in health care settings. Therefore, physicians/nurses/midwives, and community health workers should provide health education.

Health education should:

- Be given to the patient and respective family by using a multimedia approach including pamphlets, posters, videos, and also through television if available.
- Be delivered individually or in a group and should be offered when the patient accesses the health facility, in the waiting areas, during admission to the hospital and at discharge. Health education can also be delivered by using video and/or former TB patients, when available.
- Focus on simple cough hygiene measures, such as covering the mouth and nose with the hands, a tissue or a handkerchief when coughing sneezing; proper disposal of waste, hand washing, and avoiding in discriminate spitting. HCWs/ volunteers should instructing-patients and out-patients/client in waiting area stop spiting to a cup with a lid, if available disinfect the content with chlorine, ,discard it in the toilet or bury it underground ,wash the cup and re-use it. Otherwise patients/clients can also be advised to spit into a tissue and dispose it in a bucket or spit in to a handkerchief, wash it and re-use.
- Includes messages on tuberculosis infection/disease, and TB/HIV co-infection, the importance of HIV testing for TB patients, and continuous TB screening for PLHIV.
- Cover TB infection control at the community level. In particular, TB patients not on treatment should be advised to avoid contact with the general public and with people at increased susceptibility to TB such as young children and people living with HIV within the first three weeks of continuous treatment. The patient's home should be kept well ventilated, with open windows and possibly fans. Any sputum that is produced should be collected in a covered container that is emptied into a latrine and cleaned regularly. Entry into the house by visitors should be kept at a minimum. The patient's room should be cleaned with a wet mop and soap powder and then disinfected with house hold leach.

Brief education sessions lasting a few minutes should be delivered every few hours. The education messages should be clear, focused and short. Education sessions to ensure capturing all the clients/patients entering the HF, should be conducted in all registration/ waiting area/ward.

Procedures:

- Ask all individuals at first point of contact OR when they have joined the queue OR have had a seat with others OR have been allocated a hospital bed a few simple screening questions:
 - a. “Are you coughing?” If answer is yes
 - b. “For how long?”
 - c. “Have you lost weight?”
 - d. “Do you have fever?”
 - e. “Do you sweat at night?”
 - f. “Are you being investigated or treated for TB?”
 - g. “Have you been in close contact with someone who has a prolonged cough or is a TB patient?”
- If the patients answer yes to any of the screening question above;
 - Register their names and contact details in the TB presumptive TB Register
 - Provide a sputum cup with a screw cap.
 - Explain how to provide a sputum sample in a well-ventilated place outside.
 - Instruct them where to bring the sputum sample.
 - Instruct them to return, immediately thereafter.
 - Document (daily) and evaluate (monthly) the number of persons with presumptive TB against the total number of outpatients and against the numbers of notified and bacteriologically confirmed TB patients.

Procedure:*Instructions to a presumptive TB for providing a sputum sample*

Sputum collection should be done outside in a well-ventilated place and not in enclosed spaces such as toilets. Health care workers should instruct the patient on how to produce a deep cough for the purpose of getting real sputum from the lungs. Ideally health care workers should observe patients producing the sputum sample, while keeping sufficient distance (at least 3m) when the patient coughs. Healthcare workers should visually inspect the specimen to ensure an adequate specimen has been produced; if the specimen appears inadequate, the patient should be instructed to try and produce another specimen. Once the best possible sputum specimen has been collected, it should be sent to the laboratory and examined.

3.2.5 Separation of TB patients

To physically separate infectious and potentially infectious TB patients from others, especially susceptible persons, introduce the following work practices, as applicable and appropriate for the specific setting:

- Separate persons with symptoms suggestive of TB and diagnosed infectious TB patients from other patients, in particular paediatric, HIV-positive and other immune-deficient patients
- Where designated waiting areas, clinics, isolation rooms and wards are not available, divide big areas into smaller ones. Create multiple isolation rooms or small wards

- Combine any separation and isolation measures with the highest quality of care. Ensure that any curtailing of individual freedom happens as a last resort and make great efforts to explain the process and the reasoning for such action
- Limit patient movement both within and outside the facility until a diagnosed pulmonary TB patient has converted or at least has been treated with a standardised regimen for at least two weeks
- Provide a surgical mask if an infectious patient or person with symptoms suggestive of TB has to undergo essential investigations elsewhere in the health facility or meets other patients, visitors and staff
- Inform patients, staff and visitors by placing visible signage on doorways to restricted areas (*"You are entering a restricted area"*). Ensure that patients, staff and visitors follow the information and signage as to where and when they can visit isolated patients and how to protect themselves.
- Limit the number of visitors and visiting hours. Do not allow children to visit patients in isolation; place visible signage on doorways (*"This area is prohibited to children"*). If possible, create a designated roofed area outside, where DR-TB patients can receive visitors and socialise with other DR-TB patients.

Procedures:

1. Instruct persons with symptoms suggestive of TB to return immediately from the laboratory and when they return, immediately direct them to a nearby designated well-ventilated waiting area away from other patients, where they can wait until they can be seen.
2. Separate different cohorts: persons with presumptive TB; confirmed sputum smear-positive TB patients; confirmed sputum smear-negative Xpert-positive or culture-positive TB patients; and HIV-infected TB patients.
3. Separate persons suspected of having pulmonary DR-TB and diagnosed with DR-TB from other patients in designated DR-TB waiting areas, clinics, isolation rooms, wards far away from paediatric, HIV care and oncology departments.
4. Separate persons suspected of having pulmonary DR-TB; confirmed sputum smear-positive DR-TB patients; confirmed sputum smear-negative Xpert positive/Rifampicin-resistant or culture-positive DR-TB patients; and HIV-infected DR-TB patients according to the drug resistance profile to prevent re-infection with different strains.
5. Isolate persons suspected of having pulmonary XDR-TB and diagnosed with XDR-TB in single-patient airborne precaution rooms.

3.2.6 Compliance with respiratory hygiene policy and practice

To enforce patient, staff and visitor compliance with respiratory hygiene policy and practice, introduce the following work practices, as applicable and appropriate for the specific setting:

- Place signs and posters on cough hygiene at the exterior entrances and other sites in the facility, e.g. waiting areas, corridors, rooms/wards and communal areas. They should be where patients cannot miss them, directly in front of them and at eye-level and not on back walls
- Provide (daily) health education on cough hygiene
- Remind non-adhering persons to comply with the respiratory hygiene policy of the facility

- Use your own attitude and behaviour to set an example to others. Part of every health worker's responsibility is to model and educate others on the best healthcare practices
- Provide tissues or disposable surgical masks to all persons with presumptive TB and confirmed infectious TB patients, especially DR-TB and XDR-TB patients
- Provide no-touch receptacles for the disposal of used materials.

Procedures:

Provide daily health education on cough hygiene, instructing patients to:

1. Cover their mouth and nose when coughing or sneezing.
2. Turn their head away from others.
3. Not spit on the floor.
4. Discard used tissues or disposable surgical masks in the nearest waste bin.
5. Wash hands frequently.

3.2.7 Minimising the time between presumptive and diagnosed TB

To reduce the risk of TB exposure to other patients and HCWs the time presumptive and diagnosed TB patients spent within the health facility should be minimized. This time should be minimised by introducing the following work practices, as applicable and appropriate for the specific setting:

Manage patient flow by minimising the time spent receiving services, e.g. give patients specific time slots; adjust duty shifts and rosters to have more staff attending to patients when it is busy

- Define referral, admission and discharge criteria as per National Guidelines for the Management of Tuberculosis. Assess compliance with this criterion.
- Reduce turn-around time:
 - The maximum acceptable diagnostic turn-around time for sputum smear microscopy is 24 hours.
 - The maximum turn-around time for culture examination, after the sputum specimen arrives at the laboratory, is six weeks for liquid media
 - The maximum turn-around time for DST, after receiving the sputum specimen at the laboratory will depend on the availability of Line-Probe Assay (LPA) and automated tests for molecular detection of *M. tuberculosis* and RIF resistance
- Introduce rapid diagnostic tests e.g. Xpert MTB Rif and other automated TB test

3.2.8 Prevent Health staff from contracting TB and to support those who have contracted TB or are HIV infected

To prevent staff, particularly HCWs, from contracting TB and to support those who have contracted TB or are HIV infected, introduce the following work practices, as applicable and appropriate for the specific setting:

1. Make staff aware of the occupational risk of contracting TB. Remember that HCWs and other staff can develop TB, regardless of previous TB disease or BCG vaccination. Training should include the purpose of screening staff for TB and should also include the personal responsibilities of each staff member. They should be alert to the signs and symptoms of TB

and in case of signs and symptoms should seek care promptly

2. Staff training and re-training programmes (formal/orientation/in-service training) should also encourage all staff who are at risk, to know their HIV status so that they can take additional precautions and benefit from IPT if they are HIV infected
3. Staff should be investigated for TB if they have one or more sign and symptoms of TB. Self-reporting can be done to the Medical Officer in charge/matron/supervisor
4. Assign a person the responsibility of screening all staff on TB. Screening should be done using a standardised symptom screening questionnaire (see **Annex 8**), at the assumption of duty (during the week of induction), and periodically thereafter (annually, when need arises and upon exit of service)
5. Maintain a separate staff presumptive TB screening register.
6. HCWs who are diagnosed with smear-positive TB should return to work when they are no longer infectious. This is after having:
 - a. Taken treatment for at least two weeks, except for those being treated for DR-TB.
 - b. Clinically improved.
 - c. Had one negative follow-up sputum smear examination result.
7. All HCWs on anti-TB treatment should have a DOT supporter ensuring they adhere to their medication until their treatment is complete.
8. It is paramount that confidentiality be observed when staff is screened for TB and also for the records which are kept. At no point during this process should a HCW feel stigmatised.

Procedures:

- At least once a year, remind staff of the occupational risk of developing TB, educate them on the symptoms/signs of TB, inform them of the risks for TB in PLHIV and encourage them to seek prompt attention should they develop these symptoms/signs.

Baseline/Entry Screening:

- Using a standardised screening questionnaire, provided in **annex 8** (TB screening questionnaire (TSQ))
- HCWs found to have abnormalities on chest X-ray or found to have positive symptoms should have sputum examination done. Xpert MTB/Rif (Xpert) should be applied for diagnosis of TB in HCWs.
- A baseline TST can be performed for individuals who will take up employment for the first time in a health facility. These can be student nurses or medical students. Follow-up TST can be performed during the periodic/annual and exit screening of these staff. Records should be kept of findings of the skin test.
- Record in a separate presumptive TB register, name or personnel number; date of screening; what the screening consisted of: symptoms-questionnaire; chest X-ray; physical examination; sputum examination; other lab tests; advice/action.
- If diagnosed with TB, notify Medical Officer in charge/matron/supervisor and the social welfare in compliance with the code of instruction).
- Conduct contact investigations of the household members and immediate colleagues.
- If diagnosed with HIV, offer staff a package of prevention, treatment and care which includes regular screening for active TB, access to HIV medications and Preventive TB therapy for PLHIV unlikely to have active TB disease.

Periodic/Annual Screening:

- Every HCW should undergo symptom screening at first appointment and annually.
- HCWs found to have positive symptoms will have sputum investigation done, and diagnosed using TB diagnostic algorithm provided in **Annex 9**.
- Record in a separate staff TB presumptive register
- Where applicable action should be taken as stipulated under points 6-8.

Exit Screening

- Exit screening should be done for HCWs who are transferring from one duty station to another and those resigning or retiring from employment in the public health services. Annex 4 should be used.
- As with entry screening, HCWs should have symptom screening as well as chest radiography.
- Any abnormalities on chest X-ray or positive symptoms should be followed-up with available diagnostic test technique
- Where applicable action should be taken as stipulated under points 6-8.

3.2.8.1 Protection of health workers

HWs (medical and non-medical staff) need to be protected to minimize the risk of acquiring TB infection/disease in health facilities. It has been documented that HWs have increased risk of TB infection/disease compared with the general population.

As the risk of exposure is not eliminated with administrative and environmental measures, the third level of the hierarchy is the use of respiratory protective equipment to protect HWs from inhaling infectious droplet nuclei that have been expelled into the air by a patient with infectious TB disease

3.2.8.2 HIV Testing and Counselling (HTC) and Confidentiality among HCWs

Encouraging and enabling all health facility staff to know their HIV status should be a priority of all health care services, particularly CTC and TB clinics. However, there is no role for mandatory HIV testing of health care workers. Health care workers have the same rights as all individuals to confidential HIV testing with counselling conducted only with informed consent. Uptake of testing can be facilitated by providing accessible, acceptable, confidential HIV counselling and testing, including periodic retesting and provision of care and treatment including priority access to antiretroviral drugs. Options for reassignment of HIV-infected staff away from high risk work environments should be considered.

3.2.8.3 TB Infection Control Training for Health Facility Workers

Infection control is effective only if each person working in a facility understands the importance of TB infection control policies and his/her role in implementing them. All health workers at HF level should be targeted for training: medical and non-medical (administrative staff, laundry, cleaners and any other worker).

An annual evaluation of the need for follow-up training based on the number of untrained and newly employed HWs should be conducted and training courses planned accordingly.

The topics recommended to be part of the training are described in the 3Is training curriculum, NACP/NTLP MOHCDGEC 2015.

3.2.9 Treatment of TB patients

All TB patients, especially during the hospitalization, should receive Directly Observed Therapy (DOT) to ensure adherence and thus reduce the risks of transmission and treatment failure.

3.2.10 Discharge of TB patients from hospital

DOT should continue after discharge from the hospital, particularly for DR-TB patients. Patients should be referred to the DMO/DTLC who should select a DOT- Provider to supervise.

Key messages

- The TB/HIV Committee, TB IC officer, RMO/DMO and HMT should develop a TB IC plan for the HF and monitor its implementation
- Triage/registration HCW at every unit of the HF (e.g. OPD, CTC, ward) should actively identify TB suspects
- Education sessions on cough hygiene, HIV testing, TB screening and TB/HIV co-infection should be delivered regularly in the waiting areas
- PTB patients who are still infectious should be placed separated from other patients/clients, especially from PLHIV and children

3.3 ENVIRONMENTAL CONTROL MEASURES AND WORK PRACTICES

The second level of the hierarchy is the use of environmental control measures in the prevention of TB transmission. This includes ventilation (natural and mechanical) and filtration. Aimed at reducing the concentration of infectious droplet nuclei in ambient air. In health facilities and congregate settings with inadequate administrative controls, environmental control measures alone will not

eliminate the risk of TB transmission. For environmental controls to be implemented, managerial activities and administrative controls should also be in place to ensure availability of resources, the proper use and maintenance of equipment and the training of staff. The choice of environmental control measures is largely determined by local factors and resources.

The first two control levels of the hierarchy minimize the number of areas in the health care facility where exposure to *M. tuberculosis* may occur, and reduce the risk of transmission in those areas where exposure can still occur.

3.3.1 Ventilation

Ventilation systems can be natural or mechanical:

Natural ventilation relies on open doors and windows to bring in air from the outside. When fresh air enters a room it dilutes the concentration of particles in air inside the room, such as droplet nuclei containing *M. tuberculosis*. Designing rooms with adequate windows, so that they maximise natural ventilation, can help reduce the spread of TB.





- Natural ventilation is controlled when windows or doors are deliberately secured open to maintain air flow
- A room with an open window, open door, and a fan will have less risk of TB transmission than an enclosed room with no fan, enclosed room with a fan, or a room with an open window but no fans
- Natural ventilation should be promoted, especially when fans are not in place or are out of order or when power supply is interrupted

Mechanical ventilation

Mechanical ventilation should be considered in those health facilities and congregate settings where natural ventilation is inadequate, because open windows are far too small, or the climate does not allow having the windows open all the time, for example because it is too cold, or too dusty. Mechanical ventilation measures include fans which may assist to distribute the air (thus allowing better dilution of air from “dead” corners), evacuate the air (fans pulling air out of a room) and negative pressure ventilation systems. When mechanical ventilation systems are used, management must ensure that the system is regularly maintained

Air mixing

Air mixing increases the effectiveness of other environmental controls. Propeller fans increase the effectiveness of natural ventilation, by increasing the mixing of airborne TB as well as assisting in the direction of air movement by pushing or pulling the air. Propeller fans include: ceiling fans, small fans that is on a desk or other surface, fans that stand on the floor, and fans mounted in a window opening.

| Standing fan | Ceiling fan | Window fan | Desk fan |
|---|---|--|---|
|  |  |  |  |
| Directional fan | Mixing fan | Direction fan | Dirctional fn |

Example

Fans installed in the windows on the back wall of a building exhaust air to the outside. If doors and windows in the front of the building are kept open, the overall effect should be to draw in fresh air through the front of the building and exhaust air through the rear. With this arrangement, the risk that TB will be spread is greater near the back of the building.

