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Socio-demographic Factors Associated with Treatment Initiation Delays among Tuberculosis Patients in Namibia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Delayed tuberculosis (TB) treatment increases the rate of spread of the bacilli in the community and mortality rates. Rapid diagnosis and early TB treatment initiation are crucial to successful outcomes and delays affect TB control programs. In Namibia, there is a paucity of data

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on the demographic factors affecting TB treatment initiation since GeneXpert MTB/RIF (Xpert) assay was introduced in 2017.

Methods: This was a descriptive cross-sectional retrospective study conducted at Katutura Hospital TB clinic from 1st July 2018 to 31st March 2019. A total of seventy-two (72) participants comprising twenty-five (25) rifampicin resistant-TB (RR-TB) and forty-seven (47) non- RR-TB adult patients were enrolled using consecutive sampling. Patients' medical records, Xpert results and a questionnaire were used to collect data. The data were analyzed using Stata statistical software version 12. Association between socio-demographic factors and treatment initiation delays were established using logistic regression analysis.

Results: Staying with a TB patient (AOR=17.22, 95% CI: 2.29-129.773), employment status (AOR=1.23, 95% CI, 002-129), previous TB treatment (AOR=2.19, 95% CI: 0.076-0.86) and being HIV positive (AOR= 1.23, 95% CI: 0.0034-057) were the socio-demographic factors that were significantly associated with treatment initiation delays. Treatment initiation delay median time at Katutura Intermediate Hospital TB Clinic was 10 days (IQR: 1-32) and 3 days (IQR: 0-12) for RR-TB and non- RR-TB respectively.

Conclusion: The prolonged treatment initiation delays among HIV positive RR-TB patients might be due to low adherence to HIV care interventions. Staying with a household TB patient and those who were previously treated for TB were also associated with treatment initiation delays. Poor health systems infrastructure and stigma could be the determinants of this delay in these groups. An integrated family-based approach to TB and HIV care involving health care workers can mitigate TB treatment delays post-diagnosis. Further studies should explore the factors associated with late initiation to second-line treatment from a community perspective. Lastly, there is a need to assess the cost-utility of bedaquiline and delamanid drugs roll-out in Namibian health care in comparison with the standard treatment.

Keywords: Socio-demographic; Rifampicin resistant TB; treatment initiation; Genexpert MTB/RIF assay; cross-sectional study.

ABBREVIATIONS

ART : Antiretroviral Therapy;
CBTBC : Community-Based Tuberculosis Care;
CDC : United States Centre for Disease Control and Prevention;
DOTS : Directly Observed Treatment – Short Course (WHO strategy);
DR-TB : Drug Resistant Tuberculosis;
ENT : Ear Nose and Throat;
HIV : Human Immunodeficiency Virus;
IQR : Inter quartile range;
KNCV : Koninklijke NederlandseCentrale Vereniging (Royal Dutch Tuberculosis Association);
MDR-TB : Multi-Drug-Resistant Tuberculosis;
MoHSS : Ministry of Health and Social Services;
MSH : Management Sciences for Health;
NGO : Non-Governmental Organization;
NIP : Namibia Institute of Pathology;
NTLP : National Tuberculosis and Leprosy Programme;
OPD : Out-Patients Department;
OR : Odds ratio;
PEPFAR : President's Emergency Plan for AIDS Relief ;
RR-TB : Rifampicin Resistant Tuberculosis;
USAID : The United States Agency for International Development;
SEM : Social Ecological Model;
WHO : World Health Organization;
XDR : Extremely Drug Resistant Tuberculosis.

1. INTRODUCTION

Globally, tuberculosis is the major single infectious agent cause of deaths surpassing HIV and AIDS [1]. TB mortality rates are high in HIV-negative patients compared to HIV- positive people. In 2017, WHO [1] estimated that 1.3 million and 300 000 deaths occurred among HIV-

negative and positive people respectively. Worldwide, males are at a higher risk of developing TB disease compared to women and children. The estimate by WHO [1] is that of the 10 million people who developed TB in 2017, 5.8 million were males, 3.2 million being women and 1 million were children. Namibia is one of 30 high TB burden countries in the world based on the TB incident cases per 100 000 population per year [1].

