Ministry of Health and Social Welfare

Guidelines for Tuberculosis Infection Control in Health Care Facilities

National Tuberculosis and Leprosy Program (NTLP)

TABLE OF CONTENTS

FOREWORD

Tuberculosis (TB) is the major cause of morbidity and mortality in Tanzania among adults after malaria and HIV/AIDS. The notification of TB in the country has increased for more than five folds, fuelled by the rapid spread of HIV infection in the general population. The HIV related TB has increased despite successful implementation of WHO Direct Observe Treatment Short Course (DOTS) strategy which is the international recommended strategy for TB control. The high morbidity and mortality from TB among People Living with HIV (PLHIV) make TB prevention, detection and treatment a priority. TB infection control is even more relevant in HIV-settings, like the care and treatment clinics and the general wards where it is estimated that 50% of all in-patients in Tanzania are infected with the HIV virus.

Therefore the Ministry of Health and Social Welfare (MoHSW) has developed the National TB Infection Control Guidelines presented here, representing its intention and commitment to combat TB by addressing preventing transmission of the disease in health care facilities. The guidelines provide the basis for action by the National TB and Leprosy Programme (NTLP), the National AIDS Control Programme (NACP), the regional and district facility authorities and other stakeholders to work synergistically to prevent TB transmission.

The national TB Infection Control Guidelines were developed to meet all national and international standards. The MoHSW is confident that all stakeholders and partners will effectively comply with the guidelines and play a role in ensuring their implementation. The MoHSW plans to update the national guidelines as new knowledge on TB control is generated.

Finally, MoHSW is envisaging that appropriate execution of the guidelines will bring a positive impact on the control of TB in the country.

Blandina J. S. Nyoni.

Permanent Secretary
Ministry of Health and Social Welfare
Tanzania
……., 2010

ACKNOWLEDGEMENTS

These guidelines are the results of a collective effort leaded by the Ministry of Health and Social Welfare (MoHSW) of Tanzania in collaboration with the International Centers for AIDS and Treatment Programs (ICAP) - Columbia University and other stakeholders within and outside the country.

The MoHSW wishes to thank the following individuals and organizations, for their contribution, keen interested and tireless work in developing this document: the Dr F. Lwila (NTLP), Dr D. Kamara (NTLP), Dr M. Nyamkara (NTLP), Dr R. Josiah (NACP) Dr P. Mgosha (NACP), Dr. M. Makame (PATH), Dr B. Njako (GLRA), Dr R. Mbatia, (ICAP), Dr A. Howard (ICAP), Dr C. Casalini (ICAP) , Dr Z. Mkomwa (CDC, Tanzania), (Dr A. Date (CDC, Atlanta), Dr M. Kasubi (MNH), Dr J. van den Hombergh (PharmAccess Foundation and all USG Partners as well provided their valuable contribute to the final review of the guidelines.

Special thanks go to Dr E. Wandwalo (NTLP/MSH), who lead and greatly supported the team in development of this document.

The MoHSW recognizes the role played by Dr S. Egwaga (Manager, NTLP), Dr R. Swai (Manager, NACP) and Dr Ngonyani (Manager, Infection and Prevention Control) for their technical assistance throughout the process.

I wish to extend thanks to all those who in one way or another gave their inputs in the development of this document.

Last but not the least I acknowledge the technical support offered by CDC Atlanta, ICAP for reviewing the final draft and financial support from CDC/PEPFAR for facilitating production of these guidelines.

Dr. Donan W. Mmbando.
Director for Prevention Services
Ministry of Health and Social Welfare
……., 2010

ABBREVIATIONS

ACH	:	Air Changes per Hour
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
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
NACP	:	National AIDS Control Programme
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

These guidelines, targeted to management staff at all levels (regional, district and health centre) and health workers, describe TB infection control (IC) procedures to reduce the risk of M. tuberculosis transmission in Health Facilities (HFs), particularly HIV care and treatment clinics (CTC). In fact, the most risky environments for TB are crowded waiting areas in the outpatient department (OPD) and waiting areas at CTC where transmission from infectious TB patients to PLHIV can take place and in laboratories where samples of TB suspects are handled.

The guidelines call for the TB/HIV Committee, designated TB IC officer (from TB staff or CTC staff or the Health Officer), Regional/District medical officers (RMO/DMO) and Health Management Team (HMT) to develop a TB IC plan of the HF and monitor its implementation. The TB infection control plan should be based on administrative and environmental controls, and use of personal protective equipment.

The early identification of TB suspects at the HF level should be based on use of posters instructing patients to report prolonged cough to the patient registration desk, regular education of patients and family members about TB infection control, and active identification of TB suspects at every visit at the registration desk, by asking about cough for more than two weeks to those with unknown HIV status or negative or and by administering the TB screening questionnaire to People Living with HIV (PLHIV). Any TB suspects identified at registration desk should be immediately referred to the laboratory 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).

The guidelines do not recommend the use of surgical masks by Health Workers (HWs) when in contact with Pulmonary TB patients (PTB), since they do not provide protection, while the use of N95 respirators for HWs is recommended in all high risk situations, like MDR TB hospitals. Natural ventilation is highly recommended as a cost-effective measure to break the transmission of respiratory infections including TB; therefore windows should always be kept open and fans running.

HWs should receive PITC; HIV positive HWs are recommended not to work in TB clinic/ TB ward/MDR TB hospital to be protected from tuberculosis. Therefore, they re-assigned to another unit; HWs should also be informed to report when TB signs/symptoms occur and if having PTB, the HW should not work in that unit up to a minimum 3 weeks of TB treatment.

Any room and waiting area of a HF should be disinfected on a daily basis and all medical instruments should be sterilized with fresh bleach (5% sodium hypochlorite) or glutaraldehydes 2% anytime they are used for TB suspects/cases. A safety cabinet to

perform TB smears is recommended for zonal and reference laboratories.

All HWs at the HF level, including medical and non-medical staff, should be targeted for training on TB infection control and in particular on the increased risk of acquiring TB among PLHIV.

A mandatory adherence agreement for TB IC should be incorporated into all construction/ renovation contracts.

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

1. INTRODUCTION

Transmission of Mycobacterium tuberculosis from individuals with 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.

With a national HIV prevalence of 5.8% and average 60,000 new cases of tuberculosis notified every year, Tanzania estimates that 50% of the TB cases are co-infected with HIV and that up to 50% of hospital beds are occupied by patients with HIV/AIDS-related conditions (4, 5, 6).

The risk of transmission 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 a significant decline in TB transmission among patients attending health facilities (HF) and among HWs (7, 8).

These guidelines describe TB infection control (IC) measures to reduce the risk of M. tuberculosis transmission in health facilities, particularly HIV care and treatment clinics. However, the measures that are described in this document aim in general to prevent aerosol spread of infectious material.

The guidelines are targeted to:

Health Facility level

- Health Facility Management Team (Hospital Management Team, Health Centre Management Team)
- CTC staff
- Reproductive Child Health (RCH) staff
- TB staff
- Hospital directors
- OPD staff
- Ward 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 (RTLC)
- Regional AIDS Control Coordinator (RACC)
- Zonal TB/HIV Coordinator
- Regional Medical Officer (RMO)

National level

- MOHSW Director Hospital Services
- National TB and Leprosy Programme (NTLP)
- National AIDS Control Programme (NACP)
- TB, HIV and TB/HIV stakeholders who support health service provision at facility level and/or provide technical assistance to NACP and NTLP (e.g. USG partners)

2. PATHOGENESIS AND TRANSMISSION OF TB

Tuberculosis (TB) is caused by an organism called Mycobacterium tuberculosis. The organism is carried in airborne particles, or droplet nuclei, that are generated when persons with TB cough, sneeze, or speak. Not everyone who is exposed to an infectious TB patient becomes infected. 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 immunodeficiency 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.

2.1 The risk of progression from infection to disease

The risk of progression from infection to disease depends on the status of the immune-system. Ninety percent of people without HIV infection who are infected with M. tuberculosis do not develop TB disease. Their immune-system is strong enough to prevent the development of the disease. Most people infected with TB remain with "dormant bacilli" that might develop into TB disease in later in life. The risk of progression to TB disease is greatest in the first 2 years after infection. Factors which are associated with an increased risk of developing tuberculosis disease following infection include conditions that adversely affect the immune status of an individual including:

- HIV infection
- Alcohol abuse
- Diabetes
- Cancer
- Chronic Renal Failure (CRF)
- Malnutrition

Infection with HIV is currently the most common cause of immune-suppression in Tanzania. The annual risk of developing active TB in HIV-positive individuals co-infected with M. tuberculosis ranges from 5-10% which equates to a lifetime risk of approximately 50%. This is in stark comparison to the lifetime risk of 5-10% in HIV-negative individuals with tuberculosis infections.

