Public-private mix for tuberculosis care and control in Myanmar: a strategy to scale up?

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Setting: The public-private mix (PPM) tuberculosis (TB) project implemented by the Myanmar Medical Association (MMA) in 105 townships in Myanmar.

Objectives: 1) To assess the contribution of the MMA-PPM-TB project to total TB patient notification in the project townships; 2) to evaluate the outcomes of patients treated at the MMA-PPM clinics; and 3) to identify factors associated with unfavourable treatment outcomes, from January to December 2013.

Design: A retrospective cohort study.

Results: The MMA-PPM-TB project contributed 7501 (12%) of 60 905 TB patient notifications to the National Tuberculosis Programme (NTP) in 105 study townships. Of 2975 TB patients diagnosed and treated at private MMA-PPM clinics, 92% had a favourable outcome (32% cured, 60% completed treatment) and 8% had an unfavourable outcome (2.9% died, 2.5% lost to follow-up, 1.9% failure, 0.6% transfer out). Patient characteristics significantly associated with an unfavourable treatment outcome were age ⩾65 years (adjusted risk ratio [aRR] 5.7, 95% confidence interval [CI] 4.20–7.68), retreatment (aRR 2.44, 95%CI 1.79–3.33) and female sex (aRR 1.44, 95%CI 1.14–1.82).

Conclusion: This study supports the continuation and expansion of the MMA-PPM-TB model and/or similar PPM approaches in Myanmar that engage all health providers in the ambitious goals of achieving universal health coverage in this country in transition and ending its TB epidemic by 2035.

Improvements in public sector health-care delivery alone will not be sufficient to achieve the World Health Organization (WHO) goals of a 95% reduction in tuberculosis (TB) deaths and a 90% reduction in TB incidence rates by the year 2035.[1,2] A significant number of people with TB seek and receive care in the private sector, particularly in Asia, and many are not reported to public national TB programmes (NTPs).[1,3,4] Engaging all relevant care providers in TB care and control is an essential component of the WHO's End TB Strategy.[4] Private-public mix (PPM) approaches create health system linkages that can facilitate TB patient detection, treatment, referral and service accessibility, especially in resource-limited areas.[1,5,6] Of the countries reporting to the WHO in 2015, PPM initiatives contributed between 5% and 56% of TB notifications.[4] A systematic review revealed that of 48 PPM-TB programmes, 41 improved case detection, while treatment success increased by 60% in 39.[7] The majority of the programmes increased TB care utilisation and improved case management (referral and follow-up). PPM approaches were not effective in all settings, however, and depended on contextual factors—most importantly, financing and governance.[3,7]

Myanmar has adopted a bold new vision for providing better health opportunities for its people and moving towards universal health coverage.[8] TB is a major public health issue in Myanmar's population of 54 million, with an estimated incidence in 2015 of 365 per 100 000.[4] Only 71% of patients, however, were detected and notified to the NTP. Myanmar has a large private sector for health-care delivery, including TB.[9] A survey revealed that approximately 73% of the country's TB patients first seek care from a private general practitioner (GP).[10,11] Myanmar has been a global pathfinder for PPM, with several initiatives implemented in collaboration with partners such as Population Services International (PSI), the Myanmar Medical Association (MMA) and the Japan International Cooperation Agency.[10,12,13] The NTP developed PPM-TB guidelines in 2003, and private sector engagement is a key component of the current National Strategic Plan for TB (2016–2020). In 2015, PPM initiatives contributed 17% of all TB notifications in Myanmar.[4]

As the national professional society for doctors, the MMA plays a leading role in facilitating the professional development of private GPs and engaging them in public health activities.[9] An evaluation of a pilot PPM model with the MMA during 2002–2004 demonstrated an increase in case notification and treatment success.[12] The MMA has been implementing a PPM-TB project supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria since 2006. The project establishes linkages between private GPs and the NTP for quality TB diagnostics, treatment and care.[9] The project is one of the largest PPM networks in Myanmar, covering 119 of 330 townships. As national scale-up and investment in PPM for TB continues, ongoing assessment is needed. The specific objectives of this study were 1) to assess the contribution of the MMA-PPM-TB project to total TB patient notifications in the project townships; 2) to evaluate outcomes of patients treated at MMA-PPM clinics; and 3) to identify factors associated with unfavourable treatment outcomes from January to December 2013.

