

**Brief report: Opportunities and costs associated
with a model DOTS program, Kolar district,
Karnataka India**

prepared for

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by

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Background:

Public health authorities in India and around the world are faced with many challenges as they carry out their mandate to protect the public against tuberculosis (TB). This report addresses two of these--the need to quantify public and other investments and returns associated with TB control, and the need to relate these to national strategic plans to prioritize and support system efforts.

TB is considered a preventable and curable disease in many circumstances, yet the well proved strategies for prevention and cure require substantial and expensive public infrastructure, rigorous care, and careful coordination. Still, TB control offers vast public benefit in the current setting where our control is tenuous and our cures uncertain. Progress toward elimination is flattening, no viable vaccine appears imminent, effective drug therapies are losing ground to resistance, and political and geographic boundaries are no protection against enormous reservoirs of infected and ill persons around the world.

How to achieve national strategic goals set out in the RNTCP's newest 5-year plan, as well as the potential costs and outcomes associated with such efforts are poorly understood. This work is intended to support the establishment of a model DOTS program in Kolar district by proposing a way forward while anticipating its impact.

Notes, methods, and assumptions related to cost and outcome modeling:

The cost and effect of a model DOTS program is estimated using a dynamic interaction of health, cost, and outcome in a Microsoft Excel platform. The model is designed to incorporate standard techniques for conducting economic analyses of healthcare.

The model is embedded in this soft document as:



TB cost_effect
model_v_Kolar district.x

Estimates are based on observed, reported, and user provided cost, outcome, prevalence, and distribution data.

Gross system outcome measures are provided to compare the baseline (current) program with a model program. Measures include money costs from a limited societal perspective, case rates, and mortality. The incremental cost effectiveness ratio is not calculated.

A simplified and limited perspective was selected for ease of interpretation; and thus consistently and probably substantially underestimates the cost and value of many RNTCP activities.

Savings associated with incidence reduction through prevention is expressed present value net of a 3% discount rate for accrued outcomes over 3 years. Money costs were updated to

2013 Indian Rupees via June 2013 exchange rates and the medical care chained consumer price index (CPI) where appropriate.

Summary of findings:

In 1st quarter 2013, Kolar district reported 425 newly incident active TB cases (Total registered cases are 377. New cases including NSP, NSN, NEP, New Others and Relapses would be 341. I have attached the pdf of case finding report for reference). We estimate the net costs to patients and public payers associated with this incidence will exceed 22,000,000 Indian rupees by 2015; societal costs (those lost to all payers) would likely be much higher (Table 1). More importantly, we estimate that 667 TB and 44 MDR-TB cases will occur as a function of secondary transmission from the 425 known index cases by 2014 and that 64 deaths will occur among the 425 index cases during this time (Table 1).

stakeholder	source	current programme		model programme		change		
		N	cost (IR)	N	cost (IR)	N	cost (IR)	
system, current year	Uncomplicated TB	390	1,661,565₹	390	1,798,065₹	0	136,500₹	
	TB/HIV coinfection (TB-HIV)	29	123,552₹	29	133,702₹	0	10,150₹	
	MDR-TB (HIV+/-)	6	99,860₹	6	96,896₹	0	-2,964₹	
	Contact, case	850	168,300₹	1,190	235,620₹	340	67,320₹	
	TB suspects examined	2,747	858,284₹	2,747	858,284₹	0	0₹	
	MDR-TB suspects examined	8	2,500₹	8	11,748₹	0	9,248₹	
	Hospitalization day	893	47,124₹	893	47,124₹	0	0₹	
	public health system infrastructure	1	619,681₹	1	1,291,743₹	0	672,062₹	
	system, future	Secondary transmission, non-MDR	667	12,721,755₹	548	10,754,752₹	-119	-1,967,003₹
		Secondary transmission, MDR-TB	44	758,795₹	41	686,747₹	-3	-72,047₹
Personal spending		425	4,957,445₹	425	4,957,445₹	0	0₹	
individual	Health loss: patient death	64		41		-22		
	total		22,018,860₹		20,872,126₹		-1,146,734₹	

We compared this baseline to hypothetical conditions for a model DOTS program assuming conservative observed, published, and estimated cost and outcome differences oriented to

the RNTCPs NSP. Under these assumptions, the model plan is both less costly and more effective, saving more than 1.1 million IR, 22 lives, 119 new TB cases, and 3 MDR-TB cases (Table 1).

