



Original Research

Prevalence of Tuberculosis, Case Detection Rate, TB-HIV Co-Infection and Treatment Outcome of Patients Attending Health Care Facilities in Nekemte Town, Western Ethiopia

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Abstract

*Tuberculosis is one of the major public health problems wide spread worldwide. The problem is worse in Africa where our country Ethiopia is found. The aim of the study was to examine the prevalence of all TB cases in the study area, those co-infected with HIV and the treatment outcome of those attended Directly Observed Therapy Short Course service in the three government health care facilities found in Nekemte town in relation to Millennium Development Goals. A retrospective cross-sectional study design based on document analysis of TB Registry Unit of the patients found in the TB Center was used. The study revealed that there were 1,246 TB cases registered on the TB Registry units in the five years (2010/11-2014/15) period of the study. Out of these cases 644 (51.7%) were males and 602 (48.3%) females. The CDR during the five years in the study area was (38.9%). The prevalence of TB/HIV co-infection in the study area was (18.7%). Results for treatment outcome showed an overall treatment success rate of 85.5%. The case detection rate (38.9%) for smear positive PTB, was very low compared to Global target of (70%) by 2015 and still lower than the National detection rate of (62% achievement). The prevalence of TB/HIV co-infection (18.7%) was higher to national prevalence (11%) that requires a collaborative activity of TB and HIV control program. The treatment success rate of this study has met the global target of (85%) by 2015, but is lower to the national achievement of (91%) suggesting an improvement. The finding of this study showed that presence of a gender difference in TB prevalence among the sexes, that may need gender-based intervention.*

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INTRODUCTION

Tuberculosis (TB) is an infectious air borne disease that has become a major global health problem. Each year, there are around 9 million new cases of TB, and 1.5 million deaths of which 360,000 were HIV positive patients (Global TB report 2014). In 1993,

WHO declared TB as a global public health emergence and recommended Directly Observed Therapy – Short Course (DOTS) as a standard strategy to control the disease. All countries are affected, but more in the 22 high burden countries (HBCs) of the

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world where 80% of the cases are found (Global TB report, 2014).

The Stop TB Partnership was established in 2000 as a global movement to accelerate social and political action to stop the spread of TB around the world, eliminate TB as a public health problem, and secure a world free of TB (Stop TB partnership, 2010). In 2006, the plan was launched with a target of decreasing the prevalence, incidence and mortality rate of TB by half (50%) a level of the status of the disease in 1990. To get to this level screening of all TB patients (100%) for HIV, and smear positive pulmonary TB detection or Case detection rate (CDR) of 70% and reach treatment success rate of 85% by the year 2015 was recommended (Stop TB partnership, 2010).

Ethiopia is one of high TB endemic countries in the world. It ranks 13th in the list of 22 high burden countries, and 7th in Africa. The report also revealed that Ethiopia is among the 41 high TB/HIV co-infected countries in the world (Global TB report, 2014). The country had a high TB burden, high TB/HIV co-infection and had attempted to adapt and implement the Global plan to Stop TB for one decade 2006-2015.

A recent report from Federal Ministry of Health (FMOH) showed that there is a trend in declining of prevalence, incidence and mortality rate of tuberculosis (FMOH, 2014). Even WHO has declared that Ethiopia has met the global target of 2015 in TB prevalence, incidence and mortality reduction by 50% compared to the level of the TB burden in the 1990's? Accordingly, the prevalence of TB that was recorded 425/100,000 in 1990 has decreased to 211/100,000 in the year 2013. Similarly, the incidence which was 367/100000 in 1990 was reduced to 224/100000 in the same

*Sci. Technol. Arts Res. J., Oct.-Dec. 2017, 6(4), 01-09* year. However, the global target of TB patients to know their HIV status by 2015 was adjusted as 100%, but in Ethiopia only 71% of TB patients knew their HIV status by 2013 (Global TB report,2014). In addition, the available data in the country suggests wide variations in the TB prevalence, case detection rate, TB patients with known HIV status, prevalence of TB/HIV co-infection, treatment success rate and among the different localities.

Although attempts were made in case studies of some localities in Oromia Region, there is little if any information about the current status of TB and Co-infection with HIV in Nekemte town. Hence, investigation was necessary to look into the prevalence of TB cases and TB/HIV co- infection and treatment success in relation to Sustainable Development Goal 3.