METHODS

Study design

This was a retrospective cohort study of all patients registered for TB diagnosis and treatment at private clinics coordinated by the MMA-PPM-TB project between January and December 2013.

Setting

Myanmar is administratively divided into 15 states and regions, 67 districts and 330 townships.[14] The NTP provides diagnostic and treatment services for TB, conducts surveillance and sets policy and guidelines based on the WHO guidelines and the International Standards of TB Care (ISTC).[15,16]

PPM model of care

The NTP classifies PPM models through three schemes. Scheme I (SI) involves the referral of presumptive TB patients to the NTP for diagnosis and treatment initiation. Scheme II (SII) has the additional GP function of supervision of directly observed therapy (DOT) in accordance with NTP guidelines. Scheme III (SIII) comprises referral to the NTP for diagnosis, with treatment initiation and DOT performed by the GPs. In Myanmar, DOT can be conducted at facilities and clinics or in the community by a treatment supporter or family member, in which case the health-care worker conducts supervision by checking the patient treatment booklet and counting the remaining pills.

The NTP diagnostic and treatment sites were either township TB centres or government hospitals. NTP-accredited private laboratories were rarely used. The MMA-PPM-TB project enrols private GPs who practise full time in community-based clinics. The project decided not to adopt SII, as it was found during the design phase that many GPs preferred not to engage only in DOT supervision without having a role in treatment initiation. Only GPs, the first point of consultation among the community, were coordinated, and the selection process was undertaken after MMA project staff consulted with the respective township medical officers (public sector).

Financing and patient costs

The GPs are not provided with remuneration or incentives for participating in the project. Although TB diagnosis, treatment and care in Myanmar should not incur out-of-pocket expenses for patients, some patients are asked to pay small amounts for investigations, consultation fees and non-TB medications. The MMA-PPM-TB project provides reimbursements for all expenses incurred by presumptive and diagnosed TB patients, including transportation. Anti-tuberculosis treatment is provided free of charge at the NTP sites (SI), or drugs are distributed to the GP clinics (SIII), where nutritional support is also provided.

Supervision and training

The project employs township TB coordinators to support diagnosis and case management, conduct supervisory visits and perform data recording and reporting. They systematically track all referrals of presumptive TB patients from SI clinics and all patients registered for treatment at SIII clinics who missed appointments. The project staff conduct routine supervisory visits to GP clinics and hold review meetings with focal persons from the township health centres and the NTP. The project facilitates training on ISTC for private GPs.

Study participants

The study included all TB patients diagnosed and treated at private clinics coordinated by the MMA-PPM-TB project between January and December 2013.

Data and analysis

Aggregated data (the total number of TB patients notified to the NTP in each township, the number of TB patients referred by the MMA to the NTP and the number of TB patients treated by the MMA) were extracted from the presumptive TB referral record from the MMA. Individual data (township name, patient ID, age, sex, disease classification, type of patient, treatment regimen and outcome) were extracted from the township TB register from the NTP and the MMA.

The contribution of the MMA-PPM-TB project was calculated by determining the proportion of total TB patients notified by the MMA-PPM (both the SI and SIII GPs) of the total TB patients registered at the NTP in the study townships. Treatment outcomes were classified as favourable (cured, completed treatment) or unfavourable (died, failure, lost to follow-up, transferred out or not recorded). EpiData software was used (v. 3.1 for data entry and v. 2.2.2.183 for data analyses, EpiData Association, Odense, Denmark). Measures of risk associated with unfavourable outcomes were determined using relative risks (RRs) with 95% confidence intervals (CI) for demographic and clinical characteristics. To assess the independent effect of all significantly associated variables, the adjusted RR (aRR) was calculated using log binomial regression.

Ethics approval

Ethics approval was obtained from the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France. The ethics committee waived the need for individual patient consent, as the study involved the analysis of existing programme data.

RESULTS

The NTP registered 60 905 TB patients from the 105 study townships in 2013, yielding a patient notification rate of 276/100 000 for all forms of TB. The MMA-PPM-TB project referred or treated 7501 of these TB patients, a contribution of 12%. The project notified 3027 new smear-positive patients (15%) from a total of 20 603 in the study population. The PPM contribution to the NTP from the MMA varied widely among the different study townships, from 0% to 63% (median 10, interquartile range [IQR] 3.5–18).