Conclusions:

A model DOTS program is likely to be highly efficient. These estimates suggest that even modest changes in key parameters such as treatment adherence and public management of incident TB will produce substantial money and health benefits.

These findings suggest that effective prevention, management, and control of TB require a public health system to integrate planned actions like surveillance and prevention with acute responses such as medical management and contact investigation. We conclude that private healthcare systems are not well equipped or motivated to prevent incident active TB or to provide the treatment and harm reduction activities it prompts.

Positive financial returns to the system making healthcare investments are very rare in healthcare, even for interventions with undisputed value. This analysis predicts such returns are plausible through carefully nuanced resource allocation decisions. In particular, public sector investments to promote case finding, public management, enhance monitoring, registration, and training; or which more effectively mitigate risk by increasing treatment acceptance and adherence, are likely highly efficient. Identification and support of practices or policy to achieve these should be a priority, and may be well rewarded.

Kolar Model DOTS District Evaluation
Based on the Revised National Tuberculosis Control Programme National Strategic Plan Objectives

RNTCP Objective 1: Improve notification rate for TB cases

Indicators

Existing Indicator

To achieve 90% notification rate for all types of TB cases.

Suggested Additional Indicator

Short term objective: Increase contribution of private providers to reporting of new TB cases to 25% to meet the average reporting* among high-burden countries.

Summary of Program Strengths in Achieving Objective 1

- Data collection from RNTCP sources appears to be accurate and is collected for numerous relevant variables.
- The notification responsibilities for all positions at all levels are clearly defined.
- The RNTCP reporting and recording system appears to function very well.
- Complete TB registers for cases diagnosed through RNTCP providers were maintained at the district and state levels.

Data currently collected

- Annual total case notification rate
- Annual smear positive case notification rate reported by Diagnostic Microscopy Centers (DMCs)
- Annual smear positive case notification rate reported in Case Finding Report
- Annual new smear positive (NSP) cases
- Annual new smear negative (NSN) cases
- Annual new extra pulmonary (NEP) cases
- Annual previously treated case notification

Gaps Identified Between Existing Program in Kolar and Model DOTS District

- Data collection systems in primary use only account for patients reported through RNTCP channels. A significantly large proportion of cases are not documented within currently utilized reporting systems.
- A standardized, singular, fully implemented reporting system is needed.

Recommendations

Data collection

- The wide adaption and use of NIKSHAY must be strongly encouraged. If utilized in all sectors, NIKSHAY will eventually capture patient level data for all types of TB from all sectors of care.
- If NIKSHAY is underutilized by providers, despite educational and promotional efforts, consider a stop-gap means to estimating the number of cases diagnosed by non-RNTCP providers in Kolar district. Improving reporting among private providers will be a long process. In the meantime, a representative survey of local providers may estimate the extent of diagnosis and under-diagnosis among private providers and will provide a

measure to add to RNTCP numbers to provide a measure of incidence in Kolar. Such a study may be a significant undertaking, depending on the number of providers to be surveyed and survey methods. If a survey is deemed as valuable despite the investment of resources, consideration should be given to contracting an outside research team to conduct the survey to avoid additional burden on RNTCP staff. Outside researchers may also be contracted to conduct studies of which incentive methods are the most successful in boosting private provider utilization of NIKSHAY.

- Systems must continue to be supported and expanded to support electronic data collection and move away from paper records. Globally, TB health systems are moving towards electronic recording and reporting of TB. Paper records allow for more opportunity for human error in the recording and transfer of data, and do not support a seamless approach to patient care. Electronic records allow lab results, treatment, follow-up and information about co-morbid conditions to be available within a patient record. Such information access is necessary to improving health outcomes.

Programmatic Activities

- A standardized, singular, fully implemented reporting system is needed, as is the eventual goal for NIKSHAY. Currently, multiple reporting systems exist, including EpiCentre, paper records, and NIKSHAY. It is imperative to continue to support the expansion of NIKSHAY so that infrastructure exists for the data capture and tracking that is fundamental to quality TB care.