Drug-resistant tuberculosis (DR-TB) continues to be a major burden to worldwide TB control. The [1] states that in 2017, more than half a million people developed TB that was resistant to rifampicin (RR-TB), which is currently the most effective first-line TB drug used globally. The [1] avers that among these patients with RR-TB, 82% had multi-drug resistant TB (MDR-TB) TB That is resistant to first line drugs-isoniazid and rifampicin whilst extensively drug resistant (XDR-TB) is MDR-TB that is also resistant to the second line injectable regimens (e.g. kanamycin, capreomycin) and fluoroquinolones [2]. Treatment outcomes of MDR-TB patients are poor due to delays in diagnosis and/or treatment with ineffective regimens [2]. Some diagnosed MDR-TB patients delay are never enrolled for treatment allowing for amplification of resistance and continued transmission. The effect on patients is profound, as reports suggest that drug-resistant tuberculosis is associated with higher morbidity than drug-sensitive tuberculosis [3].

Namibia recently rolled-out real-time polymerase chain reaction (PCR)-based automated Xpert assay for rapid TB and RR-TB diagnosis directly in clinical specimens. According to the country's Ministry of Health and Social Service's [4] new TB diagnostic algorithm, "all patients with symptoms suggestive of TB undergo bacteriological examination and health workers must complete the necessary demographic and clinical information". The MoHSS hopes to minimize unnecessary, inappropriate and costly repeat testing while reducing the time to treatment initiation for patients with TB, including drug resistant-TB.

Significant improvement in early TB diagnosis and treatment are major milestones of global TB control strategies and programs especially in high burden countries including Namibia. However, a myriad of factors has been attributed to delays in commencing on anti-TB treatment in different settings. For instance, Seid et al. [5] reported these factors as being an extra-pulmonary TB patient, the difference in geographical location, types of health facility, low level of awareness about TB and the consultation patterns among different practitioners. It was further identified that TB diagnosis and treatment initiation delay time and associated socio-demographic factors vary from one country to another, different health systems and between population groups [5]. Thus, the need for studies to investigate population-based socio-demographic factors contributing anti-TB treatment initiation delays is relevant in the context of Namibia where medications, hospital fees, laboratory and radiological investigations for diagnosis of TB are provided free-of-charge [6].

The current study adopted the Social Ecological Model (SEM) in design and conduct. SEM is a methodological framework employed in studies in social sciences to elucidate the association between individuals and their interaction with various levels of the social environment [7]. Subsequently, the ecological perspective relates to the presence and influence of the environmental factors at different stages like the family, organization, community and the nation at large. These factors have an impact on individuals' behaviours and their fight against external factors like diseases. In the context of TB, individual-level factors relate to biological factors like the strength of the immune system, the personal history of TB infection and treatment. Relationship level factors are intrinsic factors which allow individual contact with others which may influence decisions to seek health care, initiate treatment and adhere to anti-TB therapy [7]. At the community level, influences of the school, workplace and neighbourhoods contribute to social relationships which have a bearing on one's decision to seek health care from various practitioners like faith healers, traditional healers and healthcare workers. The societal level is the broadest encompassing variables such as social, educational, economic and health policies as well as social and cultural norms [7]. In TB disease, this may relate to diagnosis algorithms, treatment guidelines, case finding initiatives, surveillance studies, capital and human resource allocation, societal customs and norms which might influence the decision to get tested and initiate treatment [8]. In Namibia, these factors have not yet been documented to any meaningful extent necessitating this retrospective study to delineate socio-demographic influences to TB treatment initiation delays which may have untoward outcomes in

TB patients and possible continued transmission of the disease. An adequate understanding of these factors is crucial for the formulation of appropriate public health interventions for reducing TB morbidity and mortality and also reducing the incurred costs associated with MDR-TB emerging infection. MDR-TB is expensive to treat and there is an increased risk of transmission to health-care workers.

