American Journal of
Health, Medicine and Nursing Practice
(AJHMN)

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AJP

American Journal of Health, Medicine and Nursing Practice
ISSN 2520-4017 (Online)
Vol.7, Issue 4, pp 34 – 47, 2022
www.ajpojournals.org

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ABSTRACT

Background: Pakistan has a large and expanding number of the private health sector and there is growing evidence that increasing numbers of patients with tuberculosis seek care from private health care providers. World Health Organization (WHO) recommends the involvement of all health care providers called public-private mix (PPM) in TB control to promote the use of international standards for TB care in all health sectors and thereby achieve national and global TB control targets. To increase tuberculosis (TB) case detection, Green Star with the National TB Program started Public-Private Mix (PPM DOTS) in private clinics in Peshawar. To effectively control TB, a viable approach is to opt for an increase in the rate of successful treatment outcomes.

Objective: This study aimed to assess the TB treatment outcome in a private health facility in Peshawar district, Khyber Pakhtunkhwa, Pakistan, over 3 years.

Methods: From January 2017 to December 2019, medical records of all the TB patients registered at the study site were gathered. Demographic data, type of TB, category of TB treatment, and treatment outcome of patients were obtained and analyzed statistically.

Results: Fifty one % of patients were females, while 49% were male. Out of a total of 222 patients, 122 patients with pulmonary TB, 62 (50.8 %) were smear-positive and 60 (49 %) were smear-negative whereas, 100/222 (45 %) had extra-pulmonary tuberculosis. Amongst the enrolled patients in the current study, 48 (21%) were cured, 159 (71%) completed treatment, 12 (5.4.%) died and 3 (1.35 %) lost to follow up and none (0%) defaulted. The treatment success rate was 92%.

Conclusion: The overall rate of TB treatment success at the study site was up to the mark and had achieved WHO targets. Working under the PPM project, the study site is assumed to play its significant role towards the "End TB Strategy" by WHO and the performance of the private sector in the PPM project is reported to be satisfactory in terms of case detection and treatment outcome with 89 % success rate, which is consistent with the target set by WHO.

Keywords: *Tuberculosis, Patients, Private Healthcare, Khyber.*

INTRODUCTION

Despite the availability of effective drugs, Tuberculosis (TB) is majorly responsible for ill health globally and is of paramount importance due to its communicable nature. It is among the 10 topmost causes of death and the primary cause of fatality from a single infectious disease globally. As stated in the World Health Organization (WHO) report published in 2020, 10 million people were reported to develop TB and 1.4 million people died worldwide in the year 2019.[1] Geographically, the highest estimated infection rate occurred in South-East Asia, Africa, and the Western Pacific with the South-East Asian region estimated as the carrier of the highest number of new cases (44%) in 2019. Pakistan ranked 5th among the high TB burden countries and is at 1st rank in Eastern Mediterranean WHO Region, with an estimated infection rate of 263/100,000 population.[1]

Although varying in magnitude from country to country, TB has a high prevalence in countries with lower income including Pakistan.[1-2] TB is also one of the top 10 leading causes of death in Pakistan.[3] The risk factors such as poverty, low literacy rate, prevalent malnutrition in children, refugees inhabiting in camps, and mediocre medical aids contribute to making the people of Pakistan more susceptible to contagious diseases like TB.[4] To effectively control TB, an increase in the rate of successful treatment outcomes is one of the viable approaches. The End TB Strategy outlines crucial targets set for 2030, to reduce the rate of new cases by 80% (per 100,000 population annually) and to reduce TB-related deaths by 90% as compared to the 2015 death rate.[5] However, after the implementation of the Directly Observed Treatment Short-Course (DOTS) strategy through National Tuberculosis Programs (NTPs), numerous countries have seen a rise in successful treatment outcomes[6] whereas, TB is still a crucial problem in Pakistan with an annual incidence rate of 510,000 and about 15,000 cases of drug-resistant TB.[7]

Pakistan has an expanded number of healthcare centers in the private health sector, and it is evident that increasing numbers of patients with tuberculosis seek care from private healthcare providers. WHO recommends the involvement of all public as well as private healthcare providers under the public-private mix (PPM) approach for TB control to promote the use of international standards for TB care in all health sectors and thereby achieve national and global TB control targets.[8]