The project enrolled 1286 GPs from 119 townships in Scheme I, of whom 210 (14%) from 29 townships participated in Scheme III. The Figure shows the total numbers of patients screened, diagnosed and treated through Scheme I and Scheme III of the MMA-PPM-TB

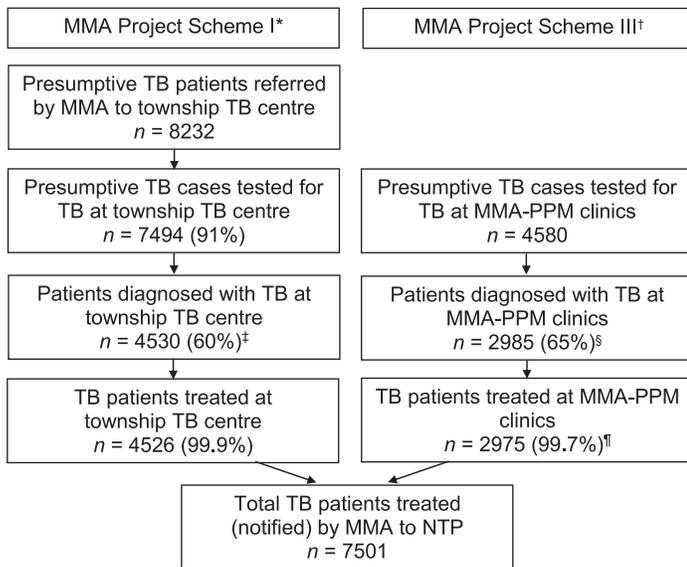| MMA Project Scheme I*	MMA Project Scheme III†
Presumptive TB patients referred by MMA to township TB centre *n* = 8232	
Presumptive TB cases tested for TB at township TB centre *n* = 7494 (91%)	Presumptive TB cases tested for TB at MMA-PPM clinics *n* = 4580
Patients diagnosed with TB at township TB centre *n* = 4530 (60%)‡	Patients diagnosed with TB at MMA-PPM clinics *n* = 2985 (65%)§
TB patients treated at township TB centre *n* = 4526 (99.9%)	TB patients treated at MMA-PPM clinics *n* = 2975 (99.7%)¶
Total TB patients treated (notified) by MMA to NTP *n* = 7501	

FIGURE Screening, diagnosis, treatment and care cascade for the MMA-PPM-TB project in 105 project townships, Myanmar, 2013. *Scheme I = referral of presumptive TB patients by MMA-PPM private practitioners to township TB centres for laboratory testing, diagnosis and treatment. †Scheme III = referral, diagnosis and treatment provision for TB with DOT by MMA-PPM private practitioners at their clinics. ‡Four TB patients did not receive TB treatment from township TB centre. §Ten TB patients from MMA-PPM clinics did not receive TB treatment from MMA-PPM clinics. ¶92% treatment success rate among TB patients treated at MMA-PPM clinics. MMA = Myanmar Medical Association; TB = tuberculosis; PPM = public-private mix; NTP = national TB programme; DOT = directly observed therapy.

project. Of the 7501 MMA-PPM-TB patients notified to the NTP, 4526 (60%) were referred by the MMA (SI) and 2975 (40%) were diagnosed and treated at MMA SIII clinics. Nine per cent of presumptive TB patients referred by the MMA (SI) were not tested for TB, and respectively only 0.1% and 0.3% were lost to follow-up after the point of diagnosis from the NTP and the MMA.

Information on outcome was only available for the 2975 patients treated at the MMA SIII clinics, as the patients referred to the NTPs for treatment were not under the direct supervision of the MMA. Table 1 shows the demographic and clinical characteristics of the patients treated at the MMA under SIII. Table 2 and Table 3 show the treatment outcomes of new and retreatment TB patients according to disease classification. The majority of the patients treated by the MMA had a favourable outcome (92% success rate), while the NTP treatment success rate was 87% over the same period. The MMA achieved a cure rate of 81% among smear-positive pulmonary TB patients and a treatment completion rate of 94% among the remaining patients, including pulmonary, smear-negative and extra-pulmonary TB patients. Of the 8% of patients with an unfavourable outcome, 87 (2.9%) died, 75 (2.5%) were lost to follow-up, 58 (1.9%) failed and 19 (0.6%) were transferred to other townships.

