Multidrug-resistant tuberculosis patients lost to follow-up: self-reported readiness to restart treatment

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SUMMARY

SETTING—Multidrug-resistant tuberculosis (MDR-TB) patients lost to follow-up (LTFU) from Programmatic Management of Drug-resistant Tuberculosis facilities in the Philippines.

OBJECTIVES—To gain insight into patients' readiness to return to treatment.

METHODS—MDR-TB patients who initiated treatment and were categorized as LTFU were identified using TB registers, contacted, and asked to consent to an interview and medical record review. At the conclusion of the interview, patients' readiness to restart treatment was assessed and examined in relation to demographic, clinical, and interview data. Odds ratios were calculated.

RESULTS—When asked if they would consider restarting MDR-TB treatment, 3% of the 89 participating patients reported that they had already restarted, 34% indicated that they wanted to restart, 33% had not considered restarting, 28% were undecided, and 2% had decided against restarting. Patients who wanted to restart treatment were more likely to report having borrowed money for TB-related expenses (OR 5.97, 95%CI 1.27–28.18), and were less likely to report being self-employed (OR 0.08, 95%CI 0.01–0.67), or perceive themselves at low or no risk for TB relapse (OR 0.30, 95%CI 0.08–0.96) than patients who did not indicate an interest in restarting treatment.

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CONCLUSIONS—Efforts to re-engage LTFU patients in care should consider financial barriers, knowledge gaps, and personal adherence challenges in patients.

Keywords

patient decision; readiness; health behavior; stages of change; patient education

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Multidrug-resistant tuberculosis (MDR-TB), defined by the World Health Organization (WHO) as tuberculosis (TB) caused by bacteria resistant to at least isoniazid and rifampin (RMP), the two most powerful first-line anti-tuberculosis drugs, presents a major threat to the control of TB in the Philippines. According to WHO estimates, 2% ($n = 4400$) of new TB cases and 21% ($n = 4100$) of TB retreatment cases are MDR-TB.[1] Moreover, drug resistance has been detected in all regions of the country.[2]

Programmatic Management of Drug-resistant Tuberculosis (PMDT) activities have been led by the Philippines Department of Health since 2009. The scale-up of PMDT activities has required concerted effort and significant resources. However, lost to follow-up (LTFU) rates have incrementally increased with the scale-up, and may undermine these efforts. In the 2011 PMDT patient cohort, 39% of the 1185 patients enrolled on MDR-TB treatment were LTFU, i.e., patients whose treatment was interrupted for at least 2 consecutive months.[3]

Persuading LTFU patients to return to treatment can help reduce mortality, prevent further spread of MDR-TB, and inhibit the development and transmission of more extensively drug-resistant strains of bacteria.[4–6] It is therefore crucial to gain insight into factors associated with non-adherent patients' readiness to return to treatment, and develop appropriate strategies to re-engage LTFU MDR-TB patients into treatment.

In 2014, the Philippines National Tuberculosis Program conducted a study to assess risk factors for being LTFU in MDR-TB patients.[7] This study found that LTFU was independently associated with alcohol abuse and patients' higher self-rating of vomiting severity. Independent factors protective against LTFU included patients' receipt of any type of assistance from the TB program, better general knowledge about TB, and greater trust in and rapport with health care staff.[7] We further analyzed the study data to identify and describe factors associated with self-reported readiness to restart treatment among LTFU MDR-TB patients.

METHODS

The study was approved by the Institutional Review Board of the Tropical Disease Foundation (Makati City), the Ethics Review Committee (ERC) of the Lung Center of the Philippines (Manila) and the ERC of the Philippine Tuberculosis Society, Inc (Metro Manila, The Philippines).

The main study had a case-control design and included adult patients with confirmed MDR or RMP-resistant TB, with MDR-TB treatment initiated between 1 July and 31 December 2012 at 15 MDR-TB treatment facilities with three or more LTFU MDR-TB patients.[7] Cases were defined as patients who were LTFU from MDR-TB treatment. Controls were defined

as patients who were still continuing MDR-TB treatment or with treatment outcomes of cured, completed, or failed at the time when the study was conducted.

