USING CONTACT INVESTIGATION TO FIND THE MISSING PEOPLE WITH TB

6

STOP TB FIELD GUIDE

Stop TB Partnership

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USING CONTACT INVESTIGATION TO IMPROVE TB CASE DETECTION

Stop TB Partnership

StopTB Field guide 6: Using Contact Investigation to Improve TB Case Detection

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6

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CONTENTS

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PURPOSE OF THIS DOCUMENT

This document is one in a series of 11 field guides produced by Stop TB Partnership in collaboration with the Global Fund to Fight AIDS, Tuberculosis and Malaria, Interactive Research and Development Global (IRD), KIT Royal Tropical Institute, and multiple global experts and implementation partners. The field guides rely on practical experiences and expertise of implementers and are meant to help national TB programmes and other TB programme managers to identify the best strategies for finding people with TB who are missed by routine health services.

This document is not to be treated as guidance, but rather as a collection of considerations, tools, experiences and examples that highlight successes and challenges in implementing effective TB case-finding interventions and may assist in their planning.

While there is much guidance, training and detailed implementation instructions on rolling out contact investigation programming, this field guide adds rationale, summarizes recent practice, and discusses ways to effectively organize and design contact investigation activities.

This field guide went through extensive peer review by the agencies and individuals acknowledged below. It presents a range of examples from peer-reviewed literature and implementation practice. Where not cited, examples are provided by TB REACH.

Acknowledgements

The production of these field guides represents a significant effort, bringing together more than 60 experts from over 30 different institutions globally in the spirit of partnership to help address a major barrier in the TB response: the fact that millions of people with TB are still missed by the current routine health systems.

The development of the guides was generously supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria as part of the Strategic Initiative on TB: Address specific barriers to finding missing tuberculosis cases, develop innovative approaches to accelerate case finding, and scale up tools and approaches. The Strategic Initiative is implemented by the Stop TB Partnership together with International Research and Development Global, Pakistan, and KIT Royal Tropical Institute, Netherlands

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Many of the contributors attended a consultation in Amsterdam, Netherlands, in June 2018, to review and refine the draft of this guide. We thank the team at KIT Royal Tropical Institute for their support in organizing the consultation and review meeting and all participants for their time, ideas, and insights.

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- Ashvini Vyas, Asha Kalp, India
- Eliud Wandwalo, The Global Fund to Fight AIDS, Tuberculosis and Malaria, Switzerland
- William Wells, USAID, USA
- Mohammed Yassin, The Global Fund to Fight AIDS, Tuberculosis and Malaria, Switzerland
- Ingrid Zuleta, KIT Royal Tropical Institute

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Design was done by Miguel Bernal in coordination with Nina Saouter.

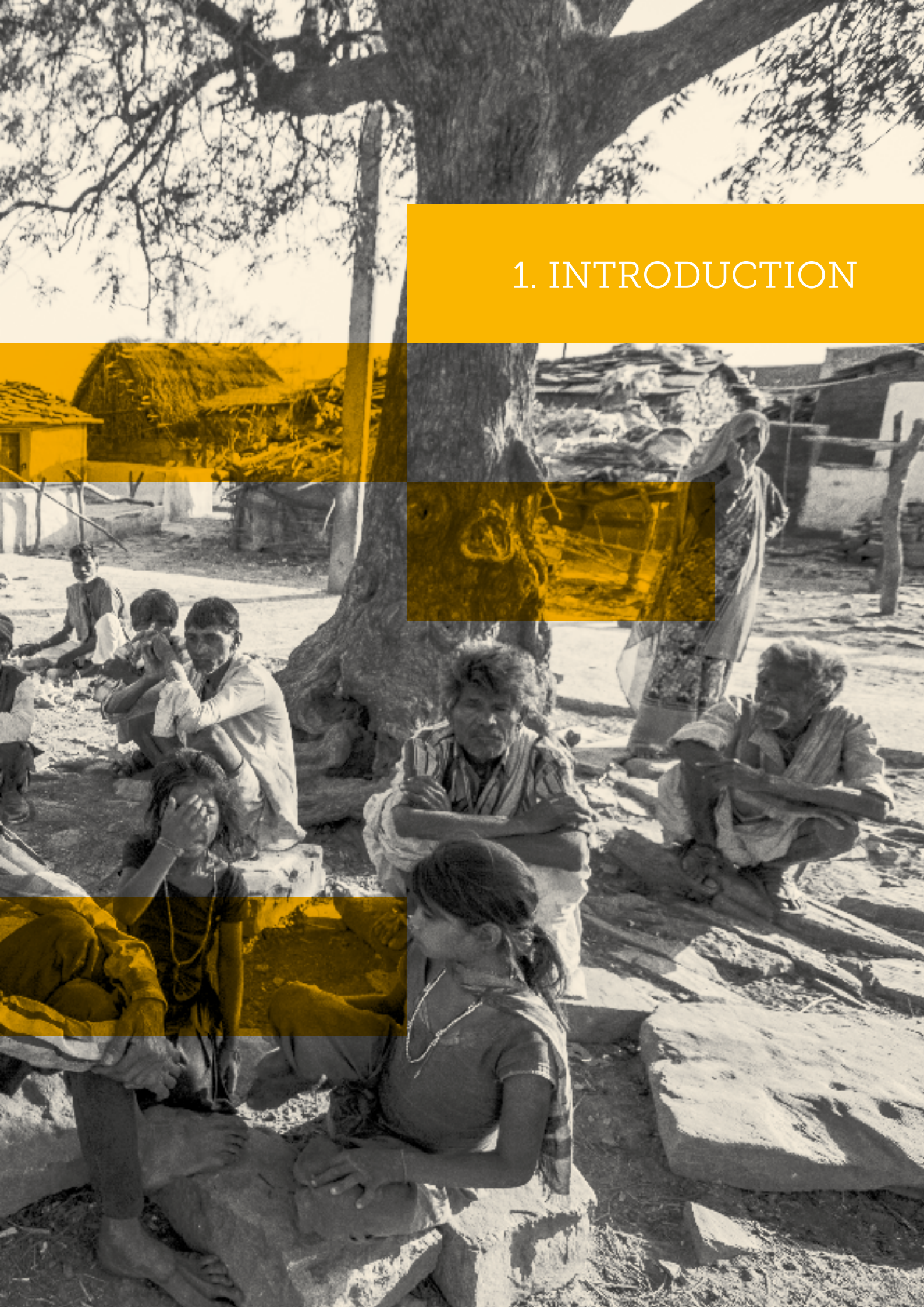
Photography for the guides was contributed by Miguel Bernal and Shehzad Noorani.

The time and expertise of all the contributors listed are gratefully acknowledged by the Stop TB Partnership.

Abbreviations

B+	Bacteriologically-positive
B-	Bacteriologically-negative
CHW	Community health worker
CXR	Chest X-ray
DOT	Directly observed treatment
DR-TB	Drug-resistant TB
DST	Drug-susceptibility testing
EPTB	Extrapulmonary tuberculosis
HEW	Health extension worker
HCW	Health care worker
HIV	Human immunodeficiency virus
IGRA	Interferon-gamma release assay
INH	Isoniazid
LMIC	Low- and middle-income country
LTFU	Loss to follow-up
MDR-TB	Multidrug-resistant tuberculosis, defined as resistance to rifampicin and isoniazid
MTB	Mycobacterium tuberculosis
NGO	Nongovernmental organization
NNS	Number needed to screen
NNT	Number needed to test
NTP	National tuberculosis programme
PLHIV	People living with HIV
TB	Tuberculosis
TBI	Tuberculosis infection
TSR	Treatment success rate
TST	Tuberculin skin test
TPT	Tuberculosis preventive treatment
WHO	World Health Organization
XDR-TB	Extensively drug-resistant tuberculosis
Xpert	Xpert MTB/RIF assay, a cartridge-based nucleic acid amplification test (NAAT) for rapid tuberculosis diagnosis

1. INTRODUCTION



1.1 Why use contact investigation?

Contact investigation *is a systematic process intended to identify undiagnosed cases of TB among the close contacts of a person who has been diagnosed with active TB (an index case) (1). Contacts of people with active TB are more likely to be exposed to TB than other individuals in the population. As such, they constitute a high-risk group that should be targeted for systematic and active case finding. Moreover, since contacts of TB patients should be relatively easy to identify, contact investigation could be an efficient approach to finding people with TB sooner.*

Contact investigation is one of the approaches recommended by the World Health Organization (WHO) as part of the End TB Strategy (2) to enhance case detection and notification in all settings, although there are specific recommendations for countries with high HIV prevalence and for specific groups such as people with multidrug-resistant (MDR-) TB and children (3).

Identifying persons with TB infection (TBI) among contacts can help to reduce the spread of TB in a community. A systematic review and meta-analysis of data from low- and middle-income countries (LMICs) showed that prevalence of all forms of active TB was 3.1% among contacts of TB patients and 3.4% among contacts of MDR- or extensively drug-resistant (XDR-) TB patients. Incidence was estimated to be greatest in the first year after exposure (4).

There are several factors that may prevent contacts from attending health facilities by themselves. People with TB might fear disclosure because of stigma. People in contact with TB patients may also face numerous barriers to accessing care in addition to stigma. These include poor awareness, fear of diagnosis, costs of travel, concerns over loss of wages, doubts about the quality of care, gender norms, lack of empowerment, and cultural beliefs about the cause of disease and its contagiousness.

The relative importance of 'TB contacts' as a target group may vary between countries based on the TB burden among other risk groups and the prevalence in the general population. If TB prevalence in the general population is low, contact investigation is likely to be **an important cornerstone of TB control**. If prevalence in the country is high, contact investigation is likely to be **one of many useful approaches** to find missing people, in combination with other case-finding activities.

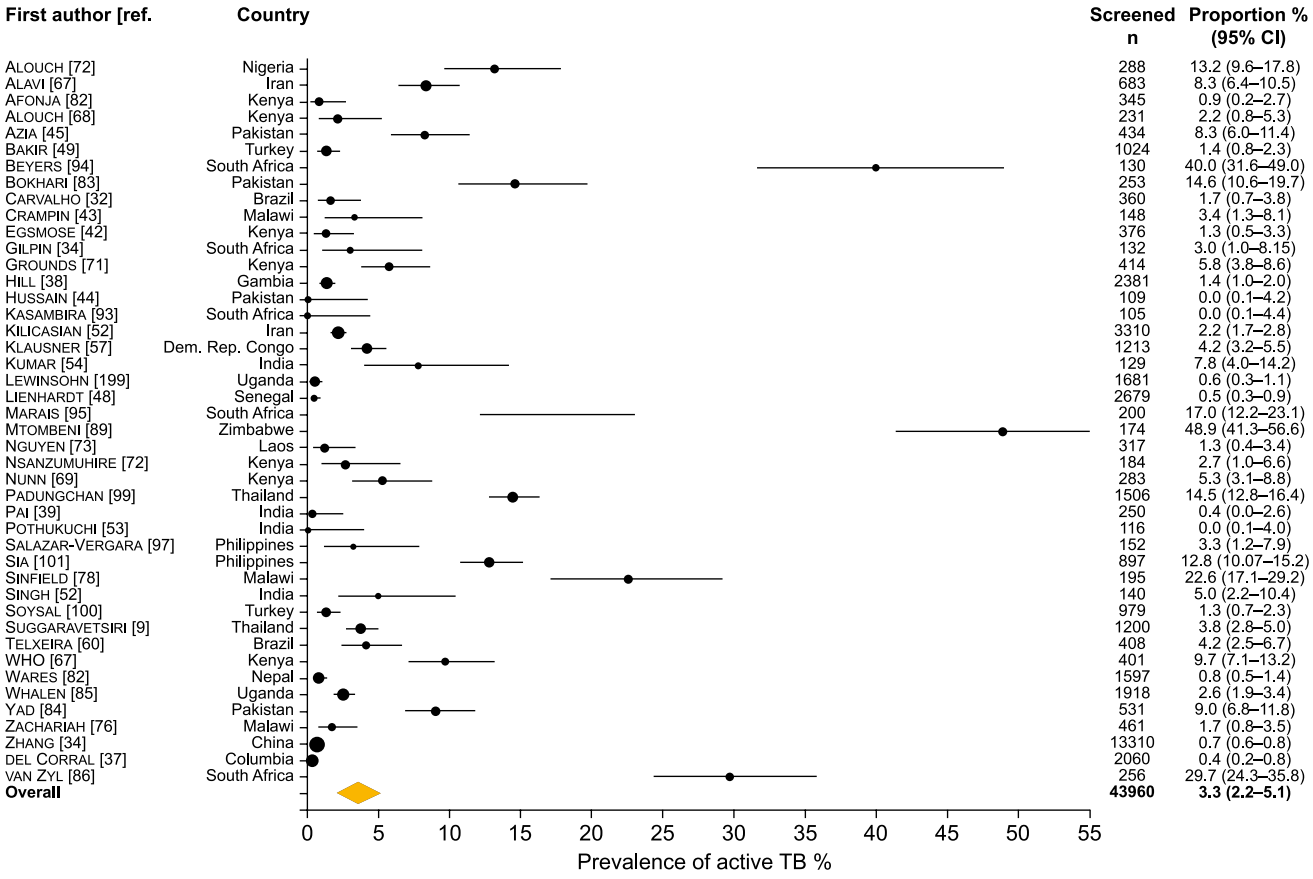
Even though some cases identified through contact investigation may still be identified without this approach, a potential benefit of contact investigation is that it can lead to:

- **Earlier case finding**
- **Identification of TBI in children**
- **Provision of preventive therapy to relevant high-risk groups (children, immunocompromised, etc.)**
- **Education of patients and household members about TB and infection control measures**
- **Reduced disease transmission in the community**

Tuberculosis contact investigation should be undertaken in all countries.

