

## Treatment Outcome of Tuberculosis at One Year: A Single Centre's Experience in Niger Delta, Nigeria

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### Authors' contributions

This work was carried out in collaboration between all authors. Author IDE did the study design and wrote the protocol. Authors POI and JJ did the statistical analysis and literature searches while analyses of study was by author POI. All authors read and approved the final manuscript.

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### ABSTRACT

**Background:** Monitoring the outcome of tuberculosis treatment and evaluating the reasons for unsuccessful treatment outcome are important in assessing the effectiveness of tuberculosis control program. This study investigated tuberculosis treatment outcomes and predictors for unsuccessful treatment outcome in a tertiary hospital in the Niger Delta Region of Nigeria.

**Methods:** The medical records of patients registered in the DOTS clinic of the Niger Delta University Teaching Hospital between September 2013 and August 2014 were retrospectively reviewed. Tuberculosis treatment outcomes were assessed according to WHO guidelines. Multivariate analysis was used to determine the relationship between selected variables and treatment outcome.

**Results:** Out of the 166 PTB patients (54 males and 112 females) aged 15 years and above, 78.3% had good treatment outcome while 36 had poor treatment outcome. In the final multivariate logistic model the odds of poor treatment outcome was higher among patients older than 30 years of age (OR 1.33, 95% CI 0.580 – 3.049) female (OR 0.83, 95% CI 0.342-1.994).

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**Conclusion:** The treatment outcome among patients with pulmonary tuberculosis was satisfactory in Okolobiri, South – south, Nigeria. However, high risk patients for poor treatment outcome should be identified early and given social support.

*Keywords: Pulmonary tuberculosis; treatment outcome; HIV, distance.*

## 1. INTRODUCTION

One of the world's communicable diseases is Tuberculosis (TB). In 2013, the global incidence was an estimated to be 9.0 million with about 1.5 million mortality [1]. Thirteen percent of the new cases of TB last year were HIV-positive [1]. TB continues to be a major killer disease second only to HIV and studies have shown that it thrives on HIV and poverty with most morbidity and mortality in the developing countries of the world [2,3].

In 2012, 95% of all TB cases and 98% percent of all TB death occurred in the developing countries of Africa and Asia [2,3]. Nigeria ranks 10<sup>th</sup> among the 22 high-burden TB countries in the world with about 210,000 new cases occurring in 2010. Globally and in Nigeria, the adopted strategy for TB control is the Directly Observed Therapy Short-Course (DOTS) strategy, promoted by the World Health Organization [1,2,3,4].

The current goals of WHO through the STOP TB partnership is to achieve 85% treatment success and 70% case detention [1,3]. In Nigeria, the goal of the National Tuberculosis and Leprosy Control Programme (NTBLCP) are to reduce TB prevalence and death by 50% [2,4]. DOTS is associated with significant improved treatment out come as well as overall reduction in morbidity and development of multidrug resistant TB (MDR-TB).

Successful treatment outcome is essential in achieving the goals of both the WHO and the NTBLCP [5,6,7]. The WHO classified treatment outcome as successful (cure or treatment completed) or poor (default, treatment failure or death) [1,7]. In the developed countries of Europe 67% treatment success rate has been recorded [7]. In India, Lisha et al. [8] recorded a success rate of 94.2% while Burton et al. [9] in Ghana recorded 58.9% success rate. In Nigeria, Babatunde et al. [6] recorded between 46.2% to 49.2% treatment success. The rates of poor treatment outcome varies with locations and treatment settings [6,10,11]. Arentz et al. [11], in India recorded between 10.8% and 24.1% poor treatment outcome. In Sagamu, Nigeria, Daniel

et al. [10] recorded a default rate of 23% while Baabatunde et al. [6] recorded default rate of between 19.2% to 30.8%.

Several factors have been implicated in poor treatment outcome. HIV co-infection, delay in diagnosis and treatment, male sex, far (>7.3 km) distance from treatment provider and commitment of treatment provider and supporter had been implicated in poor treatment outcome [1-11].

Understanding the relationship between these factors and treatment outcome is essential in reduction of the morbidity and mortality associated with TB and achieving the goals of STOP TB partnership in Nigeria and the world. This study conducted in a rural TB center in the Niger Delta aims to access the rates of TB treatment outcome so as to ensure better treatment outcome.

## 2. MATERIALS AND METHODS

The medical record of patients registered in the DOTS clinic of the department of internal medicine Niger Delta University Teaching Hospital Bayelsa between September 2013 and August 2014 were retrospectively reviewed. Ethical consent was obtained from the Hospitals Ethical committee with a waiver of informed consent.