Patients characterized as LTFU by 1 January 2014 were identified using TB registers. Study staff contacted these patients and asked them to provide written consent to an in-depth interview and medical record review.

At the conclusion of the interview, study staff assessed each LTFU patient's readiness to restart MDR-TB treatment. To identify each patient's stage of readiness, an educational assessment form was developed based upon the Transtheoretical Model (TTM) and Precaution Adoption Process Model (PAPM).[8,9] These theoretical models recognize behavior change as a process that can be categorized into stages of readiness.[8,9] Both theoretical models include a stage in which a person has no intention of making a change because they are unaware of or under-informed about the consequences of their actions, a stage in which a person is undecided what to do as they are aware of the benefits and drawbacks associated with a change, a stage in which a person is planning to act, a stage in which a person is taking action, and a stage in which a person works to maintain a behavior. The PAPM includes an additional stage in which a person is aware of risks, yet makes a conscious decision not to engage in a recommended course of action.[9] In accordance with the educational assessment form, study staff first asked each patient if they had ever thought about restarting anti-tuberculosis treatment. If the patient answered 'yes', they were then asked if they had already restarted treatment and to provide the reason for restarting treatment. If a patient reported that they had not already restarted treatment, they were read a series of statements and asked to identify which of the following statements best described their thoughts: 1) 'I have never thought about restarting TB treatment', 2) 'I am undecided about restarting TB treatment', 3) 'I have decided I *do not* want to restart TB treatment', and 4) 'I have decided I do want to restart treatment'.

Once a patients' stage of readiness to restart treatment was assessed and documented, study staff relayed an educational message based on TTM and PAPM constructs, tailored to each patient's stage of readiness.

Patients' stage of readiness was then examined in relation to clinical and demographic data obtained through a review of medical records, and interview data focused on knowledge about TB, the patient's relationship with treatment center staff, risk perceptions, and self-reported reasons for LTFU. For each topic, patients who reported that they wanted to restart treatment were compared to patients who did not indicate an interest in restarting treatment (those who had not considered, were undecided, or decided against restarting treatment).

Categorical variables were compared using the χ^2 test or Fisher's exact test, as appropriate. Univariate odds ratios (ORs) with 95% confidence intervals (CIs) were estimated. We used $\alpha = 0.05$ to determine statistical significance. Statistical analyses were performed using SAS software, version 9.3 (SAS Institute Inc, Cary, NC, USA).

RESULTS

Study population

A total of 136 LTFU MDR-TB patients who had received care at 15 of the 44 PMDT centers in the country were eligible for study inclusion.[7] In this group, 41 patients were not found, 4 refused participation, 91 were enrolled, and 89 (98%) responded to the questions included on the educational assessment form (Appendix Figure A[*]). Of these 89 participants, 65% were male, the median age was 43 years (range 18–67), 53% were married or cohabiting, 74% had high school education or lower, 53% were residing in urban slum areas, and 43% were employed at the time of the interview; medical records documented that 94% were living at or below the poverty line, all had pulmonary disease, and 95% had one or more previous TB episodes noted in their medical record (Table 1).

Readiness to restart treatment

When asked if they had considered restarting MDR-TB treatment, 3 (3%) reported they had already restarted after developing TB symptoms again, 30 (34%) stated they wanted to restart, 29 (33%) had not considered restarting, 25 (28%) were undecided, and 2 (2%) stated they had decided against restarting treatment (Appendix Figure A).

As shown in Appendix Table A, among the 86 patients who had not restarted MDR-TB treatment, no differences were detected between the group who reported wanting to restart treatment (n=30) and the group who did not ($n = 56$) in terms of sex; civil status; level of education; location of residence; socio-economic level; changes to employment status during anti-tuberculosis treatment; number of previous TB episodes; outcome of previous TB episodes; comorbid conditions; and tobacco, alcohol, and drug use.

LTFU MDR-TB patients who wanted to restart treatment were significantly more likely to report that they or their family had borrowed money to cover costs associated with their TB illness than those who did not indicate an interest in restarting treatment (91.7% vs. 64.8%, OR 5.97, 95%CI 1.27–28.18). Patients who wanted to restart treatment were significantly less likely to report that they were self-employed than patients who did not indicate an interest in restarting treatment (3.3% vs. 29.1%, OR 0.08, 95%CI 0.01–0.67).

