

Bridging the Gap in Multidrug-Resistant Tuberculosis Care: A Mixed-Methods Study of Treatment Outcomes, Enrolment, and Caregiver Perspectives in Oyo State, Nigeria

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International Foundation Against Infectious in Nigeria

Research Article

Keywords: MDR-TB, treatment outcomes, enrolment, adherence, mixed-methods, Nigeria

Posted Date: May 18th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9475792/v1>

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Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Microbiology on August 18th, 2026.
See the published version at <https://doi.org/10.1186/s12866-026-05541-3>.

Abstract

Background:

Multidrug-resistant tuberculosis (MDR-TB) remains a major public health challenge, particularly in high-burden countries like Nigeria. Despite advances in diagnosis and treatment, gaps in treatment enrollment and completion continue to undermine control efforts.

Problem Statement:

Limited evidence exists on how caregiver perspectives and health system factors influence MDR-TB treatment enrolment and completion in Nigeria, particularly in subnational settings such as Oyo State.

Methods:

A descriptive cross-sectional mixed-methods study was conducted. Quantitative data were obtained from a retrospective review of 277 MDR-TB patient records (2016–2022), while qualitative data were collected through in-depth interviews with 10 caregivers, including healthcare workers, tuberculosis and leprosy supervisors, and community-based organization representatives. Descriptive statistics and chi-square tests were used for quantitative analysis, while thematic analysis was applied to qualitative data.

Results:

The majority of patients were aged ≥ 30 years (70.4%) and male (52.3%). Overall, 75.8% achieved favorable treatment outcomes (63.2% completed, 12.6% cured), while 24.2% experienced unfavorable outcomes, including loss to follow-up (11.6%) and death (6.9%). No significant associations were found between socio-demographic or clinical characteristics and treatment outcomes ($p > 0.05$). Between 2020 and 2022, only 42.2% of detected MDR-TB cases were enrolled in treatment, despite improved enrolment rates in 2022 (51.3%). Qualitative findings identified key facilitators, including treatment effectiveness, counselling, free care, financial support, and strong health system engagement. Major barriers included poverty, stigma, long treatment duration, poor adherence, and disruption of livelihood.

Conclusion:

Although MDR-TB treatment success rates were relatively high, significant gaps remain in treatment enrolment and completion. Addressing socioeconomic barriers, strengthening patient support systems, and improving linkage between diagnosis and treatment are critical to enhancing MDR-TB outcomes.

Clinical Trial Registration:

Not applicable. This study was a descriptive cross-sectional mixed-methods study involving retrospective record review and qualitative interviews, and therefore did not require clinical trial registration.

Introduction

Tuberculosis (TB) remains a major global public health challenge and continues to cause substantial morbidity and mortality worldwide [1]. Despite significant progress in TB control over the past decades, the emergence of drug-resistant forms of the disease—particularly multidrug-resistant tuberculosis (MDR-TB) has become a major threat to global TB elimination efforts [2]. MDR-TB is defined as tuberculosis caused by *Mycobacterium tuberculosis* strains resistant to at least isoniazid and rifampicin, the two most potent first-line anti-tuberculosis drugs [3]. The management of MDR-TB is considerably more complex than drug-susceptible TB because treatment requires prolonged regimens, expensive second-line drugs, and close clinical monitoring, all of which place additional strain on health systems, especially in resource-limited settings [1]. According to the World Health Organization, hundreds of thousands of new cases of MDR-TB are reported globally each year, with a substantial proportion occurring in low- and middle-income countries, including those in sub-Saharan Africa [1].

Nigeria is among the countries with the highest TB burden globally and contributes significantly to the global burden of both TB and drug-resistant TB [4]. Although the country has made notable progress in TB control through the implementation of the Directly Observed Treatment Short-Course (DOTS) strategy and expansion of diagnostic services, the increasing prevalence of MDR-TB continues to pose serious challenges to effective disease control. Studies have reported high rates of drug resistance among TB patients in Nigeria, particularly among individuals previously treated for TB, highlighting ongoing transmission and treatment challenges within the country [5]. In addition, TB remains associated with considerable mortality. For example, Adamu et al. reported a mortality rate of 16.6% among TB patients receiving treatment in a tertiary hospital in northern Nigeria, underscoring the severity of the disease burden and the need for improved treatment outcomes [6].