Fans should be strategically placed to direct air flow out of the waiting room through the doors and windows.

| | |
|--|---|
| <p>Picture: Correct air flow PATIENT VS HCW</p> | <p>This model depicts the correct air flow that should be established in any closed waiting room and examination room.</p> <p>It is important to make sure the direction of the air flow is from the HCW to the clients/patients.</p> |
|--|---|

- **Keep fans running as much as possible when there is a patient in the examination room/ward**
- **Use fans only when windows are open**

During the TB infection control monitoring visits, the TB infection control officer in charge, should check natural ventilation (if windows and doors reopen) and air mixing and determine directional air movement in all parts of occupied rooms. An inexpensive way to visualize air movement is to use incense sticks:

- Hold two incense sticks together and light them
- As soon as the incense starts to burn, blow out the flame. Now the incense should produce a continuous stream of smoke.
- Observe the direction of the smoke.
- Observe how quickly the smoke dissipates. This is a subjective test that may require some practice. It does not give a definite result but is useful for comparing rooms to each other. For example, it may take 5 seconds for smoke to dissipate in one room but 10 seconds in another.
- Repeat smoke tests for different common conditions at your facility. For example, if doors are kept open during the day but closed at night, the tests should be done under both conditions.

Maintenance of propeller fans

Over time, dust and lint accumulate on exhaust fans. The fans and ducts become clogged and less air is exhausted. For this reason, these systems should be cleaned regularly. Clean fans about once a month with a damp cloth or vacuum cleaner to remove dust and lint from fans, grilles, and ducts. Clean ducts behind grilles as far back as the vacuum cleaner can reach. This should not be done when patients are in the room. During the TB infection control monitoring visits, the TB infection control officer in charge should check all the fans and exhaust fans with a grille by holding a tissue or a piece of paper against the grille. If the fan is working, the tissue or paper should be pulled against the grille.

The use of air conditioning systems, High Efficient Particulate Air (HEPA) or negative pressure rooms is not generally recommended. However in selected health facilities, such as specialized DR-TB hospitals and referral hospitals, installation of HEPA and building of negative pressure rooms is recommended.

Key message

Natural ventilation and air mixing are highly recommended as the most cost-effective measure to break the transmission of respiratory infections including tuberculosis: windows should always be kept open and fans running

3.3.2 Ultra Violet (UV) Light

In high-risk settings where optimal ventilation cannot be achieved through natural or mechanically-aided means, properly designed, placed and maintained shielded UV light units should be considered as an effective control measure if available. Ultraviolet-Gamma (UVG) radiation inactivates *M. tuberculosis* organisms when adequately exposed to the light (long enough and close enough). Effective use of UV light ensures that TB bacilli contained in infectious droplet nuclei is exposed to a sufficient dose of UV light radiation at 253.7 nm to result in inactivation.

UV light can be considered for health facilities managing DR-TB, particularly in areas where climate conditions preclude the utilisation of natural and mechanical ventilation and in large wards with high patient numbers. If this model is used, responsibility should be assigned to ensure the lamps are cleaned, maintained (replaced) and monitored (measure UV intensity), and adverse exposure is avoided. They work better in clean air without much dust or humidity. Natural sunlight is not very effective in killing TB bacilli and should not be relied upon in TB-IC measures. Sunlight passing through windows does not kill TB bacilli.

To inactivate TB bacilli in suspended droplet nuclei, introduce the following work practices:

- Use UV light in specific patient care areas, for example large waiting areas, large DR-TB wards, X-ray units, indoor sputum collection booths, or cough-inducing procedure rooms. UV light is the ideal companion to natural ventilation when windows are closed at night and in cold weather conditions. UV light is less effective in humid climates.
- Use upper-room air shielded UV light units only. Bare bulbs, which can only be switched on after occupants have left the room, are not recommended. Use certified units and certified bulbs. The shields or louvers will protect room occupants from direct UVG exposure. Keep the UV lights on 24 hours a day; the units must be connected to a backup generator in case of power failures.
- Hire an engineer trained in UV light to design the type and placement of the units.
- Install shielded Ultra Violet Gamma Irradiation (UVGI) always in combination with slow-moving ceiling fans.
- Ensure that units have their own switch; the switch must be out of the reach of patients and visitors.
- Define a cleaning and lamp replacement schedule which is based on manufacturer guidelines. Bulbs must be replaced yearly or according to the manufacturer's specifications. Light bulbs must be cleaned with alcohol 70% to keep them free of dust. This should be done every 3 months.
- Keep a cleaning, replacement and maintenance log with dates and locations for all sites where UVGI is used in the health facility.
- Educate staff about use, safety and maintenance of UV light.

Procedures:

1. Have units cleaned and lamps replaced by, the responsible officer, according to a fixed preventive maintenance schedule:
 - a. Turn off the upper-room UV light system and let the lamps/fixtures cool.
 - b. Open the units in accordance with the manufacturer's directions.
 - c. Remove the lamps from the unit for cleaning. Handle the lamps only while wearing clean gloves to prevent oil deposits from accumulating on the lamps and decreasing their emission efficiency.
 - d. Use a cloth dampened with alcohol to clean the lamps and reflectors - do not use water.
 - e. Dry the lamps and reflectors with a soft cotton cloth to remove any residue while continuing to wear gloves.
 - f. Lamps should be changed according to a fixed schedule based on the lamp manufacturers' recommendation. If feasible, group revamping should be done on a yearly basis. The lamp or ballast should also be replaced if the lamp stops glowing or flickers.
 - g. Close the unit.
 - h. When all appropriate lamps have been replaced in the upper-room UV light system, turn on (re-energise) the system and verify (e.g. visually) lamp operation and that (if present) all louvers are in the correct position. If necessary, UV-protective eyewear should be used when verifying that lamps are re-energised.
 - i. Document inspection, cleaning, and lamp replacement in a preventive maintenance log-book.
 - j. Have UVG emission/performance of each unit measured by, the responsible officer, at defined distances and locations, after replacement and every quarter. Irradiance should be measured at various levels - both at upper room level and at occupancy level.

For each environmental control measure above consider the stepwise implementation of the following work practices and Standard Operating Procedures (SOPs).

To ensure sufficient air exchange and control airflow direction, introduce the following work practices, if applicable and appropriate for the specific setting:

- Keep as many windows and doors open at all times. It is important to guarantee a supply of fresh air, with sufficient openings in the opposite walls, for example through a grill in the door or a door which is cut short by 20 mm.
- Install ceiling fans and wall-mounted fans to improve air mixing in large rooms (high volume areas).
- Install extractor fans in consultation rooms, isolation rooms and laboratories. The use of extractor fans is the most cost effective form of mechanical ventilation. Extracted air should not be a risk for people outside the building. Contaminated air should not be exhausted into a space which is occupied by people. Extracted air should also not re-enter immediately through an opening (short-circuiting). As back up, natural ventilation should be considered in areas where a constant power supply is not guaranteed; therefore windows should not be sealed, but should remain opened.
- Wind driven roof turbines (whirly birds) can be installed as they do not require a power supply and makes use of natural air currents.

- Where technologies are used as environmental controls, the responsibility to check and service them on a regular schedule should be assigned to a dedicated person or team. Keep a log to record the date, what was done (e.g. checking, cleaning, replacement of part, repair) and when the equipment should be serviced again. Adequate resources (budget and staffing) for maintenance are critical. Have faults repaired as soon as possible.
- Have a preventive maintenance programme and incorporate the maintenance procedures of windows, doors and fans into this programme.
- Educate staff on the use of environmental controls, not only engineers.

Procedures:

1. Daily, check if windows and doors are in a proper position in all areas/settings and if they are easy to open/close and to keep open/ closed.
2. Daily, check extractor fans by holding a tissue or a piece of paper against the grille. If the fan is working, the tissue or paper should be pulled against the grille.
3. Monthly, check if all windows and doors are in good condition. Keep a log with the date and the action: checking/maintenance/repair.
4. Monthly, check if fans are clean. Keep a log with the date and what was done: checking/cleaning/maintenance/repair.

3.4 PERSONAL RESPIRATORY PROTECTION

Respirators ('N95 and/or FFP3 masks') are the last line of defence against (nosocomial) TB infection for HCWs. Respirators can protect HCWs from inhaling *M. tuberculosis* only if standard work practice and environmental measures are in place. Respirators are recommended to be used by HCWs only in high risk areas, such as DR TB settings. Unfortunately, even the combination of administrative and environmental controls can never provide 100% safety. Respiratory protection is therefore needed in specific areas and during the performance of specific tasks, to supply the desired level of safety. The main limitation of respirators is that they may not be practical to wear at all times, and they are often not used when unsuspected (untreated) TB patients are being attended. In addition, in order to be effective, respirators need to fit properly and to be worn correctly with each use, which is not always the case.

Respirators are made of a material which filters out very small particles in the air (including the infectious particles in aerosols). Respirators are closely fitted to the face to prevent leakage around the edges. If the respirator is not fitted correctly, infectious droplet nuclei can easily enter a person's airway, potentially resulting in infection. Respirators manufactured with at least 95% filter efficiency for particles of 0.3 microns in diameter are usually recommended for use by HCWs. They are disposable but can be re-used repeatedly for one to two weeks if they are taken care of properly.

The main factors responsible for the deterioration of respirators are humidity, dirt and crushing. They should be stored in a clean dry location. One method is to fold a light paper towel around the respirator (being careful not to crush it). Another practical method is to hang the respirators on a hook or nail in the staff room. Plastic bags should never be used since they retain humidity.

Respirators are available in different makes, models and sizes, because of variation in the size and shape of people's faces (not 'one-size-fits-all'). It is recommended that HCWs be "fit tested" to ensure selection of the appropriate respirator. Qualitative fit testing of respirators should be performed to ensure that the appropriate respirator (size and shape) for each HCW is used. Qualitative fit testing involves the use of an aerosol which may be "tasted". If the HCW "tastes" the aerosol (usually

saccharin or a bitter-tasting material such as Bitrex) the respirator must be adjusted (i.e. the nose clip) and retested. If the HCW fails the test a second time, a different size or type of respirator should be tested. Beard and facial hair do not allow for the proper sealing of respirators to the face and therefore staff with facial hair should shave. Any leak between the face and the mask is a potential entry point for infectious droplet nuclei.

A respirator fit testing programme should be incorporated into the IPC plan of a health facility. Qualitative fit testing should be conducted prior to the use of a respirator and preferably annually thereafter. IPC focal persons are responsible for conducting qualitative respirator fit testing. Refer to chapter 4.2 of this guideline and the Guidelines for management of Drug resistance TB in Tanzania 3rd Edition 2017.

Face Masks or Surgical Masks

There are important differences between a face mask and a respirator. Face masks, such as surgical masks (cloth or paper) prevent the spread of microorganisms from the wearer (e.g. HCW, TB patient) to others by capturing the large wet particles near the nose and mouth but they do not provide protection to the wearer (e.g. HCW, patient, family member) from inhaling infectious droplet nuclei in the air. Disposable (paper) surgical masks can be used to reduce aerosols generated from potentially infectious TB patients. Face masks/Surgical masks do not provide protection to HCWs, therefore it is not recommended to wear a mask when in contact with PTB.

Consider the stepwise implementation of the following work practices and SOPs.

To reduce the inhalation of infectious particles by breathing air which has been effectively filtered to 0.3 microns, introduce the following work practices:

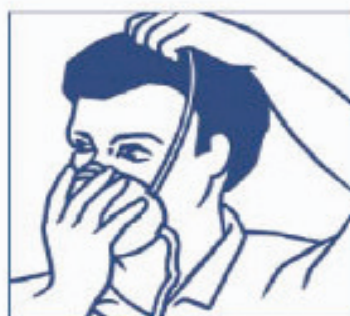
- Define who shall wear, and where and when respirators are worn based on the recommendations given in these guidelines or a risk assessment. In particular, staff and visitors caring for known or suspected DR TB patients or HCWs performing aerosol-generating procedures have to use respirators.
- Put up signs at the entrances of airborne infection precaution rooms reminding staff and visitors to wear respirators when entering the area.
- Provide information (verbal or written) to patients and visitors explaining why staff is wearing respirators and patients are wearing surgical or face masks.
- Get training on when and how to wear the respirators safely. Develop, implement and evaluate a respirator programme with the following elements: training, fit testing, selection, use, care (storage) and disposal of respirators.
- Employees should pass an appropriate qualitative fit test:
 - Prior to initial use, supervisors are responsible for informing the person responsible for fit testing, when need arises for new fit testing (e.g. new recruit).
 - Whenever a different respirator (i.e. size, type, model or make) is used.
 - Periodically thereafter; ideally, staff should be fit-tested every year.
 - Additional fit-tests should be performed whenever changes in physical condition or job description which could affect respirator fit are noticed or reported.
- Assign and train a responsible person, preferably the IPC focal person, in qualitative fit-testing.
- Keep a register on fit-test results, i.e. name, date of fit test, result, respirator make, model, type and size, date of next fit test.

- Fit testing should be done on all HCWs, new recruits (during induction/orientation), assigned to work in areas identified for the use of respirators and when new respirators are introduced.
- Remind colleagues on the proper use and storage of respirators and correct those who are not adhering to these work practices.
- IPC focal person should liaise with pharmacy staff to ensure uninterrupted availability of respirators.
- Inspect a disposable respirator every time before re-using it. If the elastic bands are loosened or if the material is soiled then the respirator should be disposed of.
- Do not wear a respirator around the neck while not in use; this may loosen the elastic bands.
- After use store the respirator in a dry, dust-free place such as in a clean towel, in a personal locker or hanging freely on a nail or hook with the name/initials of the owner clearly indicated. **Never store the respirator in a plastic bag. Do not share respirators. Do not fold or crush respirators.**
- After use, dispose the respirators as normal waste, there is no need for disinfection prior to disposal.
- Wash hands each time after donning and removing the respirator.

Fitting Instructions



1. Cup the respirator in your hand with the nosepiece at your fingertips allowing the headbands to hang freely below your hand.



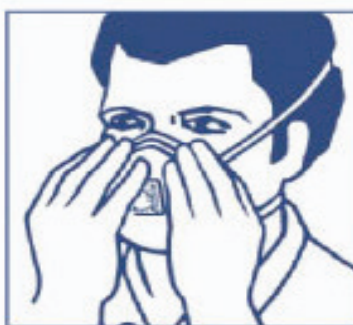
2. Position the respirator under your chin with the nosepiece up.



3. Pull the top strap over your head resting it high at the top back of your head. Pull the bottom strap over your head and position it around the neck below the ears.



4. Place the fingertips of both hands at the top of the metal nosepiece. Mould the nosepiece to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece. Pinching the nosepiece using one hand may result in less effective respirator performance.



5. The seal of the respirator on the face should be fit-checked prior to wearing in the work area.

- a) Cover the front of the respirator with both hands, being careful not to disturb the position of respirator.
- b) Inhale sharply.

A negative pressure should be felt inside the respirator. If any leakage is detected, adjust position of respirator and/or tension of strap. Repeat the seal. Repeat the procedure until the respirator is sealed properly.

Procedures:

1. Perform a qualitative respirator fit test, at least once a year for each eligible HCW:
 - a. Use sensitivity solution to establish if the HCW tastes the test agent (Sacharine or Bitrex)
 - b. Cover head with hood with opening in front
 - c. Squeeze the spray of fit test sensitivity solution 5-10 times
 - d. Remove hood
 - e. Replace sensitivity solution with fit test solution (higher concentration)
 - f. Don't apply respirator (Observe if the HCW applies the respirator in a correct manner)
 - g. Cover head with hood with opening in front
 - h. Squeeze the spray of fit test solution 5-10 times and repeat between next steps
 - i. Normal breathing 1 minute
 - j. Deep breathing 1 minute
 - k. Move head side-to-side 1 minute
 - l. Move head up-and-down 1 minute
 - m. Talk non-stop 1 minute
 - n. Jog or walk in place 1 minute
 - o. Normal breathing 1 minute
 - p. Remove hood
 - q. Remove elastic bands one by one from behind over the head
2. Don't apply the respirator as follows:
 - a. Find centre of nose piece and squeeze
 - b. Open respirator in a hand, looking into the inside
 - c. Place straps on back of hand
 - d. Place respirator on face
 - e. Pull top elastic band over head
 - f. Place top elastic band on crown of head
 - g. Pull lower elastic band over head
 - h. Pinch metal clip or foam cuff around nose
 - i. Pull respirator over chin
 - j. Check for major leaks

Key messages

- HCWs should receive PITC by the respective supervisor and if HIV positive and working at TB clinic/TB ward/DR TB hospital, the HCW should be given option to re-assign to another unit.
- HCWs should be informed by the respective supervisor to report when TB signs/symptoms occur and if PTB, the HCW should be removed from the unit up to minimum 3 weeks of TB treatment.
- Use of surgical masks by HCWs is not recommended.

4. AREA SPECIFIC TB INFECTION CONTROL MEASURES

It is critically important to ensure reduction of TB transmission especially for PLHIV and HCWs in specific areas and settings in the health facilities and communities. TB airborne infection precautions vary from one setting to another depending on the risk of transmission in that setting. Additionally, some areas are considered to be of high risk relative to others. Each of the high-risk areas should have an independent risk assessment, and should have a detailed written plan description of the department as part of the overall IPC programme.

