

Factors that Influence the Interruption of Tuberculosis Treatment in Imenti South Sub-County, Meru Kenya

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Abstract

Tuberculosis (TB), which is a highly infectious air-borne disease is a major health problem in the world. Kenya is 15th in TB prevalence among 22 high TB burden countries in the world. TB treatment interruption refers to missing of appointments therefore a patient will miss taking drugs. This increases disease morbidity, mortality and contributes significantly to the development of Drug Resistant TB which is expensive to treat. Data on factors influencing TB treatment interruption in Imenti South were unavailable. The study objectives were to determine the demographic, health services, cultural and patient factors that influence TB treatment interruption. A descriptive cross-sectional study was conducted. Data was obtained from 247 TB patients randomly selected from treatment registers and who had missed taking drugs during the treatment period. Ten key informant interviews were conducted on Health Care Workers working in TB clinics. A researcher-administered questionnaire was used to collect data from HCWs and TB treatment interrupters. Data Collected was cleaned, coded and keyed into Statistical Package for Social Sciences (SPSS). Chi-square test was applied to identify the relationship between variables. Results were presented using tables. Results showed that majority TB treatment interrupters were male (71.6%). The most frequent age group was 15-34 years (50.2%). There was no association between demographic factors and TB treatment interruption ($p>0.05$). The largest number (41.5%) interrupted treatment because they forgot appointment dates. A leading number of TB treatment interrupters are smokers (60.9%) and alcohol abusers (60.9%). Low education level, low income and unemployment influences interruption of treatment. The health system should pay particular attention to male TB patients and age group 15-34 years old through sustained health messages. Substance abuse should be addressed through rehabilitation and health education. Reminding patients about appointments through short messages service is important. Research to establish why males interrupt treatment more is recommended.

Key Words: *TB treatment Interrupter, TB treatment interruption, TB Patients,*

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Introduction

Tuberculosis (TB) is a highly infectious airborne disease caused by Mycobacterium Tuberculosis bacteria. The bacteria are carried in airborne particles called droplet nuclei and are generated when persons, who have pulmonary or laryngeal Tuberculosis disease cough, sneeze, shout, yawn or sing. These particles remain suspended in the air for several hours and a person becomes infected when they inhale droplet nuclei containing the Mycobacterium tuberculosis (Centre for Disease Control [CDC] 2014). Tuberculosis mainly affects the lungs but the bacteria can be transported to all parts of the body through the blood stream and lymphatic system to affect other parts of the body. The only parts that cannot be affected by TB are the nails, hair and teeth (Kurkani *et al.*, 2015). An infected person who goes untreated can infect 10-15 people with TB in a year (Ministry of Health [MOH], 2013).

TB is diagnosed by laboratory examination and radiology. Examinations will involve sputum examinations or any other sample from the affected sites. The tests will involve microscopy and molecular methods. The identification of acid fast bacilli using a microscope or Mycobacterium Tuberculosis genes using the molecular methods confirms the diagnosis. Radiological investigations involve taking chest Xrays to demonstrate pulmonary cavities and consolidation in the lungs (National Leprosy TB and Lung Diseases Program, 2016). Other radiological investigative methods e.g. computerized tomography scanning can also be done.

The Global incidence of TB in 2018 was 10.4 million cases (World Health Organization [WHO], 2018) and of these 1.9 million was attributable to poverty and 0.8 million to smoking. TB was among the top 10 causes of death worldwide. It kills 5000 people daily

and 16% (1.6 million in 2017) in a year. There is an estimated 558000 people with TB that is resistant to Rifampicin, the most effective first-line drug used in TB treatment. (World Health Organization TB Report., 2018) In Africa the Global TB Statistics for 2018 showed that the region had 26% of the world's TB cases of 275/100 000 people which is almost double the Global average of 142/100,000 population. Africa also accounts for 84% of TB deaths in the Globe. (WHO., 2018)

Kenya is one of the 22 high TB burden countries and is ranked 15th according to the WHO TB Report 2018. According to National Leprosy and Tuberculosis Program the TB Treatment default rate was 9% which put Kenya among countries with highest Treatment Interruption rate in the region (NLTLD, 2016). In Kenya the TB incidence in 2017 was estimated at 158000 cases with a prevalence estimated at 139/100000 population. Total notified cases in 2017 was 85188 cases (WHO, 2018). In the same report, Drug Resistant TB cases were estimated as 1100 among notified Pulmonary TB cases.