The successful management of MDR-TB is influenced by multiple factors related to health systems, socioeconomic conditions, and patient-level experiences. Nigeria's healthcare system continues to face several structural constraints, including limited funding, inadequate human resources, and unequal distribution of healthcare services between urban and rural areas. Weak laboratory infrastructure and limited diagnostic capacity may delay the identification of drug-resistant TB cases, thereby hindering timely initiation of appropriate treatment [7]. Although the introduction of rapid diagnostic technologies such as GeneXpert has improved the detection of drug-resistant TB, access to these technologies remains uneven across many parts of the country [8].

Beyond health system constraints, socioeconomic factors play an important role in shaping treatment outcomes for MDR-TB patients. Poverty, limited education, and poor access to healthcare services can affect patients' ability to seek care early and adhere to treatment regimens [9]. MDR-TB treatment typically lasts up to two years and is often associated with significant adverse drug reactions. These challenges, combined with financial constraints and transportation barriers, can make treatment adherence difficult for many patients. Consequently, treatment interruptions, loss to follow-up, and poor treatment outcomes remain common concerns in MDR-TB management programs.

Despite these challenges, several facilitators have been identified that support successful MDR-TB treatment outcomes. Healthcare workers and community-based organizations play critical roles in providing patient education, adherence monitoring, psychosocial support, and treatment supervision. Evidence suggests that when patients receive comprehensive support, including psychological counseling, nutritional assistance, transportation support, and treatment supervision treatment outcomes can significantly improve [10]. The commitment and dedication of frontline TB program staff, including Directly Observed Treatment (DOT) workers and tuberculosis program supervisors, are therefore essential components of effective MDR-TB management.

Although previous studies in Nigeria have largely focused on the epidemiology, clinical outcomes, and risk factors associated with TB and MDR-TB, relatively little attention has been given to the perspectives of caregivers and frontline health workers involved in implementing MDR-TB treatment programs. These individuals; including DOT workers, community-based organization staff, and tuberculosis and leprosy supervisors play a central role in facilitating patient enrolment, supporting treatment adherence, and ensuring completion of therapy. Understanding the facilitators that support their work, as well as the barriers they encounter in delivering MDR-TB services, is crucial for strengthening treatment programs and improving patient outcomes.

Therefore, this study aims to investigate the perceived facilitators and barriers associated with MDR-TB treatment enrolment and completion among caregivers involved in tuberculosis control programs in Oyo State, Nigeria. By exploring the experiences and perspectives of frontline caregivers responsible for treatment delivery, this study seeks to generate evidence that can inform targeted interventions, strengthen MDR-TB treatment programs, and ultimately improve treatment outcomes in Nigeria.

Materials and Methods

Study Area

The study was conducted in Oyo State, southwestern Nigeria. The state is predominantly urban, with Ibadan as its capital and one of the largest cities in the country. Oyo State has a mix of public and private healthcare facilities, including primary, secondary, and tertiary institutions that provide tuberculosis (TB) and multidrug-resistant TB (MDR-TB) services. Despite the availability of these services, MDR-TB

remains a significant public health challenge in the state, with gaps in diagnosis, treatment access, and patient adherence.

Study Design

This study employed a descriptive cross-sectional design using a mixed-methods approach. The quantitative component involved a retrospective review of MDR-TB patient records over a five-year period (2017–2022). The qualitative component involved in-depth interviews with healthcare workers (HCWs), tuberculosis and leprosy supervisors (TBLS), and community-based organization (CBO) representatives to explore facilitators and barriers to MDR-TB treatment enrolment and completion.

Study Population

The study population comprised individuals involved in MDR-TB care and support in Oyo State, Nigeria, including healthcare workers directly engaged in MDR-TB diagnosis and management, TBLS providing treatment support, and representatives of community-based organizations involved in MDR-TB-related activities.