Table 4 shows the unfavourable treatment outcome of TB patients according to their demographic and clinical characteristics. Patient characteristics significantly associated with an unfavourable treatment outcome were age ≥65 years (aRR 5.7, 95%CI 4.20–7.68), retreatment (aRR 2.44, 95%CI 1.79–3.33) and female sex (aRR 1.44, 95%CI 1.14–1.82).

DISCUSSION

Our study found that the MMA-PPM-TB project made a significant contribution to TB patient notifications in 2013 in Myanmar through case finding, diagnosis and care, with a high treatment cure rate among sputum-positive patients and high completion rates among sputum-negative and extra-pulmonary patients. Notably, a high proportion of presumptive TB patients referred to the township TB centres by private GPs were diagnosed with TB and commenced on treatment in both the MMA and NTP treatment centres. Patients aged ≥65 years who were treated for TB were six times more likely to have an unfavourable treatment outcome than those aged 15–64 years.

The strengths of this study are that the data were collected from a nationwide PPM project in Myanmar, and that the study was conducted in accordance with the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) guidelines.[17] A limitation is that we were unable to collect data on other risk factors that might be associated with TB treatment outcomes, such as human immunodeficiency virus status, diabetes status or clinical indicators of disease severity.[18] Another limitation is that the study might not be a complete evaluation of the project, as we were not able to collect NTP data from 14 of the total 119 project townships. These 14 townships were excluded from the calculation of the project's total contribution to NTP patient notification.

Despite its 12% contribution to notifications in the project townships in 2013, the MMA-PPM-TB project accounted for 2.4% of total cases contributed by PPM initiatives in Myanmar in 2015, compared with the PSI's contribution of 12.4%, facilitated by its active case-finding activities; other NTP partners contributed the remaining 2.2%. Possible reasons for the exceptionally high TB diagnostic yield from referrals (60% from SI and 65% from SIII) include the practice of referring selected patients with pronounced clinical features from among those positive on the symptom screen and the overdiagnosis of clinically diagnosed TB patients (smear-negative, extra-pulmonary and childhood TB) at the township TB centres.

In a systematic assessment of PPM TB control in 12 high-burden countries in 2009, most of the study countries reported high

TABLE 1 Demographic and clinical characteristics of TB patients from MMA-PPM-TB project clinics, Myanmar, 2013

Demographic and clinical characteristics of TB patients	Total *n* (%)
Total	2975 (100)
Sex	
Male	1835 (62)
Female	1140 (38)
Age, years	
0–14	712 (24)
15–64	2215 (74)
≥65	48 (2)
Disease classification	
Pulmonary smear-positive	1162 (39)
Pulmonary smear-negative	1550 (52)
Extra-pulmonary	263 (9)
Type of TB patient	
New	2822 (95)
Retreatment*	153 (5)

*Relapse, treatment after failure, treatment after loss to follow-up, other.
TB = tuberculosis; MMA = Myanmar Medical Association; PPM = public-private mix.

TABLE 2   Treatment outcome of new TB patients from the MMA-PPM-TB project clinics according to their disease classification, Myanmar, 2013

	Treatment outcomes						
Disease classification	Cured n (%)	Completed n (%)	Died n (%)	Failure n (%)	LTFU n (%)	Transfer out n (%)	Total n
Pulmonary smear-positive	863 (81)	94 (9)	36 (3)	36 (3)	24 (2)	12 (1)	1065
Pulmonary smear-negative	NA	1405 (94)	37 (3)	4 (0.3)	42 (3)	6 (0.4)	1494
Extra-pulmonary	NA	256 (97)	3 (1)	0	3 (1)	1 (0.4	263
Total	863 (31)	1755 (62)	76 (3)	40 (1)	69 (2)	19 (1)	2822

TB = tuberculosis; MMA = Myanmar Medical Association; PPM = public-private mix; LTFU = loss to follow-up; NA = not applicable.

