FINDING
MISSING PEOPLE
WITH TB
IN COMMUNITIES

3

STOP TB FIELD GUIDE

Stop TB Partnership

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StopTB Field guide 3: Finding missing people with TB in communities

Global Health Campus
Chemin du Pommier 40
1218 Le Grand-Saconnex
Geneva, Switzerland

Design: Miguel Bernal and Diana Schwalb
Photo credits: Miguel Bernal, Shehzad Noorani, Sam Nuttall, Stella Rajagukguk and Vanessa Vick

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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 have been produced as part of the Global Fund's Strategic Initiative on TB to help find the people with TB currently missed. These guides rely on practical experiences and expertise of implementers. Much guidance exists on what to do, but in the TB response, the 'how to' is often missed. These guides are meant to help national TB programmes and partners to design and implement interventions that will improve TB case detection and reach more of the people with TB who are currently missed.

This document should be used as a collection of considerations, tools, experiences and examples that highlight successes and challenges in implementing effective community case-finding interventions and may assist in their planning and implementation. Community case finding can be more complex and resource-intensive than other approaches. At the same time, community-level buy-in and well-managed collaborations may guarantee access to TB services for previously unreached communities and long term impact. This field guide is central to the work of Stop TB Partnership and TB REACH and serves as a basis for planning community-based interventions.

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 in published literature, examples are provided by TB REACH.

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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.

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The writing of these field guides was coordinated by Marina Smelyanskaya, under the guidance of Jacob Creswell. The core writing team consisted of (in alphabetical order) Mirjam I Bakker, Lucie Blok Andrew J Codlin, Jacob Creswell, Lisanne Gerstel, Ali Habib, Manjot Kaur, Liesl PageShipp, and Marina Smelyanskaya. Many others contributed to writing sections of different guides as well as reviewing them. A list of the writers and reviewers is presented below.

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- Ramya Ananthakrishnan, REACH (Resource Group for Education and Advocacy for Community Health) India
- Sandra Alba, KIT Royal Tropical Institute, Netherlands
- Uliane Appolinario, The Global Fund to Fight AIDS, Tuberculosis and Malaria, Switzerland
- Mirjam I. Bakker, KIT Royal Tropical Institute, Netherlands
- Mercedes Becerra, Harvard Medical School, USA
- Stela Bivol, Center for Health Policies and Studies, Moldova
- Lucie Blok, KIT Royal Tropical Institute, Netherlands
- Frank Bonsu, National Tuberculoses Control Programme , Ghana
- E. Jane Carter, Warren Alpert Medical School, Brown University, USA
- Andre J Codlin, Friends for International TB Relief, Vietnam
- Jacob Creswell, Stop TB Partnership, Switzerland
- Luis Cuevas, Liverpool School of Tropical Medicine, UK
- Salah Edine-Ottmani, Morocco
- Carlton Evans, Innovación Por la Salud Y Desarrollo (IPSYD), Asociación Benéfica PRISMA, Perú
- Elizabeth Fair, Curry International Tuberculosis Center, University of California, San Francisco, USA
- Lisanne Gerstel, KIT Royal Tropical Institute, Netherlands
- Elmira Gurbanova, WHO, Azerbaijan
- Dr. Stephen John, Janna Health Foundation, Nigeria
- Peter Hansen, The Global Fund to Fight AIDS, Tuberculosis and Malaria, Switzerland
- Kyung Hyun Oh, Head, Korean Institute of Tuberculosis, Korea

- Kekeletso Kao, FIND, Switzerland
- Manjot Kaur, Interactive Research and Development, India
- Aamir Khan Executive Director, International Research and Development Global, Pakistan
- Amera Khan, Technical Officer, Stop TB Partnership, Switzerland
- Daniele Chaves Kuhleis, Brazil
- Daisy Lekharu, The Global Fund to Fight AIDS, Tuberculosis and Malaria, Switzerland
- Lynette Mabote, AIDS and Rights Alliance for Southern Africa (ARASA), South Africa
- Farihah Malik, Pakistan
- Anna Mandalakas, Baylor College of Medicine and Texas Children's Hospital, USA
- Enos Masini, WHO, Kenya
- Thulani Mbatha, Interactive Research and Development, South Africa
- Christina Mergenthaler, KIT Royal Tropical Institute, Netherlands
- Peter Mok, Independent Consultant, Malaysia
- Monde Muyoyeta, Centre for Infectious Disease Research in Zambia
- Sreenivas Nair, Stop TB Partnership, Switzerland
- Sode Novatus Matiku, New Dimension Consulting (NEDICO), Tanzania
- Drusilla Nyaboke, Republic of Kenya National Tuberculosis, Leprosy and Lung Disease Program, Kenya
- Chidubem Ogbudebe, KNCV Tuberculosis Foundation, Nigeria
- Madhukar Pai, McGill Global Health Programs, McGill International TB Centre, Canada
- Liesl PageShipp, Interactive Research and Development, South Africa
- Zhi Zhen Qin, Stop TB Partnership, Switzerland
- Oriol Ramis, Spain
- M. D'Arcy Richardson, USA
- Ataulhaq Sanaie, UK
- Melissa Sander, Tuberculosis Reference Laboratory Bamenda, Cameroon
- Anna Scardigli, The Global Fund to Fight AIDS, Tuberculosis and Malaria, Switzerland
- Simon Schaff, Desmond Tutu TB Centre, Department of Paediatrics and Child Health, Stellenbosch University, South Africa
- Bogdana Shcherbak-Verlan, PATH, Ukraine
- Marina Smelyanskaya, Stop TB Partnership, Switzerland
- Robert Stevens, UK
- Pedro Suarez, Management Sciences for Health, USA
- Guy Stallworthy, USA
- Ajaykumar Thirumala, Independent Public health laboratory consultant, India
- Stephanie M. Topp, James Cook University, Australia
- Pillar Ustero, Switzerland
- Brittney van de Water, Harvard Medical School, USA
- Frank van Doren, CheckTB! Netherlands
- Wayne van Gemert, Stop TB Partnership, Switzerland
- Kristian van Kalmthout, KNCV Tuberculosis Foundation, Netherlands
- Shibu Vijayan, PATH, India
- Luan Vo Nguyen Quang, Friends for International TB Relief/Interactive Research and Development, Vietnam
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- Mohammed Yassin, The Global Fund to Fight AIDS, Tuberculosis and Malaria, Switzerland
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The field guides were edited by Fiona Stewart and Marina Smelyanskaya.

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Abbreviations

CBO	Community-based organization
CHW	Community health worker
CSO	Civil society organization
CXR	Chest X-ray
DR-TB	Drug-resistant tuberculosis
DST	Drug-susceptibility testing
EPTB	Extrapulmonary tuberculosis
FBO	Faith-based organization
HEW	Health extension worker
HIV	Human immunodeficiency virus
MDR-TB	Multidrug-resistant tuberculosis, defined as resistance to rifampicin and isoniazid
M&E	Monitoring and evaluation
MoH	Ministry of Health
NGO	Nongovernmental organization
NSP	National Strategic Plan
NTP	National TB programme
PLHIV	People living with HIV
SS+	Sputum smear positive
STI	Sexually transmitted infection
TB	Tuberculosis
TPT	Tuberculosis preventive therapy
WHO	World Health Organization
Xpert	Xpert MTB/RIF assay, a cartridge-based nucleic acid amplification test (NAAT) for rapid tuberculosis diagnosis

1. INTRODUCTION

1.1 Why implement community-based case finding[1]?

When many barriers to health services exist, people cannot receive timely tuberculosis (TB) diagnosis and treatment. Community-based case-finding approaches bring essential TB services to the community. Along with awareness-raising, stigma reduction and treatment support activities, community-based TB case finding can achieve early diagnosis, improved treatment outcomes and reduced transmission. As a consequence, community-based case finding can have an impact on TB incidence, prevalence and mortality (1). Furthermore, community involvement in TB care and prevention (2) has proven to be effective and cost-saving in multiple areas of the TB care cascade(3).

Passive case finding – the standard approach in many settings, requires people with TB symptoms to present at designated health facilities for testing and diagnosis – is inexpensive and requires less effort on the part of the health system compared to community-based case-finding approaches. However, it has become increasingly evident that, in putting the burden of care-seeking for TB on the patient, passive case finding alone will not achieve the 90% treatment coverage target set out in the Global Plan to End TB (4), the End TB Strategy (5), and many National Strategic Plans (NSPs) (6). Multiple TB prevalence surveys have revealed that a large number of people with TB in the community are not aware of their disease symptoms, do not have symptoms, or consider these symptoms not severe enough to seek care.(7) In high TB burden settings and among populations with poor access and uptake of TB diagnosis and care, case-finding activities beyond health facilities are crucial, with treatment linkage mechanisms clearly outlined.

[1] *In this field guide, the terms community-based case finding and community-based screening are used interchangeably. The set of activities in the community may span the TB care cascade, but the focus remains on engaging community members and community health systems for identifying people with TB outside routine healthcare provision.*

Box 1.

Need and justification for implementing community-based case finding

POTENTIAL REASONS WHY COMMUNITY-BASED CASE-FINDING IS NEEDED:

1. Limited access to TB services (in terms of distance and costs) is leading to low treatment coverage.
2. A high level of TB stigmatization in the community is preventing people from seeking TB care.
3. There is a high prevalence of TB combined with low treatment coverage.
4. People treated are diagnosed late; a high positivity rate is observed among those tested; many diagnosed cases present with high smear grades when doing microscopy; there is a high death rate among people with TB; there are long delays in care seeking.
5. Numerous risk factors support the transmission or development of TB in the population (e.g. undernutrition, overcrowding, high levels of alcohol or drug use, high HIV prevalence).

WHY ADDRESS THESE GAPS WITH COMMUNITY-BASED CASE FINDING?

1. High potential for improving TB case detection and reach people with TB currently missed by the health system
2. Opportunities to link with other disease areas or programs in the community
3. Increasing awareness of TB and addressing stigma and discrimination
4. Potential for improving treatment outcomes
5. Facilitating contact investigation

1.2 What to expect?

When implemented successfully, community-based case finding can have a significant impact on TB notification rates. While the a WHO review of the evidence underlying this statement was regarded as low to moderate(1), several recent implementation examples have shown substantial numbers of additional people treated.

In southern Ethiopia, a community-based active case-finding approach among rural populations doubled the TB notification rate by training health extension workers (HEWs) to identify people with presumptive TB, collect sputum and fix slides, as well as setting up a sputum transportation system. Notification rates increased from 64 to 127 per 100,000 population in the first year of the intervention, followed by a steady decline in notification rates of 9% during the total 4.5 years of implementation suggesting an impact on transmission (8). In Nigeria, community screening days among nomadic populations in combination with routine laboratory strengthening substantially increased sputum smear positive (SS+) TB notifications by 49.5% over the expected number of notifications based on historical trends and the nomadic population made up 31% of all SS+ TB notifications at the state level(9). In Cambodia, door-to-door screening in an urban area successfully increased bacteriologically-confirmed TB notifications by 29% relative to historical trends (10). In India, 1-day community-based health camps (TB symptom screening and sputum collection with samples transported to designated laboratories for microscopy) led to an 11% increase in the detection of SS+ TB patients in the intervention communities compared to baseline, with only a 0.8% increase seen in the control communities (11). In Zimbabwe, the DETECTB study reduced the overall prevalence of culture-positive TB from 6.5 per 1,000 adults (CI: 5.1–8.3) to 3.7 per 1,000 adults (2.6–5.0) through implementation (12). Despite the success of these community interventions, there are numerous examples in other settings have shown no effect on TB notifications (13).

In addition, a large cluster randomized trial in Zambia and South Africa showed no impact of an enhanced community-based approach on TB prevalence or incidence.(14)

Implementing community-based case finding is not simple, as it involves identifying the right target population/area; setting priorities; designing the intervention; finding the right implementing partners; engaging and involving the community; ensuring sustained community dialogue; keeping staff motivated; ensuring that people follow the complete pathway of care; and ensuring continuous follow-up and supervision. Implementation is also not uniform across countries or regions. Translating one intervention's results cannot routinely be expected in another setting. The following section outlines several key steps for launching case finding in the community.

2. KEY STEPS TO STARTING A COMMUNITY CASE-FINDING INTERVENTION

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Step 1

Identify and work to eliminate human rights and gender barriers in the community

Even the most well-managed TB case-finding interventions will not succeed if they do not consider structural and rights-based barriers to care. Therefore, to accomplish their case-finding goals in the community, interventions should be:

- Participatory – engaging multiple stakeholders, particularly from affected populations;
- Evidence-driven
- Human rights-based; and
- Gender-responsive;

In practice, this means that implementers need to consider:

- What barriers to care exist and how to address them
- What data exists to suggest that an active outreach approach will yield more people with TB than are currently diagnosed and treated
- The ability of the health system to cope with an increased use of TB services (15); and
- The perception of members of affected communities regarding the acceptability, accessibility, and risks associated with TB diagnostic and care services.

While strengthening the health system (e.g. training staff, ensuring sufficient lab supply and lab technicians) is an important component of the intervention, addressing gender and human rights may be equally crucial for placing and maintaining patients in the cascade of care. There are multiple tools available to implementers to support analysis around eliminating human rights and gender barriers (e.g. Legal Environment Assessments for tuberculosis: an operational guide [16], Gender assessment tool for national HIV and TB responses: towards gender-transformative HIV and TB responses [17], and Data for action for tuberculosis key, vulnerable and underserved populations [18]). Stop TB Partnership is currently working to combine these tools into a unified assessment approach that can be used by national stakeholders to evaluate barriers to TB health services at the community level. Implementers are strongly encouraged to utilize these tools in the context of programme planning.

In the planning stage, consultations with affected populations and at community level can also offer perspectives on the current level of acceptance of TB services and procedures.

