INT J TUBERC LUNG DIS 10(12):1380–1385

A rural public-private partnership model in tuberculosis control in South India

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SUMMARY

SETTING: A rural tuberculosis (TB) unit in South India, 2001–2003.

OBJECTIVE: To evaluate a rural public-private partnership model (PPPM) within the TB control programme (RNTCP).

DESIGN: All of the private practitioners trained in modern medicine (PPs, $n = 52$) and the private laboratories (PLs, $n = 13$) in the area were listed. The PPs underwent training about the RNTCP, and PL staff were trained in sputum microscopy. PPPM included referral of TB suspects to the smear microscopy centres (government or PLs) for diagnosis and treatment of patients as per RNTCP guidelines. Patients were back-referred to the PPs. The directly observed treatment providers and centres were chosen by the PPs in consultation with their patients. The case detection rate, cure rate and profile of patients referred by the PPs were compared with those of self-reported patients.

RESULTS: Of 489 TB suspects referred by the PPs, 24% were smear-positive compared to 10% of 15 278 self-reported patients ($P < 0.001$). Of 319 referred to PLs, 7% were smear-positive. The annual average case detection rate increased from 66 to 75 per 100 000 population. The cure rates of patients referred by the PPs were comparable to those of self-reported patients.

CONCLUSIONS: This rural PPPM is effective and does not require additional staff or any direct financial incentives.

KEY WORDS: public-private partnership; PPM; DOTS; RNTCP; India

STUDIES IN Vietnam, Hong Kong, Nepal and India have shown that 50% to 86% of rural and urban tuberculosis (TB) patients, including 20% of the poorest in India, seek care from the private sector, where diagnosis, treatment and reporting practices for TB often do not meet national or international standards.[1] It is encouraging to note that in India, 85% of the 0.46 million new smear-positive TB patients registered in 2003 under the DOTS-based Revised National TB Control Programme (RNTCP), have been declared 'cured'.[2] For TB control in any population, all TB patients should have easy access to DOTS-based regimens, regardless of the providers they choose to seek care from, and the public-private mix (PPM) approach to TB control has been acknowledged as an important solution.[3] The RNTCP has created specific guidelines for PPM.[4]

The private sector in India includes private medical practitioners trained in modern medicine (allopaths) or indigenous systems of medicine (non-allopaths), non-governmental organisations (NGOs) and private pharmacies.[5] In pharmacies, anti-tuberculosis drugs are dispensed over the counter. It is reported that although private doctors prescribe anti-tuberculosis drugs for several months, patients often buy drugs on a daily basis due to financial constraints.[6] Irregular or inadequate treatment may result in development of drug resistance, treatment failure and high rates of relapse, which might impede the epidemiological impact of TB control measures in India.

Studies involving the private sector in India and elsewhere have demonstrated the beneficial impact of involving the private sector in TB control.[7–10] We therefore undertook a study to evaluate a public-private partnership model (PPPM) in a rural area in South India. The key issues and the effectiveness of the PPPM are discussed.

MATERIALS AND METHODS

Setting and profile of the private and public sectors in the study area

The study site was a rural Tuberculosis Unit (TU) in Tiruvallur, South India, where the RNTCP was implemented in May 1999. The TU covers a population of

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Article submitted 15 May 2006. Final version accepted 26 July 2006.

580 000, the basic functional RNTCP unit. There are two rural hospitals with in-patient facilities and 15 peripheral health institutions (PHIs), including seven that offer TB diagnostic services in the government sector. Of the 17 health centres, one was in a relatively inaccessible area. Free TB diagnosis and treatment were offered in the government sector. The population of Tiruvallur town was around 50 000, but a large floating population from the surrounding 209 villages and eight towns also frequented the town. The longest distance from a PHI to Tiruvallur was 56 km. In general, the distance between households and the health centre was about 10 km. There were 52 allopaths (PPs) including 12 post-graduates practising in and around Tiruvallur. There was an NGO-run hospital with a few beds. There were 26 non-allopaths, the majority of whom practised in relatively inaccessible villages. The study area covered approximately 200 km^2. The RNTCP personnel monitoring the programme were the District TB Officer (DTO), the Medical Officer for TB control (MO-TC), the Senior Treatment Supervisor (STS) and the Senior Tuberculosis Laboratory Supervisor (STLS).