To introduce TB control based on NTP guidelines and increase tuberculosis (TB) case detection, Greenstar Social Marketing Pakistan (Guarantee) Limited started Public Private Mix (PPM DOTS) in private clinics in Peshawar, Khyber Pakhtunkhwa. In Khyber Pakhtunkhwa province which is listed among areas with high TB prevalence (32.02% - 43.56%),[9-13] availability of control programs and PPM-DOTS services set out an initiative for the progression of WHO control strategies for TB. However, the monitoring of treatment outcomes of TB provides an effective mean to analyze the effectiveness of TB control programs and helps in the implementation of interventions targeted for TB management and prevention, but only a few studies have been conducted on the treatment outcomes of TB in Pakistan [14-18] and hardly any of it reports treatment outcomes of TB in the private health facility. The available data does not delineate the recent trends regarding treatment outcomes as most of it is limited between 2011 and 2016 and there is a lack of data from the private health sector. This study aims to assess the TB treatment outcome in a private health facility involved in the TB program in Peshawar district, Khyber Pakhtunkhwa, Pakistan, over 3 years.

METHODS

Study design and setting

The study was a retrospective cohort conducted through gathering TB patients' data, registered at a private clinic in Peshawar district, Khyber Pakhtunkhwa from January 2017 to December 2019, as a part of a public-private mix project. The private healthcare facility exhibits DOTS strategy and provides services to the general population in the Peshawar region. Patients were diagnosed, registered, treated, distributed with drugs, and followed up by observing standard operating procedures and NTP guidelines. A social mobilizer of Green Star was coordinating with the private clinic and the patients registered, who was supposed to visit the patient's home, make sure patient is taking medicine regularly, perform contact tracing of family members, counsel patient for regular and timely follow up in case of late visits making sure that patients are not lost to follow-up.

In line with NTP guidelines, the patients were registered as New Case or Retreatment cases (Category-I or Category-II) based on the TB treatment history. Category-I comprised of new cases, which means the patients have never received TB treatment or consumed any anti-TB drugs for less than a month. Retreatment case or Category-II comprised previously treated cases, relapse cases, treatment after loss to follow-up, treatment after failure, and other previously treated patients. The patient's diagnostic category served as a basis for anti-TB drug prescription and treatment duration.[19]

Study Participants

The study included all TB patients enrolled between January 2017 and December 2019.

Data Collection

All patients' data were retrospectively obtained from the medical records and registration books of TB patients. The collected information included sociodemographic variables (gender, age, and residence), TB category, type of TB (i.e., available data indicated whether the patients had pulmonary TB, extra-pulmonary TB, or multi-drug resistant TB [MDR-TB]), the status of sputum smear, TB treatment outcomes (i.e., patients cured, treatment completed, died and default) and treatment success. The successful treatment outcome included patients cured and the patients who completed treatment whereby the unsuccessful outcome included patients who died, had treatment failure and lost to follow up.

Operational definitions

The TB treatment outcomes and TB case definitions were adopted from WHO.

Table 1. Standard definitions adopted from WHO.

Treatment outcomes and TB cases	Definitions
Cured	A patient who was initially sputum smear-positive and who was sputum smear-negative in the last month of treatment and on at least one previous occasion.
Completed treatment	When a patient completed treatment but did not meet the criteria for cure or failure. This definition applies to sputum smear-positive and sputum smear-negative patients with pulmonary TB and patients with extrapulmonary disease.
Died	When a patient died from any cause during treatment.
Failed	When a patient was initially sputum smear-positive and when a patient remained sputum smear-positive at month 5 or later during treatment.
Defaulted	When a patient whose treatment was interrupted for 2 consecutive months or more
Successful treatment outcome	A patient who was cured or completed treatment
Unsuccessful treatment outcome	A patient who had treatment failure lost to follow up, or death

Statistical analysis

All the data variables were statistically analyzed using IBM SPSS Statistics version 20.0. The categorial variables were expressed as frequencies and percentages whereas, the continuous variables were expressed as mean ± SD.