These consultations could include topics such as:

1. Integrating services (for TB and HIV as well as for TB and drug and sexually transmitted infection [STI] treatment);
2. Creating accessible and potentially mobile diagnosis and treatment services for key affected populations;
3. Engaging peers, community health workers (CHWs), traditional healers and other low-threshold service providers (pharmacists, etc.) to participate in case-finding interventions;
4. Reducing the stigma faced by people with TB in the health workforce;
5. Addressing perceived risks of TB screening and diagnosis (e.g. job loss, loss of income).

It is recognized that TB impacts men and women differently and that men and women may face specific barriers when accessing TB services (see Figure 1; a more extended discussion on gender barriers to TB services can be found in the key populations and introductory field guides in this series). Implementers must identify the specific barriers that women and men in the community might face when engaging with the intervention. These discussions should focus on the availability, acceptability, accessibility and quality of services, as specified in Table 1. When the intervention is ongoing, implementers may also add human rights-focused and gender-disaggregated indicators to track how these issues might be impacting TB case detection.

Figure 1 Examples of gender-specific TB risks

Men	Women
• High TB risk occupations such as mining, which may be associated with crowded living conditions • Pressure to return to work as the primary income earner • Behaviours such as smoking, alcohol consumption and drug use • More likely to be incarcerated	• Work in garment industry and informal mining sector, residence in peri-mining communities and crowded factory dormitories • Health might be less valued than that of male family members • Possibly less likely to be asked to submit sputum for testing (19) • No childcare available and cannot forgo childcare and housework responsibilities to seek care • Greater cultural barriers associated with the need to be accompanied to health care facilities and stigma related to diagnosis and treatment • If incarcerated, even less likely to have access to TB services than male counterparts

Table 1. Assessing barriers to care to ensure community uptake

Barrier	What needs to happen	Questions to ask
Availability of TB Services	A sufficient quantity of functioning health care facilities, goods and services for the diagnosis and treatment of TB should be available to the community.	Are services for key affected communities available? There might be a well-developed network of TB health service providers and laboratories, but are these available in mining or rural communities, or in remote areas where a large proportion of the nation's indigenous peoples live? Are the TB services readily available to people living with HIV (PLHIV) or people who use drugs? These considerations will also guide the type of community case-finding approach that may be selected.
Accessibility of TB services	TB services should be available to all. While there are many ways to interpret accessibility, for health services it can be divided into four main pillars: non-discrimination, physical accessibility, economic accessibility and information accessibility.	**Non-discrimination** – Are the staff sensitized to the needs of communities? Would placing peers/interpreters/indigenous healers in the same location/soliciting their collaboration make individuals more comfortable when receiving services? **Physical accessibility** – Will individuals have to travel long distances and/or durations to obtain proper diagnosis and treatment? Will there be many opportunities for pre-treatment loss to follow-up because the duration of testing and obtaining results will be too long for populations who are mobile, discriminated against or criminalized? **Economical accessibility** – Are all services related to TB free? For example, are chest X-rays (CXRs) free along with sputum testing? Are health workers imposing informal payments? Are services free, but transportation costs for individuals to get to health centres prohibitive? Are the health needs of women and children prioritized in the community at the same level as the needs of men, and if not, would economic considerations prohibit women and children from accessing services? Are operating hours prohibitive to community members who work? **Information accessibility** – Is information about TB transmission, sputum collection, process of diagnosis and treatment available in languages/via visual aids (such as flyer, poster, reminder card, video etc) that make it accessible to all members of the community? Are health and social services providers taking time to explain these procedures?
Acceptability of TB services	Health facilities, goods and services for TB must be respectful of medical ethics and culturally appropriate, as well as sensitive to gender and life-cycle requirements, and the particular needs of the communities most at risk for TB.	Are health workers receptive to the needs of patients of another gender (i.e. male health workers to the needs of women, and female health workers to the needs of men)? Are the services culturally appropriate for populations whose worldview and view of health may differ from those of the formal health system? Are health staff patronizing and punitive to patients who miss appointments, discriminatory towards behaviours, or demonstrating racial or ethnic bias?
Quality	Health facilities, goods and services for TB must be scientifically and medically appropriate and of good quality.	Are all individuals receiving the same quality of services? Because of stigma, might health staff not perform procedures or not be as diligent with some community members?

Step 2

Prioritize populations for the intervention

The Global Plan to End TB (4) describes some of the populations most vulnerable to TB according to the conditions underlying their risk: increased exposure to TB, limited access to TB services, or possession of certain biological or behavioural characteristics (see Figure 2). At community level, these are often the populations likely to be targeted by interventions. The key populations field guide in this series presents specific approaches and considerations for some of these groups, and the introductory guide in the series describes a framework for prioritizing problems that may be impacting access to TB services at the community level.

Figure 2 Key populations with TB

People who have **INCREASED EXPOSURE** to TB **due to where they live or work**

Prisoners, sex workers, miners, hospital visitors, health care workers and community health workers

PEOPLE WHO:
- live in urban slums
- live in poorly ventilated or dusty conditions
- are contacts of TB patients, including children
- work in environments that are overcrowded
- work in hospitals or are health care professionals

People who have **LIMITED ACCESS TO QUALITY TB SERVICES**

Migrant workers, women in settings with gender disparity, children, refugees or internally displaced people, illegal miners, and undocumented migrants

PEOPLE WHO:
- are from tribal populations or indigenous groups
- are homeless
- live in hard-to-reach areas
- live in homes for the elderly
- have mental or physical disabilities
- face legal barriers to access care
- are lesbian, gay, bisexual or transgender

People at **INCREASED RISK** of TB because of **biological or behavioural factors** that compromise immune function

PEOPLE WHO:
- live with HIV
- have diabetes or silicosis
- undergo immunosuppressive therapy
- are undernourished
- use tobacco
- suffer from alcohol-use disorders
- inject drugs

Analysing (sub)national programmatic TB data and identifying the size and location of risk groups, migratory patterns (if any), access to TB services, risk factors for TB transmission, and TB prevalence among them are crucial first steps when planning community-based interventions. It should be noted that often data are most scarce on those groups most at risk for TB. Implementers are encouraged to review Stop TB Partnership's Data for action for tuberculosis key, vulnerable and underserved populations framework (18), which discusses the concrete steps national TB programmes and programme implementers can take to prioritize and estimate the size of key populations for effective programming. In the absence of data, implementers are encouraged to utilize the Framework's prioritization and mapping tools, and work closely with civil society organizations (CSOs), non-governmental organizations (NGOs) and faith-based organizations (FBOs) in the communities to understand where people are being missed and what barriers the key populations face in accessing TB services. Local TB departments may also have insight into how to best approach communities and key population groups and improve outcomes based on experience from past and ongoing community-based screening activities.

Step 3

Identify key stakeholders

Once implementers have identified and prioritized the communities and populations that will be targeted by the intervention, it is essential to engage these groups. Multiple global health entities, including the Global Fund and Stop TB Partnership, refer to the engagement of affected community stakeholders as a cornerstone of their organizational strategies. Engaging and empowering individuals and communities is also at the core of the WHO Framework on integrated, people-centered health services (20). In addition to affected populations, multiple government and nongovernmental entities and principal community structures may need to be involved in the intervention.

Key stakeholder engagement begins with:

- **Identifying existing community structures**
- **Conducting stakeholder mapping**

Identifying existing community structures

Community structures are existing entities that are of importance to community members. Such entities may include:

- **Schools;**
- **Markets**
- **Local volunteer/community organizations;**
- **Places of worship;**
- **Workers' unions;**
- **Tribal/ward/municipal/village/community councils; and**
- **Other structures, depending on setting.**

Conducting stakeholder mapping

Stakeholders already involved in the community, such as NGOs, CSOs and FBOs, are likely connected to these entities and may already be using them to deliver other health or social services. In communities where NGOs, CSOs and other supportive services have little presence, **community structures** carry important weight and influence and will play a crucial role both in helping to launch the project and in influencing community members' engagement. These structures' spheres of influence and potential contribution to the intervention can be mapped out when interventions are being designed.

Without a doubt, the Ministry of Health (MoH), national TB programme (NTPs), and provincial and district health offices (specifically the TB coordinators) are also key stakeholders that need to be involved from the start. The national HIV programme may be another important stakeholder for discussing alignment of TB and HIV screening efforts, especially in settings with high HIV prevalence. It may also be advantageous to link to other disease programmes for community-based activities.

Stakeholder mapping: To engage stakeholders, implementers may hold individual meetings with identified community structures and potential leaders, or facilitate community-level meetings to discuss the intervention and give stakeholders the opportunity to consider their roles, assess existing resources and map the steps of the intervention.

Mapping resources: An inventory of ongoing activities is useful to ensure engagement of all stakeholders that may be instrumental to the intervention and to understand what resources (financial or human) may be available and/or lacking (see Table 3 for a sample resource-mapping tool). Many stakeholders might already be working on activities and delivering services in the communities (e.g. disease-specific screening, immunization days, community education and empowerment activities), which could be extremely helpful in rolling out TB programmes. Implementers can make use of various items and infrastructures within the existing health system/community system and community-based organization (CBO)/FBO networks, e.g. bicycles for sputum transport or human resources for screening interventions.

Table 2. Stakeholder mapping

Stakeholder Groups	TB medical expertise	Respected by peers	Influence with TB stakeholders	Decision maker in their organization	Stakeholder access	Access to potential partners	Health programme development expertise	Influence with high-level policy-makers	Knowledge of TB programmes & services	Knowledge of TB rules and regulations	Meeting facilitation	Leadership skills
TB programme staff												
Tribal/informal and other leaders of key populations												
Professional organizations/trade unions												
CBOs/NGO/FBOs working in the community/with key populations												
Peer support and other informal groups that may have influence over community members												
Employers of at-risk populations												
Formal health care providers												
Laboratory leadership												
Private sector												
Prison authorities												
Media/social engagement coordinators												
UN/human rights/emergency response agencies												

Table 3. Taking an inventory of existing services/resources to improve TB case finding in the community/among key populations

COMMUNITY RESOURCES	**Accessing the community to deliver the intervention**	**Utilizing existing health programming to deliver TB case finding**	**Capitalizing on existing human resources for screening**	**Transporting sputum and supporting lab infrastructures**	**Providing linkages to treatment and adherence**
[List organizations and funded projects, programmes, and initiatives.]	Health fairs Community celebrations Markets Religious gatherings Merchant association meetings Informal gatherings of interest/religious/other interest groups	HIV prevention activities Immunization Mother and child wellness Malaria eradication Health awareness campaigns Other health programming	Community health workers Community health volunteers/informal volunteer groups involved in delivery of routine health services/awareness Traditional healers Peer groups for people who use drugs and/or alcohol/other support groups	Commuter networks Community members in possession of motorbikes and bicycles Cars/vans and/or boats Solar panels/generators for uninterrupted electricity supply Cooling boxes Technology support	Family and community structures for support Traditional healers and community support groups Faith-based community volunteers/health volunteers mHealth and other tech resources

Step 4

Foster partnerships and create management structures

To ensure all stakeholders are in agreement on the key deliverables of the intervention and to keep the programme on track, it may be useful to establish a multisectoral **oversight** body and separate **coordinating** body to perform specific functions, as outlined in Table 4.

Table 4. Oversight and coordination functions

Oversight and governance	Coordination and implementation
Directing the implementer	Carrying out routine tracking of programme/project performance
Tracking implementation activities, ensuring independent audits	Troubleshooting to identify where changes in programmatic inputs can result in better outcomes
Providing strategic direction, ensuring adequate financial controls, policies and procedures, etc.	Periodically assessing changes in output as a result of programme intervention
	Conducting M&E activities and focusing on details

Step 5

Identify, train and manage community intervention workforce

Community based case finding usually involves work outside health facilities to conduct screening, collecting and transporting sputum, initiating treatment, and conducting follow-up for people with TB. The decision as to who will fill these roles, however, will depend on the existing cadre of CHWs or volunteers, the presence of health care providers already sensitized to working with communities and key populations, and the availability of peers/lay people who are able to engage in case-finding activities. Staffing considerations will also depend on whether a continuous or event-based community case-finding approach is selected (see Section 3 for more details).

Task-shifting – a key consideration:

Task-shifting or role adjustment occurs when diagnosis and treatment activities are allocated to mid and lower level health workers, or when lower level health workers delegate tasks to CHWs, volunteers and peers. Task-shifting may eliminate wait times, facilitate closer relationships with patients and increase positive outcomes. As such, the approach has been endorsed by WHO as a tool for "expanding the health workforce to rapidly increase access to HIV and other health services" (21). In TB, task-shifting has seen CHWs being recruited as X-ray technicians, laboratory and pharmacy assistants, and data clerks (22). In other instances, pharmacy technicians have been involved in providing TB treatment support (23). When considering who will run the screening activities in the communities, it is important to analyse which tasks can be shifted and which should remain a prerogative of trained health staff.

In settings where groups of CHWs already exist, there might be guidance on how to train CHWs and health volunteers and policies on remuneration and results-based incentives. In some settings, however, these policies may complicate task-shifting, presenting challenging rules regarding the division of roles and delegation of tasks such as counselling, screening, testing, or providing medication. It is crucial to understand local policies on task-shifting in order to avoid possible counter actions or abuse of the approach.

Expanding the tasks of community health workers/community volunteers

Using or creating networks of CHWs

In many countries, a network of CHWs bridges the gap between public health services and communities (24). CHWs often provide a range of basic essential health services, such as child immunization services, support to malaria and health pregnancy campaigns, and promotion of healthier lifestyles (25). CHWs are non-medical professionals who are usually supported by NGOs, CSOs or governments (26) and linked to a health facility. CHWs usually receive some form of pre-service training, and depending on their educational background and the duration of that training, they may receive an allowance, monetary incentive or even salary (27).