Human Resources

- Continue trainings at all levels (District, Block, TU) on the use of NIKSHAY as its implementation expands in the years ahead.
- Personnel training systems should continue to be supported with financial and human resources. The *National Database on Trained Manpower* and the *Learning Management System* are essential to continuing to provide high quality training as global systems move towards electronic learning formats. The missions of the RNTCP cannot be realized without well-trained staff. Systems to deliver and monitor staff training are an essential component to realizing long-term goals for TB care. While there is a significant initial monetary investment, the investment will see gains for TB care throughout the county for years to come.

RNTCP Objective 2: Improve success rate for new and re-treatment cases

Existing Indicator

To achieve 90% success rate for all new and 85% for re-treatment cases (already existed as NSP objective)

Suggested Additional Indicators

Achieve target of 90% of new cases started on treatment

Achieve target of 90% treatment completion among those starting treatment

Summary of Program Strengths in Achieving Objective 2

- The RNTCP DOTS program has achieved a treatment success rate of over 85% among new smear-positive patients.
- The success of the RNTCP administration of the world's largest DOTS program is clear at the District level in Kolar and the State level of Karnataka.
- There are well-established, well-functioning procedures for the procurement and storage of anti-TB drugs.
- There is excellent participation of the Medical College in Kolar in the RNTCP programs, based on observation and interviews with Kolar District staff.
- Staff positions and responsibilities are clearly defined at all levels within the District.
- Staff training material tailored to each position at all levels has been thoroughly developed and fully implemented.

Data currently collected

- Three month smear conversion rate for NSP patients
- Three month conversion rate of retreatment patients
- Number and proportion of all smear positive cases started on DOTS within seven days of diagnosis
- Number and proportion of all cured smear positive cases having end of treatment follow-up sputum done within seven days of the last dose
- Number and proportion of all registered TB cases receiving DOT through a community volunteer

Gaps Identified Between Existing Program in Kolar and Model DOTS District

- Thorough household contact investigation protocols are not in place.
- Data collection lacks mortality measures.
- There is not consistent, ready access to patient enablers such as food.
- Molecular testing not available at District level.
- New initiatives are needed to ensure continued motivated, dedicated workforce as demand for their efforts increases with increased case-finding.
- A significant proportion of the District's TB patients receive treatment from private providers not associated with RNTCP.
- Many private providers do not following the RNTCP guidelines on diagnosis and treatment, prescribe anti-TB medications of unknown quality and use clinically incorrect treatment regimens.

Recommendations

Data collection

- Create indicator to define families who require food assistance to enable recovery
- Assess number of families needing food assistance so can plan and budget accordingly
- Assess data according by community within district so can plan for distribution
- Document side effects of DR TB patients and HIV-TB patients
- Invest in development and expansion of data collection systems such as NIKSHAY. TB is a complicated disease and a data-intensive process. TB control requires exceptional data systems because it is both an issue of individual patient care, as well as public health. Treatment regimens are complicated and lengthy, compliance must

be tracked, there are frequent laboratory results, and contacts of a case must be found. Such extensive activities are most effectively coordinated when data about a case is centralized in an electronic system.

- Establish measures for mortality and collect data on TB-cause mortality

Programmatic Activities

- As a pilot program in Kolar, implement procedures for thorough household contact investigations. This is a recommended priority as numerous potential pilot programs are considered. First, “household” must be defined. Second, steps to undertake thorough screening of all persons in the defined household should be detailed.
 - In Van Wyk, et al (2012), “household” in the context of household contact investigations is defined as: “a group of persons who live together in the same dwelling unit and who have the same eating arrangements.” (p.157)
 - It is important that the definition used is broad enough to capture all persons who spend sufficient time together in the home to meet the local clinical standards for exposure.
 - Every member of the household, as well as other persons who spend sufficient time in the household to be exposed, should be screened. This includes all children and adults.
- Active screening of clinical and employment-based risk groups
 - Efficiently use resources by focusing on training at PHIs, PHCs, and other clinics serving populations with a defined prevalence of persons at clinical and employment risk for TB
 - Outside research may be helpful in identifying the employment risk group(s) with the greatest prevalence so that resources can be efficiently targeted. It may be worthwhile to solicit proposals from NGOs or academic research institutions to conduct such work.
 - To obviate unnecessary workload, re-define TB symptoms for community workers to consider when conducting screenings. Include a minimum set of symptoms that is the most sensitive and yields the highest positive predictive value such as the WHO four-symptom algorithm for TB screening (current cough, fever, weight loss, and night sweats). A checklist may be implemented for community workers to document symptoms noted. This can also be used as justification for the screening so persons are not screened unnecessarily due to motivation by monetary incentives for community workers.
- Revise logistics of transportation systems to account for transportation of increased sputum samples to laboratories