## **MATERIAL AND METHODS**

### **Description of the Study Area**

The study was conducted in Nekemte town, Oromia Regional State, West Ethiopia. It is located at 9<sup>0</sup>5'N and 36<sup>0</sup>33'E with altitude of 2088m above sea level. The town is 312 km from Addis Ababa to the west. It has a population size projected for 2014 as 105,358 with male 53,332 (50.6%) and female 52,026(49.4%). The town has two governmental Referral Hospitals, two Health Centers and a number of Private Clinics. The government health care facilities have TB centers that provide DOTS service to TB control program.

### **Study Design**

The study involved a retrospective cross-sectional survey design using document analysis from TB Registry Unit of the TB

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Center at the three government health care facilities (Nekemte Referral Hospital, Nekemte Health Center and Cheleleki Health Center) in Nekemte town from 2010/11-2014/15. The objective of the study was to examine the prevalence of all TB cases in the study area, those co-infected with HIV.

**Sampling technique:**

The selection of the three health care facilities was done by using purposive sampling technique. These three health facilities were selected due to that majority of TB treatment (DOTS service) takes place in government health care facilities that made high inflow of TB Patients to the center. The samples of the study were all TB patients recorded on the Registry unit of the health care facilities from 2010/11-2014/15.

**Data Collection**

Data were collected from the three government health care facilities providing DOTS service. The health care facilities TB Center has TB Registry unit on which TB patient information was recorded. The variables on the record were names of TB patient, age, sex, address, forms of TB (smear positive PTB, smear negative PTB & Extra PTB), TB category (new cases, retreatment cases), HIV status, treatment date started and completed, treatment outcome (cured, complete treatment, died, loss to follow up, transferred out).

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**Data Analysis**

The data from all TB patients of the five years (2010/11 to 2014/15) was checked for completeness and clarity. Then the prevalence of tuberculosis was determined by sex, age, and co-infection with HIV was determined as a proportion of the number of individuals with variable of interest to the total number of TB patient. Additionally, case detection rates and treatment outcomes were processed and analyzed using descriptive statistics in percentages and ratios using tables.

**RESULTS**

The study on the prevalence of TB from secondary data from the year (2010/11 to 2014/15) showed that a total of 1246 TB cases were registered on the TB Registry Unit, and attended their DOTS service. From these TB cases 644(51.7%) were male and 602 (48.3%) were females. Generally, from the total TB cases 21.3% were smear positive, 33.5% smear negative and 45.2% were Extra Pulmonary TB (EPTB). Among the males 144(22.4%) were smear positive PTB and 244(37.8%) were smear negative PTB, while 256 (39.3%) were Extra Pulmonary TB cases. Likewise, among females 122 (20.2%) were smear positive PTB and 174(28.9%) were smear negative PTB, while 306(50.8%) were Extra Pulmonary TB. The re-treatment cases among the total TB cases were only 1.9%.

Table 1. Prevalence of TB cases by sex in Nekemte Referral Hospital, Nekemte Health Center & Cheleleki Health Center (2010/11 -2014/15)

Characteristic (sex)	Total TB cases N (%)	Pulmonary TB cases		Extra Pulmonary TB cases N (%)
		Smear positive N (%)	Smear negative PTB N (%)	

Male	644(51.7%)	144(22.4%)	244(37.9%)	256(39.7%)
Female	602(48.3%)	122(20.2%)	174(28.9%)	306(50.8%)
Total	1246(100%)	266(21.3%)	418(33.5%)	562(45.2%)

In this study the prevalence of tuberculosis in Nekemte town was also evaluated amongst age groups based on WHO category system; as under five (0-5 year), children (6-14year), adult or high productive age (15-64year) and old age (65 and above). Based

on this category out of 1246 total TB cases 90.2% was in the age category of 15-64years followed by 4.0% infection in age groups (6-14 years) and the age of 65 and above, and with only 1.7% cases was in the age group of (0-5 years) (Table 2).