Although expanding the tasks of CHWs to include TB screening, diagnosis and treatment could be a sustainable way to organize active case finding for TB in the community, they may have many competing tasks, which may make it difficult to prioritize TB screening. However, in Ethiopia, CHWs found the positive feedback from and visible impact on communities to be very motivating, despite having other tasks (28). Other examples of successfully engaging CHWs in community screening for TB include the Ethiopian Health Extension Programme (8), the Lady Health Worker Programme in Pakistan(29) and the accredited social health activists (ASHAs) in India(30). However, engaging CHWs has been less successful in some settings. For example, in Malawi, a project involving health surveillance assistants (HSAs) had a hard time sustaining community sputum collection points over time due to a lack of incentives and motivational support, and absence of refresher trainings, among other factors (31). When setting up a new network of CHWs in a previously untapped community, considerations for incentives, training and supervision should be prioritized.

How to make this engagement successful

Factors contributing to the success of CHW involvement include training and the level of integration into the health system. Facility-based health care workers will need to work closely with the cadre of CHWs, feel co-responsible and accept the work of the CHWs as a part of the system. This collaboration might be difficult to achieve if CHWs, for example, are being paid by NGOs instead of the government and are reporting to systems within organizations and communities, but not the NTP. A salary and a well-designed reporting structure may help to embed CHWs in the public health system, allow them to perform their functions, and facilitate collaboration with the NTP and other public system health workers. See also the discussion on training and compensation below.

Community volunteers

In some communities, there is already an established network of community volunteers (in place of or in addition to CHWs) who can be given the additional task of TB screening. In this field guide, community volunteers are equated to CHWs, since their tasks are often similar and/or aligned. (Involvement of lay people and peers is discussed below.) In Ethiopia, for example, the Health Development Army consists of volunteers who assist five surrounding households in health-related issues. These volunteers work in close collaboration with the CHWs (Health Extension Workers) and identify people with presumptive TB (and other illnesses) by conducting door-to-door visits. Community health volunteers can be organized per village into so-called care groups. In Indonesia, female community volunteers were trained to look for people with a cough, with each volunteer covering around 20 households in their village. The care groups also organized activities, such as village education sessions. A number of experiences have shown that having people volunteer their time instead of receiving renumeration in the form of salary or performance-based incentives often leads to high levels of turnover and can limit sustainability of the work.

Engaging lay people and peers

Why engage lay people and peers?

In situations where there are no existing human resources to support the recruitment of CHWs or where TB tasks cannot be added to current CHW activities, lay people can be trained to mobilize or identify fellow community members with symptoms suggestive of TB. Moreover, people who have lost trust in the health services or fear stigma may be more willing to talk to a trustworthy neighbour or TB survivor.

What can they do?

The list of tasks that can be delegated to lay people or peers will vary by country. Community education, awareness-raising and symptom screening will be considered appropriate in most settings, whereas collection of sputum, counselling of individuals and treatment may not be considered acceptable in all situations or can only be delegated after special training when implemented under supervision. Local health authorities may be able to provide some advice as to which TB-related activities can be performed by lay people and peers. Some level of advocacy may be required to achieve task-shifting.

Former TB patients as a peer group are often very motivated to act as screeners. For example, in the South Kivu province of the Democratic Republic of the Congo, TB survivors started an NGO that involved groups of one to 20 former TB patients working in the catchment area of their local clinic. These groups identified community members with prolonged cough and referred them for TB testing (32). In other settings, involvement of TB survivors was found to be an effective way to enter social networks at community level. In Cambodia, former TB patients find people with TB in their community and then recruit them to find others. This kind of snowball approach has frequently been used to deliver interventions or conduct situational assessments among HIV key populations. TB recruiters get incentives to continue their work, and their effectiveness is tracked by determining how many of the people they have screened actually test positive for TB. This network of people with TB helps to normalize TB in the community and deliver information, thereby helping to minimize stigma and reduce transmission.

Other considerations

Safety and respect for peers need to be taken into consideration, especially when they come from vulnerable communities/populations. Adequate financing, supervision and incentive schemes are discussed below.

Engaging health and social services providers and utilizing existing community structures

While health care provider engagement and training is discussed in greater detail in the field guide on intensified case finding at facility level, it is important to note that providers within existing community structures may be well-positioned to conduct screening and other case-finding activities. Such providers include ward health committees, traditional healers, community pharmacists, patent medicine vendors, social workers, OB/GYNs, STI treatment doctors, drug treatment doctors, and HIV specialists, as well as primary care providers, nurses and physician assistants. Engaging health or social services providers could take the form of education sessions on motivating their existing client base to undergo screening and testing, establishment of TB testing days, and provision of other support around diagnosis and treatment.

Health and social services providers can also be part of the multidisciplinary or mobile teams that conduct community screenings. Such teams are able to address multiple issues at the same time, such as TB diagnosis, counselling for HIV testing, and enrolment in drug treatment, housing and other programmes. In doing so, they may be able to encourage health-seeking behaviours and other behaviour change. Multidisciplinary teams often include laboratory staff to coordinate efforts and resolve bottlenecks in testing an increased number of samples.

Training and supervision

Training

Training of health and social services providers, CHWs, community volunteers, lay people and peers may focus on:

- Screening basics;
- Sputum collection (if appropriate; also see Section 3.2 on sputum collection);
- Diagnosis basics (if appropriate);
- Treatment initiation and treatment adherence;
- Preventing stigma; and
- Eliminating gaps in knowledge about TB.

Depending on the cadre of workers, the following considerations might be incorporated into training:

- Opportunities for information exchange during training may be valuable. Although health and social services providers, CHWs, volunteers and peers might lack in-depth knowledge about TB, the knowledge they do have might benefit programming in terms of how to best relay the information about TB to communities and which additional cultural, behavioural, traditional healing perspectives, and other information to consider when implementing programmes.
- Training of peers should take the form of a respectful informational exchange, wherein peers can deliver valuable information on how to best approach vulnerable populations and insight into whether the interventions will work. TB education for peers needs to complement their existing knowledge and be presented in a way that they can understand, with considerations for language, literacy and differing worldviews.

Box 2. **Examples of types of training given to people who will deliver case finding in the community**

- Basic training on TB (especially if participants have not screened for TB before)
- Cough hygiene and infection control measures, including protection of the screeners themselves
- Symptom recognition and application of the screening tool
- Sputum production, collection and packaging for transportation (if relevant)
- Basic understanding of TB diagnostics to appreciate the importance of good-quality sputum
- Data collection
- Communication skills
- Counselling skills, with a special focus on the importance of adherence and treatment completion
- Technical skills as needed
- Training on other programmatic SOPs as needed (e.g. processes around diagnosis and clinical referral in the facility)
- Basics of occupational health and safety to ensure that providers are aware of risks associated with sputum collection and potential increased exposure to TB

Supportive supervision

Supportive supervision of the CHWs, community volunteers, and peers is essential and will define the quality of their work. In many cases, a health care provider working at the next level of service (e.g. health centre) will be in charge of supervising the CHWs. Since supervision of CHWs will likely be an added task for these health care providers, additional training, motivation and reminders that CHW screeners are included in the supervision must be considered.

In some programmes, as in southern Ethiopia and Pakistan, supervisors have been added as a new layer of staff, specifically appointed by the project to supervise all CHWs in an area. Assigning supervision tasks to dedicated staff and providing them with transportation (e.g. a motorcycle) creates clarity over the distribution of responsibilities. This approach is beneficial for monitoring and evaluation (M&E), as supervisors can regularly visit each screener to discuss results, provide feedback, offer motivation, ensure quality, assist with organizing the transportation of sputum, and help provide linkages to care or initiate treatment when TB is confirmed. It is important to budget for the salaries and travel costs of the supervisors.

Questions to ask:

- Who will supervise the cadre of workers doing the case finding in the community?
- What will be the frequency of supervision?
- Where will supervision take place? (Will the supervisor visit the CHWs or lay people in the community or alternatively will they meet at a central place or at the health centre?)
- What will be discussed?
- What performance indicators can be set and how will these link to incentives?

Remuneration/motivation of community screeners

Due to the voluntary nature of engaging lay people and peers and low wages for CHWs (despite increased workload), implementers may have to consider investing in incentive schemes, supervision and motivational team-building in order to mitigate burn-out and poor retention.

For paid staff such as CHWs, incentives should be in line with the incentive schemes associated with their other tasks so as to avoid creating competition among different programmes. The introductory guide in this series has some more detail and considerations on incentives. Regular communication and feedback of project results (e.g. through social media) can also be very motivating for community volunteers/CHWs. "Screener of the month" recognition or other prizes, and use of social media groups (WhatsApp and Facebook messenger) to regularly update community volunteers/CHWs on the latest findings and developments have proven effective in keeping CHWs and volunteers engaged and motivated.

Box 3. **Responsibilities of people who screen and their supervision for effective community case finding**

TASKS OF CHWS/LAY PEOPLE/PEERS:

- Organize awareness-raising activities in the community
- Contact the target population either systematically (door-to-door) or through social contacts
- Identify people with presumptive TB by applying the screening algorithm
- Ensure testing of sputum samples by either collecting sputum in the community and assisting in its transportation or by assisting the person to the laboratory
- Complete necessary registers and forms
- Apply appropriate infection control measures when in contact with people with presumptive TB
- Support and monitor treatment
- Initiate contact investigation
- Trace people with TB who are lost to follow-up
- Notify any deaths within their jurisdiction

TASKS OF PEOPLE WHO SCREEN OR THEIR SUPERVISORS

- Receive/collect test results from laboratory and communicate results to tested person
- Follow up in case of negative test result and persistent symptoms

TASKS OF SUPERVISORS

- Support awareness-raising activities organized by community screeners
- Monitor the quality of the work of the community screeners
- Organize transportation of samples or of people
- Initiate treatment of individuals identified with TB or link them to care
- Register and report people identified with TB and their treatment outcomes (when the supervisor is a health care worker)

Other considerations and support

Gender and cultural considerations

It is important that individuals who will be impacted by the case-finding interventions can relate to the CHWs, speak the same language and share the same or are respectful of each other's worldview and culture. This is particularly important for indigenous peoples and in communities where traditional medicine prevails. Implementers should also accommodate gender norms that might dictate that women in the community will respond best to female CHWs and men to male CHWs. Ensuring that CHWs and volunteers come from affected communities can help build trust, cultural sensitivity and sustainability.

Safety and risk

TB case-finding interventions may expose CHWs, health care workers and social services workers to a range of risks, including occupational risks of exposure to TB and being stigmatized among peers (other health workers) and in the community. Therefore, education and training on occupational hazards, access to regular TB screenings, and a guarantee of support and safety should be provided to the case-finding workforce.

Step 6

Ensure community buy-in and sustainability

Although the acceptability of screening for TB has generally high, it varies across groups and settings.(33) Because of stigma, discrimination, criminalization, cultural norms and beliefs, and different socioeconomic factors, getting communities and key populations to accept TB screening interventions might be a challenge. Therefore, it may be necessary to conduct community awareness-raising and educational campaigns to normalize TB screening, explain the benefits of treatment and eliminate stigma. Ensuring high acceptability and participation in case finding activities will help ensure as many people with TB as possible are identified.

Awareness-raising

Awareness can be raised through the use of radio messages, social media, plays, events in the community, informational booths and distribution of leaflets at places frequented by people in the community (e.g. markets, churches or bars) or key populations (drop-in centres, support group community spaces) (34). These communication channels vary in effectiveness, and preferred sources of information may differ by gender, age and education/literacy level. In some cases, word-of-mouth and the influence of community leaders might be more effective than media campaigns.

Sustained engagement

Key community stakeholders may be more likely to mobilize around continuing the programming if communities observe the benefits of regular TB case-finding campaigns. Therefore, early and sustained engagement is critical, as is continuing to secure community buy-in, building capacity of key stakeholder organizations and intervention implementers, and advocating with local and national TB programmes once case-finding interventions gain momentum. For a comprehensive to-do list for engaging and building the capacity of relevant stakeholders, refer to the annex 4 flowchart of the WHO guide Community involvement in tuberculosis care and prevention. Towards partnerships for health: guiding principles and recommendations based on a WHO review (35).

Ownership and accountability

With a view to embedding community case-finding activities in the health system, the local health system and community authorities need to be involved during planning. Since community visits will inevitably increase the workload in the health system (for example, laboratory testing and treatment support), it is important for there to be agreement on how responsibilities will be shared prior to project implementation. These responsibilities can be laid out as in Table 5 and described. Regular meetings are needed to review operational challenges, solutions, data flows, patient care, results, errors and targets. Stakeholder meetings to discuss progress and results will also help to establish effective collaboration.

Table 5. Example responsibility chart between health system and implementing organization

Screening pathway	CSO/NGO	Health facility/ TB programme	Laboratory
Awareness-raising/mobilization	x		
Screening	x		
Quality check of screening results		x	x
Sputum transportation	x		
Mobile testing	x	x	x
Quality control testing procedures			x
Patient follow-up (results)	x	x	
Treatment initiation	x	x	
Notification		x	
Treatment support	x	x	

3. DESIGNING A COMMUNITY-BASED SCREENING INTERVENTION

3. DESIGNING A COMMUNITY-BASED SCREENING INTERVENTION

3.1 Choosing the approach

There are several options for organizing community-based case finding, which are grouped into two approaches for the purposes of this field guide:

1. **Continuous community-based case finding; and**
2. **Event-based case finding.**

Continuous community-based case finding involves setting up a long-term system of continuous TB awareness-raising and active case finding in the community with dedicated human resources in the targeted areas. Alternatively, it may be more efficient or practical to send a mobile team to communities on a periodic basis, as is done in **event-based case finding.** It is crucial to involve the community in designing the approach from an early stage.

The choice of approach will depend on factors such as the availability of human resources, budget, context/setting specifics, target population characteristics, and acceptability of screening. Box 4 highlights some characteristics and considerations related to each approach, and Box 5 presents some thoughts to assist in decision-making.

Fast track: Discussions presented in this section are summarized in Table 7 on page 65.

