

# Prevalence and Treatment Outcomes of Pulmonary Tuberculosis in Ekiti State

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## Abstract:

The study examined the prevalence and treatment outcomes of pulmonary tuberculosis in Ekiti State. It was a retrospective study with an evaluative case study approach. A checklist developed by the researcher was used for data collection. The data collected were analysed using descriptive statistics. The result of the analysis indicated that for the five-year (2015- 2019) reviewed, a total of 2,045 patients were admitted and treated. Majority of these patients were males (59.3%) while 40.7% were females. Also, majority of the identified cases within the five-year review were new cases making 77.5% while only 22.5% were old cases. PTB was found to be prevalence among youth/young adults whose ages are between 31 and 40years (23.9%) while the age group 0 – 10years had the least with just 2.7% of the population. PTB treatment outcome showed that 58.2% were cured and discharged, 22.8% completed treatment, 7.5% defaulted, 4.8% died, 2.1% had treatment failure, 2.2% transfer out while 2.4% were not evaluated within the period reviewed. The males responded to treatment more than the females throughout the five-year period reviewed with 45.38% and 4.12% of males and females were cured and discharged respectively. It was concluded that proper monitoring and evaluation of treatment outcome should be carried out; individuals with immunosuppressive diseases should ensure

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they go for TB prophylaxis and commence anti-TB medications at the slightest suspicion or diagnosis of TB; and there should be a wide coverage of DOTS in all the Local Government Areas.

**Keywords:** Prevalence, Treatment Outcomes, Pulmonary Tuberculosis, Ekiti State,



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## Introduction

Pulmonary Tuberculosis (PTB) is an infectious disease of the lungs caused by Mycobacterium tuberculosis. When stained using the Ziehl-Neelsen method, this organism appears as a thin, non-sporing, short red rod (Krishna & Kumar, 2016). This disease is clinically suspected in any individual with a protracted cough of more than two weeks, usually productive of purulent, blood stained sputum in the acute phase of the disease (WHO, 2018). There is a high index of suspicion when this cough does not respond to the use of common antibiotics in treating respiratory infections. Apart from cough, other prominent symptoms include: Weight loss, low appetite and anemia from phagocytic and underlying tissues and cellular damage. In Nigeria, PTB is a significant public health issue. In 2018, the TB emergency plan was designated a national emergency and created in Nigeria. The nation ranks 19th out of 30 countries in the world with a high burden of TB (Global Tuberculosis Report 2018).

Tuberculosis is an infectious disease transmitted by bacteria of the genus Mycobacterium. Additionally, it is a major global public health problem (WHO, 2015). While one-third of the world's population is believed to be infected with Mycobacterium, only 10% is believed to have active tuberculosis. Over 9 million individuals acquire active tuberculosis each year, which is spread via coughing, speaking, sneezing, spitting, and singing. TB-related mortality and morbidity are more common in poor nations, accounting for 95% of TB cases and 98% of TB-related fatalities. According to Zerihun, Girmay, Adane and Gobena (2014), the number of tuberculosis outbreaks in jail accounts for the lion's share of the disease's national burden in a country like South Ethiopia. They revealed that, the median incidence of PTB in jails was many orders of magnitude greater than in the general population. It is commonly believed that the prison environment is neither clean nor well ventilated; this could be the major factor for the prevalence of PTB in jails. It can also be an indication that the poor environmental condition contributed to the high rate of PTB in the developing nations.

The 2018 WHO Global Tuberculosis Report has updated worldwide new cases of tuberculosis estimates from prior years, showing that almost half a million more TB infections had occurred globally than its 2013 estimate. In 2018, 1.5 million individuals died of around 9 million people who acquired tuberculosis (deaths up from 1.3 million estimated in 2018). WHO World Tuberculosis Report (Zumla, George, Sharma, Herbert, Oxley & Oliver, 2015). The WHO (2016) reports that tuberculosis is the world's ninth top mortality cause and the main cause of death from an infectious substance that exceeds HIV/AIDS. There is tuberculosis worldwide. According to WHO (2017), Asia has 61% of all new cases of TB, along with Africa, accounted for the greatest number in 2016, with 26% of all new cases. Furthermore, 87% of new TB occurrences were reported in 2016 by high TB burden nations. Sixty percent of new TB occurrences occurred in India, Indonesia, China, Nigeria, Pakistan, and South Africa. In these nations, global growth relies on progress in the prevention and treatment of tuberculosis.