STUDY DESIGN

In this prospective study (June 2001–December 2003), an initial situational analysis was performed by listing all the private medical practitioners (allopaths and non-allopaths) and the private laboratories (PLs) that offered diagnostic services. All formally registered private medical practitioners (PPs) with a qualification in modern medicine providing medical care for a fee were included in the study. A private laboratory was defined as one that offers diagnostic services for a fee.

Role of the Tuberculosis Research Centre

Development of the PPPM

Physicians from the Tuberculosis Research Centre (TRC) provided PPs with information about the RNTCP in the meetings organised through the Indian Medical Association. TRC physicians interacted on a one-to-one basis with the PPs and briefed them on the PPPM (Figure 1). Focus group discussions were organised among the PPs to develop a PPPM. Sputum examination forms were provided in duplicate (in a referral book) to the PPs, who filled in two forms for each TB suspect and referred the suspect with one form to a government laboratory or PL. The duplicate form retained by the PP was collected by TRC staff on the monthly visits. Arrangements for the patient to go directly to the hospital laboratory were made, bypassing routine out-patient formalities. At the microscopy units, referrals from PPs were recorded by the laboratory technicians as 'referred by PPs' in the laboratory registers. For every suspect referred, three sputum smears were examined and feedback letters were sent to the referring PP. For all diagnosed patients, treatment (including preparation of the treatment card) was offered free of charge by the government physicians as per RNTCP guidelines. The treatment card was given to the PP by the TRC staff with an anti-tuberculosis treatment box (containing drugs for the full course of treatment). The PPs chose the DOT treatment centres and providers for their patients (either themselves or community providers or PHIs) with the consent of the patients. DOT providers (clinics, community) were given on-the-spot training in administration of drugs, including documentation, by TRC staff. For patients who chose to take their treatment at the PHIs, arrangements were made to send the treatment cards to the respective PHIs.

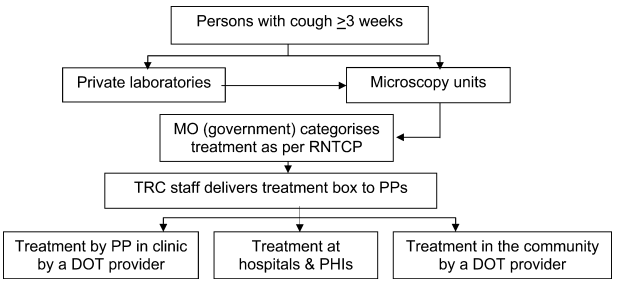

Figure 1 Private practitioner model in a rural area of South India. MO = medical officer; RNTCP = Revised National TB Control Programme; PP = private practitioner; DOT = directly observed treatment; PHI = peripheral health institution.

Role of PPs

The participation of PPs was voluntary and by verbal consent. The PPs charged fees for their consultation alone.

Role of PLs

TRC staff trained all the PL staff in sputum smear microscopy as per RNTCP guidelines. PLs charged fees for microscopy. The RNTCP STLS provided supervision and maintained quality control of the PLs.

Monitoring

The PPs and PLs were met with individually at least once per month by a TRC physician/staff for feedback and data collection.

Data collection and analyses

Data on referrals by PPs and on self-reported TB suspects attending all PHIs were collected from the laboratory registers of the microscopy units and the PLs. Trained health workers interviewed all TB patients diagnosed within 1 week of treatment using a pre-coded interview schedule to elicit information on patient profile, including personal habits, costs incurred due to TB, etc. Treatment details were collected from the treatment cards. Self-reported suspects attending all PHIs during the study period were used as controls.

PPPM process and outcome indicators

The effectiveness of PPPM was evaluated using the following criteria: proportion of PPs enrolled, PPs referring TB suspects for sputum microscopy, PP clinics serving as DOT centres, PL staff trained, PLs doing sputum microscopy, including participation in quality control, and changes in the annual case notification rate. The proportion of TB cases diagnosed among referrals by the PPs, smear positivity rates, smear conversion rates and cure rates among the treated patients were compared with those of the government sector.