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

2.2 Nosocomial transmission of Mycobacterium tuberculosis

Nosocomial transmission of M. tuberculosis 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 intubations and suctioning, open abscess irrigation, and autopsy) is associated with a high risk of nosocomial transmission.

Factors contributing to nosocomial M. 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
    - Underestimation 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

3. TB INFECTION CONTROL MEASURES IN HEALTH CARE FACILITIES

TB infection Control measures aim to prevent TB transmission in health care settings. The TB infection control programme is based on a three-level hierarchy of control measures, including administrative and environmental controls, and the use of personal protective equipment.

3.1 Administrative 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 M. tuberculosis. Administrative control measures should take priority over all other interventions to reduce nosocomial transmission of TB. Without effective administrative control measures, environmental control measures and personal protective equipment (respiratory protection) are of limited value. 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 HWs 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 HWs
- Ensuring proper cleaning and sterilization or disinfection of potentially contaminated equipment

3.1.1 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 persons who are at high risk for exposure to M. tuberculosis work or receive care, policies and procedures for TB infection control should be developed, reviewed periodically, and evaluated for effectiveness.

TB/HIV Committees

The existing TB/HIV Committees at regional and district level should be responsible for:

- Developing a written TB infection control plan tailored to the specific health facility setting. A baseline TB infection control assessment should be conducted by the

designated TB infection control officer in charge using the checklist available in Annex 1. This assessment will guide the development of a facility-specific plan. Each health facility should develop a TB infection control plan using the framework provided in Annex 2. The plan should address administrative, environmental and respiratory protection measures in the health facility

- Assigning a designated TB infection control officer in charge at the health facility level to monitor the implementation of the plan at the health facility; the designated TB IC officer in charge should be the TB focal staff (TB MO/AMO/CO/nurse) or a member of the TB/HIV team or a member of the HIV/CTC team or the Health Officer

- 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

- Evaluating the plan implementation on a quarterly basis and revising it on an annual basis

- The TB/HIV Committee at the regional level is responsible for overseeing the implementation of TB infection control measures at all HFs in the region
    - The TB/HIV Committee at the district level is responsible for overseeing the implementation of TB infection control measures at the district hospital, HC and dispensary level
    - The TB/HIV Committee and the designated TB IC officer in charge should coordinate with the Hospital Management Team (HMT) and the Regional/ District Medical Officer (RMO/DMO) to develop a TB IC plan. It is the duty of the designated TB IC officer in charge and all HWs to ensure that the plan is implemented and protect themselves and others.

Infection control monitoring and report at facility level

The quarterly monitoring of the heath 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, HC) 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 HF level and the Regional/District Tuberculosis and Leprosy Coordinator (RTLC/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 (Annex 3) 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.

Early identification of TB suspects at the health facility level

Most risky environments for TB transmission:

- Any crowded waiting area, especially if it is a closed room (e.g. registration desk at the entrance of the HF, OPD waiting areas, drug dispensing window)
- CTC waiting area: transmission from infectious HIV positive TB patients who are coughing to PLHIV

The early identification of TB suspects at the health facility level should be based on three strategies:

A. The use of posters displayed at the entrance of each unit, instructing patients on cough hygiene an self-referring to the registration desk if TB suspects
B. Active identification of TB suspects at every registration desk, by asking about cough for more than two weeks to patients and family members with HIV status unknown or negative **and** administering the TB screening questionnaire to PLHIV only
C. The regular education of patients and family members about TB infection control, especially for people living with HIV

A. Information Education and Communication materials on TB IC

Posters on cough hygiene and self-referral if TB suspects should be displayed at entrances of the HF and in waiting areas of the OPD, TB clinic, CTC, RCH and in the wards, the general registration desk of the hospital, and in other strategic places (e.g. elevators, radiology and laboratory). Poster on cough hygiene includes the following education messages:

- covering the mouth and nose with the hands, a tissue or a handkerchief when coughing/sneezing
- avoiding 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 among PLHIV and encourages those with one or more sings 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 among PLHIV is provided respectively in Annex 4 and 5.

While the poster on cough hygiene and self-referral if coughing should be displayed in the waiting area of all the units of the HF, the poster on intensified TB case finding among PLHIV should be specifically displayed in the waiting areas of the CTC.

These posters play an important role thus should be displayed in well visible positions to ensure that clients/patients will see them 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 HWs is provided in Annex 6.

B. Intensified TB Case Finding and Separation of TB Suspects

At any unit, such as the OPD, TB clinic, CTC, and RCH, the triage/registration nurse should actively ask the patient and his/her family members about cough for more than two weeks if HIV status unknown or negative or administer the TB Screening Questionnaire (Annex 7) if the client/patient is HIV positive. If a triage/registration nurse 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 suspect 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 HW 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, provided with 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.

C. Education of patients on TB and cough hygiene

Educating communities and patients to recognize symptoms of TB (cough ≥ 2 weeks, fever, excessive night sweats and weight loss) and to seek health care and further investigations should be routine in health care settings.

Health education should be provided by physicians, nurses/midwives, social workers and outreach workers. It should be given to the patient and respective family by using a multimedia approach including pamphlets, posters, videos, and also through television if available.

Health education can 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 videos and /or former TB

patients, when available.

Health education should 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 indiscriminate spitting. HCWs/ volunteers should instruct in-patients and out-patients/clients in waiting areas to spit into 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 into a handkerchief, wash it and re-use.

Education sessions should also include simple messages on tuberculosis infection/disease, and TB/HIV co-infection, the importance of HIV testing for TB patients, and continuous TB screening for PLHIV.

Health education should also cover TB infection control at the community level. In particular, TB patients 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 household bleach.

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.

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 to be HIV positive. Once identified as a TB suspect, 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 down wind from the HCW.

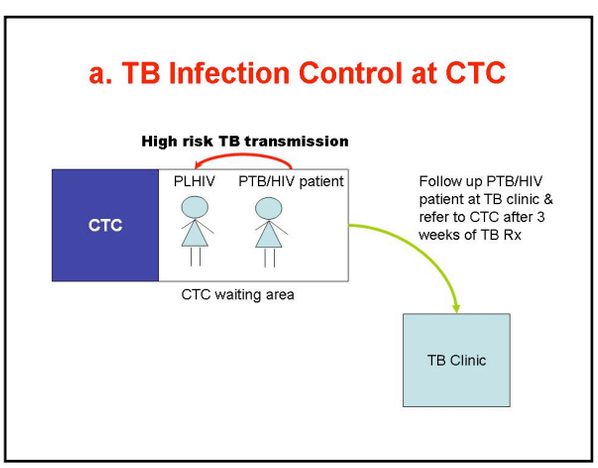
3.1.2 Separation of TB patients

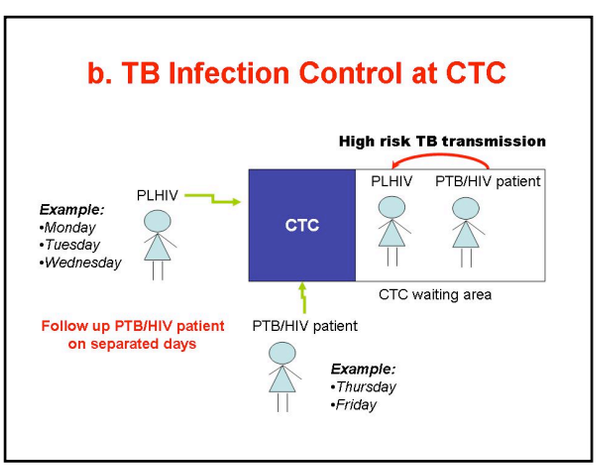
Care and Treatment Clinic

Any PLHIV identified as a PTB case, should follow this patients' flow:
For the management of confirmed PTB/HIV co-infected patients, the following options are recommended:

a) <u>If TB clinic is providing ART,</u> to channel PTB/HIV co-infected patients to the TB clinic, where they should receive TB and HIV care, treatment (anti-TB treatment/CPT/ART) and adherence counselling; refer them to CTC at the end of the TB treatment to ensure continuum of care (general HIV care, Cotrimoxazole prophylaxis, ART provision, Home Based Care etc)
b) <u>If TB clinic is not providing ART,</u> to evaluate PTB/HIV co-infected patients at CTC on separate days, to avoid sharing the same waiting area with PLHIV

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





General ward

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 any other HIV positive patient.
PTB patients should be provided with tissues/handkerchiefs to cover their mouth and nose and they should be educated about cough hygiene education.

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.

TB clinic

At registration desk, any PTB patient should be instructed on cough hygiene and should receive a tissue/handkerchief to be used to cover the mouth/nose when coughing/ sneezing for at least the first three weeks of TB treatment. Physical examinations and adherence counselling should take place in a closed but ventilated room. Drugs 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 HWs and in a area separated from those TB suspects who are referred from any other unit or who are self-referred, to minimize the risk of TB transmission between patients/suspects.

