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Factors Influencing Adherence to Anti-Tuberculosis Treatment among Patients Attending Tuberculosis Clinics in Migori County, Kenya

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Abstract

Tuberculosis (TB), a disease caused by Mycobacterium tuberculosis, affected 10 million people and claimed the lives of 1.4 million people worldwide in 2018. Poor anti-TB treatment adherence has a number of negative consequences, including increased disease transmission. The incidence rate of tuberculosis in Nyatike sub-county is 209 per 100,000 people, compared to 155 in Migori County. As a result, the primary goal of the study was to identify factors that influence anti-TB treatment adherence among tuberculosis patients attending anti-tuberculosis clinics in Migori County, Kenya. The study employed an analytical cross-sectional study design, with the target population consisting of adult active TB patients (n=) on anti-TB treatment and health care providers (n=) involved in TB Comprehensive care clinic services. Questionnaires, focus group discussions, and key informant interviews were used to collect data, which was then analyzed using chi square and logistic regression techniques. The following factors were found to be associated with patient adherence in the study: HIV co-infection (OR=1.152, 95% CI; 0.408,3.691; p=0.029), in which HIV positive patients were 1.152 more adherent than HIV negative participants; using other non-TB drugs (OR=0.418; P= 0.008, 95% CI; 0.157, 1.109), with pill burden being a barrier for adherence to ant-TB treatment; and lack of money to meet Adherence was also found to be influenced by knowledge (OR: 2.856; 95% CI: 1.282, 6.365), P= 0.01). Anti-TB treatment adherence was found to be associated with HIV co-infection, taking other drugs alongside anti-TB patients, and financial constraints. The study's implication is that various factors influence patient adherence to anti-tuberculosis treatment.

Keywords: *Adherence to Anti-Tuberculosis Treatment, Patients, Tuberculosis, Clinics, Migori County*

1.0 Introduction

Tuberculosis (TB) is a lung infection caused by the bacteria Mycobacterium tuberculosis (MTB). When an infected person coughs, the droplets remain suspended in the air and spread the disease. When an uninfected person breathes contaminated air, infected droplets are inhaled into the lungs and can cause disease later in life. A variety of factors, including the individual's immune system and the MTB strain, can influence the outcome of TB infection. The bacterium has infected one-third of the world's population in its latent form, commonly known as latent TB, with a 10% lifetime risk of developing active TB (WHO, 2018). TB is the world's leading cause of death among infectious diseases, and it is the leading cause of preventable deaths among people living with HIV/AIDS (UNAIDS, 2019). In 2019, a total of 10 million people were infected with the disease, 87% of whom were from the 30 countries classified as highly burdened, and 1.4 million died (WHO, 2020). Furthermore, the fact that there was a 10% increase in cases of Multi-Drug Resistance (MDR) in 2019 compared to 2018 (WHO, 2020) adds to its public health significance. Notably, Africa accounts for 25% of the global TB burden and ranks second among WHO regions in terms of TB mortality rates (WHO, 2020). Kenya is one of the 30 high burden countries, with a mortality rate of 20 per 100,000 people and an incidence rate of 140 per 100,000 people (WHO, 2020).

Adherence is a critical factor in tuberculosis management, with the potential to reduce disease burden by up to 60% globally (Du Vaure et al, 2016). In general, WHO defines adherence as "the degree to which a person's behavior corresponds with the agreed-upon recommendations of a health care provider." Although there is no gold standard for measuring adherence, the World Health Organization suggests assessing non-adherence by assessing the quantity and timing of missed medication or hospital appointments. Notably, different researchers use different methods in their studies to assess non-adherence (and thus adherence). Non-adherence in Kenya is defined as missing at least one doctor's appointment and failing to take 10% or more of the total prescribed medication doses (Wanyonyi et al, 2017; Zegeye et al, 2019). Adherence to antituberculosis medication is difficult in many parts of the world. A study conducted in Gondar, Ethiopia, discovered 78% adherence, with 21.2% considered non-adherent, the majority of whom were'return after default' patients (Mekonnen & Azagew,2018). Adherence rates were lower in Mumbai, India, and Schenzhen, China, compared to Gondar, at 50% and 66.26%, respectively (Kulkarni et al, 2013; Tang et al, 2015). According to the most recent adherence survey in Kenya, the national average is 65% (NTLP, 2018), though different studies show different rates (Obwoge et al, 2016).

