

Five-year trend analysis (2018-2022) of tuberculosis care and control activities at Federal Teaching Hospital in Ekiti State, Nigeria

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ABSTRACT

INTRODUCTION: Tuberculosis (TB) mainly affects the respiratory tract, with one-third of cases occurring as extra-pulmonary TB involving distant organs like the brain, bones, and abdomen. About one-quarter of the global population is estimated to have been infected with TB. This study was done to review TB care and control activities over five years by analyzing the screening methods, means of diagnosis, and treatment outcomes in a tertiary health facility in Nigeria.

METHODS: A cross-sectional study was conducted at the Federal Teaching Hospital, Ido-Ekiti, Southwestern Nigeria, from 2018 to 2022. A retrospective review of hospital records of all patients registered and managed at the DOTS clinic from 2018 to 2022 was done. Tuberculosis treatment outcomes were assessed according to World Health Organization (WHO) guidelines. SPSS version 20.0 was used to analyze the data.

RESULTS: Records of a total of 193 patients were reviewed. About three-fifth of the patients, 115 (59.6%) were males. About two-fifths 74 (38.3%) of the patients were within the age group of 40-59 years. About three-fourths, 143 (74%) of the patients recorded successful treatment. Also, there is a statistically significant association ($p=0.036$) between treatment success and the age group of patients.

CONCLUSION: The prevalence of TB in our study demonstrated an increasing trend over the years from 2018 to 2020 and then decreased from 2021 to 2022. The productive age groups (40-59 years) and males were at the greater prevalence of TB, highlighting the importance of strengthening sustainable TB care and control activities in our facility.

Keywords: Trend, analysis, mycobacterium tuberculosis, care and control activities, teaching hospital, Ekiti State, Nigeria.

INTRODUCTION

Tuberculosis (TB) is a chronic infectious disease caused by Mycobacterium tuberculosis and is usually transmitted through the airborne spread

of droplet nuclei. TB mainly affects the respiratory tract, with one-third of cases occurring as extra-pulmonary TB involving distant organs like the brain, bones, and abdomen. About one-quarter of the global population is estimated to have been

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infected with TB [1], but not all go on to develop the disease, and some will clear the infection [2]. Of the total number of people that develop the disease each year, 90% are adults, with men having more cases than women. Without treatment, the death rate from TB disease is high (about 50%) [3]. However, with currently recommended treatments (a 4–6 months course of anti-Tb drugs), about 85% of people can be cured.

Globally, 10.6 million people developed TB disease in 2022. They comprised 5.8m men (55%), 3.5m women (33%) and 1.3m (12%) children. There were cases in all countries and age groups. Of these, only 7.5 million people were newly diagnosed and officially notified as TB cases by the WHO. Two-thirds were in eight countries: India (27%), Indonesia (10%), China (7.1%), the Philippines (7.0%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%) and the Democratic Republic of Congo (3.0%) [4]. The five major determinants of TB disease in 2022 were diabetes, smoking, alcohol use, Human Immunodeficiency Virus (HIV) infection, and undernourishment. These accounted for 0.37m, 0.70m, 0.73m, 0.89m and 2.3m cases respectively [5].

Nigeria ranks 1st in Africa and 6th in the world on the World Health Organization's list of countries with high TB burden, accounting for about 4.6% of the global TB burden [6]. Tuberculosis is a preventable and curable disease, with only a small proportion of people who get infected with TB come down with the TB disease. WHO recommends using rapid molecular diagnostic tests such as the Xpert MTB/RIF Ultra and Truenat assays as the initial diagnostic tests in all symptomatic patients [6]. These tests have high diagnostic accuracy and have led to major improvements in the early detection of TB and drug-resistant TB, especially as the prevalence of drug-resistant TB is increasing worldwide [6].