Priority areas with a high risk of exposure include the following:

- Enclosed and crowded spaces where unidentified persons with symptoms suggestive of TB and particularly vulnerable patients for example PLHIV and children may interact (e.g. waiting areas, HIV care clinics, TB clinics, emergency rooms, ambulances and X-ray rooms).
- Spaces where aerosol-generating procedures are performed (e.g. bronchoscopy, spirometry, gastric aspiration, sputum induction, sputum collection/preparation, endotracheal intubation, surgical drainage and irrigation of TB abscesses and autopsy)

Below are suggestions for recommended combinations of TB-IC measures to be provided for specific areas/settings. The aim is to implement those control measures which are feasible in each specific area/setting. See **annex 10** for an overview of the recommended combinations of TB-IC measures for different areas/settings.

NOTE: To determine the proper combination of TB-IC measures for a specific area/setting, conduct the following:

- List the different specific patient care and auxiliary service areas/settings.
- Conduct a proper risk assessment using a standardised facility risk assessment checklist, **Annex 11** to evaluate the strengths and weaknesses related to work practices and infrastructure features at the different specific areas/settings.
- Prioritise the control measures and work practices described in chapter 3 for stepwise implementation, depending on the availability of resources.

4.1 Waiting Areas

Depending on the size of the facility, there may be one or several waiting areas. The most crowded area is probably where patients are registered immediately after they enter the facility. Smaller multiple waiting bays offer opportunities for separation, as long as crowding in small enclosed waiting areas is prevented. Large open waiting areas can be simply divided into smaller partitions with screens, low walls or plants creating distance between waiting patients.

Key recommended control measures are the following:

- Triage
- Separation – in separate area or well-ventilated partition of large waiting area
- Cough hygiene – encourage use of napkin/tissue/handkerchief or surgical mask to coughing persons (expert advice required) if available
- Minimising waiting time – Fast-tracking to the front of the queue
- Natural ventilation – out-of-doors waiting areas are strongly recommended
- Mechanical ventilation – ceiling fans in large indoor waiting areas and extractor fans in enclosed indoor waiting areas (expert advice required)

4.2 Casualty/Emergency Departments

Acute undiagnosed patients are first admitted to the emergency rooms, High-risk aerosol generating procedures are performed in emergency rooms such as resuscitation and intubation of patients. Due to high tension of saving patients' lives TB preventive measures are not well adhered and hence increasing the risk of TB infection. Often times TB patients presenting with haemoptysis who are highly infectious and in advanced disease are first attended at emergency room.

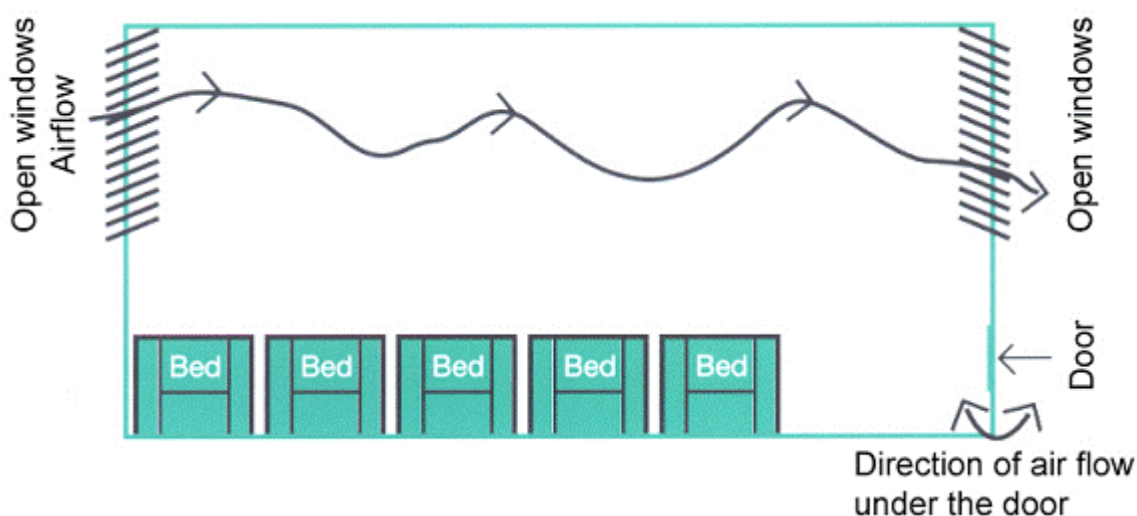
Key control measures are the following:

- Triage
- Separation and isolation – as is the case for other airborne infections
- Cough hygiene – encourage use of napkin/tissue/handkerchief or surgical mask to coughing persons (expert advice required) if available
- Minimising time spent with persons with symptoms suggestive of TB and confirmed infectious TB patients
- Natural ventilation – high level (permanent) open windows policy
- Mechanical ventilation – ceiling fans or extractor fan in isolation rooms (requires expert advice)
- UVGI - in large casualty rooms where ventilation cannot be improved adequately by mechanical ventilation alone (requires expert advice)
- Respirators on staff – especially when performing cough-inducing procedures on patients presenting with respiratory symptoms.

4.3 Consultation Rooms (including OPD)

Depending on the size of the health facility there may be several consultation rooms. The risk of the transmission of airborne infections is higher in small enclosed poorly ventilated rooms. TB and HIV care clinics are examples of high-risk setting, but general OPD consultation rooms should not be forgotten. Air conditions, increase the risk when HCWs keep windows closed and not maintained regularly. Even in consultation rooms with adequate natural ventilation, the placement of furniture and seating arrangement may inhibit air exchange.

Fig 4.1. Natural ventilation; free flow of ambient air in and out through open windows



Source: Adopted from India health and family welfare website: Accessed in July, 2017. http://www.delhi.gov.in/wps/wcm/connect/doit_health/Health/Home/Directorate+General+of+Health+Services/Public+Health+Wing

4.4 X-ray Departments

X-ray rooms are by definition enclosed rooms because of the regulations for the use of radiation and are potential for TB transmission. Persons identified with symptoms suggestive of TB and may be infectious are often referred for a chest X-ray. Air conditioning units are often installed in X-ray rooms.

Key control measures are the following:

- Triage
- Separation – scheduling other non TB patients and diagnosed/presumptive TB persons, For example
 - o Block can be set at the end of the morning or in the afternoon for inpatients.
 - o Identifying a specific X-ray room for presumptive TB cases in the case where multiple rooms for performing chest X-rays exists.
- Minimising waiting time – expedite service for (potentially) infectious TB patients
- Cough hygiene – encourage use of napkin/tissue/handkerchief or surgical mask to coughing persons (expert advice required) if available
- Mechanical ventilation – ceiling and extractor fans (requires expert advice)
- UVGI – in X-ray rooms where ventilation cannot be adequately improved by mechanical ventilation alone (requires expert advice)
- Respirators for staff e.g. N95

4.5 HIV Care and Treatment Clinics

PLHIV are more vulnerable to TB due to compromised immune system and hence high rates of undiagnosed TB among PLHIV. Intensified case finding by screening all PLHIV in each visit, initiation of ART, TB preventive therapy (TPT) for eligible PLHIV and treatment of diagnosed TB to PLHIV reduce TB transmission and mortality. Despite of all these, high standards of infection control are strongly recommended, in particular where integrated HIV and TB services are offered to supplement above interventions.

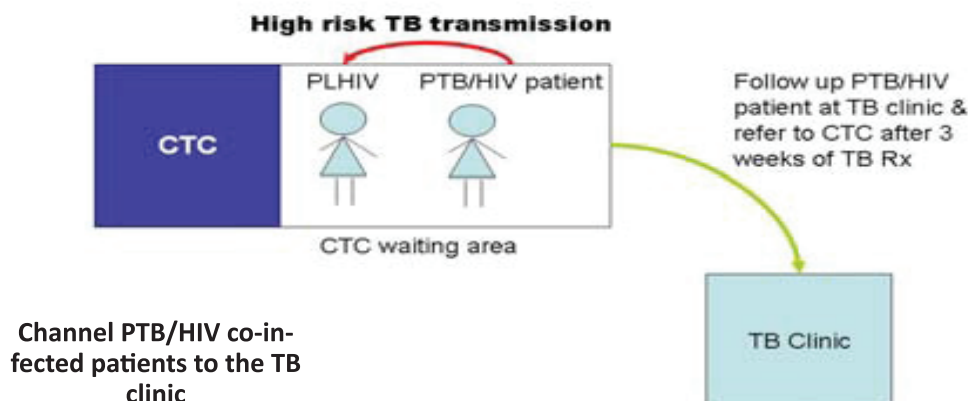
In addition, active screening for TB offers the opportunity to provide TPT to PLHIV in compliance with the national TB and ART guidelines.

For the management of confirmed PTB/HIV co-infected patients, the following options are recommended:

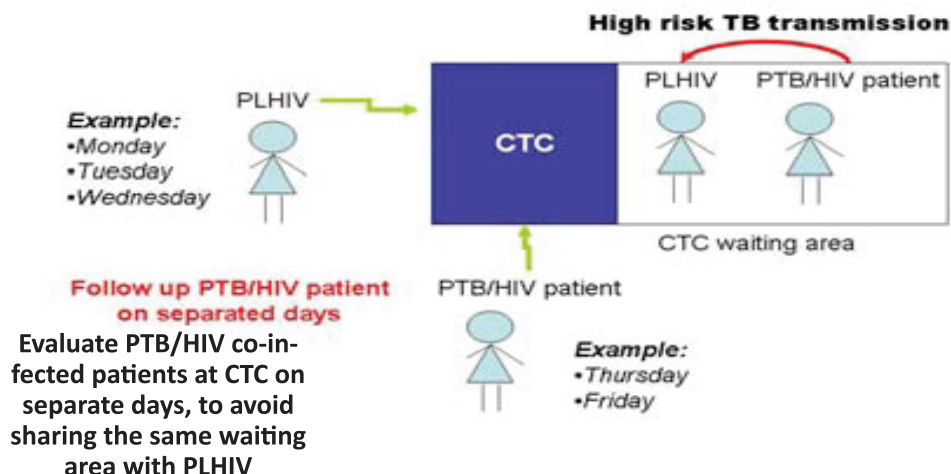
- a) If TB clinic is providing ART; channel TB/HIV co-infected patients to the TB clinic, where they should receive comprehensive TB/HIV services. Refer them to CTC at the end of TB treatment to ensure continuum of care (general HIV care, Co-trimoxazole prophylaxis, ART provision, Home Based Care etc.)
- b) If TB clinic is not providing ART; evaluate TB/HIV co-infected patients at CTC on separate days or block appointments, to avoid sharing the same waiting area with non TB PLHIV

If volunteers living with HIV (e.g. peer educators) are working at the HF level (e.g. CTC), they should be informed about the risk of developing TB and they should avoid or take precautions during escorting presumptive TB case /patients.

a. TB Infection Control at CTC



b. TB Infection Control at CTC



Key control measures are the following:

- Triage – TB screening in compliance with the National Guidelines for the Management of Tuberculosis at every visit
- Separation – separate waiting area, preferably outdoors, different clinic days for co-infected patients
- Cough hygiene – encourage use of napkin/tissue/handkerchief or surgical mask to coughing persons (expert advice required) if available
- Minimise waiting time and frequency of visits
- Natural ventilation
- Mechanical ventilation – ceiling and extractor fans in waiting areas, passages and rooms where adequate natural ventilation cannot be realised (expert advice required)
- Respirators for staff if available (N95)

4.6 TB clinics and TB wards

Patients diagnosed with TB should in principle be treated on an ambulatory basis. Most TB patients on effective treatment are considered to be no longer infectious after two weeks of treatment. However, few TB patients and those with undiagnosed smear positive DR-TB patients are unlikely to convert as long as they are on first-line drugs only. Also, HIV-infected TB patients are often smear-negative, but may still be infectious, which calls for high standards of TB-IC in TB clinics and TB wards.

Key control measures are the following:

- Separation – in particular sputum smear-positive or culture-positive TB patients, as well as persons suspected of having drug-resistant TB
- Cough hygiene – PTB patient should be instructed on cough hygiene and should be encouraged to use tissue/handkerchief to cover the mouth/nose when coughing/ sneezing.
- Minimising waiting time and admission – preferably ambulatory treatment
- Natural ventilation
 - o Physical examinations, adherence counselling and PITC should take place in a closed but ventilated room
 - o Drugs dispensing including TB treatment and CPT/ART (for TB/HIV co-infected patients in selected sites where CPT/ ART are supplied) should be distributed in a well-ventilated area to protect the HCWs.
- Mechanical ventilation – ceiling and extractor fans in waiting areas, passages and rooms/ wards where adequate natural ventilation cannot be achieved (requires expert advice)
- UVGI - in large TB wards where adequate ventilation cannot be realised (requires expert advice)
- Respirators for staff – when patients are not yet on a continuation phase regimen, in particular if risk of initially undiagnosed DR-TB patients among TB patients on first line drugs is high; ventilation is not optimal; and supported by surveillance findings

A summary of the patient management model is described in **Annex 14** and FAST infection control strategy for prioritizing diagnosing and putting patients on effective treatment is described in **Annex 13**. Furthermore, posters and diagrams on TB/ HIV co-management (Cough Hygiene, Intensified Case finding, TB screening questionnaire among PLHIV, TB diagnostic algorithm) are described in **Annexes 7-11**.

TB wards

TB patients admitted to a special isolated TB ward should be instructed on cough hygiene; they should use tissue/handkerchief to cover their mouth/nose when HWs or visitors are entering the TB ward or when outside the ward for any reasons.

Example

A PTB patient who needs a chest x-ray should be instructed to use a tissue/handkerchief during transport to the radiology department. HCWs should inform the receiving department prior to the patient's arrival. At the radiology unit, the staff should be ready to perform the x-ray immediately to minimize exposure of other patients and staff.

Whenever possible, tests such as electrocardiograms and specimen collection for laboratory analysis should be performed where the PTB patient is located, further reducing the risk of transmission to other patients and staff.

4.7 DR TB Treatment and care

Multidrug Resistant TB (MDR-TB) is defined as TB disease due to *M. tuberculosis* that is resistant to, isoniazid and rifampicin. Rifampicin resistance (RR TB); Resistance to rifampicin detected using molecular tests or culture. Extensively drug resistant TB (XDR-TB) is defined as TB which is resistant to isoniazid and rifampicin, plus a fluoroquinolone group and at least one of the three Injectables second-line drugs (e.g. amikacin, kanamycin, or capreomycin). Pre-XDR TB; MDR TB + additional resistance to EITHER FQs (levofloxacin, moxifloxacin) OR one of the SLIs (kanamycin, capreomycin) but not both. From an infection control perspective, preventing initial infection with MDR-TB, XDR-TB and managing the treatment of existing cases effectively, are key to containing the spread of DR-TB. Meanwhile, the highest standards of TB-IC should be applied to DR-TB care settings.

Any presumptive DR -TB should be quickly identified according to the national DR TB guidelines and the specimen be sent for Rapid TB drug susceptibility testing (DST) or using Xpert MTB/RIF testing (**annex 9**). Results from rapid test should be available within 24 hours and immediately communicated to the original health facility. While the presumptive DR-TB waiting for the result he/she should be instructed on cough hygiene.

Any confirmed DR-TB patient should be started on treatment immediately on an ambulatory basis in decentralized settings. Patients not meeting criteria to start treatment on an ambulatory basis should be referred and treated at the specialized DR-TB hospital.

HCWs staff working in DR-TB hospitals should be screened for TB symptom in line with national guidelines.

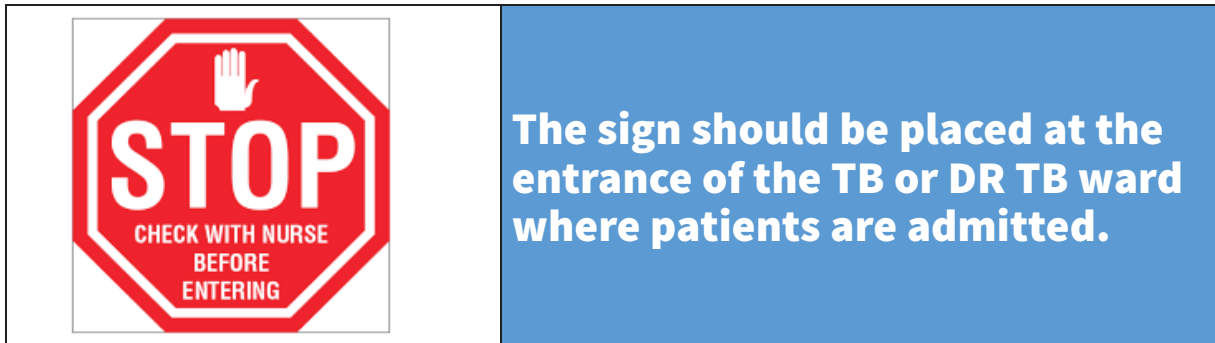
Respiratory protection targeted to HCWs apply to facilities providing inpatient and outpatient DR TB treatment and care. HCWs should wear N-95 respirators any time they enter the DR-TB wards and clinics. Follow SOPs on how to use Respirators properly and how to conduct fit testing (**annex xx**)

The use of UVGI is recommended in decentralized clinic and specialized DR-TB hospitals providing outpatient and inpatient DR TB care and treatment.

