



FACTORS ASSOCIATED WITH RELAPSE, DEFAULTER AND TREATMENT FAILURE IN TUBERCULOSIS TREATMENT IN EASTERN NEPAL

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ABSTRACT

Introduction: Tuberculosis is an infectious disease caused by the bacillus *Mycobacterium tuberculosis*. Relapse, defaulter and treatment failure are one of the major public health concerns in the South-East Asia Region. These cases are in increasing in recent years in Nepal. This study attempts to find out the factors associated with relapse, defaulter and treatment failure.

Materials and Methods: A cross sectional study was conducted in three purposively selected districts namely Sunsari, Morang and Jhapa of Eastern Nepal. Altogether 67 cases of relapse, defaulter and treatment failure cases were collected from different DOTS referral centers of these three districts. Univariate and Bivariate analysis were performed to find out the associated factors.

Results: The majority of collected cases were found to be relapse 65.7% and defaulter 29.9% then treatment failure 4.5%. The mean age of respondent was 49.01 years, more than two third were male and majority were married. More than half of respondents were unemployed. Nearly two third of respondents were illiterate. Nearly 40% respondent had family income in range of 10,000 -20,000 per month. Most of them (64%) resided in urban area. Most of them had cross ventilation in sleeping rooms. Nearly 90% respondents were non-smoker and 21% respondents took alcohol habitually.

Conclusions: The study revealed that there was significant association between occupation with relapse and defaulter. However, there was no association found between smoking cigarettes, alcoholism, illicit drug use and economic status. This study could be helpful to the concerned authority and stakeholders in making plan and policy related to relapse, defaulter and treatment failure associated with different occupational groups.

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INTRODUCTION

Tuberculosis (TB) is still a disease of immense public health concern of Nepal. Despite huge success and wide coverage of Direct Observe Therapy Short Course (DOTS) in Nepal, still the number of defaulter, relapse and treatment failure cases are the major impediment to fighting Tuberculosis. A case becomes default if the treatment is interrupted for two successive months or more. A case is known as relapse if the case is cured or treatment completed and is diagnosed bacteriologically positive Tuberculosis. Likewise, if a case has positive sputum smear or culture at five months or later throughout treatment is called treatment failure.

This study on socio-demographic, cultural and economic factors as well as perceived barrier towards DOTS utilization among defaulter, relapse and treatment failure can bring the opportunity to reduce the numbers and guide the health workers to understand the problem during treating defaulters and relapse.¹

The study aimed to assess the factors associated with relapse, defaulter and treatment failure in Tuberculosis treatment, to determine the association with knowledge about Tuberculosis infection and practice towards Tuberculosis treatment with relapse, defaulter and treatment failure and to determine the perceived barriers regarding DOTS utilization.

MATERIALS AND METHODS

Cross-sectional study was conducted in Eastern Region of Nepal. Three districts of Eastern region namely Sunsari, Jhapa

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and Morang were selected purposively. The study duration was of six months (September 2014 to February 2015). Quantitative approach was adopted to find out the associated factors of relapse, defaulter and treatment failure in Tuberculosis treatment. Ethical approval was taken from the Institutional Review Board, BPKIHS. Informed verbal consent was taken from individual subject prior to interview.

Purposive sampling technique was adopted. First of all out of 16 districts of Eastern Region, three districts, namely Sunsari, Morang and Jhapa were selected purposively. Then after, all the DOTS centers and sub-centers were identified with the help of TB/Leprosy Supervisor in respective District Public Health Office. Patient flow in each DOTS centers as well as sub-centers were analyzed with the support of resource persons of each DOTS centers. Finally those DOTS centers and sub-centers were selected where patient flows were more in each district. Pre-testing was carried out for finalizing the tools in one DOTS center.