2. METHODS

2.1 Study Design and Setting

A descriptive cross-sectional retrospective study was carried out among TB patients with RR-TB and non-RR-TB at Katutura Intermediate Hospital TB clinic and its outpatient's department (OPD). Katutura Intermediate State Hospital is one of two state referral hospitals in the Windhoek area of the Khomas Region. Being an intermediate hospital, it receives referrals from district hospitals and provides tertiary and secondary health services. These referrals include: respiratory and lung problems, gynaecology, obstetrics, cardiology, neurology, haematology, endocrinology, surgery, diabetes and hypertensive patients, oncology, paediatric surgery, orthopaedics, ear nose throat (ENT) services, neurology and renal patients [6]. Others include rehabilitation, pathology and medical engineering services. RR-TB patients were admitted in male and female TB isolation wards at the TB clinic whereas drug susceptible TB patients were drawn from TB general wards as well as those visiting the outpatient's department.

The hospital is state-assisted serving an urban and peri-urban population whilst USAID, KNCV Tuberculosis Foundation, CDC Namibia and Global Fund provide technical and financial support. Management of Science for Health (MSH) is a USAID funded international NGO providing practical assistance on pharmaceutical management, maintenance of the online recording and reporting system for DR-TB cases [4]. The TB Clinic also provides antiretroviral therapy (ART) services with support from the President's Emergency Plan for AIDS Relief (PEPFAR). ART is offered according to the Namibian HIV guidelines [4].

2.2 Sampling and Sample Size

Medical records for all RR-TB and non-RR-TB patients admitted at Katutura Hospital TB Clinic and OPD constituted the sampling frame of the study. Consecutive sampling technique was used and all eligible patients were part of the sample. In consecutive sampling, each consecutive eligible patient who was admitted or present for care at OPD was approached, and informed consent was sought and obtained for enrollment. The maximum period for data collection was from 1 July 2018 to 31 March 2019. Using G*Power 3.1 at medium effect size 0.15 [9], the margin of error of 0.05 and a two-sided 95% CI, the minimum sample size required for the study using linear multiple regression analysis was 65 participants with a statistical power of 0.80. However, this study enrolled 72 participants comprising 25 RR-TB patients and 47 non-RR-TB patients. This sample size allowed the researcher to utilize multivariate analysis to investigate multiple factors.

Treatment initiation delay time was the dependent variable whereas the diagnosis of TB, socio-demographic factors and RR-TB and non-RR-TB treatment were independent variables. Age was regarded as a continuous variable with a range of 21-65 years. Gender was regarded as a dichotomous variable (male = 1 and female = 2).

2.3 Study Procedures

Participants were identified using the Katutura Intermediate Hospital's TB clinic treatment register and Xpert tests are done after January 2017. Patients were diagnosed at the Namibia Institute of Pathology (NIP) laboratories in Hardap, Khomas. Otjozondjupa, Ohangwena, Kavango East, Erongo and Oshana Regions. The TB clinic provides MDR-TB treatment and receives patients referred by the various healthcare centres from rural and urban Namibia. For eligible participants, data were extracted on age, gender, TB history, level of education, marital status, consulting traditional healers, employment status, annual household income, HIV status, contact with MDR-TB patients, smoking, alcohol consumption, treatment history and Xpert results. The initial structured questionnaire was adapted from WHO and prepared by reviewing similar literature [10,11]. A literature review on socio-demographic factors associated with treatment initiation delays was conducted to provide an initial basis for selecting items to be included in the questionnaire. Thereafter, the SEM provided the framework for questionnaire construction. The lead researcher and trained data assistant collected information from the study participants using a pre-tested questionnaire through a face-to-face interview.

All the information from interviews was verified by looking through the patient's case notes and their TB treatment card. The questionnaire was assessed to increase the level of content validity after verification by TB research experts from MoHSS and TB clinic. This was done before the questionnaire being administered to a larger sample. Lastly, treatment delays were calculated as median days from Xpert TB diagnosis to treatment initiation. WHO recommends that TB treatment must be initiated immediately after diagnosis.

