USAID FROM THE AMERICAN PEOPLE

msh Management Sciences for Health

CHALLENGE TB

TECHNICAL BRIEF

Photo credit: Warren Zelman

Advances in Tuberculosis Contact Investigation in Ethiopia

BACKGROUND

Contact investigation (CI) refers to the systematic evaluation of individuals who have been in close contact with potentially infectious tuberculosis (TB) cases within three months of TB treatment initiation (Lönnroth 2013, WHO 2013). CI aims to identify contacts of all ages with undiagnosed TB and provide preventive therapy for contacts without TB who have increased susceptibility to active TB following recent infection. CI helps to improve TB case finding by focusing on screening high-risk groups, reducing further transmission of mycobacterium TB, ensuring that latent TB-infected individuals have access to medical evaluations and preventive treatment before they develop active TB, and reducing the burden of TB on health systems (Lönnroth 2013, Tuberculosis Coalition for Technical Assistance 2007).

Evidence shows that CI could be particularly useful for identifying TB in children (Lönnroth 2013, WHO 2013). CI can also assist in identifying people who require closer follow-up, such as contacts of index drug resistant TB (DR-TB) or extensively drug-resistant TB patients (Nebiyu et al 2018). CI also helps in the identification of latent TB and provides an opportunity to treat eligible children (Tadesse et al 2016, Tuberculosis Coalition for Technical Assistance 2007).

Systematic reviews in high TB incidence countries show that the prevalence of TB among contacts of pulmonary TB patients may reach 5%, particularly among household members (Fox et al 2013). Therefore, the World Health Organization (WHO) recommends that contacts of TB patients be investigated systematically and actively for TB infection and disease (WHO 2012).

Although WHO recommends CI as a systematic screening method for TB, Ethiopia has only recently adapted and started to implement CI in places where community TB was given due emphasize (FMOH, 2017). Previously, CI data were reported to neither the Federal Ministry of Health (FMOH) nor the National TB Program (NTP).

ETHIOPIA

However, CI has been actively implemented by projects such as TB REACH, implemented by REACH Ethiopia in the southern regions of the country (Datiko et al., 2017; Yassin et al., 2013); HEAL TB in Oromia and Amhara; and Challenge TB in other regions across the country (Jerene et al., 2015; Gashu et al., 2016). Implementing and strengthening TB CI is paramount in high-incidence countries like Ethiopia to ensure its dual benefits of early TB case detection and treatment and to introduce preventive therapies (FMOH 2018).