The WHO (2018) emphasized that while the recorded number of new cases (7.0 million) and the anticipated amount of 10.0 million (sort of 9.0 million – 11.1 million) incidents in 2018 still exists, even if the number of Tuberculosis notifications is increasing. This deficiency is the result of a mix of undeclared and diagnosed instances (i.e. Individuals with tuberculosis do not have access to health care or are misdiagnosed when they do). The difference is



approximately 80% in ten nations, with more than half of the gap being made of India (25%), Nigeria (12%), Indonesia (10%) and the Philippines (8%).

In several areas of Nigeria tuberculosis infections were verified and characteristics in the top six causes of death among disclosable diseases have occurred. The WHO has recorded a tuberculosis (TB) incidence of 311 per 100,000 persons in Nigeria during 2007. Nigeria was the fourth highest on the list of the 22 High Burden countries worldwide. Only 3,5% of total government expenditure was spent on public health (Gidado, Obasanya, Habib, & Nasiru, 2017). This is why the National Tuberculosis and Leprosy Control Programme (NTBLCP) and German Leprosy and TB Relief Association (GLRA) fight tirelessly in Nigeria to eliminate PTB. With the spread of HIV, the development of multi-drug resistance TB or the rise in default rates, the WHO recognized TB as a worldwide emergency and also established a new strategy and framework for successful TB control, (DOTS TB Guideline, 2018).

The WHO (2020) pointed out that bacteriologically 55% of cases of pulmonary TB were diagnosed in 2018, a small drop from 56% in 2017. About 80 per cent of cases of pulmonary TB are bacteriologically verified in high-incoming countries with extensive use of the most sensitive diagnostic techniques. The PTB detected in 2018, according to the WHO (2018), was 64% higher than 60% in 2017, compared to 60% in 2018. 87 percent of TB patients have a recorded HIV test result in the WHO African region, where the incidence of HIV-associated TB is greatest. A total of 477,461 TB cases have been recorded among individuals living with HIV, with an antiretroviral treatment accounting for 86 percent. The most up-to-date results for new TB patients indicate an 85% global success rate in 2017, up from 81% in 2016.

The United Nations high-level policy statement on tuberculosis contains initiatives to improve diagnosis, treatment and care for people with medicament-resistant PTB coverage and quality. Detection of MDR/RR-TB requires bacteriological TB confirmation, and drug strength testing, using rapid molecular testing, crop methods, or sequencing technologies. Treatment must be second-line treatment, including counseling and monitoring for adverse effects, for at least nine months and up to 20 months. MDR/RR-TB testing, diagnosis and treatment have improved considerably in 2017 and 2018. Globally, 51% of individuals with bacteriologically confirmed TB were tested for rifampiquin resistance in 2018 from 41% in 2017. 10 New and 83% new TB patients were covered by 46%. Off of 160 684 cases found and reported in 2017 and 156 071 in 2017, a total of 186 772 cases of MDR/RR-TB were discovered and reported in 2018 compared to 139 114 cases reported in 2017 (The World Health Organization 2019, Geneva Database).

Nigeria has the highest tuberculosis burden in Africa and is one of the most important differences between the estimates and reports according to the recently released Global TB Report 2019. Comparing the 2018 and 2019 reports, Nigeria has shown that the burden of disease increases, in contrast to a global improvement. In Nigeria, incidence of tuberculosis rose from 418 000 in 2017 to 429 000 in 2018 while deaths rose from 155 000 to 157 000 in 2018, but treatment coverage of tuberculosis remained constant at 24%.

Tuberculosis treatment does not only aim to eliminate the disease but also to prevent it and to prevent it from spreading and developing resistance to medications. This may be achieved by using short-term chemotherapy (SCC) (Kassam, Fanning, Cruz, & Tarclencilla, 2002). Tuberculosis control requires early detection of the disease and ensuring that individuals



diagnosed finish their treatment and are cured. The WHO targets treatment success at 87 percent of all smear-positive cases identified. Even when medicine is provided for free, many patients may not get adequate treatment. Death (during or before to treatment) and loss to follow-up are the primary causes for failure.