Healthcare workers eligible for inclusion had at least six months of experience in MDR-TB care and were actively practicing within Oyo State. CBO representatives were those involved in MDR-TB awareness, advocacy, or patient support, while TBLS were individuals directly supporting MDR-TB patients throughout their treatment.

Individuals not directly involved in MDR-TB care, those not practicing within Oyo State, and CBO representatives not engaged in MDR-TB-related activities were excluded from the study.

Sample Size Determination

For the qualitative component, purposive sampling was used to select participants from MDR-TB treatment sites across Oyo State. Two respondents were selected per site: one healthcare provider and one TBLS. The final sample size was guided by the principle of data saturation.

For the quantitative component, all available records of MDR-TB patients diagnosed and enrolled in treatment between 2017 and 2022 across MDR-TB treatment facilities in Oyo State were included.

Sampling Technique

A purposive sampling technique was used to recruit participants for the qualitative component. Participants were selected from MDR-TB treatment facilities, particularly those with high patient burden. Eligible participants included directly observed treatment (DOT) officers, TBLS, community health

workers, and caregivers involved in MDR-TB patient management and support. Participation was voluntary, and written informed consent was obtained prior to data collection. Participants were required to communicate in English, Pidgin English, or a local language.

Study Instruments

Data were collected using a structured questionnaire, a data abstraction form, and a semi-structured interview guide. The structured questionnaire was used to obtain information from HCWs, CBO representatives, and TBLS in line with the study objectives. The data abstraction form was used to extract retrospective data from MDR-TB program records, while the interview guide contained open-ended questions to explore facilitators and barriers to MDR-TB treatment enrolment and completion.

Data Collection

Data collection was conducted using both quantitative and qualitative approaches.

For the quantitative component, retrospective data were extracted from MDR-TB program records obtained from the State Drug-Resistant TB focal unit. Variables collected included the total number of MDR-TB cases diagnosed, number enrolled in treatment, and sex distribution.

For the qualitative component, in-depth interviews were conducted with selected HCWs and TBLS to explore their experiences, perceptions, and challenges related to MDR-TB care. Interviews were audio-recorded, conducted using a semi-structured guide, lasted approximately 30 minutes, and were transcribed verbatim. Transcripts were translated into English where necessary.

Pretesting of Research Instrument

The data collection instruments were pretested in Osun State among a small group of healthcare workers and TBLS with similar characteristics to the study population. Feedback from the pretest was used to refine the instruments for clarity, relevance, and completeness.

Data Analysis

Quantitative data were entered and analyzed using Microsoft Excel. Descriptive statistics, including frequencies and percentages, were computed and presented using tables and figures.

Qualitative data were analyzed using thematic analysis. Transcripts were reviewed independently by at least two researchers to ensure accuracy and completeness. Codes were generated inductively and grouped into categories, from which themes were developed based on patterns and relationships.

Ethical Considerations

Ethical approval

for the study was obtained from the Oyo State Ministry of Health Ethical Review Committee. Informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were maintained throughout the study.

Results

Table 1
Socio-demographic and clinical characteristics of MDR-TB patients (n = 277)

Variable	Category	Frequency	Percentage (%)
Year of enrolment	2016	36	13.0
	2017	32	11.6
	2018	43	15.5
	2019	50	18.1
	2020	28	10.1
	2021	74	26.7
	2022	14	5.1
Age group (years)	0–10	6	2.2
	10–19	12	4.3
	20–29	64	23.1
	≥ 30	195	70.4
Sex	Male	145	52.3
	Female	132	47.7
Site of infection	Pulmonary	277	100.0
Registration status	New	159	57.4
	Relapse	47	17.0
	Treatment after failure	26	9.4
	Return after LTFU	9	3.2
	Transfer-in	29	10.5
	Others	7	2.5
HIV status	Negative	265	95.7
	Positive	12	4.3

A total of 277 MDR-TB patients were enrolled between 2016 and 2022. The highest proportion of enrolments occurred in 2021 (26.7%), while the lowest was recorded in 2022 (5.1%). The majority of patients were aged ≥ 30 years (70.4%), followed by those aged 20–29 years (23.1%). Children and adolescents accounted for a small proportion of cases. Slightly more than half of the patients were male (52.3%), indicating a marginal male predominance. All patients (100%) had pulmonary tuberculosis. Most patients were newly registered cases (57.4%), while relapse cases accounted for 17.0%. Other

categories, including treatment after failure (9.4%), transfer-in (10.5%), and return after loss to follow-up (3.2%), were less frequent. The majority of patients were HIV-negative (95.7%), with only a small proportion being HIV-positive (4.3%).