Tuberculosis is endemic among low- and middle-income countries like Nigeria due to the high burden of HIV, poverty, unhealthy lifestyle, poor early TB screening, and prompt treatment with recommended valid anti-TB drugs [7]. The estimated incidence rate, prevalence rate, and TB/HIV co-infection in Nigeria were reported to be 10,000 cases per year, 219/100,000 and 11/100,000 population respectively [8]. Nigeria alone has an estimated annual new TB case of

590,000 [9]. If properly treated, TB caused by drug-susceptible strains is curable in virtually all cases. The World Health Organization has developed guidelines for the implementation of infectious control measures in healthcare facilities providing tuberculosis services globally. These guidelines include environmental control, personal protective control, managerial control, and administrative control, respectively [10].

The National Tuberculosis and Leprosy Control Programme (NTBLCP) was established in 1989 to coordinate TB and leprosy control efforts in Nigeria. This study was done to review TB care and control activities over a five-year period by analyzing the screening methods, means of diagnosis, and treatment outcomes in a tertiary health facility in Nigeria. This 5-year review is justified not only to assess progress made in the response to TB in the context of quality, responsiveness, and effectiveness of care and activities but also to obtain data to formulate policies on quality improvement so as to attain the global targets to reduce TB deaths and TB incidence by 90% and 80% respectively by 2030.

METHODS

Study design and setting

This cross-sectional study was conducted at the Federal Teaching Hospital, Ido-Ekiti (FETHI), Southwestern Nigeria, from year 2018 to 2022. The hospital serves as a referral centre for all the other health facilities in Ekiti State as well as some of the neighboring states. It is a federal government-owned health service provider and clinical training institution in Nigeria with various specialties, including tuberculosis care and control services provided by the directly observed short course (DOTS) treatment clinic managed by the community medicine department. The DOTS Clinic is responsible for all TB care and control activities. These included identifying presumptive TB cases, collection of sputum for TB diagnosis, classifying TB patients for treatment, administering and monitoring treatment, examination and management of household contacts of patients, tracking & retrieving all TB patients who interrupted treatment, and patient education. The patients are mostly referred from the outpatient clinic, antiretroviral (ART) care and support unit and the hospital wards. These activities are coordinated by three trained Nursing officers, who

work alongside three community health extension workers (CHEWs) trained as cough officers with full support from the Ekiti State Tuberculosis, Buruli ulcer & Leprosy Control Program (TBLCP) team and the Ido/Osi Local Government Tuberculosis supervisor. The clinic runs from Monday to Friday.

Data collection tools and techniques

A retrospective review of hospital records of all patients registered and managed at the DOTS clinic from 2018 to 2022 was done. The data was retrieved using a data extraction form. The form included five (5) sections, namely: section 1 provided the patient information (patient's name, age, sex, date of admission and date of discharge), section 2 highlighted the TB diagnosis and treatment (method of TB diagnosis, TB treatment regimen, treatment duration, and treatment outcome); section 3 revealed TB-HIV Co-infection (HIV status and Antiretroviral therapy status); section 4 elicited contact tracing and prevention (contact tracing conducted, number of contacts traced, isoniazid preventive therapy provided); and section 5 provided additional information like any adverse events or any additional comments. There was no missing data, and records of a total of 193 patients were reviewed. Tuberculosis treatment outcomes were assessed according to World Health Organization (WHO) guidelines [4-6].

Data analysis

SPSS version 20.0 was used to analyze the data. A year-by-year analysis of clinical and outcome data and their association with treatment outcomes was done using SPSS version 24. Frequency tables and cross-tabulations were generated, and a p-value of less than 0.05 was considered statistically significant for the study.

Ethical approval for the study was obtained from the Ethics Review Committee of the FETHI. Patient data were anonymized, confidentially maintained, encrypted, and securely stored.

RESULTS

Table 1 shows that about three-fifths of the patients, 115 (59.6%) were males. Almost two-fifths 74 (38.3%) of the patients were within the age group of 40-59 years. The majority of the patients, 157 (81.3%), were HIV-negative, with more than three-quarters 148 (76.7%) being pulmonary TB patients.