- Establish a pilot program to introduce molecular and LED FM at selected lab(s) in the district. Microscopy has limited sensitivity (20-80%) and misses the diagnosis of many cases. Molecular and LED FM options are superior to microscopy for case detection. For clinical monitoring, though, smears and cultures are necessary.
- The purchase and implementation of new laboratory equipment should only occur after careful consideration and budgetary allocations for resources to support the electrical power supply needed to support and sustain such equipment. Plans should be made to simultaneously implement battery back-up and generator back-up with the implementation of new equipment to sustain equipment use during power outages.
- A plan similar to the excellent logistical coordination that exists for drug supplies could be created for logistical coordination of diagnostic supplies, if deemed appropriate. The laboratory consumables supply chain may be written out and implemented with the same level of detail with which the drug supply chain as set forth in the RNTCP Strategic Plan. However, revising the supply chain of lab consumables is only appropriate if there is adequate call for it, and if laboratories have sufficient storage and refrigeration for additional stock of consumables.
- Create a checklist to address each reason for default that is appropriately within the control of the TB program. The checklist should include addressing each item with regard to education, allocation and training of human resources, logistics, and financial support. The complete list of reasons for patient default given qualitatively is included in Appendix A.
- Institutionalize provision of food packages for patient families. Lack of food exacerbates side effects and gastritis, and deprives patient of nutrition needed for healing. Food must be provided for the entire family. Food only provided for the patient will likely not reach the patient because patient will use the food to feed the family—especially if there are children. The average family has 5 members. The suggested monthly food package for a five member family is reported to be the following:
 - 25 kgs rice
 - 5 kgs millet
 - 2-3 liters oil
 - 3 kgs wheat
 - 1 kg pulses
 - 1 to 2 eggs per day (in lieu of currently recommended protein powder)

Anganwadi (AWW) Centers may provide a suitable logistical means to provide food packages to patients. These centers provide food to women and children who qualify, so they are already accustomed to such culture and logistics. Further, they already serve as locations from which most community workers provide DOTS. DOTS and food package pick-up

could occur at the same center in most places. It is suggested to keep the food packages in the PHC office (if they can be held securely) and AWW centers.

- Continue to engage Axshya in community health worker education, emphasizing the role of community health workers in two key regards: 1) Educating families and community members, in addition to individual patients; and 2) Target community worker education of patient and families to address the key reported reasons for default in Kolar district, as reported by Kolar STSs. These include:
 - Stigma
 - Patient ignorance about disease and implications of not completing treatment
 - Psychological influence of feeling better physically and only completing a few weeks of treatment
 - Unfriendly or otherwise un-motivating DOTS provider. When patient has rapport with his/her service provider, whether DOTS worker, physician or other health educator, he/she is more likely to take treatment and finish
- Patient education must include and emphasize the importance of taking pills in the prescribed combination to reduce the influence of inappropriate advice from private providers, especially advice sought from providers for relief of side effects. Community health educators must be made aware of this inappropriate advice dispensed by private providers and educate patients accordingly. With proper rapport with patients, in some cases, community health workers may be able to establish sufficient trust with patients to overcome private provider influence.
- The community health worker should be trained to educate the entire family, as well as the individual patient, to overcome challenges set forth by lack of family support.
- Pilot employment schemes in Kolar district for TB patients. A TB patient suffers from loss of income while sick, as well as the possibility of never being able to perform a previously-held manual labor job again, if he/she sustained pulmonary impairment. Existing vocational and employment schemes can be tailored to and made available to TB patients in latter stages of treatment and those who are recovered, but sustained impairment.

Human Resources

- There are reported inequities between contracted and “regular” staff. Compensation and benefits should be commensurate between the two to prevent losing staff and continue to have a dedicated workforce.
- Pilot-test employee reward programs in Kolar. Compensation should be reviewed for adequacy and reward programs (monetary or other form of recognition) should be considered to keep staff appropriately engaged to reduce temptation to work with inappropriate transactions in the private sector (e.g., via procurement of anti-TB drugs).