For additional details, please refer to the National DR TB guidelines, NTLN MOHCDGEC 2017.

Key control measures are the following:

- Separation and isolation – preferably in designated treatment sites with a separate entrance;
 - o in single-patient rooms or otherwise according to their infectiousness and drug resistance profiles ;(if known);
 - o Restriction of patient movement; visiting hours and designated outdoor areas to meet with visitors.
- Cough hygiene – surgical masks on patients when not in their room.
- Minimising waiting time (when visiting other departments such as the X-ray department) and admission.
- Natural ventilation – to the maximum
- Mechanical ventilation – extractor fans in waiting areas, passages and rooms/wards where natural ventilation is inadequate (< 12 air changes per hour). (requires expert advice)
- Mechanical ventilation – of single-patient isolation rooms for XDR-TB patients.
- UVGI - in combination with slow-moving ceiling fans where adequate ventilation rates cannot be realised (requires expert advice).
- Respirators for HCWs – in areas where the signage on entry doors indicates that respirators must be used.



4.8 General wards

It is extremely important to ensure that patients in general wards are protected against nosocomial TB transmission. This is due to the fact that, undiagnosed infectious TB patients may occupy the general ward together with other vulnerable patients and put them at risk of acquiring TB. From the perspective of airborne precautions, extra attention must be paid to the prompt identification and separation of patients with symptoms suggestive of TB or the confirmed infectious TB patients. In hospital wards, PTB cases should be kept in a separate area of the ward or designated TB ward, ensuring at least three metres distance between the TB case and other patients if possible. In particular, TB patients should be placed far away from PLHIV.

TB case detection in the general ward

In the wards, after admission, in-patients should be actively asked on regular basis about cough for more than two weeks or the TB screening questionnaire should be administered if the patient is known PLHIV. Once identified as a presumptive TB case, he/she should be rapidly channelled for diagnosis. In the ward, sputum samples should not be collected at the bedside; in-patients should be instructed to produce sputum specimen in an isolated open area or space outside the ward. The HCW should not remain close to the patient during the sputum collection procedure and the patient should always be downwind from the HCW.

Key control measures are the following:

- Triage – screen for TB symptoms as a routine work practice for all new admissions
- Separation – of patients with symptoms suggestive of pulmonary TB in a well-ventilated part of the ward; away from immune-compromised patients (e.g. diabetes, malignancies and HIV infection)
- Cough hygiene – provide surgical masks to coughing patients
- Minimising admission in the general ward
- Natural ventilation

Note: Only complicated TB patients should be hospitalized, but prolonged hospitalization is not recommended for TB patients to prevent nosocomial transmission; as soon the TB patient's clinical conditions allows, he/she should be discharged.

4.9 Sputum Collection Areas

Sputum collection areas are very high-risk areas and therefore should take place in open air using a sputum container with wide mouth so that the patient can expectorate easily inside the container without contaminating outside. The HCW should not remain close to the patient during the sputum collection procedure and the patient should always be downwind from the HCW.

Simple shelters with screens on one or two sides offer sufficient privacy. The use of toilets by patients to provide a sputum sample should be prohibited as they are not well ventilated. After collecting

sputum specimen, the lid should be placed on the container and closed firmly. The HCW should wash the hands with soap and water.

Procedures like sputum induction lead to coughing and aerosol production which increase the risk of the transmission of TB. These procedures should only be done as a last resort, after less risky diagnostic measures have been taken. The rooms for these procedures should have proper mechanical ventilation coupled with respiratory protection with N95 respirators.

Key control measures are the following:

- Natural ventilation – sputum collection must be ideally collected in a designated outdoor area. Also, bed ridden patients suspected of having pulmonary TB should be assisted to collect sputum in a well-ventilated area, preferably outside.
- Mechanical ventilation – extractor fan in a closed sputum collection booth and in areas where aerosol generating procedures are undertaken; adequate time should be allowed between patients for disinfection of air. (requires expert advice)
- UVGI – direct (open source) UVGI in a closed sputum collection booth; time slot in between patients for disinfection of air (requires expert advice).
- Respirators on staff – when performing sputum induction.

4.10 High-Risk Procedure Rooms

The risk of exposure is high in areas where aerosol generating procedures (bronchoscopy and spirometry rooms; Dental clinic; surgical theatres where patients are intubated, and autopsy suites where post mortems may also produce aerosols *M. tuberculosis*) are performed particularly on TB patients and patients with presumptive TB.

These settings require special TB-IC consideration for preventing TB transmission. Poorly ventilated surgical and autopsy rooms pose considerable risk of TB transmission and subsequent infection to HCWs whenever surgical or dissection procedures are done on infectious TB patients or cadavers.

In general, elective surgery on infectious TB patients should be postponed until patients have received adequate treatment and are no longer infectious. Efforts should be made to establish adequate environmental controls and personal protection for all the HCWs involved in the procedures.

Bronchoscope and any other instruments used for TB suspect/case should be sterilized with fresh bleach or Glutaraldehydes 2%.

Key control measures are the following:

- Triage – as part of the pre-operative screening protocol
- Separation – schedule TB patients at the end of a morning or afternoon programme
- Mechanical ventilation – extractor fans; closed (laminar flow) air supply and exhaust ventilation systems (requires expert advice)
- Respirators on staff – surgeons and theatre staff should not wear a respirator with an exhalation valve or wear a surgical mask under the respirator; a surgical mask under the respirator will negatively influence the seal.

4.11. Protecting HCWs against nosocomial TB transmission

To protect HCWs, early recognition of TB disease and standard treatment is recommended. Therefore medical and non-medical staff at HF level has to be informed on signs and symptoms of TB and screened when those occur.

Health workers at the CTC, TB clinics/wards, MDR-TB hospitals, laboratories processing sputum specimens, prison medical services, intensive care units (ICU), bronchoscopy/ endoscopy units, and paediatric wards, are considered to be at higher risk of TB transmission. Therefore they should be particularly sensitized on early report of any sign/symptom suspicious for TB disease.

In general, staff should be instructed that if signs/symptoms of TB occur (if the HCW is HIV negative; cough ≥ 2 weeks or fever ≥ 2 weeks, or excessive night sweat ≥ 2 weeks or haemoptysis or noticeable weight loss (or ≥ 3 kg loss) he/she should undergo the TB diagnostic investigations (2 sputum samples and CXR as needed). if the HW is HIV positive with any; cough, fever, night sweat, or/and noticeable weight loss (or ≥ 3 kg loss) should undergo TB diagnostic investigations immediately

4.11.1. Workplace restrictions

Any HCW identified as having pulmonary TB disease should be removed from the unit where they are providing service, regardless of the type of department. Anti-TB treatment should be initiated within 24 hours of the diagnosis. HCWs with PTB disease should be allowed to return to work when they have completed at least 3 weeks of TB treatment with evidence of clinical response. If the above condition applies, the HW is determined to be non-infectious and can return to work.

HWs with TB disease in extra-pulmonary sites only do not need to be excluded from the workplace. They may be confirmed as non-infectious and may continue to work based on evidence that concurrent pulmonary TB disease has been excluded.

HWs identified as presumptive TB case and working in units where PLHIV have access (e.g. CTC), should follow a fast track for diagnosis, treatment, and removal from the workplace.

HWs receiving HIV Post Exposure Prophylaxis (PEP) do not need to be moved during the prophylaxis intake; however, if they are found to have positive HIV test, should be counselled according to workplace policy. HWs living with HIV and working at the TB clinic, DR-TB hospital, or TB ward should be given the option of re-assignment to a department that has a low risk for exposure to M. tuberculosis. However, this choice should be the personal decision of the HW.

Information provided by HWs on their immune status and requests for voluntary work re-assignments should be treated confidentially, according to written procedures on the confidential handling of such information. All HWs should be aware of these procedures at the time of employment and during initial TB training.

Any other HW living with HIV and providing service in any other unit is not required to move. All HWs who are HIV positive should be referred to CTC for initiation of ART, Cotrimoxazole Preventive Treatment (CPT), and Preventive Treatment (TPT).

5. TB INFECTION CONTROL IN THE COMMUNITY AND OTHER SETTINGS

TB infection control in the community should include:

- Increase awareness on reducing transmission of TB in the community by creating community awareness, early identification of Presumptive TB and referral for follow-up in the health care setting.
- Sensitization of identified TB cases on cough hygiene.
- Strengthening of all initiatives towards increasing community awareness on importance of adherence to TB treatment.
- Encouraging the community to go for Voluntary Counselling Testing due to HIV TB co infection.

5.1 Infection Control Measures in Special Settings and household

There are special settings in the community that are of high risk and call for special attention as far as TB infection, prevention and control is concerned.

These include:

1. Congregate settings:

- Prisons and remand cells
- Informal settlements(slums)
- Refugee and internally displaced persons (IDP) camps
- learning institutions(boarding schools, colleges)
- Security forces training camps (military, National Services, police, **Prisons and remand cells.**)

TB is spread more readily in congregate setting such as prisons, remands, informal settlement and public transport. This is because of the longer duration of potential exposure, crowded environment, poor ventilation, and limited access to health care services. All inmates on admission should be screened for TB. The prison and remand cell should follow and implement TB infection control guidelines. There is need for active advocacy and sensitization of relevant ministry and departments for the implementation of TB infection control guidelines in the prisons.

Informal settlements (slums)

To reduce TB transmission in the informal settlement, there is need to have adequate sensitization and advocacy on proper ventilation on the existing structures/ housing and practice of cough hygiene. The implementation of community TB infection control guidelines should be emphasized. Screening, contact tracing and defaulter tracking should be highly emphasized in such settings.

Learning institutions and security forces training camps

Learning institutions should embrace TB infection control guideline. TB infection control should be incorporated in the school health program. Learning institutions should adopt and own TB environmental measures and UVGI among others.

5.2 Public Transport Services

Efforts should be made to ensure TB infection control measure is implemented in public transport services. These efforts should include:

- Advocacy and sensitization with different ministries and the community.
- Ensuring adequate ventilation in public transport vehicles by opening Windows.
- Transportation of presumptive TB or DR-TB Patients from one facility to another should be by well ventilated means of transport with personal respiratory protective devices. The infectiousness of the patient should always be considered during transportation.
- Every patient sharing transportation services with other patients or HCWs should have been screened for TB, and the necessary precautions should be taken when transporting persons with symptoms suggestive of TB or diagnosed infectious TB patients.

Key control measures during transportation of TB or DR-TB patients are the following:

- Triage: this should be a routine work practice even when the reason for ambulance transportation is known and medical information of the patient is available.
- Cough hygiene: surgical masks should be used by patients with a cough which has lasted for two or more weeks or diagnosed with infectious TB.
- Natural (cross) ventilation: open windows; after patient transport air out the vehicle with all windows/doors open for 30 minutes.
- Respirators on staff: in the case of transportation of persons with symptoms suggestive of TB and those diagnosed with TB.

5.3 Households

Household members, in particular children and PLHIV are at high risk of becoming infected with *M. tuberculosis* and consequently developing the disease

The major risks of infection through contact lie in exposure to the infectious case before diagnosis. Early case detection, treatment and health education of the index patient and preventive therapy for eligible infected family members and other close contacts remain the most important control measures for reducing the risk of transmission in households.

Contact investigation of household members and close contacts of diagnosed TB patients, including PITC for HIV, is paramount for intensified case finding. At least one home visit (and one follow-up home visit, if needed) should be conducted as soon as possible for an assessment and the planning of interventions based on the assessment. Family members of infectious TB patients, close contacts and community health workers (CHWs) should be educated on how to minimize exposure.

Key control measures are the following:

- Triage: contact investigation of household members especially children and PLHIV
- Separation: infectious TB patients should spend as little time as possible in crowded public places/transportation. Advise patients to minimise contact with infants and children during the initial months of treatment.
- Safe sputum collection and transportation: outdoor collection of sputum samples and transportation of the sample as per the *National Guidelines for the Management of Tuberculosis*.
- Cough hygiene: anyone who coughs should be educated on cough hygiene
- IPT for eligible household members especially children and PLHIV
- Natural ventilation: Houses should be well-ventilated, particularly rooms where infectious TB patients spend much time. Respirators for CHWs while visiting DR-TB patients and while caring for bed-ridden patients because of the risk of undiagnosed XDR-TB. Whenever possible,

consultation with DR-TB patients should not be done in enclosed areas. Each CHW should receive two disposable particulate respirators (N95 or FFP2) per month if the patient is smear or culture positive and be trained on how/when to use them

Infection control and legal implication

TB, DR-TB patient, and the community should be adequately educated on the importance of adhering to DOTs and DOTs Plus strategy. Patients who may refuse to adhere to the treatment will have to be managed according to the existing laws and guidelines.

5.4 Community Based DR-TB Infection Control Measures

Decentralization of DR-TB care necessitates persons with known DR-TB to receive routine care in the districts where they live with community follow up by initiating health facilities. The health care workers working with DR TB patients should take necessary preventive precautions.

Community-based health workers (CHW) also have the unique opportunity to help prevent the spread of TB by teaching and monitoring proper implementation of IC measures practiced in the home during home visits. Key people involved are: CHWs, patients, and family members. Community IC can be enhanced by directly involving the respective community/political leaders on the following:

1. Offer a rapid screening, referral mechanism for household members and other (close) contacts.
2. Encourage proper cough hygiene by talking with the household and people diagnosed with active TB disease about adhering to proper cough hygiene
3. Ask infectious DR-TB patients to wear surgical masks when in contact with susceptible people during intensive phase.
4. Ask the patient not to clear their throat and then spit on the ground, but spit the sputum into a tissue, cloth, covered container or toilet, in order to dispose it
5. Environmental control measures combined with patient practices further reduce TB transmission in community. Use ventilation (either natural or mechanical) in the community and home environment.
 - Natural ventilation: Keep doors and windows fully opened
 - Mechanical ventilation: A fan may be used to enhance ventilation.

6. TB INFECTION CONTROL IN LABORATORIES

Laboratory personnel have high occupational risk of contracting TB. The most important factor in the prevention of laboratory acquired TB infection is good laboratory practices on the part of the laboratory personnel. Each laboratory needs to have a safety manual that describes in details all safety precautions while working in the laboratory.

6.1 Safety precaution in sputum handling and processing

Aerosols may be produced in the TB laboratory when handling leaking specimens, opening sample containers, and preparing smears. When care and appropriate techniques are used, handling sputum presents a minimal risk of acquiring infection to a technician.

For laboratory staff, the greatest risk of infection involves sputum collection. People with presumptive TB may cough and in doing so, spread TB bacilli in tiny droplets in the air which may infect others when they are inhaled. Precautions must be taken to minimize this exposure.

The laboratory technician is considerably at more risk when sputum is processed for culture and drug susceptibility testing. These procedures require shaking, vortexing and centrifugation. Consequently, this requires special equipment such as biological safety cabinets, which are costly to purchase and maintain.

6.1.1. Proper collection of sputum

Collecting sputum represents the greatest hazard to a laboratory technician because infectious aerosols may be produced by coughing. If a coughing patient comes into the laboratory, ask them to cover their mouth. Collect specimens outside where air movement will rapidly dilute infectious droplets and UV rays from the sun will rapidly inactivate TB bacilli. NEVER collect sputum specimens in laboratories, toilets, waiting rooms, reception rooms, or any other enclosed space. Always stand well clear and upwind when a patient is collecting a sputum sample. For hospitalized patients not able to move, sample specimen (Sputum) should be collected at designated area that is well ventilated downwind.

6.1.2. Proper handling of other TB infectious materials

These materials include body fluids such as Pleural, Ascitic and Cerebral Spinal Fluids etc.

6.1.3. Laboratory arrangement

Every laboratory processing sputum specimens should have at least two rooms, one for reception and the other one for performing the test. Sample processing for Gene Xpert and smear preparation should be performed in a well-ventilated room with adequate light. Establish airflow in working areas that will direct potentially infectious particles away from personnel. An extraction fan is useful to vent air from a smear preparation area with poor ventilation such as areas with extreme climatic conditions.

Laboratory safety precautions for specimen handling and transportation including wearing gloves and laboratory coats should be followed.

6.2 Personal Protective Equipment

The use of personal protective equipment (PPE) provides a physical barrier between micro-organisms and the user. It reduces exposure risk but does not eliminate the infectious hazard. Besides, it does not replace basic infection control measures such as hand hygiene. Selection of PPE should be based on risk assessment. PPE should be stored in appropriate area free from dampness, sunlight and dirt. They need to be examined for the expiry date and checked regularly to ensure integrity. Single use PPE should be properly discarded according to standard operation procedures (SOP).

6.2.1 Gloves

Gloves do not provide any appreciable protection against airborne transmission of *M. tuberculosis*, but they should be used all the time when handling sputum because just like any other fluid sputum may contain other infectious agents. Use of gloves does not replace the need of hand hygiene. Gloves should be removed promptly after the procedure and before touching non contaminated items and surfaces such as telephones, microscope and performing office work.