Out of all patients with extra-pulmonary TB, more than two-fifths, 29 (64.4%), were osteo-articular. Most of 182 (94.3%) of patients lived within Ekiti state. In Table 2, the year 2020 recorded the most successful treatment for patients, 25 (83.3%), followed by the year 2019, 29 (82.9%), while the year 2018, 26 (63.4%) had the least number of patients treated successfully. Table 3 reveals that there was a statistically significant association between treatment success and the age group of patients ($p=0.036$), with patients within the age group of <20 years having the highest successful treatment rate 3 (100.0%).

Table 1: Socio-demographic characteristics of tuberculosis patients

Socio-demographic variable	Frequency (N = 193)	Percent (%)
Gender		
Female	78	40.4
Male	115	59.6
Age group (years)		
<20	18	9.3
20-39	64	33.2
40-59	74	38.3
>60	37	19.2
Weight (kg)		
<30	10	5.2
30-37	6	3.1
38-54	87	45.1
55-70	73	37.8
>70	17	8.8
HIV Status		
Positive	35	18.1
Negative	157	81.3
Unknown	1	0.5
Type of Tuberculosis Disease		
Pulmonary Tuberculosis	148	76.7
Extra-pulmonary Tuberculosis	45	23.3
Type of Extra-pulmonary Tuberculosis Cases (N=45)		
Osteoarticular	29	64.4
Soft tissue	16	35.6
Place of Residence		
Within Ekiti State	182	94.3
Outside Ekiti State	10	5.2

Table 2: Treatment success rates from 2018-2022

Year	Treatment success		
	Successful	Unsuccessful	Total
2018	26 (63.4%)	15 (36.6%)	41 (100.0)
2019	29 (82.9%)	6 (17.1%)	35 (100.0)
2020	25 (83.3%)	5 (16.7%)	30 (100.0)
2021	29 (67.4%)	14 (32.6%)	43 (100.0)
2022	34 (77.3%)	10 (22.7%)	44 (100.0)

This was followed by 40-59 years 84 (80.0%), then 20-39 years age group recorded 15 (75.0%) and >60 years age group 42 (64.6%) had the least treatment success rates. However, there was no statistically significant relationship ($p>0.05$) between the treatment success rate of patients and other variables such as gender, type of TB disease, and HIV status.

Figure 1 depicts a map showing the various residences of patients within and outside Ekiti state.

Figure 2 clearly displays the number of presumptive and confirmed TB cases from the year 2018 to 2022 in FETHI, excluding referrals from other facilities. The year 2018 had the highest number of TB cases detected, 26 (10.1%), while the year 2019 recorded the least TB cases detected, 27 (5.7%) of

all presumptive cases screened for that year.

Figure 3 shows the means of diagnosis of the TB cases detected. More than half, 103 (53.4%) of the TB cases detected were diagnosed using RIF-Xpert, while the other half 90 (46.6%), included chest x-ray, clinical assessment, MRI, etc.

Figure 4 summarizes the treatment outcomes of all TB patients from 2018 to 2022. Of all the TB patients, two-fifths, 79 (40.9%), were cured, one-third, 64 (33.2%), completed their treatment, 28 (14.5%) died, 18 (9.3%) were lost to follow-up, 2 (1%) experience treatment failure and 2 (1%) were transferred out.

Figure 5 shows the trend analysis of total confirmed TB cases per year. There has been a dip in the number of confirmed cases from 2018 to 2020 and an upsurge from 2020 to 2022.

