



ORIGINAL ARTICLE

## Comparative Study of Patients' Adherence between Hospital-based and Community-based Treatment for Multidrug Resistant Tuberculosis (MDR-TB) in Kaduna State,

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### Keywords

Treatment  
Adherence;

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### ABSTRACT

**Background:** Multidrug-Resistant Tuberculosis (MDR-TB) epidemic is threatening the global control of TB. It is driven by the programme, health system and patient related factors. This study aimed at comparing the level of adherence to treatment among MDR-TB patients treated in hospital-based and community-based models of care.

**Methods:** This was a comparative cross-sectional survey conducted in 2019 with mixed methods of data collection. The study population were 360 MDR-TB patients treated in hospital-based and community-based facilities in Kaduna between 2013 and 2018. Questionnaire, FGD and KII guides respectively were the quantitative and qualitative data collection tools used. Statistical Package for Social Sciences (SPSS) version 25.0 was used to analyze the quantitative data while thematic analysis was used for analysing qualitative data. The quantitative results were presented in descriptive statistics with level of significance set at  $p < 0.05$  and the qualitative results were presented as prose.

**Results:** The majority were males in the community-based 135 (71.8%) and the hospital-based model 126 (73.3%), with median (IQR) ages of 33 (27-40) years and 34 (27-43) years respectively. Adherence to treatment was significantly higher among patients in hospital-based (64%) compared to community-based (36%), ( $p = 0.001$ ). Availability of family and community support encourages adherence while lack of food supplies, dissatisfaction with services and drug side effects were factors against adherence to treatment. Treatment success rate was similar in both models.

**Conclusion:** Adherence was better among patients initiated on treatment in the hospital-based model. Adherence should be strengthened in the community-based model by regular counselling and health education.

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### INTRODUCTION

Drug-resistant tuberculosis (DR-TB) is a deadly communicable disease that poses a serious global health threat.<sup>1</sup> It impacts not only on individual patients and their families, but also imposes a tremendous burden on public health systems that may lack the resources needed to contain it and threatens the lives of healthcare workers.<sup>12</sup> Patients' adherence to Multidrug-Resistant

Tuberculosis (MDR-TB) treatment is key to a favourable treatment outcome which is required to reduce further transmission of Tuberculosis (TB).<sup>13</sup> Medication adherence is defined as the extent to which a patient takes medications as prescribed by health care providers and as agreed upon in the patient's treatment plan.<sup>4</sup> It is estimated that more than one-third of patients fail to take medications as prescribed, especially

for chronic disorders.<sup>5</sup> Direct observation of therapy (DOT) will promote adherence to TB treatment.<sup>6</sup> Promoting adherence through a patient-centred approach is effective and has been advocated by the End TB Strategy.

Limited studies had shown the effect of adherence to favourable treatment outcome.<sup>7, 8</sup> Some studies highlighted the reasons for non-adherence among TB patients,<sup>9,10</sup> which can include health service factors (organization of treatment and care), social context (family, community and household influences) and the financial burden of treatment.<sup>11</sup> Another study identified poor quality of TB service delivery in public health facilities as a key determinant of low adherence to treatment.<sup>12</sup> Poor adherence to TB medication can result in prolonged treatment, higher cost of treatment, increase transmission of TB infections, and the development of drug resistant TB. The long treatment duration of TB increases the risk of treatment interruption which contributes to prolonged infectiousness, drug resistance, relapse, and death.<sup>13,14</sup>

Multidrug-Resistant Tuberculosis (MDR-TB) is TB that is laboratory-confirmed to be resistant to both rifampicin and isoniazid.<sup>1</sup> It has become the major form of the drug-resistant TB epidemic which is driven by programme-related factors, health system-related factors, and patient-related factors.<sup>15</sup> The programme-related factors include poor or no monitoring of treatment and the health system-related factors include inadequate treatment regimens, inadequate dosage, poor quality drugs, lack of DOT system, poor infection control practices, and poor patient treatment adherence counselling, while patient-related factors include poor adherence to TB treatment, history of previous TB treatment, and adverse effects of TB drugs. The treatment of MDR-TB is very challenging and resource intensive as it entails a longer duration of treatment, many drugs/pills intake per day, more baseline and follow-up investigations, more human and financial resources when compared to drug-susceptible TB. To reduce the cost of hospital treatment, community-based treatment model was introduced and these two models; community-based and hospital-based models are operational in Nigeria.