Plan for sustainability

Before withdrawal of the project by the TRC, TRC staff discussed with the District TB Officer (DTO) and his team about the PPPM and its benefits and requested them to continue to encourage the involvement of PPs with the RNTCP. Ways in which the tasks could be undertaken by the existing RNTCP personnel (DTO/MO-TC/STS), such as creating awareness, training, monitoring, data collection and analysis, were also suggested. We continued to collect the data for 1 year after the study period.

Statistical analysis

The data were computerised after being scrutinised for completeness. Changes in case detection after the implementation of the PPPM were analysed and compared to the data collected before and after the TRC's withdrawal from the study. Univariate analysis was performed using Epi Info version 6.04d (Centers for Disease Control and Prevention, Atlanta, GA, USA, 2001) to identify differences in various factors between patients referred by the PPs and self-reported patients. The χ^2 test of significance was used to test differences in proportions. Stepwise logistic regression analysis was performed using SPSS/PC Version 13.0 (SPSS Inc, Chicago, IL, USA, 1990) for those factors found to be significant in the univariate analysis. A P value of <0.05 was considered statistically significant.

RESULTS

Involvement of PPs and PLs

Of 52 PPs listed, 48 (92%) participated in the study, 30 (62%) referred TB suspects for sputum microscopy and two (4%) administered treatment in their clinics. Of the referrals, 38% were diagnosed with TB (Table 1). Although staff in all 13 PLs were trained, only four (31%) laboratories participated, only one sputum was examined per suspect, and they did not refer the sputum-positive cases to the government centres for treatment.

Referral of subjects with chest symptoms and sputum microscopy results

Of 489 TB suspects (including 182 [37%] females) referred by the PPs for sputum examination, 118 (24%), including 34 females, were smear-positive for acid-fast bacilli (AFB). During the same period, of 15 278 self-reported suspects, 1 579 (10%) were AFB smear-positive; the difference was significant ($P <0.001$). Of 319 TB suspects referred to PLs, 21 (7%) were AFB-positive.

Table 1 Process indicators of the PPPM

Process indicators	*n* (%)
PPs in Tiruvallur	52
PPs enrolled	48 (92)
PPs who referred TB suspects	30 (62)
PPs clinics used as DOT centres	2 (4)
PLs with staff trained	13
PLs doing sputum microscopy and quality control	4 (31)
Number of TB suspects referred	489
Cases diagnosed among referrals	186 (38)
Sputum positivity among those examined	118 (24)

PPPM = public-private partnership model; PP = private practitioners; TB = tuberculosis; DOT = directly observed treatment; PL = private laboratory.

Time from referral for sputum smear microscopy to testing

Of 489 TB suspects referred by PPs to the government facilities, 125 (26%) reported the same day, a total of 312 (64%) had done so by the second day and 465 (95%) within 1 week.

TB patients

Of 489 TB suspects referred by PPs, 186 (38%) TB cases were detected compared to 2490 (16%) TB cases among 15 278 self-reported suspects ($P < 0.001$). However, the type of cases was similar in both groups (Figure 2). Of the 186 referred patients, 179 were

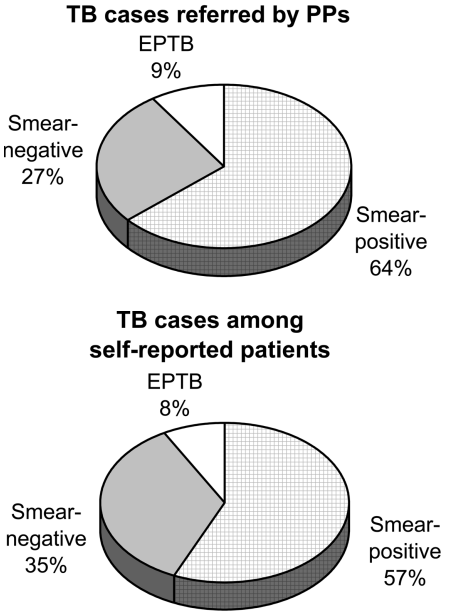

Figure 2 Distribution of TB cases referred by PPs and among self-reported patients. TB = tuberculosis; PP = private practitioner; EPTB = extra-pulmonary tuberculosis.

treated in the TU and seven were referred back to their PPs for organisation of treatment outside the study area.