Patients who considered restarting treatment were more likely to report that they were unable to work (26.7% vs. 10.9%, OR 2.97, 95%CI 0.92–9.59) or were out of work and looking for work (36.7% vs. 17.9%, OR 2.66, 95%CI 0.97–7.31), and less likely to report that they were responsible for the household budget (23.3% vs. 42.9%, OR 0.41, 95%CI 0.14– 1.10) than patients who did not indicate an interest in restarting treatment; however, these associations did not reach statistical significance.

Table 2 summarizes the data collected during interviews to identify reasons for being recorded as LTFU during MDR-TB treatment with regard to patients' decision about restarting MDR-TB treatment. No statistically significant relationships were found between

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[*]The appendix is available in the online version of this article, at http://www.ingentaconnect.com/content/iuatld/ijtld/2016/00000020/00000009/art00016

their readiness to restart treatment and patient's knowledge about TB, relationship with treatment center staff, or self-reported reasons for LTFU. However, 46.7% of those who wanted to restart treatment reported medication side effects or fear of side effects as a personal reason for LTFU compared to 66.1% of those who did not indicate an interest in restarting treatment (OR 0.45, 95%CI 0.18–1.13), suggesting that side effects are a major adherence challenge and that the efficient management of side effects should be a high-ranking program priority.

When risk perceptions were examined, 13.3% of those who wanted to restart treatment thought they had little to no chance of a TB relapse compared to 33.9% of those who did not want to restart treatment (OR 0.30, 95%CI 0.08–0.96). How frequently patients worried about a TB relapse or transmitting TB to loved ones, and understanding that a relapse may be harder to cure, was not associated with readiness to restart.

DISCUSSION

Of the 89 LTFU patients included in this study, only three (3%) had restarted MDR-TB treatment, and all three noted that their motivation for restarting was because they had become ill again. Among the remainder of the group, more than half did not indicate readiness to restart their treatment. We found that only three factors were significantly associated with patients' decision regarding restarting treatment: self-employment, having borrowed money to cover costs due to TB illness, and greater perceived susceptibility towards a TB relapse. These data, examined in context with the socio-economic status of the entire cohort and all self-reported reasons for LTFU, indicate that economic factors influence LTFU patients' decision-making processes. Specifically, these patients may not want to risk loss of income, or are unwilling to draw resources away from the household to pursue treatment. The data also illustrate the importance of a patient-centered approach, [10,11] with attention to adherence challenges, when developing a plan to re-engage LTFU MDR-TB patients into treatment or to prevent LTFU.

Reports in the literature demonstrate that enablers such as transportation assistance and food packages[7,12] help patients minimize or overcome financial barriers to adherence. In the Philippines, transportation assistance, food assistance, and temporary housing is available to patients after initiating treatment.[7,13] Table 3 outlines services available to enable adherence when participants are undergoing treatment. As noted, the amount of assistance is limited, and as reported elsewhere, patients often incur transportation expenses due to fares that exceed the allotted amount, housing costs after moving away from family to be closer to treatment centers, and loss of income when undergoing directly observed therapy (DOT) at treatment centers that are open for a limited number of hours each day.[4,7,14] Achieving program targets and improving patient outcomes among persons living slightly above, at, or below the poverty line may require services that enable patients and their families to preserve their capacity to earn income, keep what they earn to meet basic needs, and retain their possessions. To accomplish this may require operating DOT programs in a manner that accommodates work or school schedules, providing financial aid to those too sick to work, eliminating out-of-pocket expenses for transportation to and from clinic-based DOT sites by

providing full transportation costs, offering community-based DOT, and delivering assistance without delay.

Additional approaches include screening for early identification of medication side effects, prompt access to medical care, and well-managed treatment for a range of medication side effects at no cost. In the Philippines, although medications to manage side effects are available at no cost, the formulary of available medications is limited, and during interviews participants reported out-of-pocket costs for medical care for side effects. These experiences may have influenced patients' readiness to restart treatment.