There is paucity of studies comparing adherence to MDR-TB treatment in both models in the study area. There are also limited studies comparing adherence to MDR-TB treatment among patients in both models of care<sup>16,3</sup>. This study is aimed at determining and comparing the level of adherence to treatment among MDR-TB patients treated in hospital-based and community-based models of care in Kaduna State, Nigeria.

## METHODOLOGY

The study was conducted in the MDR-TB Treatment ward, National Tuberculosis and Leprosy Training Centre, (NTBLTC) Zaria and the community DR-TB programme of the Kaduna State Tuberculosis and Leprosy Control Programme (KDSTBLCP). The MDR-TB Treatment ward which was commissioned for use in 2012 and the KSTBLCP are supported financially to care for MDR-TB patients by the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). The patients are mainly from Kaduna State. The NTBLTC has medical doctors and nurses trained in MDR-TB management and is the only hospital in the state where MDR-TB patients are admitted, initiated on treatment and the intensive phase treatment completed before they are discharged home to complete their continuation phase treatment in the community. The centre has a 40-bed MDR-TB treatment ward that has capacity to admit 20 males and 20 females. At most times the centre is said to be 80-90% full. Over 250 MDR-TB patients have been initiated on treatment in the centre since the inception of MDR-TB management as of December, 2019. MDR-TB patients when admitted are entitled to adequate and proper nutrition at the expense of the GFATM. They are also provided with logistic support to ensure they are comfortable during their stay in the ward and visit to the centre or any other designated facility nearest to them for follow up routine check-ups.

The KDSTBLCP was established in 1997 following the signing of the first Memorandum of Understanding with the Netherlands Leprosy Relief. Programme implementation is organized at both local government and state level. Activity implementation and data reporting from

facilities providing DOT and laboratory services are done on a quarterly basis through the Local Government TB and Leprosy Supervisors (LGTBLS) to the STBLCP and there are 23 LGTBLS that are responsible for TB implementation in the 23 local government areas. All the LGTBLS have been trained on the clinical and programmatic management of DR-TB and they support the management of MDR-TB patients in the community. The community-based model of care is implemented by the KDSTBLCP DR-TB team and supported by 6 hospitals across the state (Barau Dikko Teaching Hospital Kaduna, General Hospital Kafanchan, Gwamna Awan Hospital Kakuri, Bilba Hospital Tudun Wada, Nasuha Hospital Rigasa and Wilbasun Hospital Narayi), where MDR-TB patients initiated on treatment in the community usually present monthly and are reviewed on an outpatient basis, and their concerns regarding treatment are attended to. During this monthly visit, routine investigations and examinations are carried out. MDR-TB treatment in the community is provided by the local government area (LGA) team which is made up of the local government TB & leprosy supervisor (LGTBLS), a medical officer, and a nurse. When diagnosis of MDR-TB is confirmed, the State DR-TB focal person and the LGTBLS visit the patient's home and provide health education to the patient and their relatives on the patient's health status, treatment duration, need for adherence, cough etiquette, and informs the patient on the 2 models of care available for a choice to be made. If the community model is chosen arrangement for baseline investigations is done. A consent form is signed by the patient and drugs are requested from the NTBLCP for the patient. At the completion of baseline investigations, the DOT provider (nurse) and the LGTBLS counsel patients and their relations on the side effects of the drugs, the need for DOT, the follow-up investigations schedule and treatment monitoring.

This was a comparative cross-sectional descriptive study design, using mixed method of quantitative and qualitative data collection. The study population comprised a cohort of 267 patients who are 18 years and above and were confirmed to have MDR-TB and enrolled for

MDR-TB treatment in the NTBLTC MDR-TB treatment centre, Zaria and the Kaduna State community DR-TB programme from January, 2013 to December, 2018. MDR-TB patients who were pregnant and had co-morbidities are usually managed in the hospital-based model, therefore they were excluded from the study. This study was part of a larger study and the sample size was determined using the formula for comparative study for comparing proportions<sup>17</sup> as shown below:

$$n = \frac{2(Z\alpha + Z\beta)^2 [P_1(1-P_1) + P_2(1-P_2)]}{(P_2 - P_1)^2}$$

Where;