A variety of factors influence anti-TB medication adherence among patients around the world. Patient-centered factors influencing adherence include, but are not limited to, forgetting to take medication, a lack of knowledge about the treatment, its importance, and the risk factors for failure (developing MDR TB, prolonged treatment, high treatment cost), as well as patients' education level (Woimo et al, 2017; Mekonnen and Azagew, 2018). Several studies have discovered social factors that influence patient adherence to medication. One of them is a lack of or limited support from family and friends, particularly in terms of financial assistance, food, and reminding the patient to take their medications (Getahun and Nkosi 2017). Stigma, whether perceived or experienced, is another potential factor influencing adherence, particularly among HIV-TB comorbid patients (Ayele et al, 2016). Despite the fact that TB medication is provided free of charge, economic factors can influence anti-TB medication adherence (Ayele et al, 2016). This is due to the inability to meet other needs associated with anti-TB medication, such as nutritional supplements and transportation costs (Ayele et al, 2016). Health systems also play a role in patient adherence, particularly through factors such as the patient-provider relationship and patient satisfaction (Gube et al, 2018).

Kenya has prioritized the early detection and treatment of tuberculosis cases. Adherence is critical for the successful treatment of these cases (NLTD, 2018). Medication adherence measures have been implemented, including follow-up clinics, pill counts, and the assignment of a treatment support partner to patients. Notably, recent efforts to address the TB burden in Nyatike sub-county have been unsuccessful, as evidenced by an increase in case notification rate to 124 from 109 per 100,000 populations in the first and second quarters of 2019 (NTLP 2018, 2020). The rising trend must be addressed, given that most infections in Kenya occur as a result of active transmission, particularly among the young population aged under 44 years (NTLP, 2017). There is also a need to address factors influencing adherence given the sub-county's high TB incidence rate of 209 per 100,000 population compared to 155 per 100,000 populations in Migori county (NTLP, 2020). Notably, no peer-reviewed studies estimating the scope of the problem in Migori and Nyatike in particular have been published. As a result, the study was carried out to determine the factors influencing anti-tuberculosis treatment adherence among patients in Nyatike sub-county, Migori County.

2.0 Methodology

The study used a cross-sectional study design. This study involved registered patients on anti-TB treatment attending selected Comprehensive Care Clinics (CCC) and health care workers (Clinicians officers and Nurses) involved in care for TB patients attending selected CCCs.

The researcher used a census method to sample health facilities offering TB services. This is because of the small number of patients within the sub-county since majority had recovered from the disease and as such were not eligible for the study. The sample size of the study was 200 participants. The study used both questionnaires, focus group discussion and interview guide. Researcher used SPSS version 25 in data analysis. For inferential statistics, chi-square was used to measure association of variables. Bivariate logistic regression was used to measure the strength of statistically independent associations between variables.

3.0 Findings and Discussions

Majority of research participants were males at 62.7% (n=94), the modal age group being between 31-40 ((n=54) years. Most participants were primary school leavers (56.7%; n=85), self- employed (n=90; 60%), married (74%; n=111) with an average monthly income of less than Ksh. 5000 (66%). Notably, most participants were HIV negative (58.7%).

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Table 1: Participants Characteristics

Characteristics	Category	Frequency (n=150)	Proportion (100%)
Gender	**Male**	**94**	**62.7**
	Female	56	37.3
Age	18-20 years	13	8.7
	21-30 years	22	14.7
	31-40 years	**54**	**36.0**
	41-50 years	40	26.7
	51-60 years	20	13.3
	61-70 years	0	0.0
	71-80 years	1	0.7
Level of Education			
	Primary	**85**	**56.7**
	Secondary	47	31.3
	Certificate	8	5.3
	Diploma	9	6.0
	Degree	1	0.7
Occupation	Student	14	9.3
	Casual jobs	36	24.0
	Self-employed	**90**	**60.0**
	Employed	10	6.7
Marital Status			
	Single	27	18.0
	Married	**111**	**74.0**
	Separated	12	8.0
Household monthly y income			
	Less than 5,000	**99**	**66.0**
	5,000-10,000	37	24.7
	11,000-20,000	13	8.7
	21,000-30,000	1	0.7

3.1 Factors Influencing Adherence to Anti-Tuberculosis Treatment Among Patients

Chi square was used to test the association between adherence of TB medication and socio-demographic characteristics. None of the socio-demographic characteristics was found to be statistically significant.