Sample size was calculated. Final sample size was 67 defaulters, treatment failure and relapse patients. Patients registered with relapse, defaulter and treatment failure visiting DOTS centers for follow-up were taken as study population. Those patients were excluded who were not able to come to health facility at the time of data collection at DOTS centers of Sunsari, Jhapa and Morang districts of Eastern region. The information was collected from different Health institutions. Nepal Anti-Tuberculosis Association, Biratnagar, BPKIHS, DOTS referral center, Rani Primary Health Center (PHC), Mangalbare PHC, Pathari Health Post (HP), Itahari PHC, Damak HP, Bakauri HP, Belbari HP, AMDA Nepal, Madhumala HP. Data was collected using semi-structured questionnaire by researchers.

Collected data was entered in excel. Editing was done in excel and coding was made. The data was transferred in SPSS. Labeling, recoding and analysis of data was done using SPSS. Univariate analysis was done to find out the frequency and percentage of each variable. Bivariate analysis was done to make an association with socio-demographic determinant factors, economic factors and associated factors with relapse and defaulter.

RESULTS

Altogether 67 samples were taken from three districts (Sunsari, Morang and Jhapa) of Eastern region. The majority of collected cases were relapse 65.7% and defaulter 29.9% then treatment failure 4.5%.

Table 1 Socio-demographic characteristics of respondent (n=67).

Characteristics	Frequency(n)	Percentage (%)
Age		
<20 years	1	1.5
20-40 years	15	22.4
41-60 years	30	44.8
>60 years	21	31.3
Gender		
Male	55	82.1
Female	12	17.9
Religion		
Hindu	64	95.5
Muslim	2	3.0
Buddhism	1	1.5
Marital status		
Married	59	88.1

Unmarried	6	9.0
Widow	2	3.0
Ethnicity		
Brahmin	19	28.4
Chhetri	6	9.0
Janajati	35	52.2
Dalit	5	7.5
Other	2	3.0
Family type		
Nuclear	27	40.3
Joint	40	59.7
Occupation		
Agriculture	9	13.4
Service	2	3.0
Businessman	5	7.5
Migrant Labor	2	3.0
Housewives	4	6.0
Unemployed	41	61.2
Student	4	6.0
Literacy		
Literate	22	32.8
Illiterate	45	67.2
Family income		
<5000 NRs	11	16.4
5000-10000 NRs	15	22.4
10000-20000 NRs	25	37.3
>20000 NRs	16	23.9
Residence		
Rural	24	35.8
Urban	43	64.2
Sleeping room		
Two person/ room	37	55.2
Three person/ room	27	40.3
Four person/ room	3	4.5
Cross ventilation		
Yes	63	94.0
No	4	6.0
Smoking status		
Smoker	7	10.4
Non-smoker	60	89.6
Alcohol status		
Alcoholic	14	20.9
Non- alcoholic	53	79.1
Substance abuse		
Yes	10	14.9
No	57	85.1
Chronic condition		
Yes	25	37.3
No	42	62.7

The majority of respondent were in age category 41-60 years (44.8%). The mean age of respondent was 49.01 years. There were 55 (82%) male respondents and 64 (95.5%) were from Hindu religion. Likewise, 59 (88%) of respondents were married. Many of them belonged to Janajati 35(52.2%) and Brahmin 19 (28.4%). Most of them (60%) belonged to joint family. As high as 61.2% were unemployed. More than 60% respondents were illiterate. Furthermore, 37% respondents had family income in range of 10,000 -20,000 per month. Most of them (64%) were residents of urban area. More than half of respondents said that they had two persons per sleeping room. Large number of them (94%) had cross ventilation in sleeping rooms. Nearly 90% respondents were non-smoker and 21% respondents consumed alcohol occasionally. The co-morbid conditions like diabetes mellitus, asthma, hypertension, arthritis were present in 37% of respondents (table 1).