Table 2. Prevalence of TB cases by age category in Nekemte government health care facilities (2010/11 -2014/15)

Age groups	Total TB cases N(%)	Pulmonary TB		Extra pulmonary TB N(%)
		Smear positive N (%)	Smear negative N (%)	
0-5	21(1.7%)	0(0%)	3(0.2%)	18(1.4%)
6-14	51(4.0%)	5(0.4%)	11(0.8%)	35(2.8%)
15-64	1124(90.2%)	260(20.8%)	381(30.6%)	483(38.8%)
65+	50(4.0%)	1(0.08%)	23(1.8%)	26(2.0%)
Total	1246 (100%)	266(21.3%)	418(33.5%)	562(45.1%)

In this study the highest prevalence of TB was detected in 2010/11 contributing to 26.2% of all cases between 2010/11-2014/15, followed by the prevalence of

20.3% in 2014/15 (Figure 1). In general, there was a decline in TB between 2010/2011 and 2014/15 years by 5.9%, which is 1.47% per year

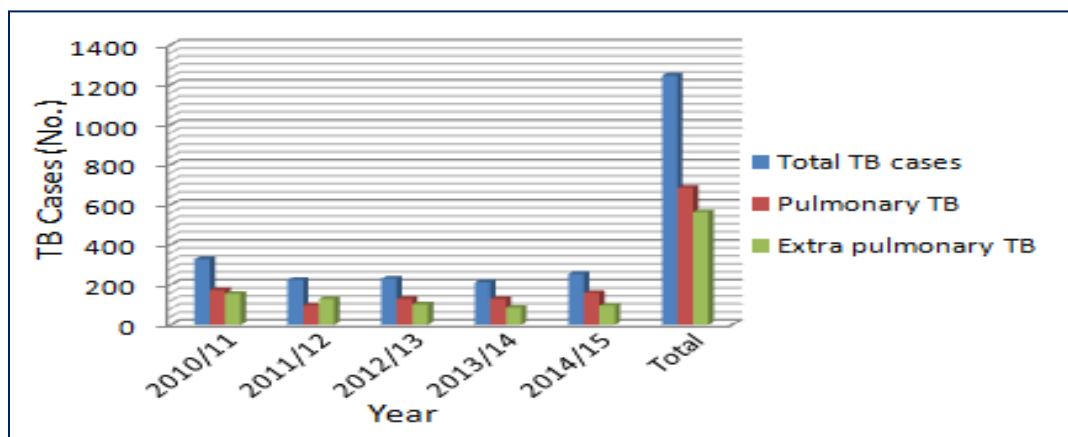


Figure 1: Trend in year-specific prevalence of TB cases in Nekemte government health care facilities (2010/2011-2014/15)

Attempts were made to investigate the detection rate (smear positive pulmonary TB diagnosed) among pulmonary TB cases. During the five years (2010/11-2014/15) out of the total 684 Pulmonary TB cases, 266 (38.9%) were smear positive and 418

(61.1%) were smear negative. The year specific detection rate of smear positive cases was 41.6% between the years 2010/2011 and 2011/12, and 35.4% in 2014/2015 showing a slight decline as function of years.

Table 3. Prevalence of Smear positive PTB cases indicating case detection rate (CDR) (2010/11- 2014/15) in Nekemte government health care facilities

Year	Total Pulmonary TB cases	Smear positive PTB	Smear negative PTB
	N	N (%)	N(%)
2010/11	173	72(41.6%)	101(58.4%)
2011/12	96	40(41.6%)	56(58.3%)
2011/13	129	48 (37.2%)	81(62.8%)
2013/14	128	50(39.1)	78(60.9)
2014/15	158	56(35.4)	102(64.6)
Total	684	266(38.9%)	418(61.1%)

The total TB cases registered in the five year in Nekemte town health care facilities were 1246. All TB patients were tested to know their HIV status by the DOTS program. Of the total TB patients tested for HIV for 5 years, 233 (18.7%) were HIV positive ranging from the lowest 16.8% in the year 2010/2011 to the

highest co- infection of 22.1% in the year 2012/2013 (Table 4). The prevalence of TB/HIV co-infection showed an increasing trend from 2010/11 which was 16.8% to 22.1% in a year 20112/13 then decreased to 16.9% in 2014/15.

Table 4. Prevalence of TB/HIV co-infection among TB patients attended DOTS service in Nekemte health care facilities (NRH, NHC&CHC) 2010/11-2014/15.