If gloves are used, there should be a guaranteed supply. Reusing disposable gloves is strictly prohibited. Discard gloves at any interruption of sample processing. Never wear gloves outside the laboratory.

NOTE: Hand washing and good laboratory practice is mandatory for laboratory safety at all levels.

6.2.2 Laboratory Coats

Laboratory Coats must be worn at all times when in the laboratory. Laboratory coats of various sizes should be provided and cleaned by the laboratory organisation. They should be tied at the back, not the front, and be made from water-resistant materials to avoid liquids soaking into the gown. Laboratory coats must NOT be worn outside of the laboratory.

6.2.3 Surgical Masks

The use of surgical masks is not recommended for laboratory staff and other health care workers. These masks are made from porous material that will not trap TB bacilli, and have an extremely poor fit creating large gaps between the face and mask.

6.2.4 Respirators

Respirators such as N95 “duck-bill” are recommended for laboratory staff dealing with live open cultures. Respirators must be selected and fitted correctly to be functional. Regular fit test is recommended annually. SOP for use of respirators should be adhered to during their operation.

6.3 Ventilation

Two types of ventilation are recommended for the TB laboratory:-

- Natural ventilation, which relies on open doors and windows and is recommended for laboratory which performs smear microscopy and Xpert MTB/Rif only.
- Mechanical ventilation this depend on the use of mechanical air-moving equipment

Types of Mechanical ventilation recommended in Tanzania

6.3.1 Extractor Fan

This type of mechanical ventilation is recommended in laboratories which perform smear microscopy and Xpert MTB/RIF. It is NOT recommended in the laboratories dealing with live isolates.

6.3.2 Biological Safety Cabinets (BSCII)

BSCII are designed to contain airborne microorganisms in laboratories working with DR or liquid suspensions of *M. tuberculosis*. Class II cabinets provide both kinds of protection (of the samples and of the environment) since makeup air is also HEPA-filtered. When used with appropriate laboratory practices they restrict spread of aerosol.

BSCII should be connected to uninterrupted power supply to ensure staffs have adequate time to complete procedure in event of power outage. Also, they must undergo certification at time of installation, when moved and following any repair or filter changes. They also require regular (annual) maintenance to ensure proper function. Maintenance of safety cabinet should be done properly and in timely manner to mitigate risk of infection.

For laboratories engaged in MTB solid culture, DST and LPA a safety cabinet class II is recommended for infection control. The use of BSCII is not necessary for direct sputum smear examination and GeneXpert processing.

6.3.3 Negative Air Pressure Room

Any TB laboratory dealing with manipulation of open live TB isolates MUST have negative air pressure (NAP) ventilation system. Procedures that involve open live TB isolates include Mycobacteria Growth Indicator Tube (MGIT) culture, Conventional Drug Susceptibility Test (DST) DNA extraction from isolates.

NAP is created by exhausting more air from a room than is supplied to the room. This creates a ventilation imbalance, called an offset. The room makes up the offset by continually drawing in air from outside the room. Infectious particles are contained within a room by a continuous air current being pulled into the room under the door. Therefore, when the negative pressure room is used as designed, airborne particles generated in the room cannot escape to the corridor.

NAP room must be as air-tight as possible to prevent air from being pulled in through cracks and other gaps. This is called sealing a room. In a sealed room the direction from which the make-up air enters the room and the speed with which it moves can be controlled.

NAP system should be connected to backup power supply to ensure staff has adequate time to complete procedure in event of power outage. Also, they must undergo certification at time of installation, when moved and following any repair or filter changes. They also require regular (annual) maintenance to ensure proper function. Maintenance should be done properly and in timely manner to mitigate risk of infection.

6.4. Risk Assessment

Risk levels, associated laboratory techniques and risk assessment for tuberculosis (TB) laboratories (WHO Tuberculosis Laboratory Biosafety Manual)

| Risk level of TB laboratory* | Laboratory Techniques | Assessment of Risk |
|---------------------------------------|---|---|
| Low Risk | Direct sputum-smear microscopy; preparation of specimens for use in an automated nucleic acid amplification test cartridge (such as the Xpert® MTB/RIF assay) | Low risk of generating infectious aerosols from specimens; low concentration of infectious particles |
| Moderate Risk | Processing and concentration of specimens for inoculation on primary culture media; direct DST (for example, line-probe assays on processed sputum) | Moderate risk of generating infectious aerosols from specimens; low concentration of infectious particles |
| High Risk (TB-containment Laboratory) | Culture manipulation for identification; Conventional DST or line-probe assays on cultured isolates | High risk of generating infectious aerosols from specimens; high concentration of infectious particles |

*The risk level refers to how likely it is that someone in the laboratory will become infected with TB as a result of procedures performed in the laboratory.

6.5. Laboratory Waste disposal

The laboratory should have 3 distinct labelled containers with plastic bags made of polyethylene for proper disposal of various wastes. The containers should be labelled non-infectious, infectious and highly infectious. This is separate from a sharp box that is only used to throw sharp items.

All infectious material should be decontaminated, incinerated and prepared to be buried or autoclaved, i.e. used sputum cups, applicator sticks and slides.

Each laboratory is supposed to have a spill kit for management of accidental spillages.

Key messages

- Access control: restrict entry except for authorised staff only
- Proper Hand wash
- Good laboratory Practice adhere safety and technical procedures
- Ventilation: the overall direction of air flowing through the laboratory should be from functionally clean areas to dirty areas
- Protective Personal Equipment's/gears should be worn at all times in the laboratory.

7. DISINFECTANTS AND WASTE MANAGEMENT

7.1 Disinfectants

Disinfectants are chemicals that kill or inhibit all micro-organisms except bacteria endospores. The following disinfectants kill all bacteria including *M. tuberculosis*:

- Glutaraldehydes 2%
- Sporidicin 2%
- Chlorhexidine 4%, centrimide 5%
- Hydrogen peroxide 6%
- Chlorine 0.5%

Instructions on the use of disinfectants:

- Follow the manufacturer's instructions and ensure that the correct (optimum) dilution is used
- Check expiry date of the solution. The date should be clearly marked on the container
- Thoroughly clean or sterilize the disinfectant container between uses and before refilling
- Do not use disinfectants to sterilize instruments or equipment (unless specified in the disinfectant policy, e.g., endoscopes)
- When disinfectants are indicated for use on surfaces, wipe (do not wash, bathe or flood-wash)
- Always thoroughly decontaminate, then clean articles before disinfection, i.e., remove any substances such as dirt and biological materials
- Clearly label containers with type of contents, the in-use dilution and the expiry date
- Do not expose disinfectants to inactivating substances, e.g. cork, rubber caps or incompatible detergents
- All staff who using these chemicals should wear the appropriate Personal Protective Equipment for the task as many of these agents can stain clothing. Good ventilation is required when using all these products.

Any room and waiting areas at HF should be cleaned and disinfected on a daily basis. Safe management of healthcare waste is key to reduce nosocomial infections inside a hospital and to ensure that the outside environment is well protected.

Each TB and DR-TB patient should receive a sputum cup with a lid into which he/she can discard any expectorate; For admitted patients the HCWs should disinfect the cups' content of a TB patient with fresh bleach (5% sodium hypochlorite) or glutaraldehydes 2%, then discard in the toilet, wash the cup and re-use it. The cups' contents of a DR TB patient should be discarded in the incinerator on a daily basis.

7.2 Waste Management

Waste-management procedures must comply with safety and standard operating procedure for waste disposal. Waste is anything that must be discarded. The principle in minimizing risks from waste is that all infectious materials should be decontaminated, autoclaved and incinerated/buried.

7.2.1 Decontamination

Refers to removal of infectious organisms from materials with the aim of reuse or disposal. This action utilizes various chemicals known as disinfectant.

7.2.2 Autoclave

Refers to sterilization supplies and equipment's with the use of high pressure that is saturated at 121°C for about 1 hour. Autoclaves are used to sterilize solutions or glassware (clean materials), and to decontaminate infectious materials. This procedure precede incineration process for materials which are meant to be discarded like mycobacterial cultures and all infectious TB materials

Incineration

Hazardous waste material should be incinerated. Materials for incineration, even if they have been decontaminated, should be transported to the incinerator in bags, preferably plastic. There should be proper instruction in loading the incinerator and controlling the temperature to ensure materials are burnt completely. Highly infectious waste from TB isolation wards should always be incinerated on-site.

For facilities without incinerator and home based patients the waste materials should be burnt completely and buried.

Key message

Disposal of TB infectious materials should be:

- Autoclaving at a temperature of 121°C at 1 bar for at least 1 hour; or
- Burnt in an incinerator; or
- Discarded in a deep pit at least 1.5 metres depth; or
- Disinfected overnight in a solution of sodium hypochlorite in concentrated form and then discarded with hazardous health care waste; or

If none of the above treatment options can be ensured, pack infectious materials in specific bag that should be sealed and directly discarded with the hazardous health care waste

Safe management of healthcare waste is key to reduce nosocomial infections inside a hospital and to ensure that the outside environment is well protected.

8. CONSTRUCTION OF HEALTH FACILITIES ACCORDING TO TB INFECTION CONTROL MEASURES

Construction and renovation of health facilities should comply with the Standard Guidelines & Drawings for Health Care facilities in Tanzania, MOHCDGEC-PORALG 2017.

Mandatory adherence agreements for TB infection control design and engineering should be incorporated into construction/renovation contracts, with penalties for non-compliance and mechanisms to ensure timely correction of problems. Stipulations should include the plans and designs for improved ventilation, ceiling fans and extractor fans prior any construction or demolition. Also plans for the removal of debris and dust containment should be specifically noted.

Construction/renovation plans of HF should be in harmony with TB infection control measures described in this guideline. Therefore, the following specifications are recommended for constructing health facilities:

- Plan construction of rooms in order to ensure >12 air changes per hour (ACH). It would ensure efficient removal of 99 -99.9% of airborne contaminants in less than 20-30 minutes. Use the formula below to calculate ACH
 - Average air velocity through fan, duct or box opening= 2.5 m/s
 - Average air velocity through window= 0.5 m/s
 - Average flow rate= Average air velocity through fan, duct, box opening or window/window x area fan, duct, box window opening/window x 3600 s/ hour
 - ACH=average flow rate/room volume
- Construct open waiting areas
- Place windows to allow maximum cross ventilation; windows should be accessible so that they can be opened easily
- Plan for a ceiling fan in every room
- Build large windows to allow maximum sunlight and ventilation
- Ensure that different buildings are not constructed too close to each other to ensure maximum sunlight and better air flow
- Ensure that air fresh intakes are located far away from exhaust outlets of ventilation systems; exhaust outlets should be vented to the roof away from air intakes wherever possible
- Ensure that patient admitted in any ward can have access to the toilet without having to enter the general corridor area
- Add a sentence to refer to the Ministry document on construction of buildings.

Regional and district hospital level

- Wards
 - In multi-bed rooms, the minimum distance between bed centre lines should be 2.4m
 - The minimum spacing between beds should be 1.2m
 - In multi-bed rooms, a clearance of 1.2m should be available at the foot of each bed
 - Bed spaces should be arranged to ensure clearance of at least 0.6m from the side of the bed to the wall
 - Nurse desk of any wards should be 5.5x7.2 metres or at minimum 25-30 m²

- o The ward should have windows that can be opened from the inside
- Out-patient
 - o consultation room of RCH, CTC, CITC, PMTCT, TB clinic should be 3.6 x 4.8 metres
 - o The waiting area for adult and children should be separated
- X-ray room of the radiology block should be 7.2 x 4.8 metres
- Laboratory block: sample taking room should be 3.6 x 4.8 metres, sample preparation room 7.2 x 4.8 metres
- At the mortuary department, the washing and post-mortem room should be 9.6x7.2 metres
- The minimum ceiling height at any consultation room/ward should be 2.7 metres; the minimum ceiling heights for operating rooms with ceiling mounted equipment should be 3.5 metres
- The minimum corridor width should be at least 2.1 metres at wards and 1.5 metres at out-patients units
- The minimum door width at any consultation room/ward for patient use should be 1.2m

Any HF renovation should comply with the criteria listed above and should ensure at minimum: waiting area in open space, opposite windows in each examination room/ward, all fans exhausting air to the outside should go from the HCW to the patient and then outside.

Health Care Facilities are also encouraged to set-up special isolation ward for infectious airborne diseases.

Key messages

- **Mandatory adherence agreement for TB IC design and engineering should be incorporated into construction/renovation contracts**

The TB infection control measures described in the guidelines apply also to medical services in refugee camps, army, police,] prisons and other community settings.

9. MONITORING AND EVALUATION

The Monitoring and Evaluation (M&E) system ensures the most efficient use of resources to generate the data needed for decision-making. It guides data collection, analysis and increasing consistency of data and enabling managers to track trends over time. The M&E should serve different constituencies – including programme managers, donors and government planners. At the same time it should bring the various interests together into the one system to avoid duplication of effort.

The effectiveness and impact of the TB-IC implementation should be monitored and evaluated. This will provide the data needed to guide the planning, coordination, and implementation of TB-IC efforts, assess its effectiveness, and identify areas for programme improvement. Monitoring the results of the TB-IC programme will allow health facilities, districts, regions as well as the community, to determine if the TBIC measures already in effect are working well or if changes (internal and external) are required.

9.1 Objectives of M&E in TB-IC

The following are objectives (but not limited) of conducting M&E of TB-IC measures:

- To facilitate the most effective and efficient use of human and financial resources to achieve maximum health benefit for the population served
- To provide information to inform and improve programme management. In this regard M&E will help to
 - Ensure quality and effectiveness in service provision
 - Measure progress towards the achievement of specific objectives
 - Identify problems and possible solutions
- To help promote a learning culture focused on service quality improvement
- To define roles and responsibilities and to improve accountability
- To attract resources for TB-IC.

9.2 Monitoring infection control interventions

Monitoring the implementation of TB infection Control interventions should include conducting periodic supervision of the measures outlined in the TB Infection, prevention and Control Plan.

The following two indicators should be collected and reported

Indicator 1:

Proportion of health care facilities and/ or congregate settings that have infection control practise that include TB infection control measures

Definition

Number of health care facilities and/or congregate settings with a written TB infection control plan, expressed as a proportion of the total number of health care facilities and/or congregate settings evaluated

- Numerator: Number of health care facilities and/or congregate settings with a written TB infection control plan that is consistent with national guidelines

- Denominator: Total number of health care facilities and/or congregate settings evaluated. (Also give the total number of each type of facility nationally to indicate the proportion evaluated)

Purpose

To ensure that facility-level TB infection control plan exists to minimize the risk of transmission of TB in health facilities and congregate settings

Methodology:

Health facility review of written infection control plan with yes/no answers on the following:

- Is there a written infection control plan?
- Is there a person responsible for implementing TB infection control?
- Is the waiting area well ventilated? (e.g. open windows and doors)
- Are presumptive TB cases identified on arrivals at the facility and separated from other patients?
- Are TB cases among health care workers routinely monitored and reported

A positive response to all questions is required for a facility to be identified as implementing TB infection control measures that are consistent with national TB infection guidelines. A positive answer to the question on asking for a written TB infection control plan requires verification.

Periodicity

The indicators should be collected and reported quarterly by the District TB and Leprosy Control Coordinator in collaboration with District AIDS coordinator using the standard TB quarterly report updated with the TB infection control component. The report should be submitted to NACP and NTLP, according to the standard reporting procedures.

Indicator 2:

Proportion of health care workers, employed in facilities who developed TB during the reporting period

Definition

Number of health care workers in the facility diagnosed with TB in the reporting period (Quarterly), expressed as a proportion of the total number of health care workers in the facilities during the same period.

- Numerator: Number of health care workers diagnosed with TB during the reporting period
- Denominator: Total number of health care in the facility during that particular period.

Annex 12 summarizes information to be collected and reported from each health facility by DTLC.

Purpose:

To measure incidence of TB among health care workers over time as a measure of the impact of infection control measures on health workers

9.3 Evaluating infection control interventions

One of the ways used to measure effectiveness of TB infection control interventions is to detect a change in TB rates among HCWs after the implementation of TB infection control measures. This can be easily done from district health facility level and above

TB infection control measures should also be evaluated by reviewing the medical records of a sample of TB patients seen in the facility. Outcomes of evaluation should be used to identify areas that need improvement.

9.4 Operational Research Priorities in TB infection Control

Besides evaluating TB infection control measure, operational research can further inform TB infection control practices. Areas in which data can be carefully collected and analysed includes:

- Presumptive TB registers to quickly identify potentially infectious TB patients presenting in health facilities;
- Mechanisms for referrals and links between Community, congregate settings, HIV; other points of care in health facility and TB services;
- Strategies for increasing the proportion of health care workers who know their HIV status and are able to access adequate care, including antiretroviral therapy and TB preventive therapy;
- Designs for enhancing total air flow and air flow direction through controlled natural ventilation;
- Utility of ultraviolet germicidal irradiation in resource-limited settings; and
- Feasibility of prolonged treatment with Isoniazid for prevention of TB in immuno-compromised health care workers.
- Feasibility of short regimen TB preventive treatment (3HP)

GLOSSARY

Aerosol: droplet nuclei that are expelled by a person with infectious TB disease upon coughing, sneezing, or shouting.