- n = minimum sample size in each group
- Z $\alpha$  = Critical ratio at significance level of 95% = 1.96
- Z $\beta$  = Critical ratio at statistical power at 80% = 0.84
- P<sub>1</sub> = Treatment Success rate of hospital-based care
- P<sub>2</sub> = Treatment Success rate of community based care

A proportion of 52%<sup>18</sup> and 75.8%<sup>19</sup> from previous studies in an hospital-based study and a community-based study of MDR-TB treatment respectively was used in calculating the sample size which gave an estimated minimum sample size of 118 for each arm of the study. However, to reduce sampling error and to improve the power of the study to detect statistical differences in measured estimates and increase the confidence in the measured estimates between the two groups, the total eligible patients were used for the study as they had treatment outcomes. A total of 188 participants were recruited for the community-based arm while 172 were recruited for the hospital-based arm. Participants who initiated and completed intensive phase treatment in the hospital were included in the hospital-based arm of the study while those who initiated treatment and did not complete intensive phase treatment in the hospital were excluded from the study. While participants who initiated and completed the intensive phase treatment in the community were included in the community-based arm of the study. However, during the adherence assessment in the continuation phase of treatment and follow up, only those that were available participated

explaining the difference in numbers of participants who has treatment outcomes and adherence scores.

An interviewer-administered questionnaire adapted from previous study was used to collect information on socio-demographic characteristics and adherence to treatment<sup>21</sup> and a review of records guide (patient record data abstraction form) developed by the researchers from literature review and based on the objectives of the study was used to obtain complementary information from the patient treatment card, community DR-TB state central register and treatment registers. Adherence to treatment was measured by asking questions adapted from a Medication Adherence Scale.<sup>20</sup> The adherence assessment was done for study participants during their continuation phase of treatment and follow-up. The eight-item Morisky Medication Adherence Scale (MMAS-8) used in the study assessed self-reported measure of medication-taking behaviour using eight items measuring the failure of adherence when taking medication.<sup>21</sup> Each item measures a specific medication-taking behaviour. The responses for the items are yes/no except for one item which is on a five-point Likert scale. A "Yes" response was scored 1 and a "No" response was scored 0. The item on five-point Likert scale was recoded to a yes and no option to enable scoring of either 0 or 1 score. An aggregate score of 0-3 was categorized as Good Adherence while an aggregate score of 4-8 was categorized as Poor Adherence.<sup>22</sup>

These tools were pre-tested and relevant adjustments were made to ascertain their validity, reliability and acceptability. The quantitative tools were entered into Open Data Kit (ODK) software version 1.16.1 using an android hand - held smart devices. The tool was scripted to prevent or minimize data entry errors, ease timely data collection, ensure completeness of information, and subsequent processing and analysis.

Quantitative data analysis was done using IBM Statistical Package for Social Sciences (SPSS) version 25.0 software. Data was cleaned for correctness and completeness. Recoding,

categorization and computation were performed where applicable.

Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were carried out to complement the quantitative data on adherence to treatment. Participants for the FGDs were patients receiving MDR-TB treatment and participants for the KII were medical officers reviewing patients in six hospitals, matron in charge of the NTBLTC MDR-TB ward and three treatment supporters in the community. A total of eight FGDs (two at the hospital-based site; male and female groups, six at the community-based sites; three male and three female groups spread across the three senatorial districts of the state) and ten KII participants were purposively selected (one at the hospital-based site, six at the hospitals where monthly outpatient reviews are done for MDR-TB patients initiated for treatment in the community across the state and three were done for treatment supporters).

The FGDs were conducted with the aid of an FGD guide and it took about 60-90 minutes. All interviews were audio-recorded with permission and notes taken. The socio-demographic characteristics of the participants were documented, ground rules were agreed on and ten questions were used to guide the discussion. Each focus group was made up of six to eight participants depending on the available numbers purposively selected to further explain factors influencing adherence to MDR-TB treatment.

The Key Informant Interviews were conducted among healthcare workers who were involved in the management of MDR-TB patients in the hospital-based and community-based models of care. An interview guide aimed at probing factors affecting adherence to treatment from the healthcare worker's perspective was used in interviewing seven healthcare workers and three treatment supporters. Responses were documented during and immediately after the interview. With the informant's consent, the interviews were tape recorded to ensure complete documentation and accurate recall of the interview.