Table 3: Treatment success by age, gender, type of TB disease, and HIV status

Variables	Treatment success		
	Successful	Unsuccessful	Total
Age group (years) *			
<20	3 (100%)	0 (0.0%)	3 (100.0)
20-39	15 (75.0%)	5 (25.0%)	20 (100.0)
40-59	84 (80.0%)	21 (20.0%)	105 (100.0)
>60	42 (64.6%)	23 (35.4%)	65 (100.0)
Gender **			
Female	59 (75.6%)	19 (24.4%)	78 (100.0)
Male	84 (73.0%)	31 (27.0%)	115 (100.0)
Type of TB disease **			
Pulmonary TB	110 (74.3%)	38 (25.7%)	148 (100.0)
Extra-pulmonary TB	33 (73.3%)	12 (26.7%)	45 (100.0)
HIV status **			
Negative	116 (73.9%)	41 (26.1%)	157 (100.0)
Positive	26 (74.3%)	9 (25.7%)	35 (100.0)

*Statistical significant, [$X^2(3)=8.540$, $p=0.036$]; ** Differences in proportions not significant ($p>0.05$)

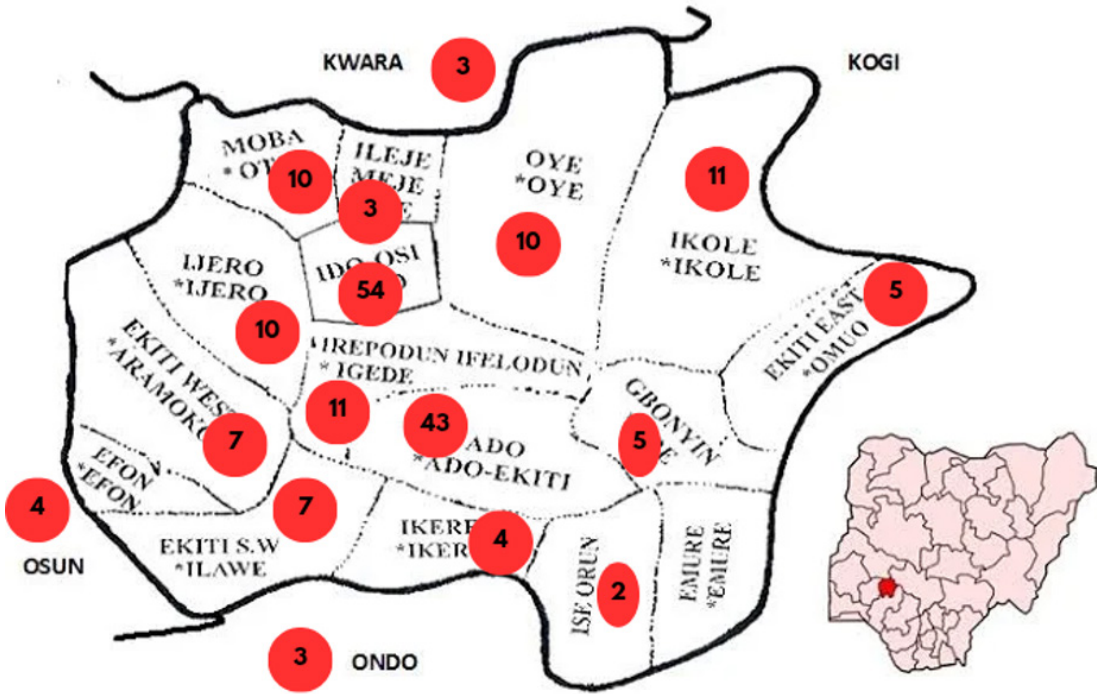


Figure 1: Map showing places of residence of patients within and outside Ekiti State