During the same period Meru County notified a total of 4813 TB Cases, giving a case notification rate of 320/100000 which was higher than the estimated national rate of 139/100000 population. Meru County is ranked 4th out of the 47 counties in TB prevalence. In Meru county, there are eight TB control Zones among which is Imenti South. A TB control zone is equivalent to a sub county. Imenti South Sub County is ranked 3rd in terms of prevalence of TB in Meru County. The Sub County notified 1005 TB cases in 2018 (NLTLP, 2018). Of these cases, 11 were drug resistant TB cases.

According to the National Leprosy, TB and lung Diseases Program, Kenya (NLTLP) drug sensitive TB is treated for a minimum of 6 months using oral therapy monitored at facilities or by community members and drug resistance TB (DR TB) is treated for a minimum of 9 months which includes a daily injection for 4 months plus oral drugs monitored by a Health Care Worker. During the treatment period there are important follow up tests done to monitor progress (NLTLD, 2015).

According to the WHO, 5% of new TB cases started on treatment globally defaulted in 2018, but this default rate ranges from <1% to 13% in the world's 22 high TB burden countries. Default includes patients who interrupted and resumed treatment. According to the NLTLD program, Kenya, Meru had a TB interruption rate of 7% in 2018 whereas the rate for Imenti South Sub County was 12% during the same period.

Interruption of anti-tuberculosis (TB) treatment adversely affects treatment success rate. It increases disease morbidity and mortality. Also, it contributes significantly to the development of TB drug resistance (Kulkarni, 2014). Poor patient adherence to the treatment regimen is a major cause of treatment failure and of the emergence of drug-resistant TB. Previous research reported travel expenses, traveling to treatment centers, male sex, poor patient information and communication, alcoholism and homelessness as the major determinants of treatment interruption of anti-TB treatment (Ibrahim et al., 2014). Patient adherence to the standard anti-TB therapy in developing countries has been estimated to be as low as 40% (Paramasivan, 2016)

Providing early treatment of TB cases helps to reduce mortality and morbidity and this depends on good adherence to treatment and

follow-up of patients. Based on these facts the study sought to determine the factors influencing TB Treatment interruption among TB patients on treatment in Imenti South Sub County of Meru County. The researcher explored the demographic, health services, cultural and TB patients factors that influence TB treatment interruption in the Sub County.

Materials and Methods

The study adopted a descriptive cross-sectional design. The Study was conducted in ten TB treatment sites selected through purposeful sampling method. The facilities were selected based on the high number of TB patients notified in the TB treatment registers. These facilities also had higher TB treatment interrupter cases in the sub county. The target population included all TB patients that interrupted treatment at the time of the study. The number of participants from each facility was assigned proportionate to the number of TB patients registered in 2018. Simple random sampling was applied to identify participants. Only TB treatment interrupters registered in the TB treatment registers in the selected TB treatment sites and who had capacity to consent and were 18 years and above were considered for interview. Health Care Workers (HCWs) who had worked in the TB treatment services for 6 months and above at the selected sites were interviewed.

Scientific approval was sought from the Departmental Graduate Committee of the School of Health Sciences at the Meru University of Science and Technology (MUST). Ethical clearance was obtained from the MUST Institutional Research Ethics Review Committee (MIRERC). Permission to access the Health Facilities was sought from the Directorate of Health, Meru County

Department of Health. A verbal and written consent was sought from potential study participants. Confidentiality was observed throughout the study processes.

Both qualitative and quantitative data was collected from the sampled HCWs and TB treatment interrupters. A structured questionnaire was administered by the researcher and trained research assistants. Data on the demographic; health services, cultural and patient factors was collected.

A pilot study was conducted in 2 TB treatment facilities in neighboring Imenti Central Sub County to pretest the questionnaire. The results of piloting did not influence any adjustment of the questionnaire.

Data Collected was cleaned and keyed into the Statistical Package for Social Sciences (SPSS) version 22. Chi-square statistic test was used. Cross tabulation was employed to compare the relationship between variables. Results of the study were presented as tables.

Results and Discussion

Demographic characteristics influencing TB treatment interruption

The indicator are gender, age in complete years, level of education, income, marital status, occupation and area of residence.