The final treatment outcome was determined by counting the treatment outcome observed for each participant at the end of treatment. Those who achieved cure and/or treatment completion were calculated and regarded as treatment success while those who failed treatment, died, or were lost to follow up were calculated and regarded as unfavourable treatment outcomes.

Data processing and analysis started with computing the percentages of MDR-TB patients who are deemed to be adherent to treatment. For univariate analysis, descriptive statistics was conducted using mean and standard deviation (for normally distributed continuous data) and median and interquartile range (for skewed data). Simple frequencies and percentages were reported for categorical data. Data was presented in the form of tables and charts using Microsoft Office Excel 2016.

Bivariate analysis was used to examine the association between dependent and independent variables. Continuous data was checked for conditions necessary for parametric tests and Chi square test or Fisher's Exact Test was conducted for association between categorical variables. The FGDs and KII were transcribed manually and content analysis was done. All tapes were listened to severally and texts were read several times to identify statements that relate to the topic of analysis. These statements were then condensed. The findings were then presented in narrative form as prose.

Ethical approval was obtained from the Kaduna State Ministry of Health (MOH/ADM/744/Vol.1/531) and the National TB and Leprosy Training Centre, Zaria ethics committees (NHREC/01/02/2007-19/07/2018) and informed consent obtained from the respondents. Confidentiality of information was assured to all participants.

## RESULTS

Among the patients that had hospital-based treatment, majority were males (73.3%) with a median (IQR) age of 34 (27-43) years. Similarly, among the patients treated in the community, majority were males (71.8%) with a median (IQR) age of 33 (27-40) years. There were no statistically significant differences between the sex and age group distributions of the two groups. However, differences were observed in the marital status distribution ( $p=0.002$ ), educational status distribution ( $p=0.001$ ) and occupational distribution ( $p=0.007$ ) in both models of care. (Table 1)

**Table 1: Comparison of socio-demographic characteristics of patients treated between both models**

<b>Variable</b>	<b>Community Based (n=188)</b>	<b>Hospital based (n=172)</b>	<b>Statistics</b>
<b>Sex</b>	<b>n (%)</b>	<b>n (%)</b>	
Male	135 (71.8)	126 (73.3)	$\chi^2=0.94$
Female	53 (28.2)	46 (26.7)	p=0.759
<b>Age group (years)</b>			
≤29	66 (35.1)	57 (33.1)	$\chi^2=1.829$
30-39	62 (33.0)	51 (29.7)	
40-49	39 (20.7)	46 (26.7)	p=0.609
≥50	21 (11.2)	18 (10.5)	
<b>Tribe</b>			
Hausa	160 (85.1)	148 (86.0)	$\chi^2=0.064$
Others	28 (14.9)	24 (14.0)	p=0.800
<b>Religion</b>			
Islam	102 (54.3)	115 (66.9)	$\chi^2=5.961$
Christianity	86 (45.7)	57 (33.1)	p=0.015
<b>Marital Status</b>			
Married	138 (73.4)	99 (57.6)	$\chi^2=10.027$
Not Married	50 (26.6)	73 (42.4)	p=0.002
<b>Educational Status</b>			
No formal education	21 (11.2)	42 (24.4)	$\chi^2=10.920$
Formal education	167 (88.8)	130 (75.6)	p=0.001
<b>Employment Status</b>			
Not Employed	54 (28.7)	54 (31.4)	$\chi^2=0.305$
Employed	134 (71.3)	118 (68.6)	p=0.581
<b>Occupation*</b>			
Farmer	24 (17.9)	28 (23.7)	$\chi^2=21.067$
Businessman	67 (50.0)	44 (37.3)	
Artisan	12 (9.0)	12 (10.2)	p=0.007
Civil Servant	27 (20.1)	14 (11.9)	
Others	4 (3.0)	20 (16.9)	
<b>Monthly Income* (N)</b>			
≤ 29,999	58 (43.3)	40 (33.9)	$\chi^2=0.217$
≥ 30,000	76 (56.7)	78 (66.1)	p=0.641

*\*The denominator for occupation and monthly income was restricted to only those employed in both models.*