Considering the economic credentials of the states of the federation, Ekiti state falls in the low-income state. TB is also a public health challenge in Ekiti state despite the fact that the state is ranked as 30<sup>th</sup> in TB burden in the country. In 2018, the state reported a total of 333 TB cases which represent 11% of expected case notification of the year. Over 2,691 TB cases were missed in 2018 alone, with each potential TB case capable of infecting 12-15 other persons annually (WHO, 2018). Different approaches have been hallmark for the treatments and prevention of the spread of this deadly disease. Ekiti State is among the states being sponsored by German Leprosy Relief Association, a non-governmental organization for Tuberculosis control. This study therefore investigated the prevalence of pulmonary tuberculosis and the treatment outcomes in Ekiti State Nigeria. Specifically, the study:

1. determined the prevalence of pulmonary tuberculosis in Ekiti State; and
2. described the treatment outcome of pulmonary tuberculosis in Ekiti State

### Research Questions

1. What is the prevalence of pulmonary tuberculosis in Ekiti State at the TB centre understudy?
2. What are the treatment outcomes of patients within the period under review in the hospital under study?

### Methodology

This study was a retrospective, quantitative, non-experimental study. The technique utilized in this evaluative case study was based on the key methods to the assessment of the tuberculosis control program globally. Research was conducted at Ekiti State ministry of health Tuberculosis, Leprosy and Buruli Ulcer Control Centre. The Ekiti state is entirely tropical. It is south of the Kwara and Kogi States, East of the Osun State, and borders on the East and South with Ondo state. Specialized healthcare services are provided primarily through the Tertiary Health Care. The Tuberculosis patients' records in Ekiti State were used for this study (2045 treated from January 2015 to December 2019).

The information supplied during the time under consideration was provided by an updated central registry for pulmonary tuberculosis from January 2015 to December 2019. The data was gathered by the researcher using a self-developed prototype comprising of two sections. In Section A, demographic data of PTB patients for the year under review such as gender and age were sought for whereas in Section B the information on the risk factors and results of treatment were sought for.

After obtaining the ethical approval, the researcher visited the Ministry of Health Tuberculosis, Leprosy and Buruli Ulcer Control Programme to examine the pulmonary tuberculosis central register using the self-developed checklist. The researcher trained four (4) research assistants by organizing a day seminar on how to use the self-developed checklist to collect data. During the seminar the research assistants were presented with sample of the checklist while the researcher demonstrated to them on how use it. By the end of the training the research assistants were given copies of the checklist which were used to





collect the data within a period of 4 weeks. The instrument was later retrieved from the research assistants by the researcher at the expiration of the 4weeks. Data were collated, tallied and analyzed with the aid of a Statistical Package for Social Sciences (SPSS, version 27). Descriptive statistics was used to analyze the data. The results were presented in tables as percentages, means and standard deviation.

### Results

Research Question 1: What is the prevalence of pulmonary tuberculosis in Ekiti State at the TB records understudy?

**Table 1: Patients with pulmonary tuberculosis from hospital records, January 2015 - December 2019**

Variables	2015	2016	2017	2018	2019	Total	(%)	X	SD	P-value
<b>Total No. of patients</b>	<b>509</b>	<b>436</b>	<b>406</b>	<b>364</b>	<b>330</b>	<b>2045</b>				
<b>Gender</b>										
Male	240	241	236	142	294	1253	61.3	242.4	56.5	<b>0.000</b>
Female	169	195	170	222	36	792	38.7	166.6	67.5	
<b>Age group</b>										
0 – 10	7	12	13	13	11	56	2.7	11.2	2.2	<b>0.077</b>
11 – 20	83	64	48	34	37	266	13.0	53.2	18.2	
21 – 30	92	96	84	73	80	425	20.8	85	8.2	
31 – 40	115	106	85	96	86	488	23.9	97.6	11.5	
41 – 50	97	60	76	67	48	348	17.0	69.6	16.5	
51 – 60	54	42	39	33	36	204	10.0	40.8	7.2	
61 and above	61	56	61	48	32	258	12.6	51.6	10.8	
<b>Prevalence</b>										
New Case	397	345	310	275	258	1585	77.5	317.0	49.9	<b>0.000</b>
Old Case	112	91	96	89	72	460	22.5	92.0	12.8	

Table 1 above shows the total number of 2,045 patients with Pulmonary Tuberculosis for the five years period (January 2015 – December 2019) reviewed. Out of this number, 1,253(61.3%) were males while 792(38.7%) were females. The highest prevalence was found within age 31-40 years with total of 488(23.9%) while the least were ages 0-10 years with total of 56(2.7%).

Research Question 2: What are the treatment outcomes of patients within the period under review in the hospital under study?