- Create opportunities for upward mobility within the RNTCP workforce. STS, STLS, and others should have opportunities for advancement to keep the workforce motivated. When vacancies in staffing occur for regularly sanctioned positions, preference should be given to contracted workers. Accomplishing this does not require allocating funds to create new positions. It may be as inexpensive as a change in job title with a small increase in pay and a few additional responsibilities. The purpose is to give the employee a goal to work towards.
- Establish a system to review performance of employees. Link performance of employees to reward programs (monetary, position advancement, or other reward).
- In addition to individual employee systems, pilot-test the creation of team-based assessment and reward systems for teams that work together for TB control in their assigned area. This may be STLS and STS teams within a hospital or other facility, and, eventually, be teams of entire districts.
- Use existing community workers, including ASHAs, anganwadis, and other informal health care workers to initiate and conduct screenings for symptoms and sputum collection among high-risk groups.
- Revise criteria for payment of community workers who refer potential TB cases. Considerations include improved case detection without unnecessary burden of false potential cases referred out of desire for monetary incentive compensation. A system for TB screening referral may be to only provide compensation to the community worker for every case diagnosed, not only for referral. This may lead to more stringent screening using a more specific, extensive symptomatology rather than inappropriate referral.
- Revise current community worker honorariums to improve motivation among workers. It is reported that community members who provide treatment monitoring do not receive enough compensation to be sufficient incentive for their work. Forty percent of cases in Kolar receive DOTS via community workers. Thus community worker incentive and performance is crucial to treatment completion. It is suggested that the current honorarium of 250 rupees be increased to 600 rupees. It is further suggested that half of the honorarium be provided half-way through completion and the remainder be given immediately upon treatment completion, or, instead, may be linked to the patient's successful clinical outcome. Efforts should be made to avoid the current delay in providing the honorarium to the worker.

RNTCP Objective 3: To significantly improve the successful outcomes of treatment of Drug Resistant TB

Suggested Indicators

Increase treatment success rates among patients with MDR-TB to align with the WHO $\geq 75\%$ target success rate.

Increase number of confirmed MDR cases started on treatment to 100%^{†*}
Achieve the rate of 100% of confirmed MDR cases with second-line drug testing.

Summary of Program Strengths in Achieving Objective 3

- Treatment under the RNTCP has been integrated with PMDT services including staffing, drug supply, recording and reporting throughout Karnataka and Kolar.
- Karnataka has a high-quality state laboratory with well-functioning systems, infrastructure, and infection control for diagnosing DR-TB.
- The NSP sets forth plans to improve treatment outcomes by transitioning to criteria C and through using rapid diagnostics such as liquid culture and line probe assay (LPA).
- Regulations to curb inappropriate use of anti-TB drugs are currently under national legislative consideration.

Data currently collected

- Coverage of MDR-TB services
- Case finding
- Interim reports
- Conversion reports
- Outcomes

Gaps Identified Between Existing Program in Kolar and Model DOTS District

- A significant proportion of the District's DR-TB patients receive treatment from private providers not associated with RNTCP.
- The rapid expansion of services to meet Criteria C outlined in the NSP may potentially strain the management and laboratory systems, unless they are reinforced with additional staff.

Recommendations

Data collection

- District-level data is needed on drug resistance. A district-level representative drug-resistance survey from public and private laboratories is suggested for new and retreatment cases.

Programmatic Activities

- Continue implementation of NIKSHAY to serve as online data management system for DR TB, as well as all TB.
- Strengthen regulations concerning inappropriate prescription of anti-TB drugs among private providers. It is understood that national legislation regarding this is currently under discussion.
- Exercise caution to continue to provide sufficient resources to other TB activities so that they are not compromised to provide resources for the extensive scale-up required to meet PMDT criteria C. It is suggested to establish tangible measures to assess this.

- Review and strengthen protocols concerning detection of contacts of DR TB cases. This includes implementing strict household contact investigations for all members of the household.
- Expedite implementation of molecular testing (e.g., GeneXpert) at the State Laboratory in preparation for Criteria C.
- It was recommended during field visits that sputum collection be de-centralized. Sputum samples may be collected at TU level and sent by courier to Bangalore lab.
- Decentralized drug storage is needed. The following requirements are needed to fulfill this:
 - Installation of air conditioners in local pharmacies.
 - Regular power source (e.g., generator back-up) to keep air conditioning continuous.
 - Temperature-controlled drug stores at TU level
 - There are hospital funds available to provide air-conditioning or other temperature control.
 - Drug stores are reportedly needed within all TUs.