RESULTS

At the study site, a total of 222 TB patients were registered for treatment from January 2017 to December 2019. . More than half of the patients were females (51 %). The average age of the patients was 36.66 ± 22.01 years. Of the total number of patients, 122 (54.95 %) had pulmonary tuberculosis (PTB) whereas, 100 (45 %) had extra-pulmonary (EP) tuberculosis. Out of 122 PTB patients, 62 (50.82%) were smear-positive and 60 (49.18 %) were smear-negative. 1 (0.5 %) turned out to be MDR-TB. The majority of the patients 205 (92 %) were new cases, 14 (6 %) of them were relapse cases and 3 (1.35 %) belonged to the group of other previously treated patients. 208 (93.6 %) patients belonged to treatment category-I, summarized in Table 2.

Overall, the treatment success rate in the specified private clinic of Peshawar district was 177 (89 %). Among the total number of patients, 48 (21 %) were cured, 159 (71 %) completed treatment, 12 (5.4% %) died, only 3 (1.3 %) were lost to follow-up, and none defaulted summarized in Table 3. Overall, the treatment success rate in the specified private clinic of Peshawar district was 177 (89%). Among the total number of patients, 48 (21%) were cured,

159 (71%) completed treatment, 12 (5.4%) died, only 3 (1.3%) were lost to follow-up, and none defaulted as summarized in Table 3.

Table 2. The sociodemographic and clinical characteristics of TB patients (n = 222)

Variable	No. (%)
Gender	
Male	108 (48.6 %)
Female	114 (51 %)
Type of TB	
Pulmonary	122 (54.95 %)
Smear positive	62 (50.8 %)[a]
Smear negative	60 (49.1 %)[a]
Extra-pulmonary	100 (45 %)
MDR-TB	1 (0.5 %)
Previous TB Treatment	
No (New cases)	205 (92 %)
Yes (Relapse cases)	14 (6 %)
Other	3 (1.35 %)
Treatment Category	
Category-I	208 (93.6 %)
Category-II	14 (6.3 %)

Note: n[a] = 122

Table 3. The overall TB treatment outcome and success rate during the study period (n = 202)

Overall outcome	No. (%)
Success rate	
Successful treatment Outcome	190 (92%)
Unsuccessful treatment Outcome	12 (8%)
Total	202 (100 %)
TB treatment outcome	
Cured	48 (21%)
Treatment Completed	159 (71%)
Died	12 (5.4 %)
Default	0(0 %)
Lost to follow up	03 (1.3 %)
Total	222 (100 %)

DISCUSSION

The purpose of this study was to determine the treatment outcome of patients infected with TB in a private clinic of Peshawar, Khyber Pakhtunkhwa, and to assess the efficiency of a private healthcare unit as part of PPM project for TB treatment and management. The success rate of the treatment in the current study is comparable with the success rate of the provincial treatment for TB (94%) and with rates reported in other studies conducted in Shangla district (95%),[20] Peshawar (89.6% in PTB, and 92.5 % in EP patients),[21] and district Malakand (99.17%)[22] of Khyber Pakhtunkhwa. Nevertheless, in comparison, it turned out to be higher than the success rates in other countries with limited resources such as Ethiopia (85.6%),[23] Uzbekistan (83%),[24] India (81-83%),[25-27] Iran (83.1%),[28] Nigeria (78.5% to 83.1%),[29-30] Afghanistan (77.7%)[31] and

Somalia (81.8%)[32,] etc. The treatment success rate of this study is also consistent with global End TB Strategy targets set by WHO.

The frequency of the disease in the current study was observed to be higher in females (51%) which is consistent with other similar studies.[33-35] The rate of PTB in women of District Dir (lower) was reported to be 62.02% by Ahmad et al. based on data extracted from different healthcare centers.[11] The factors such as inaccessibility to hospitals, delayed diagnosis, and treatment, substandard hygiene, joint family arrangements, social forbiddance, poor nutrition, and illiteracy in females of our society can be considered as probable causes of high disease rates in females. Further, some studies reveal that women possess less immunity than men,[36] have low accessibility to public health care centers, and they are improbable to undertake sputum smear examination if appear to have respiratory symptoms,[37] thus, leading them to be more susceptible for the development of disease. One of the reason of slight higher detection rate in female (51%) in this study may be due to the fact that this was the clinic of female Pulmonologist and due to cultural issue in society more females attended this clinic as compared to male.