TABLE 3   Treatment outcome of retreatment TB patients from the MMA-PPM-TB project clinics according to their disease classification, Myanmar, 2013

	Treatment outcomes						
Disease classification*	Cured n (%)	Completed n (%)	Died n (%)	Failure n (%)	LTFU n (%)	Transfer out n (%)	Total N
Pulmonary smear-positive	74 (76)	2 (2)	3 (3)	17 (18)	1 (1)	0	97
Pulmonary smear-negative	NA	42 (75)	8 (14)	1 (2)	5 (9)	0	56
Total	74 (48)	44 (29)	11 (7)	18 (12)	6 (4)	0	153

*There were no retreatment EPTB patients.
TB = tuberculosis; MMA = Myanmar Medical Association; PPM = public-private mix; LTFU = loss to follow-up; NA = not applicable; EPTB = extra-pulmonary TB.

TABLE 4   Unfavourable treatment outcomes among TB patients from MMA-PPM-TB project clinics according to their demographic and clinical characteristics, Myanmar, 2013

Demographic and clinical characteristics of TB patients	Total N	Unfavourable treatment outcome* n (%)	RR (95%CI)	aRR (95%CI)	P value
Total	2975	239 (8)			
Sex					
Male	1835	130 (7)	1	1	
Female	1140	109 (10)	1.35 (1.06–1.72)	1.44 (1.14–1.82)	0.002
Age, years					
0–14	712	11 (2)	0.17 (0.09–0.31)	0.21 (0.11–0.39)	<0.001
15–64	2215	203 (9)	1	1	
≥65	48	25 (52)	5.7 (4.20–7.68)	5.7 (4.20–7.68)	<0.001
Disease classification					
Pulmonary smear-positive	1162	129 (11)	4.17 (1.97–8.82)	2.0 (0.95–4.26)	0.07
Pulmonary smear-negative	1550	103 (7)	2.49 (1.17–5.31)	1.73 (0.82–3.68)	0.15
Extra-pulmonary	263	7 (3)	1	1	
Type of TB patient					
New	2822	204 (7)	1	1	
Retreatment†	153	35 (23)	3.16 (2.30–4.36)	2.44 (1.79–3.33)	<0.001

*Died, failure, LTFU, transfer out.
†Relapse, treatment after failure, treatment after LTFU, other.
TB = tuberculosis; MMA = Myanmar Medical Association; PPM = public-private mix; RR = risk ratio; CI = confidence interval; aRR = adjusted risk ratio; LTFU = loss to follow-up.

treatment success rates (often >85% and sometimes >90%) through PPM interventions.[19] In another review of private TB control initiatives, the treatment success rates were above 80%, which was as good as or better than the treatment success rates in the NTP facilities in the same settings.[20,21] The excellent treatment outcomes in the private sector may be due to quality patient care (including the nutritional enablers provided), good access in terms of geographic proximity to patients and the flexibility of clinic hours.[12] The other possible reason is that the project incentives and enablers (transport, nutrition) and case management systems enhanced adherence and reduced loss to follow-up and/or failure. Finally, it is also possible that private

GPs manage TB patients who do not have clinical indicators of disease severity and who have more favourable outcomes, and refer patients with complications to the NTP or to health facilities.

The association of older and retreatment patients with unfavourable TB treatment outcomes is well established.[22,23] Potential causes include comorbidity with other conditions, increased disease severity and drug-resistant TB.[24]

The project-specific implications of the study are that there should be further investigation of the high proportion of presumptive TB patients identified with TB through auditing of the symptom screening and potential over-diagnosis of smear-negative TB. The low uptake by GPs of SIII, which has the potential to

reduce the burden on the public system, needs to be further explored through qualitative research.

As the private health sector is highly utilised in Myanmar, PPM for TB is an essential component of the national strategy. The MMA-PPM model provides an opportunity to promote evidence-based TB diagnosis and treatment through training and capacity building in the private sector. This improves cure rates and reduces the risk of developing drug resistance. PPM reduces patient costs by ensuring that treatment for TB is free of charge and all other costs are kept to a minimum. PPM may also potentially reduce indirect patient costs by providing services closer to their homes or workplace, as private clinics are embedded in communities with different backgrounds and regions.