A summary of the patient management model is described in Annex 8 and a poster on TB/ HIV co-management (TB screening questionnaire among PLHIV, TB diagnostic algorithm, and TB and HIV co-treatment) is described in Annex 9.

At any TB suspects/patients should be offered PITC in a closed but ventilated room to minimize risk of TB transmission and ensure confidentiality. Once the TB suspect/patient agree, he/she should be referred to the VCT for HIV testing, unless the HIV rapid test is available within the unit (e.g. TB clinic).

3.1.3 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.

3.1.4 Discharge of TB patients from hospital

DOT should continue after discharge from the hospital, particularly for MDR-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 nurse 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

3.2 Environmental Control Measures

The second level of the hierarchy is the use of environmental control measures to reduce the concentration of infectious droplet nuclei in ambient air. This includes ventilation (natural and mechanical) and filtration.

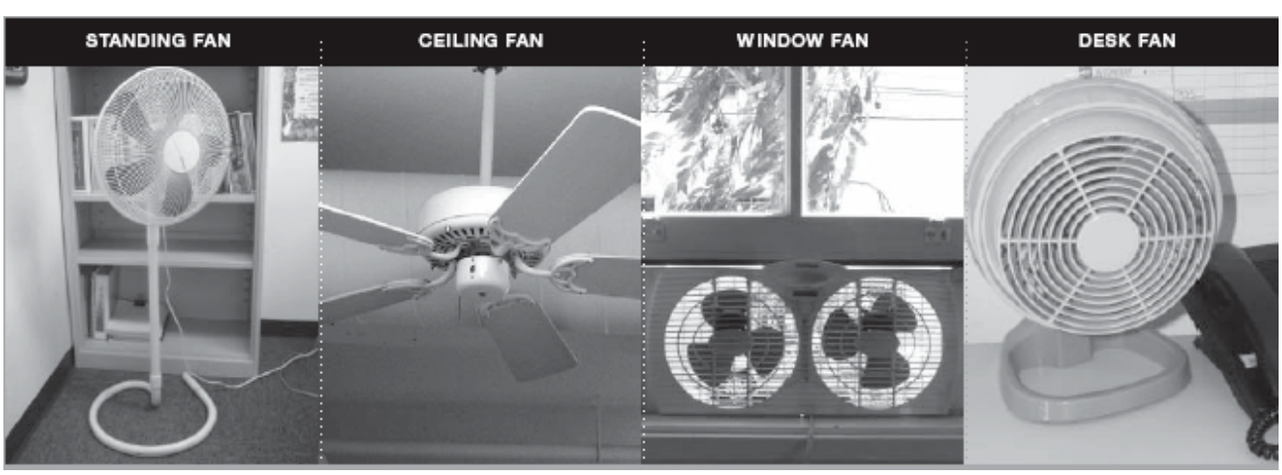
The first two control levels of the hierarchy minimize the number of areas in the health care facility where exposure to M. tuberculosis may occur, and reduce the risk of transmission in those areas where exposure can still occur.

3.2.1 Natural ventilation and air mixing

Natural ventilation refers to fresh air that enters a room through openings such as windows or doors; this can be achieved by opening windows and doors on the opposite sides of the room to increase cross ventilation.

- 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 that 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

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 sit on a desk or other surface, fans that stand on the floor, and fans mounted in a window opening.

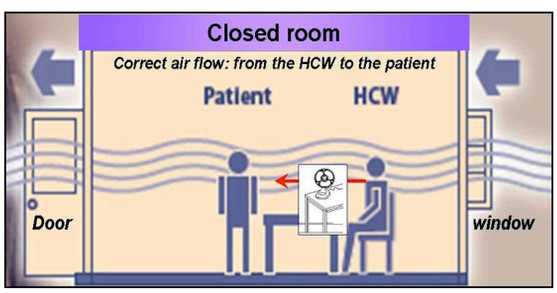


Directional fan mixing fan direction fan directional fan

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.



This model depicts the correct air flow that should be established in any closed waiting room and examination room.

It is important to make sure that the direction of the air flow is *from the HCW to the clients/patients.*

- **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 are open) 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, HEPA or negative pressure rooms is not generally recommended. However in selected health facilities, such as specialized MDR-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 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

3.3.1 Provider initiated testing and counselling (PITC)

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.

3.3.2 TB diagnostic services

To protect HWs, 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 (cough ≥ 2 weeks if the HW is HIV negative; cough ≥ 2 weeks or fever ≥ 2 weeks, or excessive night sweat ≥ 2 weeks or haemoptysis or weight loss ≥ 3 kg if the HW is HIV positive) he/she should undergo the TB diagnostic screening (2 sputum samples and CXR as needed).

3.3.3 Workplace restrictions

Any HW 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. HWs 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 extrapulmonary 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 TB suspects 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, the HWs living with HIV should be counselled as follows regarding workplace restrictions. HWs living with HIV and working at the TB clinic, MDR-TB hospital, or TB ward should be given the option of re-assignment to an area or activity 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 routine clinical assessment and evaluation for starting ART, Cotrimoxazole Preventive Treatment (CPT), and Isoniazid Preventive Treatment (IPT).

3.3.4 Personal respiratory protection

Respirators can protect HWs from inhaling M. tuberculosis only if standard work practice and environmental measures are in place. Respirators are recommended to be used by HWs only in high risk areas, such as MDR TB settings; refer to chapter 4.2 of these guidelines and to the National MDR TB plan - NTLP MOHSW 2009 for additional details.

Surgical masks do not provide protection to HWs, therefore it is not recommended to wear a mask when in contact with PTB.

Key messages

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

4. CONSIDERATIONS FOR TB INFECTION CONTROL IN SPECIAL SETTINGS

4.1 TB infection control measures at Radiology department, Bronchoscopy, Intensive Care Unit, Autopsy suite, Dental clinic, Surgery theatre

Radiology department, Bronchoscopy, Intensive Care Unit, Autopsy suite, Dental clinic, and Surgery theatre should:

1. *Use the room with the best ventilation for taking images of potentially infectious TB patients*
2. *Provide expedited priority service to potentially infectious TB patients to minimize the length of time spent in the department*
3. *Schedule radiographs and bronchoscopy on infectious TB patients and TB suspects for non-busy times, such as the end of the afternoon*
4. *Provide N95 respirators for HWs when a MDR-TB patient accesses the service*

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

4.2 TB Infection control measure at TB wards and MDR TB Hospital

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.

MDR TB Hospital

Multidrug Resistant TB (MDR-TB) is defined as TB disease due to M. tuberculosis that is resistant to, isoniazid and rifampicin. Extensively drug resistant TB (XDR-TB) is defined as TB which is resistant to isoniazid and rifampicin, plus a fluoroquinolone and at least one of the three injectable second-line drugs (e.g. amikacin, kanamycin, or capreomycin).

Any MDR- or XDR-TB suspect should be quickly identified according to the national MDR TB guidelines and the specimen referred for TB drug susceptibility testing (DST) at the reference laboratory. Results should be available within four weeks and immediately communicated to the original health facility. While the MDR- or XDR-TB suspect is waiting for the result he/she should be instructed on cough hygiene.

Any confirmed MDR-TB patient should be referred and treated at the MDR-TB hospital (Kibongoto Hospital, Hai District, Kilimanjaro Region). Isolation in a MDR-TB ward and treatment should be up to culture conversion and during this period any MDR-TB patient should use a mask when leaving the ward.

At the MDR-TB hospitals, nurses are selected as the DOT-Plus Providers and the supervision should be integrated in the standard hospital system. DOT should continue after discharge from the hospital, particularly for MDR-TB patients. Patients should be referred to the DMO/DTLC who should select a DOT-Plus Provider to supervise MDR TB patients. It is not advisable to select a family member as a DOT-Plus Provider as there may be a conflict of interest.

HWs staff working in MDR-TB hospitals should undergo chest X-ray examination and sputum culture on annual basis regardless of symptoms/signs screening result.

Respiratory protection targeted to health workers apply only to MDR TB hospitals. HWs should wear N-95 respirators any time they enter the MDR-TB ward. Respirators have to fit closely to the face to prevent leakage around the edges; the fit testing should be conducted prior use of the respirator and thereafter repeated annually. Respirators are disposable, but can be re-used repeatedly. The main factors responsible for the deterioration of respirators are wetness, punctures, tears or any breach of the respirator and crushing and stretching out of the elastic band. Respirators should be labelled with the wearer's name and hung on a peg in a clean dry location.

The installation of HEPA filters and building of negative pressure rooms is recommended in specialized MDR-TB hospitals.

For additional details, please refer to the *National MDR TB guidelines, NTLP MOHSW 2009*.

Visitors' precautions

Preventive measures directed at visitors are important for high risk patient wards, such as TB wards and MDR-TB wards. Family and household members visiting TB patients should be forbidden to enter TB and MDR TB wards. However, exceptions can be considered for the TB ward only if the TB patient is bedridden and cannot move to the outside area.
Restricting visitors' access to the TB and MDR-TB isolation wards can be achieved by posting a sign that instructs family members and any visitor not to enter the ward, as depicted in the sample wall sign below. HCWs should instruct families and any visitor on the need for

protective restrictions. All visitors to MDR TB ward are required to wear the N95 respirator.

