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Tuberculosis Treatment Outcomes and Determinants of Treatment Default in a Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State

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Abstract

Background: The study aimed to assess tuberculosis treatment outcomes, and the factors associated with treatment default among patients who received TB treatment at the Directly Observed Treatment Short Course (DOTS) clinic of the University of Port Harcourt Teaching Hospital

Materials and Methods: A cross-sectional study design was used to retrospectively review tuberculosis cases at the DOTS Clinic from January 1, 2019, to December 17, 2023. The research examined 342 files/records. Data was analysed using SPSS version 27. Pearson's Chi-square test was used to determine the association between the outcome and independent variables at $P \leq 0.05$ statistical significance level.

Result: The result shows that mean age of 31.5±17.9, 89 (26.0%) of the cases seen were less than 20 years old, 187 (54.7%) were males, and 213 (62.3%) were singles. Fifty-three (15.5%) were cured, 103 (30.1%) of the respondents completed treatment, 81(23.7%) defaulted, 69 (20.2%) lost to follow-up, 3 (0.9%) were treatment failures and 14 (4.15%) died. The overall treatment success rate was 156 (45.6%), 35 (38.8%) in 2019 and 51 (57.9%) in 2023. Sputum positivity ($\chi 2 = 31.34$; $p < 0.001$) and HIV status ($\chi 2 = 11.75$; $p < 0.007$) were significantly associated with treatment success rate, only sputum positivity ($\chi 2 = 7.726$; $p < 0.038$) was associated with default $P \leq 0.05$.

Conclusion: The treatment success rate was lower than the World Health Organisation's cut-off mark (85.0%). The default rate was also high. Strategies should be developed to enhance optimum TB treatment outcomes in Rivers State, Nigeria.

Keywords: Tuberculosis, Treatment Outcomes, Default, Determinants, Rivers State.

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Introduction

Tuberculosis (TB) still stands as a serious global health challenge, ranking as the ninth leading cause of death worldwide and the leading cause of death from a single infectious agent, surpassing even HIV/AIDS. Globally, in the year 2023, the estimated incidence of TB was 10.8 million people.[1] In 2015, tuberculosis (TB) killed 1.8 million people with 95% of cases and deaths in developing countries. [2,3] The global number of deaths caused by TB fell to an estimated 1.25 million deaths in 2023.[1] The decline was achieved in the year 2022 after 2 years of increases during the worst years of the COVID-19 pandemic (2020 and 2021).[1] The net reduction in global TB death between 2015 and 2023 was 23%, which is almost one-third the WHO End TB Strategy milestone of a 75% reduction by 2025.[1]

Tuberculosis is an airborne bacterial disease caused by M. Tuberculosis which affects any part of the body, most commonly the respiratory organs such as the lungs. [4]The burden of TB is concentrated in eight countries, contributing to 64% of new TB cases worldwide. India (26%), holds the highest count of new TB cases, followed closely by Indonesia (10%), China (6.8%), the Philippines (6.8%), Pakistan (6.3%), Nigeria (4.6%), Bangladesh (3.5%) and the Democratic Republic of the Congo (3.1%). [1,5] Despite the commendable initiatives of the Nigeria National TB Control Program and its partners, the burden of TB in Nigeria persists at high levels. Striving to align with the 2030 target of Sustainable Development Goal 3, the country faces ongoing challenges in meeting its objectives.[6] The U.S. Centres for Disease Control and Prevention (CDC) has joined forces with both Federal and State authorities in Nigeria in TB control efforts. This collaboration extends to leadership in TB/HIV collaborative efforts, disease surveillance, laboratory services, and TB infection prevention control programs. The concerted efforts of these entities contribute significantly to the strides being made in addressing the TB epidemic in Nigeria. [7]

Nigeria like most African countries, practice the directly observed therapy short-course (DOTS) strategy as a vital pillar of TB control.[7] In the WHO report of 2020, the predicted treatment success rate of new cases of TB was estimated to be 85% and a lower 76% for patients living with HIV[8], whereas in the WHO report of 2024, the treatment success rate for drug-susceptible TB remains high (at 88%). [1] Izudi and colleagues reported that the pooled estimate of TB treatment success rate in Africa was 79%, which was still below the WHO threshold, and that HIV co-infection and retreatment were associated with an increased risk of unsuccessful treatment outcomes.[9,10] Another report gave the pooled Treatment Success Rate (TSR) in sub-Saharan Africa as 76.2%, with an observation of a gradual decline in TSR over the past decade.[11]