In the current study, treatment failure and default was not reported in any of the cases while 2.6 %, 2.29% default in a study by Tauseef et al, M Saqib et al [44]. Lost to follow up was also very less(1.3%) comparable to other studies.[20-29, 40-42] These are very encouraging findings, the reason for this is proper prescribing according to dosage and weight, the close liaison of social mobilizer, private practitioner, and the clinic assistant who helps in recording and reporting. If any of the patients were found to be late for follow-up, the social mobilizer would call the patients for regular treatment and in case the patient could not visit the clinic, the social mobilizer would take medicine to the patient's home and discuss a management plan.

The count of new cases was observed to be very high and most of the patients suspected of TB were treated with CAT-I. Sunday *et al.*[38] at Ogbomosho, Oyo state Nigeria also reported that 95.1% of patients were treated with CAT-I while treatment with CAT-II was only in 4.9% of the patients which is in concurrence with our study. However, in our current study, the frequency of relapse cases (6 %) was reported to be higher as compared to the data reported by Fatima *et al.*[39] and Tauseef *et al.*[12]

The reason for this may be the fact that this was that difficult or undiagnosed relapse patients are diagnoses in this tertiary level private clinic, where patients prefer to come to be seen in the capital city of KP(Peshawar), whereas new cases are seen as first-line at GP level clinic or patients own home town. Moreover, our findings indicated the high prevalence of smear-positive PTB among patients which conforms with earlier studies. Patients with smear-positive PTB are more likely to transmit the infection in the community. For such cases, early detection and treatment are crucial and mandatory to decrease the progression of the disease. The case fatality rate is observed to be 6% in this study which is higher compared to previously conducted studies.[40-42] Reson for death in these TB patients are largely associated with the comorbidities associated with TB like Diabetes, chronic renal failure, etc, presenting late for diagnosis of the disease and this being specialized private clinic, TB patients with complications are referred here. The lower rates of loss to follow-up of the current study were contrary to other studies [42-43] indicating better implementations of TB control strategy of the private center.

However, being a single-center study, it was limited by the fact that additional data from the surrounding private health centers were not available, to identify risk factors involved. The usual limiting factors associated with any retrospective study were also involved. Still, even after the mentioned limitations, it is acknowledgeable that this center was able to attain a

comparable cure rate and engage in a comprehensive study, considering inadequate resources and a high patient burden. This study will prove helpful and encouraging for any newly developed centers to do more regarding the issue.

CONCLUSION

Public health care in Pakistan is under extreme pressure as the number of doctors in this sector is insufficient to cope with the magnitude of public health care requirements. Private health care is increasing exponentially to cater to the health care needs of the general population. TB is one of the major health risks to which the general population is exposed in developing countries such as Pakistan. Although the public health care sector is doing a commendable job not just in controlling the spread of TB but also providing medical help to the patients, however, due to the magnitude of the problem the role of private healthcare providers is also essential.

To the best of the researchers' knowledge , the current study is the first of its kind in the region to report treatment outcomes based on the data extracted from a private practitioner healthcare unit in Peshawar. The overall rate of TB treatment success at the study site was up to the mark and had achieved WHO targets. As per the findings, the performance of the private sector as a part of the PPM project is satisfactory in terms of case detection and treatment outcome. However, further data mining and analysis from different private healthcare units would be advantageous to assess the efficiency of the private sector as a part of PPM.

RECOMMENDATIONS

Based on the results of the current study it is recommended to involve the private health care providers in catering with not only the medical needs of the TB patients but also in educating the general population about the risk factors involved in the spread of TB. Public-private partnerships can increase the awareness of the general population which will not only be beneficial in the short term but also help in eliminating this health menace in the long run.