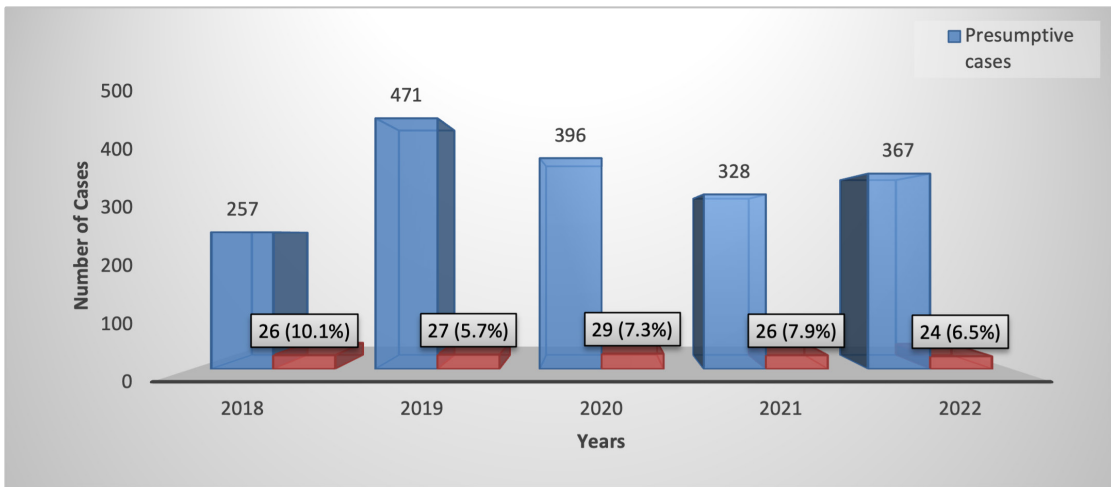


Figure 2: Tuberculosis screening from 2018-2022 at FETHI

DISCUSSION

This study did a five-year trend analysis of Tuberculosis care and control activities at Federal Teaching Hospital, Ido-Ekiti, Ekiti State, Southwest, Nigeria. A total of 193 patients were reviewed in the 5-year period (41, 35, 30, 43 and 44 patients were reviewed in 2018, 2019, 2020, 2021 and 2022 respectively). Our study shows that about

three-fifths of the patients were males. About two-fifths of the patients were within the age group of 40-59 years. The majority of the patients were HIV-negative, with more than three-quarters being pulmonary TB patients. Out of all patients with extra-pulmonary TB, more than two-fifths were osteo-articular. The majority of patients were living in Ekiti. Also, the year 2020 recorded the most successful treatment for patients, followed by the