There were more males 177 (71.6%) than females 70 (28.4%) TB treatment interrupters. This agreed with a study done in Tanzania to explore perceptions of TB and treatment seeking behavior that found out

that females comply better than males (Kilale *et al* 2015). This however differed with the key informants in the study that believed occupation 8 (80%) was the main predictor of TB treatment interruption compared to the male gender 1 (10%). According to Kilale *et al*,2015 the reason for gender differences was alcoholism and smoking..... Half 124 (50.2%) were in the age group 15-34 Years. The mean age for TB treatment interrupters according to Kilale *et al*,2015 was 36.28 years concurring with the findings of this study that show the age group 15- 34 years having the highest number of interrupters 124 (50%). This also concurs with the NLTLD Report, 2013 which showed that interruption affected all age groups but had the greatest toll in the most productive age group 15-44 years.... Most of the participants 135 (54.4%) had attained primary school education.

A study done in Tanzania showed that level of education impacted on adherence (Kurkani, 2017). A study in Iraq (Al-Humadi, 2017) found out that the main sources of knowledge of TB disease for TB patients was the physicians and television. The findings of this study show little similarity with those findings. In this study, friends 99 (39.9%) and HCWs 90 (36.3%) were the main sources of knowledge. Those who had no source of income were 85 (34.3%) and 11 (4.4%) depended on guardians for upkeep. Most of the respondents 166 (66.9%) had an income level that was less than 10000 Kenya Shillings (USD 100). The key informants in the study 4 (40%) agreed that poverty was a major contributor to treatment interruption as well as nature of work 4 (40%)

Table 1: Influence of demographic factors on TB treatment interruption

Variable	X ²	Df	P Value
Age in complete years	2.393	4	0.664
Level of education	0.833	4	0.934
Source of income	1.501	3	0.682
Level of income	0.490	2	0.783
Marital status	1.553	4	0.817
Occupation	3.129	3	0.372
Area of residence	0.160	1	0.689

Table 1 shows that there is no significant relationship between TB treatment interruption and age, level of education, source of income, level of income, marital status, occupation, area of residence

Health service characteristics influencing TB treatment interruption

The indicators used were distance to facility, TB testing availability in facilities visited by patients, duration before TB treatment is initiated, cost of accessing TB treatment, type of health facility preferred, health care workers attitude, follow up to the community by health workers and availability of TB drugs in facilities the patients visited.

The majority of respondents 161 (64.9%) lived less than 5 kilometers away from the health facility. A third of the respondent 82 (33.1%) incurred no cost to reach the health facility while others 11 (4.4%) spent above 300 Kenya Shillings to access the health facility. Most of the respondents 107 (43.1%) walked to the health facilities and a few 34 (13.7%) used vehicles. Most respondents 162 (65.3%) first sought treatment at Government facilities while 32 (12.9%) used over the counter medication services before TB treatment was commenced and 30 (12.1%) attended Faith Based Hospitals (FBOs) for diagnosis and treatment. The greatest number 202 (81.5%) were requested to have a TB test

done at the facility they attended during the initial visit. Most respondents 238 (96%)

reported positive attitude of HCWs when they sought treatment. This agreed with an Iraq study findings (Al-Humadi, 2017) that showed only 3.6% of HCWs had negative attitude The majority 211 (85.1%) had their homes visited by volunteers to educate them and their families on TB and 222 (89.5%) had TB treatment initiated within a month. The study in Iraq also found out that systematic approach and structural form in the hospitals and HCWs is critical in TB treatment interruption management. This agreed with this study that show majority of patients 112 (45.2%) resumed treatment immediately after a tracing mechanism was triggered. Majority of the respondents 231 (93.1%) did not miss drugs in health facilities.

Cultural characteristics of respondents

The indicators were religion, family support and type of support from the family members. The majority of the respondents 124 (50.2%) were protestants, 111 (44.9%) were Catholics, 3 1.2% were Muslims and other denominations were 9 (3.7%). In this study, no significant association was determined between TB treatment interruption and religion. The majority of the key informants 6 (60%) believe that religion

has no influence on TB treatment interruption. In a study by Talukdar et al, 2014 in Ethiopia it was found out that religion influences TB treatment adherence.

In a study done in Nigeria to determine awareness, interruption of treatment and warning signs of TB, it was found out that the predictors to TB treatment interruption were Christian Faith among others. The finding concurs with this study where the Christians constitute the majority of TB treatment interrupters (95%). The greatest number 192 (77.4%) received family support while 55 (22.6%) never received any support. Most of

the respondents 110 (44.4%) received food supports, 50 (20.2%) received cash support, 22 (14.5%) were accompanied by relatives to the clinics and 4 (2.4%) received prayers from family members.