Box 4. Characteristics, pros/cons and considerations related to continuous community-based and event-based community case finding

Continuous community-based community case finding	Event-based community case finding
Key characteristics	**Key characteristics**
• Ongoing/continuous screening by people from the community (e.g. CHWs, community volunteers, lay people, peers) • Verbal symptom screening as the first step in the screening and diagnostic algorithm • Sputum transport assistance where appropriate • Existing health services make diagnoses	• Event-based community screening by mobile team • Community members involved in mobilization • Verbal symptom screening and/or CXR as the first step(s) in the screening and diagnostic algorithm • Mobile team may have capacity to make diagnosis
Pros:	**Pros:**
• More sustainable approach carefully embedded in existing health services • Strong community involvement • Relatively easy and cheap to set up when existing network of community volunteers or CHWs is available, and their work can be linked to existing incentives within the NTP framework • Creates a cadre of people in the community who know the signs and symptoms of TB and diagnostic process • May be integrated with other disease program initiatives	• If available, use of CXR as initial screening test allows for diagnosis of those without symptoms • Can utilize mobile team comprised of existing health staff which also may be able to provide better clinical services and diagnosis • Can be used as 'mop-up' events with lower overall costs than continuous work • Often includes ability to use new technology • Can reach to geographic areas that health services cannot • May be combined with other disease program initiatives
Cons:	**Cons:**
• Symptom screening as first step misses those without symptoms • Transportation system needs to be set up to transport sputum specimens or people with presumptive TB • Additional layer of supportive supervision needed for people who are conducting the screening • Continuous efforts needed to keep people who screen active • Often will miss cases that are not B+ as clinical services can be difficult to access	• High start-up costs when mobile CXR and vans are needed • High running costs (cartridges, mobile van, salary of mobile team) • When mobile CXR is used and there are only a few machines available, limited coverage may result • Among dispersed populations, distance to testing site/mobile van may still be considerable and transportation needs to be arranged • Result reporting and linkage to treatment may be a challenge
Other considerations:	**Other considerations:**
• Carefully assess whether the current health system is able to cope with the additional workload, including lab throughput, treatment and management of drug-resistant (DR-) TB • Opt between screening during systematic door-to-door visits, community gatherings or within social networks • Use CXR as screening tool for key populations • Use highly specific tests such as Xpert after screening • Considerations for people who are test negative but continue with symptoms • Can use CHW screeners as treatment supporters as well	• Carefully choose when and where to do the screening in the community • Opt between community mobilization for screening through door-to-door visits or through community announcements • Consider reusing the equipment purchased for other activities (prevalence surveys) • Integrate screening activities with other disease programmes such as the HIV programme • Create linkage with established health services for treatment initiation and treatment support • Facilitate DST and DR-TB management when Xpert is used

Box 5. Considerations to help guide the choice of community-based screening approach

Considerations and Questions	May favor using continuous community-based case finding if responding:	May favor using event-based community case finding if responding:	Comments
1. Is a network of community volunteers or CHWs available? a. If yes, is it possible to expand their tasks? b. If no, is it feasible to set up a new network of CHWs or community volunteers?	**'Yes'** to either **Q1a** or **Q1b**	**'No'** to both **Q1a** and **Q1b**	Expanding the tasks of community volunteers/CHWs may depend on whether these human resources are government- or NGO-supported, whether they are salaried or volunteers, and whether their current incentive scheme fits within the NTP framework.
2. Is the existing health system able to cope with an increased demand for TB services as expected during a community case-finding intervention?	A 'Yes' to **Q2** is a prerequisite; if 'No', first identify and address gaps	**'No'** to **Q2** and screening and testing is done entirely outside of the regular health system. Still, the health system needs to be able to cope with the extra patient load.	With regard to the diagnostic capacity, a first step may be to look at the current number of sputum samples tested in relation to the available human resources, take stock of the GeneXpert utilization rate, and the number of CXRs done in relation to the capacity of the machines. Diagnostics could potentially be outsourced or be part of the screening approach, but providing TB medicines should be the responsibility of the NTP/system. Therefore, any provisions for strengthening lab systems and treatment access need to be made right away.
3. Is there sufficient evidence indicating that there are many people with TB who are not being diagnosed and treated among the target population?	**'Yes'** to **Q3**; long-term investments are justified	**'No'** to **Q3**; conduct (periodic) mobile screening to find evidence of missing people with TB	This question is about developing local understanding of the number of people with TB who are being missed and deciding how to effectively utilize resources. Due to heterogeneity in disease burden and the health system, national figures may not be representative of the local context and may not always justify setting up a costly intervention. In this situation, a (rapid) community screening with mobile teams may provide insight.
4. Is the target population mobile (e.g. nomads)?	**'No'** to **Q4** (population is static)	**'Yes'** to **Q4** (population is a mobile/migrating population)	
5. Is the target population remote in terms of distance from a health facility?	**'No'** to **Q5** (population lives an accessible distance from health facilities)	**'Yes'** to **Q5** (population lives in a remote area far from health facilities)	

Note: *The proposed approaches are more flexible than presented in the table, and both may work in some settings.*

3.2 Continuous community-based case finding

Continuous community-based case finding refers to a form of ongoing TB awareness-raising and screening in the community, with the aims of identifying people with symptoms consistent with TB, offering early diagnosis and providing linkages to care. Community volunteers or CHWs are often responsible for screening and linking people to diagnosis and care. People with signs and symptoms of TB can be referred to nearby health facilities or submit sputum for diagnosis by a trained CHW. This section describes the key parameters of continuous community-based case finding.

Staffing considerations

As discussed in Step 5, the decision on who to engage in community case-finding activities often hinges on the existing cadre of CHWs or other community members who are already involved in delivery of health services. If the human resources are sparse/too costly to engage, event-based case finding might be a better match.

Screening

How to screen?

The screening and diagnostic algorithm used will determine the cost, sensitivity (i.e. proportion of true positives) and risk of over-diagnosis (i.e. number of false positives) of the approach. See Figure 3 for algorithm options and their implications.

Verbal screening for symptoms is relatively easy and cheap, and can utilize:

a **restrictive definition:**	an **inclusive definition** (any combination of the following):
cough lasting for longer than 2 weeks with or without other symptoms	☐ cough of any duration ☐ haemoptysis ☐ weight loss ☐ fever ☐ night sweats

Multiple TB prevalence surveys have shown that 40–60% of people with confirmed TB have not reported a chronic cough at initial screening (7).

A restrictive screening approach will still miss about 50% of the people with TB in a community setting.	A more inclusive screening approach has the potential to find more people with TB, but also increases the number people being tested for TB and thus the cost of the algorithm.

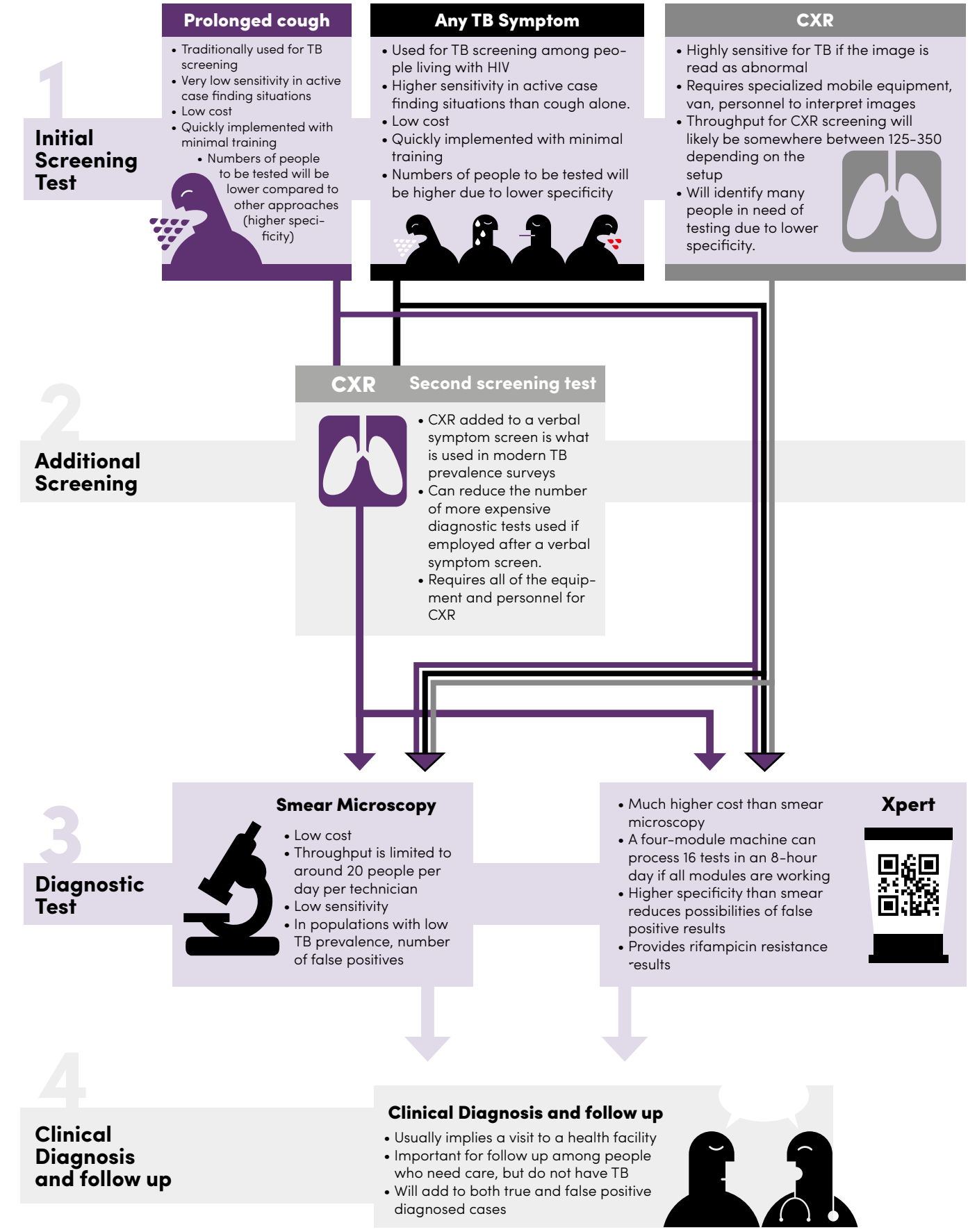
When to use Xpert and CXR

The use of a highly specific and sensitive diagnostic tool such as Xpert MTB/RIF is recommended for all settings. However, more inclusive verbal screening algorithms require a larger number of tests and thus increase costs. Using CXR as an intermediate step as a triage test can reduce the utilization of expensive diagnostic tests. However, transportation to a facility with CXR and the patient time associated with both travel and CXR must be considered. See Figure 3 that provides ways to mix different screening and diagnostic tests to create an algorithm. The results of any approach will depend on the true prevalence of TB in the population that is screened and the different tests used.

Over-diagnosis: The risk of false-positive test results depends on the TB prevalence of the population being screened: the higher the prevalence, the lower the chance of false positive results. This makes an inclusive definition of presumptive TB more appropriate among high-risk groups. With the increasing use of Xpert MTB/RIF Ultra, more care must be taken with 'trace calls'.(36)

How to ensure that the screening is not too restrictive: A two-step screening approach (i.e. an initial verbal screening performed by community screeners followed by a re-screening performed by a supervisor) often leads to a more restrictive screening. While this type of supervision may be useful at the beginning of the intervention, it is important that the validation does not result in people with TB being excluded from further testing. A positivity rate (i.e. % bacteriological positive among those tested) in a community intervention similar to the rates seen when doing passive case finding is likely a sign that insufficient numbers of people are being tested and that the definition of presumptive TB is too restrictive at the point of screening.

Figure 3. Algorithm options for implementing community-based case finding approaches



Where to screen?

Verbal symptom screening can be done in the home, at a place where community members gather regularly (e.g. marketplaces, ferry and bus terminals, and faith-based institutions), or at a special session. When organizing a community gathering, it is preferable to choose a central location that is easily accessible for most people and equally usable in rainy or hot weather (see also Step 3).

How often to screen

There is not enough evidence with which to determine optimal screening frequency. CHWs in some settings include TB symptom screening as one of the routine questions during their monthly household visits, whereas in other settings, CHWs conduct screenings quarterly or twice a year. In some communities, screening days or screening events are held at a pre-determined frequency.

Useful tools

The growing penetration of smartphones and tablets has the ability to help health screening and improve performance. Use of screening apps has the potential to improve data quality by ensuring that the people conducting the screening apply the screening tool completely. Screening apps also eliminate problems with illegibility of written text and incomplete/incorrect recording; provide data security for data storage, database access and database backup; and improve monitoring.

In addition, screening apps enable implementers to track patients along the entire TB care cascade from screening to treatment outcome. Unique identifiers for patients and their samples will facilitate this process (see the field guide on strengthening information systems in this series).

Implementation considerations

While determining the choice of data collection tool (i.e. screening app or paper collection tools), considerations include the availability of smartphones/tablets, the literacy levels of the people who will screen, the security of the devices in the community, network connectivity and acceptability. App development takes time and can be costly, and existing systems should be utilized to the extent possible.

Interactive Health Solutions (IHS) is currently building a few open source apps, which programmes can adapt to their local needs. These apps can be used to screen people for TB symptoms, link them to an electronic laboratory results register, and ultimately link to national notification databases.(37) Similar work is underway in other countries such as Vietnam.

Considerations for screening with apps

A phased screening app can allow for a quick initial screen with a limited set of questions (e.g. four questions on cough, fever, weight loss and night sweat) followed by a full set of questions (e.g. on duration of symptoms and risk factors) if the individual answers 'yes' to one of the initial questions. Even if the individual responds 'no' to all initial questions, the app will save the date and GPS coordinates, or programmes may opt to keep a manual (paper) tally of the number of asymptomatic people screened. When answering the full set of questions, often the person's name and telephone number are entered for follow-up. Research questions could also be added to the screening.