Demographic information, follow-up/new case, diagnosis and classification of diagnosis (pulmonary smear positive and smear negative/extra-pulmonary), case detection by sputum smear, HIV screening, HIV status, and outcome of treatment of the 166 patients enrolled between September 2013 and August 2014 were analyzed.

Only patients who had completed or were expected to have completed treatment were enrolled for the study. Most of the patients were referred from the Antiretroviral Clinic, Chest unit and general outpatient departments of the hospital. The hospital practices integrated management of TB/HIV coinfection hence all HIV positive patients are routinely screened for TB and vice versa.

Tuberculosis treatment outcomes were assessed according to the WHO and NTBLCP guidelines [4,7]. Data was entered and analysed using SPSS version-20 for Windows.

Demographic variables were reported using simple percentages. Chi-square test was used to estimate poor or good (successful) treatment outcome while multivariate analysis was used to determine the relationship between selected variables and treatment outcome. A p-value of less than 0.05 was considered as statistically significant.

### 3. RESULTS

#### 3.1 Demographics

Out of the 166 patients studied, there were 112 females and 54 males with a M: F ratio of 1:2.1. The mean age of the study population was  $37.0 \pm 16.3$  years. 37.3% of the study population had smear positive TB and 95.2% of them had pulmonary TB. The HIV prevalence rate of the population was 55.4% and 53.0% were on Highly active antiretroviral therapy (HAART). All the patients were on Category 1 Anti Koch's while 90.4% lived far away from the treatment center. Other demographic data of the study population are shown in Table 1.

#### 3.2 Treatment Outcome

Seventy eight point three percent (78.3%) of study population had good treatment outcome. Majority of those with good treatment outcome were older than 30 years, female, smear negative, HIV positive and on ART. There was statistically significant relation between treatment outcome and smear result at  $p=0.006$ . On multivariate analysis, a negative smear result was significantly associated with good treatment outcome at  $p=0.012$ . Thirty four (34) out of the 36 people with poor treatment outcome lived far away from the treatment center. Other data associated with treatment outcome are depicted in Tables 2, 3, 4 and Fig. 1.

### 4. DISCUSSION

The evaluation of treatment outcome and analysis of factors responsible for poor treatment outcome in DOTS programs is very important towards identifying patients at high risk of poor treatment outcome. Such early identification will allow for additional follow-up, additional medical intervention and social support [12].

**Table 1. Demographic variables of study participants**

S/no	Variables	N (%)
1.	<b>Age</b>	
	<30	64 (38.6)
	>30	102 (61.4)
2.	<b>Gender</b>	
	Male	54 (32.5)
	Female	112 (67.5)
3.	<b>HIV status</b>	
	Positive	92 (55.4)
	Negative	74 (44.6)
4.	<b>ART</b>	
	Yes	88 (53.0)
	No	78 (47.0)
5.	<b>Smear result at diagnosis</b>	
	Positive	62 (37.4)
	Negative	104 (62.6)
6.	<b>TB Site</b>	
	Pulmonary	158 (95.2)
	Extra pulmonary	8 (4.8)
7.	<b>Treatment category</b>	
	CAT 1	166 (100)
	CAT 2	
8.	<b>Distance of</b>	
	Far (>7.3 km)	150 (90.4)
	Near (<7.3 km)	16 (9.6)

In this study, 78.3% of our study population had good treatment outcome which is much lower than the WHO international target of 87% (updated target 2011-2015). This is much higher than the 67.6% recorded in a different centre in same geographical region over a period of ten years [13].

Elsewhere, different outcomes had been reported in different centres. A study here in Nigeria recorded 76.6% cured, 8.1% failed, 6.6% defaulted, 2% treatment interruption, 4.8% transferred out, and 1.9% died [14]. A study in Tanzania reported treatment success rates of 81% and 70% in patients under community vs. facility- based DOTS respectively [15]. Among the 4003 smear positive PTB patient evaluated on DOTS in Malawi, 72% had completed treatment, 20% had died, 4% defaulted, 2% were transferred out and 1% continued to have positive smears at the end of treatment [16]. The lower successful treatment outcome in our study could be due to the fact that the DOTS clinic is relatively new and yet to develop the use of community health workers in tracing and follow up TB patients.