Patient profile

The profile of patients referred by the PPs was compared with that of the self-reported patients (Table 2). In univariate analysis and logistic regression analysis, factors such as monthly income >1000 Indian Rupees (1 USD = 46 Indian Rupees), being literate, new cases, smear positivity at diagnosis and non-smoker status were independently associated with cases referred by the PPs.

The sputum conversion rates (87%) and the treatment outcomes of new smear-positive patients (81%) referred by the PPs were comparable to those of the self-reported cases (respectively 86% and 78%) (Table 3).

Table 2 Comparison of profile of patients referred by PPs with TB patients detected among self-reported patients under the RNTCP in a rural area

Risk factors	Total patients	PP *n* (%)	*P* value
Age, years			
<45	1432	99 (7)	0.6
⩾45	1237	80 (6)	
Sex			
Male	1918	120 (6)	0.1
Female	751	59 (8)	
Income (Rupees)			
⩽1000	1140	48 (4)	<0.001
>1000	1304	124 (10)	
Education			
Illiterate	997	45 (4)	<0.001
Literate	1498	129 (9)	
Occupation			
Unemployed	992	78 (8)	0.2
Employed	1503	96 (6)	
Patient delay, weeks			
0–4	2013	138 (7)	0.8
⩾5	469	34 (7)	
Amount spent, Rupees			
⩽300	1386	84 (6)	0.04
>300	1099	90 (8)	
Smoker			
Yes	1080	59 (6)	<0.01
No	1415	115 (8)	
Drinking			
Yes	844	46 (6)	<0.05
No	1651	128 (8)	
Sensitive on admission			
Sensitive to H/R/S/E	1195	90 (8)	0.3
Resistant to H/R or HR	221	12 (5)	
Patients			
New	2252	165 (7)	<0.01
Retreatment	417	14 (3)	
Disease			
Extra-pulmonary	219	17 (8)	0.5
Pulmonary	2450	162 (7)	
Smear on admission			
Negative	1146	65 (6)	0.06
Positive	1523	114 (8)	

PP = private practitioners; TB = tuberculosis; RNTCP = Revised National TB Control Programme; H = isoniazid; R = rifampicin; S = streptomycin; E = ethambutol.

Table 3 Smear conversion and treatment outcomes among new smear-positive patients referred by PPs and among self-reported patients in the TB Unit

Smear conversion and treatment outcomes	Referred by PPs (*n* = 104) %	Self-reported (*n*= 1024) %
Smear conversion rate	87	86
Cure and treatment completed rate	81	78
Default	11	12
Expired	4	4
Failure	5	6
Others	0	<1

PP = private practitioner; TB = tuberculosis.

Contribution of PPs

During the 31-month study period, the annual average case notification rate increased from 66 to 75 per 100 000 population (Figure 3).

DISCUSSION

Our study findings have established that collaboration with PPs can substantially increase the case detection rate of new smear-positive TB. This confirms the findings of other PPPMs.[7–10] The PPs' participation was high (92%), with two thirds of participating PPs referring TB suspects to the RNTCP. As the PPs did not have support systems for supervision and record keeping, only two (4%) acted as DOT providers, similar to the Nepal model.[9] The treatment outcomes were also comparable to those of the RNTCP. This PPPM is therefore effective.

This model is similar to the Delhi model 2 (of three models), where PPs referred TB suspects to the accredited microscopy/DOT centres for both diagnosis and treatment or arranged for DOT in their clinics.[11] The participation of the PLs in our model was poor. Only one sputum smear examination was performed for every suspect, despite training in the RNTCP, probably because fees were charged for smear microscopy. This finding is in contrast to the Kerala model, where active surveillance of RNTCP-trained