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APPENDIX

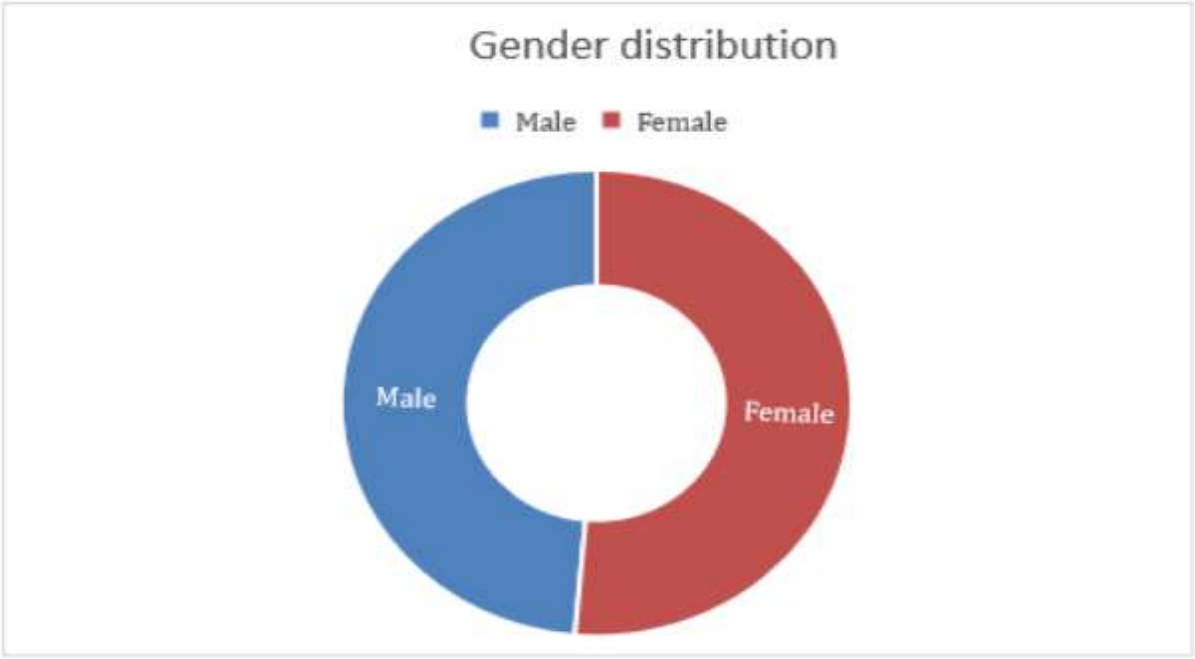

Figure 1. Gender distribution