In 2018, the World Health Organization (WHO) projected Nigeria as having the highest burden in Africa and tenth in the world with prevalence rates of 616 cases per hundred thousand annually, as well as 150,000 deaths per year. [3] According to the WHO report of 2024, Nigeria is among the eight countries with the highest burden of TB.[1]

Overall, more effort is needed to improve TB treatment outcomes in Nigeria. Despite significant efforts and advancement in TB diagnosis and treatment, the effectiveness of tuberculosis control programs in Obio/Akpo Local Government Area remains a serious concern. A study in Rivers State showed a high prevalence of tuberculosis (TB) infections, and persistent clusters were observed in 17% out of the twenty-three LGAs, including Obio/Akpor LGA. [12] Another study by Ogbonna et.al on "Treatment outcomes and associated factors of tuberculosis patients on directly observed treatment (short course) in a tertiary hospital in Port Harcourt, Nigeria" reviewed data from 2014 to 2018, reported overall treatment success rate of 355 (54.2%) and 45 (6.6%) defaulted, it will be important to audit how we have progressed five (5) years after. [13] As the world is approaching the year 2025 which will be the date for the second milestone for evaluating the End TB strategy, this year is appropriate to assess how patients on TB treatment are doing by studying their treatment outcomes and determinants of treatment default.

Therefore, identifying the treatment default and assessing treatment outcomes and its determinants throughout the period 2019 to 2023 is important for reviewing the progress so far and developing targeted interventions to reduce the TB burden and, ultimately, improve treatment outcomes in the Obio/Akpor local government area. It was deemed necessary to assess the tuberculosis treatment outcomes and determinants of treatment default in a Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State.

Definition of terms

Treatment default, also known as treatment non-adherence, refers to the situation where a patient interrupts or discontinues their prescribed treatment regimen for a specific medical condition, such as tuberculosis (TB), over a certain period, typically defined as two or more

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consecutive months. It can occur due to various reasons, including forgetfulness, lack of understanding about the importance of treatment adherence, medication side effects, and challenges in accessing healthcare services. It is one of the possible outcomes of tuberculosis treatment.

Treatment Outcome can be defined as the final known status of a TB patient who started anti-TB treatment. Tuberculosis treatment outcomes include the following.

Cured: initially, a smear-positive patient who completed treatment and had a negative bacteriology result on at least two occasions, one of which was after treatment.

Completed treatment: Finished treatment, but without bacteriology result at the end of the treatment.

Treatment failure: Remaining smear-positive at five months despite the correct intake of medication.

Transferred out: Patients whose treatment results are unknown due to transfer to another health facility.

Successfully treated: A patient who was cured or completed treatment. Not evaluated: A patient whose laboratory assessment was not done at the end of treatment, and as such no outcome was assigned

Defaulted treatment: Patients who interrupted their treatment for two consecutive months or more after commencement of ant-tuberculosis drugs.

Died: Patients who died from any cause during tuberculosis treatment. [13,14]

Treatment default is a significant concern in the management of infectious diseases like TB because it can lead to several negative consequences. Interruption of the treatment course can result in treatment failure, relapse, and the development of drug-resistant strains of TB, making the infection more challenging to treat. Moreover, patients who default on their treatment are at a higher risk of acquiring multi-drug resistance TB and transmitting the disease to others in the community, thereby perpetuating the spread of TB.

Methods

Study design and study area: This is a cross-sectional study design. It was a health facility-based review, specifically focusing on the examination of patients' records from January 1st, 2019- December 17th, 2023, at the Directly Observed Treatment, Short-Course (DOTS) clinic, located in the University of Port Harcourt Teaching Hospital (UPTH) in Obio/Akpor Local Government Area of Rivers state. Only drug-sensitive TB cases are managed at the DOTs clinic, and drug-resistant TB cases are sent to the Multidrug Resistant (MDR) TB centre in ALUU.

Sample and Sampling Technique: All case files of TB patients registered at the DOTS Clinic of UPTH from January 1st, 2019, to December 17th, 2023, that met the inclusion criteria were included in the study. The patient files/records were reviewed for completeness before inclusion. All files of patients that met inclusion criteria were accessed but to make sure the minimum sample size for this kind of study was reached, the minimum sample size was calculated based on Cochran's formula for sample size calculation for a cross-sectional study [15], $n = \frac{Z^2pq}{e^2}$ Where: Z is the Z-score corresponding to the desired level of confidence, p is the estimated prevalence of the population is q, is 1− p, and e is the margin of error, with Prevalence at 75.3% of treatment success from a previous study. [16] Therefore, with computation the calculated sample size (n) is approximately 287. For a 10 % non-response rate, Adjusted Sample Size = 1−Non-Response Rate\Calculated Sample Size. Given that the calculated sample size (n) is approximately 287, to account for a 10% non-response rate: Adjusted Sample Size=287/ 1−0.10, Adjusted Sample Size =287/0.9, the minimum sample size estimated was 319.