**Table 2. Relationship between treatment outcome and some demographic variables**

S/no	Variables	Treatment	Outcome	P value for differences
		Good N=130	Poor N=36	
1.	<b>Age</b>			
	<30	50	14	P=0.498
	>30	80	22	X <sup>2</sup> =0.459
2.	<b>Gender</b>			
	Male	44	10	P=0.669
	Female	86	26	X <sup>2</sup> =0.182
3.	<b>HIV status</b>			
	Positive	74	18	P=0.426
	Negative	56	18	X <sup>2</sup> =0.663
4.	<b>ART</b>			
	Yes	72	20	P=0.191
	No	58	16	X <sup>2</sup> =0.244
5.	<b>Smear result</b>			
	Positive	42	20	P=0.006
	Negative	88	16	X <sup>2</sup> =7.574
6.	<b>Distance from treatment centre distance of</b>			
	Far (>7.3 km)	116	34	P=0.191
	Near (<7.3 km)	14	2	X <sup>2</sup> =1.285

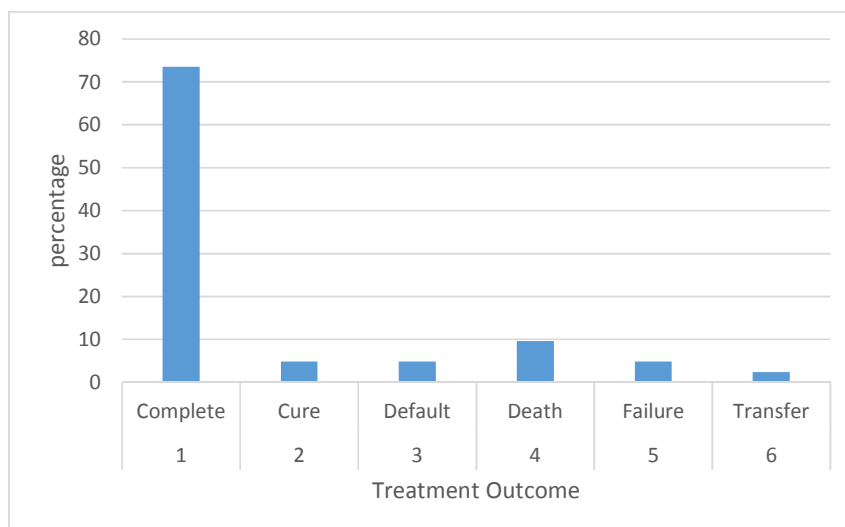
**Table 3. Multivariate analysis showing relationship between some selected variables and treatment outcome**

Variables	Odds ratio	95% CI	P value for differences
<b>Age</b>			
<30	1.33	0.580-3.049	P=0.903
>30			X <sup>2</sup> =0.002
<b>Gender</b>			
Male	0.83	0.342-1.994	P=0.492
Female			X <sup>2</sup> =0.473
<b>HIV Status</b>			
Positive	0.42	0.291-19.137	P=0.601
Negative			X <sup>2</sup> =0.547
<b>ART</b>			
Yes	2.98	0.029-1.932	P=0.411
No			X <sup>2</sup> =0.244
<b>Smear result</b>			
Positive	2.36	1.357-6.557	P=0.011
Negative			X <sup>2</sup> =6.512
<b>Distance from treatment centre distance of</b>			
Far (>7.3 km)	0.24	0.084-2.106	P=0.348
Near (<7.3 km)			X <sup>2</sup> =0.880

The 19.2% poor treatment outcome found in this study is on the high side when compared with 10.8% in Ethiopia [12]. But again it was much less than the 29.9% in the study done few kilometres away from this one [13].

In the multivariate regression model, this study showed that majority of those with good treatment outcome were older than 30 years,

more likely to be females. They were also more likely to be smear negative and HIV positive on ART. This is not in agreement with previous studies [12,13,14]. Older individuals often have concomitant diseases and general physiological deterioration with age, less able to reach health facilities. We attribute this, possibly, to the small sample size.



**Fig. 1. Prevalence of treatment outcome**

**Table 4. Prevalence of treatment outcome**

S/no	Outcome	N (%)
1.	Complete	122 (73.5)
2.	Cure	8 (4.8)
3.	Default	8 (4.8)
4.	Death	16 (9.6)
5.	Failure	8 (4.8)
6.	Transfer	4 (2.5)

There was a statistically significant relation between treatment outcome and smear status at  $P=0.006$ . A negative smear result was significantly associated with good treatment outcome at  $P=0.012$ . It is worthy of note that 34 of the 36 patients with poor treatment outcome lived far away from the treatment centre. This is not unexpected as it was shown that most of the factors associated with treatment non-completion, apart from the patient's age are those related to physical access to health-care services [17].

This study covered only a period of one year in a newly started DOTS centre. It will be interesting to repeat a study like this after a few more years whence the sample size would be bigger. Furthermore, the study considered treatment outcome in extra pulmonary tuberculosis and those with smear negative pulmonary tuberculosis.

## 5. CONCLUSION

Almost all of the patients with poor treatment outcome lived far away from treatment centre.

This brings to the front burner the issue of siting health-post nearer to patients' residence as it has been shown that community based DOTS had higher successful outcome rate (81%) as compared to facility based DOTS (70%) [13,15].

Following this observation; we recommend the decentralization of DOTS services wherever it is possible to do so.

## CONSENT

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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