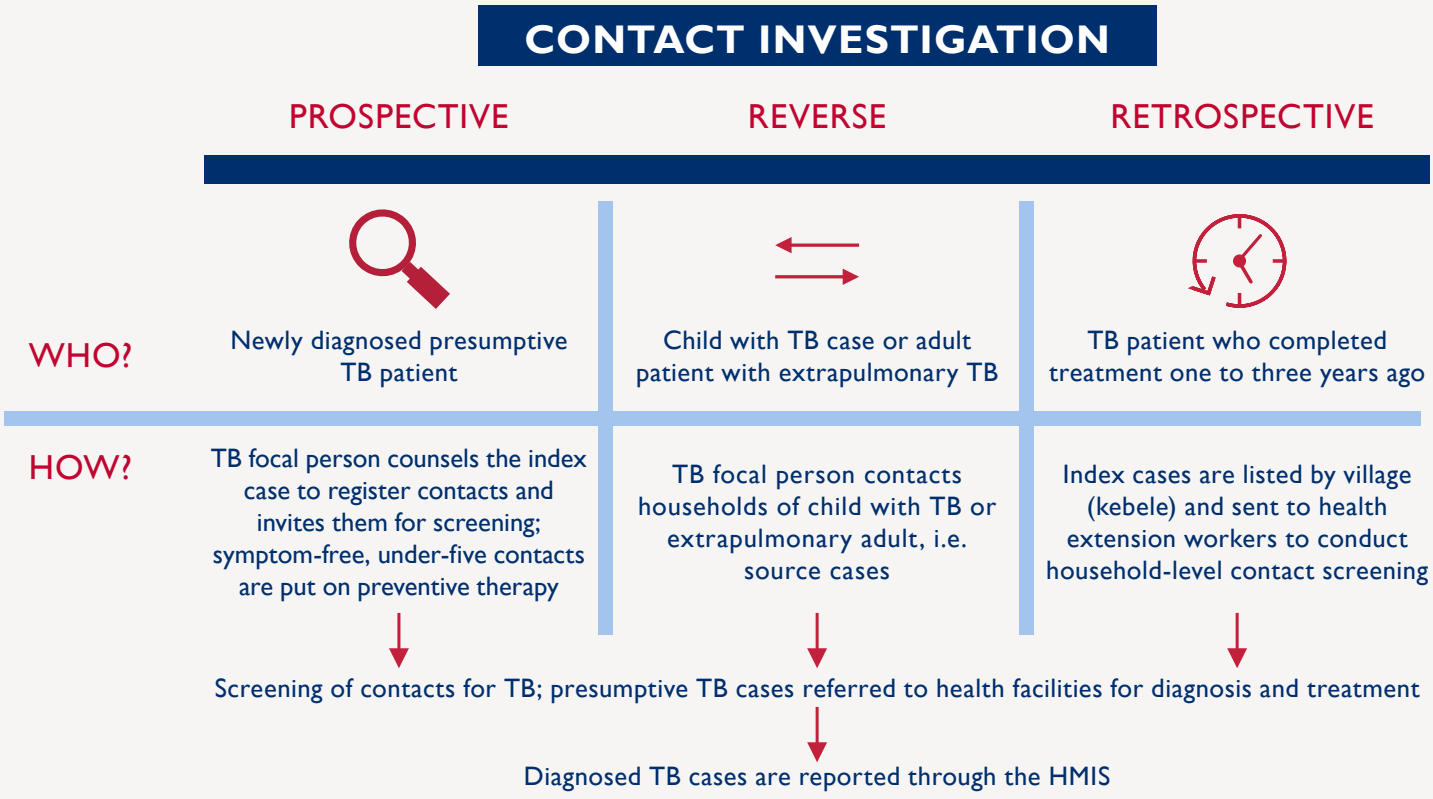
STRATEGIC APPROACH

The USAID-funded HEAL TB and Challenge TB projects have implemented three CI approaches at different levels (figure 1).

Routine or prospective contact investigation: Refers to initiating contact tracing and investigation soon after the index case is identified. It is called prospective because the tracing and investigation of the contacts commences during the identification of the index case and continues throughout the treatment course of the index case. This CI approach is performed routinely at health facilities at the community level. Outreach activities are also carried out to look for contacts in households and workplaces and among inaccessible populations.

Reverse source-case contact investigation: Refers to a source-case investigation of a child with TB by taking the child with TB as an index case. Reverse CI is also used to look for a source case when the index case has extra pulmonary TB. In reverse CI or a source-case investigation, all contacts in these settings are included if the source case was not located in the family or household. Routine CI approaches are implemented in all regions at both the community and health facility levels, in addition to routine outreach activities.

FIGURE 1. Strategic approach for CI in Ethiopia



**A kebele is the smallest administrative unit in Ethiopia.*

Retrospective contact investigation: Refers to CI of contacts of index cases who were treated in the past one to three years (Nakaoka et al., 2006; Gashu et al., 2016). The rationale for applying retrospective CI is that immediate exposure may not lead to active TB, but 90% of exposed contacts develop it within one to three years (Nakaoka et al., 2006). Therefore, going back to the families of index cases who had been diagnosed and treated one to three years prior could potentially detect symptomatic TB cases.

Retrospective CI is performed as an outreach activity because the index cases were diagnosed and treated and either released from treatment or lost to follow-up. The home of the index case is visited to screen contacts. Therefore, this requires a planned schedule in the form of outreach activities. Unlike reverse and prospective CI, retrospective CI is an active TB case finding strategy.