Forest plot of the prevalence of active TB among contacts of smear-positive TB patients in LMICs. The size of the symbols is proportional to the study sample size.

Figure 1



Source: Fox et al. Contact investigation for tuberculosis: a systematic review and meta-analysis (4)

1.2 What to expect from contact investigation interventions

Increase in notifications

Figure 1 shows the estimated prevalence of TB among contacts in various studies. Variations in yields and increases in notifications are likely due to the different approaches taken in implementing contact investigation, different TB prevalence rates across settings, and different definitions of index cases, contacts, screening approaches, algorithms, etc. In this field guide, where possible, the expected effect of these various definitions and approaches will be indicated.

Although contact investigation can show a high yield relative to the number of people screened (i.e. there will be a relatively high proportion of identified contacts screened who will be diagnosed with active TB), the impact on overall case notifications will likely be modest, particularly in settings where other case-finding interventions are ongoing and where the background prevalence is high. A comparative meta-analysis of TB contact investigation interventions showed that contact investigation could increase the notifications of bacteriologically-positive (B+) TB by up to 15%, depending on the coverage of index cases (5). To increase overall notifications, it is most likely necessary to combine contact investigation with other case-finding approaches.

Increase in notifications in children

Contact investigation is a key strategy for increasing the identification of TB in children (please see the field guide on childhood TB in this series) and should be considered very seriously among interventions targeting children with TB who are missed. In some studies, contact investigation interventions contributed to a 19% increase in notifications among children under 10 years of age (6) and an up to 32% increase in the detection of bacteriologically-confirmed childhood TB in the first year of implementation (7).

Preventive treatment

Contact investigation also presents opportunities for TB preventive treatment (TPT) of people with TBI. Recent WHO recommendations suggest TPT for *all* household contacts (after active TB disease has been ruled out) in countries with low TB incidence as well as in countries with high incidence depending on the national policy; these recommendations should be followed as much as possible to prevent transmission and deaths in the community. Infants and children under 5 years of age who are household contacts of pulmonary TB patients should receive TPT regardless of the background epidemiology of TB (8).

1.3 What we know: Assessing local contexts

WHO recommends contact investigation as an important case-finding activity for all countries. Approaches have been implemented in a wide range of contexts. Before deciding how to implement or modify contact investigation activities in a given setting, it is important to understand the local context. Almost all countries have policies on contact investigation included in their National TB Programme (NTP) guidelines; however, in many LMICs, these policies are not fully implemented (9). Moreover, implementation may be uneven in different parts of the country or not in line with international recommendations.

Differences on a subnational level

It is recommended that contact investigation be implemented regardless of TB notification rates. However, some considerations will aid in prioritization. It is worth considering subnational epidemiological data on high-risk groups, information on environmental risk factors, (human) resources available, demographic information, access to health system, and programme data. Given subnational variations, a different approach may be taken in rural regions than in urban ones, for example.

Subnational differences may also be apparent in:

- Screening protocols and tests used for contact investigation: These may differ between regions, impacting outcomes. A low yield from existing contact investigation approaches may be addressed by employing different screening and testing algorithms.
- Availability of human resources: In many countries, innovative approaches have been piloted and evaluated. The results of these pilots can be used to modify current strategies in order to make effective use of community health volunteers, lay people, private providers, etc. in the contact investigation process.
- Analysis of local treatment success rates (TSRs): When contact investigation is started in areas with low TSR, contact investigation should preferably be combined with efforts to increase adherence and treatment success in order to ensure that identified cases complete treatment.

High-risk group: childhood TB contact investigation

Contact investigation is a very important mechanism for both identifying and preventing TB in children. The rate of development of TB disease has been reported to be about 15% to 20% higher in household contacts under 5 years of age than in adult contacts (10,11). The implementation level of the policy for diagnosing childhood TB may differ between regions. In many settings, TB services lack capacity to address childhood TB; investment in contact investigation can be an opportunity to strengthen or expand implementation in this area in order to diagnose more children with TB. For more information on the diagnosis of TB in children see the field guide on childhood TB in this series.

A systematic review of studies on child contact management showed that many child contacts are not identified or screened, and frequently TPT is not initiated or completed (12). Many of the challenges leading to these dropouts in the screening cascade among children are similar to those of adult contact investigation. These include access to care and sputum transportation challenges. Some challenges are more specific to child contact investigation, for example, health care workers (HCWs) lacking confidence or knowledge on child diagnosis and treatment, issues with isoniazid (INH) procurement, low perception of risk in a healthy-looking child, lack of caregiver education and competing family priorities. In addition, low prioritization of child contact management by the government and NTP, and lack of monitoring or TPT initiation and completion play a role. The likelihood of TPT initiation depends on the child's link to the index case (higher if the index is the parent) and is positively associated with home visits. Meanwhile, the likelihood of TPT completion is linked to the costs of medication and transport and increases with directly observed treatment (DOT) via HCWs or community support (12).

LESSONS FROM THE FIELD

A clinic-based intervention in Kenya trained HCWs on TPT and the importance of childhood TB treatment and monitoring tools (13). In addition, transportation and health care costs were reimbursed, and child contact management champions were installed to assist in the screening and reporting of child contacts. The programme identified 169 child contacts under 5 years of age, of whom 146 were screened. Of those screened, 29% had active TB and 71% were eligible for TPT. Of those, 89% actually started TPT, but reliable treatment completion data were lacking. The percentage of child contacts screened increased from <1% to 86% in the pilot hospital, and the intervention has been scaled up to 100 facilities with NTP support.

Other high-risk groups

Other high-risk groups that may be unevenly spread across the country are people living with HIV (PLHIV) and people with MDR-TB. Contact investigation in areas with people from high-risk groups may have higher priority in terms of timeliness of the contact investigation or resources for drug-susceptibility testing (DST). Other considerations include:

- In high HIV burden settings, diagnostic resources and treatment for both TB disease and TBI will need to be in ample supply, while in low HIV burden settings, screening tools and care connectivity might be a priority.
- In high HIV burden settings, collaboration between the HIV programme and the TB programme is important. Given that in some countries a large proportion of people with TB are also living with HIV, alignment between both programmes may save resources and increase effectiveness. Screening of PLHIV for TB should go hand-in-hand with screening their families for TB. High HIV prevalence may also influence the choice of screening and diagnostic tools, which should ideally include chest X-ray (CXR) to allow for identification of smear-negative TB and active TB in people without symptoms.

Use of TB preventive treatment

TPT may be implemented for specific groups or in specific regions. Implementers should consult existing standards of care and ensure that TPT is implemented as per national guidance.

Review of legal context

It is also advisable to check the laws and regulations on privacy and how these laws and regulations can facilitate or hinder the implementation of TB contact investigation. These laws may determine whether and at what point the privacy of the TB case is overruled in favour of public health interest.

2. DESIGNING AND IMPLEMENTING A CONTACT INVESTIGATION INTERVENTION

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When designing contact investigation approaches or models, the planning process can be broken down into six main steps – each described in more detail below:

Step 1: Define the index case

Step 2: Define and prioritize the contacts

Step 3: Decide how to access the contacts

Step 4: Decide on the staffing

Step 5: Determine the timing of the screening; and

Step 6: Contact (clinical) evaluation and treatment

The first two steps focus on who to target, and the remaining four steps focus on how to conduct the screening. Each decision in the planning process will have implications for implementation. These will be indicated where relevant. Figure 2 shows the main steps involved in implementing a contact investigation intervention, please also see an example of a contact investigation programme plan in Appendix 1.

2.1. Who to target?

Step 1:
Define the index case

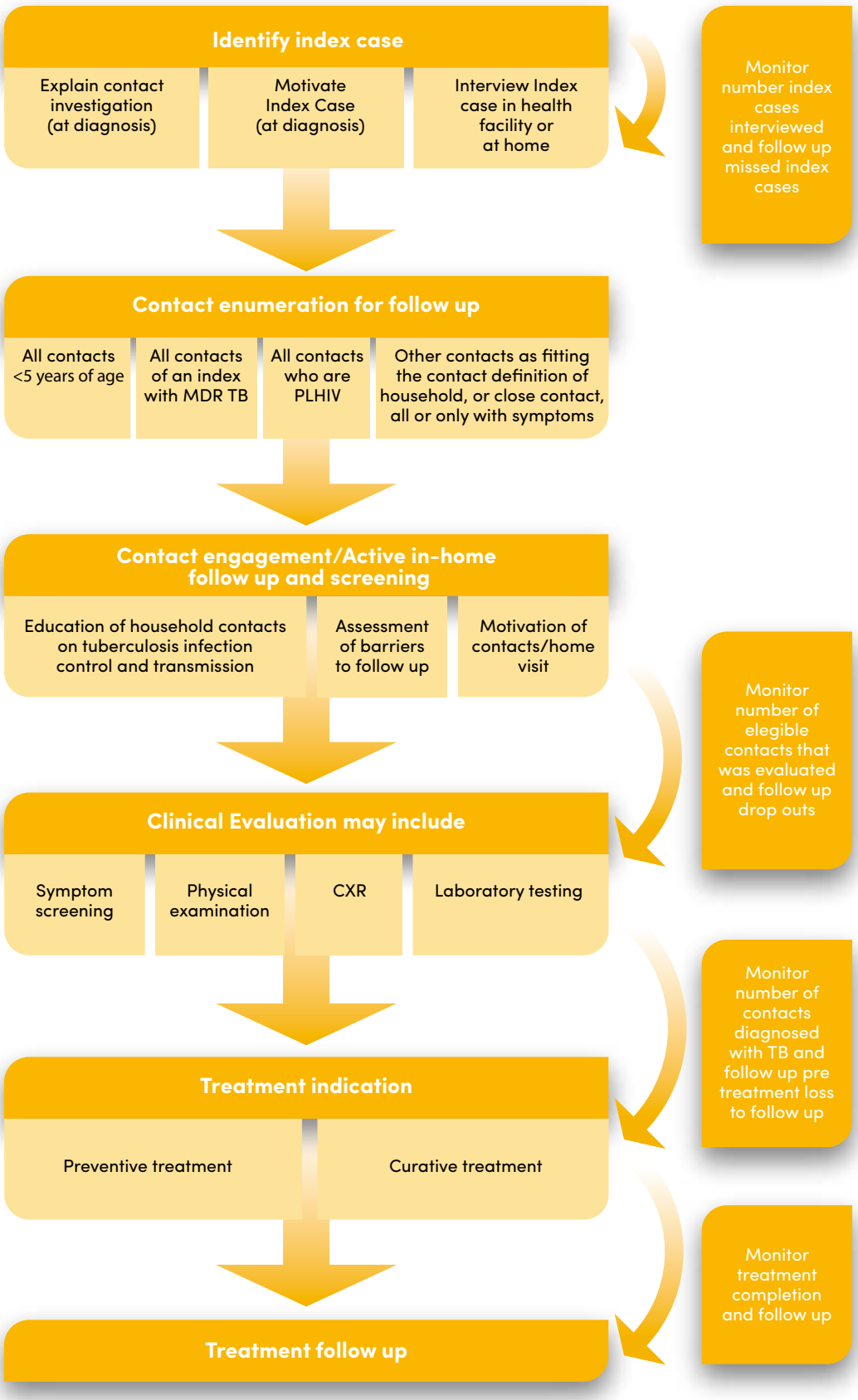
Step 2:
Define and prioritize the contacts

Step 1

Define the index case

WHO defines an index case as "the initially identified case of new or recurrent TB in a person of any age in a specific household or other comparable setting in which others may have been exposed" (3) (see Table 3 for WHO definitions related to contact investigation). An index case is the first person identified around whom TB contact investigation is initiated; she/he might not necessarily be the source of initial TB exposure, which is difficult to identify.

Implementation steps of contact investigation — Figure 2



There are many possible options for defining an index case:

- **All people with TB notified**
- **All people with pulmonary TB notified**
- **All people with B+ TB confirmed by sputum smear, Xpert MTB/RIF assay or culture and notified**
- **All people with drug-resistant (DR-) TB notified**
- **All childhood TB cases notified**
- **All TB/HIV cases notified**

Further definitions of different groups have been used in various approaches, including definitions that take into account age (all adults or all children) and HIV status. Such definitions have depended on TB epidemiology and the desired impact of the contact investigation intervention. Box 1 outlines WHO recommendations on defining and prioritizing index cases.