Similarly, majority (95.5%) of respondents had previous history of Tuberculosis among which most of respondents (95%) had Pulmonary Tuberculosis. All of respondents had undergone Tuberculosis treatment. Many of them (82.8%) received their treatment at DOTS center. Only 3% had family history of TB (table 2).

Table 2 Information regarding previous history and Treatment practice (n=67)

Information	Frequency(n)	Percent (%)
Previous history of TB		
Yes	64	95.5
No	3	5.5
Types of TB		
Pulmonary TB	61	95.3
Extra -Pulmonary TB	3	4.7
Place of TB Treatment		
Institution	5	7.8
DOTS center	53	82.8
Hospital	3	4.7
Private clinics	3	4.7
Treatment Cost		
Free of Cost	61	95.3
Paid	3	4.7
Family History of TB infection		
Yes	2	3.0
No	65	97.0

Regarding the cause of Tuberculosis infection, 52(77%) respondents regarded it occurrence from infected person with Tuberculosis. On acquiring symptoms of Tuberculosis infection, 53(79%) respondents had blood in cough, 42(63%) had fever, 35(52%) had weight loss and 27(40%) had loss of appetite (table3).

Table 3 Knowledge regarding Tuberculosis of the respondents (n=67)*

Knowledge regarding TB	Frequency(n)	Percentage (%)
Source of information		
Relative	45	67.2
Media	51	76.1
Newspaper	5	7.5
Health Institution	4	6.0
Cause of Tuberculosis		
Contact with infected Person	52	77.6
Over crowding	2	3.0
Bacterial	11	16.4
Symptoms of TB		
Weight loss	35	52.2
Loss of appetite	27	40.3
Fever	42	62.7
Blood in cough	53	79.1
Transmission route of TB		
Air route	56	83.6
Food	4	6.0
Water	1	1.5
Prevention/control of TB		
Use of Mask	59	88.1
Covering Mouth	15	22.4
Not spitting everywhere	19	28.4
Personal Hygiene	38	56.7
Increase immunity	21	31.3
Sanitation Practice	51	76.1

Note: (*) indicates multiple response answer.

Most of the respondents, 37(55%) didn't know the reason of their Tuberculosis infection. Many of them were referred to DOTS center for their TB treatment. Almost all had got treatment free of cost. Most of them (77%) visited Government health facility and then in private clinics (17%) for checkup when they felt the symptoms of TB infection. Majority (82%) of respondent consulted in Government health facility for the final TB diagnosis and 16% respondents went to private clinics for their diagnosis (table 4).

Table 4 Information regarding Diagnosis and Treatment of Tuberculosis (n=67)

Characteristics	Frequency(n)	Percent(%)
Reason of TB infection		
Infection/lung Disease	22	32.8
Weakness	8	11.9
Don't Know	37	55.2
Place of Treatment		
Hospital	20	30.2
DOTS center	47	71.2
Treatment Cost		
Free	66	98.5
Paid	1	1.5
Visited first time with Symptoms		
Clinics/private hospital	12	17.9
Pharmacy	2	3.0
Government health facility	52	77.6
Did nothing	1	1.5
Place for Diagnosis		
Clinics/private hospital	11	16.4
Pharmacy	1	1.5
Government health facility	55	82.1

Nearly half of the respondents (76%) had faced side effects during medication (table 5).

Table 5 Side effects of TB drugs faced by patients during TB treatment (n=67)

Characteristics	Frequency(n)	Percent (%)
Side effect		
Yes	51	76.1
No	9	13.4
Don't Know	7	10.4
Common side effect*		
Weakness	28	41.8
Dizziness	11	16.4
Nothing	15	22.4
Other	13	19.4

Note: (*) indicated multiple response answer.

Most of respondents pointed prolonged duration of TB treatment course (71.6%) as the major barrier for completion of TB treatment (table 6).