Acid-fast bacilli (AFB): rod-shaped bacteria that do not lose their stain when exposed to mineral acids (or acid-alcohol mixture) after a specific staining process, i.e. Mycobacterium tuberculosis and all mycobacteria.

Bacille Calmette-Guérin (BCG) vaccine: a live vaccine against TB derived from an attenuated strain of Mycobacterium bovis.

Bio aerosols: an airborne dispersion of particles containing whole or parts of biological entities, such as bacteria, viruses, dust mites, fungal hyphae or fungal spores.

Biological Safety Cabinets Class I (BSC I): cabinet that protects the worker and the work environment from exposure to aerosols generated during handling of clinical specimens (such as sputum) or cultures by drawing air through the cabinet.

Bronchoscopy: procedure for examining the respiratory tract that requires inserting an instrument (bronchoscope), through the mouth or nose into respiratory tree.

Close contact (TB): a person who has shared the same air space in a household or other enclosed environment for a prolonged period of time (days or weeks) with a person with suspected or confirmed TB disease.

Contact investigation: procedures undertaken to detect secondary cases (or the index case, particularly in case of child tuberculosis) that occur when a case of infectious TB is identified.

Cough Hygiene: A combination of measures designed to minimize the transmission of respiratory pathogens via droplet or airborne routes in healthcare settings. It includes covering the mouth and nose during coughing and sneezing using napkin/handkerchief and turning the head away from others and maintaining spatial separation, ideally >3 feet, when coughing.

Directly observed therapy (DOT): adherence-enhancing strategy in which a trained HCW or other specially trained person watches a patient swallow each dose of medication and records the dates that the DOT was observed.

Droplet nuclei: Microscopic particles (1-5 microns in size) that can become airborne when a person coughs, sneezes, shouts, sings, breathes, or talks. Droplet nuclei produced by a person who has TB disease of the lungs or larynx in an infectious state can remain airborne for a long time and can spread TB to others.

Drug-susceptibility test: Laboratory test that determines whether the M. tuberculosis bacteria cultured from a patient's isolate are susceptible or resistant to various first-line or second-line anti-TB drugs.

Exhaust air: Air that is removed from a building by a fan system, as opposed to air that is removed from a space and then re-circulated or returned.

Exhaust ventilation: an environmental control technique (e.g., laboratory hoods, tents, booths, ventilation device) to prevent dispersal of airborne particles uncontrolled in room air.

Face mask: mask made of cloth, paper, or fiber material (e.g., surgical mask) that captures droplets exhaled by its wearer thus diminishing some of the spread of micro-organisms. A mask does not protect the wearer from inhaling airborne infectious droplet nuclei.

Fit Test: Evaluation of how a respirator fits conducted by trained personnel. Includes the use of scented solution and the determination of whether the employee can detect the odor. Should be conducted prior to the use of a respirator and annually thereafter.

Hand hygiene: A general term that applies to any one of the following: 1) hand-washing with plain (non-antimicrobial) soap and water); 2) antiseptic hand-wash (soap containing antiseptic agents and water); 3) antiseptic hand rub (waterless antiseptic product, most often alcohol-based, rubbed on all surfaces of hands); or 4) surgical hand antisepsis (antiseptic hand wash or antiseptic hand rub performed preoperatively by surgical personnel to eliminate transient hand flora and reduce resident hand flora).

Health Care Workers (HCWs): employees in a health care facility including nurses, physicians, laboratory workers and others who work in health care and may become exposed to patients with communicable diseases.

Health Workers (HWs): employees in a health care facility including medical (e.g. nurse, medical officer, clinical officer etc.) and non-medical staff (e.g. administrators, cleaners, porters etc.).

HEPA filter: High-Efficiency Particulate Air filter. This is a filter that is capable of removing 99.97% of particles 0.3 micron in diameter or greater. HEPA filters remove all particles in the size range of TB droplet nuclei.

Home care: A wide-range of medical, nursing, rehabilitation, hospice and social services delivered to patients in their place of residence (e.g., private residence, senior living center, assisted living facility).

Isolation: separation of a person or a group of persons with a communicable disease (as an infectious form of tuberculosis) from others to prevent the spread of the disease.

Mechanical ventilation: methods used to direct airflow to dilute and remove air, and to produce negative pressure in isolation rooms (e.g. window fan, exhaust ventilation systems, etc.).

Mycobacterium (M.) tuberculosis: the bacterium that causes tuberculosis.

Mycobacterium (M.) tuberculosis culture: A laboratory method to confirm the presence of M. tuberculosis. A positive culture result confirms the diagnosis of tuberculosis.

Natural ventilation: natural air movement to achieve dilution and air exchange in an area with free-flow of ambient air (e.g., through the open windows).

Negative pressure: the difference in air-pressure between two areas in a health-care setting. A room that is under negative pressure has a lower pressure than adjacent areas, which keeps air flowing into it and prevents infectious air from escaping into adjacent rooms or areas in a health-care facility.

N95 respirator: air-purifying, filtering face piece that removes at least 95% of 0.3 micron particles present in inhaled air. N95 particulate, air purifying, respirator is the type used most commonly by healthcare personnel

Nosocomial: Infections which are a result of treatment in a hospital or hospital-like setting, but secondary to the patient's original condition.

Personal respiratory protection: respiratory protective device that fits over the mouth and nose to protect against transmission of *M. tuberculosis* by reducing the risk of inhaling infectious droplet nuclei.

Respirator: A personal protective device worn by healthcare personnel to protect them from inhalation exposure to airborne infectious agents that are $< 5 \mu\text{m}$ in size including *Mycobacterium tuberculosis* bacilli. These include N95, N-99, N-100 particulate respirators and powered air-purifying respirators (PAPRS) with high efficiency filters; and non-powered full-face piece elastomeric negative pressure respirators.

Surgical mask: A device worn over the mouth and nose by operating room personnel during surgical procedures to protect both surgical patients and operating room personnel from transfer of microorganisms and body fluids.

TB Infection: the subclinical, latent infection with tubercle, but without clinical evidence of disease.

TB disease: a clinically active, symptomatic disease caused by bacteria belonging to the *M. tuberculosis* complex (*M. tuberculosis*, *M. bovis*, *M. africanum*).

Ventilation: Movement of air in a building and replacement of air with air from outside.

ANNEX 1: TB INFECTION CONTROL CHECKLIST FOR BASELINE ASSESSMENT AND MONITORING THE HEALTH FACILITY

This checklist should be used to assess the current TB infection control practices in the facility, through observation and discussion with the health facility staff in charge.

Region District Name of the health facility Date form completed (dd/mm/yyyy): ___/___/_____
 Name of the designated TB Infection control officer-in charge

Type of assessed health facility:

- Hospital: -- government -- faith based -- private -- army -- police -- prison (No. beds.....average occupancy.....)
- Referral regional district/cottage
- Health centre: -- government -- faith based -- private -- army -- police -- prison (No. bedsaverage occupancy.....)
- Dispensary: -- government -- faith based -- private -- army -- police -- prison

Tick the units that have been assessed*:

OPD RCH TB clinic CTC Laboratory

Ward adult (No. beds occupancy at assessment.....) paediatric (No. bedsoccupancy at assessment

(*cumulate findings from different units in the same checklist only if the units are from the same health facility: e.g. hospital/HC)

No. TB cases identified in the HF/in past year: Adult = Paediatric =

Specify where TB data are recorded: TB register kept at TB clinic TB register kept at every unit other, specify _____

| No. TB cases among HWs/in past year | Type of unit where those TB cases where working | | | | | | |
|-------------------------------------|---|----|-----|---------|----------|-----|----------------|
| | OPD | TB | CTC | Ward ad | Ward ped | Lab | Other, specify |
| | | | | | | | |

| 1. ADMINISTRATIVE CONTROLS | | | | | | | | | | | | |
|--|-----|----|-----|----|-----|----|-----|---------|----------|-----|----------|----|
| Is there a written TB infection control plan available at HF? | | | | | | | | | | | | |
| Tick the appropriate answer (yes/no) or the box under the assessed unit | OPD | | TB | | CTC | | Yes | | No | | Remarks: | |
| | yes | no | yes | no | yes | no | RCH | ward ad | ward ped | lab | yes | no |
| | | | | | | | yes | no | yes | no | yes | no |
| a. Patients | | | | | | | | | | | | |
| 1.1 Does the HCW ask actively about cough at the registration desk? | | | | | | | | | | | | |
| 1.2 Are patients coughing > 2 weeks immediately referred for sputum test? | | | | | | | | | | | | |
| 1.3 Are the coughing patients advised to avoid close contacts with other clients/patients in the waiting area? | | | | | | | | | | | | |
| 1.4 Are coughing patients given tissue/handkerchief, scraps of cloths and instructed on cough hygiene? | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|------------|----|-----------|----|------------|----|------------|----|----------------|--|-----------------|--|------------|--|
| 2.4 Do you have cleaning, sterilization and disinfection procedures for potentially contaminated equipment (e.g. bronchoscopes, endoscopes)? | | | | | | | | | | | | | | |
| 3. AIR BARRIER SYSTEM | | | | | | | | | | | | | | |
| Observe the HCWs performing the following activities and report your observations by ticking the appropriate answer (yes/no) under the assessed unit | OPD | | TB | | CTC | | RCH | | ward ad | | ward ped | | lab | |
| | yes | no | yes | no | yes | no | yes | no | | | | | | |
| 3.1 Are fans in place? | | | | | | | | | | | | | | |
| 3.1.1. If yes, are they working and clean? | | | | | | | | | | | | | | |
| 3.1.2. Average how many fans there are per room? | | | | | | | | | | | | | | |
| 3.2 Are doors and windows open? | | | | | | | | | | | | | | |

Remarks

ANNEX 2: GUIDE TO DEVELOP A TB INFECTION CONTROL PLAN TB INFECTION CONTROL PLAN OF THE HEALTH FACILITY

| | |
|--|-----------------------------------|
| TB INFECTION CONTROL PLAN OF THE HEALTH FACILITY | |
| Name of health facility..... | District..... |
| Region | Date the plan was developed |
| Responsible for TB IC at HF level | |
| Describe which committee is responsible for monitoring the implementation of TB IC measures at district level, list the members and specify how frequently they meet | |
| Specify who is responsible for monitoring the implementation of TB IC measures at HF level and for reporting to the district on quarterly basis | |
| Specify who is responsible for monitoring the implementation of TB IC measures at each department of the HF (e.g. OPD, RCH, TBC, CTC, ward, Lab etc) | |
| Cough hygiene, early TB detection and separation procedures | |
| Describe the policy for cough hygiene in the HF (if any poster, if any patient education sessions/describe the content and the frequency; if pieces of tissue/napkin are provided to cover mouth/nose) | |
| Describe the screening procedures for early identification of TB suspects and separation of TB suspects/TB patients in waiting areas and wards | |
| Describe the questionnaire in use to identify TB suspects, if any and describe when it is used | |
| Describe the flow of patients identified as TB suspects | |
| Specify the test in use at the HF for the diagnosis of TB | |
| Specify within how many hours the laboratory should provide sputum result to the unit/patient and if the laboratory is available to accept samples both in the morning and afternoon | |

| | |
|---|--|
| Environmental control measures | |
| Describe the policy for open windows in the HF | |
| Describe how frequently windows and doors should be checked to assure they are in the proper position. | |
| Describe how frequently fans should be checked to assure they are clean, are pulling (or pushing) the correct amount of air, and are pulling (or pushing) air in the correct direction | |
| TB and HIV services to health facility staff | |
| Specify who is responsible to conduct TB infection control training courses for the HWs | |
| Describe the frequency, contents and target (e.g. clinicians and nurses only or all facility staff including administration and cleaners) of the training courses on TB infection control | |
| Describe the policy for workplace restrictions | |
| Describe the policy for offering HIV testing to the HWs | |

Annex 3: HEALTH FACILITY TB INFECTION CONTROL PLAN

| HEALTH FACILITY TB INFECTION CONTROL PLAN | | | | | | | |
|---|---|--|----------------|---------------|----------------|----------------|--|
| S/no | Level of Hierarchy in TB Control Infection measures | Activity/Task | Timeframe | | | | Responsible Person |
| | | | Q1 (Jan-March) | Q2 (Apr-June) | Q3 (July-Sept) | Q-4 (Oct.-Dec) | |
| 1 | Administrative control measures | 1.1. Establish/Integrate TB IC issues into the existing general Infection control committee 1.2 Identify TB IC focal person for the Health facility 1.3. Identify in charge of TB IC in each unit: CTC, TB Clinic, VCT, PMTCT, RCH, OPD, Wards and Laboratory 1.4. Conduct TB IC needs assessment to identify requirements for facility to implement TB Infection control | | | | | Mol/C, TB Infection Control Focal Person Mol/C Responsibilities: Endorse and funds a written TB IC plan, Ensure supplies and equipment are available and maintained, Arrange facility space to reduce TB transmission MO I/C MO I/C, Hospital Management Team MO I/C and Infection Control committee |

ANNEX 4: TB INFECTION CONTROL CHECK LIST FOR NATIONAL LEVEL TO ASSESS HEALTH FACILITIES

This checklist has to be used to assess the current TB infection control practices in the facility, through observation and discussion with the health facility staff in charge.

Region District

Name of the health facility Date form completed (dd/mm/yyyy): ___/___/___

Interviewee name Job position

Type of assessed health facility:

Hospital: government faith based private army police prison (No. bedsaverage occupancy.....)

referral regional district/cottage

Health centre: government faith based private army police prison (No. bedsaverage occupancy.....)

Dispensary: government faith based private army police prison

Tick the units that have been assessed*:

OPD RCH TB clinic CTC

Ward adult (No. beds occupancy at assessment.....) paediatric (No. bedsoccupancy at assessment

Laboratory

(* cumulate findings from different units in the same checklist only if the units are from the same health facility: e.g. hospital/HC)

No. TB cases identified in the HF/in past year: Adult = Paediatric =

Specify where the TB data are recorded:

TB register kept at TB clinic TB register kept at every unit other, specify _____

1. TB INFECTION CONTROL PLAN AND COMMITTEE

(The following questions have to be asked to the MO/AMO/CO in charge of the HF)

| Tick the appropriate answer (yes/no) or describe | Answer | Remarks |
|---|--|----------------|
| 1.1 Do you have a written TB infection control plan on site? <i>If no, move to section 2</i> | <input type="checkbox"/> yes <input type="checkbox"/> no | |
| 1.2 Do you have a committee in your HF responsible for TB infection control? | <input type="checkbox"/> yes <input type="checkbox"/> no | |
| 1.2.1 If yes, who are the members? <i>Describe</i> | | |
| 1.2.2 What are the tasks of the committee? <i>Describe</i> | | |
| 1.2.3 How often do they meet? | <input type="checkbox"/> monthly <input type="checkbox"/> quarterly <input type="checkbox"/> annually <input type="checkbox"/> other, specify _____ | |
| 1.3 Specify the job position of the person responsible to monitor the implementation of the TB infection control plan | | |
| 1.4 How frequently is the HF monitored? | <input type="checkbox"/> monthly <input type="checkbox"/> quarterly <input type="checkbox"/> annually <input type="checkbox"/> other, specify _____ | |

Note: request a copy of the TB infection control plan; specify when it was drafted ___/___/___ and updated ___/___/___

2. HEALTH FACILITY STAFF (HFS)

(The following questions should be asked of the MO/AMO/CO in charge of the HF)

| Tick the appropriate answer (yes/no) or describe | Answer | Remarks |
|--|---|---------|
| 2.1 Is the HW screened for TB if sign/symptoms are reported? If no, move to point 2.4 | yes no | |
| 2.1.1 If yes, what type of screening is used? Describe | | |
| 2.2 Is HIV testing offered to the HWs? | yes no | |
| 2.2.1 If yes, how frequently? | monthly quarterly -- annually -- other, specify _____ | |
| 2.2.2 Are data recorded on TB and HIV screening for HWs? | yes no | |
| 2.3 Does HWs report all needle sticks and other occupational exposures? If no, move to point 2.8 | yes no | |
| 2.3.1 If yes, is there a written record of all exposures? | yes no | |
| 2.4 Do you have PEP available? | yes no | |
| 2.5 Do you have IPT in place to offer to HWs? | yes no | |
| 2.6 Do you have any work restrictions for HWs with active TB? If no, move to point 2.10 | yes no | |
| 2.6.1 If yes, describe | | |

| | | |
|---|---|--|
| 2.7 Do you have any work restrictions for HWs with HIV? | Yes No | |
| 2.7.1 If yes, describe | | |
| 2.8 In the last year, how many HWs were diagnosed with active TB? | | |
| 2.8.1 Among them, how many were HIV positive? | | |
| 2.8.2 Specify the units where those TB cases among HWs were working | | |
| 2.9 Is training on TB infection control conducted? If no, move to section 3 | Yes No | |
| 2.9.1 If yes, are there records of the courses? | Yes No | |
| 2.9.2 How frequently are courses conducted? (specify the date of last course) | ___ annually ___ other, specify ___ ___/___/___ | |
| 2.9.3 Who is the target? Describe | | |