Methods of Data Collection/Instrumentation: Data was collected using a data extraction tool and a Google form that saved the data in a spreadsheet. The tool consisted of Socio-demographic data, like year, age, sex, marital status, residential area, religion, education, and employment. Disease History: Treatment category, case type, sputum result on microscopy and HIV status. *Treatment Outcome*: Status after last drug collection.

The supply of medications is facilitated through the Rivers State Ministry of Health. Diagnostic procedures adopt a holistic approach, incorporating patient history, medical examinations, and laboratory findings such as sputum acid-fast bacilli (AFB), culture, and GeneXpert testing. Patients undergo meticulous monitoring, with sputum samples collected at 2, 5 and 7 months after the initiation of treatment. The resultant data are diligently recorded in a monitoring card, contributing significantly to a robust and detailed tracking of patient progress throughout their TB treatment journey.

Methods of Data Analysis: Data were analysed with the SPSS software version 27. Outcome frequencies were summarized, and Pearson's Chi-square test was used to determine the association between the outcome and independent variables at $P \leq 0.05$ statistical significance level.

Ethical Approval: Ethical approval was obtained from the Research and Ethics Committee of the University of Port Harcourt (UPH/CEREMAD/REC/MM90/009). Permission was obtained from the Head, of the Community Medicine Department and from the DOTS clinic before accessing the patient records database.

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Results

Table 1: Socio-demographic Profile of Treated TB Cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019-2013

Variable	Frequency n=342	Percent
Age group (years)		
<20	89	26.0
20-29	77	22.5
30-39	67	19.6
40-49	52	15.2
50-59	27	7.9
≥60	30	8.8
Mean ± SD	31.5±17.9	
Sex		
Male	187	54.7
Female	155	45.3
Marital Status		
Single	213	62.3
Married	119	34.8
Cohabiting	1	0.3
Divorced	1	0.3
Widowed	8	2.3
Residential Area		
Urban	276	80.7
Rural	66	19.3
Religion		
Christianity	281	82.2
Islam	6	1.8
Others	55	16.0
Education		
No formal education	35	10.3
Primary	67	19.6
Secondary	154	45
Tertiary	86	25.1
Employment status		
Employed	170	49.7
Unemployed	172	50.3

Others* traditional religion and none.

Table 1 shows that 89 (26.0%) of the respondents were less than 20 years, 77 (22.5%) were between 20-29 years, and 67 (19.6%) were between 30-39 years with a mean age of 31.5. Also, 187(54.7%) were males, 213 (62.3%) were single, and 119 (34.8%) were married. 276 (80.7%) resided in urban areas, 281 (82.2%) were Christians, 154 (45.0%) attained a secondary level of education and 172 (50.3%) of the respondents were unemployed.

Table 2: Clinical Characteristics TB Cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State

Variable	Frequency n=342	Percent
Treatment category		
Pulmonary TB	309	90.4
Extrapulmonary TB	32	9.4
Type of case		
New case	314	91.8
Retreatment	28	8.2
Sputum positivity		
1+	76	22.2
2+	3	0.9
Negative	1	0.3
Unknown	262	76.6
HIV status		
Positive	94	27.5
Negative	213	62.3
Unknown	35	10.2
ON ARV n=94		
Yes	86	91.5
No	8	8.5

The result shows that 309 (90.4%) of the respondents had pulmonary TB, 32(9.4%) had extrapulmonary TB, 314 (91.8%) were new cases, 76(22.2%) were 1+, 94 (27.5%) were HIV positive and 86 (91.5%) of the HIV patients were on antiretroviral treatment.

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Table 3: Trends in treatment outcomes of tuberculosis cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019-2023

Treatment outcomes	**2019 n (%)**	**2020 n (%)**	**2021n (%)**	**2022 n (%)**	**2023 n**	**Total** (%)
Cured	30(25.9)	3(6.5)	2(7.1)	4(6.3)	14(15.9)	53 (15.5)
Completed	15(12.9)	16(34.8)	12(42.9)	23(35.9)	37(42.0)	103 (30.1)
Transferred	7(6.0)	3(6.5)	3(10.7)	6(9.4)	2(2.3)	21(5.6)
Failed	2(1.7)	1(2.2)	0(0.0)	0(0.0)	0(0.0)	3 (0.9)
Default	43(37.1)	13(28.3)	5(17.9)	8(12.5)	12(13.6)	81 (23.7)
Lost to follow-up	10(8.6)	9(19.6)	6(21.4)	23(35.9)	21(23.9)	69 (20.2)
Dead	9 (7.8)	1(2.2)	0(0.0)	0(0.0)	2(2.3)	12 (4.1)
Total	116(100.0)	46(100.0)	28(100.0)	64(100.0)	88(100.0)	342 (100.0)

Treatment completion peaked in 2021, 12 (42.9%) while default rates showed a decline from 2019 to 2022 though the proportion was second highest, 81 (23.7%), following a treatment completion rate of 103 (30.1%). Mortality remained relatively low, with fluctuations across the years. The findings underscore the importance of continuous monitoring and intervention to optimize TB management and patient outcomes.