Patients with Xpert results, available medical records, willing to participate in the study and 21 years and above were eligible for the study. Participants with Xpert tests done before 2017 and those who were not willing to participate in the study were excluded.

2.4 Statistical Analysis

Patient's socio-demographic data collected from the questionnaire and clinical records were coded and double entered on a Microsoft Excel (2015) spreadsheet. A double-entry template was adopted and data was validated through a series of logical checks. This data was cleaned for errors and analyzed using Stata statistical software version 12 (StataCorp LP, TX, USA). Descriptive statistics were generated where categorical data were presented as frequency and percentages. Data for treatment initiation delays were summarized as median and interquartile range. Associations between social-demographic characteristics and treatment initiation delays among TB patients were evaluated using both univariable and multivariate logistic regression models. Univariable logistic regression was carried out to evaluate crude associations between socio-demographic factors and delays to treatment initiation.

A Hosmer-Lemeshow approach where all variables with p-value<0.05 in the univariable logistic regression are included in the initial multivariable model together with variables deemed to be clinically important was used. Backwards hierarchical stepwise regression was then used to drop variable which was not significant in the multivariable logistic regression model. At the end of the iterative process of removing, refitting and verifying until the *p*-values of the remaining variables did not change by more than 15% (indicating no evidence of confounding), the final model contained significant covariates. Results were presented as odds ratios (ORs) and 95% CIs.

3. RESULTS

The study included 25 RR-TB and 47 non-RR-TB patients from Khomas, Hardap, Otjozondjupa, Ohangwena, Kavango East, Erongo and Oshana Regions in Namibia. Almost an equal number of males (54.2%) and females (45.8%) were included in the study. Mean age of the participants was 35 years and most (76.4%) of the respondents had an annual income of less than N$ 20 000 with 62.5% being unemployed. More than 2 out of 3 (69.4%) of the participants were single and were staying with household TB patients. About half (54.2%) of the participants were HIV positive and more than 9 out of 10 (94.9.2%) of HIV positive respondents were on cotrimoxazole prophylaxis treatment or antiretroviral treatment.

In this study, about two thirds (66.7%) of the participants consumed alcohol. More than half (55.5%) of the interviewees were smokers who had their TB and RR-TB diagnosis done at a primary health facility. About two thirds (66.7%) of the participants reported that time taken to reach the health facility was less than 30 minutes and about 6 out of 10 (62.5%) averred that the distance from the health facilities was less than 5km. However, transport to the health facilities was not a barrier to health-seeking behaviour as 90.3% of the participants reported that transport was available. More than half (56.9%) of the participants were new cases and most (62.5%) reported one health care visit before diagnosis. Details of socio-demographic and clinical characteristics are shown in Table 1.

Using univariate logistic regression analysis, it was revealed that TB treatment delays were not associated with marital status, health care visits before diagnosis, time is taken to reach a health facility, visited a pharmacy, visited a faith healer, alcohol intake, visited a private practitioner, distance from the health facility and residence. These variables were left out of the final model.

The following variables were included in the multivariate analysis: Smoker (COR= 1.90, 95% CI: 0.005-0.83), HIV status (COR=1.1, 95% CI: 0.0008-0.80), Staying with a TB household member (COR=53.9, 95% CI 3.4-865.5), Employment status (COR=1.46, 95% CI: 0.26-8.09) and previous TB treatment (COR= 2.11, 95% CI: 0.068-0.96).

Patient characteristics such as employment status and previous TB disease exposure, income, place of residence and diagnostic facility and education were left in multivariate analysis assuming that these variables may influence choice to initiate treatment as observed by other workers [12,13,14,15]. These variables were left in the model regardless of statistical significance.

For the final multivariable model, the study finds out that staying with a TB patient (AOR=17.22, 95% CI: 2.29-129.773), employment status (AOR=1.23, 95% CI, 002-129), previous TB treatment (AOR=2.19, 95% CI: 0.076-0.86) and being HIV positive (AOR= 1.23, 95% CI: 0.0034-057) were socio-demographic factors that were significantly associated with treatment initiation delays.