Box 1. WHO recommendations on defining the index case (3)

WHO recommends contact investigation of all people with pulmonary TB. The recommendation for conducting contact investigation for B+ pulmonary TB index cases is classified as "strong". For other index cases with pulmonary TB, the recommendation is "conditional", as experience with this group is still limited. The risk of a contact being infected with TB relates to the infectiousness of the patient, and it is possible that B+ cases and people with advanced disease are more infectious than B- cases. A meta-analysis of 19 programmatic approaches to contact investigation found that B+ pulmonary TB cases provided a higher yield than B- index cases (including children), but only one project screened contacts of index cases with "any form of pulmonary TB" (5). Usually, adult index cases with extrapulmonary TB (EPTB) are not considered for contact investigation, although they may lead to the source of TB in the household.

WHO further recommends that contact investigation be conducted among all index cases with MDR-TB or XDR-TB (proven or presumptive) and for index cases who are PLHIV or <5 years of age. **These index cases should be given priority, regardless of whether they have pulmonary TB or EPTB, or are B+ or B-.**

Contact investigation for index cases under 5 years of age is called 'reverse contact-tracing', since the source of the child's infection is usually an adult, especially one residing in the household. Depending on the context, children may be the first in a household to be diagnosed with TB, as parents across settings tend to more readily seek care for their children than for themselves. If a child is diagnosed with TB, conducting household and close contact investigation is strongly recommended to find the source case.

Why is describing and defining an index case important for an intervention? Deciding on which index cases to include and prioritize in the contact investigation will allow implementers to estimate how many contact investigations will have to be conducted and the types of resources needed. It is possible that not all notified cases will have contacts to investigate, and some groups within index case definitions may be given priority and/or different considerations.

Step 2

Define and prioritize the contacts

The second step is to determine the contacts that will be the focus of the intervention. WHO defines a TB contact as "any person who has been exposed to an index case" (3). The length of exposure and proximity of the contact to the index case are the other key factors to take into account. Because it is often not possible to conduct a complete census of contacts of people with TB, people with the most prolonged contact should be the focus of interventions, as they have a high risk of developing active TB.

There are almost limitless ways to describe a contact, i.e. someone who is eligible for contact investigation screening. In general, there are two main groups of contacts that could be used:

- **household contacts, and**
- **other close contacts.**

These groups will be discussed in detail below.

When considering the definitions of contacts, implementers need to be conscious of how the selection will impact the number of places that will need to be visited, the timing of the visits, and the number of contacts who will need to be screened. For example, it may be most efficient to visit a household during meal times or in the evening to evaluate sleeping arrangements; for families with children, visits outside of school hours should be planned. Another consideration is that the definition of household may vary widely between and within countries.

Household contacts

Household contacts are often the first group selected for screening. WHO defines a household contact as "a person who shared the same enclosed living space for one or more nights or for frequent or extended periods during the day with the index case during the three months before commencement of the current treatment episode" (3).

Depending on the setting, a household contact can be:

- **Anyone living in the house at the time of the index case's diagnosis**
- **Anyone living in the household full-time**
- **Anyone who has lived in the house for a number of weeks or months**
- **Anyone who spends more than a certain number of hours per week in the home (of particular consideration for children who might be in care outside of a home or with a relative who occasionally comes to the home)**
- **Anyone who has meals in the household on a regular basis**

Community members may be consulted regarding other specific arrangements that might place individuals in close contact with members of a household. Some considerations can also be given to households on a case-by-case basis. For example, if the index case was symptomatic long before diagnosis, household contact screening may take into account a longer historical period. If the index case has (suspected) MDR-TB or a history of TB with non-adherence to treatment, it may be useful to investigate possible contacts who may have been encountered further back in time. Family contacts of recent migrants may not be feasible to include in the contact investigation; in such cases, information provision can be done instead.

Close contacts

WHO defines close contacts as "persons who are not in the household, but share an enclosed space, such as a social gathering place, workplace or facility, for extended time periods during the day with the index case during the 3 months before commencement of the current treatment episode" (3).

This definition needs to be adapted to the local context. For example, workplaces where people operate in poorly ventilated spaces may be especially relevant. Social gathering places may be bars or communal buildings. These gathering places may be different for women and men. Contacts from social settings outside the household are sometimes called 'community contacts'. Facilities may include hospitals or detention centres. It will likely be difficult to pre-define all of these locations, especially in larger communities and open settings. Nevertheless, knowledge of the local context is essential to narrow down these definitions. When community contacts are hard to define or reach, hotspot mapping and community-based screening could be alternatives.

Despite the need for local adaptation, it is necessary to develop **clear, standardized definitions of who should and should not be considered a contact.**

Definitions for contact investigation (3) — Table 1.

Concept	Definition	Comments
Index case (index patient)	The initially identified case of new or recurrent TB in a person of any age in a specific household or other comparable setting in which others may have been exposed	An index case is at the centre of the contact investigation. Because the investigation generally focuses on a defined group of potentially exposed people in which other (secondary) cases may be found, the index case is generally the case identified initially, although he/she may not be the source case. Contact investigation may centre on secondary cases if the exposed group differs from that exposed to the original index case.
Contact	Any person who has been exposed to an index case (as defined above)	Exposure may be intense or casual, easily identified or obscure. Close exposure, such as sharing a living or working space, is generally easily identified and quantified, whereas casual exposure, such as on public transport or in social situations, may be unidentifiable.
Household contact	A person who has shared the same enclosed living space for one or more nights or for frequent or extended periods during the day with the index case during the 3 months before commencement of the current treatment episode	Definitions of 'household' vary considerably and must be adapted to the local context. Within households there is a gradation of exposure, ranging from sharing the same bed as the index case to living in the same compound, but not in the same enclosed space. Quantification of the amount of exposure, estimated as the time spent with the index case, is likely to be highly subjective. For this reason, the infectious period for the index case is set somewhat arbitrarily at 3 months before initiation of treatment, rather than relying on the index case's recollection of when symptoms began. The 3-month period is a general guideline; the actual period of infectiousness may be longer or shorter. For example, prolonged infectiousness may be associated with non-adherence (if DOT is not being used) or with unrecognized or untreated MDR-TB or XDR-TB.
Close contact	A person who is not in the household, but has shared an enclosed space, such as a social gathering place, workplace or facility, for extended periods during the day with the index case during the 3 months before commencement of the current treatment episode	In many situations, out-of-household exposure is as likely to result in transmission as household exposure. Molecular epidemiological studies showed that transmission was likely to occur in social settings such as informal bars in Mexico and South Africa and in facilities such as correctional institutions and hospitals. Such sites (particularly social settings) are difficult to identify and require knowledge of the culture and behavioural patterns in order to focus contact investigation.

2.2 How to conduct contact investigations?

Step 3:

Decide how to access the contacts

Step 4:

Decide on the staffing

Step 5:

Determine the timing of the screening

Step 6:

Contact (clinical) evaluation and treatment

The quality and planning of the steps involved in the screening, diagnosis and linkages to treatment of the contacts define the success and yield of contact investigation interventions.

One major decision for implementers to make is whether the screening will take place at home or at health facilities. This will depend on the level of staffing available for the intervention, on whether contact investigation is already being implemented at least in some form, and on access to facilities.

Step 3

Decide how to access the contacts

Perhaps the most important point in the contact investigation process is the interview with the index case. This interview is the starting point from which all other activities can be launched, and a great opportunity to identify possible issues.

Interviewing the index case

To identify contacts, the index case should be interviewed, preferably at the time of his/her TB diagnosis. Before starting enumeration, reaching out to contacts and inviting them for clinical assessment, the index case will need to be informed about the purpose and importance of the activity, and the ways in which it will be conducted. While TB patients are not ill-intentioned towards their contacts, the fear of negative consequences potentially brought on by contact investigation, such as stigma and discrimination, may affect their motivation to cooperate. TB programmes have an ethical duty to provide persons with the assistance and support needed to prevent and mitigate these negative consequences. The ethics guidance for the implementation of the End TB Strategy indicates that NTPs must "balance the need to maintain confidentiality" and "protect the patient from stigma," while protecting and promoting the common good through routine public health activities (14). The context of each particular case will determine how to achieve this balance (see Box 2 for one approach).

Often, family or caregivers accompany index patients, which could provide opportunities for screening contacts at the facilities. **Motivation level is also highest for both index patients and their contacts at the beginning of TB treatment. Sometimes when the decision-maker in a household is not convinced of the utility of contact investigation, it is difficult to motivate all other household members. It is therefore important to target the decision-makers who may not be the patient him/herself, but who may be with the patient at the time of diagnosis.**

Some index cases may have died by the time contact investigation starts. Contact investigation should still be initiated, and contacts should be counselled. A relative or friend can be identified as a substitute for the index case.

Box 2. THE USE OF CONTACT SLIPS

In a South African study, people with TB were encouraged to use contact slips to enable them to start a conversation about TB with their contacts. The slip also gave people with TB the opportunity to remain anonymous, as they could pass the slips without identifying themselves. While some people with TB encountered with stigma and challenges, others were able to inform their contacts in a less confrontational way. These and other approaches may be explored to support people with TB.

Date:

_____

TB patient #:

_____

Good day,

You have in contact with someone who has TB. TB is infectious but curable too. I you have any of these TB symptoms (cough more than 1 day, night sweats, weight loss, or fever),

come to _____
(Name of clinic)

clinic to be screened.

Thank you.

Source: Mwansa-Kambafwile et al. Tuberculosis case finding: evaluation of a paper slip method to trace contacts (15)

Contact enumeration and identification

This can be done when interviewing the index case either in the health facility or at home/in the community. The result should be a list of names and details on how to find contacts who should be screened. A contact register can be used for enumeration of contacts and for recording their follow-up along the screening cascade. An example form can be found at the end of this field guide (Annex 2) and in the resources section (7).

Contact engagement approaches

Different engagement approaches are presented in Section 3 of this field guide. However, a mix of these approaches can be used. For example, invitation by index case can be combined with home visits for specific groups or according to the preferences of the household.

Option 1:

Invitation by index case. Invitation of contacts can be done by the index case themselves (sometimes called passive contact investigation or 'contact invitation'). When opting for invitation by the index case, the patient can be provided with educational materials (see Appendix 3 for examples). Using this approach, the yield of the contact investigation will largely depend on the understanding and motivation of the index case and is usually lower than when conducted by HCWs. On the other hand, this method may be more acceptable to both people with TB and their contacts. When opting for invitation by the index case, follow-up of contacts via phone calls or SMS messages may be considered to decrease loss to follow-up (LTFU). It should be noted that, if the contacts include children, engagement should be more proactive.

As contact investigation is a public health activity from which asymptomatic contacts in particular may not see any direct benefit, costs and inconvenience to them should be kept to a minimum. Reimbursing transport costs or arranging transport, not only for the first contact but also for follow-up clinical and microscopy appointments, will increase the likelihood of participation. Small non-monetary enablers like food baskets and/or soap can be considered depending on the setting. Financial enablers can also be considered. For a discussion on the effectiveness of enablers in screening processes, see the introductory field guide in this series.

With persistent stigma and lack of knowledge about TB across settings, contacts may not readily visit health facilities. Furthermore, when the (perceived) quality of care in the community is low, contacts may be less willing to visit the health facility. Therefore, when planning for the engagement of contacts via index cases, other activities may be necessary, such as community engagement, education, placing friendly health staff in facilities, index patient education, etc. When contacts do not present at the health facility, this may mean that the index case has not disclosed his/her disease status or the need for the contacts to get screened. Follow-up with the index case, including ongoing education (e.g. during TB management visits) may be needed. All these activities must be carefully budgeted and planned for in order for contact invitation to be successful.

Index cases may be aware of who among their close contacts is coughing, but they may not be aware of other TB-related symptoms, such as enlarged lymph nodes, fevers and night sweats, or of their contacts' HIV status. Consequently, even though focusing on the symptomatic contacts identified by the index case may seem justifiable for practical reasons (e.g. limited resources), some people will still be missed. In addition to symptomatic individuals, the index case must be instructed to **systematically refer all children (<5 years) and contacts with known HIV+ status for clinical assessment and TPT if there is no active TB.**

Option 2:

Engagement by trained staff through a home visit. WHO prefers contact engagement to be conducted by trained health or lay staff through a home visit. By observing the living/sleeping arrangements in the household, these cadres can make quick judgments about who might be high-risk/close contacts, thereby improving the quality of the screening. Home visits also provide the opportunity to assess the situation of the family and provide education to contacts, especially when they have barriers to seeking care, fear of being diagnosed with TB or of the treatment, and fear of the implications of stigma. Education on infection control at home can also be given. Due to the nature of the interaction, the home visitor has the opportunity to try to address these issues. Critically ill contacts might need the kind of immediate care and social support to which a visiting health/community worker could provide linkages. Another advantage of home visits by trained staff is that sputum samples can be collected from contacts during the visit and transported for testing, avoiding the need for contacts to visit the health facility.

When human resources are limited, home visits can be prioritized for people with bacteriologically-confirmed pulmonary TB, people with MDR-TB, PLHIV, index cases whose contacts include children, and index cases who are under 5 years of age. The programme may also opt to do home visits only in high prevalence areas with low access to care, such as rural districts. In cities, transport enablers shared by index cases with their contacts may yield an acceptable number of contacts for screening.