Through HEAL TB and Challenge TB, TB focal persons, health care facilities, and health extension workers (HEWs) were oriented on these approaches using the TB job aids and algorithms included the CI. The projects included CI monitoring indicators, such as index cases, contacts traced and screened in the supervision checklists, and standards of care for monitoring (Melese et al., 2018). The projects implemented prospective CI in all project-supported health facilities. Retrospective CI was carried out in select districts where CI was historically weak. The mentoring and monitoring of the CI activity was integrated with other TB activities, and the comprehensive national TB/HIV guideline and training manuals were designed to contain CI to areas where it was emphasized during the training of community workers and health care workers.

All three CI approaches identified presumptive TB cases among contacts and referred them to a health facility for TB investigation. Children under five without TB symptoms were also put on preventive therapy.

The active TB cases and eligible children put on preventive therapy through CI are registered in both the TB unit and CI registers. Ultimately, the coverage of CI and preventive therapy is reported to districts, zones, regions, and the FMOH and NTP using the health management information system (HMIS), the standards of care, or Qual-TB tools (figure 1).

Evidence has shown that active TB case findings lead to a high case detection rate and result in program efficiencies and cost savings (Dasgupta et al., 2000). This is especially true when active TB case finding strategies such as retrospective CI are added to an existing passive case finding effort, such as reverse and prospective CI (Sekandi et al., 2015). Therefore, the implementation of an additional and active CI approach as a part of the recommended TB control strategy should be prioritized.

IMPLEMENTATION

Contact investigation at health facilities: Contacts are brought by the index case to the health facility or to HEWs and instructed to trace their contacts. Contacts are screened for TB and investigated using history and physical examinations, GeneXpert (when available), and histopathology or radiology examinations and started on TB medication per national guidelines if a diagnosis is confirmed. Eligible children are put on preventive therapy after ruling out active TB. Adherence to preventive therapy or TB treatment is monitored by HEWs, health care workers, and family members to ensure completion.

Community mother with her children being supervised by HEW (Photo credit: MSH).

Contact investigation at the community level: HEWs and community volunteers identify presumptive and confirmed TB cases in the community and check for household contacts. They ask about any symptoms of TB in the contacts. Contacts with any TB symptoms are referred to a nearby health facility for TB evaluation using the presumptive referral slip. Children under five who are identified as contacts are also referred to a nearby health facility for preventive therapy if they are asymptomatic. HEWs counsel the household on the importance of CI and the essentials of preventive therapy for exposed asymptomatic children. HEWs trace the final outcome of contact with presumptive TB cases. They support the adherence of preventive therapy and schedule a quarterly follow up visit with family members who were not symptomatic. HEWs and community volunteers report the CI and preventive therapy to the nearby primary health care unit monthly.

Administrative level (districts, zones, regions, and FMOH/NTP) implementation of contact investigation: Planning, supportive supervision, review meetings, and reporting are key activities for CI and are performed by TB focal persons at the district, zonal, regional, and national TB program levels. With assistance from HEAL TB and Challenge TB, the NTP directs technical support to regions. The projects served as a main financial source for the implementation of CI. Information on CI coverage was collated from TB unit registers and reports and compiled using an electronic reporting format or HMIS. Regions monitor CI coverage through HMIS reports and provide integrated supportive supervision to zones, districts, and health facilities as well as timely feedback and on-the-job training. The zones and districts address CI through review meetings, catchment area meetings, and supportive supervision. The coordination work between health facilities and the community on CI is facilitated by TB focal persons at the district level.

Table 1. Summary of CI Implementation at Different Levels

LEVEL OF CI IMPLEMENTATION	CI APPROACHES IMPLEMENTED	KEY ACTIVITIES	RESPONSIBLE PARTIES	DETAILS
 Health facility	All CI approaches	– Index case identification – Contact tracing – Screening of contacts – Investigation of presumptive TB cases – Treatment of active TB cases – Health education – Provision of preventive therapy – Follow on screening of contacts	TB focal persons HEWs	Capacity building of the TB focal person and HEW and coaching or mentoring were supported by HEAL TB and Challenge TB
 Community	All CI approaches	– Contact tracing and screening at home and at congregate settings – Referral of contacts to health facilities – Health education – Adherence support for TB and preventive therapy – Follow on screening of contacts	HEWs Community volunteers	HEWs, facility TB focal person, and Health Extension Program coordinator collaborated for the betterment of CI
 Administrative	Monitoring and evaluation	– Routine registration and recording of CI is monitored – Quarterly supportive supervision – Review meeting and catchment area meetings	HEW coordinators TB focal persons at districts, zones, regions, and FMOH/NTP	Financial and technical support for M&E activities was provided by HEAL TB and Challenge TB