After sputum collection, the specimen should be assigned a sample ID as soon as possible, whether in the field or at the laboratory. Some apps will properly link patient records (through unique identifiers) to the sample ID, whereas with other apps, project staff must link patient IDs in the app database to the sample ID. A broad spectrum of considerations for implementing screening apps is summarized in the Appendix.

Sputum collection

If there are no legal restrictions[2], and when trained personnel case assist the presumptive TB patient, collecting sputum in the community is preferable over referring the person to the laboratory. Various interventions have shown high rates of attrition when people are referred to health facilities for sputum collection and subsequent testing (38). Even when costs are covered, travel time might be too prohibitive. In an active case finding project in tribal communities in India, people with presumptive TB were initially either referred to the closest microscopy centre or a sputum specimen was collected in the community and transported by CHWs to the laboratory. None of the people who were referred got tested due to the prohibitive time requirements for travel, and the discrimination they felt at the public services, and this option was discontinued. Of the sputum samples transported to the laboratory, 83% were tested and the intervention resulted in increased access to treatment in the community.

Additional training and instructions

Training on infection control measures, sputum collection, labelling of specimens, filling of laboratory request forms and registers when applicable, and transportation of specimens to health facilities is essential for people performing case finding in the community. In addition, the community health workforce may need to understand sputum quality requirements in order to assist community members in producing good-quality sputum samples.

[2] *Laws around diagnosis and treatment of TB vary between countries. This can have implications on what tasks are acceptable for community volunteers from the government's perspective.*

Where to collect sputum

The community health workforce can hand out sputum containers for sputum collection at home (especially for early morning specimens) and provide instructions on how to produce sputum. Educational videos (e.g. on a mobile device), posters (e.g. in designated sputum collection areas) and visual aids (e.g. leaflets) have been shown to be effective in assisting people with TB to produce sputum samples (39). It is preferable for at least one sputum sample to be given under observation of a trained volunteer who can also provide instruction and support to the person with presumptive TB (40). It should be stressed that sputum collection should ideally be conducted outdoors in a ventilated, private space. In some settings, people with presumptive TB can go to designated sites in the community to submit sputum with support from trained volunteers (e.g. Community Sputum Collection Points in Malawi and Zambia). Proper care needs to be taken to ensure privacy.

Ensuring occupational safety

Screeners need to be instructed on proper infection control measures during their activities and especially when dealing with sputum. Screeners should be provided with appropriate personal protective equipment, such as masks and gloves as needed, and be trained on occupational safety.

Sample preparation

Although the use of Xpert MTB/RIF testing is recommended as the initial diagnostic test of choice,(36,41) it is understood that smear microscopy is still utilized in many settings. While many CHWs collect specimens for travel and testing with Xpert, preparing slides for testing with microscopy is much less common. A successful model has been reported in Tanzania, where CHWs called "sputum fixers" have been trained to screen and collect sputum samples, fix them onto slides, and transport the slides by bicycle to laboratory facilities[3]. Another example of this is Ethiopia where Health Extension Works have done similar work.(7)

Ensuring correct results

Proper labelling of sputum containers is essential. Ideally, the screener in the community will assign a unique specimen ID, which is affixed to the laboratory request form, the sputum container and the patient's register using pre-printed labels. The quality of the pre-printed labels is important, as they need to remain adhesive and visible in humid conditions.

Sample quality

Monitoring the quality of sputum produced is important. Screeners should receive feedback from the laboratory on the quality of the sputum submitted for testing in order to improve their work. For sputum samples that are not satisfactory (e.g. salivary, too minimal, etc.), the CHW should be able to trace the person with presumptive TB in their homestead for repeat submission of the sample.

[3]*Consultation with Tanzania program staff.*

Transportation

Implementers need to consider the resources available to transport samples or people. Health facilities, laboratories, communities served by community volunteers, and road networks may be mapped to analyse optimal routes and methods. While it is sometimes preferable to transport samples, projects have identified ways to support people with presumptive TB to submit sputum samples in health facilities by providing either transportation or travel reimbursements/incentives. More information on transportation networks is available in the laboratory field guide in this series.

Transporting samples

- In several successful interventions, sputum transportation was conducted by motorbike riders who were hired on a daily basis or multiple times per week or by CHWs who were given/owned bikes or motorbikes. In some settings, sputum transport may be done by boat or utilizing existing transport networks in the community.
- If sputum is only transported periodically, the availability of a refrigerator to store the samples is crucial. If refrigeration is unavailable, screeners may be instructed to only collect specimens close to the assigned pick-up day. In some settings, implementers have installed solar-powered fridges at health posts or sputum collection points where sputum specimens await pick-up. Cool boxes to preserve sample viability should be provided to all those involved in sputum collection.
- Laboratory staff should be fully aware of and involved in designing the sputum transportation network so that they can optimally accommodate the testing of the extra samples into their workload and provide a short turnaround time.

Transporting people

- If sputum cannot be collected in the community, an effort should be made to transport the person with presumptive TB to the nearest health facility or laboratory. Possible ways to arrange this transport are by using specially designated riders with motorbikes (in some settings, supervisors only) or by providing vouchers and other reimbursement to guarantee free transportation to the laboratory. CHWs in a peri-mining community in Tanzania accompanied miners to the health facility to submit sputum on their way to work in the morning. Use of approved respiratory protection is advised to prevent transmission when transporting people with presumptive TB to facilities.
- Coupons or vouchers can be given to those who are eligible for screening/diagnosis, enabling them to access so-called "fast-track" screening lanes or screening points at nearby facilities without having to queue. Another possibility is to refer community members to outreach clinics organized by health facility staff with a fixed schedule.

Community volunteers, supervisors and health facility staff (including lab technicians) need to be able to communicate with each other. Providing these actors with cell phone credit can enable them to communicate through text/WhatsApp messages.

Testing

Selecting the diagnostic tools should go hand-in-hand with selecting the screening tools, as discussed earlier. It is understood that balancing high-quality diagnostic resources with costs and logistics is complicated. More information on laboratory diagnostics and CXR is provided in the relevant field guides in this series. Here, specific considerations for community case finding are summarized.

Using rapid molecular tests

Xpert MTB/RIF testing is recommended for the diagnosis of TB in community case finding because of its higher sensitivity and specificity compared to smear microscopy, its potentially quick turnaround time (test takes 2 hours to complete), and its ability to detect rifampicin resistance (36,41).

The next-generation Xpert MTB/RIF Ultra assay is now available. Ultra has a higher sensitivity than the Xpert MTB/RIF assay, particularly in smear-negative, culture-positive specimens and in specimens of PLHIV. However, as a result of the increased sensitivity, the Xpert MTB/RIF Ultra assay also detects non-replicating and non-viable bacilli, particularly in patients with a recent history of TB. This reduces the overall specificity of the Xpert MTB/RIF Ultra assay in high-burden settings. In low-burden settings and when testing specimens to diagnose extrapulmonary TB (EPTB) and paediatric TB, false-positive results should be a major concern (36). Implementers can read more about the use of GeneXpert in the laboratories field guide in this series.

Increasing laboratory capacity

Implementers could consider whether to make use of the existing (public) laboratory network or send samples from the community to a private or more central laboratory. When working within the existing public network, laboratories need to be prepared to cope with the increased demand. Resources such as sputum cups, reagents, GeneXpert cartridges, slides and other laboratories supplies will need to be considered along with increased workloads.

Clinically diagnosed TB

Community-based screening programmes often report low proportions of clinically diagnosed TB because they are not designed to follow up with people with negative bacteriological test results. Obtaining a CXR prior to obtaining a bacteriological confirmation can make diagnosis and access to treatment faster. In the absence of CXR, community volunteers should be instructed to re-visit the person tested after 2 weeks and to collect another sputum sample if symptoms have not improved. If results are still negative, a visit to the health centre for further investigation should be arranged.

Doing the math

For a community case-finding intervention to double TB notifications, the number of tests performed might have to increase by a factor of four or five. Even a modest increase in the number of notifications will often require huge increases in testing. As the number of tests increase, the positivity rates will lower, meaning more people will have to be screened as well. During community case-finding activities, many people with symptoms/abnormal CXRs will be tested. However, because people might not yet be as sick as those who come to the facilities, a smaller proportion will be bacteriologically confirmed.

Treatment initiation, notification and support

Communicating results

After the testing has been completed, the results need to be shared with the health facility staff responsible for treating people with TB, as well as with the CHW/volunteer/peer who is providing treatment support. It is important that results (whether positive or negative) be communicated to the person tested (or in the case of a minor, to his/her parent or guardian) and that laboratory staff notify the health worker responsible for screening when the sputum sample is of poor quality and cannot be tested.

Treatment initiation

As a rule, the shorter the time between the communication of results and treatment initiation, the less opportunity there is for loss to follow-up and for transmission in the community. In some settings, a clinician has to see the patient before treatment can commence, while in others, community volunteers or their supervisors may be able to initiate TB treatment in the community, thereby reducing the chance of loss to follow-up. Programmes should push for this, even if it involves a change in regulations. Implementers should note that programmes may encounter difficulties when initiating treatment in individuals or children who are asymptomatic/not feeling sick enough to seek care. This obstacle needs to be resolved through sensitization and case management.

Current (limited) evidence indicates that screening in the community has a similar or better impact on treatment initiation and treatment outcomes compared to passive screening approaches (1). While active case finding alone may not improve treatment outcomes, it offers the opportunity to provide treatment support through the CHWs. A community screening approach in southern Ethiopia improved treatment uptake and completion from 76% to over 95% through the active role played by HEWs and their supervisors in treatment initiation and monitoring (8). During treatment initiation, a list of all of the patient's possible contacts (household, work place, social) should be provided for contact investigation and to assess their eligibility for TB preventive therapy (TPT).

Treatment support

In most integrated community screening programmes, community volunteers are given a role in treatment support and monitoring, but if not, they can help choose an appropriate treatment observer (e.g. a family member), supply treatment, provide nutrition support and collect sputum specimens during treatment for monitoring.

Box 6. Summary: Key considerations when designing a community screening approach integrated into routine services

- ☐ Who to work with at community level: CHWs, lay people/peers?
- ☐ What awareness-raising activities will be organized?
- ☐ How to reach the target population: door-to-door or targeted during community gatherings, home visits or through social networks?
- ☐ Who will supervise the community volunteers: set up an additional structure of supervisors, use intermediary organizations (CSO, CBO, FBO) or use existing health facility staff?
- ☐ What is the most appropriate screening and diagnostic algorithm? Introduce more sensitive diagnostic technologies such as CXR and Xpert?
- ☐ How many sputum samples are needed and is front-loading (i.e. testing two spot samples) an option?(42)
- ☐ Collect and transport sputum sample(s) or refer people with presumptive TB to the health facility/laboratory? In case of referral of people, organize transport to the health facility or let people travel on their own account?
- ☐ Where to test the samples: within the current laboratory system or with support from other laboratories?
- ☐ Who will communicate the result back to the community and how?
- ☐ Who will initiate the treatment?
- ☐ Who will provide treatment support: CHWs/lay people, supervisors or health facility staff?
- ☐ How often will activities such as door-to-door screening be repeated?

3.3 Event-based screening

Mobile team event-based screening is another approach that can be utilized for community case finding. This approach may be more efficient or practical depending on the setting.

Key choices

Two key choices in the design of an event-based case-finding intervention will determine many of the next steps:

- ☐ **For diagnosis:** Will the intervention use a mobile screening/diagnostic unit with testing facilities OR utilize existing laboratories and health facilities?
- ☐ **For engaging communities:** Will door-to-door visits be implemented?

Diagnosis: mobile vs. existing laboratory sites?

There are many ways to conduct event-based case finding. One approach is to employ a mobile unit (truck, van, tent, etc.) with a mobile team that conducts all of the screening and diagnostic activities. Another approach is for the mobile team to conduct the screening only and then collaborate with existing health and laboratory facilities to collect and test the sputum. The following considerations can inform the decision as to which approach to utilize.

Using a mobile screening/ diagnostic unit:

Advantages	Disadvantages
● Possibility to add CXR to the screening, resulting in a highly sensitive algorithm ● Acceptability of the screening in the community may increase in the presence of modern diagnostics ● Existing laboratory networks will not be overloaded ● Same-day testing avoids delay in obtaining results and might eliminate initial loss to follow-up ● Linkage to care may be easier with testing taking place in the community (with direct links the health centre); however, access to treatment services may still be an issue for remote communities	● High cost of the equipment (less of an issue when applying e.g. smear microscopy in a tent; mostly an issue when using CXR followed by Xpert) ● Restricted access to hard-to-reach communities when using a truck or van

Using existing labs:

Advantages	Disadvantages
● Less costly	● Have to arrange transport of samples ● Potential of overloading the laboratory when no proper agreements are made on the (temporarily) increased workload ● Delayed start of treatment; setting up a system for communicating results and linking people to care is crucial

Community engagement: door-to-door or fixed event?

Door-to-door visits may be used to mobilize the community for screening, identify people eligible for screening (e.g. the elderly) or verbally screen the population. Alternatively, the community may be mobilized to attend a screening event through community announcements, either on the screening day or prior to the mobile team's visit. In this case, the target population is requested to visit the screening site. The messages conveyed during mobilization may have an effect on a type of self-screening that may take place. For populations at risk for TB but who may have few to no symptoms (e.g. the elderly), it is desirable for everyone to visit the screening site for a CXR.