Table 4: Trends in the two category treatment outcomes of tuberculosis cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019-2013

Variable	**2019 n (%)**	**2020 n (%)**	**2021n (%)**	**2022 n (%)**	**2023 n (%)**	**Total n (%)**
Successful Treatment	45 (38.8)	19 (41.3)	14 (50.0)	27 (42.2)	51 (58.0)	156 (45.6)
Unsuccessful treatment	71 (61.2)	27 (58.7)	14 (50.0)	37 (57.8)	37 (42.0)	186 (54.4)
Total	116 (33.9)	46 (13.5)	28 (8.2)	64 (18.7)	88 (25.7)	342 (100.0)

As shown in Table 4, the overall successful treatment rate was 156 (45.6 %), the successful treatment rate increased from 2019 to 2021, declined in 2022 and rose to the highest success rate of 51 (58.0%) seen in the year 2023.

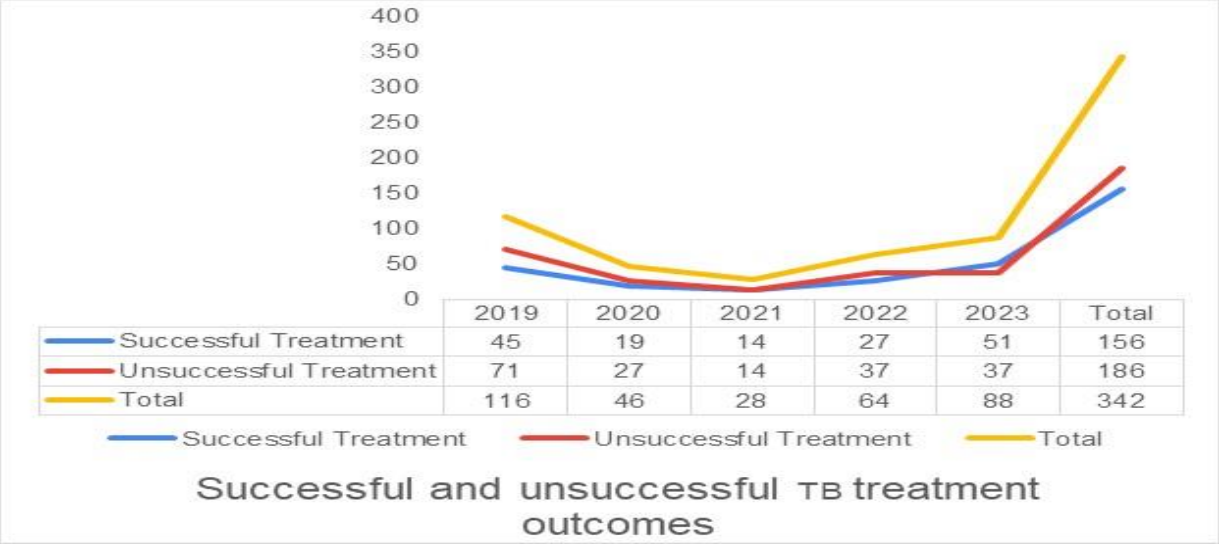

Figure 1: Shows the trend in TB treatment success in the period under review.