Finally, these data illustrate the need for robust patient education. Almost a third of the LTFU MDR-TB patients interviewed felt they had no chance or very little chance of becoming ill with TB again. However, 95.5% of these patients had experienced one or more TB episodes prior to their most recent diagnosis. These responses, coupled with personal relapse experiences, call into question how well patients understand the disease process and whether TB is differentiated from other lung infections such as pneumonia.

These responses also emphasize the need for patient education that extends beyond a simple explanation of the diagnosis and treatment. Additional educational topics may include the rationale for treatment duration, medication side effects, common problems that arise during treatment and how these may be addressed, available assistance, risks associated with MDR-TB treatment non-adherence, and consequences of non-adherence on multiple facets of people's lives.

The educational messages provided to patients incorporated some of these topics. Crafted in accordance with TTM and PAPM constructs, the messages differed slightly based upon patient's self-reported readiness to restart treatment.[8,9,15] For example, the educational message for patients who had not considered restarting treatment focused on the individual's susceptibility to relapse of TB following LTFU, information on risk factors, encouragement that the patient consider their own negative experiences while ill and the personal advantages of returning to treatment. The message for patients who were undecided about restarting treatment or had decided against restarting treatment emphasized the likelihood and potential seriousness of a TB relapse, recommendations of global TB experts, patient's fears or worries, the benefits of restarting treatment, and how to take action.

Interventions based on stage-based theories have demonstrated positive behavioral outcomes;[16,17] however, the educational messages provided to LTFU patients were not systematically evaluated during development to determine understanding and acceptability in the target population, nor was the effect of these messages on treatment return assessed, as the study timeline and resources could not accommodate these evaluations. Nevertheless, the creation of messages such as these requires additional study as part of the effort to prevent loss to follow-up or reengage LTFU TB patients with TB care.[7]

Additional study limitations include a relatively small sample size, limited statistical power, and reliance on participants' understanding and candid self-report of their readiness to return to treatment. Social desirability bias may have had an influence on participants' responses, leading them to respond with socially appropriate answers instead of their true thoughts and

experiences. Despite these limitations, this study provides insights into factors that may motivate or impede LTFU patients' return to treatment.

CONCLUSIONS

LTFU patients' understanding of TB relapse is one factor that may influence their decision to restart and complete MDR-TB treatment. Economic factors such as self-employment, retaining employment, and the need to borrow money when seeking treatment may also influence this decision process. Identifying additional factors as well as interventions that positively influence LTFU patients' treatment reinitiation requires further assessment to determine best practices to optimize return and retention. However, efforts to retain patients in care through patient enablers, effective management of medication side effects at no cost, and outreach immediately following missed doses may be more effective than expending efforts to re-engage LTFU patients.

Acknowledgments

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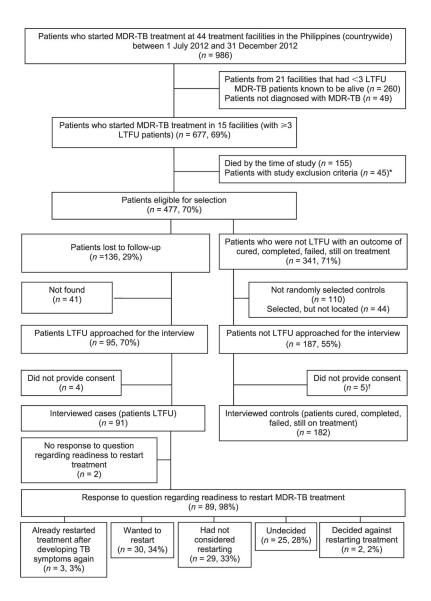
APPENDIX

Figure A.

Study population. * Study exclusion criteria were incarceration, age <18 years, enrollment in pharmaceutical clinical trials, and major psychiatric disorder or physical incapacitation. † Controls who did not provide consent were replaced by other randomly selected eligible patients. MDR-TB = multidrug-resistant TB; LTFU =lost to follow-up; TB = tuberculosis.