Human Resources

- Give consideration to staffing to prevent an increased demand from threatening the quality of microscopy. An estimation of an increased workload six-times the current MDR workload is expected at the state level. While only 40 cases are expected in Kolar, there is still an opportunity for data collection and to carefully consider the implications for staffing based on the pilot transition in Kolar.
- Laboratory capacity and staffing will need to be expanded at the state level and transportation logistics revised to accommodate the scale-up to criteria C (need more specificity)
- Stringent oversight and monitoring by RNTCP personnel is necessary during the transition to criteria C.
- A dedicated pharmacist storekeeper is needed in all drugstores so someone is present who is trained and capable of handling drugs issued.

RNTCP Objective 4: To achieve decreased morbidity and mortality of HIV-associated TB

Suggested Indicators

- Achieve the target of 75% of patients have a documented HIV test result to align with WHO target indicators.
- Achieve 100% of HIV-positive TB patients receiving co-trimoxazole preventive therapy (CPT) and early initiation of antiretroviral therapy (ART).^{†*}
- Achieve 100% receiving isoniazid preventive therapy (IPT) among patients with a documented HIV-positive test.^{†*}

Summary of Program Strengths in Achieving Objective 4

- More than 90% of TB patients living with HIV have received co-trimoxazole preventive therapy (CPT) over the past two years.
- Integrated TB -testing with HIV counseling at Integrated Counseling and Testing Centres (ICTCs) facilitates case-finding and functions well.
- ICTCs function well with strong case management for HIV patients to receive ART.
- HIV Patient treatment compliance to ART is reportedly high and improving in recent years.
- There are data systems and personnel in place to record and track adherence and outcomes.
- District-level positions (TB-HIVs) are dedicated to TB-HIV patients.

Data currently collected

- Proportion of all registered TB cases with known HIV status
- Proportion of all TB patients known to be HIV infected among those tested
- Proportion of TB patients known to be HIV infected among those registered
- Proportion of HIV infected TB patients started on cotrimoxazole prophylactic treatment (CPT)
- Proportion of HIV infected TB patients started on anti-retroviral treatment (ART)

Gaps Identified Between Existing Program in Kolar and Model DOTS District

- Data is needed on HIV patients receiving IPT.
- Options needed for readily diagnosing smear negative TB among persons with HIV.

Recommendations

Data collection

- Document the number of HIV patients receiving IPT.

Programmatic Activities

- Continue use and growth of Integrated Counseling and Treatment Centers (ICTCs).
- Where possible, place molecular testing resources in facilities where both ICTCs and Diagnostic Microscopy Centres (DMCs) are located. This will facilitate diagnosis of smear negative TB among HIV patients.

Human Resources

- Continue to leverage NGO programs and human resources to introduce and implement case management activities through ICTCs.

RNTCP Objective 5: To improve outcomes of TB care in the private sector

Suggested Indicators

- The number of incentives disbursed for reporting.
- The number of incentives disbursed for using RNTCP drug stores.

Summary of Program Strengths in Achieving Objective 5

- RNTCP staff at all levels fully and openly acknowledge the need for a new approach to encouraging and managing notification from private providers.
- The RNTCP staff at all levels invites innovative ideas to encourage private providers to make notifications.
- TB has been nationally sanctioned as a notifiable disease, creating legitimacy for pending efforts to encourage notification.
- Developments in mobile phone applications have been made to make notification more convenient for private providers.
- A financial incentive program is in development to encourage private providers to notify and to adhere to RNTCP standards for TB care.
- NIKSHAY system has been developed for convenient notification of cases from all sectors.

Data currently collected

- Some data exists on the involvement of non-public sectors (includes NGOs, private providers, and medical colleges)

Gaps Identified Between Existing Program in Kolar and Model DOTS District

- A significant proportion of the District's TB patients receive treatment from private providers not associated with RNTCP.
- Many private providers do not follow the RNTCP guidelines on diagnosis and treatment.
- Private providers are likely to prescribe anti-TB medications of unknown quality and use clinically incorrect treatment regimens.

Recommendations

Data Collection

- Continue to invest in the development of electronic mobile applications. Such a means to report has the potential to facilitate accessibility of reporting, and, with enhanced reporting, improve the quality of TB care.