Table 6 Barriers during DOTS utilization (n=67)*

Barriers during DOTS	Frequency(n)	Percent (%)
Utilization		
Prolong duration of treatment	48	71.6
Long travel time	33	49.3
Financial constrain	18	26.9
Lack of transportation	16	23.9
Return back to job	15	22.4
Less friendly staff	6	9.0
Lack of family support	6	9.0
Stigma	3	4.5
Other	2	3.0

Note: (*) multiple response answer

Bivariate Analysis

Table 7 Association between socio-demographic factor with Relapse and Defaulter

Bivariate	Relapse	Defaulter	Chi-square	p-value
Age category				
<20 years	12(27)	4(17)	.811	.279
>20 years	32(73)	19(83)		
Gender				
Male	35(79.5)	20(87)	.564	.523
Female	9(20.5)	3(13)		

Marital status				
Married	40(91)	19(83)	.990	.269
Unmarried	4(9)	4(17)		
Family type				
Nuclear	16(36)	11(48)	.825	.258
Joint	28(64)	12(52)		
Total family member				
<5 members	8(18)	6(26)	.571	.235
>5 members	36(82)	17(74)		
Occupation				
Unemployed	23(52)	18(78)	4.296	.033
Employed	21(48)	5(22)		
Educational status				
Literate	15(34)	7(30)	.092	.493
Illiterate	29(66)	16(70)		
Family income				
<5000 Rps	5(11)	6(26)	2.386	.115
>5000 Rps	39(89)	17(74)		
Residence				
Rural	13(29.5)	11(48)	2.196	.113
Urban	31(70.5)	12(52)		
Total sleeping rooms				
2 person per room	25(57)	12(52)	.132	.457
>2 person per room	19(43)	11(48)		

Occupation was significantly associated with relapse and defaulter whereas other demographic factors were found insignificant with age, gender, total family member, educational status, family income, residence and total sleeping rooms (table 7). There was no association with ventilation, smoking status, alcohol status and substance abuse (table 8).

Table 8 Association between behavior related factors with Relapse and Defaulter

Bivariate	Relapse	Defaulter	Chi-square	p-value
Cross ventilation				
Ventilated	42(95.5)	21(91)	.463	.425
Non-ventilated	2(4.5)	2(8.7)		
Smoking status				
Smoker	5(11)	2(9)	.115	.547
Non-smoker	39(89)	21(91)		
Alcohol status				
Alcoholic	10(23)	4(17)	.260	.431
Non-alcoholic	34(77)	19(83)		
Substance abuse				
Yes	6(14)	4(17.4)	.168	.470
No	38(86)	19(83)		

Note: (*) Yates corrected chi-square.

There was no association between previous history of TB, cost of TB treatment with relapse and defaulter (Table 9).

Table 9 Association between practice related factors with Relapse and Defaulter

Bivariate	Relapse	Defaulter	Chi-square	p-value
Previous history of TB*				
Present	42(95.5)	20(87)	1.580	.217
Absent	2(4.5)	3(13)		
Types of TB				
Pulmonary TB	44(100)	17(85)	NA	NA
Extra-pulmonary	0	3(15)		
Cost for TB treatment				
Free of cost	36(82)	13(65)	2.167	.125
Paid treatment	8(18)	7(35)		

Note: (*) Yates corrected chi-square.

DISCUSSION

This study attempted to explore the relationship between socio-demographic and economic factors and relapse, defaulter

and treatment failure. Religion, marital status, ethnicity, family type, family member, occupation, educational status, family income and residence were taken as socio-demographic variables. Among all cases, 65.7% belonged to relapse 29.9% to defaulter and 4.5% to treatment failure. Majority of cases were in age category 41-60 years and mean age of respondent was 49.01 year. A study done in Morocco by Slama *et al.* found that elderly population were more prone to defaulter and relapse.² Similarly, a study done in Sri Lanka showed that old age population were more prone to relapse, defaulter and treatment failure.³