**Table 2: Comparison of medication adherence for respondents between both models**

<b>Medication Adherence</b>	<b>Comm-Based (n=147)^</b>	<b>Hosp-Based (n=120)^</b>
<b>Medication Adherence Domain</b>	<b>Yes</b>	<b>Yes</b>
	<b>n (%)</b>	<b>n (%)</b>
Do you sometimes forget to take your medicine?	94 (63.9)	37 (30.8)
Over the past 2 weeks, were there any days when you did not take your medicine other than forgetting?	69 (46.9)	27 (22.5)
Did you ever reduce or stopped taking your medicine without telling your care provider because you felt worse when you took it?	91 (61.9)	24 (20.0)
When you travel or leave home, do you sometimes forget to take along your medicine?	74 (50.3)	9 (7.5)
Did you take all your medicines yesterday?	109 (74.1)	107 (89.2)
Do you ever feel under pressure about sticking to your treatment plan?	81 (55.1)	42 (35.0)
Do you often have difficulty with remembering to take all your medicines?	20 (13.6)	20 (16.7)
When you feel like your symptoms are under control, do you sometimes stop taking your medicine?	93 (63.3)	46 (38.3)
<b>Level of medication adherence</b>		
Good adherence	53 (36.1)	95 (79.2)
Poor adherence	94 (63.9)	25 (20.8)
	$\chi^2=51.891$	$p< 0.0001$

*^ Total is different from Table 1 above because some of the study population died or were lost to follow up as at the time adherence assessment were being done for both arms of the study*

Table 2 captured participants that were assessed during the continuation phase of treatment and follow up period for treatment adherence. Ninety-four (63.9%) and 37 (30.8%) of respondents sometimes forget to take their medicine in the community and hospital-based model respectively. While 93 (63.3%) and 46 (38.3%) stopped taking their drugs when their symptoms were under control in the community and hospital-based model respectively. Fifty-three (36%) and 95 (79%) of the respondents had good adherence in the community and hospital-based model respectively, and this difference was statistically significant between both models of treatment.

The distribution of treatment outcomes shows a comparable cured proportion of 92 (48.9%) and 83 (48.3%) and treatment completion by respondents in community and hospital-based model respectively. The treatment success rates of 78.7% and 76.2% in the community and hospital-based models are similar. (Table 3)

**Table 3: Treatment outcome among respondents by the model of treatment**

Treatment Outcome	Community Based (n=188)	Hospital Based (n=172)	Statistics/ p-value
	<b>n (%)</b>	<b>n (%)</b>	
Cured	92 (48.9)	83 (48.3)	$\chi^2=18.958$ p=0.001
Treatment Completed	56 (29.8)	48 (27.9)	
Treatment Failure	12 (6.4)	3 (1.7)	
Died	22 (11.7)	35 (20.3)	
Loss to Follow Up	6 (3.2)	3 (1.7)	
<b>Treatment Success</b>			
Yes	148 (78.7)	131 (76.2)	$\chi^2=0.035$ p=0.851
No	40 (21.3)	41 (23.8)	

**Profile of the FGD and KII Participants**

The 15 FGD participants from the hospital-based site (male and female groups) were aged between 31 and 52 years and educational qualifications from no formal education and tertiary. The 38 FGD participants from the community-based site (male and female groups) were aged between 29 and 53 years and educational qualifications ranging between no formal education and tertiary.

The 10 KII participants were 6 females and 4 males aged between 28 and 58 years from the NTBLTC MDR-TB Treatment centre, 6 hospitals supporting the community-based model where monthly outpatient reviews are done and 3 treatment supporters supporting the community-based model. They have more than 2 years' experience providing treatment services for MDR-TB treatment and between secondary and tertiary levels of education.

**Factors affecting Adherence to treatment**

On family and community support, since diagnosis and commencement of treatment, most of the participants agreed that they have been getting some support from their family members and friends. While others said some family members and friends have been avoiding them for fear of being infected. One of the discussants said, *“my family have been very supportive, they have been praying for me for this problem to be over and I know that it will be over very soon”* (Male, 32yrs, Hospital-based model, FGD). Although, some said that their family and friends are worried about getting infected, and that they

avoid coming close since they learned about the nature of the disease. They said friends and family are scared of getting infected so they do not spend much time with them and do not engage them in their usual discussions. They said being in the hospital reduces the stigma from these unsupportive and scared family and friends and motivates them to complete their medication so that they can get well on time and get back to their businesses.