Table A

Association of demographic/clinical data and self-reported readiness to restart treatment ($n =$ 86)

Characteristic	Total[*]	Wanted to restart treatment ($n =$ 30) (Col %)[†]	Did not indicate an interest in restarting treatment ($n =$ 56) (Col %)[‡]	OR (95%CI)	P value
Sex					
Male	56	22 (73.3)	34 (60.7)	1.78 (0.67–4.7)	0.24
Female	30	8 (26.7)	22 (39.3)	1.00	
Civil status					
Single, separated, widowed	42	15 (50)	27 (48.2)	1.07 (0.44–2.61)	0.87
Married, cohabiting	44	15 (50)	29 (51.8)	1.00	
Education					
No formal schooling/elementary/ high school	64	21 (70)	43 (76.8)	0.71 (0.26–1.91)	0.49
College/graduate school	22	9 (30)	13 (23.2)	1.00	
Place of residence					
Urban area	25	8 (29.6)	17 (39.5)	0.64 (0.23–1.8)	0.40
Urban slum	45	19 (70.4)	26 (60.5)	1.00	
Rural area	15	3 (13.6)	12 (31.6)	0.34 (0.08–1.38)	0.12
Urban slum	45	19 (86.4)	26 (68.4)	1.00	
Socio-economic level[§]					
Living below the poverty line (Category C)	81	29 (96.7)	52 (92.9)	2.23 (0.24–20.91)	0.47
Living above or at the poverty line (Category A or B)	5	1 (3.3)	4 (7.1)	1.00	
Changes to employment status during anti-tuberculosis treatment[¶]					
Paid employment before starting anti-tuberculosis treatment; had to quit/was too sick to work	34	15 (88.2)	19 (76)	2.37 (0.42–13.46)	0.32
Paid employment before starting anti-tuberculosis treatment; still employed at my job	8	2 (11.8)	6 (24)	1.00	
Paid employment before starting anti-tuberculosis treatment; was fired or asked to take a leave of absence	5	1 (33.3)	4 (40)	0.75 (0.05–11.31)	0.84
Paid employment before starting anti-tuberculosis treatment; still employed at my job	8	2 (66.7)	6 (60)	1.00	
Responses to questions related to employment status at time of interview					
Employed for wages					0.37
Yes	19	5 (16.7)	14 (25)	0.6 (0.19–1.87)	
No	67	25 (83.3)	42 (75)	1.00	
Self-employed					0.005
Yes	17	1 (3.3)	16 (29.1)	0.08 (0.01–0.67)	
No	68	29 (96.7)	39 (70.9)	1.00	

Characteristic	Total[*]	Wanted to restart treatment (*n* = 30) (Col %)[†]	Did not indicate an interest in restarting treatment (*n* = 56) (Col %)[‡]	OR (95%CI)	*P* value
Out of work, and looking for work					0.06
Yes	21	11 (36.7)	10 (17.9)	2.66 (0.97–7.31)	
No	65	19 (63.3)	46 (82.1)	1.00	
Out of work, but not currently looking for work					0.87
Yes	22	8 (26.7)	14 (25)	1.09 (0.4–3)	
No	64	22 (73.3)	42 (75)	1.00	
Homemaker					0.73
Yes	22	7 (23.3)	15 (26.8)	0.83 (0.3–2.34)	
No	64	23 (76.7)	41 (73.2)	1.00	
Student					0.46
Yes	1	0	1 (1.8)	0	
No	85	30 (100)	55 (98.2)	1.00	
Retired					0.29
Yes	2	0	2 (3.6)	0	
No	84	30 (100)	54 (96.4)	1.00	
Unable to work					0.06
Yes	14	8 (26.7)	6 (10.9)	2.97 (0.92–9.59)	
No	71	22 (73.3)	49 (89.1)	1.00	
Financial responsibility in the household					
Head of the household[#]					0.19
Yes	34	9 (30.0)	25 (44.6)	0.53 (0.20–1.37)	
No	52	21 (70.0)	31 (55.4)	1.00	
In charge of the household budget					0.07
Yes	31	7 (23.3)	24 (42.9)	0.41 (0.14–1.10)	
No	55	23 (76.7)	32 (57.1)	1.00	
Financial burden of diagnosis [**]					
Patient or family sold belongings or household items to help pay expenses during anti-tuberculosis treatment					0.57
Yes	26	10 (34.5)	16 (28.6)	1.32 (0.5–3.44)	
No	59	19 (65.5)	40 (71.4)	1.00	
Patient or family borrowed money to cover costs due to TB illness					0.01
Yes	57	22 (91.7)	35 (64.8)	5.97 (1.27–28.18)	
No	21	2 (8.3)	19 (35.2)	1.00	
Number of previous TB episodes					0.35
1	46	14 (46.7)	32 (57.1)	0.66 (0.27–1.62)	
2	40	16 (53.3)	24 (42.9)	1.00	
Outcome of previous TB episode					
Failure					0.51
Yes	18	7 (50)	11 (39.3)	1.55 (0.42–5.63)	
Cured/completed	24	7 (50)	17 (60.7)	1.00	