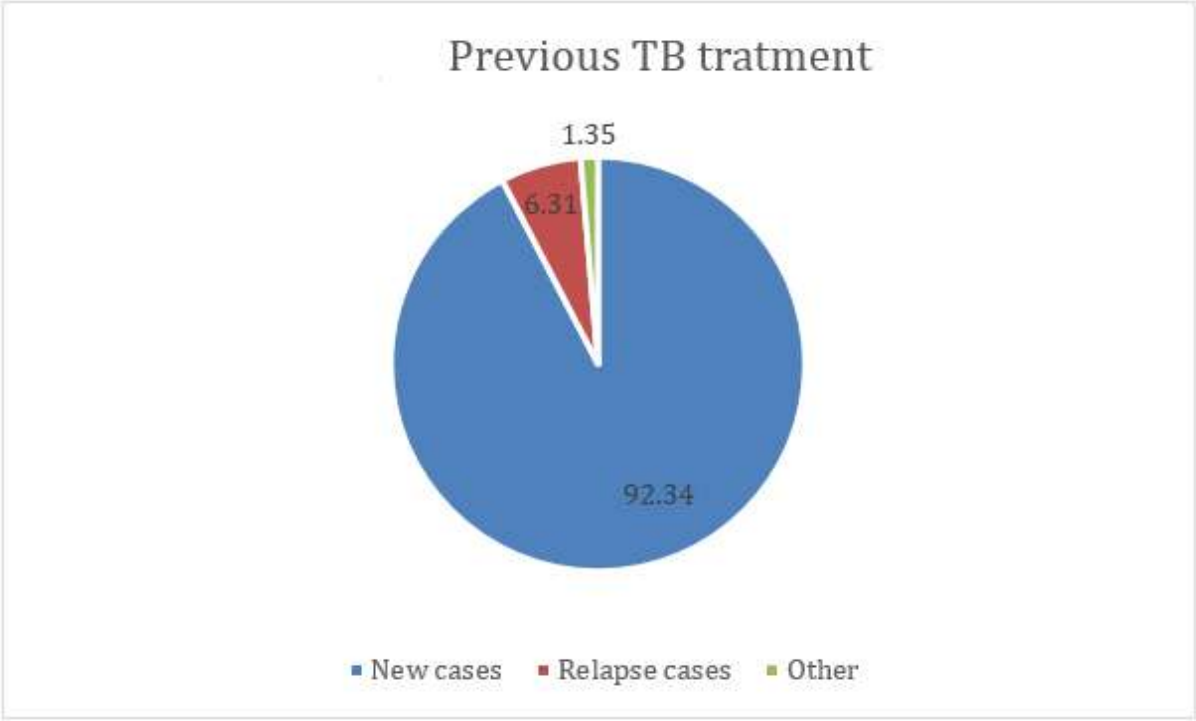

Figure 2. Previous TB treatment

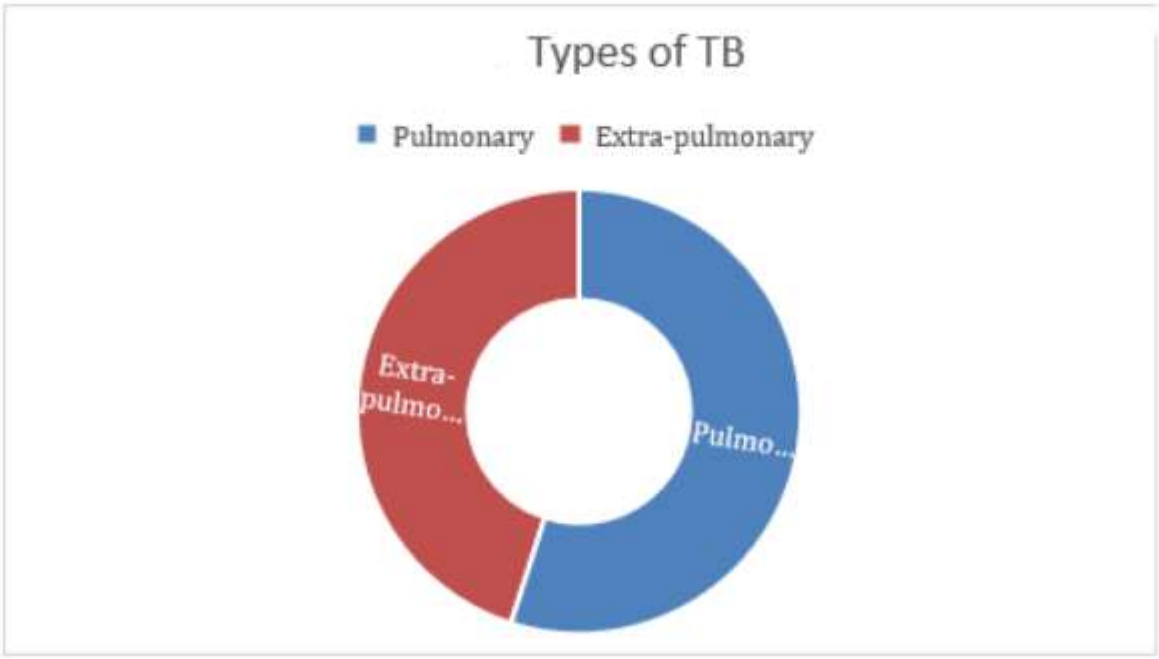

Figure 3. Types of TB