Programmatic Activities

- Align incentives with transfer of care to public sector
- Work with legislative entities to enforce the policies already in-place, including penalties.
- Make providers aware of the financial benefit of notifying public sector of cases after it is sanctioned.
- If a novel educational approach emerges, launch a provider education campaign with a novel approach. Educational campaigns have previously been conducted with minimal impact. It

may be considered if an outside organization, such as an NGO or research organization, presents a novel approach with minimal cost incurred by RNTCP.

- Begin the long process of changing professional culture among private providers with regard to TB reporting by starting with new medical graduates. Introduce the notion during medical training and residency programs.
- Pilot recognition awards within the Karnataka state-level Medical Association for well-performing providers.

Human Resources

- Sufficient monetary and human resources must be allocated in multiple pathways to address this issue. This cannot be accomplished by RNTCP alone, but will require commitment from multiple political partners. The resources allocated to advocacy and management of these issues must be in-line with the need to involve the private sector as private providers cater to 50%–75% of the TB cases in India and, presumably, Kolar district. It is understood that the RNTCP recognized the magnitude of this issue, and that its success in working to remedy it is beset by the larger political context.
- Advocate for state and national policies to restrict the sale of anti-TB drugs to accredited providers, as well as ensure that only prescriptions by sanctioned RNTCP providers are filled. It is understood that such policies are being examined at the national level.
- Outside research may be helpful to test the effects of different incentive programs on provider notification to find the most salient program. It may be worthwhile to solicit the assistance of an NGO or academic research institution in researching the most effective way to incentivize providers.

*Among countries reporting Public-Private Mix initiatives to World Health Organization, private providers contributed 10% to 40% of total notifications. The average, not including countries reporting the highest and lowest percentages, was 26.3%, of cases reported were reported by private providers.

** Criteria definitions:

Criteria A

- All new TB cases who fail an initial first line drug treatment
- Smear-positive, previously treated patients who remain smear-positive at the fourth month or later
- All pulmonary TB patients who are contacts of a known MDR-TB case

Criteria B (*in addition to Criteria A*)

- All smear-positive, previously treated cases of pulmonary TB at time of diagnosis
- Any smear-positive follow-up result in new or previously treated cases

Criteria C (*in addition to Criteria B*)

- All smear-negative, previously treated cases of pulmonary TB at time of diagnosis
- Cases of HIV-TB co-infection at time of diagnosis

⁺* Target goal set forth in The *Global Plan to Stop TB, 2011–2015*. Geneva, World Health Organization, 2010 (WHO/HTM/STB/2010.2).

APPENDIX A

Reported Reasons for Patient Default

Answers reported at a meeting held with all Kolar district STSs, STLs, TBHVs, and other district staff.

Question: “What are the barriers you see to patients completing treatment?”

Responses from participating group members:

- Alcoholism
- Patients are poor, so must work. They can't lose wages due to time away to get treatment. This is the case for “labor class” who receive daily wages for work.
- When there is a lack of food, side effects are exacerbated.
- Stigma (includes fear of reaction from neighbors, community and employers)
- Patient is ignorant about disease and doesn't know what they are faced with if don't finish treatment.
- Patients 50 years of age and older have greater issues with gastric irritation.
- Issues with interference from private doctors
 - There are 7 pills to take in one gulp. This can cause severe gastritis. So, patients go to private provider for gastritis. They are advised to stop taking pills all at once, and to take a few in the morning, and a few at night. This is scientifically wrong. Private practitioner misguides patient.
- Psychological effects because after 2 months of medication, the patient feels better. So, the patient does not think that he/she is sick and does not want to continue to take medication.
- Unfriendly DOTS provider. The person giving DOTS is crucial. When a patient believes in the service provider, whether DOTS worker or physician or whoever educates them, he/she is more likely to take treatment and finish.
- Lack of family support
 - This is particularly the case with women; they are mostly housewives and rely heavily on husband to take them to doctor appointments. Husband and others must also be willing to take on the care of children and chores so woman can comply with treatment.
 - There is better compliance if a family member will take care of patient and take patient to doctor appointments.
- Lack of food.
 - Lack of food exacerbates side effects and gastritis
 - Nutrition is needed for patient recovery.
 - Food packages must be provided for the entire family. Food cannot be provided only for the patient. The patient will give their food to the family—especially if there are children.