RESULTS AND ACHIEVEMENTS

Through HEAL TB and Challenge TB, the national CI activity was initially established and strengthened in Oromia and Amhara regions and then scaled up to other regions of the country. Retrospective CI was also implemented. CI was also used for DR-TB index cases. The CI register used by the projects was revised and became the national CI register. CI coverage became the reportable indicator in the national HMIS report. The revised national TB policy and plan emphasized CI as a key approach for TB prevention and control. The TB and TB/HIV guideline included CI as a targeted screening method (FMOH 2017). The standard CI operating procedure used by HEAL TB and Challenge TB became the national procedure. Eventually, the practice of retrospective CI changed to follow-up quarterly CI for contacts of drug-susceptible TB index cases for two years (FMOH, 2018). The is because the yield of TB among the contacts was significant during the first two years after their index cases completed TB treatment (Gashu et al., 2017).

From 2016 to 2018, 184,886 contacts of 58,257 index cases were traced and screened, making the ratio of contact to index case of approximately 3:1. The proportions of presumed and active TB cases identified through routine CI were 1.7% and 0.6%, respectively (table 2).

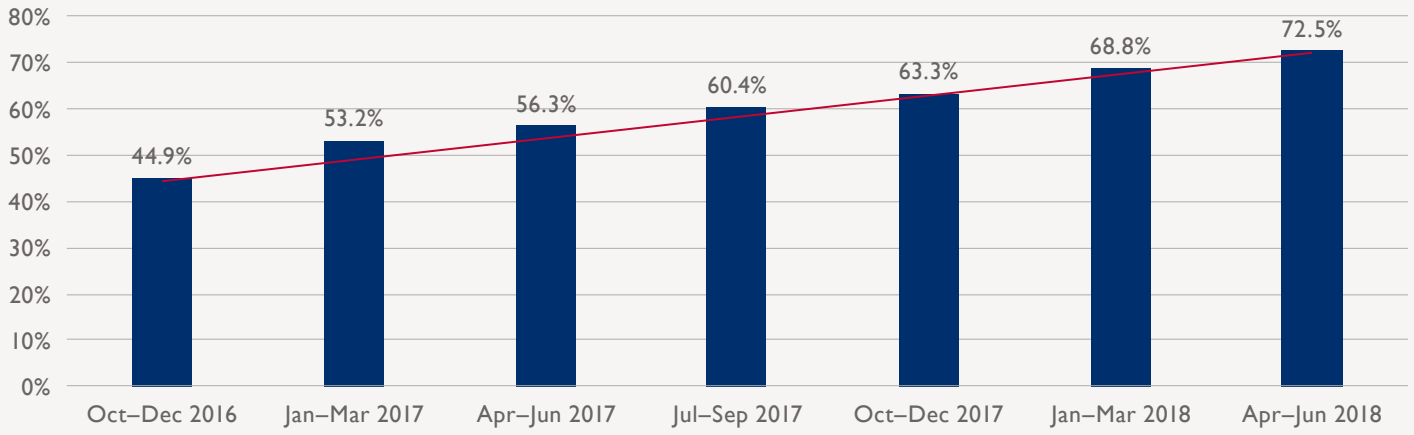
TABLE 2. CI Yield in Challenge TB-Supported Regions, July 2016–June 2018

VARIABLES	NUMBER (PERCENT)
Health facilities implementing contact screening	1,939 (58.1%)
Index smear positive TB cases	58,257 (49.3%)
Household contacts registered	184,886
Number of household contacts screened for TB	178,946 (96.8%)
Number of presumptive TB cases	3,038 (1.7%)
Number of TB cases identified among contacts	1,019 (0.6%)

Overall 16,849 contacts were children under five, and about 9,014 (53.5 %) of those were put on preventive therapy. The trend of preventive therapy coverage showed a quarterly average increment of 4.6% over the last two years (figure 2).