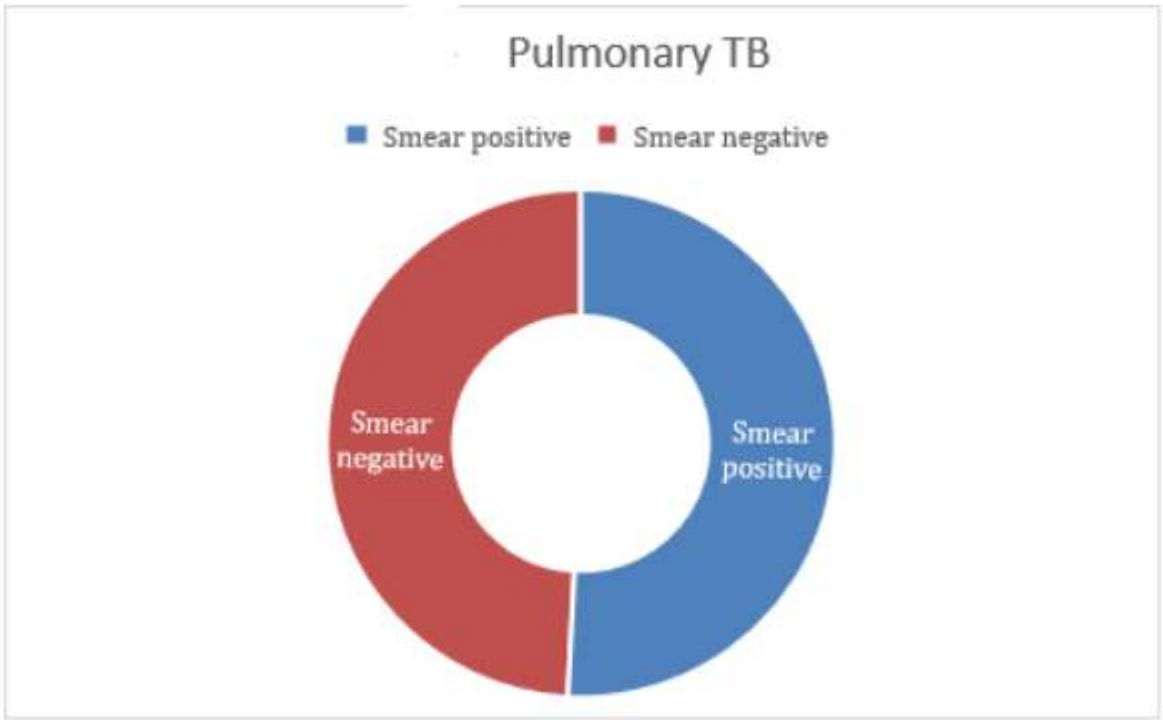

Figure 4. Pulmonary TB

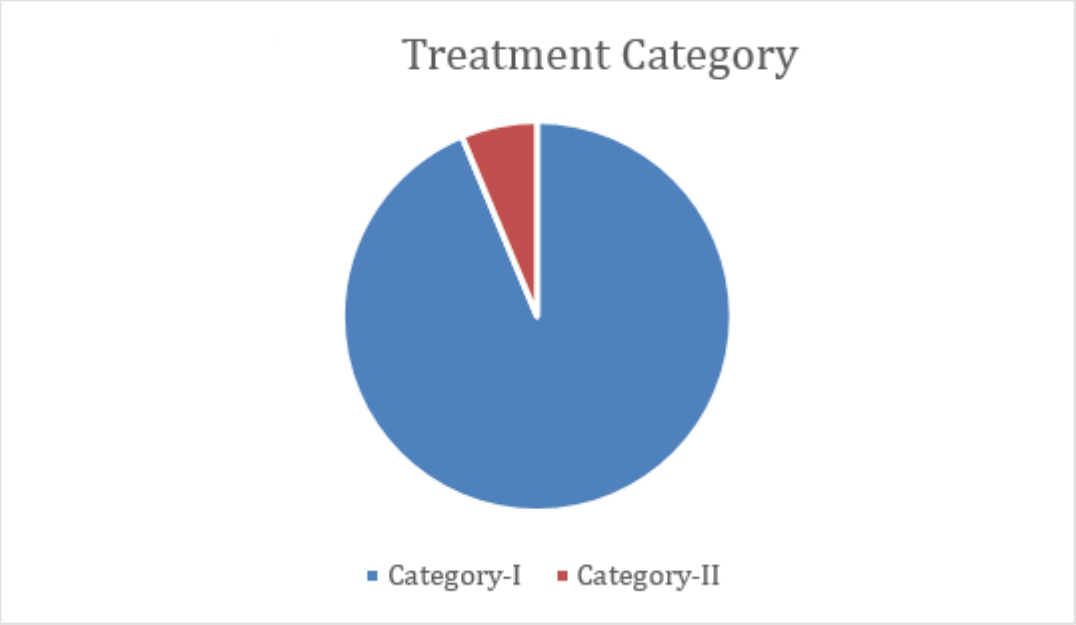

Figure 5. Treatment category