The sign should be placed at the entrance of the TB or MDR TB ward where patients are admitted.

4.3 TB infection control measures in TB laboratory

Sputum specimen collection 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. None should stand in front of a patient producing sputum. After collecting sputum specimen, the lid should be placed on the container and closed firmly. The HW should wash the hands with soap and water. Every laboratory processing sputum specimens should have at least two rooms, one for reception and the other one for performing the test. The smear preparation should be performed in a well ventilated room with sunlight. Fresh bleach (5% sodium hypochlorite) diluted 1:10 in water should be used for cleaning sputum and for decontamination of equipment (e.g. microscope, glasses for mixing reagents). Laboratory safety precautions for specimen handling and transportation including wearing gloves and laboratory coats should be followed. The use of masks is not recommended. The room should have a container with plastic bags, made of polyethylene if available, for the proper disposal of waste, and there should be good water drainage during the staining of smears. Used sputum cups, applicator sticks and slides should be disposed (e.g. place in a discard bag, then burn or bury or autoclave). In case of accidental spillage of a specimen on the floor or bench, fresh bleach (5% sodium hypochlorite) should be poured on the specimen; the area should be covered with paper or cotton wool, and left for 30 minutes before cleaning the area. During sputum specimen preparation the wire loop should be disinfected and burned before re-use, otherwise if instead a wooden applicator is used it has to be disinfected before being discarded.

At peripheral laboratories (regional/district hospitals and health centres), the use of a safety cabinet is not recommended to perform direct sputum examination. At zonal laboratories (e.g. KCMC in Moshi and Bugando in Mwanza) and at the reference laboratory (e.g. Muhimbili National Hospital), smear, culture and Drug Susceptibility Testing (DST) should be performed in a safety cabinet class II with a double/single filter. Culture media, sputum containers and glass slides should be autoclaved or burned in the incinerator prior to disposal.

Key messages

- **Safety cabinet to perform TB smear is recommended only at zonal and reference laboratory**
- **Any medical instruments should be sterilized with fresh bleach (5% sodium hypochlorite) or glutaraldehydes 2% when used for TB suspects/cases**
- **N95 respirators are recommended only for HWs at MDR TB hospital**

5. DISINFECTANTS AND WASTE MANAGEMENT

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

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

Instructions for 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 admitted TB and MDR-TB patient should receive a sputum cup with a lid into which he/she can discard any expectorate; the HWs 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. Instead, the cups' contents of a MDR TB patient should be discarded in the incinerator on a daily basis.

5.1 Laboratory waste management

Laboratory waste including cultures and stocks, sputum collection containers and devices used to transfer, inoculate and mix cultures of infectious agents such as M. tuberculosis should be:

- Properly handled by autoclaving at a temperature of 121oC at 1 bar for at least 30 minutes; 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, packed in a specific bag that should be sealed and directly discarded with the hazardous health care waste
- Highly infectious waste from TB isolation wards shall always be incinerated on-site

HIV infection control measures are described in the National HIV guidelines and HIV Workplace intervention guidelines, NACP MOHSW 2008.

6. 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 course are described in the TB infection control training curricula, NACP/NTLP MOHSW 2009. A standardized two day training module on TB infection control targeted to HWs has been developed by NACP/NTLP MOHSW. Training courses should be conducted by a facilitator who has attended the training of trainers' courses. The standardized training curricula should be used and the teaching methodology recommended by NACP/NTLP MOHSW should be adopted.

7. MONITORING AND EVALUATION

The following two indicators should be collected and reported

Indicator 1:

Proportion of health care facilities and/ or congregate settings providing services for PLHIV 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 settings where PLHIV are concentrated, such as primary health care clinics, hospitals, prisons

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. windows and doors open0?
- Are TB suspect 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 consistence with national TB infection guidelines.
A positive answer to the question on asking for a written TB infection control plan requires a hard copy of the plan to be available

Periodicity

The indicators should be collected and reported quarterly by the Regional Aid Control Coordinator in collaboration with Regional TB and Leprosy Control Coordinator using the

standard TB quarterly report updated with the TB infection control component. The report should be submitted to the NACP and copied to NTLP, according to the standard reporting procedures.

Indicator 2:

Proportion of health care workers, employed in facilities providing care for people living with HIV, who developed TB during the reporting period

Definition

Number of health care workers employed in the facility providing care for PLHIV, who develop TB in one year, expressed as a proportion of the total number of health care workers employed in the facilities providing care for PLHIV during that the same year.

- Numerator: Number of health of health care workers employed in the facility who developed TB in one year.
- Denominator: Total number of health care employed in the facility during that the same year.

Purpose:

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

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

Construction and renovation projects should comply with the Standard Guidelines & Drawings for Health Care facilities in Tanzania, MOHSW 2008.

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 national health facilities:

- Plan the 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

Regional and district hospital level

- Wards
  - In multi-bed rooms, the minimum distance between bed centre lines should be 2400 mm
  - The minimum spacing between beds should be 1200 mm
  - In multi-bed rooms, a clearance of 1200 mm should be available at the foot of each bed
  - Bed spaces should be arranged to ensure clearance of at least 600 mm 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
  - The ward should have windows that can be opened from the inside
- Out-patient
  - consultation room of RCH, CTC, VCT, PMTCT, TB clinic should be 3.6x4.8 metres
  - 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 1200 mm

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 TB patients who meet the criteria for admission, as recommended by the National Policy Guidelines for Collaborative TB/HIV activities, MOHSW 2008.

The Centre for Disease Control (CDC) Tanzania country office in collaboration with NACP/ NTLP MOHSW Tanzania developed a standard for building TB/HIV care facilities..

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 and prisons

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. beds ……average 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. beds ……occupancy 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?							Yes		No		**Remarks:**			
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**
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?														

1.5 Are posters on cough hygiene displayed?														
1.6 Are in-patients diagnosed with active TB placed in a separated area of the ward, provided with tissue/ handkerchief and instructed on cough hygiene?	Not Applicable		Not Applicable		Not Applicable		Not Applicable						Not Applicable	
1.7 Is the length of time that TB in-patients spend outside the ward for diagnostic procedures and other activities minimized?	Not Applicable		Not Applicable		Not Applicable		Not Applicable						Not Applicable	
1.9 Are patients' education sessions on TB infection control conducted?													Not Applicable	
2. ENVIROMENTAL 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**
2.1What is the policy for open windows?	☐ 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 _____	
2.2 Who is responsible for opening windows?	Not Applicable		Not Applicable		Not Applicable		Not Applicable							
2.3 Do you have any specific procedures in place to discard sputum samples?														

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**	**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. FRAMEWORK 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 (eg. 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. 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 ……..
Name of the health facility ……..
Interviewee name ……..

District ……
Date form completed (dd/mm/yyyy): __ / __ / ____
Job position ……

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. beds ……average 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. beds ……occupancy 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? *If no, move to section 2*	☐ yes ☐ no	
1.2 Do you have a committee in your HF responsible for TB infection control?	☐ yes ☐ no	
1.2.1 If yes, who are the members? *Describe*		
1.2.2 What are the tasks of the committee? Describe		
1.2.3 How often do they meet?	☐ monthly ☐ quarterly ☐ annually ☐ 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?	☐ monthly ☐ quarterly ☐ annually ☐ 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 wards/rooms ☐ other, specify	

5. ADMINISTRATIVE 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
a. Patients														
5.1 What is the estimated waiting time from registration until the patients is seen by a physician?	☐ <15 mt ☐ 15-30 mt ☐ > 30 mt		☐ <15 mt ☐ 15-30 mt ☐ > 30 mt		☐ <15 mt ☐ 15-30 mt ☐ > 30 mt		☐ <15 mt ☐ 15-30 mt ☐ > 30 mt		Not Applicable		Not Applicable		☐ <15 mt ☐ 15-30 mt ☐ > 30 mt	
5.2 Is a TB questionnaire to identify TB suspects available and in use?													Not Applicable	
5.2.1 List the questions included in the TB questionnaire or asked by the HCW to the patient													Not Applicable	
5.2.2 When is the TB questionnaire used or when are the questions asked?	☐ at registration desk ☐ in the examination room ☐ other _____		☐ at registration desk ☐ in the examination room ☐ other _____		☐ at registration desk ☐ in the examination room ☐ other _____		☐ at registration desk ☐ in the examination room ☐ other _____		☐ at registration desk ☐ in the examination room ☐ other _____		☐ at registration desk ☐ in the examination room ☐ other _____		Not Applicable	

5.3 Are the TB suspects immediately referred for sputum test before entering the examination room/ward?													Not Applicable
5.4 Are TB suspects/PTB cases advised to avoid close contact with other clients/ patients, provided with tissue/ handkerchief and instructed on cough hygiene?													Not Applicable
5.5 Are posters on cough hygiene displayed?													