Another important issue is the timing of the home or community visit. Home visits should be performed at a time when most members of the household or close contacts are at home. If the visit is scheduled during work/school hours, many contacts will be absent. Considerations need to be made for the cultural acceptability of home visits or for who is performing the visits. For example, in many communities, visits by health staff to a home may signify to the neighbours that the household is 'TB-ridden'; in this case, using lay people and community volunteers or even trained traditional healers could be more beneficial. Implementers should also consider educational campaigning and displaying educational posters in health settings in order to normalize visits by health staff in the community and thus increase acceptability.

Option 3:

Outreach. Outreach activities may be done periodically on screening days in high prevalence areas with low access to care. Mobile outreach activities can be planned in conjunction with well-attended regular community events, targeting contacts of TB patients as well as other symptomatic or high-risk groups in the community. Only if contacts were invited systematically would such outreach be considered real contact investigation. Therefore, if such an event is planned, contacts need to be invited by volunteers, peers or index cases via option 1 or 2 beforehand in order to ensure that they will be present. Outreach activities should take into account holiday periods, elections, floods, harvest seasons, etc. (see the field guide on community outreach in this series). Clinical evaluation and the use of mobile teams will be discussed in Steps 5 and 6. Outreach activities may be carried out as part of retrospective contact investigation every one to two years, when contacts of index cases diagnosed in a preceding period (up to 2 years in advance) are invited.

A readily accessible location that is acceptable to the target population should be selected for the outreach (for example, a location without political affiliation). When contacts from a workplace, facility or social setting are identified as close contacts, it is likely that the specific location will need to be visited. Whether it is possible and acceptable to screen contacts there or whether it is better done at the health facility is highly dependent on the setting.

Step 4

Decide on the staffing

Human resources for contact investigation are needed for:

- Interviewing index cases and counselling/educating them on the need for contact-screening and infection control practices;
- Conducting home visits and identifying contacts;
- Screening contacts, educating them on the need for contact-screening and counselling them on not stigmatizing the index patients;
- Proceeding to TB evaluation in contacts, including sputum collection, transport, microscopy/Xpert testing, performing and reading CXR, etc.; and
- Initiating treatment and providing treatment support.

The selection of staff will depend on the quantity and scope of contact investigation activities and the location where screening is taking place. While local coordination may lie with a primary health care facility TB staff member, this person may have many different tasks and may not be able to perform contact investigation in addition to his/her regular duties.

For this reason, other cadres may be involved, e.g. health extension workers (HEWs), CHWs, health volunteers or lay counsellors such as former TB patients.

The person who performs the home visits should:

- Speak the local language and know the local culture
- Be acceptable for/accepted by the local community
- Be trained in identifying TB symptoms and the use of relevant information/educational materials
- Be able to provide strong education and motivation to patients and contacts
- Be informed on definitions and prioritization (index case, household contacts, close contacts)
- Be trained on relevant monitoring and evaluation (M&E) aspects of contact investigation
- Be trained on soft skills to sensitively handle contact investigation, especially considering stigma associated with TB.

When HIV counselling is also anticipated, trained health staff or CHWs versed in issues of privacy and confidentiality may be required. Supervision and training will be essential both for the quality of the activities and for staff motivation.

Box 3.

Example of initial training workshop outline for HCWs and contact investigation staff

1. Background and rationale for contact investigation

2. Description of the local strategy for contact investigation

- Overview of the model of contact investigation and the algorithm for screening (train on each activity)
- Strategies for identifying high-risk contacts
- Strategies for home visits and motivating contacts to accept screening, including role plays and case discussions
- Follow-up and treatment of contacts
- How to overcome common barriers to participation in screening
- Presentation of health promotion/educational materials that will assist staff in motivating contacts to participate

3. Practical approaches to successful contact investigation

- Lessons learned from pilot studies
- Lessons learned from other countries

4. M&E

- Procedures for M&E
- Reporting forms and practical use; how and to whom to report

Training, motivation and mentoring

When a decision has been reached on the responsibilities of the various cadres, each group will need to be trained in their tasks (see Box 3).

Once the contact investigation has begun, mentoring and supervision are needed. Establishing a routine of weekly or monthly meetings for those conducting contact investigation to meet and share their successes and challenges has shown to be both motivating and instructional. Feedback based on project results can be motivating. Use of real-time feedback (with social media) to celebrate the reaching of targets, both process-related targets (% of index cases interviewed) and outcomes (cases identified), is one appropriate way to do this.

Although volunteers can be highly motivated, enablers and incentives are likely necessary if only for reimbursing costs incurred: fuel, motorcycle maintenance, telephone credits, etc. Contact investigation takes a considerable amount of time, and turnover might be high if the entire staff is volunteer-based. Financial compensation may be necessary to ensure the sustainability of interventions. Asking CHWs to take on contact investigation in addition to their many tasks may negatively affect other aspects of their work. Table 2 provides a useful overview of key staff involved in contact investigation and their roles.

Table 2. Definitions for contact investigation (3)

Staff cadre	Description of roles
TB Programme Managers	• Engagement of clinical staff and administrators to support the programme • Establishment of administrative processes for a 'one-stop shop' model of care (for clinic-based screening) • Development of adequate budget • Development of reporting framework and data management processes • Development of a local health promotion strategy for enrolling contacts • Performance of monitoring and evaluation of programme effectiveness
Local clinical staff or CHWs	• Home visits to screen contacts of TB patients • Persuasion of patients to bring contacts for screening • Registration of contacts and completion of contact registry • Performance of clinical assessments • Ordering and interpretation of diagnostic tests (including CXR, sputum samples) • Treatment of contacts for TB as required • If TPT is offered: » Performance and reading of tuberculin skin test (TST) » Prescription of TPT » Monitoring for adverse events • Completion of regular reporting • Arrangement of appointments for screening • Follow-up of contacts not attending follow-up visits
General administrative staff	• Ensuring supply chain for TST and TPT (if required) • Transportation of sputum samples to the central laboratory for testing • Responsibility for some administrative tasks
Radiology staff	• Performance of chest radiographs, if indicated • Development of skills in interpreting early disease
Laboratory staff	• Performance of sputum testing (e.g. sputum smear, Xpert testing, sputum culture) and other microbiological testing
Paediatric clinical staff	• Capacity-building of local staff in B+ diagnosis in children • Assistance with the diagnosis of TB in children, including EPTB • Initiation and supervision of treatment for active TB • Oversight of TPT administration, if required

Step 5

Determine the timing of the screening

As recommended by WHO, the interview with the index case should be performed directly after diagnosis, ideally within 1 week. There are, however, benefits to doing periodic, retrospective contact investigations. With this approach, typically all TB cases registered for TB treatment in the health facility registers from a preceding period (depending on the frequency, up to years back) are taken as index cases. This approach may be resource-saving, as households in the same area can be clustered and visited at the same time.

Ongoing programmatic contact investigation

When contact investigation can be integrated into routine case finding activities, it can be ongoing and there will be no delay in home visits or screening of contacts. This model can work when sufficient (human) resources for TB are available in the system or when strong networks of CHWs are in place. These CHW networks are then able to follow up on contacts who drop out of the screening cascade. Given that contact investigation teams rely on available diagnostic services, this model will be more challenging to implement in settings with limited access to screening tools like CXR and Xpert testing.

Retrospective contact investigation

When contact investigation is newly implemented, retrospective contact investigation may be a worthwhile option. Various interventions have screened the contacts of index cases up to 3 years after diagnosis with good yield. A periodic retrospective screening has logistical advantages, as it is organized for a specific time period with many contacts being screened at once. Accordingly, diagnostic tools that are not routinely available / accessible (e.g. GeneXpert and CXR machines) can be brought in, allowing for rapid diagnosis and treatment initiation. Such mass screenings of contacts can be done either at a facility or in a central place in the community. Historical or periodic contact investigations are not a good idea in an area with high levels of migration. In retrospective contact investigation, it is possible that several index cases will have died, thus complicating the contact investigation. Follow-up is needed after the screening day(s) to ensure that contacts do not drop out after diagnosis, and staff need to be made available for this purpose.

Whether retrospective contact investigation is a good option likely depends on the setting and how the investigation will be organized. Table 3 describes the different choices made in the planning steps of three interventions.

While all three interventions used retrospective contact investigations, they likely differed in the resources used and tests performed. The differences in the findings of these three interventions illustrate how local context, choice of setting, and selection criteria can define the outcomes of contact investigation.

Repeat screening of the same contacts

Contact investigation is ideally started soon after diagnosis of the index case; however, due to the natural disease progression of TB, contacts may be experiencing an incubation period and will not be diagnosed. One way to address this is to test for TBI and provide TPT (see Section 2.3). Another option is repeat screening of contacts.

Comparison of three differently organized retrospective contact investigation interventions

Table 3.

Country	Cambodia, rural area (16)	Myanmar, peri-urban area (17)	Ethiopia, two full regions (18)
Step 1: Defining the index case	B+ pulmonary TB cases diagnosed in the past 2 years	Drug-susceptible TB diagnosed >24 months ago	B+, B- and EPTB cases diagnosed in the past 3 years
Step 2: Contacts	Household and neighbourhood contacts, approx. 12 contacts/index	Household, workplace, neighbourhood contacts, 49 contacts/index	Household and neighbourhood contacts, 58 contacts/index
Step 3: Accessing contacts	Mobile outreach on screening days with transportation arrangements for contacts	Home visits, collecting and transporting sputum	Home visit, referral of symptomatic patients invited to health centre for sputum collection
Step 4: Contact evaluation	No symptom screening (asymptomatic screened) CXR as first test, Xpert as second	Only symptomatic patients screened (one symptom), microscopy as lab test, CXR referral for children, those with persistent symptoms, etc.	Symptom screening, microscopy as lab test. CXR for EPTB
Number of contacts screened/ identified	1,745 B+ cases and 1,980 B-/ EPTP cases among 105,351 people screened	74 cases were identified among 56,709 people screened	2,091 active TB cases among 272,441 people screened
Number needed to screen (NNS)	NNS for B+ TB 74, 28 for all forms of TB	NNS 766	NNS 227 for active TB

A study in Viet Nam compared an intervention that repeat screened at a health centre (four times at 0, 6, 12 and 24 months) to the routine effort of providing contacts with written information about TB and instructions to seek care if symptoms developed (19). The screening intervention led to a higher yield (2.5 times greater for all forms and 6.4 times greater for B+ TB). Although the highest yield of these scheduled visits (several were found in between) was at baseline, during which 0.5% of those screened were diagnosed with TB, many cases were found later: 0.3% of the contacts screened at 24 months were diagnosed with TB. A decline in contacts identified through passive case finding was also seen in districts where contacts were not actively screened. This is in line with the natural progression of TB disease from infection to symptoms. Since the prevalence of TB among contacts decreases over time, at some point the contacts no longer represent an important high-risk group compared to the general population and other high-risk groups. In high prevalence settings where the risk of ongoing transmission is higher, repeat screenings may have a better yield than in low prevalence settings.

Box 4.

EXAMPLE FROM THE FIELD: RETROSPECTIVE CONTACT INVESTIGATION IN A RURAL AREA

Passive case finding has been the mainstay of case-finding activities in Cambodia, with the exception of a few active case-finding pilot projects. This project implemented a novel approach to active contact investigation in 15 operational districts covering a population of 2.9 million.

Both household and neighbourhood contacts of smear-positive index patients were investigated for TB by mobile teams that collaborated with local health facilities for treatment linkages. Individuals were evaluated using CXR and the Xpert MTB/RIF assay. Existing health facilities hosted screening days in order to provide one-stop TB diagnosis and treatment services and thus reduce initial LTFU. Two weeks prior to scheduled screening days, initiative staff visited intervention sites to train existing health facility staff on the enhanced TB screening, diagnosis and care procedures.

Index cases: All smear-positive patients who had been registered for treatment during the preceding **2 years** were considered index patients.

Staffing: Health workers visited the homes of these patients to verbally screen their household contacts for symptoms of TB.

Contacts: Along with household contacts, neighbourhood contacts were also included, as in rural areas these individuals may have been as likely as household contacts to be exposed to index patients.

Screening and diagnostic algorithm: Any person who self-reported having one or more TB symptoms (cough of any duration, fever, weight loss, and/or night sweats) was invited to attend the scheduled screening days for further evaluation by CXR, as were asymptomatic household contacts (but not asymptomatic neighbourhood contacts). During the screening days, mobile teams worked at health facilities and screened contacts using mobile CXR. CXR films were developed immediately and scored by a project radiologist as either 'abnormal (submit sputum)' or 'normal (no sputum needed)'. To facilitate clinical diagnoses, abnormal CXRs were then scored more precisely to specify active TB, suspected TB, healed TB or other abnormalities. All individuals with an abnormal CXR were asked to provide a sputum specimen for Xpert testing, which was also conducted immediately by the mobile team. MTB-positive patients were initiated on treatment within a day of diagnosis, while MTB-negative individuals who had an abnormal CXR were sent for further clinical evaluation. Health facility staff provided treatment support to diagnosed patients.

Box 4.