The case notification rate (CNR) per 100,000 screened contacts with retrospective CI is seven times more than the CNR with prospective CI. The proportion test shows that the yield using retrospective CI (5.7%) is significantly greater than the yield with prospective CI (0.8%) (p=0.001) (table 3). The overall CNR among the contacts is four to thirty times higher than the TB prevalence of 192/100,000 in the general population. The numbers of contacts needed to screen to get a case of TB (number needed to screen—NNS) were 17 and 125 for retrospective and prospective approaches, respectively.

FIGURE 2. Trend of Preventive Therapy Coverage for Children under Five, October 2016–June 2018



** Data after June 2018 were excluded due to inconsistencies.*

TABLE 3. Difference in TB Yield between Retrospective and Prospective CI in Ethiopia (July 2017–June 2018)

	TYPE OF CONTACT INVESTIGATION			
VARIABLES	RETROSPECTIVE	ROUTINE/ PROSPECTIVE	Z-VALUE	P-VALUE
# index cases	534	24,043	--	--
# contacts traced and screened	1,136	63,703	--	--
# presumptive TB cases identified	369	1,409	--	--
% presumptive TB cases among screened contacts	32.5	2.2	59	<0.001
# TB cases	65	507		
% TB cases among screened contacts	5.7	0.8	16.7	<0.001
CNR (per 100,000 screened contacts)	5,721.8	795.9	--	--

LESSONS LEARNED

We demonstrated that retrospective CI produces a higher yield than routine/prospective CI. Retrospective CI is an important opportunity to clear the backlog of TB case identification in communities where TB prevention and control has historically been weak. For example, retrospective CI could be implemented in a community where prospective CI has been weaker. In the case of a community with strong CI, retrospective CI could be replaced by quarterly CI follow-up.

In addition to the TB case finding, prospective CI shows promise for the rapid initiation of preventive therapy for exposed children. Another added benefit is being able to provide health education to families about TB prevention and adherence support for patients in the household.

Given the heavy workload of HEWs and pressures on the health system overall, the collaboration between facility-based clinicians and HEWs is paramount for the long-term sustainability of this intervention. Integrating CI into other outreach and community-based activities, such as immunization and child health, is critical to leverage limited funding.

Finally, the low yield of CI may be due to low sensitive- and symptom-based TB screening, which indicates the need to use additional screening tools. Only half of the index cases for whom contact should have been traced and screened were approached. The reporting health facilities were as low as two-thirds of all public health facilities in Ethiopia.

WAY FORWARD

CI should be a cross-cutting TB prevention and control strategy that is implemented in high-density settings or in public-private mix (PPM) for DOTS. PPM is particularly critical in prisons, schools, areas with large numbers of refugees, and other key and vulnerable population groups for TB. In addition, the Ethiopian NTP can sensitize TB program managers on the need to increase the number of eligible index cases around whom contact tracing is performed and increase the number of health facilities reporting CI activities.

Community TB activities could begin with household contacts of the TB index case and systematically screen other close contacts such as neighbors, school, and workplace contacts. In other words, during the home-to-home visits, community workers could start contact tracing from the household where there was a TB case in the last two years and then move outward to other contacts.

Acknowledgements

Thank you to all of the staff from Challenge TB Ethiopia for their support in the development of this technical brief.

Authors

This publication was written by Zewdu Gashu Dememew with contributions from Daniel Gemechu.

For more information, please contact lessons@msh.org.

References

Datiko DG, Yassin MA, Theobald SJ, Cuevas LE (2017). A community-based isoniazid preventive therapy for the prevention of childhood tuberculosis in Ethiopia. The International Journal of Tuberculosis and Lung Disease, 21(9), pp. 1002–1007.

Dasgupta K, Schwartzman K, Marchand R, Tennenbaum TN, Brassard P, Menzies D (2000). Comparison of cost-effectiveness of tuberculosis screening of close contacts and foreign-born populations. American journal of respiratory and critical care medicine, 162(6), pp. 2079–2086.