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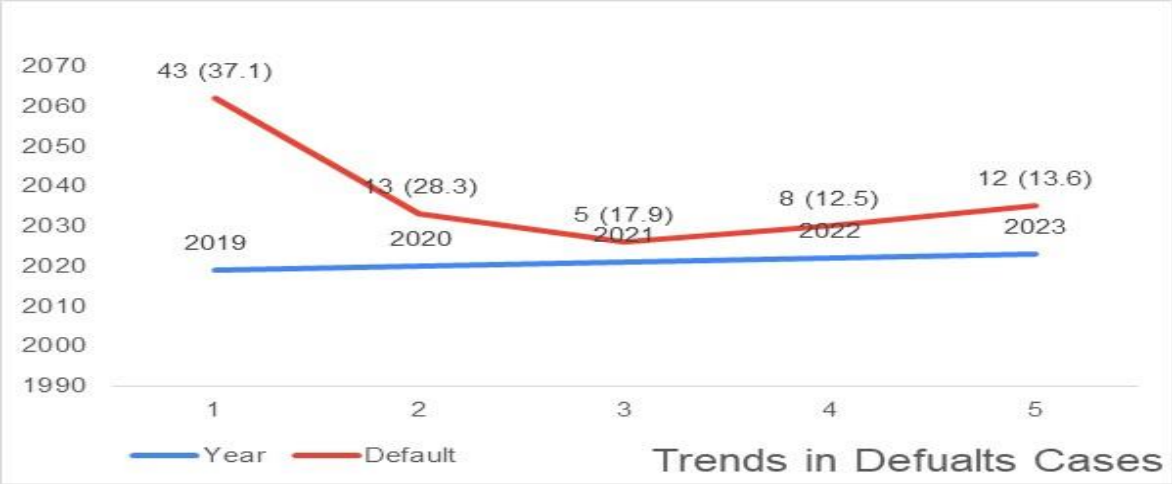

Figure 2: Shows the trend in the cases of TB treatment default within the review period.

Table 5: Predictors of successful treatment outcomes of tuberculosis cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019-2013

Variable	Successful treatment n=156	Unsuccessful treatment n=186	COR (95%CI)	p-value	AOR (95% CI)	p-value
Sputum Positivity						
1+	55 (73.3)	20 (26.7)	2.7 (1.65-4.58)	**<0.001**	0.25 (0.14 – 0.45)	**<0.001**
2+	2 (66.7)	1 (33.3)	2.0 (0.18-22.05)	0.571	0.31 (0.26-3.77)	0.359
Negative	0 (0.0)	1 (100.0)	-	-	-	-
Unknown [R]	99 (37.6)	164 (62.4)	-	-	-	-
HIV Status						
HIV Positive +ART	28 (33.7)	57 (66.3)	0.51 (0.33-0.79)	**0.003**	1.13 (0.49-2.59)	0.782
HIV Positive - ART	3 (37.5)	5 (62.5)	060 (0.14-2.51)	0.484	1.13 (0.21-6.06)	0.890
HIV Negative	112 (52.8)	100 (47.2)	1.12 (0.85-1.47)	0.410	0.63 (0.29-1.35)	0.234
Unknown [R]	12 (33.3)	24 (66.7)	-	-	-	-

Following the Chi-square analysis, the factors associated with successful treatment outcomes of tuberculosis cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019-2013 showed that there was a higher proportion of successful treatment outcomes among females 78 (50.0%) than males 78 (41.9%) and rural residents 32 (49.2%) compared to urban 124 (44.8%), but the differences in proportions were not statistically significant. Sputum positivity and HIV status were significantly associated with successful treatment outcomes. Specifically, a higher proportion of successful treatment outcomes among those with sputum positivity of 1+ 55 (73.3%) compared to sputum positivity of 2+, 2 (66.7%), ($\chi 2 = 31.34$; $p < 0.001$). Likewise, a higher proportion of successful treatment outcomes were among those with HIV-negative status 112 (52.8%), ($\chi 2 = 11.75$; $p < 0.007$).

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As shown in Table 5, following binary logistic regression analysis, those with sputum positivity of 1+ were 2.7 times more likely to have successful treatment outcomes compared to those negative or unknown (cOR = 2.7, 95%CI: 1.65-4.58, p=0.001),

Table 6: Predictors of treatment default among tuberculosis cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019-2013.

Variable	Default		OR (95% CI)	p-value	AOR (95% CI)	p-value
	Yes n=81	Non-Default n=261				
Sputum Positivity						
1+	9 (12.0)	66 (88.0)	0.14 (0.07 – 0.27)	**<0.001**	2.62 (1.22-5.62)	**<0.013**
2+	1(33.3)	2 (66.7)	0.50 (0.45-5.14)	0.571	0.69 (0.06-8.19)	0.765
Negative	0 (0.0)	1 (100.0)	-	-	-	-
Unknown **R**	71 (27.0)	192 (73.0)	-	-	-	-
HIV Status						
HIV Positive +ART	26 (30.2)	60 (69.8)	0.43 (0.27-0.69)	**<0.001**	0.61 (0.25-1.53)	0.296
HIV Positive - ART	2 (25.0)	6 (75.0)	0.33 (0.67-1.65)	0.178	0.84 (0.13-5.26)	0.852
HIV Negative	45 (21.2)	167 (78.8)	0.27 (0.19-0.38)	**<0.001**	0.86 (0.36-2.03)	0.725
Unknown	8 (22.2)	28 (77.8)	-	-	-	-

Factors associated with default treatment among tuberculosis cases at the Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019-2013. The finding showed was a higher proportion of default cases among females 39 (25.0%) than males 42 (22.6%), urban residents 69 (24.9%) than rural 12 (18.5%), and HIV positives on Anti-retroviral therapy 26 (30.2%) but the differences in proportions were not statistically significant. However, a higher proportion of default cases among those with sputum positivity of 2 pluses was statistically significant ($\chi 2 = 7.726$; $p < 0.038$).