**Table 2a: Treatment Outcome by Sex Classification (percentage) N=2,045**

Year	2015 (509)		2016 (436)		2017 (406)		2018 (364)		2019 (330)		Total (2045)			
	M (240)	F (169)	M (241)	F (195)	M (236)	F (170)	M (142)	F (222)	M (294)	F (36)	M (1253)	%	F (792)	%
Cured & Discharge	231	21	221	40	212	33	31	182	214	6	909	72.5	282	35.6
Treatment Completed	103	62	17	72	24	66	33	37	52	0	229	18.3	237	29.9
Defaulted	0	38	0	22	0	27	30	3	27	6	57	4.5	96	12.1
Died	0	27	0	18	0	15	33	0	1	4	34	2.7	64	8.1

Treatment failure	0	10	0	14	0	13	2	0	0	4	2	0.2	41	5.2
Transfer out	0	6	0	15	0	10	5	0	0	8	5	0.4	39	4.9
Not evaluated	6	5	3	14	0	6	8	0	0	8	17	1.4	33	4.2

Table 2a showed that over the five years, out of 1,253 males and 792 females that were treated, 909 males and 282 females representing 72.5% and 35.6% respectively were cured and discharged; 229 males and 237 females representing 18.3% and 29.9% respectively had completed treatment; 57 males and 96 females representing 4.5% and 12.1% respectively were defaulted; 34 males and 64 females representing 2.7% and 8.1% respectively were reported to be dead; 2 males and 41 females representing 0.2% and 5.2% respectively experienced treatment failure; 5 males and 39 females representing 0.4% and 4.9% respectively were transferred out; while 17 males and 33 females representing 1.4% and 4.2% respectively were not evaluated.

**Table 2b: Treatment outcome by age classification (percentage) 5years N=1,995\***

Treatment outcome	0-10	11-20	21-30	31-40	41-50	51-60	61+	Total
Cured & Discharge	56	266	423	291	85	47	23	1191
Completed Treatment	0	0	1	193	238	32	2	466
Defaulted	0	0	1	4	22	106	20	153
Died	0	0	0	0	0	18	80	98
Treatment failure	0	0	0	0	2	1	40	43
Transfer out	0	0	0	0	1	0	43	44
<b>Total</b>	<b>56</b>	<b>266</b>	<b>425</b>	<b>488</b>	<b>348</b>	<b>204</b>	<b>208</b>	<b>1995</b>

From the table above 1,995 were evaluated out of the total of 2,045 patient, 50 patient were not evaluated. Table 2b shows that the outcome of treatment of 1,995 patient treated, 56(2.80%) were within the ages of 0-11years, 266(13.33%) were within 11-20years, 425(24.81%) were within 21-30years, 488(24.46%) were within 31-40years, 348(17.44%) were within 41-50years, 204(10.22%) were within 51-60years, and 208(10.42%) were within 61years and above respectively.

**Table 2c: Treatment outcome by risk factor classification (percentage) N=2045**

Treatment outcome	Unknown cause	Alcohol & smoking	Overcrowding	Malnutrition	HIV	DM
Cure and discharge	293(24.62)	315(26.44)	232(19.47)	246(20.65)	72(6.04)	33(2.77)
Treatment completed	133(28.54)	72(15.45)	37(7.93)	99(21.24)	41(8.79)	84(18.02)
Defaulted	50(32.67)	16(10.45)	4(2.61)	18(11.76)	12(7.84)	53(34.64)
Died	56(57.14)	10(10.20)	0(0)	5(5.10)	1(1.02)	26(26.53)
Treatment failure	27(62.79)	2(4.65)	1(2.32)	4(9.30)	0(0)	9(20.9)





Transfer out	3068.18)	0(0)	1(2.27)	0(0)	2(4.54)	11(25.0)
Not evaluated	33(66)	2(4.0)	0(0)	0(0)	2(4.0)	13(26.0)

Table 2c above shows the treatment outcome and risk factors of 2,045 patient which were cured and discharge to be 293(24.62%) were unknown cause, 315(26.44%) were alcohol and smoking, 232(19.47%) were overcrowding, 246(20.65%) were malnutrition, 72(6.04%) were HIV while 33(2.77%) were diabetes respectively.

## Discussion

The five-year data reviewed showed 2,045 cases of pulmonary tuberculosis (new and old cases). The prevalence was higher in males than in females. The males accounted for 1,212 while the females were 833 in number. It was also discovered in the study that the males were more exposed than females because they were the ones more active and travelling most of the time, finding themselves in overcrowded areas that can expose them to pulmonary tuberculosis. The prevalence was also highest in age 31-40 years.