In the same Ethiopia study (Mekonnen, 2018), female patients' interruption rate was lower despite cultural practices of seeking permission for treatment from their spouses. Use of herbal products was found to be a predictor of TB treatment interruption in the same study however the researcher did not explore this area in this study.

Table 2: Cultural characteristics of the respondents

Characteristics	Frequency (n=247)	Percentage
Religious affiliation		
Catholic	111	44.9
Protestant	124	50.2
Muslim	3	1.2
Others	9	3.7
Family support		
Yes	192	77.7
No	55	22.3
Type of support		
Food support	110	44.5
Money	50	20.2
Being accompanied to the health facility	22	8.9
Family goes for drugs	6	2.4
Prayers	4	1.6
Not applicable	55	22.4

Table 3: Influence of cultural characteristics on TB treatment interruption

Characteristics	χ^2	df	P
Religious affiliation	0.996	3	0.802
Do you get family support	3.505	1	0.061
Type of support	1.251	5	0.940

There is no significant relationship between TB treatment interruption and religious affiliation, family support and type of support

Patient characteristics contributing to TB treatment interruption.

The indicators were knowledge on TB by the respondents, source of knowledge, feeling of respondents after TB diagnosis, relationship with family and friends after TB diagnosis, reasons for TB treatment interruption, alcohol consumption, cigarette smoking and existence of a TB treatment supporter.

The majority of respondents 179 (72.2%) had heard about TB before diagnosis was made. Most of the respondents 99 (39.9%) had friends as sources of TB information and the least 11 (4.4%) had read about TB. A study conducted in India on 156 patients found out that 78% were non-adherent to TB treatment and the independent risk factors identified were lack of knowledge on importance of regular treatment.

In Nigeria, a study to explore adherence to treatment among patients undergoing direct observation therapy found out that interruption was associated with lack of knowledge of treatment among others (Kurkani *et al.*, 2015). Most 164 (66.1%) got scared when they were diagnosed TB and 74 (29.8%) experienced no side effects of drugs during treatment. More than half 139 (56%) reported negative change of relationship with family members after being diagnosed with TB. A greater number 171 (69%) were aware that TB treatment is given free of charge in health facilities. Most of the respondents 103

(41.5%) missed clinic because they forgot the date of appointment, 74 (29.4%) did not have transport, 35 (14.1%) reported feeling well hence did not see need of attending clinic and 7 (2.8%) had fear of being tested for HIV. Majority 83 (33.5%) missed clinic for one week and 1 (0.4%) missed for more than a month.

Majority 150 (60.5%) of the TB treatment interrupters were smokers and 138 (92%) of them had smoked for more than a year. In India, a study on determinants of poor adherence with anti-TB therapy indicated that smoking during treatment and travel related costs were significantly associated with non-adherence. In Nigeria, a study (Ibrahim *et al.*, 2014) to explore factors that affect adherence found out that interruption of treatment was associated with cigarette smoking (40%).

The greatest number of the respondents 166 (66.9%) took alcohol and 137 (82.5%) of them had taken it for more than a year. Alcohol consumption was also discovered to impact TB treatment interruption (Bagchi *et al.* 2014). Most of the respondents 220 (88.7%) had a treatment supporter and 197 (93%) of them were observed daily as they took the TB drugs. A number of the respondents 87 (35.2%) feared family members would know that they had TB hence directly observed treatment did not happen in their households.

Table 4: Influence of patient characteristics on TB treatment interruption

Characteristic	χ^2	Df	P
Information on TB before diagnosis	0.376	1	0.540
Source of information	1.752	3	0.626
Feeling after being diagnosed with TB	0.508	2	0.776
Side effects of drugs	2.347	4	0.672
Did patient/family relationship change after diagnosis	1.292	1	0.256
Does patient think TB is curable	4.273	2	0.118
How long should TB be treated	0.706	3	0.872
Reason for missed clinic appointments	1.404	4	0.844
Smoking	1.553	1	0.213
Alcohol consumption	0.490	1	0.484
Treatment supporter	0.123	1	0.725

There is no significant relationship between TB treatment interruption and knowledge of TB, feeling after diagnosis, side effects, family relations, reasons for interruption, treatment supporter or substance abuse

Conclusion

Males TB patients and those in the age group 15-34 years of age are the majority of treatment interrupters. Low level of education, low level of income, living in the rural areas and a state of unemployment are a predictor that a TB patient may interrupt treatment at some stage. The demographic characteristics of respondents did not influence TB treatment interruption. The reason most missed appointment was that they forgot the dates. The leading number of the respondents were smokers and alcohol abusers. For most of the TB treatment

interrupters, relationship with family changed negatively after diagnosis. The health system should pay particular attention to male TB patients and those between 15-34 years old through sustained health messages.