At the Bivariable and Multivariable analysis level as shown in Table 6, following logistic regression and multinomial analysis, the sputum positivity rate was predictive of successful treatment (aOR = 0.25, 95%CI: 0.14 – 0.45, p=0.001) and default rates (aOR = 2.62, 95%CI: 1.22-5.62, p=0.013), shown in tables 7 and 8.

Discussion

This study assessed tuberculosis treatment outcomes and identified the determinants of treatment default among patients treated for tuberculosis in a tertiary health facility in Obio/Akpor Local Government Area, Rivers State from 2019 to 2023. Males were the majority in our study. The result agrees with reports that observed males to be more in the number of cases of tuberculosis [13,16]. The gender difference tilting towards the males is consistent with several studies[13,17]. Males have been reported to have poorer health-seeking behaviour so less likely to report any symptoms on time. They are exposed to more hazards in the environment including biological hazards such as tuberculosis. There is a need to re-strategize healthcare delivery to target male folks especially where they work. Participants below the age of 40 years were more than half of the total population in our study. This is the active schooling and workforce age. It means the high prevalence of TB in this age group will impact school attendance and fitness to work resulting in school absenteeism, school drop- out and a weak workforce. However, it is important to mention that age, sex, marital status and level of education did not show any significant association in this study.

Out of the total cases within the period, more than a quarter were HIV positive with the majority of them on antiretroviral treatment. A previous study from this same centre, gave a cumulative HIV prevalence trend to be slightly higher at 39.6%. [13]

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In this study (2019-2023), the cure rates declined from 66.7% in 2019 to 27.5 % in 2023. Comparing this with the findings of Ogbonna et al., (2020), reveals notable differences and trends and reported an increase in the cure rate from 14.1% in 2014 to 26.1% in 2018.[13] This contrasts with this study's annual cure rates, which exhibit a decline over the years 2019 to 2023. The significant drop in the cure rates to 15.8% in 2020 coincides with the onset of the COVID-19 pandemic, suggesting a potential influence of pandemic-related disruptions. Subsequent years, especially 2023 with a 27.5% cure rate, may reflect adaptations made in response to the ongoing pandemic.

The overall treatment success rate in this study was less than half 156 (45.6 %) and falls below the World Health Organization benchmark of 85%. The treatment success rate was also lower than was obtained from this same centre before the onset of the COVID-19 Pandemic which was reported to be 52.4%. [13] The peak in treatment completion rates in 2021, with 42.9% of patients completing their therapy, signifies a potential success in programmatic interventions or improved healthcare delivery during that period. This could be attributed to increased awareness, better healthcare access, or stronger adherence mechanisms during that year. The increase in successful treatment rates from 2019 to 2021 demonstrates that sustained efforts can yield improved patient outcomes.

The decline in 2022 could be linked to disruptions, such as those caused by the COVID-19 pandemic, which strained healthcare systems globally. The subsequent rise to the highest success rate of 51 (58.0%) in 2023 indicates resilience and recovery within the TB control program. This rebound could be a result of post-pandemic program adaptations, such as digital adherence technologies (short message services (SMS)/calling or community-based interventions (family member observes the person taking each dose at home or by a visit by community health care workers). The findings underscore the importance of robust surveillance systems to track treatment outcomes. Monitoring helps identify trends early, enabling timely interventions. Maintaining the gains achieved in 2023 requires sustainable investment in healthcare infrastructure, training, and community engagement.