One participant said, *“my friends and family members no longer spend time with me during discussions, they are always in a hurry when talking to me”* (Female, 30yrs, Community-based model, FGD3). Another patient said *“since I became sick and they told my husband the nature of the disease he abandoned me to my parents without asking me how I have been faring but I thank God I am alive”* (Female, 33yrs, Hospital-based model, FGD). Others said some immediate family members have remained supportive with reminders for regular drug taking and clinic visits, encouraging them to take their treatment seriously.

On factors militating against taking their drugs regularly, most of the participants listed the following: inability to purchase food supplies, irregular payment of patient support, occasional dissatisfaction with treatment services, lack of family/social support, vomiting and feeling of wanting to vomit, painful injection sites and irregular supply of drugs.

One discussant said *“These drugs are too strong, when I take them, they break all my body and if I don't*



eat and I take them my body go break down. So, if I no see food to take, I go just refuse to take them at times" (Male, 42yrs, Hospital-based model, FGD). Another said, "Keeping me here, I start thinking of my family and friends and it makes me sad and when I get sad, I don't want to talk with anyone and will not want to cooperate with those giving me drugs, so they can discharge me home" (Male, 32yrs, Hospital-based model, FGD).

A discussant revealed that he was not appropriately counselled and prepared for treatment; "They just told me to come here for treatment, and on getting here they told me I will stay here for four months and I can't be allowed to go home on weekends, is it how to treat somebody" (Male, 45yrs, Hospital-based model, FGD). Some emphasized that pain from injection sites and vomiting makes them to be scared of continuing their treatment.

One said "whenever I remember the pain I will feel when I am getting my treatment, I will just want to run away" (Female, 30yrs, Hospital-based model, FGD). Another said, "the vomiting is too bad as if I am pregnant" (Female, 29yrs, Hospital-based model, FGD). Other participants identified the many drugs they have to take a day, the feeling of wanting to vomit, and generalised body weakness they experience whenever they take their drugs as factors discouraging them from taking their drugs regularly.

One discussant said, "as soon as I take my drugs, I will not be able to do anything again for the day, I will become useless to myself" (Male, 38yrs, Community-based model, FGD3).

On factors that facilitate regular intake of their drugs, majority of the participants listed the following factors: the practice of someone coming to see and observe them take their drugs, availability of free treatment, provision of financial support for transportation, free food supplies and friendly/supportive healthcare providers and provision of health education to MDR-TB patients.

One of the participants said "The person that usually support me will always come and ensure that I take my medicines and the time he is unable to come he

will call to find out if I have taken my drugs" (Male, 50yrs, Community-based model, FGD).

Another patient said, "Before I started treatment, I was told what I need to do to get better on time and how not to infect others" (Male, 44yrs, Hospital-based model, FGD). A discussant said "The way my healthcare provider talks to me and encourages me gives me hope that I will get better when I take all my drugs properly" (Male, 37yrs, Hospital-based model, FGD).

One said, the drugs enhance his libido and that makes him to always like to take the drug as captured: "The medicine gives me power and it always make my wife to be happy with me" (Male, 50yrs, Hospital-based model, FGD).

They generally agreed that the hope of getting better is a motivation for continuing with the treatment. Also, they agreed that encouragement from family members and loved ones motivate them to want to get better on time. All the participants agreed that regular encouragement from their healthcare providers and the feeling of getting better each day with the drugs is motivating to continue with the drugs. One of the participants said "the drugs made him to have energy to perform his duties as a man at times". According to him, "The drugs make me to have energy to perform my duties as a man" (Male, 48yrs, Community-based model, FGD). Most of the participants said the hope of getting cured is enough motivation for them to bear all the pains and stigma to keep taking their drugs as much as they could. Another participant said, "whenever I see my friends visit and encourage me, it is a morale booster and motivation for me to always take my drugs" (Female, 34yrs, Community-based model FGD). While another said, "whenever I see my children, I don't want them to have the same problem I have and I don't want to die and leave them so I will take my medicines so that I will be well again" (Female, 29yrs, Community-based model, FGD).

The KII participants alluded to the fact that some patients do not adhere to their treatment when they feel they are better and can do without the drugs.

One participant said, *“imagine when they start treatment, they will do whatever you tell them to do, in fact they will tell you they are willing to do anything but as soon as they feel much better and stronger, they will be giving you excuses why they don't want to be regular on their drugs”* (Male, 43yrs, HCW). Others stop taking their drugs when they experience serious side effects of the drugs.