Characteristic	Total[*]	Wanted to restart treatment (n = 30) (Col %)[†]	Did not indicate an interest in restarting treatment (n = 56) (Col %)[‡]	OR (95%CI)	P value
LTFU					0.14
Yes	13	7 (50)	6 (26.1)	2.83 (0.7–11.51)	
Cured/completed	24	7 (50)	17 (73.9)	1.00	
Unknown					0.88
Yes	29	9 (56.3)	20 (54.1)	1.09 (0.34–3.56)	
Cured/completed	24	7 (43.8)	17 (45.9)	1.00	
New case					0.37
Yes	2	0	2 (10.5)	0	
Cured/completed	24	7 (100)	17 (89.5)	1.00	
Comorbidities[††]					
Diabetes mellitus					0.72
Yes	20	6 (21.4)	14 (25)	0.82 (0.28–2.43)	
No	64	22 (78.6)	42 (75)	1.00	
HIV/AIDS					0.48
Yes	1	0	1 (1.8)	0	
No	83	28 (100)	55 (98.2)	1.00	
Kidney disease					1.00
Yes	3	1 (3.6)	2 (3.6)	1 (0.09–11.52)	
No	81	27 (96.4)	54 (96.4)	1.00	
Other lung disease					0.37
Yes	6	1 (3.6)	5 (8.9)	0.38 (0.04–3.4)	
No	78	27 (96.4)	51 (91.1)	1.00	
Other comorbid conditions					1.00
Yes	6	2 (7.1)	4 (7.1)	1 (0.17–5.82)	
No	78	26 (92.9)	52 (92.9)	1.00	
Risk factors[††]					
Current or past tobacco smoking					0.61
Yes	60	21 (75)	39 (69.6)	1.31 (0.47–3.65)	
Never	24	7 (25)	17 (30.4)	1.00	
Current or past alcohol abuse					0.54
Yes	61	21 (77.8)	40 (71.4)	1.4 (0.48–4.11)	
Never	22	6 (22.2)	16 (28.6)	1.00	
Current or past drug use					0.87
Yes	18	6 (23.1)	12 (21.4)	1.1 (0.36–3.35)	
Never	64	20 (76.9)	44 (78.6)	1.00	

[*] Number of patients with available data or responses for each response category.

[†] Percentages were calculated for columns. The column denominator was 30 unless participants provided a response to a characteristic that was compared with a referent group or data were not available.

[‡] Percentages were calculated for columns. The column denominator was 56 unless participants provided a response to a characteristic that was compared with a referent group or data were not available.

§Data obtained from medical records. Class A indicates individuals living above the poverty line, Class B individuals living at the poverty line, and Class C individuals living below the poverty line. The poverty line was equivalent to a per capita income of 16 841 Philippine peso a year.[1]

¶Of 47 patients who had paid employment before starting treatment, 34 indicated they subsequently 'had to quit' and 5 reported that they had subsequently been 'fired/asked to take leave of absence'.

#Defined as the family member who provided for more than half of household costs in the year before TB diagnosis.[2,3]

**One participant refused to respond to the question regarding selling of household goods, and eight participants refused to respond or did not know the answer to the question regarding money borrowed.

††Data on comorbidities, tobacco use, and alcohol abuse were available for 84 study participants. Data on drug use were available for 82 study participants.

OR = odds ratio; CI = confidence interval; TB = tuberculosis; LTFU = lost to follow-up; HIV = human immunodeficiency virus; AIDS= acquired immune-deficiency syndrome.