Door to door visits:

Advantages	Disadvantages
● Improved coverage ● More focus on specific groups ● Eliminates a type of self-screening community members may apply	● Labour-intensive and thus may require a larger work/volunteer force ● People may not be at home or require multiple visits ● Limits the use of CXR as an initial screening tool (the combination of door-to-door mobilization to encourage people to visit the screening site may work well)

How do these decisions impact programs?:

A study in **Harare, Zimbabwe** (12) compared two modes of active case finding: performing door-to-door screening versus inviting people to visit a mobile van. In both situations, verbal screening to identify people with presumptive TB (≥2 week cough) was used and samples were sent to a central place for examination using fluorescence microscopy. The door-to-door screening did not lead to a higher participation rate than the screening at the mobile van.

In the **Philippines**, the DetecTB programme used a mobile unit to screen different at-risk populations: rural and urban poor, indigenous people, prisoners and high-school students. The mobile unit (bus) included a digital CXR, LED microscope and GeneXpert machine – the latter two being used in parallel. In the communities, only those attending the mobile unit were screened. Information was disseminated and advocacy meetings were held prior to the pre-scheduled screening sessions. A point person was appointed in each community (e.g. a municipal health officer) and CHWs were also involved in the screening sessions. After being oriented to the case-finding process, CHWs assisted the mobile teams in organizing participants, obtaining consent, conducting interviews, smearing slides, and providing health education. The mobile unit had a maximum screening capacity of over 250 individuals per day, while on average it screened around 50–100 individuals per day. Xpert testing doubled the number of patients identified over microscopy. While impact of the project on notification rates was not analysed, it was clear that the use of CXR and Xpert increased case detection and linkages to treatment for highly vulnerable populations (43).

In **Cambodia**, a project targeting poor urban populations organized door-to-door screening events. Trained TB workers and CHWs verbally screened 50% of the adult (>15yrs) household members using an inclusive screening definition (see Section 3.2). Two on-the-spot samples and one early morning sample from the following day were collected. Samples were sent to the health centre on the day of collection to prepare slides and register people/samples. Slides were sent for microscopy testing and fresh samples were sent to the district laboratory for Xpert and culture. Xpert was used for specific high-risk populations. Lab results were communicated to the TB worker, ideally within 24 hours, who then communicated the results to the CHW. Over the intervention, the median time from sputum collection to results communication was 3 days, which greatly improved treatment initiation. It was also estimated that the intervention contributed 19% of all-forms case notifications and 39% of bacteriologically-positive TB (10).

Screening and testing capacity/ throughput

When utilizing a mobile unit, it is important to make optimal use of the tools (i.e. neither underutilizing nor overloading) on each day of the screening. The expected number of people going through the process is context- and option specific. For example, 2-week cough prevalence may depend on the smoking prevalence in the community; CXR abnormality will depend on the cut-off scores used, etc. (see also the field guides on CXR and laboratories in this series). However, even with testing being referred to an existing laboratory, large spikes in testing volumes must be considered.

Doing the math

Each step in the screening and diagnostic process has a maximal capacity: e.g. one person might be able to visit on average 20 houses in a day and screen 100 people depending on the screening questions and data collection tool used, the household size and distance between them. Visiting houses for mobilization may be less time consuming so more people may be reached. One CXR machine might be able to screen on average 120 people, but up to 400 depending on the type (digital vs. analog, human vs. automated reading), and organization (see CXR field guide). One 4-module GeneXpert machine can perform 16 tests in one shift but more if staff are working in multiple shifts.

Pooling sputum samples that are unlikely to test positive (e.g. based on CXR results) may be an efficient way to reduce the number of Xpert tests done in a day and hence the number of GeneXpert cartridges and machines needed (see the laboratories field guide to read more about pooling). Estimating the number of people participating in each step of the screening and diagnostic algorithm is important for planning (e.g. how many Xpert cartridges needed), optimizing the intervention, and monitoring each step in real-time. For example, if only 20–30% of the individuals expected come forward for screening, it is important to find out the cause and whether those attending are indeed at a greater risk of being missed by the health system. If that is not the case, then it is possible that the intervention is simply redistributing patients between the community-based screening activity and the passive case-finding system instead of finding people who would otherwise be missed.

Table 6 gives example estimates for a hypothetical screening day, presenting variations in throughput depending on choice of intervention. Many more scenarios are possible, and the results of each step are purely hypothetical and will vary. The example highlights the importance of tracking the cascade of screening to adjust actions and efforts as necessary.

Table 6. Examples of estimates for a screening day

Screening and Testing Modality	Example 1	Screening and Testing Modality	Example 2
Catchment population	1,000 (200 households)	**Catchment population**	1,000 (200 households)
Door-to-door verbal screening (>2 wk cough)	500 (50% screened; other 50% not at home or not willing to be screened) (5 screeners)	**Door-to-door mobilization**	180 households visited (90%; 900 people directly or indirectly reached) (6 mobilizers)
Number identified with presumptive TB	50 (10%)		
Number visiting the mobile unit	40 (80%)	**Number visiting the mobile unit**	450 (50%)
		Number screened with CXR	428 (95%, 1–3 CXR machines depending on type)
		Number with abnormal CXR	86 (20% with abnormality)
Number able to produce sputum of sufficient quality	34 (85%)	**Number able to produce sputum of sufficient quality**	68 (80%, including people without a cough)
Number tested with Xpert	34 (100%) – two 4-module GeneXpert machines needed or one when working in multiple shifts	**Number tested with Xpert**	68 (100%) – four 4-module GeneXpert machines needed or less when working in shifts and/or pooling sputum

Staffing considerations

Training and supervision

Considerations for training and supervision of the case-finding workforce for event-based community case-finding activities will be largely the same as for routine case finding. However, it is important to note that training CHWs and volunteers to identify TB and devising linkages to care for a one-off event or periodic screenings may have an impact on whether these activities continue in the community and become routine. Because supervision of CHWs and other staff on a mobile team might fall under different jurisdictions (e.g. some personnel reporting to the NTP and others to the national HIV programme), coordination processes and reporting of activities need to be decided at the outset of the intervention.

Composition of mobile teams

Composition of mobile teams will depend on the screening algorithms and populations being targeted. The following persons may be needed:

- Drivers
- Social mobilizers (may be community members)
- Registration personnel (may be health facility staff)
- Radiographer if needed (to take the CXR image, may also be able to read the CXR)
- CXR reader if needed (for screening, a trained reader may be sufficient; when CXR is used for clinical diagnosis, a clinician/radiologist needs to interpret the image)
- Laboratory personnel
- Data manager/data entry staff
- Field coordinator

For specific populations the teams may also need a:

- Drug treatment specialist/case manager/social worker
- HIV doctor/nurse
- Interpreter

Implementers should not underestimate recruitment of drivers, as these staffers can perform a range of tasks, including setting up the screening location, performing data entry, ensuring safety and security of other staff, and cleaning and maintaining sensitive equipment and means of transportation. When there are numerous vans/trucks etc. in use, implementers may consider hiring a person in charge of fleet management.

Local health centre staff

Local health centre staff should participate in the events and should be considered part of the team. They can be asked to increase awareness prior to the event and perform tasks such as registration, screening, and sputum collection during the event. After the event, they play a key role in the treatment process. Their temporary increase in workload needs to be discussed with district and facility supervisors. Another approach involves engaging private health providers to help increase attendance, as was effectively done in Pakistan: Formal and informal care providers were visited prior to community case-finding events to encourage them to advise their patients to get free diagnosis and treatment for TB.(44)

Community members (CHWs, volunteers, local authorities)

Having at least one community member as part of the mobile team may improve the acceptability of the screening and linkage to TB services after the event. People from the community are often involved in awareness-raising activities and mobilizing the population prior to the event. In Cambodia, community leaders, CHWs and health centre staff were effectively trained to conduct awareness-raising, mobilization and screening prior to the event.(45)

Screening

Choice of screening algorithm: verbal vs. CXR?

Given that TB prevalence surveys have consistently documented high prevalence of asymptomatic TB (7), CXR in parallel with symptom screening and ideally followed by Xpert testing will likely identify more people with TB. CXR can be used as the first screening tool or it can follow verbal screening. The use of CXR can lead to cost savings in terms of utilizing fewer GeneXpert cartridges.

There is no question as to the effectiveness of CXR in finding people with TB who are missed by symptom screening, but logistical and financial considerations will inform whether or not CXR is utilized as a first- or second-line screening tool. Different types of CXR machines are currently available for purchase or rent. Digital machines are faster, provide easy storage of images and cost less to run but still will require maintenance from a service provider. Analogue machines might be cheaper, and more readily available from previous surveys, but also may require more maintenance due to age, especially under field conditions.

Reading a CXR for screening purposes is not the same as reading it for diagnosis. CXR readers need to be given good instructions and should 'intentionally overread' images for screening purposes to prevent suboptimal sensitivity. Computer-aided reading of digital CXR is increasingly being used and may be useful when large numbers of people are being screened. Additional considerations with respect to the number of machines needed, safety of CXR, and differences between digital and analogue reading are discussed in the laboratories field guide in this series. If CXR screening is not an option (for logistical or financial reasons), verbal symptom screening is the alternative. See the discussion on symptom screening in Section 3.2 for more information.

Location, timing and frequency of screening

Where: The closer the screening site is to the community in need of services and to where its members frequently congregate, the more likely it is that representatives of this community will attend the screening. Although mobile units can be parked in many locations, permissions, visibility and safety for participants and workers should be planned prior to events. Implementers should also consider availability of electricity, shade (if outdoors), ventilation (if indoors), suitable space for expectorating sputum privately, proximity to bus terminals/markets etc., proximity to police stations when working with marginalized communities, and other factors specific to the community of interest. The use of solar panels may reduce the need for a constant power supply. Purchasing a generator for back-up power should also be considered. Entertainment may help to attract participation (46). For example, mobile vans in Tanzania showed movies during Xpert sputum processing, and chest camps in Pakistan used clowns for entertainment.(47)

When: The timing of screening activities should take into account working patterns, gender-related barriers, safety and other factors. Implementers may consider screening in shifts, in the evenings and on weekends, and consider gender in planning (e.g. will women in the community be comfortable being screened with men). Seasonal variations in population size may need to be taken into consideration, especially in rural communities where people are out in the fields for longer periods during farming or harvesting season. These specific considerations underline the need to consult with community leaders and key community stakeholders in the design phase. In Nigeria, community screening camps targeting nomadic population were usually held during community market days after consultation with nomadic community leaders (9).

How long: The duration of the team's stay in the community may be a half day, 1 day or multiple days. When targeting remote populations, at least 2–3 days may be necessary to collect sputum samples, communicate the test results and start treatment in the community.

Moving the mobile unit: It is not advisable to move mobile units during the day to cover multiple locations/sites, as set up for mobile units takes time. For a project in Cambodia, the location of the mobile unit each day was carefully planned, taking into account community needs and the size of the population the team could cover in one day (see earlier planning section). They moved the mobile unit in the evening, determining the most optimal route to cover six different locations per week.

How often: In general, there is a dearth of evidence on the most optimal frequency for screening events. The frequency, among other factors, may depend on the rigour of the screening approach implemented, TB prevalence in the community, and population mobility. A study in Harare, Zimbabwe repeated community screenings every 6 months for a period of 3 years (12), while an approach in South Africa compared 6- and 12-month screening frequencies among gold miners in South Africa. The latter approach did not find substantial benefits in screening more frequently (48). However, only 28% loss to follow-up during the study period indicates a rather stable mining population, which may have contributed to the lack of difference in the results. A modelling exercise showed that yearly screening events could have potential cost-savings over a period of 10 years, depending on the local TB epidemic and the intensity of the approach, and should be considered (49).

Transportation to the screening/diagnostic location

In rural areas with low population density and villages scattered across large areas, it will be necessary to organize transportation of people from villages to the mobile unit in order to maximize use of the tools on a daily basis. Mobile teams will also need to consider road conditions and have local stakeholders survey the area and the route prior to mobile unit arrival. See the field guides on CXR and laboratories for information on setting up location and transport.

A project in Cambodia initially planned to drive through villages to screen and test elderly populations with CXR and Xpert using a mobile unit. This, however, proved to be inefficient, as the elderly lived too far apart and road conditions were so bad that only a few people could be reached each day. Implementers discovered that it was more efficient to arrange transportation for the elderly to come to the mobile screening site.

Testing

Sputum collection

Depending on the screening approach, sputum may be collected at the person's house or at a central location/mobile unit. It is preferable for at least one sputum sample to be given under observation of a trained volunteer who can also provide instruction and support to the person with presumptive TB (40). It should be stressed that sputum collection should ideally be conducted outdoors in a ventilated, private space. (Please see additional discussion on sputum collection in the laboratories field guide in this series.)