This study supports the continuation and scale-up of the MMA-PPM-TB project and/or similar models in Myanmar, given its contribution to TB patient finding and successful treatment outcomes. As the project is donor funded, consideration of longer-term financing, including the incorporation of PPM into domestic funding streams, needs to be considered in the context of an in-depth understanding of Myanmar's TB epidemic, including the generation of evidence for better allocative efficiency of funding to various interventions with the aim of interrupting TB transmission and preventing deaths due to TB.

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Contexte : Le projet mixe public-privé (PPM) pour la tuberculose (TB) mis en œuvre par l'association médicale du Myanmar (MMA) dans 105 townships, Myanmar.

Objectifs : 1) Evaluer la contribution du projet TB MMA-PPM à la notification totale des patients TB dans les townships du projet ; 2) évaluer le devenir des patients traités dans les centres de santé MMA-PPM ; et 3) identifier les facteurs associés avec un résultat défavorable du traitement de janvier à décembre 2013.

Schéma : Étude rétrospective de cohorte.

Résultats : Le projet MMA-PPM-TB a contribué à 7501 (12%) des 60 905 notifications de patients TB au Programme National TB dans les 105 townships de l'étude. Parmi 2975 patients TB diagnostiqués et traités dans les centres privés du MMA-PPM, 92% ont eu un résultat favorable (32% de guérison, 60% d'achèvement) et 8% des patients ont eu un résultat défavorable (2,9% sont décédés, 2,5% ont été perdus de vue, 1,9% ont eu un échec du traitement et 0,6% ont déménagé). Les caractéristiques des patients significativement associées avec un résultat défavorable du traitement ont été l'âge ≥65 ans (ratio de risque ajusté [aRR] 5,7 ; intervalle de confiance [IC] 95% 4,20–7,68), le retraitement (aRR 2,44 ; IC95% 1,79–3,33) et le sexe féminin (aRR 1,44 ; IC95% 1,14–1,82).

Conclusion : Cette étude est en faveur de la poursuite et de l'expansion du modèle MMA-PPM-TB et/ou d'approches similaires public-privé au Myanmar, engageant tous les prestataires de santé, car ce pays en transition présente une vision audacieuse consistant à offrir une couverture santé universelle et à mettre fin à l'épidémie de TB d'ici 2035.

Marco de referencia: El proyecto de colaboración público-privada (PPM) en materia de tuberculosis (TB) puesta en práctica por la Asociación Médica de Myanmar (MMA) en 105 municipios de Birmania.

Objetivos: 1) Evaluar la contribución del MMA-PPM-TB en Birmania al total de notificaciones de casos de TB en los municipios que participaron; 2) evaluar los desenlaces clínicos de los pacientes tratados en los consultorios participantes; y 3) definir los factores que se asociaron con los desenlaces terapéuticos desfavorables, de enero a diciembre del 2013.

Método: Fue este un estudio retrospectivo de cohortes.

Resultados: El MMA-PPM-TB aportó 7501 casos (12%) a las 60 905 notificaciones de pacientes al Programa Nacional contra la TB en los 105 municipios que participaron en el estudio. De los 2975 pacientes diagnosticados con TB y tratados en los consultorios del MMA-PPM-TB, el 92% logró un desenlace terapéutico favorable (32% curaciones y 60% tratamientos completos) y el 8% obtuvo un desenlace desfavorable (2,9% defunciones, 2,5% pérdidas durante el seguimiento, 1,9% fracasos y 0,6% transferencias a otros centros). Las características que se asociaron de manera significativa con un desenlace desfavorable fueron la edad ⩾65 años (riesgo relativo ajustado [RRa] 5,7; intervalo de confianza [IC] del 95% 4,20–7,68), los pacientes en retratamiento (RRa 2,44; IC95% 1,79–3,33) y el sexo femenino (RRa 1,44; IC95% 1,14–1,82).

Conclusión: Los resultados del presente estudio respaldan la continuación y la ampliación del modelo de MMA-PPM-TB y de otras iniciativas equivalentes de PPM en Birmania que vinculen a todos los profesionales de salud, pues el país en un momento de transición pone en marcha una perspectiva ambiciosa de cobertura universal de salud y de erradicación de la epidemia de TB en el 2035.