Table 2
Treatment outcomes among MDR-TB patients (n = 277)

Outcome	Frequency	Percentage (%)
Cured	35	12.6
Treatment completed	175	63.2
Treatment failed	3	1.1
Died	19	6.9
Loss to follow-up	32	11.6
Not evaluated	13	4.7
Favorable outcome (cured + completed)	210	75.8
Unfavorable outcome	67	24.2

Treatment outcomes showed that the majority of patients completed treatment (63.2%), while 12.6% were cured, resulting in an overall favorable outcome rate of 75.8%. Unfavorable outcomes included loss to follow-up (11.6%), death (6.9%), treatment failure (1.1%), and cases not evaluated (4.7%), accounting for a total of 24.2% of patients. These findings indicate that although treatment success was relatively high, a considerable proportion of patients still experienced suboptimal outcomes.

Table 3
Association between patient characteristics and treatment outcomes

Variable	Category	Favorable n (%)	Unfavorable n (%)	χ^2	p-value
Age group (years)	0–10	6 (100.0)	0 (0.0)	2.501	0.475
	10–19	8 (66.7)	4 (33.3)		
	20–29	49 (76.6)	15 (23.4)		
	≥ 30	147 (75.4)	48 (24.6)		
Sex	Male	104 (71.7)	41 (28.3)	2.793	0.096
	Female	106 (80.3)	26 (19.7)		
Registration status	New	118 (74.2)	41 (25.8)	4.195	0.522
	Relapse	34 (72.3)	13 (27.7)		
	Treatment after failure	23 (88.5)	3 (11.5)		
	Return after LTFU	8 (88.9)	1 (11.1)		
	Transfer-in	21 (72.4)	8 (27.6)		
	Others	6 (85.7)	1 (14.3)		
HIV status	Negative	202 (76.2)	63 (23.8)	0.572	0.449
	Positive	8 (66.7)	4 (33.3)		

There was no statistically significant association between age and treatment outcomes ($\chi^2 = 2.501$, $p = 0.475$), although children aged 0–10 years had a 100% favorable outcome. Similarly, while females had a higher proportion of favorable outcomes (80.3%) compared to males (71.7%), the association between sex and treatment outcome was not statistically significant ($\chi^2 = 2.793$, $p = 0.096$). Clinical characteristics also showed no significant associations. Registration status was not significantly associated with treatment outcomes ($\chi^2 = 4.195$, $p = 0.522$), despite slightly higher favorable outcomes among patients treated after failure and those returning after loss to follow-up. Likewise, HIV status was not significantly associated with treatment outcomes ($\chi^2 = 0.572$, $p = 0.449$), although a higher proportion of unfavorable outcomes was observed among HIV-positive patients compared to HIV-negative patients.

Table 4
MDR-TB case detection and enrolment (2020–2022)

Year	Cases detected	Cases enrolled	Enrolment (%)
2020	92	27	29.3
2021	224	63	28.1
2022	400	205	51.3
Total	716	295	42.2

Between 2020 and 2022, a total of 716 MDR-TB cases were detected, out of which 295 (42.2%) were enrolled in treatment. Although the number of detected cases increased substantially from 92 in 2020 to 400 in 2022, enrolment rates varied, with a notable improvement in 2022 (51.3%) compared to previous years. This trend suggests improvements in case detection and treatment enrolment over time, although a significant proportion of diagnosed patients were not enrolled in treatment.