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Table 2: Anti-TB medication and Sociodemographic factors

Characteristics	Adherence of TB Medication			
	Non-adherent (%)*	Adherent (%)*	Chi-square	*P*-value
No. of participants	**n=33**	**n=117**		
Gender			χ^2 =2.249	0.134
Male	17(18.1)	77 (81.9)	df = 1	
Female	16 (28.6)	40 (71.4)		
Age			χ^2 =4.619	0.474
18-20 years	5 (1.4)	6 (1.7)	df = 5	
21-30 years	5 (8.5)	27 (7.7)		
31-40 years	9 (16.9)	72 (20.5)		
41-50 years	11 (21.1)	86 (24.5)		
51-60 years	3 (21.1)	80 (22.8)		
71-80 years	0 (29.6)	70 (19.9)		
Education Level			χ^2 =5.697	0.194
Primary	14 (16.5)	71 (83.5)	df = 4	
Secondary	13 (27.7)	34 (72.3)		
Certificate	2 (25.0)	6 (75.0)		
Diploma	4 (44.4)	5 (55.6)		
Degree	0 (0.0)	1 (100.0)		
Occupation			χ^2 =4.858	0.182
Student	6 (42.9)	8 (57.1)	df = 3	
Casual jobs	8 (22.2)	28 (77.8)		
Self-employed	16 (17.8)	74 (82.2)		
Employed	3 (30.0)	7 (70.0)		
Marital status			χ^2=4.648	0.098
Single	8 (29.6)	19 (70.4)	df = 2	
Married	20 (18.0)	91 (82.0)		
Separated	5 (41.7)	7 (58.3)		
Monthly income			χ^2 = 5.432	0.212
Less than 5,000	22 (22.2)	77 (77.8)		
5,000-10,000	7 (18.9)	30 (81.1)	df = 4	
11,000-20,000	1 (11.1)	8 (88.9)		
21,000-30,000	2 (50.0)	2 (50.0)		
31,000-40,000	1 (100.0)	0 (0.0)		

3.1.1 Individual factors and HIV co-infection

A chi square test was used to determine the association between individual factors and adherence to anti-TB medication. The findings indicated that there was a significant statistical association between use of other non-TB drugs and adherence of medication p = 0.039, Chi Square (χ^2) (1) = 4.371. The findings also showed a statistically significant relationship between HIV status and adherence to anti-TB medication (P=0.024, χ^2 =5.096).

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Table 3: Chi-square test

Characteristics	Adherence of TB Medication			
	Non-adherent %)*	Adherent n (%)*	Chi-square	*P*-value
No. of participants	**n=33**	**n=117**		
Alcohol consumption			χ^2 =0.036	0.826
Yes	9(23.1)	30 (76.9)	df = 1	
No	24 (21.6)	87 (78.4)		
Smoking			χ^2 =0.444	0.686
Yes	1 (12.5)	7 (87.5)	df = 1	
No	32 (22.5)	110 (77.5)		
Use of other non-TB drugs			χ^2 =4.371	**0.039**
Yes	6 (12.0)	44 (88.0)	df = 1	
No	27 (27.0)	73 (73.0)		
Pill Burden			χ^2 =4.858	0.182
Yes	10 (27.0)	27 (73.0)	df = 3	
No	23 (20.4)	28 (79.6)		
Conditions improved			χ^2=2.811	0.094
Yes	29 (20.6)	112 (79.4)	df = 1	
No	4 (44.4)	5 (55.6)		
Prior TB treatment			χ^2 =0.017	0.896
Yes	12 (21.4)	44 (78.6)	df = 1	
No	21 (22.3)	73 (77.7)		
Side effects			χ^2 =0.373	0.541
Yes	13 (19.4)	54 (80.6)	df=1	
No	15 (23.80	48 (76.2)		
Treatment period				
Less than 6 months	29 (21.0)	109 (79.0)	χ^2 =0.976	0.299
>6 months	4 (33.3)	8 (66.7)	df=1	