More than two-thirds (82%) of respondents were male which is consistent with study done in Pakistan by Afridi *et al.*⁴ This might be due to the reason that women had less access to diagnostic facilities than men. As well, males traveled more in areas of studies conducted. However, this study doesn't show any significant association between sex, relapse and defaulter. The majority of respondents were from Hindu religion (95.5%). More than four-fifths (88%) of respondents were married. Similar study done in Bangalore city found the difference in marital status was statistically significant among new patients, wherein a higher proportion of defaulted patients were among those married in contrast to the completed group.⁵

A higher number of study sample belonged to Janajati (52.2%) and Brahmin (28.4%). This might be due to higher number of population belonging to Brahmin/Chettri as well as Janajati and relatively lesser from dalit community. Additionally, dalits had less access to DOTS compared with Brahmin/Chettri. In contrast, the study conducted by Malhotra *et al.* showed upper caste (Brahmin/Chettri) had lesser than other caste i.e. 29.1 percent in case and 21.8 percent control.⁶

Nearly 60% belonged to joint family. Sixty one percent of the respondents were unemployed and 13.4% were involved in agriculture. More than half respondents were not able to read and write i.e. illiterate. A similar study done in Lucknow district of India showed illiteracy was linked with non-compliance and the authors assumed patients' unawareness of the consequences of irregular treatment.⁷

Poverty is one of main reason for defaulter and relapse. In our study, 37% respondents had family income of NRs. 10,000-20,000 per month. Furthermore, it was found that 27% of respondents expressed financial constraints. This finding is consistent with that of a study done in Bangalore city by Vijay *et al.* who found significantly higher proportion (57.6%) of defaulters in CAT II had per capita income of more than IRs. 633 in comparison to the completed group.⁵

Among study sample, most (64%) resided in urban area. More than half of them had two persons per sleeping room. Most of them (94%) had cross ventilation in sleeping rooms. Nearly 90% were non-smoker and 21% took alcohol occasionally. The co-morbid conditions like diabetes mellitus, asthma, hypertension, arthritis were present in 37% of respondents. Majority (95.5%) had previous history of Tuberculosis. Among which most of (95%) had pulmonary Tuberculosis. All of respondents had done Tuberculosis treatment. Many of them (82.8%) had done their treatment at DOTS center. Only 3% had a family history of TB.

While accessing knowledge, more than half of respondents expressed Tuberculosis as a communicable disease. One fourth knew it was an infectious as well as fatal disease whereas 19% of had no idea about Tuberculosis infection. A high number of

the defaulters do so due to lack of knowledge about the disease and treatment. Similarly, they share community cultural beliefs about the cause of TB and its spread therefore choose to seek help from traditional healers. Other is affected by the stigma in which the disease is healed.⁸ Malhotra *et al.* found that 73.7% of rural community in India knew that cough with sputum was the most common symptoms of TB. They were aware that TB could spread to others but only 48% knew it was caused by an infectious agent. A common misconception (79%) regarding need of separate utensil and food for TB patients has also been studied.⁶ This leads to discrimination and stigma for these patients. Raising awareness seems a possible way to get over this. Additionally, a typical health staff response is to blame the patient for his lack of knowledge. Providing information in a way that can be understood is the most efficient way to overcome noncompliance issue which in fact is health service providers' responsibility that again requires well trained staffs with good communication skills.

Alcohol consuming patients with Tuberculosis are common and are likely to default and to have treatment failure which has also been shown by Shantha *et al.* in India where 28% of the defaulters were alcoholics. Moreover, alcoholic patients are more likely to be irregular in treatment.⁹ Alcohol dependence lessens interest for health and makes remembering to swallow tablets regularly more difficult. Lienhardt *et al.* have pointed the risk of multidrug resistance and treatment failure with irregular treatment.¹⁰