Education on use of medications should be emphasized. The people who have recovered successively from TB can help in provision of mentoring those on treatment. Provision of incentives like food and transport by the health system can have positive implication to interruption. Substance abuse should be addressed through rehabilitation and health

education. Reminding patients about appointment dates through short messages service could have a positive implications in addressing interruption.

The Government should improve economic status of the community through income generating activities as a long term measure. Although the TB treatment service is significantly successful in the areas explored

in this study, the problem of treatment interruption continuous to persist due to the various reasons determined. Those reasons need to be analyzed further to understand any existing loop-holes to come up with strategies and interventions that will better patient compliance to treatment. An example can be research to establish why males are more vulnerable to TB treatment interruption.

References

- Al-Humadi H.W., Al-Saigh, R.J., & Al-Humadi A.W. (2017). *Addressing the challenges of Tuberculosis: A Brief Historical Account*. *Frontiers in Pharmacology* 8(689), 1-10. doi: 10.3389/fphar.2017.00689.
- Centers for Disease Control (2014) *Transmission of multidrug-resistant tuberculosis among immunocompromised persons in a correctional system—New York*, *Morbidity and Mortality Weekly Report* 41(28), 507-9.
- Bagchi, S., Ambe. G., & Sathiakumar, N. (2014). Determinants of Poor Adherence to Anti-Tuberculosis Treatment in Mumbai, India. *International Journal of Preventive Medicine* 1(4), 223–232
- Ibrahim, L.M., Hadejia, I.S, & Nsubuga, P. (2014). *Factors associated with interruption of treatment among Pulmonary Tuberculosis patients in Plateau State, Nigeria*. *The Pan African Medical Journal*, 17:78
- Kulkarni. S., Akarte,R., Mankeshwar.S., Bhawalkar.A., Banerjee.R., Kulkarni,A. (2014) *Non-Adherence of New Pulmonary Tuberculosis Patients to Anti-Tuberculosis Treatment*. *Annals of Medical and Health Science Research* 3(1), 67–74.
- Kurkani, D.R., Sulegaon, R.V., Chulki, S.F. (2015). *Tuberculosis at unusual sites: A case series from tertiary care center in North Karnataka, India*. *Annals of Tropical medicine and public Health* 8(3), 67-70
- Kilale,M., Mushi,A., Lema,L., Kunda, C., Makasi,D., Mwaseba,A., ...Mfinanga,G. (2018). *Perceptions of tuberculosis and treatment seeking behaviour in Ilala and Kinondoni Municipalities in Tanzania*. *Tanzania Journal of Health Research*, 10(2), 89-94
- Mekonnen, H.S., & Azagew, A.W. (2018). *Non-adherence to anti-*

- tuberculosis treatment, reasons and associated factors among TB patients attending at Gondar town health centers, Northwest Ethiopia.* BMC Research Notes, 11(1), 691.
- NLTLD, (2017). *National Tuberculosis, Leprosy and Lung Diseases Program Guidelines Kenya.* Retrieved from <https://www.nltp.co.ke/>
- Paramasivan, S., Thomas, B., Thayyil, J., Rahim, A., Thavody, J., Lilabi, M.P., & Jayadev, V.K. (2016). *Knowledge and health seeking behavior of Tuberculosis patients in Kerala, India.* International Journal of Community Medicine and Public Health, 3(9), 2464-2471.
- Talukdar N, Basu A, & Punekar R.M ((2015). *An Ethnographic Study on the Factors Affecting Adherence to Directly Observed Treatment Short-Course in Typical Indian Settings.* Journal of Tuberculosis Research, 3(1), 19-25.
- World Health Organization (2018) *Global Tuberculosis Report.* Retrieved from www.who.int/tb/publications/global-report/en.