ORIGINAL ARTICLE

Analysing Sociodemographic Factors: Highlighting Gender in Tuberculosis Treatment and Defaulters

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ABSTRACT

Introduction: : Current tuberculosis (TB) eradication strategies have shifted away from the medical sphere, focusing on a more holistic approach that encompasses both healthcare and social support. This means a greater emphasis on TB prevention strategies, particularly on social determinants of TB. Using a locality in Malaysia as a case study, a research was carried out among 844 TB cases in Pasir Mas, Kelantan (2013 to 2017) to identify the socioeconomic distributions of TB defaulters and its implications for current TB prevention strategies. **Methods:** TB patients' sociodemographic characteristics and treatment outcomes were extracted and analyzed from the Malaysian registry. Pearson's chi-square test was used to determine sociodemographic factors associated with TB defaulters. **Results:** Gender, age and education levels were significantly associated with default treatment ($p<0.05$), highlighting the need to focus on adult male patients with low educational background. **Conclusion:** Results indicate that current national TB management needs to focus on targeting those at increased risk of defaulting by understanding gender-specific challenges to treatment. While more research is needed to explore the gender associated issues related to treatment defaulting, we are also calling for a change in current TB management practices to one that focuses on gender-specific intervention that addresses personal and societal challenges to TB treatment.

Keywords: Defaulter, Gender, Treatment adherence, Tuberculosis

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INTRODUCTION

While the world is still reeling from the effects of the pandemic on society and economy, it is easy to forget the existing disease burden that we have always faced. One such burden is Tuberculosis (TB), a disease that is spread via airborne droplets, commonly affecting the lungs and is causing approximately a million deaths yearly (1). Not only that, it is estimated that 10 million people contract TB each year, and this despite the fact that we are in possession of gold standard treatments which have boasted high cure rates. This begets the question, where have we gone wrong? Even in Malaysia, where TB has since dropped from the number one cause of death in the 1950's to below the top ten causes of death thanks to a very successful implementation of treatment and management program, we are still dealing with thousands of cases each year .

As cited in the local news (2), TB cases in Malaysia are declining, with cases now approximately around 25,000 in 2018. Despite that, Malaysia is still under the classification of intermediate TB burden country, with an estimated TB incidence falling between 80 and 100 cases per 100,000 population (1). Over the last decade, the government has made concentrated efforts to strengthen TB control services in Malaysia and these include efforts in upgrading TB recording and reporting systems as well as reinforcing the network of public health laboratories (3). TB incidence rates, however, showed no signs of being able to meet the target set by the World Health Organization (WHO), that of 90% reduction of TB incidence rate by 2035, as stated in the End TB Strategy report .

While we are so close to achieving the recommended target set by WHO, an issue commonly faced by public health officers in Malaysia is defaulters. Defaulters are those who are "lost to follow-up", such as a TB patient who failed to start treatment or whose treatment stopped for a period of at least 2 months (1). Defaulted patients are at much greater risk of future treatment non-adherence, multidrug-resistance and mortality (4). Treatment

adherence, on the other hand, is "the extent to which patients are able to follow the agreed recommendations for prescribed treatments" (19) which refers to the TB patients who fail to follow the prescribed regimen. Patients who defaulted also have a higher rate of smear-positive TB when tested again, which is indicative of high risk transmission to the surrounding population, especially in high-burden settings (5). Clearly, poor treatment adherence is a major obstacle that prevents us from accomplishing the goal of TB control programs. Not only that, defaulters or non-adherence to TB treatments are commonly associated with several factors which includes patients with low-income, history of alcoholism, HIV, being male and homeless as well as low level of knowledge and interest towards treatment (6); and since treatment default possesses a high possibility to acquire drug resistance due to inadequate treatment time (6), overcoming the problem of defaulting becomes even more critical.