Monitoring framework: The districts visited by the team were defined as the evaluation population. The control districts chosen seemed to be similar in setting (rural) and notification rates. The notifications in the year preceding the team visit (baseline) and the year from the visit onwards were compared. This comparison was done per district, as the intervention began in different quarters in each location. Furthermore, trends were compared to control districts in the same period. Relevant process indicators were defined and targets were set. Indicators included number of index cases reached, number of contacts defined, number tested, and number diagnosed and treated.

Main costs: The major costs associated with this initiative were for supporting staff and procurement. The initiative supported programme staff to perform active case finding days in remote districts, hired new lab technicians and radiologists, and paid incentives to health facility staff to carry out additional activities. Two project vehicles were procured to support site visits, and medical equipment (CXR films and GeneXpert systems) were purchased to support the enhanced diagnostic algorithm.

Outcomes: Analyses of district-level notification data showed an increase in patients treated in the quarters when screening days were hosted. This increase was followed by a decrease to below pre-intervention levels the following quarter. This could be an indication of early detection, as patients who would have self-presented at health facilities in the subsequent quarter had already been identified and reported through these activities. The initiative investigated 105,351 household and neighbourhood contacts of 12,631 smear-positive index patients. Xpert testing identified 1,745 B+ patients, of whom just 11 (0.7%) were found to be resistant to rifampicin. A further 1,980 B- and EPTB patients were identified and initiated on TB treatment.

Step 6

Contact clinical evaluation and treatment

The screening algorithm may be based on a combination of:

- Availability of trained staff for verbal screening
- Availability of CXR for screening/triage
- Lab throughput (i.e. can the existing lab system handle an expanded screening load?)

The following can be a simple screening algorithm:

- Verbal screening:
  - » Identification of children and contacts with known HIV+ status or contacts of MDR-TB patients
  - » Identification of symptoms
- Physical examination: palpation of lymph nodes and other identifiable symptoms
- Radiological examination: CXR
- Microbiological examination: smear microscopy, Xpert testing, culture

The algorithm can be different for specific groups. For more information on preferred algorithms to be used to screen children for TB, see the field guide on addressing case finding among children in this series.

The location of interviews and diagnostic services is extremely relevant for contact investigation. Both services can be brought to the patients via outreach activities, thereby contributing to patient-centred care. If no mobile diagnostic facilities are available, sputum samples will need to be transported to a laboratory and/or patients will need to be transported to facilities to submit sputum or be screened/followed up with CXR. **The logistics of screening locations need to be carefully considered so that any delays can be minimized and contacts will not drop out of the screening process. Furthermore, screening possibilities at home differ from the type of screening when inviting contacts to a facility or mobile van (physical examination).**

The screening criteria may partly depend on the timing chosen in Step 5. When outreach is organized or retrospective contact investigation is planned, these choices inevitably increase the number of people to evaluate. It may be possible to organize diagnostic methods that are not routinely accessible in the area. The main decision, however, is on the use of symptoms or abnormal CXR as a screening criterion. When deciding on diagnostic algorithms for contacts, the national protocols need to be consulted, especially with regard to specific groups such as children, PLHIV, people evaluated for MDR-TB, and individuals with TBI. Important practical implications related to the use of screening algorithms are outlined below.

Verbal screening

Verbal screening aims to classify contacts as 'symptomatic', person with 'presumptive TB', or neither. When used as a screening criterion, the definitions used for these classifications are highly relevant to the yield of the overall intervention. If only contacts with 2 weeks of cough are selected for further investigation, the yield will likely be lower compared to testing contacts with any TB-related symptom or all contacts regardless of symptoms, but the number of samples tested will be much higher (5). Interventions that tested all contacts had a yield that was 6.9 times higher than for interventions that only screened contacts for cough. If the programme will also be screening for TBI, all contacts should be evaluated, as screening for TBI is only done once active TB has been excluded. While TBI treatment is recommended for all contacts, it is particularly important for children. Programmes that plan to focus on child contacts will need to consider this approach most seriously.

Even if all contacts will receive further testing, it may be important to know the symptoms. If contacts present with symptoms that could point to another serious (lung) disease, they should be referred for appropriate care. However, this can likely only be done when HCWs are performing the screening. The verbal screening will check for TB symptoms, but can also investigate whether the contact might be at risk for HIV or MDR-TB.

Physical examination

Physical examination may be part of the screening. Especially when child contacts are screened, palpation of lymph nodes may be performed. Physical examination will only be part of the screening criteria when the screening is performed by HCWs.

Microbiological assessment

Depending on the availability of tests in-country, smear microscopy, Xpert MTB/RIF assay, and/or culture may be used. These tests have different levels of sensitivity. The choice of test will influence the yield of the intervention and the ability to detect drug resistance. When there is limited capacity in terms of advanced diagnostics, it may be prioritized for certain groups such as PLHIV, people being evaluated for MDR-TB, etc. TB genotyping is sometimes used in research settings to establish links between cases, but is not regularly used in contact investigation in LMICs (to read more about various diagnostic modalities, please see the field guide on laboratories in this series).

In 11 high-burden countries, the percentage of contacts who submitted a sputum sample for testing ranged from 13.6–93.4% (5), suggesting that sputum sample collection and transport might be the most important logistical consideration for programme implementers. Transportation of either samples or people will have to be provided to diagnostic facilities. This logistical consideration will likely be a critical point in determining the yield of the intervention.

If people being evaluated for TB need to transport themselves to an evaluation point, it can lead to high dropout in rural but also in urban settings (see Box 4). When opting for home visits, sputum can be collected in the home, in which case, a private space will need to be identified for producing the sputum. When deciding on such a space, infection control needs to be taken into consideration. If sputum is collected from the home on the next day (for example, if morning sputum is required), the instructions for collection need to be clear. In addition to the instructions of a health worker, visual aids and videos have been developed, which have proven to be extremely effective in multiple settings. These additional aids should be adopted by programmes to ensure the high quality of the sample.

Radiographic examinations

Using CXR to screen people for TB in addition to or instead of symptom screening can result in more people being eligible for testing through radiographic abnormalities; at the same time, CXR may ensure more precision. Accessibility to CXR at the level of the community may be low, especially in rural areas, as CXR machines are usually not available at the level of primary care. When (mobile) outreach is organized, use of CXR machines can increase yield and also coverage of the activity, as the use of modern technology may increase the trust in the quality of the intervention. When contact investigation is integrated into routine health services, CXR can be used for specific groups, for example, people who cannot produce sputum (like children) and people with a negative sputum test but persistent symptoms. Referrals for CXR may be guided by health care staff or volunteers who also provide transportation enablers to contacts. For more information and for a discussion on the role of digital CXR and Computer-Aided Detection for Tuberculosis (CAD4TB), see the field guide on CXR in this series.

Linkages to treatment, and ensuring treatment adherence

Once contacts are diagnosed with TB, they must be registered for treatment and provided with treatment support. Treatment management will be as per national protocols, depending on whether the contact is a new or previously treated TB case, adult or child, patient with DR-TB or TB/HIV coinfection. When providing TPT, contacts should also be registered and follow-up should occur. Digital technologies, such as 99DOTs, Everwell, Video Observed Therapy and others, can be used to improve treatment adherence (20). For children, education of parents and caregivers is essential to ensure adherence, especially to TPT (see field guide on childhood TB.)

2.3 TB infection

Testing for TBI: indication for preventive treatment

Testing for TBI is only useful if it is subsequently treated. As yet, there is no evidence that testing for TBI in healthy adults in LMICs can be justified as a broad programmatic approach, but WHO does recommend the approach for contacts. A systematic review on contact investigation found that there was a 51.5% prevalence of TBI among contacts in LMICs (4). As such, not considering TBI when conducting contact investigation may be seen as a lost opportunity.

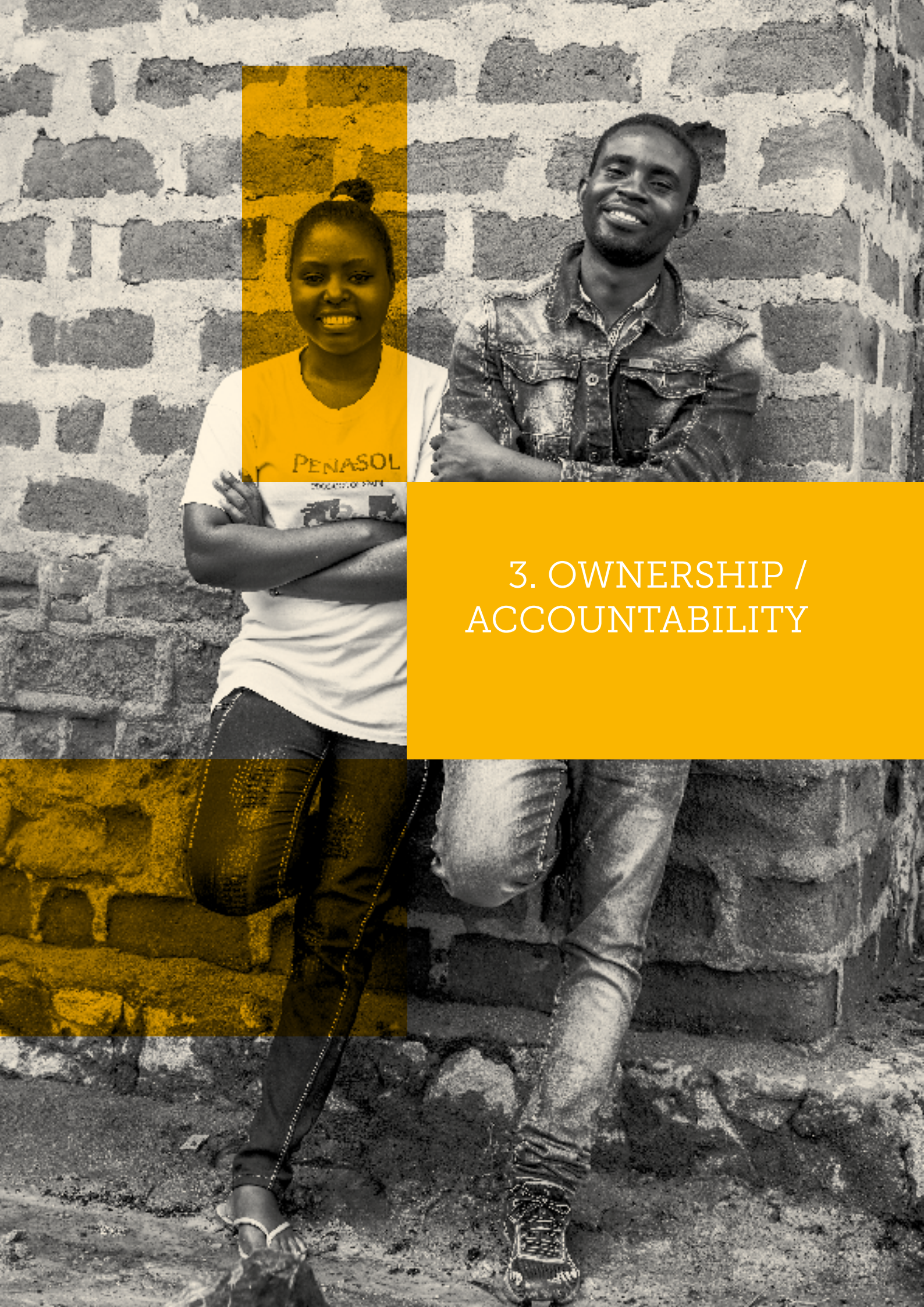
Every contact will first be assessed for active TB; only when active TB has been ruled out will assessment for TBI become relevant. Children under 5 years of age who are household or close contacts of people with TB and who, after an appropriate clinical evaluation, are found not to have active TB should be treated for presumptive TBI with TPT, as per WHO guidelines, without performing TBI testing. The same applies to contacts who are PLHIV. Diagnostics used to test people for TBI include the TBT and interferon-gamma release assay (IGRA).

HIV testing and TBI

In high prevalence settings, ALL household and close contacts should be counselled and tested for HIV as part of their clinical evaluation (irrespective of the HIV status of the index patient). This is also recommended for low prevalence settings, although evidence is still sparse. In all countries, contacts of index cases who are positive not only for TB but also for HIV need to receive counselling and testing for HIV. If any of the contacts of a TB case are known to have HIV, they should receive treatment for presumptive TBI after active TB has been ruled out.

Key decisions and considerations for contact investigation | Table 4.