Another said, *“these drugs have serious side effects on the patients, to the extent they will ask you if there is another drugs they can take with milder effect on them”* (Female, 36yrs, HCW).

When side effects experienced are addressed and health education re-enforced, they adhere better to their treatment. A participant said, *“whenever I noticed that they are not being enthusiastic about taking their drugs or trying to ask for alternatives, I remind them about the importance of adhering and tell them it is for a while they will soon complete their drugs and how far they had come in the journey they get motivated to continue with their drugs”* (Female, 39yrs, Treatment supporter).

Also, they recommended provision of financial and food support to the patients while on treatment as incentives to adhere to treatment.

A participant said, *“the financial incentives they get also serve as motivation as some of them are very poor and they look forward to getting their financial support while on treatment, whenever it is delayed they are not happy”* (Female, 44yrs, HCW).

## DISCUSSION

This study showed that adherence to medication is better among patients initiated in the hospital-based model than those initiated in the community-based model. This may be due to the fact that patients initiated in the hospital had very experienced and trained nurses and medical doctors providing care under a strict/regimented protocol during their intensive phase of treatment where health education and the need to adhere to treatment were emphasised and re-enforced. Also, whenever they developed side effects or adverse drug reactions during treatment it was promptly attended to making them to be more receptive to

their treatment. During their stay in the hospital, they were provided with free meals and the intensive phase of treatment is very critical to a successful outcome of treatment. With a smooth initiation of treatment and all attendant problems promptly attended to in the hospital, it primed them up in a better to state to adhere and complete their treatment when compared to their community-based counterpart who did not enjoy some of these incentives of free meals, re-enforced health education and having healthcare providers close by. This finding is similar to what was reported in a study aimed at assessing the intensive-phase treatment outcomes among all MDR-TB in-patients receiving treatment in Nigeria, which concluded that hospitalization was effective in ensuring treatment adherence and hospital-based care promotes adherence to treatment during intensive phase of MDR-TB treatment.<sup>16</sup> Factors in this study that are similar to our study are; availability of experienced and trained healthcare providers, patients admitted for MDR-TB treatment were supported by non-governmental organizations which provided complete nutritional support (three nutritionally balanced meals were served to each patient daily), stipends to make phone calls to their homes and provision of recreation activities such as games, books and films. Also, family and friends were allowed to visit in-patients over the weekend.

Good adherence to medication among majority of patients found in the hospital-based model in this study is similar to what was reported in Kenya<sup>3</sup>, Zambia<sup>23</sup>, Ethiopia<sup>24</sup>, South Africa<sup>25</sup>, Latvia<sup>7</sup> and in a systematic review and meta-analysis study among migrant MDR-TB patients on treatment.<sup>26</sup> Poor adherence among majority of patients found in the community-based model in this study could be due to stigma and fear of being exposed to Tuberculosis by the family members and treatment supporters who may not be very supportive to patients on treatment.<sup>1127</sup>

During admission, healthcare providers spend much time and resources in educating patients on the need for adherence to treatment to ensure better treatment outcome unlike those in the community where less time and resources might have been spent, as patient education has been

shown to enhance adherence to treatment.<sup>28</sup> This study showed that patients initiated in the hospital-based model had more support in terms of free feeding, access to financial support for family members to visit and ready access to follow up investigations and ancillary drugs. These could be enabling factors to self-motivate them to adhere to their treatment to get cured. Adherence to MDR-TB treatment is vital for a successful treatment outcome and prevention of development of extensively drug resistance. This should be emphasised to healthcare providers in the community who should also be adequately trained on the importance of adherence to treatment. There should be mechanisms such as regular health education, prompt treatment of side effects, support by family and community-based organizations, etc. to re-enforce the importance of adhering to treatment to MDR-TB patients while on treatment.

**Limitations of the Study:** Data used for measurement of adherence was based on self-reporting, hence, prone to response bias (social desirability bias). Future studies should be conducted to determine and demonstrate adherence to TB treatment using more objective ways of assessing adherence in addition to the adherence scale used in this study.

**Conclusions:** Adherence to medication is better among patients initiated in the hospital-based model than those initiated in the community-based model.

**Recommendation:** Healthcare providers implementing the community MDR-TB treatment should be trained on the various mechanisms for enhancing better adherence to treatment by MDR-TB patients during the period of treatment.

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