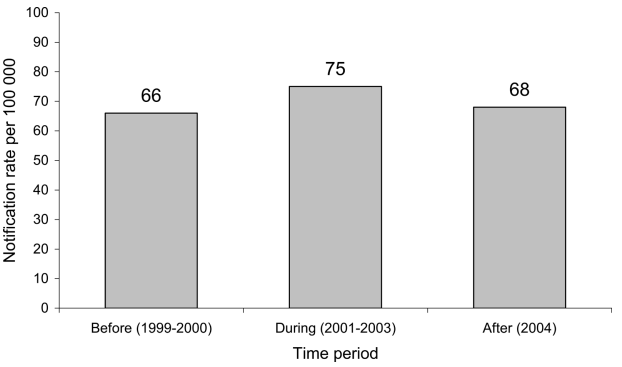

Figure 3 Notification rate (per 100 000) of new smear-positive cases before, during and after the involvement of PPs. PP = private practitioner.

laboratories substantially increased the case detection rate.[12] Other PPM models followed diverse approaches depending on the local situations: the Mahavir model of Hyderabad played the role of the government health services, as there was no other government facility available, while an NGO acted as the intermediary in the PPPMs of rural Maharashtra and Chennai.[7,13]

In the present PPPM, the referral of TB suspects from the PPs to the government system was effective, as all those referred by the PPs underwent sputum microscopy uneventfully. PPs began to rely on sputum microscopy, a paradigm shift in the diagnostic practices of PPs, as earlier studies had shown that PPs relied mainly on chest radiographs (CXRs) for diagnosis.[14] This indicates the impact of sensitisation about the RNTCP. Given the option of referring TB suspects to the private laboratories, PPs referred 61% to the government services and 95% of the referred patients attended within 1 week, with the remainder attending within 3 weeks. These findings indicate that, if it was assured that patients were back-referred and/or the PPs were kept well-informed about what happened to their patients in the facility they were referred to, they seemed happy to refer cases.

About 92% of the PPs in our series participated voluntarily without receiving any incentives, as the doctors were met individually and briefed about the study in their clinics. In contrast, in the Philippines model, the majority of the PPs demanded monetary incentives for their participation.[15] In the Vietnam model, PPs were given incentives as a policy.[8]

Selection of TB suspects by our PPs was quite good, as the sputum positivity rate among TB suspects was 24% compared to 10% among self-reported suspects, while 38% of referrals by PPs compared to 16% among self-reported suspects were TB cases. A few PPs continued to order CXRs before referral; this is the likely reason for the high yield of TB cases among the PP referrals.

In this series we observed that patients referred by the PPs were more likely to have a monthly family income of >1000 Indian Rupees compared to self-reported patients. This finding is contrary to earlier reports that 20% of the poorest patients approached the private sector for care.[1]

We believe that this PPPM is sustainable using existing personnel in the RNTCP, as the kind of input provided by the TRC can be undertaken by the DTO and team (MOTC/STS). As per the RNTCP guidelines, involvement of the private sector is one of the priority areas of the DTO. Similar opinions have been expressed by programme staff in rural Maharashtra and Ahmadabad.[16,17]

After the TRC's withdrawal from the project, there was a drop in case notification rates. This indicates that the sustainability of any model will depend upon the ability, commitment, cooperation and communication of the government staff with the PPs. During this period, PPs were not contacted regularly and feedback was not sent promptly to the referring PPs. As the referrals from PPs were not registered separately, the contribution from the PPs could not be analysed. A few PPs in our series felt that demonstration of high technical and service quality, especially prompt feedback to the PPs, is essential, to attract the interest of the PPs and their patients.

This study had certain limitations. The methodology did not include means of knowing whether the PPs referred all the TB suspects. Discussion with a few PPs revealed that a few suspects refused to go to the public system for fear of loss of confidentiality. This is one of the areas that need to be strengthened by effective information, education and communication (IEC) strategies in the community.

This study has shown that an individualised, one-to-one approach to sensitise this group of individual PPs seems to work well. The diagnostic and case management strategies of the PPs improved after this project. In the RNTCP setting, the PPPM increased the TB notification rate, achieved comparable levels of treatment success and paved the way for ongoing cooperation with the private sector for other public programmes. To conclude, this simple rural PPPM (excluding the role of the PLs) is effective and did not require additional staff or any direct financial incentives.