Table 1. Socio-demographic and clinical characteristics of RR-TB and non RR-TB patients at Katutura Intermediate Hospital (Total n=72)

Characteristic	N	%
RR-TB	25	65.28
TB	47	34.72
Gender		
Male	39	54.17
Female	33	45.83
Age (years)	Mean=34.9722	SD=9.3823
Annual income (N$, 000)		
≤ 20	55	76.39
>20	17	23.61
Marital status		
Married	13	18.06
Single	50	69.44
Divorced	2	2.78
Windowed	4	5.56
Co-Habiting	3	4.17
Staying with a TB patient		
Yes	22	30.56
No	50	69.44
Education		
No education	10	13.89
Primary	32	44.44
Secondary	22	30.56
More than Secondary	8	11.11
Employment status		
Formal	7	9.72
Informal	20	27.78
Unemployed	45	62.50
HIV Status		
Positive	39	54.17
Negative	31	43.06
Unknown	2	2.78
HIV + VE patient on CPT/ART prior to TB treatment		
Yes	37	94.9
No	2	5.1
Residence		
Semi-Urban	39	54.17
Rural	31	43.06
Urban	2	2.78
MDR TB patient past exposure		
Unknown	60	83.33
MDR-TB	10	13.89
Contact		

Characteristic	N	%
Occupational Exposure	2	2.78
Previous TB infection		
No previous TB	38	52.78
1 episode	20	27.78
2 episodes	10	13.89
3 episodes	4	5.56
Visited a pharmacy: Took self-medication		
Yes	12	16.67
No	60	83.33
Visited traditional healer		
Yes	9	12.50
No	63	87.50
Visited private practitioner		
Yes	3	4.17
No	69	95.83
Visited a faith healer		
Yes	8	11.11
No	64	88.89
Health care visits prior to diagnosis		
One	45	62.50
Two	12	16.67
Three	5	6.94
≥ Four	10	13.89
Time taken to reach health facility		
< 30 minutes	48	66.67
30-60 Minutes	18	25.00
61-120 Minutes	5	6.94
>120	1	1.39
Alcohol intake		
Yes	48	66.67
No	24	33.33
Smoker		
Yes	40	55.56
No	32	44.44
Diagnostic facility		
Primary health care	53	73.61
Secondary Hospital	7	9.72
Tertiary Hospital	7	9.72
TB hospital	5	6.94
Distance (Km) to the nearest health facility		
< 5 kms	45	62.50
6-16kms	25	34.72
16-30 kms	2	2.78
Transport		
No	65	90.28
Yes	7	9.72
Previous Treatment history classification		
Initial treatment failure	1	1.39
Retreatment Failure	26	36.11
New	41	56.94
Relapse	4	5.56

Table 2. Univariate logistic regression analysis on socio-demographic data associated with TB treatment initiation delays (Total n=72)

Variables	Crude Odds Ratio	95% Confidence Interval
Smoker	1.90	0.005-0.83
Previous TB disease	0.34	0.11-1.00
HIV	1.70	0.0008-0.80
Age	0.20	0.97
MDR-TB exposure	0.65	0.15-2.90
Gender	0.06	0.22-16.90
Staying with a TB patient	53.90	3.35-865.46
Employment status	1.46	0.26-8.09
Annual income	3.23e-11	0-.
HIV on ART treatment	4.28e+09	0-.
Visited a traditional healer	0.41	0.008-21.80
Diagnostic facility	0.26	0.75-5.93
Previous Treatment history classification	2.91	0.068-0.96

Table 3. Final multivariate logistic regression analysis on socio-demographic data associated with TB treatment initiation delays (Total n=72)

Predictors	Adjusted Odds Ratio	95% Confidence Interval
Smoker	0.19	0.30-1.27
Previous TB Disease	0.55	0.30-1.04
Income	0.14	0.18-1.13
HIV Status	1.44	0.0034-0.57
Employment status	1.23	0.002-1.29
Staying with a TB patient	17.22	2.29-129.77
Diagnostic Facility	0.19	0.93-5.13
Previous Treatment History	2.19	0.076-0.86