3.1.2 Socio-Economic and system related Factors

A chi-square test showed a statistically significant association between adherence to anti-TB treatment and money to cater for other needs. However, there was no association between other

factors and adherence to anti-TB treatment. A chi-square test further showed no association between health system-related factors influencing adherence to anti-TB treatment.

Table 4: Chi-square test on association between socio-economic factors and adherence to anti-TB treatment

Characteristics	Adherence of TB Medication			
	Non-adherent (%)*	Adherent (%)*	Chi-square	*P*-value
No. of participants	**n=33**	**n=117**		
Treatment supporter				
Yes	23 (19.8)	93 (80.2)	χ^2 =1.407	0.246
No	10 (29.4)	24 (70.6)	df=1	
Appreciated by others				
Yes	22 (19.1)	93 (80.9)	χ^2 =2.365	0.124
No	11 (31.4)	24 (68.6)	df=1	
Money for other needs				
Yes	10 (38.5)	16 (61.5)	χ^2 =4.967	**0.026**
No	23 (18.5)	101 (81.5)	df=1	

Characteristics	Adherence of TB Medication			
	Non adhere %)*	Adherent n (%)*	Chi-square	*P*-value
No. of participants	**n=33**	**n=117**		
Drug stock-outs				
Agree	2 (13.3)	13 (86.7)	χ^2 =0.730	0.393
Disagree	31 (23.0)	104 (77.0)	df=1	
Long waiting time				
Agree	7 (35.0)	13 (65.0)	χ^2 =2.273	0.132
Disagree	25 (20.0)	104 (80.0)	df=1	
Friendly caregivers				
Agree	29 (22.1)	102 (77.9)	χ^2 =0.011	0.915
Disagree	4 (21.1)	15 (78.9)	df=1	
Lengthy treatment				
Agree	11 (26.8)	30 (73.2)	χ^2 =0.767	0.381
Disagree	22 (20.2)	87 (79.8)	df=1	
Clinic distance				
1-5 km	12 (12.2)	42 (77.8)	χ^2 =0.002	0.961
>5 km	21 (21.9)	75 (78.1)	df=1	
Drug refill period				
Weekly	1 (20.0)	4 (80.0)	χ^2 =3.996	0.334
2 weeks	3 (15.8)	16 (84.2)	df=3	
Monthly	28 (22.4)	97 (77.6)		
2 months	1 (100.0)	0 (0.0)		
Waiting time				
<30 minutes	25 (20.7)	96 (79.3)	χ^2 =3.344	0.316
30-45 min	5 (25.0)	15 (75.0)	df=3	
45-60 min	3 (50.0)	3 (50.0)		
1 hour	0 (0.0)	3 (100.0)		
Transport cost (ksh)				
1-500	32 (22.2)	112 (77.8)	χ^2 =0.979	0.781
501-1000	0 (0.0)	3 (100.0)	df=2	
Above 1000	1 (3.3)	2 (66.7)		

Participants were asked in an FGD whether they have money to cater for other needs associated with TB treatment, such as nutritional supplements. They reported as follows:

Respondent 3: I spend Kshs. 300 to the facility to pick my medication. If other facilities can also be equipped so that I can access them near my home so that I don't have to travel to this place it can be better.

Respondent 7: While on medication, you must have porridge made of millet or sorghum. It is preferable to tea. Sometimes I lack money to acquire the ingredients.

The researcher interviewed the participants to know if they have peer-to-peer support groups. They reported as follows:

Respondent 9: We have never seen that here in this clinic but we would appreciate if it was initiated here. It can be very good if peer counselling can be initiated in our facility.