Table 5
Socio-demographic characteristics of qualitative respondents (n = 10)

Variable	Category	Frequency	Percentage (%)
Age group (years)	< 50	2	20.0
	50–59	6	60.0
	≥ 60	2	20.0
Sex	Male	2	20.0
	Female	8	80.0
Education level	Secondary	2	20.0
	Tertiary	8	80.0
Years of experience	< 10 years	3	30.0
	≥ 10 years	7	70.0

A total of 10 respondents participated in the qualitative interviews. The majority were aged 50–59 years (60.0%), with equal proportions (20.0%) in the < 50 and ≥ 60 age groups. Most respondents were female (80.0%), had tertiary education (80.0%), and had been working for more than 10 years (70.0%). This indicates that the qualitative findings were largely informed by experienced and highly educated care providers.

Qualitative findings: Facilitators and barriers to MDR-TB treatment enrolment and completion

Care providers, including healthcare workers (HCWs), tuberculosis and leprosy supervisors (TBLS), and community-based organization (CBO) representatives, identified several key facilitators and barriers influencing MDR-TB treatment enrolment and completion in Oyo State. The findings are presented under two major themes: facilitators and barriers.

Facilitators of MDR-TB Treatment Enrolment and Completion

1. Perceived effectiveness and safety of MDR-TB treatment

Most respondents expressed strong confidence in the **effectiveness and safety** of MDR-TB medications, which positively influenced patient acceptance and adherence.

"The patients return to full health when used and it is very safe to the body." (DOT worker, private hospital)

"It is effective because it works where patients have been resistant to other treatments." (TBLS, SDP TB clinic)

Participants also highlighted that treatment reduces disease transmission and protects both patients and their families.

2. Role of counselling and health education

Counselling was identified as a critical facilitator, especially at the point of diagnosis and during follow-up visits. Care providers emphasized that initial fear and resistance among patients often decreased after counselling.

"Most patients are scared at diagnosis but accept treatment after counselling." (DOT worker, PHC)

Patients were reassured about treatment benefits, curability, and the importance of adherence.

3. Free treatment and financial incentives

The availability of free MDR-TB treatment was consistently reported as a major facilitator. In addition, financial and material support, including stipends, transportation allowances, and food provision, significantly improved treatment uptake and adherence.

"It is very helpful because it is free and this helps them accept." (DOT worker)

"Free treatment with stipend, accommodation, and feeding helps patients continue treatment." (TBLS)

4. Social and family support systems

Support from family members and treatment supporters was identified as a key enabling factor in improving treatment acceptance and continuity.

"After persuasion and support from family members, they usually accept treatment." (TBLS)

5. Health system support and follow-up mechanisms

Regular follow-up visits, patient monitoring, and support from healthcare workers contributed to improved treatment adherence. Participants also emphasized the need for increased staffing and community sensitization.

"More personnel for follow-up and more sensitization will improve treatment uptake." (TBLS)

Barriers to MDR-TB Treatment Enrolment and Completion

1. Socioeconomic constraints

Financial difficulties, including inability to afford food and sustain livelihood during treatment, were major barriers to both enrollment and completion.

"They do not have enough money to maintain themselves during treatment." (TBLS)

2. Treatment burden and duration

The long duration of treatment and the pill burden discouraged many patients from continuing therapy.

"There are too many drugs and the treatment period is too long." (DOT worker)

3. Stigma and poor health beliefs

Fear of stigmatization and denial of diagnosis were significant barriers. Some patients also preferred alternative treatments.

"They are scared of stigmatization." (TBLS)

"Some chose to use herbal treatment instead." (TBLS)

4. Lack of family and social support

In some cases, family members discouraged patients from continuing treatment, negatively affecting adherence.

"Relatives discouraged them from taking treatment." (TBLS)

5. Disruption of daily life and livelihood

Patients were often unwilling to leave their homes, businesses, or families, especially when hospitalization was required.

"Many patients are not willing to leave their businesses and families." (TBLS)

6. Poor treatment adherence and follow-up

Non-adherence due to perceived recovery, forgetfulness, or loss of motivation was commonly reported.

"They feel better and stop taking drugs." (TBLS)

"Some patients do not come for follow-up treatment." (DOT worker)

Discussion

This study assessed the socio-demographic characteristics, treatment outcomes, and factors influencing enrolment and completion of multidrug-resistant tuberculosis (MDR-TB) treatment using a mixed-methods approach. The findings provide important insights into both quantitative trends and contextual drivers of treatment outcomes.