Federal Ministry of Health of Ethiopia (2018). Standard operating procedure of contact investigation and preventive therapy in Ethiopia. Addis Ababa Ethiopia.

Federal Ministry of Health of Ethiopia (2017). National tuberculosis strategic plan. Addis Ababa, Ethiopia.

Fox GJ, Barry SE, Britton WJ, Marks GB (2013). Contact investigation for tuberculosis: a systematic review and meta-analysis. European Respiratory Journal, 41(1), pp. 140–156.

Gashu Z, Jerene D, Ensermu M, Habte D, Melese M, Hiruy N, Shibeshi E, Hamusse SD, Nigussie G, Girma B, Kassie Y (2016). The yield of community-based "retrospective" tuberculosis contact investigation in a high burden setting in Ethiopia. PloS one, 11(8), p.e0160514.

Hiruy N, Melese M, Habte D, Jerene D, Gashu Z, Alem G, Jemal I, Tessema B, Belayneh B, Suarez PG (2018). Comparison of the yield of tuberculosis among contacts of multidrug-resistant and drug-sensitive tuberculosis patients in Ethiopia using GeneXpert as a primary diagnostic test. International Journal of Infectious Diseases, 71, pp. 4–8.

Jerene D, Melese M, Kassie Y, Alem G, Daba SH, Hiruye N, Girma B, Suarez PG (2015). The yield of a tuberculosis household contact investigation in two regions of Ethiopia. The International Journal of Tuberculosis and Lung Disease, 19(8), pp. 898–903.

Lönnroth K, Corbett E, Golub J, Godfrey-Faussett P, Uplekar M, Weil D, Raviglione M (2013). Systematic screening for active tuberculosis: rationale, definitions and key considerations [State of the art series. Active case finding/screening. Number 1 in the series]. The international journal of tuberculosis and lung disease, 17(3), pp. 289–298.

Melese M, Habte D, Girma B, Kassie Y, Negash S, Melkeneh K, Daba S, Negussie G, Haile YK, Jerene D, Hiruy N (2018). Use of indicators of standards of care to improve tuberculosis program management in Ethiopia. Journal of Clinical Tuberculosis and Other Mycobacterial Diseases, 10, pp. 17–23.

Nakaoka H, Lawson L, Squire SB, Coulter B, Ravn P, Brock I, Hart CA, Cuevas LE (2006). Risk for tuberculosis among children. Emerging infectious diseases, 12(9), p. 1383.

Sekandi JN, Dobbin K, Oloya J, Okwera A, Whalen CC, Corso PS (2015). Cost-effectiveness analysis of community active case finding and household contact investigation for tuberculosis case detection in urban Africa. PLoS One, 10(2), p.e0117009.

Tadesse Y, Gebre N, Daba S, Gashu Z et al. (2016). Uptake of isoniazid preventive therapy among under-five children: TB contact investigation as an entry point. PloS one, 11(5), p.e0155525.

Tuberculosis Coalition for Technical Assistance. Handbook for Using the International Standards for Tuberculosis Care. Tuberculosis Coalition for Technical Assistance. The Hague, 2007.

World Health Organization (2013). Systematic screening for active tuberculosis: Principles and recommendations. World Health Organization.

World Health Organization (2012). Recommendations for investigating contacts of persons with infectious tuberculosis in low-and middle-income countries. World Health Organization.

Yassin MA, Datiko DG, Tulloch O, Markos P, Aschalew M, Shargie EB, Dangisso MH, Komatsu R, Sahu S, Blok L, Cuevas LE (2013). Innovative community-based approaches doubled tuberculosis case notification and improve treatment outcome in Southern Ethiopia. PloS one, 8(5), p.e63174.

The Global Health Bureau, Office of Health, Infectious Disease and Nutrition (HIDN), US Agency for International Development (USAID), financially supports this publication through Challenge TB under the terms of agreement no. AID-OAA-A-14-00029. This publication is made possible by the generous support of the American people through USAID. The contents are the responsibility of Challenge TB and do not necessarily reflect the views of USAID or the United States Government.