Key decisions	Effect on yield	Main considerations
Step 3: Decide on access to the contacts		
Invitation of contacts to a health centre by index case or conducting home visits	Home visits will likely have a higher yield, but alternatives, such as using phone calls/ messaging can improve yield in case home visits are not possible.	• Human resource availability • Cultural acceptability of home visits • Home visits should be prioritized for index cases (MDR-TB, children <5, PLHIV) or index cases living in places without access to a health centre
Outreach/ mobile or facility-based interventions	For hard-to-reach populations, the highest yield will be with outreach.	• Outreach will be periodic per definition. It can be combined with facility-based contact investigation and/or other outreach activities.
Step 4: Decide on the staffing		
Volunteers or professionals	As long as contact investigators are trained, either could work.	• Availability of (trained) health workers and community resources
Step 5: Determine the timing of the screening		
Ongoing contact investigation or periodic screening	Ongoing investigations, when well implemented, have a shorter time between diagnosis of the index case and contact investigation, and this seems preferable. However, regular periodic investigations may have similar yields with logistical advantages.	• Local diagnostic options • Human resource availability • In areas with low population density and bad road conditions, clustering home visits will facilitate logistics
One time only or repeat screenings of contacts	Repeat screenings will give a higher yield, but more tests will need to be performed.	• The percentage of contacts screened that have TB will become lower with each round of screening, and re-screening of contacts may not be cost-effective compared to other activities.
Step 6: Contact (clinical) evaluation and treatment		
Testing all contacts or symptomatic contacts with presumptive TB	Testing all contacts will give a higher yield, but more tests will need to be done.	• Sensitivity of the screening definition • Symptom check by index or trained resource person • Prevalence survey results (% of cases with no TB-specific symptoms) • Prevalence of HIV/MDR-TB
Use of CXR or not	Use of CXR will likely lead to higher yields.	• National protocols, available machines & access to CXR, high risk groups for B- TB



3. OWNERSHIP / ACCOUNTABILITY

3. OWNERSHIP / ACCOUNTABILITY

Contact investigation cannot and should not be performed without the support of the NTP, and will normally fall under the responsibility of the NTP and/or Ministry of Health (MoH). The NTP or the relevant entity in charge of TB activities needs to develop clear guidelines, standard operating procedures (SOPs) and algorithms for implementing TB contact investigation activities, and include them in the national strategic plan established for TB prevention, care and control. **The goal of all implementers should be to integrate contact investigation into the routine TB services.** Even when nongovernmental organizations (NGOs) take on part of these activities, the NTP should help to ensure that regional, provincial and local TB managers support the intervention and that sufficient diagnostic services (e.g. Xpert cartridges) and treatments for adults, children and those needing TPT are available.

In addition to the NTP, the national HIV programme is an important stakeholder, especially in settings with high HIV prevalence. Screening efforts for HIV and TB should be aligned where possible, and HIV-specialized staff can assist in counselling and testing for HIV among contacts of index cases who are PLHIV. The Ministry of Finance is likely another important stakeholder along with major donors (see next section).

In districts/regions where contact investigation has started, local TB managers can be involved in defining close contacts in their settings, for example, in relation to regional workplaces or institutions. Health centre staff will likely face extra work. Therefore, buy-in of the health centre management and staff is important to start the intervention. Laboratories need to be involved in the planning of the screening, as do (children's) hospitals, which may have to provide additional diagnostic support and specialized treatments.

Outside the health sector, the local authorities may need to be involved when planning home visits or outreach activities. Local authorities can help motivate people to participate and support the home visitors. In many instances, local politicians may also need information to help support the intervention, although the intervention itself is best left apolitical. Community councils can provide advice on planning for outreach activities and help to sensitize the population if there are doubts about the intervention. TB survivors can play a role in planning the intervention and taking part in contact-screening activities. In many settings, local volunteers or HCWs may play a role in treating identified patients via (community) DOT and may also assist in providing other kinds of (social) support to affected families. Community members can also be involved in supporting activities for the contact investigation, such as continuous education to address stigma and fears that may be present in the community.

The results of contact investigation should be carefully monitored, and information on the yield of the activities should be fed back to all stakeholders. Stakeholders can help to address the issues identified via M&E interventions.

4. RESOURCE CONSIDERATIONS / MAJOR COSTS

4. RESOURCE CONSIDERATIONS / MAJOR COSTS

Contact investigation will result in indirect costs for the programme, patients and caregivers. There will also be direct medical costs related to diagnosis, outpatient visits and treatment. The costs per case will be highly context-specific and are often hard to estimate, as contact investigation is usually combined with other strategies. In a modelling study in Uganda (21), the cost per additional TB case detected through passive case finding combined with household contact investigation through home visits took into account all costs (including costs for patients and caregivers). Most of the costs were provider-based costs, with medical costs constituting the highest cost category for household contact investigation, including items such as tests, medicines and outpatient visits. Programmatic costs included administration, salaries, transportation and communications. Depending on the intervention model, costs may further include transportation, patient and staff enablers, and costing of mobile teams.

As indicated above, the costs incurred by patients and caregivers should be minimized. However, loss of work time may still lead to financial losses, despite transportation reimbursements and household-centred services.

It is important that budget be allocated from long-term grants and/or the national budget, although smaller grants can be used for pilots and innovative approaches or research activities related to the pilots. Costs will need to be factored into each decision that needs to be made (Table 4). When considering costs per case, the percentage yield (i.e. identified cases per contacts screened) will give a rough indication of cost-effectiveness, especially when compared to screening costs. Repeat screenings will also increase the yield, but give a lower percentage yield and higher costs per case with each additional round of screening. Larger numbers of people screened per household seem to lead to lower percentage yields (5).

The cost-effectiveness of screening for TBI among contacts in LMICs is not yet clear. A review of migrant screening in high-income countries showed that it was cost-effective for contacts of TB patients among migrants (22).

To find the most (cost) effective organization of contact investigation in a country, it may be wise to start with a pilot in several regions, testing several different models before national scale-up.

Dropout of contacts during the screening process will also likely increase the costs per case. M&E is therefore crucial to identify inefficiencies in the screening process and strategies to improve cost-effectiveness. In a modelling study in sub-Saharan Africa, the cost-effectiveness of passive case finding with systematic household contact investigation was found to be more favourable compared to passive case finding combined with active case finding among the general population (door-to-door screenings) (21).

5. MONITORING & EVALUATION

5. MONITORING & EVALUATION

M&E is important for assessing the level of implementation of TB contact investigation with respect to what was expected or planned, evaluating the effectiveness of the intervention, identifying weaknesses in the implementation approach, and improving the intervention. M&E can also be used to motivate staff and justify the intervention. Much effort will go into the implementation of the activities, but the budget and time to design a proper data collection and M&E system along the screening cascade should be allocated, as this will impact the long-term success of the intervention.

The M&E system should be integrated into the general NTP M&E reporting and recording system. The NTP should avoid organizing a separate M&E system for contact investigation, although some indicators will likely need to be added to the existing system (see section 5.1 below).

Box 5 presents an example from Ghana on how process monitoring can help to identify weaknesses in the intervention set-up. The key problem is often that TB registers at health facilities are not designed to keep records for contact investigation. This may result in a low percentage of contacts actually screened and delayed access to care for contacts with TB. Setting up a specific contact investigation register may be useful and will facilitate follow-up efforts. An example form for household contact investigation is shown in Annex 2 of this field guide. This form should be adapted to the local context. For example, questions may be added about relevant high-risk groups like miners or diabetics. The forms can also be used as an interview guide with training on how to talk to an index case.

Another challenge in M&E may be that other active case finding activities are implemented in the same area and therefore it may not always be easy to attribute cases to contact investigation. Once indicators have been selected and defined, data collection methods and forms have been designed, and staff have been trained on the system, a further point of attention will be the monitoring of data quality during implementation (see also the M&E section of the introductory field guide in this series). Checking and improving data quality will involve monitoring visits to health clinics as well as checking databases for logical errors and data completeness.

Box 5. EXAMPLE FROM THE FIELD: STANDARDIZED TUBERCULOSIS CONTACT INVESTIGATION IN GHANA (23)

There was no structured way of conducting contact investigation in Ghana until this intervention was prioritized in the TB strategic plan. Consequently, the NTP introduced operating guidelines for conducting contact investigation and training for health facility staff, which were first implemented in June 2010 in 10 facilities in Accra, the capital city.

Index cases: Cases diagnosed with B+, B- or EPTB

Contacts: Household contacts of the index case who were living together in the same house, sharing the same housekeeping arrangements and eating together (no timeframe specified)

Box 5.

Screening and diagnosis: Either CHWs conducted home visits or the index and contacts could come to the health centre for scoring via a questionnaire. Two sputum samples from symptomatic contacts were investigated via smear microscopy. B- contacts were offered CXR and clinical assessment. Child contacts were referred to a clinician to indicate preventive or curative treatment.

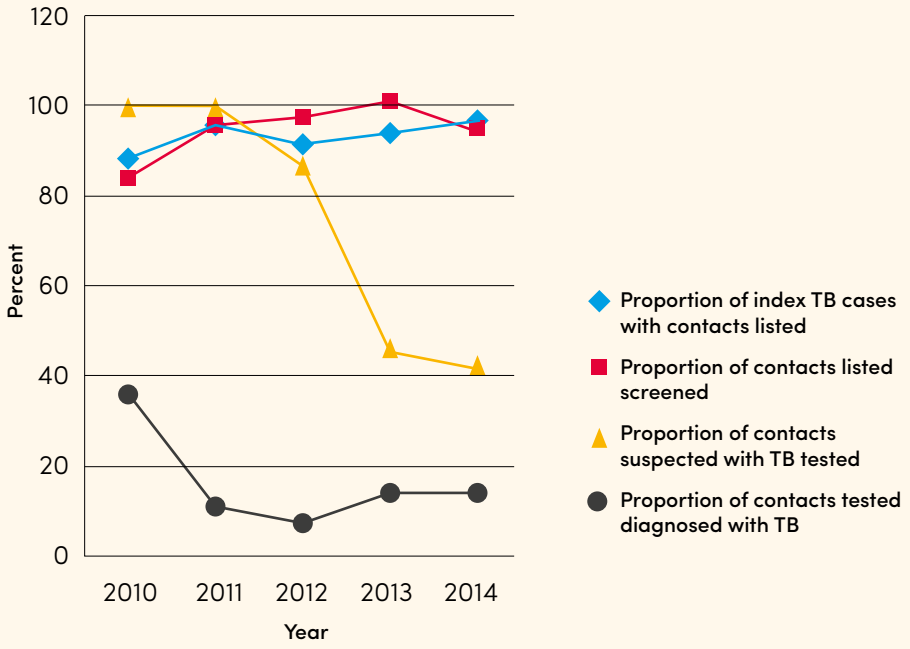
Monitoring framework: Indicators A to F of the list in Section 5.1 were collected. A questionnaire was used for screening contacts along with a monthly contact investigation reporting form for health centre staff. A contact investigation register was kept by the NTP. Relevant proportions were analysed for the key indicators for 2010–2014.

Outcomes

The NNS was 154 and the NNT was 8. A summary of key indicators is given below:

- Number of index cases 3,505
- Number TB index cases reached 3,267 (93%)
- Number of contacts identified per index) 8,519 (2.5
- Number of contacts undergoing symptom screening 8,166 (96%)
- Contacts suspected to have TB 614 (7.5%)
- Contacts tested/evaluated for TB 438 (71%)
- Number of diagnosed TB cases (All forms) 63 (26 B+)

The proportions were calculated over the years:



Box 5.

Successes and challenges

After the initial training and also over the years, contact identification and prioritization were satisfactory. The yield would likely have been higher if the intervention had focused on all contacts rather than only on symptomatic contacts, and if more sensitive diagnostic tools had been used instead of smear microscopy. The intervention aligned with routine NTP practices such as home verification of TB before initiation of treatment, which likely contributed to good outcomes.

The proportion of contacts tested dropped by more than 50% in 2013, which may have been due to issues in the referral system and laboratory diagnostic services, resulting in limited follow-up of presumptive TB cases. Age-disaggregated data were felt to be missing and, as such, child contact investigation could not be evaluated separately. Likewise, HIV status was not recorded, sex was unavailable for most indicators, start on TPT was not recorded, and MDR-TB was not diagnosed. As a result, meaningful analysis of outcomes in specific groups was not possible. Evaluating M&E results over time can highlight important issues in the screening cascade, such as the need to re-train staff or the need to improve diagnostics or remove other barriers.

5.1 M&E indicators

In order to evaluate contact investigation, standard indicators should be used (24).