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
a. Patients														
5.6 Specify the TB diagnostic test in use	☐ AFB ☐ CXR ☐ other, specify _____		☐ AFB ☐ CXR ☐ other, specify _____		☐ AFB ☐ CXR ☐ other, specify _____		☐ AFB ☐ CXR ☐ other, specify _____		☐ AFB ☐ CXR ☐ other, specify _____		☐ AFB ☐ CXR ☐ other, specify _____		☐ AFB ☐ CXR ☐ other, specify _____	
5.7 Where does TB diagnosis occur?	☐ on site ☐ off site		☐ on site ☐ off site		☐ on site ☐ off site		☐ on site ☐ off site		☐ on site ☐ off site		☐ on site ☐ off site		☐ on site ☐ off site	
5.8 How many specimens are obtained for TB diagnosis?	☐ 1 ☐ 2 ☐ 3 ☐ >3		☐ 1 ☐ 2 ☐ 3 ☐ >3		☐ 1 ☐ 2 ☐ 3 ☐ >3		☐ 1 ☐ 2 ☐ 3 ☐ >3		☐ 1 ☐ 2 ☐ 3 ☐ >3		☐ 1 ☐ 2 ☐ 3 ☐ >3		☐ 1 ☐ 2 ☐ 3 ☐ >3	
5.9 Where is the sputum collected?	☐ inside the unit ☐ outside in open air		☐ inside the unit ☐ outside in open air		☐ inside the unit ☐ outside in open air		☐ inside the unit ☐ outside in open air		☐ inside the unit ☐ outside in open air		☐ inside the unit ☐ outside in open air		☐ inside the unit ☐ outside in open air	

5.10 Is sputum production observed by HCWs?							
5.11 How long from sputum collection until the patient receives the AFB result?	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours
5.12 Is the in-patient placed in a separated area when diagnosed with active TB?	Not Applicable	Not Applicable	Not Applicable	Not Applicable			Not Applicable
5.13 Specify the average time from diagnosis to initiating treatment	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ >72 hours	Not Applicable
5.14 Is the length of time that PTB in-patients spend outside the ward minimized?	Not Applicable	Not Applicable	Not Applicable	Not Applicable			Not Applicable
5.15.1 Estimate the average time PTB patients spent outside the ward per day	Not Applicable	Not Applicable	Not Applicable	Not Applicable	☐ <30 mt ☐ 30 mt-1 hr ☐ > 1 hr	☐ <30 mt ☐ 30 mt-1 hr ☐ > 1 hr	Not Applicable
5.15.2 Are tissue/handkerchief provided for PTB in-patients when they leave the ward for diagnostic procedures or other activities?	Not Applicable	Not Applicable	Not Applicable	Not Applicable			Not Applicable
5.16 Do you offer IPT to PLHIV?							
5.17 Do you conduct patients' education on TB infection control?							

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*														
6.2 What is the policy for open windows?	☐ 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 _____	
6.2.1 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							
6.4 Are there any cleaning, sterilization and disinfection proceduresinplaceforpotentially contaminated equipment (e.g. bronchoscopes, endoscopes)?	Not Applicable		Not Applicable		Not Applicable		Not Applicable							
6.5.1 Are there standard procedures for disinfecting contaminated rooms?														

6.5.2 If yes, describe																
6.6 Are there negative pressure rooms? HEPA? If yes, use the specific checklist to assess these rooms																
6.7 Is there centralized ventilation?																
6.7.1 If yes, specify the type and in which unit:																
☐ enclosed room with re-circulating air conditioner	☐ OPD ☐ TB ☐ CTC ☐ RCH ☐ ward adult ☐ ward ped ☐ Lab															
☐ re-circulating HVAC	☐ OPD ☐ TB ☐ CTC ☐ RCH ☐ ward adult ☐ ward ped ☐ Lab															
☐ extraction system	☐ OPD ☐ TB ☐ CTC ☐ RCH ☐ ward adult ☐ ward ped ☐ Lab															
☐ single pass heating, ventilation and air conditioning (HVAC)	☐ OPD ☐ TB ☐ CTC ☐ RCH ☐ ward adult ☐ ward ped ☐ Lab															
☐ air conditioning system	☐ OPD ☐ TB ☐ CTC ☐ RCH ☐ ward adult ☐ ward ped ☐ Lab															
☐ re-circulating room air cleaners	☐ OPD ☐ TB ☐ CTC ☐ RCH ☐ ward adult ☐ ward ped ☐ Lab															
☐ other, specify	☐ OPD ☐ TB ☐ CTC ☐ RCH ☐ ward adult ☐ ward ped ☐ Lab															

Remarks

---

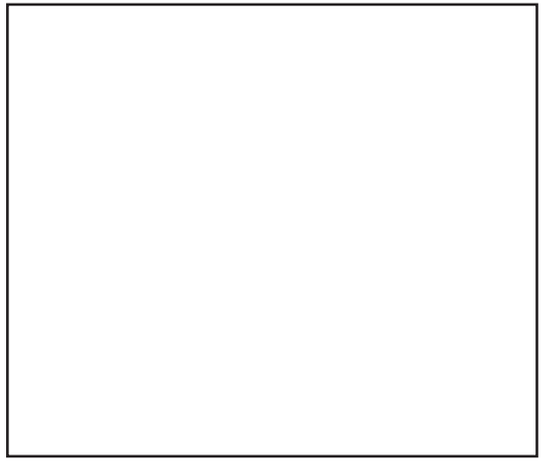
7. AIR BARRIER SYSTEM

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?														

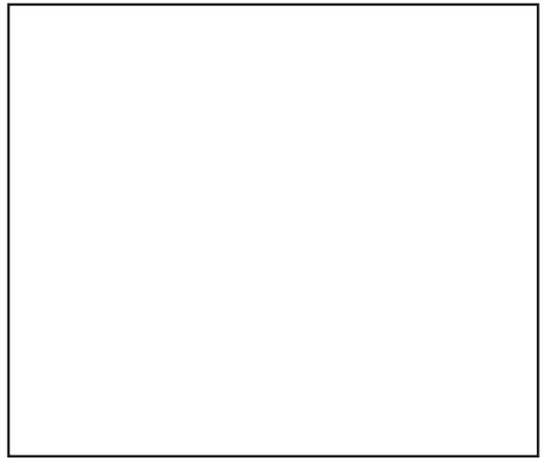
Remarks

Sketch placement windows, doors and fans of each assessed unit

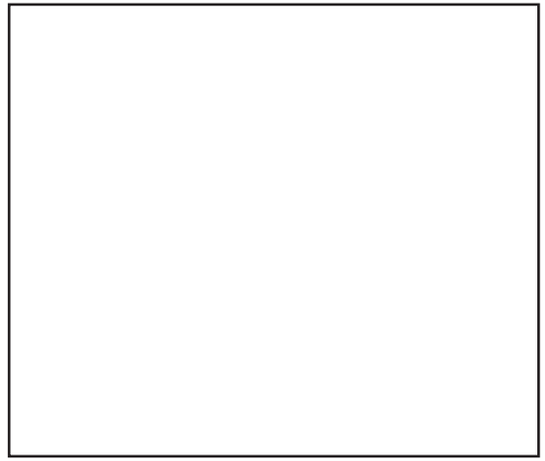
OPD room



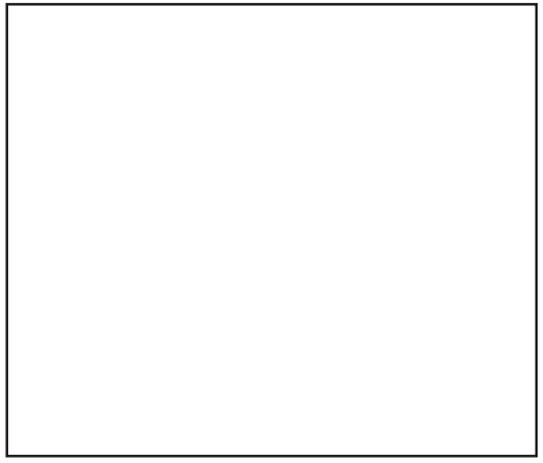
TB clinic



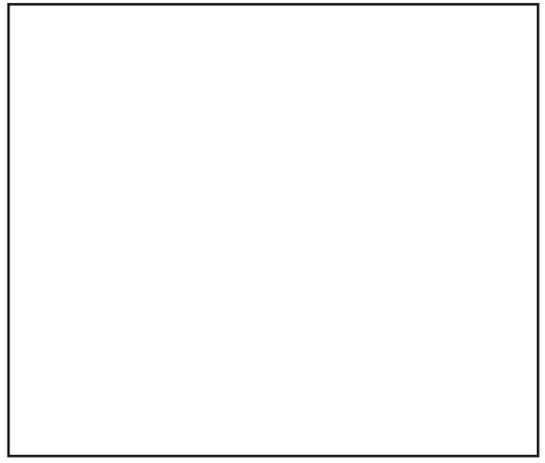
CTC



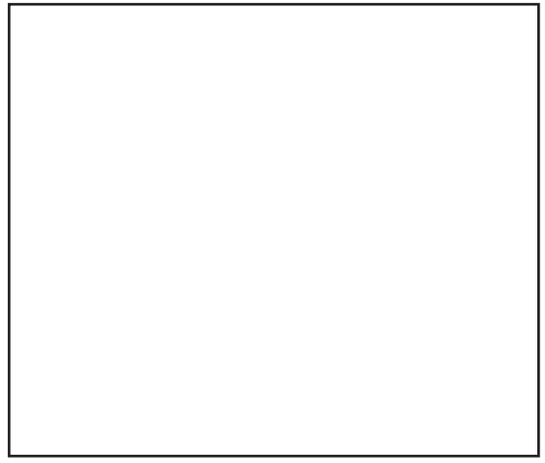
Ward adult



Ward ped



RCH



Lab

Recommendations:

Supervisor signature ……..