Based on the Clinical Practice Guidelines released specifically by the Malaysian Ministry of Health for TB Management (3), TB disease is treated with a combination of drug regimen such as isoniazid, rifampin, ethambutol and pyrazinamide for 6-8 months, but only if it is a non-drug resistant TB. Drug resistant TB, however, makes the treatment process more challenging, as it requires a combination of 4-6 drugs for 18-24 months; and requires close management by a trained specialist. The long duration of TB treatment presents a challenge to ensure that it is followed. Additionally, current TB eradication strategies have shifted away from the medical sphere, focusing on a more comprehensive (7) approach that encompasses healthcare, intensive prevention programmes, governmental as well as social support. This means more effort is needed to not only ensure that TB patients receive the most optimal healthcare, but also that potential TB patients are identified or transmission curbed and that social support is available in order to allow them to be a functioning part of the community. Therefore, as part of the effort to initiate a holistic approach to TB, we start by analysing treatment outcomes to identify groups that are vulnerable to defaulting. Using Pasir Mas, Kelantan as a case study, TB treatment data from 2013 and 2017 is analysed and investigated to identify the sociodemographic patterns associated with defaulters in Pasir Mas.

MATERIALS AND METHODS

This was a retrospective case study of all TB patients notified in Pasir Mas between 2013 and 2017, based on registered information in Malaysian National TB Surveillance Database. According to the Malaysian Law, under Act 342: Prevention and Control of Infectious Disease , each TB case must be notified(8). Diagnosis of TB in Malaysia is carried out via medical imaging and laboratory tests, apart from identification of Mycobacterium tuberculosis from patients' sputum (9). Once diagnosed with TB, patients' information, such as sociodemographic characteristics, comorbidities and other relevant medical history, as well as their TB disease condition throughout the treatment period is recorded. All TB patients are also screened for diabetes mellitus (DM) and human immunodeficiency virus (HIV) infection. The data are then recorded and reported for every individual TB patient into the national TB registry surveillance database by the health inspector of the respective District Health Office who received the notification report.

Treatment outcomes are recorded at one year surveillance and classified based on WHO reporting guidelines (10) as either treatment success, failure, death, loss to follow-up and not evaluated. "Treatment success" or favourable treatment outcomes are cases that have been confirmed cured by negative-culture at completion of treatment and on at least one previous occasion, or those who completed the treatment without failure. The other outcomes (treatment failure, death, lost to follow-up and not evaluated) reflects unsuccessful or unfavourable treatment. "Death" refers to a TB patient who died for any reason before starting the treatment. "Treatment failure" describes a TB patient with positive-culture at 5 months or later during the treatment. TB patients who did not start the treatment, or the treatment was interrupted for at least two consecutive months is classified as "lost to follow-up" or default treatment, the criteria used to define defaulters cases in this study. "Not evaluated" refers to TB patients with no assigned treatment outcome including cases that are transferred out to another treatment and those with unknown treatment outcomes. This includes TB patients who are unable to be contacted and moved to other countries.

Data was analyzed using SPSS statistical software package, version 22.0. Sociodemographic data of TB patients and the outcomes of their treatment were descriptively analyzed. Pearson's chi-squared test was used to determine the associations between selected sociodemographic variables with the outcomes of interest (default cases). P-value and confidence interval (CI) were set at <0.05 and 95%, respectively. Patient names were anonymised to ensure confidentiality. This study has been approved by the Medical Research and Ethics Committee (MREC), Ministry of Health, Malaysia [NMRR-20-2358-54328 (IIR)].

RESULTS

Between 2013 to 2017, Pasir Mas district had registered 844 TB cases in the national TB surveillance database (myTB). Once cases were excluded based on the exclusion criteria in Table I, the final iteration is 708 confirmed TB cases with verified treatment outcomes at one-year surveillance. Table II summarizes the sociodemographic characteristics of the TB patients in the course of 5 years. The majority of TB patients

Table I: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
• All TB patients registered in Pasir Mas, Kelantan between 2013 and 2017	• Cases categorized as "change of diagnosis" • Cases categorised as "unable to be contacted" • Cases with unknown treatment outcome • Patients who died during case investigation or treatment • Patients who have moved out of the locality during case investigation or treatment

were male (n=445, 62.85%) aged between 45-54 years (n=138, 19.49%), of mainly Malay ethnicity (n=692, 97.74%). Of these, 91.67% (n=649) were living in rural areas, with the majority not having a fixed monthly income (n=641, 90.54%) and more than half received only secondary education (n=466, 65.82%).