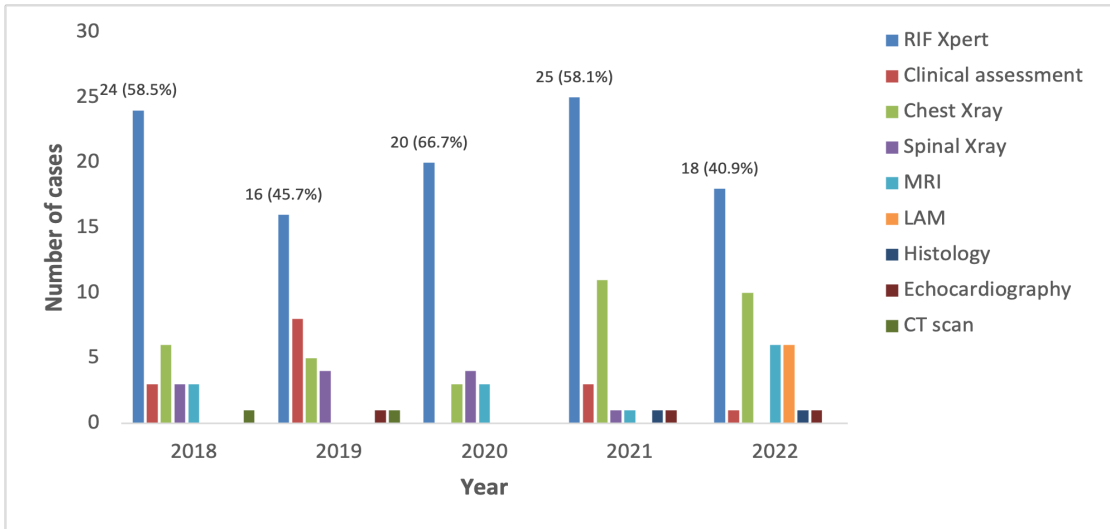


Figure 3: Means of diagnosis of TB from 2018-2022

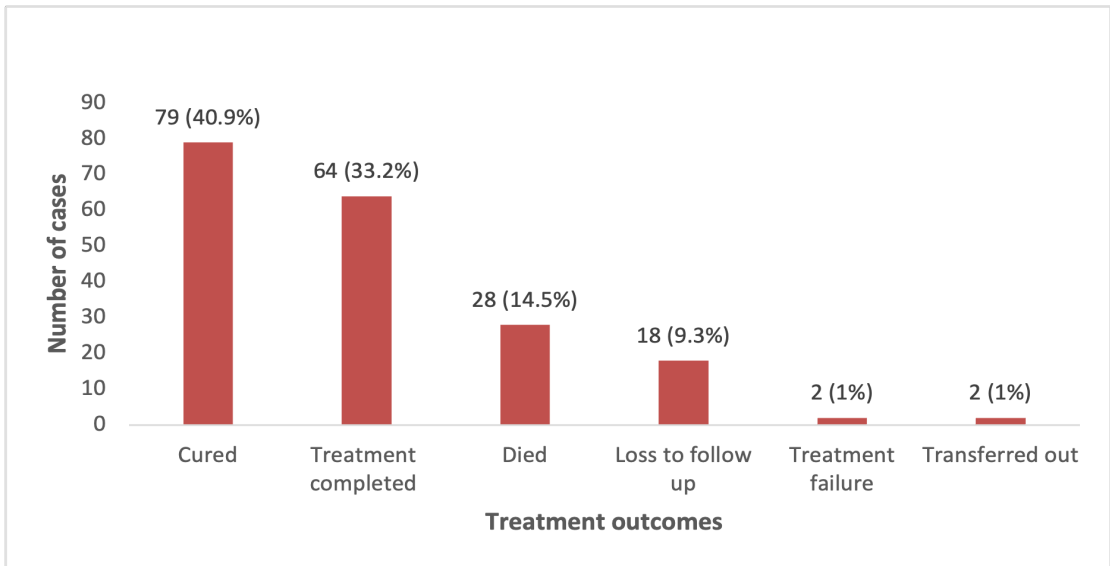


Figure 4: Treatment outcomes of TB patients

year 2019, while 2018 had the least number of patients treated successfully. The highest number of TB cases detected was in 2018, while the year 2019 recorded the least TB cases detected of all presumptive cases screened for that year. More than half of the TB cases detected were diagnosed using RIF-Xpert, while other cases were diagnosed using chest X-ray, clinical assessment, MRI, etc.

Of all the TB patients, two-fifths were cured, one-third completed their treatment, and one-tenth died, while others were lost to follow-up, experienced treatment failure, and were

transferred out with about three-fourths of cases successfully treated. There was a statistically significant association between treatment success and the age group of patients ($p=0.036$), with patients within the age group of <20 years having the highest successful treatment rate 3 (100.0%), followed by 40-59 years 84 (80.0%), then 20-39 years age group recorded 15 (75.0%) and >60 years age group 42 (64.6%) had the least treatment success rates. However, there was no statistically significant relationship ($p>0.05$) between the treatment success rate of patients and other variables such as gender, type of TB disease, and HIV