The key informants were also in agreement to what the study participants reported, except one, whose facility had initiated the peer-to-peer groups:

Respondent 1: We do have it twice a month- first and last week of every month.

Respondent 2: We don't have patient support groups as at now like it is for HIV since the NGOs supporting the programme have not incorporated funds for the same, so we can`t have it. We had it before Covid but since Covid came, we don't have it.

Respondent 3: We currently don't have a peer-to-peer counselling at the facility.

The researcher also enquired on the issue of stigma from the community and as such needed to know how the community perceives them as TB patients. they responded thus:

Respondent 1: People here know TB is a disease just like any other. There is no stigmatization here. Although some believe TB and HIV is `chira' (curse).

Respondent 5: I almost got divorced because I contracted the disease and being a woman, I don`t go to gold mines, so I probably got it from promiscuity.

Qualitative data was also collected in regard to system-related factors influencing adherence to anti-TB treatment as reported below:

For drug stock-outs, participants in an FGD responded on the positive as such instances were common in the facilities as reported:

Respondent 2: ``We always find drugs in the clinic every time we come for refill. However, we sometimes find the small white pills (Pyridoxin) out of stock. For example, today we came for refill but we did not find the white pills and that means we have to go and buy them at the chemist at our own cost, for which a dose goes at ksh. 200 for one month.''

Key informants also alluded to the fact that there has been drug stock-out, although it is not for the main anti-TB drugs, as reported:

Respondent 1: We never have anti-TB drug stockout, except for TB preventive therapy and pyridoxin.

Respondent 2: It is not so frequent but when it does occur, then it`s usually from the subcounty level. Although it has happened thrice in the past. Pyridoxin stockout happened and that was countrywide and not in our facility alone. The stockout has been there for quite a long time, for about six months now.

Respondent 3: We don't have a drug stockout in our facility since we plan early enough.

When asked whether they have money to cater for the drugs they are asked to buy from the chemist, they responded thus:

Respondent 1: I don`t have money to buy those pills. I really have to hustle to get that ksh. 200 because I have been laid off from work.

The researcher asked the participants if the healthcare provider are friendly and whether they give them nutritional supplements whenever need arises They reported as follows:

The researcher asked participants whether they receive nutritional guidance and supplements. This was their response:

Respondent 4: I have never seen that here. However, when I was in Bondo, I was very weak at drug initiation. I was given baby porridge flour, which I took for one month and thereafter I was a real man.

Respondent 6: When you come and have poor appetite, you are given vitamin supplement either by injection or pills.

Respondent 7: When I came here the first time, I was weighing 51kg and I used to have difficulties walking for long distances. After being given the vitamin supplement, within one month I was weighing 60kg and walking was no longer an issue for me.

When asked about challenges they face while dispensing their duties, the key informants responded thus:

Respondent 1: We have a challenge with drug stockout, isoniazid and pyridoxin, to be specific. I sometimes get a client whom I feel should be given TB preventive drugs but I can`t administer because they are not available. When we give patients drugs and thy come next time, we tell them to buy, they claim we have taken the drugs and now we are asking them to buy when in the real sense the drugs are not available.

Lack of nutritional supplements. We sometimes get a client whose BMI is 12 and really, they can't afford to buy whatever you are advising them because of financial challenges.

Respondent 2: Few personnel, being a mission hospital. We don`t get financial support from the government. The few personnel available are not regularly updated on the changes in TB care from the TB program.

Need to channel funds to support the peer-to-peer groups.

Increase the test centres to reduce the time taken to access them, GeneXpert to be specific. Currently they are not many in the county

If we can be facilitated in terms of funds to contact those patients who don't show up on clinic appointments as well as the non-adhering patients, it can be of much relief to us.

4.0 Discussion

Several social demographic factors have been attributed to patients` poor adherence to medication, and these vary from country and region to the other. In this study, factors were divided into various subsections. None of the socio-demographic factors were found to impact patient adherence to anti-TB treatment.

HIV co-morbidity was found to be associated with patient adherence to anti-TB treatment, HIV positive patients were 1.152 times more likely to adhere to anti-TB treatment compared to HIV negative patients (OR=1.152, 95% CI; 0.408,3.691; p=0.029).