Health facility responsible signature …….. job position ……

ANNEX 4. HEALTH FACILITY TB INFECTION CONTROL PLAN

HEALTH FACILITY TB INFECTION CONTROL PLAN							
S/no	**Level of Hierarchy in TB Control Infection measures**	**Activity/Task**	**Time framme**				**Responsible Person**
			Q1 (July -Sept. 2010)	Q2 (Oct. -Dec. 2010)	Q3 (Jan-March 2011)	Q -4 (April - Jne. 2011)	
1	Administrative control measures	1.1.Establish/Integrate TB IC issues into the existing general Infection control committee					*MO I/C, TB Infection Control Focal Person MoI/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*
		1.2 Identify TB IC focal person for the Health facility					*MO I/C*
		1.3.Identfy in charge of TB IC in each unit: CTC, TB Clinic, VCT, PMTCT, RCH, OPD, Wards and Laboratory					*MO I/C, Hospital Management Team*
		1.4. Conduct TB IC needs assessment to identify requirements for facility to implement TB Infection control					*MO I/C and Infection Control committee*

		1.5. Prompt recognition of patients with suspected/confirmed TB in clinics and wards and separation of infectious TB patients.					*MO I/C, Incharge of TB infection control in the unit; CTC, TB, TB, Ward, General wards, OPD, RCH, VCT, PMTCT and Laboratory.* *Responsibility; to oversee daily implementation of TB IC in the unity;* *HCWs- responsibilities: Screen PLHIV for TB symptoms, Prioritize TB patients to see a clinician, Give coughing patients tissues, cloths, Evaluate and treat pts as soon as possible, collect sputum in a well ventilated place* *Laboratory Staff: Implement TB Infection Control procedures, Ensure that results are returned to clinicains quiclky.*
		1.6 Conduct training to staff on TB IC measures					*MO I/C and TB Infection Control Focal Person*
		1.8 Provide Health education to patients at CTC, PMTCT, VCT, TB clinic, wards and OPD					*Incharge of TB infection control in the unit; CTC, TB, TB, Ward, General wards, OPD, RCH, VCT, PMTCT Laboratory.*
		1.9 Strengthen referral/ linkages and feedback mechanisms between CTC, PMTCT, TB clinic and laboratory					*Incharge of TB infection control in the unit; CTC, TB, TB, Ward, General wards, OPD, RCH, VCT, PMTCT Laboratory.*
2	Environmental Control measures	2.1 Ensure natural ventilation					
		2.1.1 Open windows					*Staff on duty*
		2.1.2 Ensure flow of air from health care worker to the patient to the outside of the room.					*TB IC Focal Person, Incharges of the unit and All Staff*
		2.1.3 Ensure open waiting area/well the ventilated waiting area.					*MO I/C , TB IC focal person & Incharges of the unit*
		2.2 Ensure use of mechanical ventilation.					

		2.2.1 Ensure availability and functioning of fan					*MO I/C*
3	Personal Respiratory Protection						
		3.1 Ensure use respirator (N 95) in MDR TB hospital and masks to patients if necessary					*Staff working in MDR - TB.*
		3.2 Ensure prompty diagnosis of TB among HCWs					*All staff*
4	Monitoring and Evaluation	4.1 Conduct supervision and follow up implementation of TB IC plan					*TB IC Focal Person and Infection control committee*
		4.2 Conduct quarterly meetings to appraise implementation of TB IC plan in health facility					*TB IC Focal Person and Infection control committee*
		4.3 Keep and Provide report on TB IC indicators: Indicator #1 - Presence of TB infection control plan and its implementation Indicator #2: Number of health care workers develop TB					*TB IC focal person, Data clerks*

ANNEX 5. POSTER ON COUGH HYGIENE (targeted to the patients/general population)

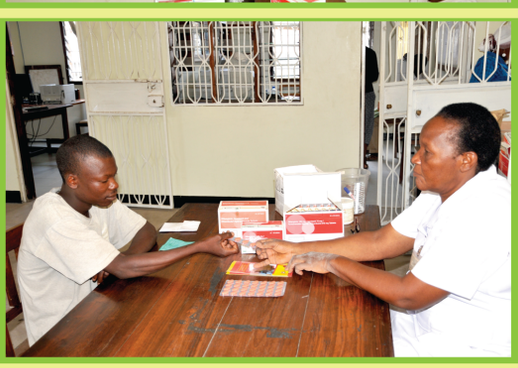
TUNAWEZAJE KUZUIA KUENEA KWA KIFUA KIKUU?

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**

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 MAKOHOZI 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

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 mfuniko

Weka karatasi Iliyotumika kwenye pipa au shimo la taka

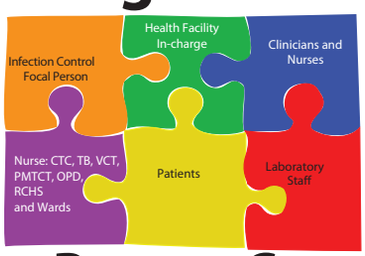
Mwaga makohozi kwenye choo na usafisha kopo na kufua kitambaa, nawa mikono kwa maji safi na sabuni

- 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 7. POSTER ON TB INFECTION CONTROL (targeted to the HWs at any health facility)

TB Infection Control in HIV Clinics and Out-Patient Settings: a Team Approach*



Every Person Counts

Health Facilitator In-Charge

- Endorse and fund a written TB infection control plan
- Appoint an Infection Control Focal Person
- Ensure supplies and equipment are available and maintained
- Arrange facility space to reduce TB transmission

Infection Control Focal Person

- Develop a TB infection control plan
- Ensure exam and waiting rooms are well-ventilated
- Conduct on-site staff training
- Keep a record of health care workers who develop TB
- Monitor infection control practices daily

Nurse: CTC, TB, VCT, PMTCT, OPD, RCHS and Wards

- Provide health education to patients on cough hygine
- Give coughing patients tissues, cloths, or surgical masks
- Prioritize TB suspects to see a clinician quickly

Clinicians and Nurses: CTC, VCT , PMTCT and TB

- Screen patients for TB symptoms
- Evaluate and treat patients as soon as possible
- Wear respirators (N-95/FFP2) when caring for patients with suspected or proven TB (MDR-TB or XDR-TB **)
- Collect sputum in a well-ventilated area

Patients

- Cover mouth and nose when coughing
- Put used tissue in the wastebasket
- Wear a face mask if asked by clinic staff
- Take TB medications as prescribed

Laboratory Staff

- Implement laboratory infection control procedures
- Ensure that results are returned to clinicians quickly

Entire Team

- Seek care promptly if you think you may be infected
- Discuss ways to improve TB infection control procedures in your clinic
- Think TB infection control!

* Based on the 2009 WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings, and Households.
** Multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB)

THIS POSTER HAS BEEN ADAPTED AND REVISED TO FIT TANZANIAN CONTEXT

CS208166-B

ANNEX 8. NATIONAL TB SCREENING QUESTIONNAIRE

This standardized national TB screening questionnaire helps identifying patients who meet the definition of "TB suspect" so that appropriate precautions can be taken (e.g. respiratory hygiene, patient's education and separation in waiting areas) and he/she can be referred for direct sputum test.