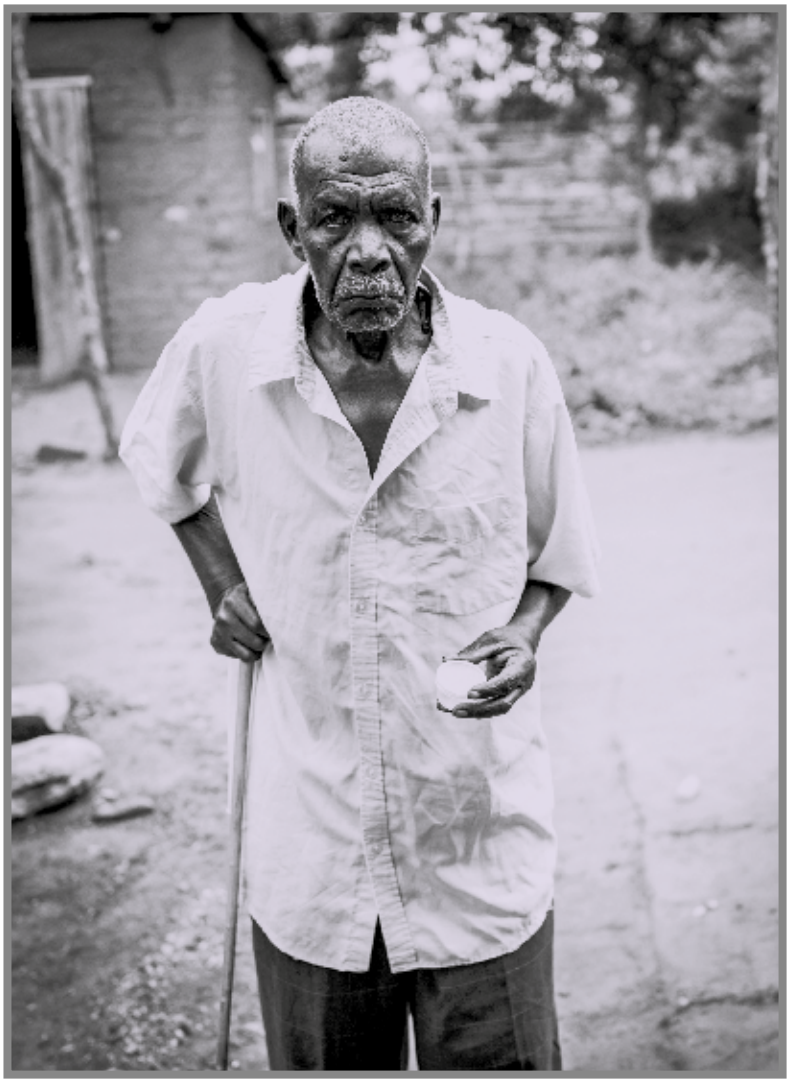
Mobile laboratories

In recent years, there has been an increase in the use of mobile laboratories equipped with (digital) CXR and GeneXpert machines. This combination has great advantages, as it brings together highly sensitive and specific triage and diagnostic tests. The quality of care offered by these technologies is often perceived to be high, which likely contributes to higher coverage. Nevertheless, quality control measures need to be implemented to monitor the quality of the testing services, and implementers will need to consider supplies for the mobile laboratories, such as sputum collection cups and cartridges.

Clinically diagnosed TB

Not only is CXR a highly recommended screening tool, it can also be used to aid in clinical diagnoses of TB and other pulmonary diseases. As mentioned earlier, reading CXR images for screening and reading for diagnosis are different. Although community-based screening interventions often have lower rates of clinically diagnosed TB due to fewer clinicians to see patients, the use of CXR as a screening tool in some settings can lead to high rates of clinical diagnosis, even to the extent of suspecting over-diagnosis. A project in Cambodia bacteriologically confirmed only 34% of their found patients; the rest were clinically diagnosed through the use of CXR.

On the other hand, the use of CXR to assist clinical diagnosis will be important to reach all people with TB, as Xpert testing among people with smear-negative TB can have sensitivity of less than 70%.(50) Depending on the quality of the sample and the setting, quite a large proportion of adult prevalent TB cases may be Xpert-negative. For those people with abnormal CXR not suggestive of TB, it is important to have services available for alternative diagnoses (e.g. COPD, asthma, heart failure). For more considerations and discussion on when and how to use CXR, please see the relevant field guide in this series.



Treatment initiation, notification and support

A successful community-based screening intervention will guarantee linkage to treatment and monitor treatment until the person with TB has successfully completed the treatment course. If test results are not available on the day of collection (e.g. when transporting sputum to a laboratory), a system needs to be set up to communicate results to the person tested.

Role of the mobile team

Treatment initiation, support and notification are usually done by the regular TB services (public or private). Therefore, the mobile team should establish good communication with these services prior to the visit. The logistics of linking people with TB to treatment and planning for sufficient TB medicine supplies need to be coordinated with local TB programmes when planning events.

3.4 Additional considerations

Linkage to HIV and other programmes

Collaboration between HIV and TB activities is important, and combining HIV and TB community screening programmes (e.g. adding a TB screening component to an HIV outreach programme) may be beneficial to both. In Tanzania, individuals living in poor underserved areas who are approached for HIV testing in a Test&Treat programme are now also screened for TB as part of that mobile outreach. See also the key populations field guide for more details on integrating TB and HIV services.

Multifaceted interventions

Community-based screening interventions often include activities that go beyond community screening to tackle various barriers to accessing care. For example, programmes often include elements aimed at reducing TB stigma in the community, improving recognition of TB among health workers, strengthening the laboratory capacity to diagnose TB, and improving linkages between public and private providers. A package of different activities tailored to the setting usually works well to offer an integrated approach to TB care and prevention.

Table 7 presents a summary of the discussion around roles intervention options for community-based screening in Section 3.

Table 7. Summary of possibilities/options for each step in the screening pathway

Step	What	Who	Where	Frequency	How
Awareness-raising/ mobilization	» Agree on time and location of screening with community leaders » Announce the screening activities » Identify people eligible for screening » Hand out screening vouchers	• Lay people • CHWs • Health staff • Project staff	• In the community • At the house	• Once • Regular • Continuous	• Door-to-door • Through local care providers • Community gatherings/events • Campaigns (TV, radio, social media)
Screening	» Identify people eligible for testing » Refer people for testing or collect sputum sample » Organize transportation for person or sputum	• Lay people • CHWs • Health staff/ Supervisors	• At the house • At a central point in the community • At a health facility	• Once • Regular • Continuous	• Verbal screening • CXR screening
Testing	» Identify people with bacteriologically-confirmed TB and refer for treatment » Refer people with bacteriologically-negative results for further investigation » Organize linkage to care	• Public/private facility laboratory staff • Project lab staff	• Routine lab • Temporary lab • Mobile lab		• Smear microscopy (LED/ZN) • Xpert • CXR
Treatment initiation and notification	» Make final diagnosis (especially relevant for clinically diagnosed TB) » Initiate TB treatment » Notify patients » Initiate contact investigation	• Public/private health facility staff	• Health facility		
Supporting treatment	» Motivate patients to continue treatment » Ensure patients complete necessary follow-up sputum examinations	• CHWs • Health staff • Supervisors	• At the home	• As needed	

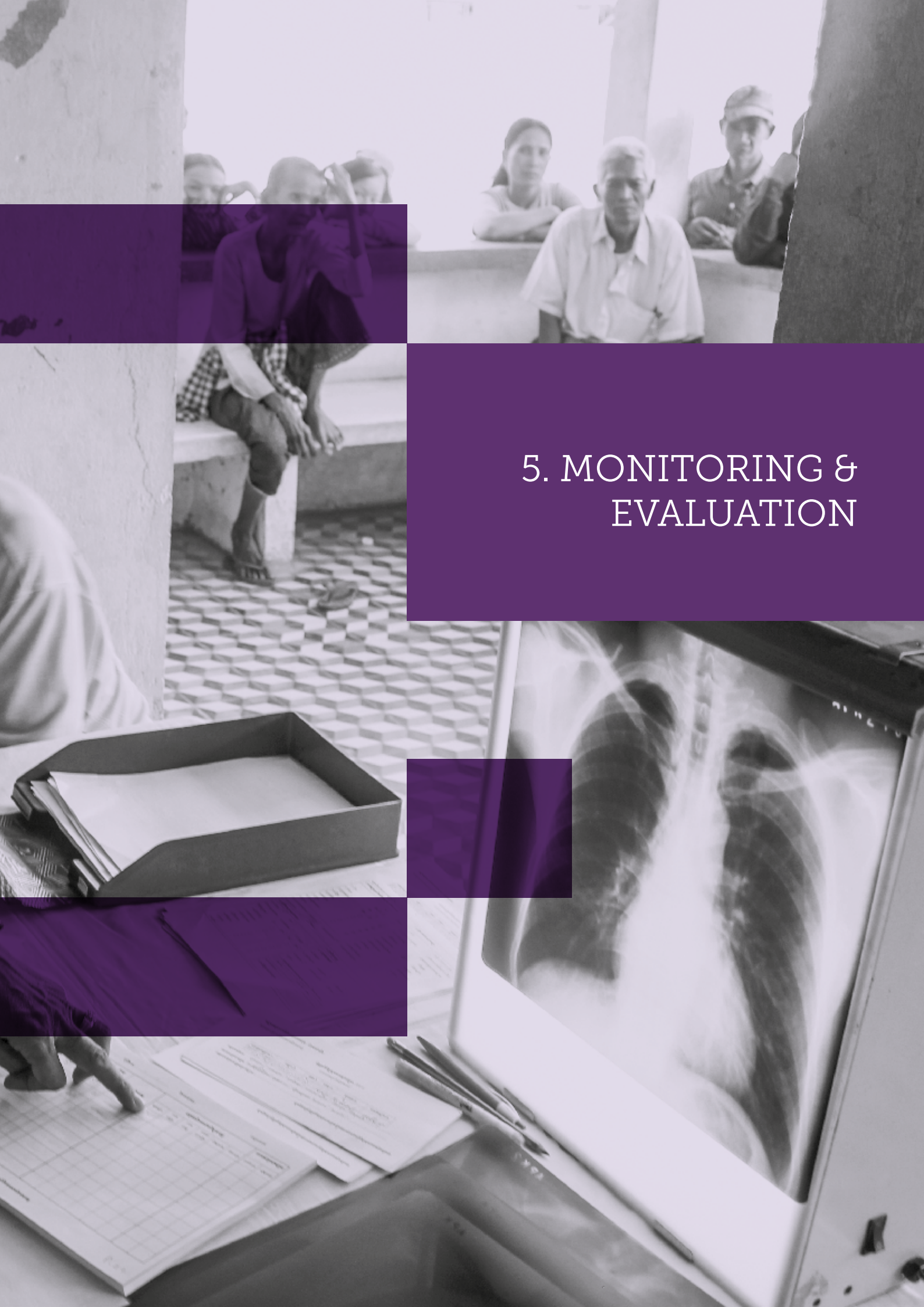
4. RESOURCE CONSIDERATIONS / MAJOR COSTS

4. RESOURCE CONSIDERATIONS / MAJOR COSTS

As mentioned earlier, organizing community-based screening activities will always have additional costs compared to facility-based approaches. Costs will depend on the design and duration of the intervention, the size of the target population, existing resources to be leveraged (e.g. mobile digital X-ray machines after a prevalence survey), and the availability of partners who can support the work.

Cost drivers for continuous community-based case finding	Cost drivers for event-based/mobile community case finding
• Incentives/compensation schemes for CHWs/volunteers; • Costs involved in setting up a supervisory system; • Communication means; • Transportation costs for CHWs and supervisors, as well as for sputum (when applicable); • Introduction of new diagnostics such as Xpert and their running costs.	• Staff costs of the mobile team; • Transportation costs of moving the team around; • Procurement of a mobile van equipped with the necessary screening and diagnostic tools; • Introduction of new diagnostics such as Xpert and their running costs.

The choice of algorithm impacts the budget in two major ways: 1) the procurement and running costs of new tools (especially GeneXpert machines); and 2) the choice of first screening test (which determines the number of people to be tested in the second step – e.g. a very inclusive or restrictive symptom screening will influence the number of Xpert tests to be done if that is the second test in the algorithm).



5. MONITORING & EVALUATION

5. MONITORING & EVALUATION

5.1 Monitoring system

Careful M&E of community-based screening is needed to continuously improve the activities and assess whether the activity is still targeting the relevant population. It is important to design the M&E framework before starting any activities.

The following points should be taken into consideration with regard to measuring the yield of the intervention:

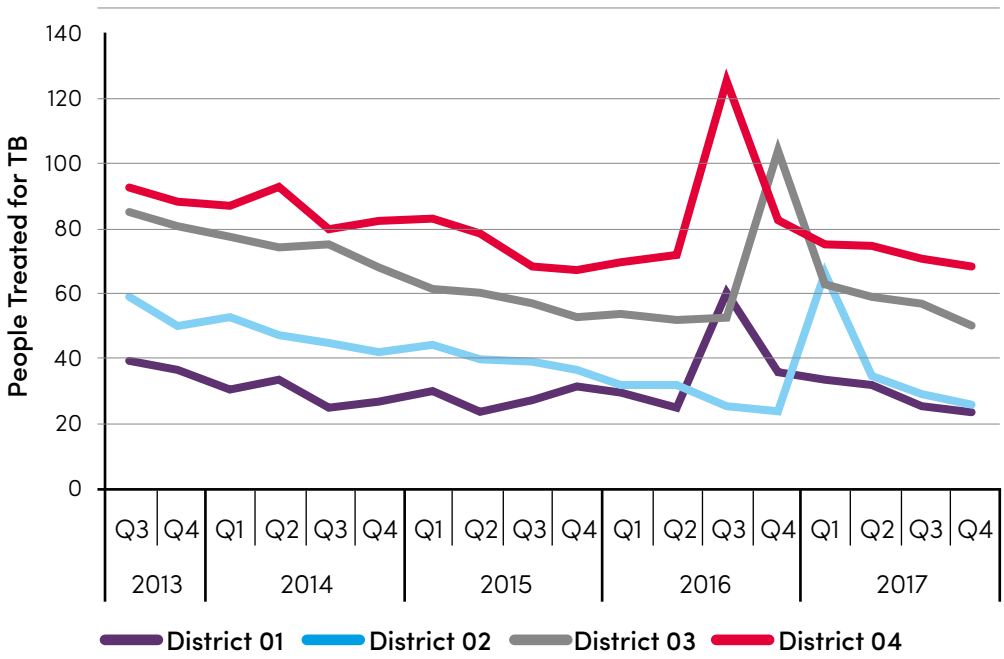
- Estimating the size of the target population and potential yield is important when setting targets for the numbers to be screened, tested and diagnosed. For certain target populations, this can be quite difficult. For other populations, census data and other research can be used. Please also see the key populations field guide and Stop TB Partnership's data framework on key populations (14) to read more about population estimations.
- When CHWs or lay people conduct routine screening, it is often difficult to determine the number of people verbally screened, especially if they are only screened for cough. Data collection often only begins when the person is identified for testing. It is still worth discussing ways to gain insight into the underlying screening efforts of the CHWs and lay people. For example, they could be asked to tally the number of people they reach on a daily basis or use a screening app.
- Sometimes the number of people reached is used instead of the number of people screened, e.g. the number of people attending TB awareness/education sessions where the symptoms of TB are discussed.
- It is recommended by WHO, and even required by the Global Fund, to collect TB-related data disaggregated by age and sex, and preferably also for the different target populations (e.g. when both nomadic and mining communities are being targeted). This will enable implementers to compare groups and identify those groups with the highest yield and/or lowest number needed to screen. In addition, intervention gender dynamics should be tracked to come up with the most efficient and effective approaches to addressing gender barriers.
- When using mobile teams for screening and testing, monitoring treatment initiation and outcomes requires special attention, as both will likely occur after the team has left the site. It is important to request the mobile team to mark/label patients found during the intervention in the TB register (or on the patient card) to enable retrospective data collection on treatment outcomes.
- When mHealth technologies, such as screening apps, are used, all data are electronic and could all be combined into one database. This allows for real-time monitoring, e.g. to identify areas or populations where efforts could be further intensified.