Relevant indicators include:

A. *Number of index patients eligible for contact investigation*

B. *Number of index patients for whom contact investigation was done*

C. *Number of contacts identified, disaggregated by age group (<5, 5>) and HIV status*

D. *Number of contacts reached/ verbally tested*

E. *Number of contacts tested via diagnostic tool (per test)*

F. *Number of contacts diagnosed (disaggregated by B+ and all forms)*

G. *Number of contacts put on TB treatment (disaggregated by B+ and all forms)*

H. *Number of contacts successfully treated*

When TPT is included in the intervention, the following indicators should be added:

I. *Number of contacts eligible for TPT*

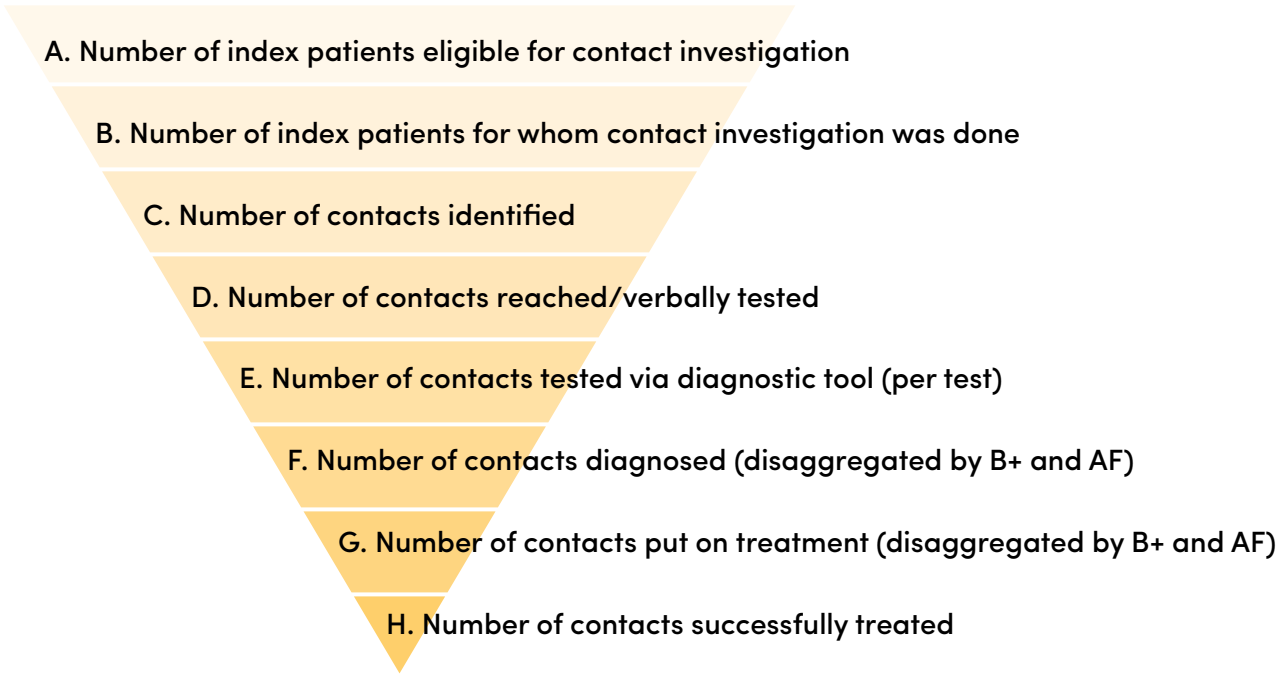
J. *Number of contacts commenced on TPT*

K. *Number of children aged <5 years eligible for TPT*

L. *Number of children aged <5 years commenced on TPT*

M. *Number of PLHIV commenced on TPT*

Figure 3. Indicators in screening cascade



Disaggregation of data per health centre/district, per priority group (e.g. children <5, MDR-TB, PLHIV) and by gender is recommended to facilitate the evaluation and optimization of activities for each of these groups, for different regions or for urban/rural areas.

When defining the indicators, it should be taken into account that a number of index patients might not have any contacts eligible for contact investigation. They may live alone or their contacts may already be on treatment. These individuals can therefore be excluded from Indicator A.

When defining Indicator C, 'number of contacts identified', contacts who are already undergoing treatment can be excluded. Alternatively, an extra indicator can be added: 'number of contacts eligible for screening.'

5.2 Interpreting the indicators

At the outset of the intervention, a realistic estimation should be made for each of these indicators based on experience of similar interventions, pilot studies or evidence-informed assumptions. These estimations can be used as targets against which to evaluate the intervention once it is running.

Percentages/proportions can be calculated using these indicators. Table 5 highlights some important percentages for monitoring purposes. The column 'what to expect' is based primarily on a comparative meta-analysis of TB contact investigation interventions in 11 high-burden countries (5). An evaluation of drop-outs in contact investigation in Uganda found that the probability of completing the entire screening cascade was 5%, and that improvements were needed in the proportion of eligible index cases on which contact investigation was based, as well as the proportion of contacts completing evaluation (25).

Table 5. Interpreting M&E indicators

Proportion/ ratios	What to expect	Main considerations
Proportion of eligible index cases on whom contact investigation is based (B/A)	One should aim for high coverage to maximize the yield. Coverage of index cases varied widely from 2.8% to 91.7% in 19 interventions.	If the proportion is lower than expected, more effort should be made to motivate staff or a different modality should be chosen (e.g. interviewing index cases at diagnosis rather than later).
Number of contacts identified per index case (C/B)	Rarely more than five household contacts are included. Can add many more if other close contacts like neighbourhood contacts are included.	If the number of contacts is high, the definition of contacts may be too wide and the programme might consider restricting the definition of 'close contact'. DHS surveys or census reports are good sources for average household size.
Proportion of contacts screened (D/C)	The proportion of identified contacts who were screened ranged from 42.9% to 100%.	If the proportion of contacts screened is lower than expected, a different mode of engagement may be considered (e.g. home visits instead of invitation by the index case). The timing of home visits may not be optimal, or contacts may not have access to screening facilities or are reluctant to be screened; education may have to be implemented. See step 3.
Percentage of contacts who submitted a sputum sample for testing (E/D depending on algorithm per step)	This percentage ranged from 13.6% to 93.4%.	• If this percentage is too low, instructions for sputum collection may not be clear and/or sputum transport may be an issue. • If one chooses to test sputum of all contacts, regardless of having symptoms, this proportion is not relevant and the denominator should be changed to all screened contacts.
Proportion of contacts referred for CXR, undergoing CXR screening (E/D depending on algorithm per step)	Highly dependent on where CXR is placed. Nearly 100% in mobile outreach, but may be near 0 if patients need to go to a referral hospital.	Transport enablers or assistance of volunteers or health staff may be necessary to ensure that people receive CXR. If CXR is used only for B- people with persistent symptoms, no estimate may exist on how many are referred. One may instead calculate how many B- people have received CXR. If this is low, then this also gives an indication that B- TB might be missed.
Proportion of contacts who submitted sputum with B+ TB and with TB all forms (F/D)	Seldom more than 2.5 % for B+. This proportion is lower in active case finding compared to passive case finding; higher when using GeneXpert compared to microscopy; higher when using a more restrictive screening algorithm.	If too low, this may be because of issues with sputum quality, quality of laboratory services, or identification of contacts.

Proportion/ ratios	What to expect	Main considerations
Number needed to screen (number of contacts needed to be screened to find one case of tuberculosis) (D/F)	NNS varied from 16 to 316 for B+ TB; from 21 to 164 for all forms of TB.	Patients may drop out of the screening process, the diagnostic algorithm might need to be adapted, the contacts from index cases were diagnosed long ago, or rescreening is done too frequently. Close contacts defined are not at high risk.
Proportion of cases identified starting treatment (G/F)	LTFU at this stage should be minimal, although some cases may die before treatment initiation.	If people are not put on treatment, attention should be given to follow-up. Incentives may be considered for putting patients on treatment. Treatment shortages may play a role.
Proportion of cases who successfully completed treatment (H/G)	Should be at least the same as the regular TSR in the area and preferably at least 85%. Can only be estimated after minimum 6 months.	If too low, modalities like community DOT should be explored.
Proportion of cases identified through contact investigation among all notifications in the area	Ranging from under 1% to 14.1% of all cases notified in the intervention area having been identified through contact investigation, with a pooled estimate of 1.8%.	If this is low, the coverage of index cases may be too low. Percentage of contacts screened may be too low.
Proportion of contacts eligible for TPT who were put on treatment (J/I)	LTFU at this stage should be minimal.	If it is low, the protocols on TPT should be reviewed. Follow-up/staff training may be needed and/or medication stocks should be checked.
Proportion of contacts <5 years eligible for TPT who were put on treatment (L/K)	LTFU at this stage should be minimal.	If it is low, the protocols on TPT should be reviewed. Follow-up/staff training may be needed and/or medication stocks should be checked.

Besides looking at programme-specific indicators, it is worth evaluating whether and by how much the contact investigation activities have really increased case notifications. The proportion of cases identified through contact investigation among all notifications in the area does not really provide this perspective, as some of those cases would have been identified in the absence of the intervention. The M&E section of the introductory field guide gives more information on how to select an 'evaluation population' and a 'control population', and how to compare the baseline with the intervention period. As already mentioned in the 'what to expect' column of Table 5, the increase in notifications is usually modest (for B+ TB, <1% to max 15%).

Feedback

To ensure local use and real-time programme improvements, the M&E data should be shared with relevant stakeholders and people involved in the screening. They may know how to improve the impact of the intervention based on this real-time feedback. Comparison between regions can also be made, and successful regions can share experiences and examples of how they reached their targets. Other regions can share challenges. Feedback to implementers is best given frequently or even continuously via online resources. Regular meeting can be organized to discuss the interpretation and plan for adjustments in the strategy. More comprehensive reports for non-implementing stakeholders can be organized periodically.

6. KNOWLEDGE GAPS AND SUGGESTIONS FOR OPERATIONAL RESEARCH

6. KNOWLEDGE GAPS AND SUGGESTIONS FOR OPERATIONAL RESEARCH

Despite contact investigation being a universally recommended activity in active case detection, systematic implementation of contact investigation under routine programmatic conditions is still relatively rare and the quality of evidence for some WHO recommendations is labelled as "low". In addition, as noted above, there is significant heterogeneity across contact investigation activities.

Additional operational research questions could better inform the planning and implementation of contact investigation, including:

- Does the identification and evaluation of contacts reduce TB incidence in the selected population?
- What is the importance of prioritizing contacts of smear-negative TB or EPTB cases?
- How can index cases and contacts best be prioritized in settings of high HIV prevalence?
- How should contact investigation be prioritized when the index case has DR-TB?
- How feasible is it to develop digital health interventions, e.g. using text messaging for screening of contacts and relaying results?
- What is the effect of using modern diagnostics on the impact of contact investigation interventions?
- How can TB contact investigation be effectively integrated with screening for other (non) communicable diseases?
- Will preventive treatment be given to HIV-negative adult contacts of DR-TB index cases in LMICs?

7. RESOURCES

There are generic guidelines on contact investigation for Europe and the United States. For LMICs, the main international guidelines and relevant reviews are:

1. TB CARE I "Recommendations for Investigating Contacts of Persons with Infectious Tuberculosis in Low- and Middle-Income Countries: Adaptation and Implementation Guide" (1)
2. WHO "Recommendations for Investigating Contacts of Persons with Infectious Tuberculosis in Low- and Middle-Income Countries" (3)
3. Fox et al. "Contact Investigation for Tuberculosis: A Systematic Review and Meta-Analysis" (4)
4. Blok et al. "Comparative Meta-Analysis of Tuberculosis Contact Investigation Interventions in Eleven High Burden Countries" (5)
5. Contact investigation form, supplementary material to Mandalakas et al. "BUTIMBA: Intensifying the Hunt for Child TB in Swaziland through Contact Tracing" https://doi.org/10.1371/journal.pone.0169769.s001 (7)
6. Szkwarko et al. "Child Contact Management in High Tuberculosis Burden Countries: A Mixed-Methods Systematic Review" (12)
7. Morrison at al., "Tuberculosis and Latent Tuberculosis Infection in Close Contacts of People with Pulmonary Tuberculosis in Low-Income and Middle-Income Countries: A Systematic Review and Meta-Analysis" (26)

More resources can be found in the annexes.

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ANNEXES

Annex 1.

Example outline of a contact investigation programme plan

1. Goal and objectives of the programme
2. Definitions for contact investigation used
3. Roles and responsibilities per health cadre
4. List of activities required for tuberculosis contact investigation, indicating activity, who is responsible, the forms and location of the activity
5. Protocols for each contact investigation activity, indicating who is responsible for the activity, what resources are needed, what procedures are to be followed in diverse situations, and links to relevant other protocols on treatment of laboratory referrals. Examples of activities:
    - New index case diagnosed at clinic
    - Index case interviewed for roster of household contacts
    - Home visit and household assessment
    - Follow-up to determine if those referred actually went to the clinic
    - 1-month follow-up visit to household
6. Data recording and reporting forms:
    - Contact investigation form
    - Referral form
    - Monthly reporting form contact tracer
7. Training plan
8. Monitoring and evaluation plan
9. Implementation plan
10. Operational research (optional)

TUBERCULOSIS HOUSEHOLD CONTACT INVESTIGATION FORM

Index Case Study ID _____ Index Case TB Type: □ SS+ □ SS- □ EPT Index Case HIV: □ R □ NR □ UNKNOWN/NOT TESTED

Index Case Name _____ Date of Index Case Diagnosis: __ __ / __ __ / __ __ __ __ (D D M M Y Y Y Y)

Clinic / District where Index Case was Diagnosed: _____

TB Contact Investigator (TBCI) Name: _____ Date of household visit: __ __ / __ __ / __ __ __ __ (D D M M Y Y Y Y)