The majority of MDR-TB patients in this study were aged ≥ 30 years, with a smaller proportion among younger age groups. This pattern is consistent with some studies in Nigeria, where MDR-TB patients are predominantly adults, with median ages reported in the mid-30s and the majority falling within the 20–49-year age group. [11–13] Similar trends have been documented in Ethiopia, where MDR-TB is largely concentrated among economically productive age groups. [14] This distribution may be explained by cumulative exposure to *Mycobacterium tuberculosis* over time, as well as the higher likelihood of previous TB treatment among adults, which is a key risk factor for the development of drug resistance. In addition, increased social and occupational interactions among adults may also enhance transmission risk, while delayed health-seeking behaviour and socioeconomic constraints further contribute to disease progression. The relatively low proportion observed among children may also reflect challenges in diagnosis due to the paucibacillary nature of TB in this group.

The slight male predominance observed in this study is consistent with evidence from Nigeria, where males typically account for a higher proportion of MDR-TB cases, often exceeding 60% in national cohorts. [15] Similar patterns have been reported across sub-Saharan Africa, where males generally constitute the majority of MDR-TB patients. [16] This has been attributed to gender-related differences in occupational exposure, health-seeking behaviour, and social risk factors, with men more likely to delay care and engage in high-risk activities. [17] However, the relatively comparable proportion of females observed in this study suggests a narrowing gender gap, highlighting the need for gender-inclusive TB control strategies.

All patients in this study had pulmonary TB, which is expected given that pulmonary forms are the most common and most transmissible. More than half of the patients were newly registered cases, suggesting ongoing transmission of drug-resistant strains rather than resistance arising solely from previous treatment failure. This finding underscores a critical public health concern, indicating that primary transmission of MDR-TB may be contributing significantly to the burden in the study setting.

The treatment success rate (75.8%) observed in this study is encouraging and comparable to recent global benchmarks for MDR/RR-TB, which have hovered around 68–71% in reported cohorts, but still fall

short of desired optimal targets for MDR-TB control set by global programmes. [18] The proportion of patients who completed treatment was substantially higher than those classified as cured, which may reflect limitations in bacteriological confirmation at the end of therapy, as patients are sometimes classified as “completed” in the absence of final culture results. [19] Despite this relatively high success rate, nearly one-quarter of patients in this study experienced unfavorable outcomes, particularly loss to follow-up and mortality, consistent with other MDR-TB cohorts where these outcomes remain significant programmatic challenges. [20] Loss to follow-up remains a critical challenge, as it not only affects individual patient outcomes but also contributes to ongoing transmission and the development of further drug resistance.

No statistically significant associations were found between socio-demographic or clinical characteristics and treatment outcomes. Although females and younger patients appeared to have better outcomes, these differences were not statistically significant. Similarly, HIV status was not significantly associated with treatment outcomes, despite a higher proportion of unfavorable outcomes among HIV-positive patients. This lack of statistical significance may be due to the relatively small number of HIV-positive patients in the cohort. Nonetheless, the observed trends suggest that vulnerable subgroups may still require targeted interventions.

The gap between MDR-TB case detection and treatment enrolment is another critical finding. Although case detection increased substantially over the study period, less than half of detected cases were enrolled in treatment overall. The improvement in enrolment rates in 2022 is encouraging and may reflect strengthening of TB programmatic efforts, including decentralization of care and improved linkage systems. However, the persistent gap indicates missed opportunities in the care cascade, which could undermine TB control efforts if not addressed.