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Table 1

Demographic characteristics of MDR-TB patients lost to follow-up whose readiness to restart treatment was assessed ($n = 89$).

	n (%)
Sex	
Male	58 (65.2)
Female	31 (34.8)
Age, years	
<20	4 (4.5)
20–29	18 (20.2)
30–39	15 (16.9)
40–49	30 (33.7)
50	22 (24.7)
Civil status	
Single, separated, widowed	42 (47.2)
Married, cohabiting	47 (52.8)
Education	
No formal schooling/elementary/high school	66 (74.2)
College/graduate school	23 (25.8)
Residence	
Rural area	15 (16.9)
Urban slum	47 (52.8)
Urban area	26 (29.2)
Unknown	1 (1.1)
Socio-economic level	
Living below the poverty line (Class C)	84 (94.4)
Living above or at the poverty line (Class A and B)	5 (5.6)
Employment status	
Unemployed	33 (37.1)
Employed	38 (42.7)
Other (retired, student, disabled, housewife)	12 (13.5)
Unknown	6 (6.7)
Site of disease	
Pulmonary	89 (100)
Extra-pulmonary	0 (0)
Number of previous TB episodes	
None	1 (1.1)
One	45 (50.6)
Two or more	40 (44.9)
Unknown	3 (3.4)

MDR-TB = multidrug-resistant TB; TB = tuberculosis.

Table 2

Association of interview data and self-reported readiness to restart treatment

Characteristic	Total*	Wanted to restart treatment (n = 30) (Col %)†	Did not indicate an interest in restarting treatment (n = 56) (Col %)‡	OR (95%CI)	P value
Patient reported reasons for loss to follow-up during MDR-TB treatment					
Medication side effects or fear of side effects§					0.08
Yes	51	14 (46.7)	37 (66.1)	0.45 (0.18–1.13)	
No	35	16 (53.3)	19 (33.9)	1.00	
Need to work, financial problems					0.38
Yes	21	9 (30.0)	12 (21.4)	1.57 (0.55–4.34)	
No	65	21 (70.0)	44 (78.6)	1.00	
No or insufficient money for transportation to clinic					0.55
Yes	17	7 (23.3)	10 (17.9)	1.40 (0.45–4.20)	
No	69	23 (76.7)	46 (82.1)	1.00	
Difficulty traveling to the treatment center					0.53
Yes	9	4 (13.3)	5 (8.9)	1.57 (0.35–6.67)	
No	77	26 (86.7)	51 (91.1)	1.00	
Behavior of treatment center staff					0.54
Yes	8	2 (6.7)	6 (10.7)	0.60 (0.08–3.04)	
No	78	28 (93.3)	50 (89.3)	1.00	
Patient felt their health had improved and there was no need for further treatment					0.23
Yes	7	1 (3.3)	6 (10.7)	0.29 (0.01–2.10)	
No	79	29 (96.7)	50 (89.3)	1.00	
Distance to the treatment center					0.22
Yes	5	3 (10.0)	2 (3.6)	3.00 (0.42–26.13)	
No	81	27 (90.0)	54 (96.4)	1.00	
Work or school schedule conflicts with treatment center hours of operation					0.52
Yes	4	2 (6.7)	2 (3.6)	1.93 (0.19–19.19)	
No	82	28 (93.3)	54 (96.4)	1.00	
Depression or psychiatric problems during treatment					0.08
Yes	4	3 (10.0)	1 (1.8)	6.11 (0.61–163.5)	
No	82	27 (90.0)	55 (98.2)	1.00	