Year	TB cases	Tested for HIV	HIV positive	SPPTB	SNPTB	EPTB
	N	N	N (%)	N (%)	N (%)	N (%)
2010/11	327	327	55(16.8%)	15(27.2%)	20(36.4%)	20(36.%)
2011/12	224	224	44(19.6%)	10(22.7%)	14(31.8%)	20 (45%)
2012/13	230	230	51(22.1%)	13(25.5%)	21(4.2%)	17(33.%)
2013/14	212	212	40(18.8%)	7(17.5%)	11(27.5%)	22(55.%)
2014/15	253	253	43(16.9%)	9(20.9%)	15(34.9%)	19(44.2%)
Total	1246	1246	233(18.7%)	54(23.2%)	81(34.7%)	98(42.1%)

Regarding the treatment outcome of TB patients attended DOTS service from 2010/11 to 2014/15 in Nekemte town, 85.5% of the attendants were successfully treated, whereas 6.6% of the patients died, 2.4% lost to follow up the treatment, 0.8%

treatment failure and 4.5% of the patients were transferred to other area. Successful treatment was observed in the year 2010/2011 in which the treatment success rate was 88.6% compared to the lowest range 82.5% in 2013/2014 (Table 5).

Table 5. Treatment Outcome of TB patients attended DOTS service in NRH, NHC& CHC in Nekemte town (2010/11-2014/15)

Year	Total TB Cases	Treatment Outcome				
		Successfully Treated (TSR)	Died	Loss to follow up	Failure	Transferred out
	N	N (%)	N (%)	N (%)	N (%)	N (%)
2010/11	327	290(88.6%)	12(3.6%)	12(3.6%)	1(0.3%)	12(3.6%)
2011/12	224	188(83.9%)	12(5.3%)	3(1.3%)	1(0.4%)	20(8.9%)
2012/13	230	196(85.2%)	24(10.4%)	3(1.3%)	2(0.8%)	5(2.1%)
2013/14	212	175(82.5%)	20(9.4%)	5(2.3%)	4(1.8%)	8(3.7%)
2014/15	253	216(85.0%)	15(5.9%)	8(3.1%)	3(1.0%)	11(4.3%)
Total	1246	1065(85.5%)	83(6.6%)	31(2.4%)	11(0.8%)	56(4.5%)

## DISCUSSION

In this study the proportion of male to female ratio of TB case was 1.1: 1 which was slightly different from other studies in some parts of the country (Sidama Zone (1.2:1), and Yirga Cheffe (1.3:1) (Dangisso, *et al*,2014) & Atire, 2015 respectively). Accordingly, a research carried out on 'Trends of Case Notification and Treatment Outcome in Sidama Zone on Retrospective analysis of 10years (2003-2012) showed that, out of 37,070 total TB cases registered 54.5% were male and 45.5% were females in a ratio of 1.2:1 respectively (Dangisso et al, 2014). Similar research in Gambella region also showed out of a total 2,303 TB patients registered at Gambella regional hospital within five years (2006- 2010) , 54.5% were males and 45.5% were females with a ratio of

1.2:1 (Demeke & Legesse,2013). Other Retrospective study done at Yirga Cheffe Health Center on pulmonary TB prevalence for 6 years (2008-2013) showed, out of 1190 total TB cases 56.6% were male while 43.2% were females with 1.3:1 ratio respectively (Atire ,2015). In all cases, the data showed that male were more vulnerable to TB than females. Hence, the present study showed more prevalence of TB cases in males than females (1.1 :1) that is in accordance with the national (1.2:1) and many other local areas of the country, even if lower variation in comparison with regional (Africa) (1.4:1) and global (1.6:1) is observed (Global TB report,2014).

In this study among the total 1246 TB cases, 266(21.3%) were smear positive pulmonary TB, 418(33.5%) were smear negative PTB and 562(45.2%) were extra PTB. This shows the prevalence of TB forms is higher in smear negative and extra pulmonary compared to smear positive. This result is in agreement with a longitudinal study carried out in Addis Ababa, that summarized socio-demographic and medical information of 6, 450 registered TB patients, show among the total, 25.6% were smear positives, 33.9% were smear negatives and 40.5% were extra pulmonary TB patients. This shows a comparable prevalence of all TB forms to this study. Other research by Gashaw (2013) on prevalence of tuberculosis co-infection with HIV on Dire Dawa hospital showed a 26.1% smear positive, 39.7% smear negative and 34.2% EPTB.