Table 4. Treatment initiation delay after Xpert diagnosis (n=72)

	Median		IQR*	
	RR-TB	Non-RR-TB	RR-TB	Non-RR-TB
Treatment initiation delay (days)	10	3	1-32	0-12

*Key: *IQR: Inter-quartile range*

4. DISCUSSION

Treatment initiation delays for RR-TB was 10 days and 3 days for drug-susceptible TB. The study demonstrated that staying with a household TB patient, previously treated for TB and those co-infected with HIV experienced more delays for initiation of treatment. This suggests that TB control practices are failing to reduce transmission between close contacts among RR-TB compared to non-RR-RB patients. The Social-Ecological Model is very crucial in understanding the interrelationship between the variables as they occur at intrapersonal, patient-provider relationship and family network levels [7]. Staying with TB patients implies more exposure to TB bacilli, increased family responsibilities and socio-economic hardships among the employed could have prevented the participants from commencing treatment post-diagnosis. Another rationale could be an inadequate understanding of the laboratory testing process and misplaced perception of TB risk by both patients and clinicians.

Since HIV and TB services are integrated into Namibia, HIV positive TB patients and those who previously had been treated were expected to have greater awareness regarding TB. These patients have easier access to health care due to their links with HIV clinics. The prolonged treatment initiation delays in this group might be attributed to low adherence to HIV care interventions. This indicates that there might be resistance in health-seeking behaviour among this group possibly driven by factors like a

stigma. Another plausible explanation may be long waiting times to appointments regardless of them being linked to secondary and tertiary health care facilities. In a recent study, Amukugo and Nangombe [16] identified challenges within health facilities in MoHSS. The study revealed challenges with public health system infrastructure and patient safety in Namibia. This can fuel treatment initiation delays observed in the current study.

The findings of the current study correlate with [17] who investigated the association between the anti-TB treatment delay and treatment outcomes. Higher risk of unsuccessful outcome was observed among those who initiated treatment beyond 30 days onset, HIV co-infection and those who received treatment at hospitals. The current study revealed that HIV positive TB patients who have a previous history of anti-TB treatment experienced more delays and hence greater risk of unsuccessful treatment. Comparably, Seid et al. [5] assessed the length of delays and analyzed predictors of treatment initiation delays among newly diagnosed TB patients in Dessie City, Northern Central Ethiopia. Having more than three family members, previous treatment history and a household TB patient was an independent predictor of health systems delay.

In contrast, van de Water et al. [18] examined treatment MDR-TB initiation delays by age using a prospective cohort study. The study evaluated respondents aged 13 years or older nested within a cluster-randomized trial in 2 South African provinces. The study also concluded that neither patient's socio-demographic characteristics (like age, sex, prior TB history, HIV status) nor health system characteristics (province) were associated with treatment initiation per guidelines. However, geographical location (urban/rural) significantly delayed MDR-TB treatment initiation. Our study was retrospective in design whilst van de Water and colleagues' study was prospectively conducted.

In South Africa, [19] determined the percentage of participants' diagnosed with rifampicin-resistant (RR-) TB who commenced treatment in the City of Johannesburg (COJ) after the introduction of decentralized RR-TB care in 2011. Their study concluded that despite decentralized RR-TB treatment, less than half the patients diagnosed in COJ initiated appropriate treatment. Evans and colleagues [19] excluded socio-demographic variables like HIV status, travel time, travel cost and previous history of TB which formed the bedrock of our study. Thus, misclassification could have occurred as RR-TB may be MDR-TB or pre-XDR-TB.