In all, 583 patients (82.34%) had a successful treatment outcome while 125 patients (17.66%) defaulted from the treatment. Default treatment cases were dominated by male patients (n=93, 74.40%) with the age between 35 and 44 years (n=35, 28.00%). Majority of the defaulters had only had secondary education (n=95, 77.60%), no fixed monthly income (n=117, 93.60%), and were living in rural areas (n=116, 92.80%). Table III showed the results from chi-square analysis on sociodemographic factors associated with the treatment outcomes. Analysis indicated that significant factors are gender (p=0.003), age (p=0.002) and education levels (p=0.01).

Table II: Sociodemographic characteristics of the study population (n=708)

Characteristic	Total *n*=708, *n* (%)
Gender	
Male	445 (62.85)
Female	263 (37.15)
Age groups, years	
0-14	10 (1.41)
15-24	106 (14.97)
25-34	101 (14.27)
35-44	117 (16.53)
45-54	138 (19.49)
55-64	135 (19.07)
Above 64	101 (14.27)
Ethnicity	
Malay	692 (97.74)
Chinese	11 (1.55)
Others	5 (0.71)
Education Level	
No formal education	91 (12.85)
Primary school	56 (7.91)
Secondary school	466 (65.82)
Form 6 / Certificate / Diploma	65 (9.18)
Degree	30 (4.24)
Fixed monthly income	
Yes	67 (9.46)
No	641 (90.54)
Location of residence	
Urban	59 (8.33)
Rural	649 (91.67)

DISCUSSION

Analysis indicated that education level is a significant factor for TB patient defaulting, where those with secondary level education and below are the ones that most often default. This result, while not exactly the same, is somewhat consistent with research carried out in other

Table III: Associated factors with default cases in Pasir Mas, Kelantan (n=708)

Variable	Successful treatment outcome *n=583, n* (%)	Default cases *n=125, n* (%)	X^2	*p*-value
Gender			8.669	0.003*
Male	352 (60.38)	93 (74.40)		
Female	231 (39.62)	32 (25.60)		
Age groups, years			20.055	0.002*
0-14	9 (1.54)	1 (0.80)		
15-24	94 (16.12)	12 (9.60)		
25-34	80 (13.72)	21 (16.80)		
35-44	82 (14.07)	35 (28.00)		
45-54	113 (19.38)	25 (20.00)		
55-64	115 (19.73)	20 (16.00)		
Above 64	90 (15.44)	11 (8.80)		
Ethnicity			1.733	0.420
Malay	571 (97.94)	121 (96.80)		
Chinese	9 (1.54)	2 (1.60)		
Others	3 (0.51)	2 (1.60)		
Education Level			13.105	0.01*
No formal education	75 (12.86)	16 (12.80)		
Primary school	52 (8.92)	4 (3.20)		
Secondary school	369 (63.29)	97 (77.60)		
Form 6 / Certificate / Diploma	60 (10.29)	5 (4.00)		
Degree	27 (4.63)	3 (2.40)		
Fixed monthly income			1.663	0.197
Yes	59 (10.12)	8 (6.40)		
No	524 (89.88)	117 (93.60)		
Location of residence			0.005	0.945
Urban	50 (8.58)	9 (7.20)		
Rural	533 (91.42)	116 (92.80)		

*p-value was significant at 0.05.

parts of the world, such as Namibia (20) and Portugal (21) where TB defaulters are found to be significantly associated with those who are from much lower social class or socioeconomic background. In fact, Endjala et. al. (20) highlighted that TB treatment defaulting cannot be attributed to a single factor, but must also take into consideration other cultural, community, family and religious factors, none of which was taken into account in our research. Not only that, this highlights a possible inequality and social justice issue, as poor socioeconomic status, or even poor education, should not prevent a person from getting access to treatment or a positive treatment outcome. In this, however, we believe a more in-depth study should be carried out to better understand the Malaysian context.