This study shows a tuberculosis (TB) default rate of about a quarter of the total 342 cases. This indicates that 81 (23.7%) patients defaulted on their TB treatment during the study period. This was higher than what was reported by Ogbonna et.al, (2020), in their study that reviewed the previous five years 2014 to 2018, which reported a default rate of 45 (6.6%) of the total 677 drug-sensitive TB cases.[13] The findings in this study are in tandem with what was reported in a study in Benin City Edo State, Nigeria. [18] In contrast, a study from Sagamu, Nigeria, reported a significantly lower TB default rate of 10%. [19] The default rate in the study by Azuogu et al in Ebonyi Southeast Nigeria was 10.6%, [20] default rates documented in Hong Kong was 8% [21]and it is lower than that observed at the DOTS Clinic of UPTH. High default rates highlight the need for strategies tailored to patient needs, such as socioeconomic support, psychological counselling, or directly observed therapy. The decline in Default Rates (2019–2021) in this study indicates progress in patient retention strategies. However, 23.7% of cases defaulted, representing the second-highest rate, underscores the need to further strengthen interventions targeting treatment adherence. Regarding factors associated with successful treatment outcomes, the findings highlight a significant association between sputum positivity levels and treatment success. Patients with lower sputum positivity (1+, 73.3%) were more likely to achieve successful outcomes compared to those with higher positivity (2+, 66.7%). The significant chi-square test ($\chi^2 = 31.34$, $p < 0.001$) indicates that sputum load is a critical determinant of treatment success, reflecting disease severity and bacterial burden. Patients with high sputum positivity should be prioritized for intensive follow-up and adherence counselling to improve outcomes. These differences underscore the importance of timely diagnosis and initiation of treatment, as higher sputum positivity often correlates with advanced disease stages. Higher default rates among patients with sputum positivity of 2+ (statistically significant ($\chi^2 = 7.726$; $p < 0.038$) suggest that severe disease may be associated with treatment fatigue or barriers to adherence. This was further reinforced by the multivariable analysis that showed that sputum positivity rates were predictors of successful treatment outcomes and treatment default. Enhanced adherence support for these patients is vital. The higher default rates among HIV-positive patients on antiretroviral therapy (30.2%) highlight the compounded burden of managing dual therapies.

The finding that HIV-negative individuals exhibited a significantly higher proportion of successful treatment outcomes 112 (52.8%), ($\chi2 = 11.75$; $p < 0.007$) compared to their HIV-positive counterparts reflects an important insight, and this is in tandem with a similar study in Southeast Nigeria. [22] Enhanced collaboration between TB and HIV services, including synchronized appointments and psychosocial support, can reduce the

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dual burden on patients. The dual burden of TB and HIV requires comprehensive and coordinated care models.

Implication of the findings of this study

The increase in successful treatment rates from 2019 to 2021 and the peak in 2023 (58.0%) highlight progress in the treatment process and adherence strategies. The decline in 2022 may suggest potential lapses in program implementation or external factors such as disruptions caused by public health crises and the COVID-19 pandemic. The recovery and peak in 2023 reveal the potential effectiveness of targeted interventions, programme adjustments, or resource allocation. The predictive association between sputum positivity and treatment outcomes highlights its utility as a diagnostic and prognostic tool in tuberculosis management. Also, the reduced likelihood of successful treatment with high sputum positivity (aOR = 0.25, p=0.001) suggests the need for intensified support and monitoring in patients with higher sputum positivity rates. Additionally, the increased odds of default with higher sputum positivity levels (aOR = 2.62, p=0.013) indicate that it is necessary to address barriers to adherence among patients with severe disease presentations.

Strength and Limitations

The use of both logistic and multinomial regression provides robust insights into predictors of treatment outcomes, and the identification of sputum positivity as a predictive factor will help to refine patient stratification and tailor interventions. The longitudinal analysis from 2019 to 2023 enables the understanding of programme performance and external influences over time. However, as a retrospective study, missing data in medical records presented a notable limitation in the analysis, the absence of certain variables limits the study's capacity to conduct certain analyses. Also, since it is a quantitative study, it does not provide qualitative depth, to the understanding of the drivers of treatment success and default.

Further research considerations: Further research could conduct a qualitative study to explore patient and provider perspectives on barriers to successful treatment and causes of default. Also, a prospective cohort study to monitor patients throughout the treatment process, capturing dynamic predictors of outcomes could be designed. Additionally, further research could examine the influence of systemic factors such as healthcare infrastructure, provider training, and resource allocation on treatment success and default.

Conclusion

This study provides a recent analysis of tuberculosis treatment outcomes and determinants of treatment default in a Tertiary Health Facility in Obio/Akpor Local Government Area, Rivers State from 2019 to 2023. The cure rate is less than half and lower than the WHO recommendation of 85% treatment success rate target. It highlights the persistence of high default and lost-to-follow-up rates, urging for targeted interventions to address these challenges. These findings reinforce the importance of data-driven strategies to address the multifaceted challenges of TB treatment and improve the outcomes of tuberculosis patients' treatment. These findings align with global efforts to meet the World Health Organization's End TB Strategy targets, emphasizing the need for integrated care, patient support, and system resilience.