3. NETWORK WITH OTHER HEALTH FACILITIES AND COMMUNITY AND MDR-TB CARE AND TREATMENT

(The following questions have to be asked to the MO/AMO/CO in charge of the HF or the TB staff)

| Tick the appropriate answer (yes/no) or describe | Answer | Remarks |
|--|--------|---------|
| 3.1 Are MDR TB diagnostic/treatment services provided within the HF? If no, move to section 4 | yes no | |
| 3.1.1 if yes, describe procedures for MDR-TB diagnosis | | |
| 3.1.2 Do you have a register in which to record MDR/XDR TB cases? | yes no | |
| 3.1.3 If yes, are data reported to the District TB and Leprosy officer/ District Medical Officer? | yes no | |
| 3.2 Do you coordinate with other authorities or community based organizations to ensure TB infection control at community level? | yes no | |
| 3.3 Do you conduct contact investigation among households of TB index cases? | yes no | |

4. RESPIRATORY PROTECTION MEASURES

(The following questions have to be asked to the MO/AMO/CO in charge of the MDR TB hospital)

| Tick the appropriate answer (yes/no) or describe | Answer | Remarks |
|---|---|---------|
| 4.1 Are respirators available within the HF? | yes no | |
| 4.1.1 if yes, specify the type of respirators available | -- N95 -- FFP2 -- other | |
| 4.2 Is the HW using the respirators? | yes no | |
| 4.2.1 If yes, when are the respirator used by the HWs? | -- during sputum induction procedures -- entering MDR-TB ward/rooms -- other, specify | |

6. ENVIRONMENTAL CONTROLS

| Tick the appropriate answer (yes/no) or the box under the assessed unit | OPD | | TB | | CTC | | RCH | | ward ad | | ward ped | | lab | |
|---|--|----|--|----|--|----|--|----|--|----|--|----|--|----|
| | yes | no | yes | no | yes | no | yes | no | yes | no | yes | no | yes | no |
| 6.1 Is air mixing/directional air movement checked? | | | | | | | | | | | | | | |
| 6.1.1 If yes, how often is it conducted? | annually other | | annually other | | annually other | | annually other | | annually other | | annually other | | annually other | |
| 6.1.2 By whom? Specify | at night day time day&night other | | at night day time day&night other | | at night day time day&night other | | at night day time day&night other | | at night day time day&night other | | at night day time day&night other | | at night day time day&night other | |
| 6.2 What is the policy for open windows? | | | | | | | | | | | | | | |
| 6.2.1 Who is responsible for opening windows? | | | | | | | | | | | | | | |
| 6.3 Are there any procedures in place to discard sputum samples? | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | |
| 6.4 Are there any cleaning, sterilization and disinfection procedures in place for potentially contaminated equipment (e.g. bronchoscopes, endoscopes)? | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | | Not Applicable | |
| 6.5.1 Are there standard procedures for disinfecting contaminated rooms? | | | | | | | | | | | | | | |

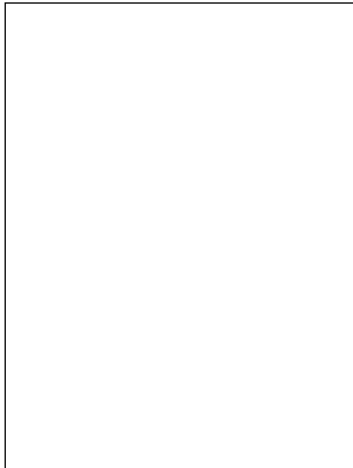
7. AIR BARRIER SYSTEM

| Observe the HCWs performing the following activities and report your observations by ticking the appropriate answer (yes/no) under the assessed unit | OPD | | TB | | CTC | | RCH | | ward ad | | ward ped | | lab | |
|--|-----|----|-----|----|-----|----|-----|----|---------|----|----------|----|-----|----|
| | yes | No | yes | no | yes | no | yes | no | yes | no | yes | no | yes | no |
| 7.1 Specify the room/windows size and the number of windows and doors per room/ward | | | | | | | | | | | | | | |
| 7.2 Are fans in place? | | | | | | | | | | | | | | |
| 7.2.1 If yes, how many fans are there per room/ward? | | | | | | | | | | | | | | |
| 7.2.2 Are they working and clean? | | | | | | | | | | | | | | |
| 7.2.3 Are the fans cleaned on a monthly basis? | | | | | | | | | | | | | | |
| 7.3 Is there any directional air flow? (check by using incense stick) | | | | | | | | | | | | | | |
| 7.3.1 Is yes, describe | | | | | | | | | | | | | | |
| 7.4 Are doors and windows easy to open? | | | | | | | | | | | | | | |

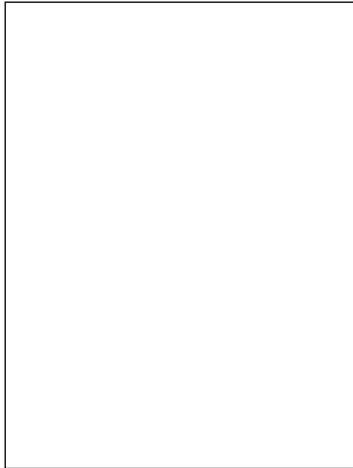
Remarks

Sketch placement windows, doors and fans of each assessed unit

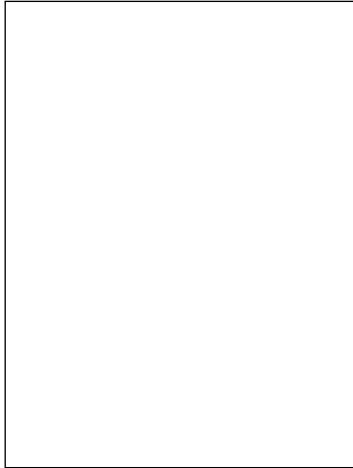
OPD room



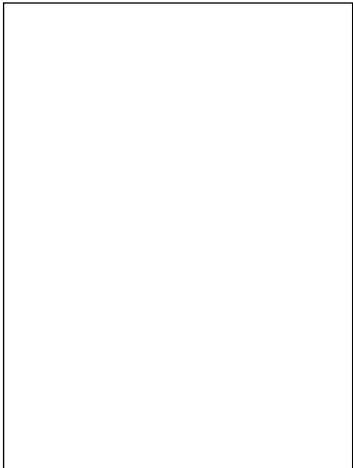
TB clinic



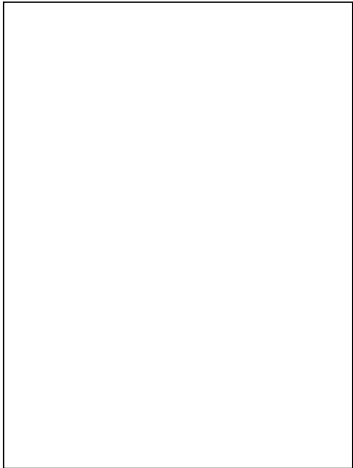
CTC



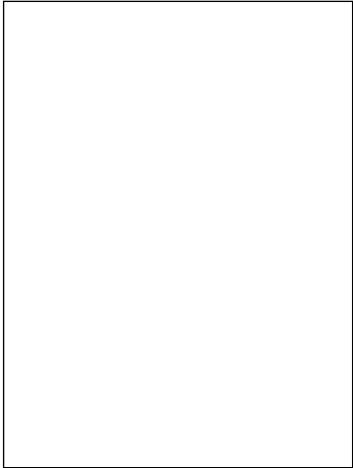
Ward adult



Ward ped



RCH



Lab

Recommendations:

Supervisor signature

Health facility responsible signature

Job position

ANNEX 5: POSTER ON COUGH HYGIENE

(Targeted to the patients/general population)

TUNAWEZAJE KUZUIA KUENEA KWA KIFUA KIKUU?



Vimelea vya kifua kikuu vinaenea kwa njia ya hewa kutoka kwa mgonjwa wa TB ambaye hajaanza tiba anapokohoa au kupiga chafya.



Tunawezaje kuzuia maambukizi ya vimelea vya kifua kikuu?

- Kwa kufunika mdomo na pua wakati wa kukohoa. Tumia kitambaa au karatasi laini.
- Fua kitambaa kwa maji na sabuni.
- Osha mikono kwa maji na sabuni.



- Fungua madirisha kuruhusu hewa safi na mwanga wa jua.



- Kama unakohoa kwa wiki mbili au zaidi, wahi kituo cha huduma na tiba
- Tumia dawa za kutibu kifua kikuu kama ulivyoelekezwa na mhudumu wa afya, na hakikisha unakamilisha matibabu



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ANNEX 6: POSTER ON INTENSIFIED TB CASE FINDING

(Targeted to the patients/general population)

DALILI ZA KIFUA KIKUU



KUKOHOA KWA WIKI 2 AU ZAIDI



**KUPUNGUA UZITO ZAIDI YA KILO 3
NDANI YA WIKI 4**



HOMA KWA WIKI 2 AU ZAIDI



KUKOHOA MAKHOZI YENYE DAMU



**KUTOKWA JASHO KWA WINGI USIKU
KWA WIKI 2 AU ZAIDI**

**Kama una dalili mojawapo ya hizi,
nenda kituo cha huduma kwa
uchunguzi na tiba**



ANNEX 7: POSTER ON TB INFECTION CONTROL TARGETED TO HCWS

(Targeted to the patients/general population)

MHUDUMU WA AFYA AFANYE YAFUATAYO KUZUIA MAAMBUKIZI YA TB KWENYE KLINIKI (OPD, CTC, RCH, TB NA KLINIKI YOYOTE)

- **Weka bango linaloelezea jinsi ya kuzuia maambukizi ya TB sehemu ya kusubiri wagonjwa**
- **Fundisha wagonjwa kanuni za kuzingatia wakati wa kukohoa:**

| | | | | | | | |
|---|---|---|--|--|---|---|---|
|  | Funika mdomo/pua kwa karatasi laini, kitambaa au mkono unapokohoa au kupiga chafya |  | Usiteme mate ovyo, tema kwenye karatasi laini au kopo lenye mtuniko |  | Weka karatasi iliyotumika kwenye pipa au shimo la taka |  | Mwaga makohozi kwenye choo na usafisha kopo na kufua kitambaa, nawa mikono kwa maji safi na sabuni |
|---|---|---|--|--|---|---|---|
- **Waeleze umuhimu wa uchunguzi wa TB, uhusiano wa maambukizi ya TB na UKIMWI**
- **Waagize wagonjwa wote wenye kukohoa wiki mbili au zaidi (wanaohisiwa kuwa na TB) kwenda maabara kwa uchunguzi wa makohozi**
- **Washauri wagonjwa wanaokohoa wasikae karibu na wagonjwa wengine**
- **Fungua madirisha ili kuleta mzunguko wa hewa wa kutosha ndani ya chumba**



Hakikisha madirisha yako wazi

ANNEX 8A: TB SCREENING & IPT FORM FOR HIV INFECTED PATIENTS ABOVE 5 YEARS



MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN COLLABORATIVE TB/HIV ACTIVITIES

Patient's name: Age: Sex: M/F Date:/...../.....

Reg. Number:

| Date | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. For children 5 years and below | | | | | | | | | | | | | | | | |
| Cough of any duration? | | | | | | | | | | | | | | | | |
| History of household contact with TB? | | | | | | | | | | | | | | | | |
| Fever of any duration? | | | | | | | | | | | | | | | | |
| Reduced activities or irritability for 2 weeks or more? | | | | | | | | | | | | | | | | |
| Inadequate weight gain, weight faltering? Weight loss? | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> • If 'YES' to one or more questions continue evaluation according to the Paediatric TB diagnostic flowchart of the National Tuberculosis and Leprosy Program (NTLP) by filling table number 2. • If 'No' to all questions asses for IPT contraindications in table 3 and repeat TB screening at the subsequent visit (every month) | | | | | | | | | | | | | | | | |
| 2. Action taken for presumptive TB. | | | | | | | | | | | | | | | | |
| Sputum smear /Gene expert | | | | | | | | | | | | | | | | |
| TB Score (Paediatric TB score chart) | | | | | | | | | | | | | | | | |
| Chest x – ray (if available) | | | | | | | | | | | | | | | | |
| Started broad spectrum antibiotics | | | | | | | | | | | | | | | | |
| Started anti – TB treatment | | | | | | | | | | | | | | | | |
| After ruling out TB disease, assess for IPT contraindications in table 3 and repeat TB screening at the subsequent visit (every month) | | | | | | | | | | | | | | | | |
| 3. IPT contraindications (tick all that apply) | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N |
| 4. IPT inclusion (tick appropriate box) | | | | | | | | | | | | | | | | |

| 3. IPT contraindications (tick all that apply) | | Y | N | 4. IPT inclusion (tick appropriate box) |
|---|--|---|---|---|
| Current/ past history of hepatitis | | | | <p>Eligible (Answered NO to all questions in table 3)</p> <p>Not eligible (Answered YES to any question in table 3)</p> <p>Parent/caregiver accepted IPT Yes No</p> <p>If accepted, date IPT started ___/___/___</p> |
| History of TB treatment in the past 2 years | | | | |
| Non-adherence to long term treatment | | | | |
| Alcohol abuse (regular and heavy alcohol consumption) | | | | |
| Medical contra- indication to INH | | | | |
| Symptoms of peripheral neuropathy | | | | |
| | | | | |

| 5. IPT Follow up visit | Date | | | | | | | |
|--|------|--|--|--|--|--|--|--|
| IPT Adherence (write number of doses missed) If > 6 doses in 4wks, send patient for adherence counselling) | | | | | | | | |
| Minor adverse events continue with IPT (write code A1-A5) | | | | | | | | |
| Severe adverse events Yes/ No (If yes, write code A6-A9) | | | | | | | | |
| IPT outcome | | | | | | | | |
| Refer code number | | | | | | | | |

Codes

| | | | |
|-------------------|---|-------------------------------------|--|
| Adverse events: | A1. Tingling/ burning sensation | A2. Joint pain | A3. Mild skin rash |
| | A4. Peripheral neuropathy | A5. Abdominal pain | A6. Severe skin rash with peeling skin |
| | A7. Hepatitis/ jaundice | A8. Disabling peripheral neuropathy | A9. Convulsions |
| IPT outcome | | | |
| Refer code number | | | |
| | 1. Completed | 2. Stopped | 3. Died |
| Adherence: | Compensation of pills if a client has taken less than 80% (145 doses) | | |
| Refer CTC 2 | : Code 7 | | |

ANNEX 8B: TB SCREENING & IPT FORM FOR HIV INFECTED CHILDREN 5 YEARS AND BELOW



MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN COLLABORATIVE TB/HIV ACTIVITIES
 Patient's name: Age:..... Sex: M/F Date:/...../.....