Acknowledgements

The authors are grateful to Dr T Santha and Dr A Thomas for their helpful suggestions in carrying out the study; Dr Selvakumar, Bacteriology Department, for organising bacteriological examinations for all the persons enrolled in this study; the EDP section, particularly R Subramani, for organising data entry of the study data; the assistance and cooperation of S Radhakrishnan, STS, S Prabakaran, STLS, and S Vamanamoorthy, field staff; and the DTO, Dr S Govindaraj and his team for their co-operation in carrying out this study. This report was funded in part by a grant from the United States Agency for International Development (USAID) provided through the World Health Organization (WHO), SEARO, New Delhi.

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RÉSUMÉ

CONTEXTE : Une unité rurale de tuberculose (TB) en Inde du Sud, 2001–2003.
OBJECTIF : Evaluer un modèle de partenariat public-privé (PPPM) rural au sein du programme de lutte contre la TB (RNTCP).
SCHÉMA : Tous les praticiens privés formés en médecine moderne (PP, $n = 52$) ainsi que les laboratoires privés (PL, $n = 13$) ont été enregistrés dans la zone. Les PP étaient sensibilisés concernant le RNTCP ; et les PL étaient formés pour l'examen microscopique des expectorations. Le PPPM a inclus le fait de référer les suspects de TB aux centres de microscopie (du gouvernement ou des PL) pour le diagnostic et le traitement des patients, conformément aux directives du RNTCP. Les patients ont été renvoyés en retour aux PP. Les pourvoyeurs de soins du traitement directement observé et les centres ont été choisis par les PP en consultation avec les patients. Le taux de détection des cas, le taux de guérison et les profils des patients référés par les PP ont été comparés à ceux des patients consultant spontanément.
RÉSULTATS : Parmi les suspects de TB, 24% des 489 référés par les PP contre 10% des 15 278 s'étant présentés spontanément ont eu une bacilloscopie positive ($P <$ 0,001). Sur les 319 référés au PL, 7% ont eu une bacilloscopie positive. Le taux moyen annuel de détection des cas est passé de 66 à 75 pour 100 000 habitants. Les taux de guérison des patients référés par les PP sont comparables aux taux des sujets consultant spontanément.
CONCLUSIONS : Ce PPPM rural est efficient et n'a nécessité ni personnel complémentaire ni un quelconque incitant financier direct.

RESUMEN

MARCO DE REFERENCIA : Una unidad rural de tuberculosis (TB) en el sur de la India entre 2001 y 2003.
OBJETIVO : Evaluar el modelo de colaboración pública y privada (PPPM) dentro del Programa Nacional Revisado de lucha contra la TB (RNTCP).
MÉTODO : Se tuvieron en cuenta todos los médicos formados en medicina moderna que ejercían en práctica privada (PP, $n = 52$) y los laboratorios privados (PL, $n = 13$) de la zona. Se sensibilizó a estos médicos sobre el RNTCP. Se adiestró al personal de los PL a la baciloscopia del esputo. En el PPPM se incluyó la remisión de individuos con presunción clínica de TB a los centros de microscopia (laboratorios públicos o PL) para diagnóstico y tratamiento según las recomendaciones del RNTCP. Los 489 pacientes se remitieron de nuevo a los PP. Los PP, en acuerdo con los pacientes, escogieron los proveedores del tratamiento directamente observado y los centros. Se compararon las tasas de detección de casos y de curación y las características de los pacientes remitidos por los PP con las tasas de los pacientes que acudieron espontáneamente.
RESULTADOS : De 489 individuos con presunción diagnóstica de TB remitidos por los PP, el 24% presentó baciloscopia positiva comparado con el 10% de los 15 278 que acudieron espontáneamente ($P <$ 0,001). De los 319 pacientes remitidos a los PL, el 7% tuvo baciloscopia positiva. El promedio anual de detección de casos aumentó de 66 a 75 por 100 000 habitantes. Las tasas de curación de los pacientes remitidos por los PP fue equivalente a la tasa de curación de los pacientes que acudieron espontáneamente.
CONCLUSIÓN : Este modelo rural de colaboración pública y privada de atención sanitaria es eficaz y no precisó personal suplementario ni ningún incentivo económico directo.