Regardless, what we found most interesting is that the significant majority of the TB defaulters are adult male, a phenomenon that has been similarly observed in other research that focused specifically on TB treatment adherence (11-14). Interestingly, recent studies indicated that treatment adherence to other types of illness seems to be more of a problem associated with the female gender, as indicated in the study on treatment post-myocardial infarction (15) and cardiovascular treatment programmes (16). For TB, it seems, men are more at risk for defaulting treatment and this has been highlighted in studies carried out in Asia (11, 13) Africa (12, 20) and even Europe (21).

This highlights the question, why men? One research indicated that patient-provider trust may play a part. According to Govender (17), it is critical for healthcare providers and health institutions to understand patients' need beyond the illness itself, and this include access to social support, which is important in building trust and subsequently affects adherence to treatment. Does this mean that men require more work towards building patient-provider trust? In this referenced research carried out in South Africa, men - it seems - found that healthcare facilities are not able to accommodate the challenges they faced as household head and income-provider (17). Male patients tend to focus more on daily life rather than completing TB treatment, including the need to continue to work in order to financially support their family. Not only that, the fact that the defaulters in Pasir Mas are also those with poor education and mainly with no fixed income, indicates that future treatment programmes need to address this challenge first.

Previous research has highlighted that gender plays a larger role in TB treatment and diagnosis (22). While the aforementioned research focused on access to treatment rather than treatment adherence, it does highlight the issue of societal gender values that could affect the way different genders are viewed in terms of health care. Societal gender values, or social construction of gender, refers to specific gender roles played by both male and female, which affects how one is perceived or how one reacts to certain social situations (23). For instance, how gender affects one's access to and perception towards TB treatment (22). Another research by Mason et. al (24) stresses gender itself has received very little attention in TB research and disease control programs, despite the fact that males and females have different risk factors and require different pathways to TB treatment. Not only that, the authors also stress the idea of social construction of gender and explicitly stated that male TB patients are at higher risk of defaulting (24).

However, it is equally important to note that treatment adherence and the processes that promote or work against it are extremely complex, and as mentioned earlier, defaulting and non-adherence must also take into account other factors, and should not be explained solely as a function of gender (18). In the recent study by Tok et. al, the authors had also suggested that a more in-depth qualitative discussion is needed to explore the problem of defaulters (14), which we wholeheartedly agree. Nevertheless, we believe if TB eradication is to be attained, the focus should not be on more research, but rather a different, more gender-specific approach to treatment is needed, especially if trust between healthcare provider and patient is critical to ensure adherence. However, the question remains, how do we do that?

CONCLUSION

TB treatment programmes are a critical part of TB eradication. However, challenges arise when TB treatment alone is inadequate in eliminating and eradicating TB incidences. With over five decades of TB treatment experience, the fact that Malaysia has managed to reduce the incidence of TB must be applauded. Despite that, it is not enough. More effort must be put to understand how we can integrate the current treatment program with other elements that added value to the current efforts. Gender, it seems, are the critical element that we could focus on. Men's role, for instance, as head of household and provider may perhaps prevent them from focusing on their treatment and health, which could lead to defaulting. However, these are mere suppositions, which means more in-depth study is needed to better understand this phenomena as well as to suggest holistic and gender-specific interventions. This study, therefore, highlights the immediate need for a restructuring of Malaysia's current intervention strategies that are gender-specific, targeting those who are at high risk of default treatment, as well identify the best practice for the retreatment of non-compliant TB patients.

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