MINISTRY OF HEALTH AND SOCIAL WELFARE **COLLABORATIVE TB/ HIV ACTIVITIES**

TB SCREENING QUESTIONNAIRE FOR ABOVE 6 YEARS AND ADULT HIV/AIDS PATIENTS

Patient's name: …… **CTC Reg. Number:** …… **Date of birth:** …/……/…. **Sex:** □ Male □Female

Physical Address: …… **Area leader/ neighbor:** …… **Contact telephone (if available)**……

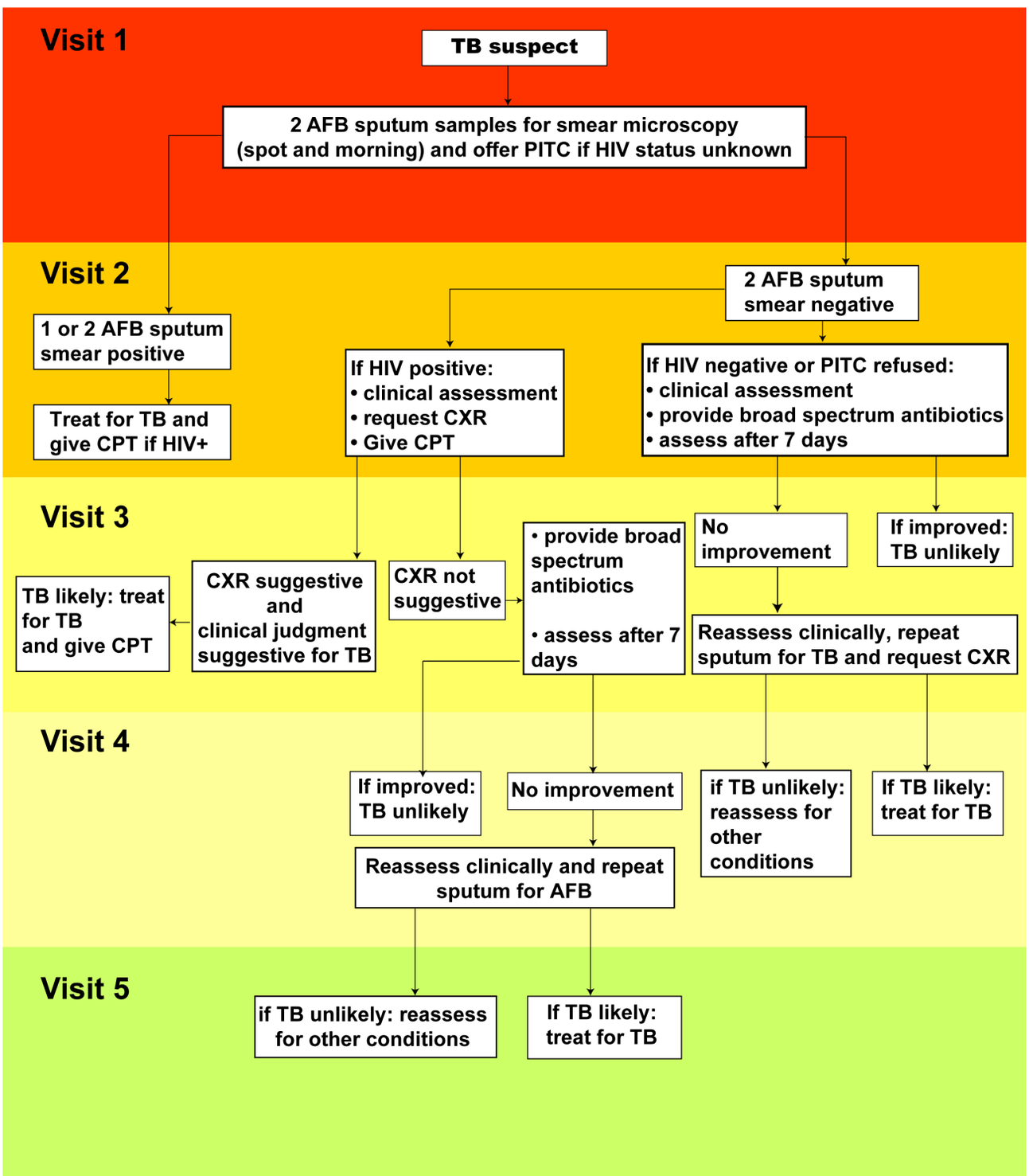
Date																								
Tick appropriate response	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**
Cough for **≥ 2** weeks?																								
Coughing up bloodstained sputum (haemoptysis)?																								
Fevers for **≥ 2** weeks?																								
Noticeable weight loss for new patients or a 3 kgs weight loss in a month (subsequent visit)?																								
Excessive sweating at night for **≥ 2** weeks?																								

If 'YES' to <u>one or more</u> questions enter the code "*TB Susp*" in the TB status column of the CTC2 form and complete the respective column in the table below:

Date												
Do sputum smear for AFB and enter results (*pos* / *neg*)												
If sputum negative, do chest X-ray and enter result (*suggestive* or *not suggestive*)												
Outcome of assessment (*TB* or *No TB*)												

If 'No' <u>to all</u> questions: Do not initiate TB investigations and repeat screening at the subsequent visit. Enter the code "NO" in the TB status column of the CTC2 form

FLOWCHART ON THE DIAGNOSIS OF PULMONARY TB IN CHILDREN ABOVE 6 YEARS AND ADULT



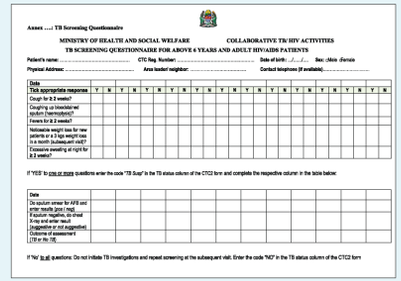
ANNEX 9. PATIENT MANAGEMENT TO PREVENT TRANSMISSION OF TB IN HEALTH CARE FACILITY

Five steps for patient management to prevent transmission Of TB in Care and treatment Clinics		
Step	**Action**	**Description**
1	**Screen**	– 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**	– 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**	– 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

ANNEX 10: POSTER ON TB/HIV CO-MANAGEMENT (targeted to HCWs at CTC)

MATIBABU YA TB NA UKIMWI KWA WANAOISHI NA VIRUSI VYA UKIMWAI (VVU)

A. Uliza maswali yote matano kwa kila mwenye VVU



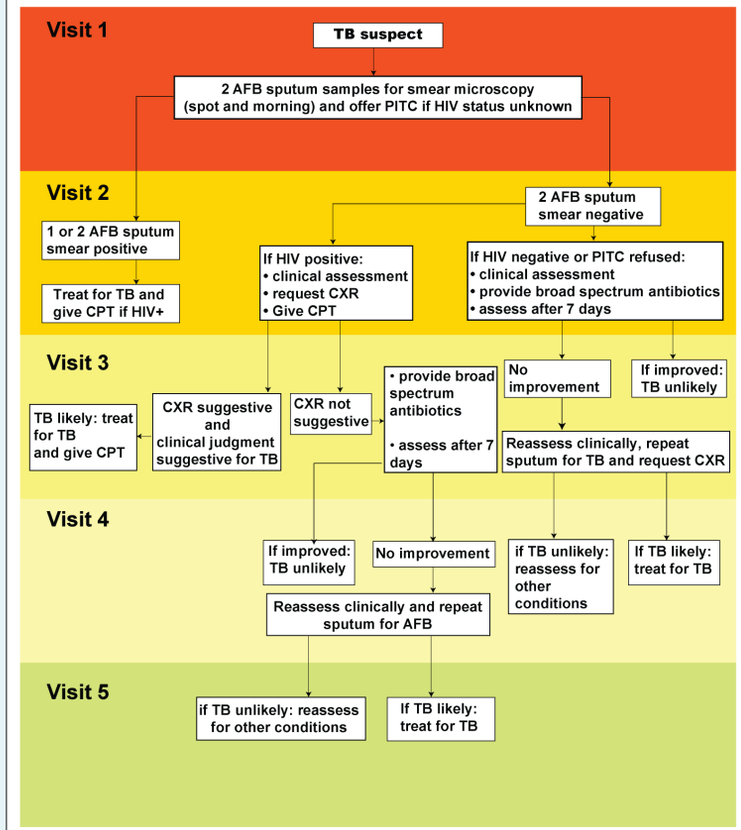
B. Tumia fomu ya maabara ya uchunguzi wa TB kwa ajili ya upimaji wa makohozi kwa wanaohisiwa kuwa na TB

D. Toa dawa ya magonjwa nyemelezi (cotrimoxazole) kwa wote wenye kuishi na maambukizi ya TB na UKIMWI

E. Fuata chati kushauri kuanza ART

CD4 > 350	Treat TB and defer ART: • if PTB/stage 3, re-check CD4 at completion of TB treatment and start ART if CD4 <200; • if EPTB/stage 4: start ART at completion of TB treatment
CD4 350 - 200	Treat TB and start ART after 2 months
CD4 < 200	Treat TB and start ART after 2 weeks
Already on ART at TB diagnosis	Treat TB and replace NVP with EFZ

C. Fuata mwongozo wa taifa wa kubainisha Walengwa wote wenye ugonjwa wa TB



GLOSSARY

Administrative controls: managerial measures that have to be undertaken to significantly reduce the risk of exposure of patients and HWs to infectious droplet nuclei generated by individuals who have or are likely to have TB disease (e.g., early TB diagnosis, prompt isolation or separation of infectious TB patients, prompt initiation of appropriate anti-tuberculosis treatment). It includes also risk assessment of the setting, developing and instituting a written TB infection control plan and screening and evaluating HCWs who are at risk for TB disease or who might be exposed to M. Tuberculosis.