The findings do not agree to what some of the studies found out. Amuha et al. (2009) found no association between being on ART and adherence even though one of the key informants felt the adherence should be high adherence. Elsewhere, in South Africa, a study found out that patients on ART were less likely to be adherent citing pill burden and side effects as the major

contributors (Naidoo, et al, 2013). Adane et al (2013) and Muture (2011) found a similar phenomenon whereby HIV co-morbid patients are more likely to default as compared to HIV negative patients. However, in this study, patients on ART drugs have an upper hand as far as patient care is concerned as was explained by one of the patients and one KII as quoted below:

We have never seen that here in this clinic but we would appreciate if it was initiated here. It can be very good if peer counselling can be initiated in our facility.

Similar sentiments were noted during discussion with the key informants.

HIV patients have a strong peer-to-peer network as well as close connection with CHVs and healthcare providers who are always in close contact with them hence tend to be more adherent. In addition, the patients get nutritional supplements in case they are in need of them and this goes a long way to alleviate some of the side effects experienced by the patients as was explained by one of the patients:

I have never seen that here. However, when I was in Bondo, I was very weak at drug initiation. I was given baby porridge flour, which I took for one month and thereafter I was a real man.

For individual factors, patients using other non-TB drugs were 0.418 less likely to adhere to anti-TB treatment than those using only anti-TB drugs (OR=0.418; P= 0.008, 95% CI; 0.157, 1.109). The pill burden experienced by participants in this study could be due to HIV co-infection, although some patients cited other drugs to treat other ailments mostly diabetes and hypertension. The findings in this study have been reported by studies done elsewhere. In Ukraine, patients reported pill burden as one of the barriers to anti-TB treatment adherence (Aibana et al, 2020). In Ethiopia, TB patients that were HIV co-infected were uncomfortable with the pill burden, coupled with pill size. This they said impacted their morale to take medication, rendering them non-adherent (Boru et al, 2017).

For socio-economic factors, lack of money to meet other needs was found to influence patient adherence to anti-TB treatment (OR= 2.363; p=0.007; 95% CI, 0.934, 5.981) Patients who felt they have enough money to cater for anti-TB treatment related issues (transport, food, pyridoxin drug among others) were 2.363 times more likely to be adherent to treatment than those who felt they had insufficient money. Woimo et al. (2017) and Lei et al. (2016) found that patients in Ethiopia defaulted from treatment citing a similar reason. Patients had to meet other extra costs such as transport and other drugs to protect them from adverse side effects of anti-TB drugs.

In this study, most patients travelled for long distances to go pick their medical supplies, most of them spending between Ksh 200-400. In case of pyridoxin drug stockout, they spend extra Ksh 200 to buy the drugs in chemists as was reported by some patients and KIIs:

We always find drugs in the clinic every time we come for refill. However, we sometimes find the small white pills (Pyridoxin) out of stock. For example, today we came for refill but we did not find the white pills and that means we have to go and buy them at the chemist at our own cost.

Similar sentiments were noted during discussion with the other key informants

Considering the fact that most patients are self-employed (60%), earning less than sh. 5000 per month (66%), this is a challenge to the patients. Wanyonyi et al. (2017) found a similar challenge in Kenya whereby patients earning less than Ksh. 10,000 were likely to be non-adherent as they had to meet other needs from their pocket.

5.0 Conclusion

The study concludes that HIV co-infection, taking other drugs alongside anti-TB patients and financial constraints were associated with anti-TB treatment adherence.

TB management team at the County should liaise with the pharmacy department at the county and subcounty level to ensure patients are supplied with pyridoxin drug from the facility`s pharmacy in case of a stockout at the TB clinic.

The healthcare givers and CHVs should accelerate contact tracing of patients to ensure they compete their treatment. This will help to improve adherence as well as minimize defaulters and loss to follow up cases.

The national TB programme should include supply of nutritional supplements for TB patients who are vulnerable to malnutrition and financially unstable.

The healthcare givers at the facilities providing TB services should incorporate community health volunteers in TB awareness creation in the communities to reduce stigmatization.

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