In Myanmar, Wai *et al*. [8] assessed whether the community-based MDR-TB care (CBMDR-TBC) project's support improved treatment initiation in 33 townships. After adjusting other potential confounders (age, gender, HIV, previous TB treatment), patients receiving support had 80% higher chance of initiating treatment when compared to patients not receiving support. Additionally, age (15-54 years), previous history of TB and being HIV negative were independent predictors of treatment initiation. Therefore, the study demonstrated that receiving support under CBMDR-TBC project improved treatment initiation. Most importantly, the socio-economic support received by MDR-TB patients improved the proportion initiated as well as reducing time to treatment initiation. Thus, this study emphasizes the there is a need to track all diagnosed patients as early as possible to prevent/reduce delay in treatment.

Finally, it is noteworthy to mention that Delamanid and bedaquiline are currently used at Katutura TB Clinic for patients with resistance to both injectables and fluoroquinolones. In their study, Schnippel *et al*. [20] reveal that new bedaquiline-based treatment regimens are attributable to a significant decrease in deaths among patients with drug-resistant TB, compared with the standard treatment. Based on these findings, patients with MDR-TB in South Africa, now receive life-changing treatment with bedaquiline. This is the first country to replace painful and toxic TB injectables. The roll-out of bedaquiline is crucial as it replaces old treatment options which consist of injections administered drug resistant treatment like kanamycin, capreomycin, amikacin and streptomycin. Bedaquiline is a friendlier short regimen, which can improve adherence and ensure success especially among MDR-TB patients with previous treatment with toxic and harmful second-line injectables.

5. LIMITATIONS AND STRENGTHS

This study recruited patients who were already on RR-TB and drug susceptible TB treatment. There was paucity of information on patients who did not start treatment after diagnosis. Lastly, the study recruited only patients who used the Xpert

assay after January 2017 roll-out at NIP. Those with poor medical records (lack of information) and whose diagnosis was done at other laboratories were excluded. The major strength of this study is that patients were recruited from 7 out of 14 regions in Namibia; therefore the results can be generalized in these parts of the country.

6. CONCLUSION

The prolonged treatment initiation delays among HIV positive RR-TB patients and those who were previously treated for TB might be due to low adherence to HIV care interventions. Participants staying with unemployed TB household members may prolong treatment initiation due to their experiences with stigma. Also, long waiting times to appointments may harm efforts to early treatment commencement. Based on the SEM model, an integrated, family-based approach to TB and HIV care involving health worker needs to be piloted to see its feasibility to reduce treatment initiation. This approach may go a long way in improving the management of TB among women, children, and other vulnerable groups. Family members are very crucial in day-to-day care including adherence to medication, preparing food, accompanying patients to health centres and mediating discussions with health workers thereby improving the patient-provider relationship. The NTLP of Namibia adopted a multi-sectorial collaboration to address all risk factors and therefore can advocate for a family-based approach to integrated TB and HIV care. Future studies need to assess the cost-utility of bedaquiline and delamanid drugs roll-out in Namibian health care in comparison with the second-line treatment currently being offered.

CONSENT AND ETHICAL APPROVAL

Ethical approval for the study was granted by the Information Management and Research Unit in the Ministry of Health and Social Services, Republic of Namibia (Ref:17/3/3 FFC). Permission to conduct the study was given by the management of Katutura Intermediate Hospital. All persons who agreed to participate in the survey were required to provide verbal consent for the face to face interview after a full explanation of the aims of the study. Participants were allowed to withdraw from the interviews whenever they pleased without any repercussions on their treatment and care at Katutura Intermediate Hospital. Individual interviews were held in a private setting if requested either inside or outside the hospital. Efforts were made to avoid interference from other patients. No names of respondents were recorded on the questionnaires. Instead, numbers were placed on the questionnaires. Measures were taken to protect this confidentiality during the data compilation, storage and analysis. Once the data was collected, it was kept secured and was analyzed as aggregate. Each section of the questionnaires contained a short introduction stating its focus and explaining why the questions were being asked, as well as assuring respondents of the confidentiality of their responses. For participants with inadequate literacy, the information sheet was read out by a data collection assistant using their preferred languages. The interviewer also respected the dignity of the participants by ensuring that there was no harm to the patients in term of emotional distress.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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