Air changes: ratio of the volume of air flowing through a space in a certain period of time (airflow rate) to the volume of that space (room volume). This ratio is usually expressed as the number of room air changes per hour (ACH).

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. A laboratory test to detect the presence of mycobacteria in a specimen (usually sputum) involves microscopic examination of smears stained using an acid-fast staining method.

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

Bioaerosols: an airborne dispersion of particles containing whole or parts of biological entities, such as bacteria, viruses, dust mites, fungal hyphae or fungal spores. Such aerosols usually consist of a mixture of mono-dispersed and aggregate cells, spores or viruses, carried by other materials, such as respiratory secretions and/or inert particles. Infectious bioaerosols (i.e., those that contain biological agents capable of causing an infectious disease) can be generated from human sources (e.g., expulsion from the respiratory tract during coughing, sneezing, talking or singing. Bioaerosols include large respiratory droplets and small droplet nuclei.

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. The air is either exhausted outside or filtered and re-circulated into the room. Biological Safety Cabinets Class II (BSC II): cabinet that uses a laminar air flow in addition to exhaust to protect both the employee, and the specimen /culture from contamination.

Bronchoscopy: procedure for examining the respiratory tract that requires inserting an instrument (bronchoscope), either flexible or rigid, through the mouth or nose into respiratory tree. Bronchoscopy can be used to obtain diagnostic specimens and creates a risk of transmission for exposed HCWs when performed on a patient with pulmonary or laryngeal TB.

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, not minutes or hours) 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. It includes identification of people (contacts) exposed to the case, testing and evaluation of contacts to identify TB disease, and treatment of those with TB disease.

Cough Hygiene: A combination of measures designed to minimize the transmission of respiratory pathogens via droplet or airborne routes in healthcare settings. The components of Respiratory Hygiene/Cough Etiquette are 1) covering the mouth and nose during coughing and sneezing, 2) using tissues to contain respiratory secretions with prompt disposal into a no touch receptacle, and 3) turning the head away from others and maintaining spatial separation, ideally >3 feet, when coughing. These measures are targeted to all patients with symptoms of respiratory infection and their accompanying family members or friends beginning at the point of initial encounter with a healthcare setting (e.g., reception/triage in emergency departments, ambulatory clinics, healthcare provider offices).

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. DOT is the standard of care for all patients with TB disease and should be used for all doses during the course of treatment for TB disease.

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.

Environmental control measures: physical or mechanical measures that can be used in high-risk areas to reduce the concentration of droplet nuclei in the air (e.g., maximizing natural ventilation or controlling the direction and rate of airflow). Examples include

ventilation, filtration, and ultraviolet lamps in the airborne infection isolation rooms and local exhaust ventilation devices.

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 handrub (waterless antiseptic product, most often alcohol-based, rubbed on all surfaces of hands); or 4) surgical hand antisepsis (antiseptic handwash or antiseptic handrub 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.

HIV infection: Infection with the human immunodeficiency virus (HIV), the virus that causes AIDS (acquired immunodeficiency syndrome).
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). Home health-care services include care provided by home health aides and skilled nurses, respiratory therapists, dieticians, physicians, chaplains, and volunteers; provision of durable medical equipment; home infusion therapy; and physical,

speech, and occupational therapy.

Infectious Droplet nuclei: microscopic particles with an estimated diameter of 1-5 microns produced when a person coughs, sneezes, shouts or sings. Such particles may remain suspended in the air for hours.

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).

Multidrug-resistant tuberculosis (MDR-TB): TB caused by strains of M. tuberculosis, which are resistant to both isoniazid and rifampicin with or without resistance to other drugs.

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 disposable respirator: air-purifying, filtering facepiece that removes at least 95% of 0.3 micron particles present in inhaled air.

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 µm in size. These include infectious droplet nuclei from patients with M. tuberculosis. The N95 disposable particulate, air purifying, respirator is the type used most commonly by healthcare personnel. Other

respirators used include N-99 and N-100 particulate respirators, powered air-purifying respirators (PAPRS) with high efficiency filters; and non-powered full-face piece elastomeric negative pressure respirators.

Standard Precautions: A group of infection prevention practices that apply to all patients, regardless of suspected or confirmed diagnosis or presumed infection status. Standard Precautions are based on the principle that all blood, body fluids, secretions, excretions except sweat, non intact skin, and mucous membranes may contain transmissible infectious agents. Standard Precautions includes hand hygiene, and depending on the anticipated exposure, use of gloves, gown, mask, eye protection, or face shield. Also, equipment or items in the patient environment likely to have been contaminated with infectious fluids must be handled in a manner to prevent transmission of infectious agents, (e.g. wear gloves for handling, contain heavily soiled equipment, properly clean and disinfect or sterilize reusable equipment before use on another patient).

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.
Surgical masks also are used to protect healthcare personnel from contact with large infectious droplets (>5 µm in size). Surgical masks are evaluated using standardized testing procedures for fluid resistance, bacterial filtration efficiency, differential pressure (air exchange), and flammability in order to mitigate the risks to health associated with the use of surgical masks. These specifications apply to any masks that are labeled surgical, laser, isolation, or dental or medical procedure. Surgical masks do not protect against inhalation of small particles or droplet nuclei and should not be confused with particulate respirators that are recommended for protection against selected airborne infectious agents, (e.g., Mycobacterium tuberculosis).

TB control measures: Steps taken to reduce the risk of TB transmission. TB control measures are divided into a hierarchy: (1) administrative (work practice) controls, (2) environmental controls, and (3) respiratory protection controls.

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.

XDR TB: Extensively Drug-resistant TB. TB that is resistant to isonizazid, rifampicin, a fluoroquinilone and at least one of three injectable drugs (i.e., amikacin, kanamycin, or capreomycin).

1. Anderson C, Abubakar I, Maguire H, Sonnenberg P. Survey of tuberculosis incidents in hospital healthcare workers, England and Wales, 2005. J Public Health (Oxford) 2007; 29: 292–297.
2. Centers for Disease Control and Prevention. Tuberculosis transmission in a renal dialysis center—Nevada, 2003. MMWR Morb Mortal Wkly Rep 2004; 53: 873–875.
3. Driver C R, Stricof R L, Granville K, et al. Tuberculosis in health care workers during declining tuberculosis incidence in New York State. Am J Infect Control 2005; 33: 519–526.
4. Jensen P A, Lambert L A, Iademarco M F, Ridzon R, Centers for Disease Control and Prevention. Guidelines for preventing the transmission of Mycobacterium tuberculosis in health-care settings, 2005. MMWR Recomm Rep 2005; 54: 1–141
5. Sotgiu G, Arbore A S, Cojocariu V, et al. High risk of tuberculosis in health care workers in Romania. Int J Tuberc Lung Dis 2008; 12: 606–611.
6. NTLP Annual TB Report. Dar es Salaam Tanzania, 2007.
7. Van den Hombergh J, Lambregts-van Weeezenbeek K. TB and HIV/AIDS integration in Ethiopia, Kenya, Tanzania and Eritrea. Africa Region, World Bank, 2008.
8. Tanzania Health Management Information System, MoHSW, Dar es Salaam Tanzania, 2008
9. Manual of the National Tuberculosis and Leprosy Programme, Dar es Salaam Tanzania, 2006
10. National Policy Guidelines for Collaborative TB/HIV activities 95th edition), Dar es Salaam, Tanzania, 2008
11. National Guidelines for Clinical Management of HIV/AIDS Dar es Salaam, Tanzania, 2008
12. National Infection Prevention and Control Guidelines for Healthcare Services – MoHSW, Dar es Salaam, Tanzania. 2007
13. National Guidelines for HIV Workplace guidelines - MOHSW, Dar es salaam, Tanzania. 2008
14. the "MDR TB Plan – MOHSW 2009",
15. Standard Guidelines and Drawings for health Care Facilities, MOHSW Dar es Salaam, Tanzania, 2008.
16. The 3 I's for TB control in People with HIV, NAM 2008.
    Francis J. Curry. The "Tuberculosis Infection Control: a Practical Manual for Preventing TB, National Tuberculosis Centre 2007
17. Guidelines for the prevention of tuberculosis in resource-limited settings, WHO 2004.
18. Tuberculosis Infection Control in the Era of expanding HIV Care and Treatment-Addendum, WHO, 2006.
19. Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in

Health-Care Settings, CDC, 2005.
20. Guidelines for Environmental Infection Control in Health-Care Facilities Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC), CDC 2005.
21. Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, CDC 2007.