The qualitative findings provide important insights into the facilitators and barriers influencing MDR-TB treatment enrolment and completion in this study. Key facilitators identified included perceived effectiveness and safety of treatment, counselling and health education, financial support, and strong health system engagement. Confidence in the effectiveness of MDR-TB treatment played a central role in patient acceptance and adherence, as patients were more likely to initiate and continue therapy when they believed in its curative potential. Similar findings have been reported that positive perceptions of treatment outcomes and trust in healthcare providers significantly improved adherence to MDR-TB therapy. [21, 22]

Counselling and health education emerged as critical facilitators, particularly at the point of diagnosis when patients often experience fear and uncertainty. Evidence from qualitative studies in Africa shows that structured counselling helps to address misconceptions, reduce stigma, and improve treatment uptake and retention. [21, 23] This highlights the importance of patient-centered communication as a core component of MDR-TB programs. In addition, the availability of free treatment and financial incentives, including transport support and food provision, significantly enhanced treatment adherence. This aligns with broader evidence demonstrating that socioeconomic support interventions reduce

catastrophic costs and improve MDR-TB treatment outcomes in low- and middle-income settings. [24, 25]

Social and family support also played a vital role in facilitating treatment enrolment and completion. Patients who received encouragement and assistance from family members were more likely to adhere to treatment, consistent with findings from studies in Ethiopia and South Africa where family support was a key determinant of successful treatment outcomes. [22, 26]. Furthermore, strong health system support, including regular follow-up and patient monitoring, contributed to improved adherence, underscoring the importance of continuity of care and community-based follow-up mechanisms.

Stigma and poor health beliefs were also prominent barriers, with some patients expressing fear of discrimination or preferring alternative therapies. Similar patterns have been documented in Nigeria and other African settings, where stigma and cultural beliefs delay treatment initiation and contribute to non-adherence. [23, 27]. In addition, lack of family support and disruption of daily livelihood emerged as important contextual barriers. Patients often faced competing priorities between continuing treatment and maintaining their economic activities, particularly when hospitalization was required. This reflects findings from qualitative studies showing that social and economic pressures frequently undermine adherence to MDR-TB treatment. [26, 27]

Poor adherence due to perceived recovery and inadequate follow-up further compounded these challenges. Patients who experienced symptomatic improvement often discontinued treatment prematurely, a behavior widely reported in MDR-TB programs and associated with increased risk of treatment failure and ongoing transmission. [28] Weak follow-up systems also contributed to disengagement from care, highlighting the need for strengthened community-based adherence support strategies.

Overall, these findings demonstrate that MDR-TB treatment enrolment and completion are influenced by a complex interplay of individual, social, and health system factors. While facilitators such as counselling, financial support, and health system engagement can enhance treatment uptake and adherence, persistent barriers related to poverty, stigma, treatment burden, and social disruption continue to undermine program effectiveness. Addressing these challenges will require a comprehensive, patient-centered approach that integrates health system strengthening, socioeconomic support, and community engagement, in line with global recommendations for MDR-TB control. [25]

Implications for Policy and Practice

Efforts to improve MDR-TB outcomes should focus on:

- Strengthening linkage between diagnosis and treatment initiation
- Expanding community-based and decentralized treatment models
- Enhancing patient counselling and continuous adherence support

- Scaling up social and financial support interventions
- Addressing stigma through community sensitization programs

Strengths and Limitations

A key strength of this study is the use of a mixed-methods approach, which allowed for a more comprehensive understanding of both quantitative outcomes and contextual factors. However, the study may be limited by its retrospective design and potential for incomplete records. Additionally, the small number of HIV-positive patients may have limited the ability to detect significant associations.

Conclusion

While MDR-TB treatment success in this setting is relatively high, substantial challenges persist in ensuring optimal enrolment and completion. Bridging gaps in the treatment cascade and addressing socioeconomic and systemic barriers are essential for improving outcomes and achieving TB control targets.

Declarations

Ethics approval and consent to participate

Ethical approval for the study was obtained from the Oyo State Ministry of Health Ethical Review Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki. Informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were strictly maintained throughout the study.

Consent for publication

Written informed consent for publication of anonymised data was obtained from participants where required.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

OSO conceptualized and designed the study and is the corresponding author. AMA, AC, and AG contributed to the study design and methodology. OLO, IMA, and IOF were involved in data collection, analysis, and interpretation of results. IOF and AJA drafted the initial manuscript. All authors critically reviewed the manuscript, contributed to revisions, and approved the final version for submission.

Acknowledgements

The authors acknowledge the staff of Modupe Folorunso Alakija Medical Research and Training Hospital, Osun State University, for their support during the study.

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