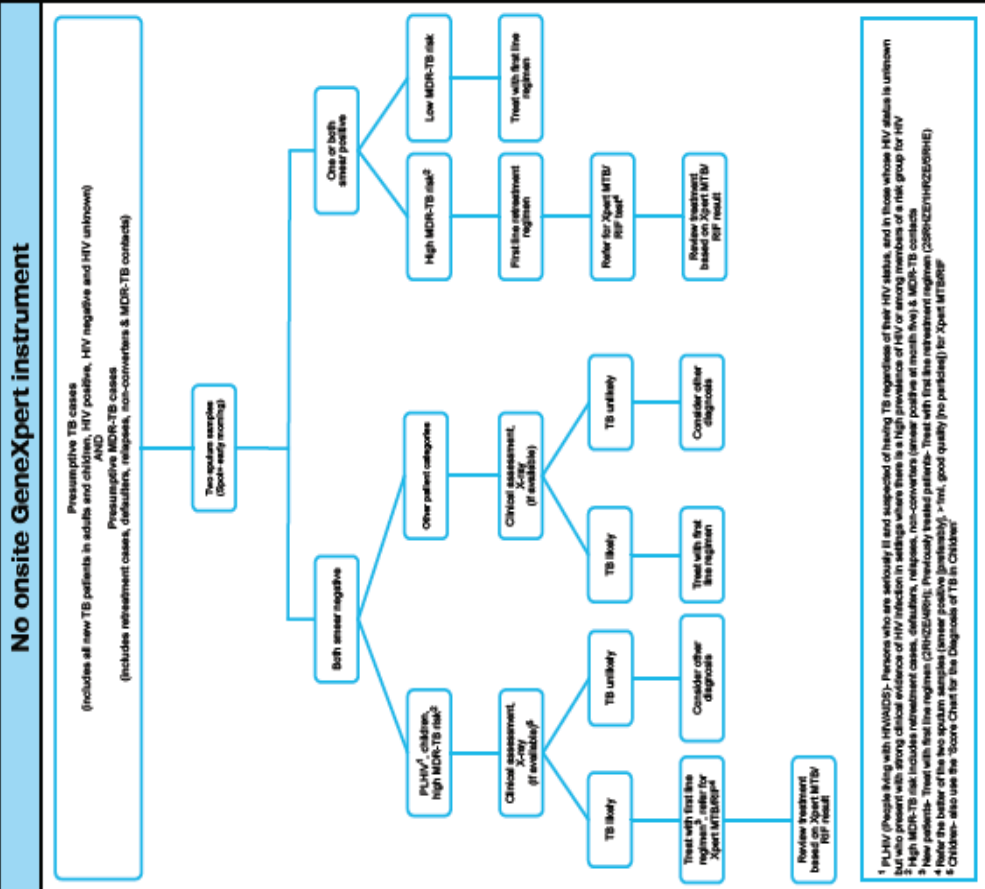
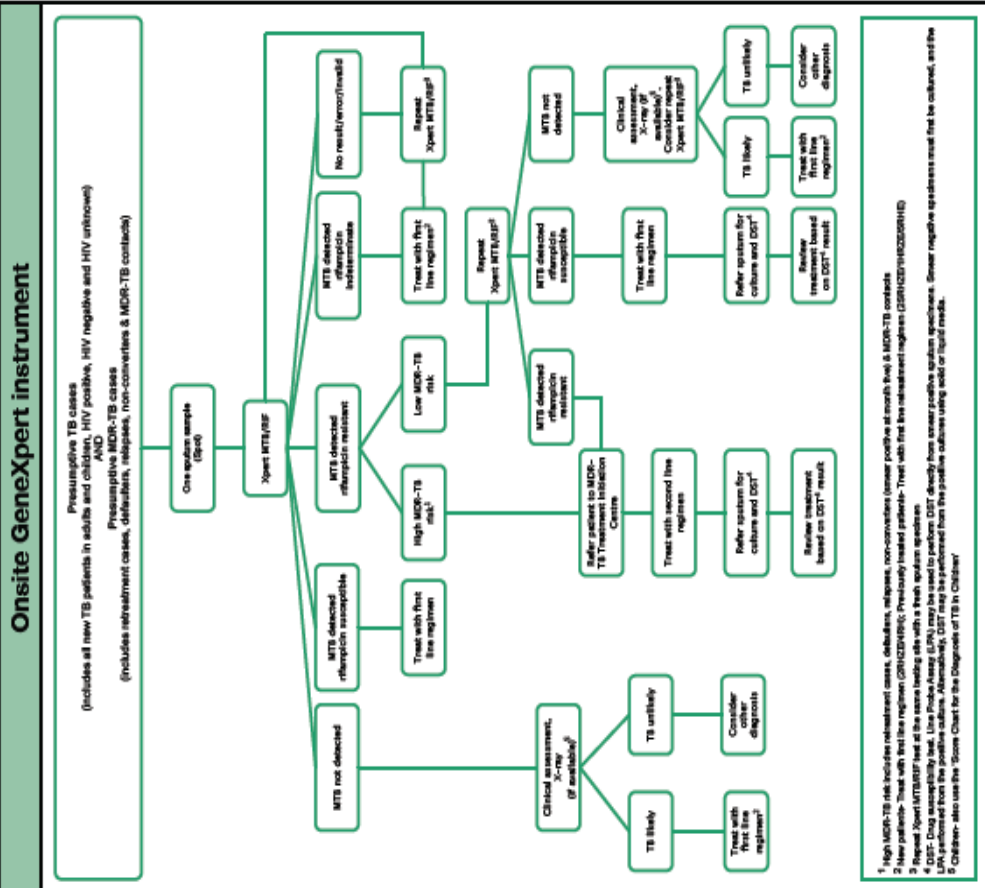
Reg. Number:

| Date | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. For children 5 years and below | | | | | | | | | | | | | | | | |
| Cough of any duration? | | | | | | | | | | | | | | | | |
| History of household contact with TB? | | | | | | | | | | | | | | | | |
| Fever of any duration? | | | | | | | | | | | | | | | | |
| Reduced activities or irritability for 2 weeks or more? | | | | | | | | | | | | | | | | |
| Inadequate weight gain, weight faltering? | | | | | | | | | | | | | | | | |
| Weight loss? | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> • If 'YES' to <u>one or more</u> questions continue evaluation according to the Pediatric TB diagnostic flowchart of the National Tuberculosis and Leprosy Program (NTLP) by filling table number 2. • If 'No' to <u>all</u> questions asses for IPT contraindications in table 3 and repeat TB screening at the subsequent visit (every month) | | | | | | | | | | | | | | | | |
| 2. Action taken for presumptive TB. | | | | | | | | | | | | | | | | |
| Sputum smear /Gene expert | | | | | | | | | | | | | | | | |
| TB Score (Paediatric TB score chart) | | | | | | | | | | | | | | | | |
| Chest x – ray (if available) | | | | | | | | | | | | | | | | |
| Started broad spectrum antibiotics | | | | | | | | | | | | | | | | |
| Started anti – TB treatment | | | | | | | | | | | | | | | | |
| After ruling out TB disease, assess for IPT contraindications in table 3 and repeat TB screening at the subsequent visit (every month) | | | | | | | | | | | | | | | | |
| 3. IPT contraindications (tick all that apply) Y N | | | | | | | | | | | | | | | | |
| 4. IPT inclusion (tick appropriate box) | | | | | | | | | | | | | | | | |

ANNEX 9: TB DIAGNOSTIC ALGORITHM



Tanzania National Tuberculosis Diagnostic Algorithm



ANNEX 10: RECOMMENDED COMBINATIONS OF TB-IC MEASURES FOR DIFFERENT AREAS/SETTINGS.

The table below should be used as a guide for applying TB-IC measures in different areas encountered by HCWs. **Overview of Setting-Specific TB-C Measures.** These measures may be applied in the specific areas as indicated, taking into consideration important variations such as patient burden and the geographical area please refer to the relevant sections of these guidelines for more information on how to apply each of the control measures. This table may also be used as a checklist for monitoring and supervision, as well as to guide health education package for health facilities, the community and congregate settings.

| Specific Area/ Setting | Administrative Control Measures | | | | | | | | | | Environmental Control Measures | | | PPE Respirator (N95) |
|-------------------------------------|---------------------------------|---------|------------|-----------|--------------------|------------------|-------------------------------|--------------------|------------------------|---------------------------|--------------------------------|-----|-----|----------------------------|
| | Triage Active case | Finding | Separation | Cohorting | Cough Etiquette | Surgical Mask | Reduce time in facility | Staff screening | Natural Ventilation | Mechanical Ventilation | UVGI | | | |
| Waiting Areas | + | | + | + | + | +/- | + | + | + | +/- | -- | +/- | -- | -- |
| OPD consulting rooms | N/A | | + | + | + | + | N/A | + | + | +/- | -- | +/- | -- | -- |
| X-ray room | + | | + | + | + | + | + | N/A | + | +/- | +/- | +/- | + | + |
| Casualty room | + | | + | + | + | + | + | + | + | +/- | +/- | +/- | + | + |
| HIV care clinic | + | | + | + | + | + | + | + | + | +/- | -- | +/- | + | + |
| TB clinic/ward | + | | + | + | + | + | + | + | + | +/- | +/- | +/- | + | + |
| CB-DOT point | + | | + | + | + | + | + | + | + | -- | -- | -- | -- | -- |
| MDR-TB ward | N/A | | + | + | + | + | + | + | + | + | +/- | + | + | + |
| General ward | + | | + | + | + | + | + | + | + | -- | -- | -- | -- | -- |
| Sputum collection area | N/A | | N/A | N/A | N/A | N/A | N/A | + | + | -- | -- | + | N/A | N/A |
| Sputum induction room | N/A | | N/A | N/A | N/A | N/A | N/A | + | + | + | +/- | + | + | + |
| TB microscopy laboratory | N/A | | N/A | N/A | N/A | N/A | N/A | + | + | +/- | N/A | + | N/A | N/A |
| TB culture laboratory | N/A | | N/A | N/A | N/A | N/A | N/A | + | + | + | N/A | + | N/A | + |
| High risk procedure room | + | | + | + | + | + | + | + | + | + | + | + | + | + |
| Patient transport services | + | | N/A | N/A | + | + | N/A | + | + | -- | -- | -- | + | + |
| Prison cells/Police holding cells | + | | + | + | + | -- | N/A | + | + | -- | -- | -- | N/A | N/A |
| Prison halls | + | | + | + | + | -- | N/A | + | + | +/- | -- | -- | N/A | N/A |
| Military Barracks | + | | + | + | + | -- | N/A | + | + | -- | -- | -- | N/A | N/A |
| Households | + | | + | + | + | -- | N/A | + | + | -- | -- | -- | + | + |
| Other community congregate settings | + | | -- | -- | + | -- | N/A | N/A | + | -- | -- | -- | -- | -- |

• = Control measure must be applied, -- = Control measure is not necessary/required, N/A = Control measure is not applicable +/- = Control measure may be applied depending on risk in consultation with an expert

ANNEX 11: FACILITY RISK ASSESSMENT CHECKLIST

This worksheet should be considered for use in performing TB risk assessments for health facilities. Facilities with more than one type of setting will need to apply this to each setting.

Scoring Y=Yes N=No

1. Incidence of TB

| | | | |
|--|--|---|--|
| a. Number of notified TB patients/100 000 in your facility, or region served by the health-care setting? | Catchment Population _____ Regional rate _____ Facility rate _____ | | |
| b. Are patients with suspected or confirmed TB encountered in your setting (inpatient and outpatient)? | Yes <input type="checkbox"/> No <input type="checkbox"/> | | |
| c. Number of general outpatients with presumed TB | 1 year ago _____ 2 years ago _____ | | |
| d. Number of TB suspects among general outpatients with presumed TB | 1 year ago _____ 2 years ago _____ | | |
| e. Number of PLHIV | 1 year ago _____ 2 years ago _____ | | |
| f. Number of PLHIV in HIV care (being evaluated) with presumed TB | 1 year ago _____ 2 years ago _____ | | |
| g. How many patients with confirmed TB were treated in this facility? | Year 1 year ago 2 years ago | Number Notified _____ _____ | Cured and Treatment completed _____ |
| h. Health care worker surveillance (for the past 12 months) | Total number of nurses _____ | Number of nurses screened for TB _____ | Number of nurses diagnosed with TB _____ |

2. Clarification

| | |
|--|--|
| Inpatient settings | |
| a. How many inpatient beds are in your inpatient setting? | Number _____ |
| b. How many patients with TB disease were hospitalised in 1 year? | Previous year _____ |
| c. Does you triage all new admissions for cough? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Outpatient settings | |
| d. How many TB patients were evaluated at your outpatient setting in 1 year? | Number _____ |
| e. Is your health-care setting a TB clinic? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| f. Is your health-care setting a HIV care clinic? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| g. Providing ART? | Yes <input type="checkbox"/> No <input type="checkbox"/> |

| | |
|---|--|
| h. Have patients with drug-resistant TB (Poly-and-DR-TB) been encountered in your healthcare setting in the previous year? | Yes <input type="checkbox"/> No <input type="checkbox"/> Number _____ |
| i. Does your healthcare setting have a triage procedure for the identification of persons with symptoms suggestive of TB among attendees of the general OPD and of the HIV care clinic? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| j. Does your healthcare setting have a separate outdoor waiting areas at both the general OPD and HIV care clinic? | Yes <input type="checkbox"/> No <input type="checkbox"/> |

3. Screening of HCWs for M. tuberculosis Infection

| | |
|---|--|
| a. Does the healthcare setting have a TB screening programme for HCWs? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| b. If yes, which categories of HCWs are included in the TB screening programme? | |
| c. How frequently are HCWs screened for TB disease? | |
| d. Who conducts the screening and maintains the records? | Screening done by: _____ Records kept by: _____ |

4. TB Infection Prevention and Control (IPC) Plan and Programme

| | |
|--|--|
| a. Does the health-care setting have a written TB IPC plan? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| b. Who is responsible for the IPC programme? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| c. When was the TB IPC plan written? | d. Last review or update date: _____ |
| e. Does the written IPC plan need to be updated? (Based on the timing of the previous update, changing TB epidemiology, change in national guidelines, or other factors related to a change in risk for transmission of M. tuberculosis)? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| f. Does the healthcare setting have an infection control committee (or another committee with infection control responsibilities)? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| g. Has a person been designated to be responsible for implementing an infection prevention and control plan in your healthcare setting? If yes, list the name: | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| <p>h. Review 20 patient records (random) for the past 6 months. Based on a review of the medical records, what is the average number of days for the following:</p> <ul style="list-style-type: none"> • Presentation of patient until collection of specimen _____ • Specimen collection until receipt by laboratory _____ • Receipt of specimen by laboratory until smear results are provided to healthcare provider _____ • Diagnosis until initiation of standard anti-tuberculosis treatment _____ • Receipt of specimen by laboratory until culture results are provided to healthcare provider _____ • Receipt of specimen by laboratory until drug-susceptibility results are provided to healthcare provider _____ • Receipt of DST results until adjustment of anti-tuberculosis treatment, if indicated _____ | |
| i. Is annual in-service training and education regarding TB-IC practices provided for HCWs? | Yes <input type="checkbox"/> No <input type="checkbox"/> |

5. Environmental Controls

| | | |
|---|-----|--|
| a. Which environmental controls are in place in your healthcare setting? | | |
| b. What are the actual air changes per hour (ACH) and design for various rooms in the setting? Room | ACH | Design |
| _____ | | |
| _____ | | |
| _____ | | |
| c. Are environmental controls regularly checked and maintained with results recorded in maintenance logs? | | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| d. Who is responsible for ACH measurements? | | |

6. Respiratory-Protection Programme

| | |
|---|--|
| a. Are respirators used in this setting for HCWs working with TB patients? | |
| b. Does your health-care setting provide respirator fit testing for HCWs? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| -If yes, when is it conducted? | _____ |
| -New employees upon resuming duties | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| -Annually | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| -When a new type of respirator is procured | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| c. What method of fit testing is used? Describe. | Qualitative Yes <input type="checkbox"/> No <input type="checkbox"/> Bitrex Yes <input type="checkbox"/> No <input type="checkbox"/> Saccharine Yes <input type="checkbox"/> No <input type="checkbox"/> |
| d. Who is responsible for respirator and fit testing? | |

ANNEX 13: FAST Strategy

FAST is an infection control strategy, which prioritizes rapidly diagnosing and putting patients on effective treatment. **FAST** stands for **F**inding TB cases **A**ctively, **S**eparating safely, and **T**reating effectively, focuses HCWs on the most important infection control practices.

- **Finding TB Patients**

The most infectious TB patients are the undiagnosed cases who often transmit bacilli in the clinics and waiting areas, infecting HCWs, patients and other users of the facility. HCWs have to find, diagnose and effectively treat these patients in order to stop the further transmission of TB.

- **Active TB case finding**

Undiagnosed patients with TB may present themselves to the health facility for reasons unrelated to TB, and they may not mention cough, fever, night sweats or weight loss - symptoms which may or may not be associated with pulmonary TB. The FAST approach encourages health facilities to assign “cough monitors” to all waiting areas or entrance points to identify persons with symptoms suggestive of TB, such as a current cough.

- **Separating Safely**

While waiting for evaluation, patients identified by cough monitors should be separated temporarily from other patients in a well-ventilated area to prevent further spread of TB. The sputum must be collected outdoors and away from others, and tested promptly for TB as per *National Guidelines for the Management of Tuberculosis*.

- **Treating Effectively**

Prompt and effective treatment is an important step in preventing the transmission of TB. Patients become non-infectious soon after starting effective TB treatment.

ANNEX 14: PATIENT MANAGEMENT TO PREVENT TRANSMISSION OF TB IN HEALTH CARE FACILITY

| Five steps for patient management to prevent transmission Of TB in Care and treatment Clinics | | |
|--|-----------------------------|--|
| Step | Action | De- scrip- tion |
| 1 | Screen | <ul style="list-style-type: none"> – Early recognition of patients with suspected or confirmed TB is the first step in the protocol – A triage/registration nurse should screen patients for a prolonged duration of cough (≥ 2 weeks) immediately after they arrive at the HF (at registration desk or in the triage room) |
| 2 | Investigate for TB or refer | <ul style="list-style-type: none"> – Those TB suspects should be referred to the laboratory for sputum smear microscopy test – If the TB test is not available on site, the HF should have an established link with a TB diagnostic centre to which TB suspects can be referred – Each HF should also have a link with a TB treatment centre to which those diagnosed with TB can be referred |
| 3 | Separate | Patients with cough ≥ 2 weeks duration or PLHIV with one of the 5 sign/symptoms suggestive for TB or who reported to be under TB investigation or initial treatment for TB should be instructed on cough hygiene, provided a tissue/handkerchief to cover mouth/ nose when coughing/sneezing and advised to avoid close contact with other clients/patients |
| 4 | Educate | <ul style="list-style-type: none"> – TB suspects and PTB patients under TB treatment (especially within the first 3 weeks) should be educated on cough hygiene: cover mouth and nose when coughing or sneezing, do not spit indiscriminately, wash hands with water and soap and dispose tissues in the bucket. – Whenever available, tissues/handkerchief should be distributed to those patients |
| 5 | Provide HIV services | Triaging symptomatic patients to quickly provide care and reduce the amount of time that others are exposed to them is recommended |

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