Declaration

Authors contributions: Adetula, B, -Conceptualization and design, Data Collection, preliminary data analysis, and discussion of findings. Ojule, I N-Conceptualization and design. Ogbonna VI -Study design and design of data extraction tool, data analysis, manuscript preparation and write-up

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References

1. World Health Organization. Global Tuberculosis Report 2024 [Internet]. [cited 2025 Mar 3]. Available from: https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2024
2. World Health Organization. Global Tuberculosis Control. 2011.
3. WHO. Global Tuberculosis Report 2018. Geneva: 2018.
4. WHO. Tuberculosis [Internet]. [cited 2022 Jan 21]. Available from: https://www.who.int/news-room/fact-sheets/detail/tuberculosis
5. Bagcchi S. WHO's global tuberculosis report 2022. The Lancet Microbe. 2023 Nov 22;4(1):e20.
6. George DM, Bibiye AAS. Compliance to Tuberculosis Treatment Across Medical Institutions in Rivers State, South-South Nigeria. International Journal of Health and Psychology Research. 2022 Nov 22; 8:9.

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7. FMOH. Department of Public Health & Leprosy Control Programme Nigeria 2014 NTBLCP Annual Report. 2014.
8. Chakaya J, Khan M, Ntoumi F, Aklillu E, Fatima R, Mwaba P, et al. Global Tuberculosis Report 2020 – Reflections on the Global TB burden, treatment and prevention efforts. International Journal of Infectious Diseases. 2021 Nov 23;113(S): S7–12.
9. Izudi J, Tamwesigire IK, Bajunirwe F. Treatment success and mortality among adults with tuberculosis in rural eastern Uganda: a retrospective cohort study. BMC Public Health. 2020 Nov 23;20(1):501.
10. Shilongo E. Treatment Outcomes and Associated Factors in TB/HIV-Coinfected Patients in Namibia. Walden University; 2022.
11. Izudi J, Semakula D, Sennono R, Tamwesigire IK, Bajunirwe F. Treatment success rate among adult pulmonary tuberculosis patients in sub-Saharan Africa: a systematic review and meta-analysis. BMJ Open. 2019 Sep;9(9):e029400.
12. Des-Wosu I, Owhonda G, Tobin-West CI. Spatial-temporal Distribution of Tuberculosis Infections in Rivers State from 2009-2018. Journal of Epidemiological Society of Nigeria. 2021 Nov 23;4(2):7–12.
13. Ogbonna V, Alabere D, Tobin-West C. Treatment outcomes and associated factors of tuberculosis patients on directly observed treatment (short course) in a tertiary hospital in Port Harcourt, Nigeria. Nigerian Journal of Medicine. 2020;29(4):707–13.
14. National Tuberculosis and Leprosy Control Programme. 2019 Annual TB report. 2019.
15. Israel GD. Determining sample size. 1-5. 2009.
16. Alao MA, Maroushek SR, Chan YH, Asinobi AO, Slusher TM, Gbadero DA. Treatment outcomes of Nigerian patients with tuberculosis: A retrospective 25-year review in a regional medical center. Wingfield TE, editor. PLOS ONE. 2020 Nov 23;15(10):e0239225.
17. Tesfahuneygn G, Medhin G, Legesse M. Adherence to Anti - tuberculosis treatment and treatment outcomes among tuberculosis patients in Alamata District, Northeast Ethiopia. BMC Research Notes. 2015;11(691):1–11.
18. Inotu A, Abebe F. Assessment of defaulting from directly observed treatment short course (DOTS) and its determinants in Benin City, Nigeria. Journal of Tuberculosis Research. 2014 Nov 25;2014.
19. Daniels OJ, Oladapo OT, Alausa OK. Default from tuberculosis treatment programme in Sagamu, Nigeria. Nigerian Journal of Medicine. 2006 Nov 25;15(1):63–7.
20. Azuogu B, Eze N, Azuogu V, Emegoakor A, Osuagwu A, Inya A, et al. Prevalence and Predictors of Tuberculosis Treatment Default in Abakaliki, Nigeria: An Implication for Patient Centred Education and Treatment Follow-Up. International Journal of TROPICAL DISEASE & Health. 2018 Nov 25;29(1):1–9.
21. Chan-Yeung MMW, Noertjojo K, Leung CC, Chan SL, Tam CM. Prevalence and predictors of default from tuberculosis treatment in Hong Kong. 2003 Nov 25.
22. Umeokonkwo CD, Okedo-Alex IN, Azuogu BN, Utulu R, Adeke AS, Disu YO. Trend and determinants of tuberculosis treatment outcome in a tertiary hospital in Southeast Nigeria. Journal of Infection and Public Health. 2020 Nov 25;13(7):1029–33.

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