In this study, nearly half of the respondents (76%) had faced side effects during medication. The most common side effects they faced were feeling weakness (41.8%) and dizziness (16.8%). Vomiting, GI upset and red urine were other side effects (19.4%). Twenty two percent respondents faced no side effects problem during TB treatment. Side effects such as these often lead to discontinuation of treatment. Panjabi *et al.* noticed side effects of medicine as the major contributor of default.¹¹ Yet again, in a study by Jakubowiak *et al.* while describing reason for "default" state "when side effects appear and symptoms don't subside, the patient suspect that he is getting the wrong treatment. He may stop taking medicine and seek advice elsewhere."¹²

Delay in seeking treatment is another big problem. In a study conducted by Lienhardt *et al.* in the delay to treatment was found after 8 weeks of illness in urban area and 12 weeks in rural area. The problem was due to distance between patients' home and the health service centers.¹⁰ In a Book "TB chemotherapy" by Toman K. stated "distance is a common reason for irregularity- the patient may not be able to walk long distance and transport if available may be too expensive for him."¹³ Studies have found an initial default rate 6.7% in urban area whereas 9.8% in rural due to difficulties with distance and transportation.^{14,15}

As the disease affects people in the productive age group, most are working and not free during Government office hours. Sanmarti *et al.* found non-flexible DOTS office hours definitely caused problems in regular treatment.¹⁶ Likewise, Sevim *et al.* stated inconvenient hours as a reason for being default and suggested that it could be remedied by organizing treatment near the patients home or adjusting consulting hours to their convenience.¹⁷ A study done in eastern Nepal found fixed office hours of DOTS clinics as a significant hindrance to their compliance.¹⁸

DOTS workers should be more accountable towards patients, and as a good counselor, advisor as well as professional. Edginton *et al.* stated that attitude and role of DOTS workers played an important role for completing the treatment.¹⁹ It is necessary to instruct the patients early about disease and its treatment. It was found that many TB patients had not understood what health provider told.¹⁹ Rude behavior and attitude makes patients escape from the treatment. If DOTS workers are impatient on counseling during the treatment or they don't explain clearly when asked by patients about the treatment or if they make patients feel guilty they would not like to come back and finally become defaulter.

In this study, prolonged duration of TB treatment was seen one of the major factor. Nearly half of the patient complained for longer duration. A similar study done by Shah *et al.* to provide a systematic assessment of the timing of default from Tuberculosis treatment which could help to quantify the potential contribution of new shorter duration TB drugs to global TB control. It found that there was insufficient high-quality comparable information on the timing of default from TB treatment to permit any firm conclusions on trends in default.²⁰ However, a substantial proportion of defaulters appear to leave treatment in the later stages of the current 6-month regimen, suggesting that new TB chemotherapeutic agents which can reduce the length of treatment have the potential to improve global TB treatment success rates.^{19,20}

Limitations

The limitations of this study was that out of 16 districts of Eastern region, three teaching districts of BPKIHS namely Sunsari, Morang and Jhapa were selected purposively without randomization. Therefore, it does not represent the data of that entire region. Due to small sample size, some variables were not found significant in bivariate analysis, which was supposed to be significantly associated with relapse, defaulter and treatment failure.

CONCLUSIONS

Relapse, defaulter and treatment failure is the burning issues mainly in the developing country like Nepal. Most of the affected people are the poor. There are many reasons like lack of transportation facility, lack of trained health worker, prolonged duration of treatment, financial constraint, illiteracy, lack of knowledge about tuberculosis and practice regarding TB treatment, for relapse, defaulter and treatment failure. Some of the variables such as age, family income, smoking, alcohol and substance abuse were found insignificant in bivariate analysis.

Lack of proper counseling to patients at DOTS centers is also one of hidden factor of relapse and defaulter. The concerned authority should also focus community based awareness and counseling to patients. There should be proper tracing out mechanism to find out defaulter, relapse and treatment failure. The strength and truthfulness of these associations need to be examined with other different studies so that risk factors can be unveiled. Such studies can be designed based on the finding of this study.

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