Characteristic	Total[*]	Wanted to restart treatment (n = 30) (Col %)[†]	Did not indicate an interest in restarting treatment (n = 56) (Col %)[†][‡]	OR (95%CI)	P value
Miscellaneous reasons					0.86
Yes	21	7 (23.3)	14 (25.0)	0.91 (0.31–2.58)	
No	65	23 (76.7)	42 (75.0)	1.00	
Patient rating of their trust in, rapport with, and support from treatment center staff[¶]					
Fair	18	8 (30.8)	10 (21.7)	1.6 (0.51–4.82)	0.39
Good (reference)	54	18 (69.2)	36 (78.3)	1.00	
Poor	14	4 (18.2)	10 (21.7)	0.80 (0.19–2.88)	0.73
Good (reference)	54	18 (81.8)	36 (78.3)	1.00	
TB knowledge (etiology, transmission, treatment) score[#]					
Excellent	5	2 (13.3)	3 (13.6)	0.97 (0.10–7.42)	1.00
Fair (reference)	32	13 (86.7)	19 (86.4)	1.00	
Good	23	8 (38.1)	15 (44.1)	0.78 (0.25–2.41)	0.66
Fair (reference)	32	13 (61.9)	19 (55.9)	1.00	
Poor	26	7 (35.0)	19 (50.0)	0.54 (0.17–1.67)	0.28
Fair (reference)	32	13 (65.0)	19 (50.0)	1.00	
Risk perceptions/expectations					
When you were first diagnosed with TB, did you worry that you would pass TB to your family and friends?					
Never/occasionally	21	6 (20.0)	15 (26.8)	0.68 (0.22–1.99)	0.48
Often	65	24 (80.0)	41 (73.2)	1.00	
Do you worry that your TB will come back?					
Never/occasionally	26	7 (23.3)	19 (33.9)	0.59 (0.20–1.62)	0.31
Often	60	23 (76.7)	37 (66.1)	1.00	
What do you think are your chances you will become sick with TB again?					
None/very little chance	23	4 (13.3)	19 (33.9)	0.30 (0.08–0.96)	0.04
Some	63	26 (86.7)	37 (66.7)	1.00	
In the future, if you have TB again, what are the chances that it may be harder to cure?					
None/very little chance	18	6 (20.0)	12 (21.4)	0.92 (0.29–2.75)	0.88
Some	68	24 (80.0)	44 (78.6)	1.00	

[*]
Number of patients with available data or responses for each response category.

[†]
Percentages were calculated for columns. The column denominator was 30 unless participants provided a response to a characteristic that was compared with a referent group.

‡Percentages were calculated for columns. The column denominator was 56 unless participants provided a response to a characteristic that was compared with a referent group.

§In the Philippines the standardized treatment regimen for MDR-TB comprises pyrazinamide, kanamycin, levofloxacin, prothionamide, and cycloserine; the intensive phase is at least 6 months, the continuation phase lasts for at least an additional 12 months.

¶The interview form contained 22 questions, scored on a 5-point Likert scale that asked patients the extent to which they agreed or disagreed with statements related to trust in, rapport with, and support received from doctors and nurses at the treatment centers. The possible range of points on this scale was 22 to 110. A score of 90–110 was categorized as 'good' as this would result from a patient providing a positive answer to the majority of the questions. A score of 80–89 was categorized as 'fair'. A score of 79 was categorized as 'poor' as this would result from a patient answering in a non-committal or negative manner to the majority of the 22 questions.

#The interview form contained 14 knowledge questions: Excellent = 0–1 questions answered incorrectly; Good = 2–3 questions answered incorrectly; Fair = 4–5 questions answered incorrectly, Poor = 6 questions answered incorrectly.

OR = odds ratio; CI = confidence interval; MDR-TB = multidrug-resistant TB; TB = tuberculosis.

Table 3

Program services to enable treatment adherence available to MDR-TB patients in the Philippines at the time of this study

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- Anti-tuberculosis medicines provided to patients at no cost

- Medications to manage adverse events provided to patients at no cost (limited formulary)

- TB diagnostic tests provided to patients at no cost

- Fixed amount provided for transportation costs (funds provided retrospectively, based upon adherence to appointments)

- Temporary housing located near PMDT treatment centers for patients from rural areas (limited availability)

- 44 PMDT treatment centers located throughout the country, to provide comprehensive MDR-TB services

- Patient education (non-standardized)

- Patient support groups (located within some facilities)

- Food basket incentives (limited availability)

- Small monetary bonus provided to patients at 6, 12, and 18 months, if fully adherent during each 6-month period

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TB = tuberculosis; MDR-TB = multidrug-resistant TB; PMDT = programmatic management of drug-resistant TB.