Contact Number	Contact name *(First name, Surname)*	Age	Sex *(M, F)*	Contact Found? Date contact screened *(DD/MM/YYYY)*	Cough? *(circle)*	If YES to Cough:	Fever?	Weight loss? (>3kgs/ mth)	Abnormal night sweats? (past 4 wks)	Swelling or lumps? (neck, arm pits, groin)	Prior TB?	HIV? *(Reactive, Non-reactive, Unknown, not tested)*	Contact referred for evaluation?	Contact sought evaluation?	Contact positive for TB? TB Registry Number
1			M F	Contact found? YES NO Date screened? __/__/____	YES NO	How long? □ <1 wk □ 1-3 wks □ 3 wks – 1 yr □ >1 yr Coughing blood? YES NO	YES NO If fever, how long? ____days	YES NO	YES NO	YES NO	YES NO	R NR UNK NT	YES NO	YES NO	YES NO Registry #: _____ Date diagnosed? __ / __ /____
2			M F	Contact found? YES NO Date screened? __/__/____	YES NO	How long? □ <1 wk □ 1-3 wks □ 3 wks – 1 yr □ >1 yr Coughing blood? YES NO	YES NO If fever, how long? ____days	YES NO	YES NO	YES NO	YES NO	R NR UNK NT	YES NO	YES NO	YES NO Registry #: _____ Date diagnosed? __ / __ /____
3			M F	Contact found? YES NO Date screened? __/__/____	YES NO	How long? □ <1 wk □ 1-3 wks □ 3 wks – 1 yr □ >1 yr Coughing blood? YES NO	YES NO If fever, how long? ____days	YES NO	YES NO	YES NO	YES NO	R NR UNK NT	YES NO	YES NO	YES NO Registry #: _____ Date diagnosed? __ / __ /____
4			M F	Contact found? YES NO Date screened? __/__/____	YES NO	How long? □ <1 wk □ 1-3 wks □ 3 wks – 1 yr □ >1 yr Coughing blood? YES NO	YES NO If fever, how long? ____days	YES NO	YES NO	YES NO	YES NO	R NR UNK NT	YES NO	YES NO	YES NO Registry #: _____ Date diagnosed? __ / __ /____

Available from: http://www.currytbcenter.ucsf.edu/sites/default/files/contact_investigation_implementation_guide_2015_final.pdf (1)

DET Page Number:_____ **BMU:** _____ **Baylor EMR :** _____ ☐N/A

BUTIMBA: TB REACH FAMILY MAPPING TOOL

Has anyone in the household been employed as a miner? ☐Yes ☐No **Verbal consent obtained for home visit:** ☐Yes ☐No **Date of home visit:**_____

Name of IC: _____ **IC's TB Register Number:**_____ **Date FMT Completed:**_____

Death in home in prior 2 years: ☐Yes ☐No *(If yes, cause: ☐TB ☐HIV ☐Other illness ☐Accident ☐Other)* **IC's DOB:**_____ **IC's Sex:** ☐M ☐F

IC's HIV Status: ☐NR ☐R ☐Unk **IC's Phone Number:**_____

IC's GXP: ☐Not Done ☐MTB Detected ☐MTB Not Detected ("ND") ☐Indeterminate/Invalid *(If MTB Detected: ☐Rif Resistance Detected ☐Rif Resistance NOT Detected)*

IC's Smear: ☐Not Done ☐3+ ☐2+ ☐1+ ☐Scanty ☐Negative (Date Test Result Received: _____)

IC's Culture: ☐Not Done ☐Pending ☐Negative ☐Positive (Date Results Rec'd:_____) *(If positive, DST results: Rif* ☐S ☐R */ INH* ☐S ☐R */ Eth* ☐S ☐R */ Strepto* ☐S ☐R*)*

IC's CXR: ☐Not Done ☐Positive ☐Negative/Normal (Date of CXR: _____)

Please list all living in the household that are:

Under 5 Years Old

Name and Surname	DOB (DD/MM/YYYY)	Sex		Rel to IC		Sleep Location Compared to IC				TB Screen Questions			TB Scrn		HIV Status			On TB Tx		Ref to Clinic		Sputum Collected					IPT Start Date
		M	F	Child	Other	Same bed	Same room	Same house	Different house	Cough	Fever x ≥2 wks	Poor wt gain/FTT	P	N	R	NR	?	Y	N	Y	N	Yes, at facility	Yes, at home visit	No	If yes, date sputum collected	Tick if GA, NPA or IS	

***Please remember to update TB Screen "Date screening positive" in the DET.*

Update FMT Date: Cough Monitor:

5 - 14 Years Old

Name and Surname	DOB (DD/MM/YYYY)	Sex		Relation to IC			Sleep Location Compared to IC				TB Screen Questions			TB Scrn		HIV Status			On TB Tx		Ref to Clinic		Sputum Collected					Contact Number
		M	F	Parent/Caregiver	Child	Other	Same bed	Same room	Same house	Different house	Cough	Fever x ≥2 wks	Poor wt gain/FTT	P	N	R	NR	?	Y	N	Y	N	Yes, at facility	Yes, at HV	No	If yes, date sputum collected	Tick if GA, NPA or IS	

***Please remember to update TB Screen "Date screening positive" in the DET.*

15+ Years Old

Name and Surname	DOB (DD/MM/YYYY)	Sex		Relation to IC			Sleep Location Compared to IC				TB Screen Questions			TB Scrn		HIV Status			On TB Tx		Ref to Clnc		Sputum Collected					Contact Number
		M	F	Parent/Caregiver	Child	Other	Same bed	Same room	Same house	Different house	Cough	Fever x ≥2 wks	Nt Swts x ≥2 wks	P	N	R	NR	?	Y	N	Y	N	Yes, at facility	Yes, at HV	No	If yes, date sputum collected	Tick if GA, NPA or IS	

***Please remember to update TB Screen "Date screening positive" in the DET.*

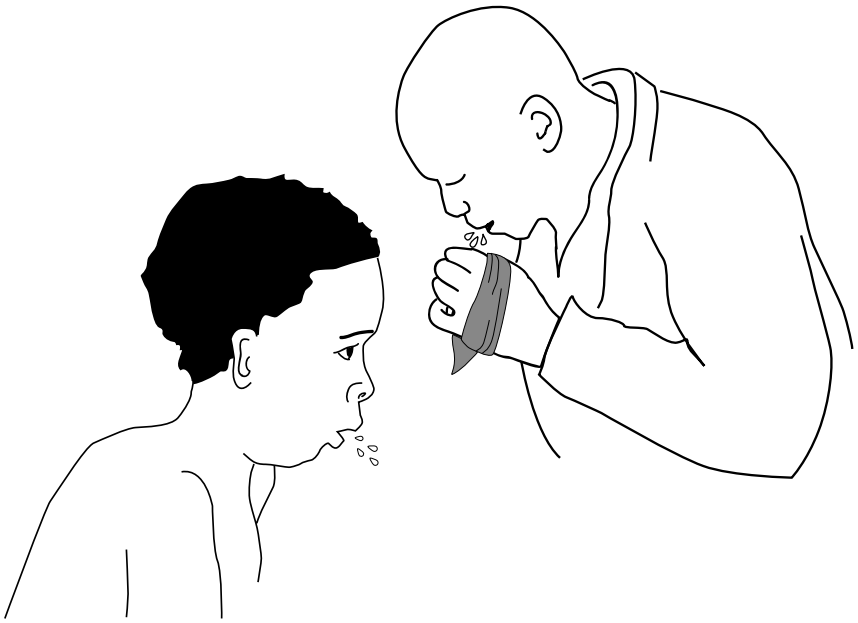
CM's Initials: _____ **TB Nurse's Initials:** _____ FMT cross-checked with DET: _____ (initials), Date: _____

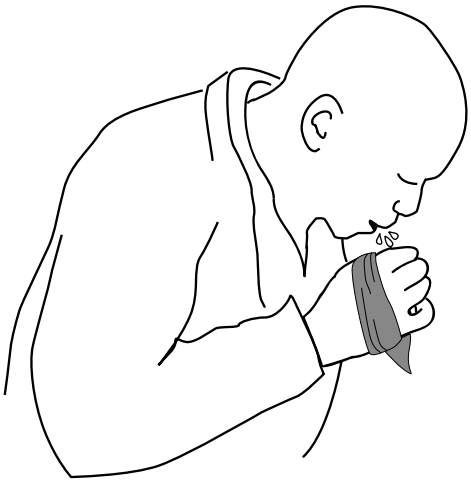
Available from: https://doi.org/10.1371/journal.pone.0169769.s001 (7)

Annex 2. Examples of IEC materials

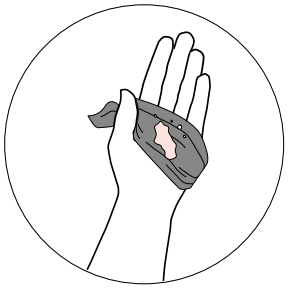
Examples to aid in screening the symptoms of TB contacts and taking their contact history (1)

Have you had a cough?

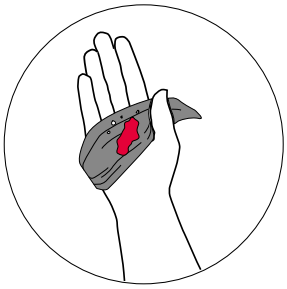




Are you coughing up blood or blood -stained sputum?

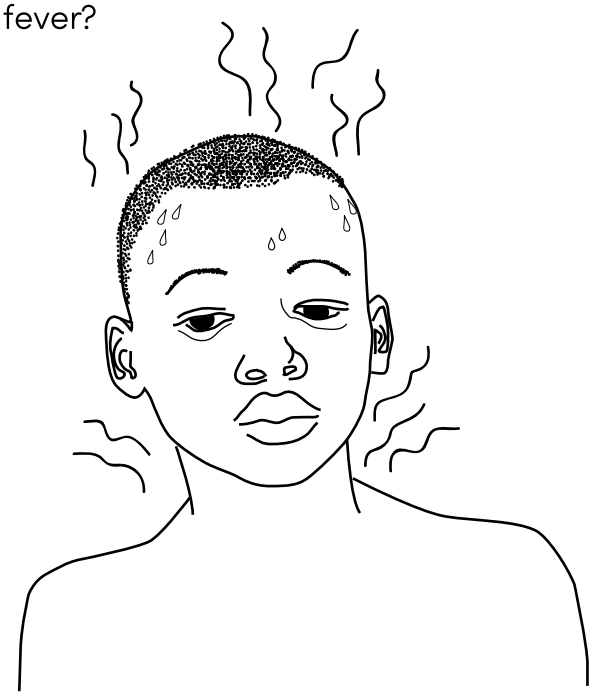


Sputum

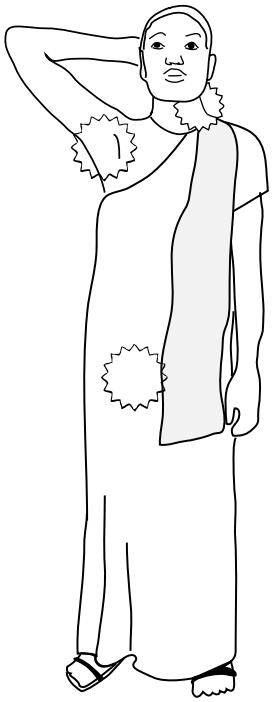


Blood-stained

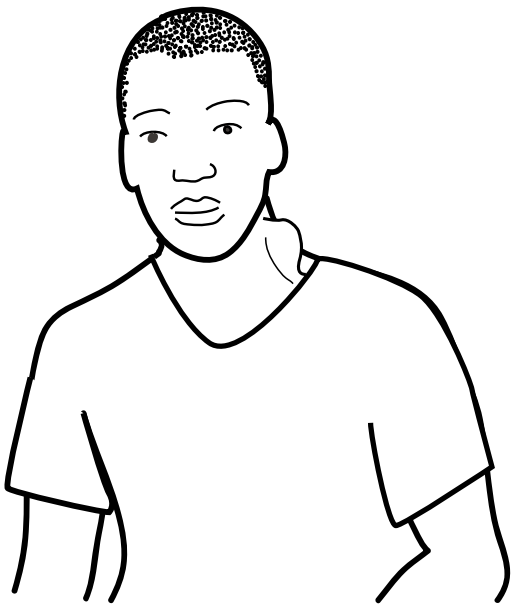
Have you had a fever?



Have you been sweating at night for 3 or more weeks in the last 4 weeks?

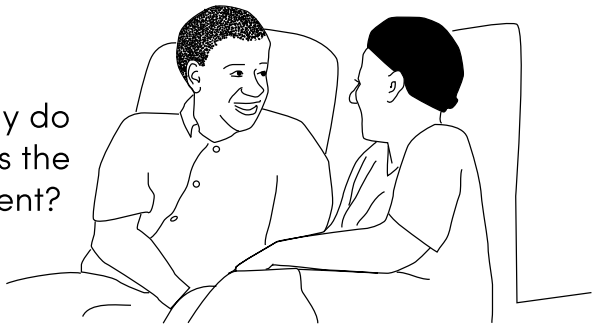


Have you noticed any swelling and/or lumps on your neck, armpit or groin?



Do you share a bed with the tuberculosis patient?

How much time in one day do you spend in the same room as the tuberculosis patient?



Example of education material for infection control at home used in a TB REACH project in Wave 4 in Chennai, India.

This document is one in a series of 11 field guides produced by Stop TB Partnership in collaboration with the Global Fund to Fight AIDS, Tuberculosis and Malaria, Interactive Research and Development Global (IRD), KIT Royal Tropical Institute, and multiple global experts and implementation partners. The field guides rely on practical experiences and expertise of implementers and are meant to help national TB programmes and other TB programme managers to identify the best strategies for finding people with TB who are missed by routine health services.

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