The male preponderance in this study is similar to other studies in a systematic review by Kigozi et al. (2019), with strong evidence that males were the most affected and they responded to treatment. For this reason, their default rate was also high. It also shows men are disadvantaged in seeking and/or accessing TB care in many settings. Also, in the northern part of Nigeria, Sanni et al. (2015), found a higher prevalence in males with the same modal age range as obtained in this study. This was also in line with the study carried out by Zignol study Team (2019) on UNAIDS global health data exchange on communities where prevalence of PTB was associated with HIV infection. It also shows men are disadvantaged in seeking and/or accessing TB care in many settings. Gabriel-Job and Paul (2019) concluded that males have the higher prevalence of pulmonary tuberculosis. For the prevalence of PTB in the hospitals reviewed, it is shown that there is a significant difference between men and women in the prevalence of PTB infection. The rate of progression from infection to disease shows that males had higher prevalence and worse treatment outcome of TB.

The study also discovered that males constituted a larger number of cases exposed to overcrowding which put them at risk of being infected by mycobacterium tuberculosis. This is in accordance with what is obtainable in other nations.

The completion of the treatment for males was 188, while the females had 278, the males the more impacted and the treatment reacted. That's why they also had a low default rate. The 31-40-year age group had the greatest treatment result and the pulmonary tuberculosis was most impacted. They also have a low default rate since they have stuck to the treatment. The research also showed that women received worse treatment than men. This is not in line with the research by Alao, Maroushek, Chan, Asinobi, Slusher and Gbadero (2020), which showed that men had a greater risk of poor treatment than women for treatment outcomes of pulmonary tuberculosis patients in treatment facilities in Ibadan.

The relatively high default rate could be as a result of travelling out of the DOTs centre thereby not meeting with appointments which can lead to non-adherence to anti tuberculosis



drugs which would finally result to multi-drug resistant tuberculosis. An individual that developed multi-drug resistant tuberculosis is a threat to the community and the nation. The target achievement of 62.7% case detection rate and 70.7% treatment success rate of tuberculosis cases in Ekiti State within the five years period reviewed was below the Global fund target case detection rate and treatment success rate which was also below the WHO target and is in line with the study carried out by Alao, et al (2020) on treatment outcomes of Nigeria patients with tuberculosis. The poor treatment recorded could be the attitude of the State Government not providing capital and human resources meant for the programme which was also in line with the Federal Ministry of Health report on achievement of tuberculosis control (FMH, 2019).

### Summary of Major Findings

The findings from the study were summarized under the following paragraphs:

- For the five years reviewed, 2,045 patients were admitted and treated as outpatient. Out of this number, 1,212(59.3%) were males while 833(40.7%) were females.
- The highest prevalence were found within ages 31-40 years with total of 488(23.9%) while the least were ages 0-10 years with total of 56(2.7%).
- Total prevalence for the 5 years reviewed was 1,585(77.5%) new cases and 460(22.5%) old cases.
- Treatment outcome shows that 1,191(58.2%) were cured and discharged 466(22.8%) were treatment completed 153(7.5%) defaulted, 98(4.8%) died 43(2.1%) treatment failure 44(2.2%) transfer out while 50(2.4%) were not evaluated within the period reviewed.
- Out of the 1,212 males that were treated, 909 were cured and discharged while 282 out of 833 females treated were also cured and discharge within the five years reviewed.
- The males responded to treatment more than the females throughout the five (5) years period reviewed.
- The target of 62.7% achieve case detection rate and treatment success rate of 70.7% of tuberculosis cases in Ekiti State within the five years period reviewed was below the Global fund target case detection rate and treatment success rate.

### Conclusion

The prevalence of PTB from 2015 to 2019 was 2045. The treatment outcome of patient with PTB in Ekiti state shows that 58.2% were cured and discharged and death rate of 4.8%. Co-morbidities such as diabetes mellitus accounted for the mortalities recorded.

### Recommendations

Based on the findings from this study, the following recommendations are suggested:

1. The private health practitioners should also be integrated into tuberculosis control activities so as to meet the target of case detection rate.
2. TB/HIV collaboration should be encouraged and enhanced. HIV testing should be extended to all TB patients while all HIV patients should be screened to TB.
3. There should be improvement in case finding, which means proper diagnosis and treatment of index cases to ensure cured and discharged and proper reporting of data by DOTS facilities to improve the treatment success rate



4. Trained work force should be encouraged to do proper step down training to other staff so that issues of staff attrition can be handled well by the DOTs centers.
5. Proper monitoring and evaluation of treatment outcome is needed.

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