Apart from looking at programme-specific indicators, it is worth evaluating the degree to which community-based screening impacts TB case notifications. The M&E section in the introductory field guide provides more information on how to select an 'evaluation population' and 'control population' and how to compare the baseline with the intervention period. The following points should be taken into consideration with regard to measuring change in notifications:

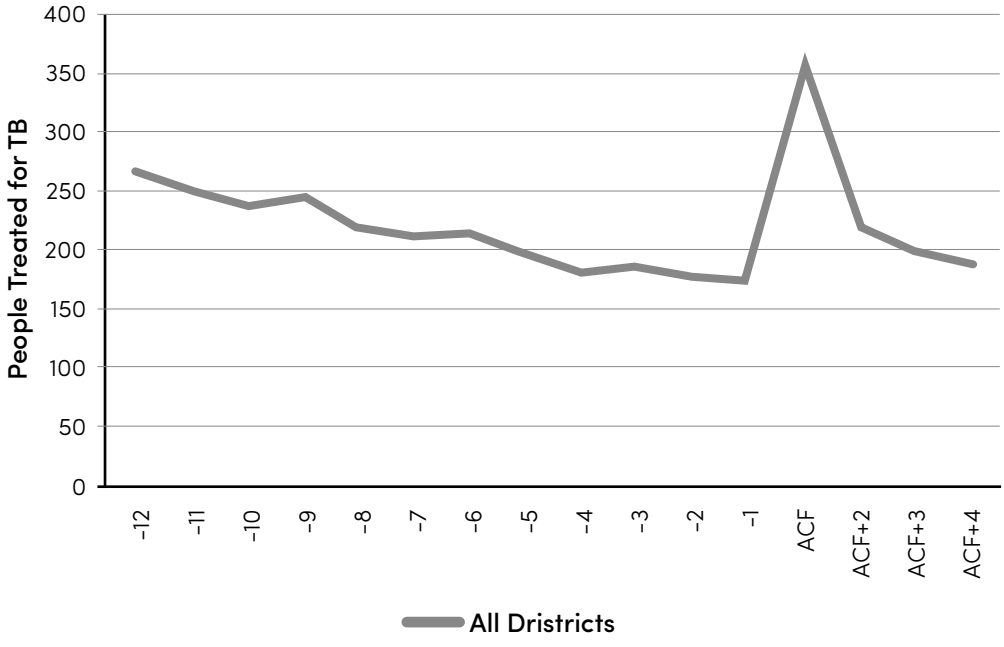
- It is important to understand that improved case finding is only relevant when people are initiated on treatment and when they successfully complete their treatment.
- When routine screening activities targeting entire communities are integrated into health services, the size of the target population may be close to the size of the evaluation population, which increases the chance of showing an effect above normal random variation. When interventions target key populations that are smaller in size, it may be more challenging to see a change in notifications. A possible solution is to limit the evaluation population to include only this specific population.
- For mobile case finding targeting specific areas, it may be best to go from district to district, as notification data are often organized by district for evaluation purposes. In this case, evaluation can be staggered, with each district having its own start date for the intervention. A clear increase in notifications in the quarter when the mobile team visited the district is often followed by a decrease in notifications in the subsequent the quarter (see Figure 4). When a district is large, more than one quarter may be needed to cover the whole district. The effect may be diluted if the intervention starts towards the end of a quarter and continues into the next quarter.

Figure 4. Impact of mobile team CXR screening on notifications

Impact of mobile CXR screening on TB case notifications in four districts



Summary impact of mobile CXR screening for four districts with active case finding activities standardized into a single quarter



5.2 Process indicators

Some extra process indicators may be added to the standard set of indicators.

Process indicators for routine screening:

1. Target population size
2. Number of people reached during awareness-raising activities (in case number screened is unknown)
3. Number of houses visited
4. Number of people verbally screened (often difficult to collect) by key population
5. Number of people with presumptive TB identified by CHWs/volunteers
6. Number of people with presumptive TB confirmed by supervisor (when applicable)
7. Number sputum samples (or slides) transported to laboratory (when applicable)
8. Number of sputum samples of poor quality submitted for testing
9. Number of people tested
10. Change in the sputum grading between baseline and intervention
11. Number of people identified with Bact+ TB or any form of TB
12. Number of people started on treatment (for Bact+ and any form of TB separate)
13. Number of people successfully treated (for Bact+ and any form of TB separate)

Activity monitoring of each CHW/volunteer (e.g. number of houses visited per week, numbers screened, efforts to reach key populations) is important to track their engagement and limit fraud. Monitoring the quality of the sputum samples sent to the laboratory is important to quickly intervene if sub-standard.

Process indicators for event-based screening:

1. Target population size
2. Number of days performing screening activities
3. Number referred for screening (in case of door-to-door mobilization)
4. Number of people screened verbally and/or by CXR (sometimes better to split the indicator, but always relevant to know total number screened) by key population
5. Number of people with abnormal CXR suggestive of TB and/or signs and symptoms suggestive of TB
6. Number of people producing sputum sample(s)
7. Number of sputum samples of poor quality submitted for testing
8. Number of people tested (usually separated by type of test done)
9. Number of people identified with Bact+ TB or any form of TB
10. Results of quality control measures
11. Number of people started on treatment (for Bact+ and any form of TB separate)
12. Number of people successfully treated (for Bact+ and any form of TB separate)

To optimize the use of the screening and diagnostic tools, it is important to monitor the number screened and number of tests performed per day at the mobile venue and compare this with the capacity of the tools.

5.3 Use of monitoring for improving interventions

Internal monitoring and regular feedback cycles for quality improvements are essential. The choices of who, where, when and how monitoring is conducted and the targets set are often based on experiences in other settings and the relevant literature. During implementation, M&E results can be compared to the targets and any deviations will point to improvements that can be made. Table 8 below presents some considerations about setting targets and interpreting data for community-based case finding activities.

The study among miners in South Africa (48) highlighted an important issue: There were significant losses between being identified with symptoms suggestive of TB (abnormal CXR) and having sputum tested (only 37% were tested) and between being diagnosed with TB and starting treatment (only 44% started treatment). Only when each step of the process is carefully monitored can these issues come to light and solutions can be sought. Indeed, close monitoring may lead to the discovery that certain approaches are less successful in specific populations and that adaptations are needed.

Table 8. Setting indicators for community case-finding interventions

Indicator	What to expect – target set	Interpretation
Proportion screened of the target population	Depends largely on the scale of the activities	When low, explore the underlying reasons. Who is not being reached and why? Size of the target population may be overestimated. Community volunteers may be less active than anticipated, or only a few of the trained volunteers remain active. Camp: Why are people not attending? Are they unable to reach the screening site?
Proportion screened of those referred for screening	Depends on distance from home to screening site; motivation of the person; whether transportation is arranged; and screening hours	When low, it is important to find out what is hindering those referred from going for screening, and to look for solutions. Sometimes, people who were not referred are also being screened, which makes this proportion difficult to interpret.
Proportion identified with presumptive TB of those screened	Any form of pre-screening or self-selection directly increases this proportion; also depends heavily on the screening algorithm: low when using strict symptom screening to high when using combination of CXR and inclusive symptom screening	High proportions are indicative of a pre-screening/self-selection step. When low in combination with a high proportion testing positive (next indicator), the screening algorithm may be too strictly applied by the screeners.
Proportion bact+ out of those tested	This proportion is often lower in active compared to passive case finding; higher when using Xpert compared to microscopy; higher when using a more restrictive screening algorithm; and higher with higher TB prevalence.	Very low proportion points to an inefficient screening and diagnostic algorithm or one that is not targeting the right population. A high proportion is indicative of a strict algorithm, especially when the previous indicators in the same population are low.
Proportion tested out of those identified with presumptive TB	Potentially high when screening and testing are done at the same location; depends on the sputum quality and screening algorithm: people without symptoms but with abnormal CXR may have more difficulties producing a sputum of good enough quality; in the case of referral or sputum transportation, the proportion is usually lower.	This is typically a step in the pathway that needs to be addressed at the start of the intervention; low proportions are often seen, especially when there is no transport system arranged. When sputum is transported and the proportion is lower than expected, poor quality due to poor sample collection or delayed transport may result in samples being unsuitable for testing. It is important to know who is not producing (quality) sputum and why.
Proportion initiated on treatment	Needs to be high, and programme should strive to put all people with TB on treatment in a timely manner.	When low, linkage to care is not well organized or there are sudden treatment shortages.
Proportion successfully completing treatment	The Global Plan's target is to achieve at least a 90% treatment success rate among all people identified as needing treatment for TB	Time is needed to be able to monitor changes in this indicator.

6. RESOURCES

Several useful guides exist:

- Global Laboratory Initiative (2017): GLI guide to TB specimen referral systems and integrated networks
- World Health Organization (2015): Systematic screening for active tuberculosis: an operational guide
- World Health Organization (2013): Systematic screening for active tuberculosis: principles and recommendations
- CORE Group (2013): Community-based tuberculosis prevention and care: why—and how—to get involved: an international handbook for nongovernmental organizations and civil society organizations
- FHI 360 (2011): TB infection control at the community level: a training handbook
- Global Health Workforce Alliance/World Health Organization (2010): Global experience of community health workers for delivery of health related millennium development goals: a systematic review, country case studies, and recommendations for integration into national health systems
- World Health Organization (2008): Community involvement in tuberculosis care and prevention: towards partnerships for health: guiding principles and recommendations based on a WHO review.

In 2013, a series of papers were published on screening, among them:

- Golub JE, Dowdy DW (2013): Screening for active tuberculosis: methodological challenges in implementation and evaluation

A paper comparing four models of active case finding:

- Adejumo AO, Azuogu B, Okorie O, Lawal OM, Onazi OJ, Gidado M, et al. (2016): Community referral for presumptive TB in Nigeria: a comparison of four models of active case finding

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ANNEXES

Practical considerations when implementing a screening app

App development

1. Complete a situational analysis; map the diagnostic algorithm, patient flow and data flow; and develop a codebook for the developers.
2. Plan enough time for app development, as it can easily take 3–6 months.
3. The developer needs to have the same device for testing the app.
4. Check the network availability in the planned implementation area, as perhaps two providers are needed.
5. In situations where screeners will not have a network available all the time, create the option for asynchronous communication.
6. Aim for open source instead of proprietary software. When using proprietary software there will be a risk of additional payments to the developer whenever an update to the tool is necessary.
7. Make sure to negotiate with the developer the possibility of additional customization after the product is finalized.
8. Discuss with stakeholders where data will be stored (server) and take necessary steps to ensure confidentiality of data following legal regulations.
9. Use commonly used language in the app, i.e. carefully chosen words that will be familiar to the end-user (e.g. use MDR-TB instead of rifampicin-resistant TB).
10. Translate the app into the local language(s).
11. Make sure that font size is large enough and carefully select the colours to ensure optimal visualization.
12. Make sure metadata are captured and downloadable.
13. Collect GPS locations to monitor where data are collected (e.g. to prevent fraud).
14. Make sure to have a mandatory set of questions that must be answered before proceeding, as this will avoid incomplete fields and make tracking of patients easier.
15. Pilot the app: Ask users about its usability and their interpretation of questions.

Preparations

16. Buy enough devices (phones, tablets, phablets), as some will get lost or break down during implementation.
17. Purchase insurance, cases and screen protectors.
18. Consider procuring devices with replaceable batteries.
19. Budget enough time for installation.
20. Disable all functionalities on devices for the programme except for the phone, calculator, calendar, and possibly the camera to scan QR codes – especially to prevent the misuse of the device. Each programme should start its own discussion around the allowed functionalities of the devices provided, based on the context and ease of communication. (e.g. The use of WhatsApp will ease communication between groups of screeners and supervisors, but could potentially be misused and embarrass the programme.)
21. Unlimited data use is preferable, but expensive. If prepaid, adjust the amount to the needs of the project.
22. Supply airtime credit to enable volunteers to call supervisors, laboratory technicians and patients.
23. Possibly add sputum collection instructional videos and other health communication materials on the device; however, showing videos rapidly lowers the battery and therefore a series of pictures may work better.
24. Customize training on how to use the app. Some users may need more help (often older volunteers). Training should not only include the screening questions, but also device features such as how to increase font size and modify the brightness. After the training, one day of supervised training in the field should also be included.
25. A paper back-up system is always necessary; sputum specimens usually need to be accompanied by a collection form and/or a transport form.
26. Realize that if the project needs to transition from paper-based to digital recording, productivity may slow down initially, partly because of more accurate data and partly because screeners need to get used to the app.

Implementation

27. Have user agreements in place clearly defining where and for what the device can and cannot be used. Clearly articulate how to manage lost, stolen and damaged devices.
28. Provide supporting documents: one-pagers on app technicalities (e.g. how to add a new person) and the screening algorithm.
29. Coordinate software updates.

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.

Stop TB Partnership

Global Health Campus
Chemin du Pommier 40
1218 Le Grand-Saconnex
Geneva, Switzerland