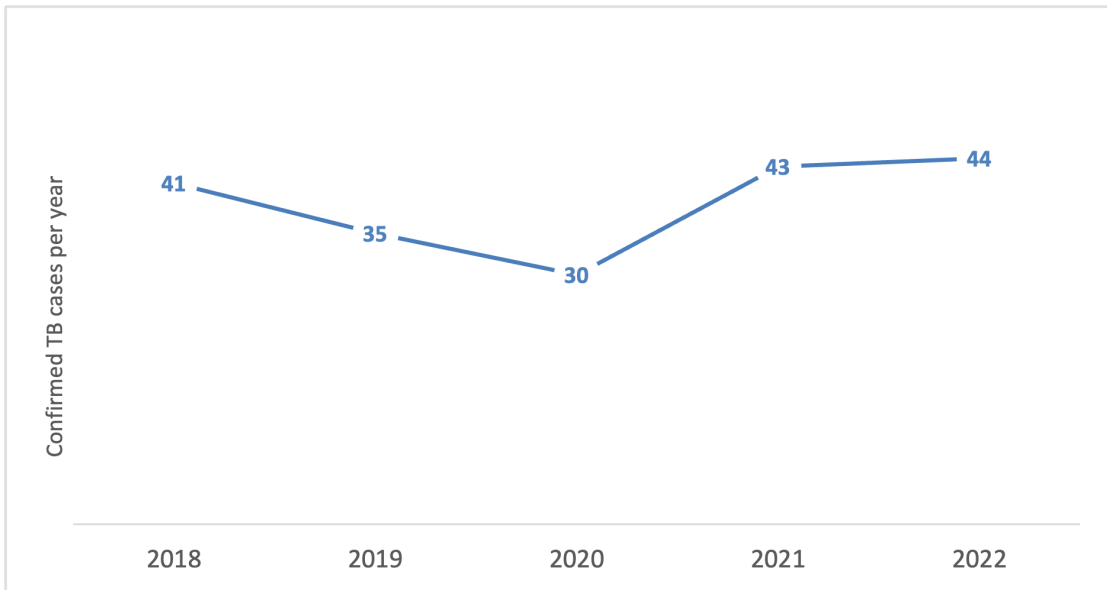


Figure 5: Trend analysis of confirmed TB cases per year

status. In our study, male patients account for more than half of the total cases. This is in agreement with a study done in Iran [11], which showed that men are more likely to develop tuberculosis than women. This could be explained by the fact that men are more exposed to underlying risk factors of tuberculosis than women, such as homelessness, HIV complex cases, and diabetes mellitus, which are more observed in the male population [12, 13]. However, in a study conducted in Ethiopia [14], female patients account for more than half of the total cases, which is in contrast to our study. This may be accounted for by the good health-seeking behaviors of females compared to males.

The prevalence of TB burden was highest among people of productive age groups (40–59 years) while lowest among ages <20 years. This is similar to findings in previous studies [14, 15], with the highest burden in productive age groups (15–34 years). This could be explained by the fact that young people are prone to HIV comorbidity, which commonly predisposes them to TB infections. The trend of tuberculosis cases in our study revealed that there was an increase in the number of TB cases in the first three years of the study and then a slight decrease in the last 2 years of the study. This finding is consistent with similar trend studies conducted in Iran and Fiji [16, 17].

Our study reported a treatment success rate of 74.1%. This is in tandem with the average success

rate reported in Nigeria, 75.3%, by the National Tuberculosis, Leprosy, and Buruli ulcer control program [18]. However, it is less than the WHO recommended threshold of 85 to 90% treatment success rate [19]. There is a statistically significant association between treatment success rate and age group of patients. The treatment success rate was highest (100.0%) in the < 20 years age group and is similar to a study conducted in Ethiopia, which recorded a treatment success of the same age group with a value of 85.9% [20].

CONCLUSION

The prevalence of TB in our study demonstrated an increasing trend over the years from 2018 to 2020 and then decreased from 2021 to 2022. The productive age groups (40–59 years) and males were at the greater prevalence of TB, highlighting the importance of strengthening sustainable TB care and control activities in our facility. However, despite this, the study provided a comprehensive insight into the trends of TB burden in Ekiti, which could guide potential intervention strategies.

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