The distribution of TB amongst the different age groups in this study showed the same trend with previous studies in Ethiopia. Although age categories differed, all showed that the age groups above 15 were more vulnerable to TB infections. Similarly, in the present study the highest prevalence (90%) within the age group 15-64 years was comparable with studies conducted in Dire Dawa (94%) (Gashaw, 2013) and Yirga Cheffe health Center (80%) (Atire, 2015).

Studies showed a decrease in TB cases across the country with a decline of TB infection in Yirga Cheffe by (5.3%) within (2008-2013) (Atire, 2015), but a high decline of 16.4% in Dire Dawa (2008/9-2011/12) (Gashaw, 2013). However, in case of the present study even if there is an overall decreasing trend of TB prevalence by (5.9%) in 5 years there is a fluctuation in a year in between for instance 224 cases in 2011/12 and 230 cases in 2012/13. This shows the burden of the disease is still high in this

study area that is, the transmission rate is not tackled as needed.

The data also showed variations in the prevalence of pulmonary and extra pulmonary TB between the years. Accordingly, pulmonary TB showed the highest burden of 62.5% in the year 2014/15 and the lowest burden of 42.9% in the year 2011/2012; whereas the highest and lowest infections of extra pulmonary TB were recorded in years 2014/2015 and 2011/2012 with prevalence of 57.1% and 37.5%, respectively. In both cases the difference in the prevalence of pulmonary TB and Extra-pulmonary TB between the highest and lowest records was almost 20 .6%. In contrary to previous studies conducted by Atire (2015), most of the TB patients were also new cases.

The present study showed that the case detection rate (38.9%) for smear positive PTB, was very low compared to Global target of 70% by 2015 and still lower than the National detection rate of 62%, Africa (Regional) 52% and Global 64%. This low detection rate in this study area could be attributed to: Non-adherence to the national diagnostic algorithm (Mesfin *et al.*, 2005), Poor quality (under-reading) and examination of a sub optimal number of sputum smears (Hawken, *et al.*,2001), inadequate sputum collection, storage staining and human error, etc. (Harries *et al.*,1998).

The prevalence of TB/HIV co-infection in this study was comparable to the global co-infection rate of 18% and slightly higher than the national one. Although TB/HIV co-infection in Nekemte (18.7%) was lower than that of Dire Dawa (24.8%) and Addis Ababa (45.3%), at which the study was carried out where HIV was highly distributed in the country still higher compared to the national prevalence (11%)



and the global (18%) level. This indicates occurrence of more prevalence of HIV in the area.

The treatment success rate of the current study was 85.5% which has improved highly compared to the research carried by Eyasu *et al* (2015) with TSR of 70.8%. The result of current study revealed that the treatment success rate was 85% which is comparable to the set global target. However, it has fell short slightly, but not significantly of the national achievement 91% and treatment success of other areas of the country.

## CONCLUSIONS

In the present study the prevalence of TB forms is higher in smear negative followed by extra pulmonary compared to smear positive. All TB patients attended DOTS service was tested for their HIV status, and 18.7% were co-infected with HIV. Since all (100%) of TB patients in the study area knew their HIV status, it has met the global target for 2015. The study also indicates the presence of a gender difference in TB prevalence among the sex, in which females were more affected than males and the data also showed that the majority of the patients were in age group of 15-64 years which was the active productive age groups followed by children and old age, with least prevalence in under five age appropriate documents.

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categories. The prevalence of TB in 5 years showed a decrease. The proportion of smear positive PTB patients among Pulmonary TB patients indicates lower detection rate. Regarding the treatment outcome, out of the total TB patients attended DOTS service majority of them were treated successfully whereas some died and a few losses to follow treatment. The study area TSR is lower to the national and slightly lower to the global, but higher to the regional TSR of the 2014 Global TB report.

Since the study showed the presence of a gender difference in TB prevalence, gender-based intervention is highly recommended to mitigate the problem. Additionally, further studies are needed to verify possible reasons for an overall decreasing trend of TB prevalence and low detection rate.

## No Competing Interest

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