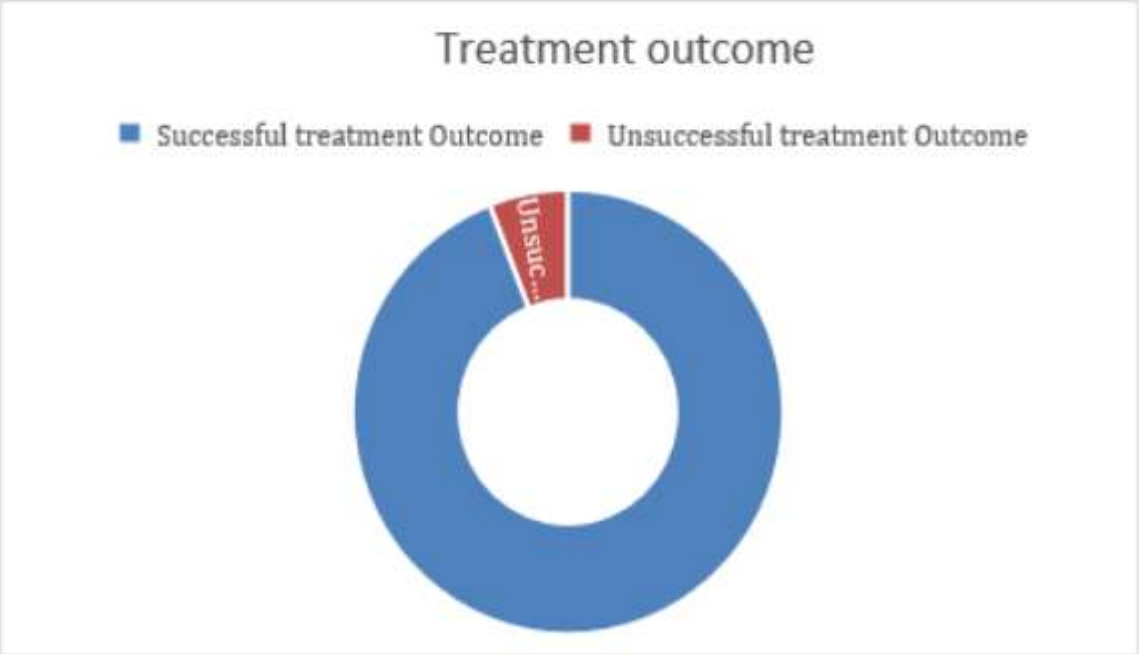

Figure 6. Treatment outcome

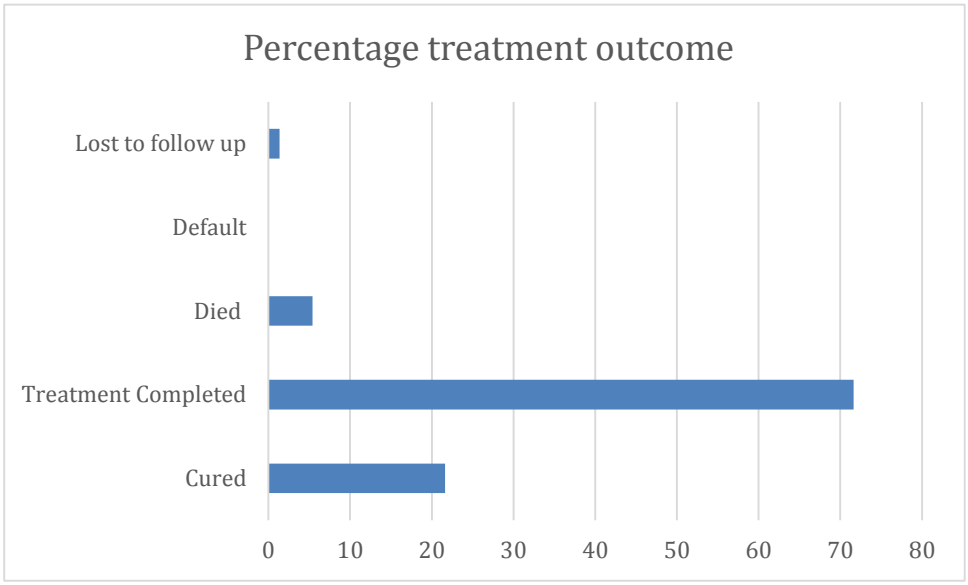

Figure 7. Percentage treatment outcome