



ASSESSMENT OF OUT-OF-POCKET EXPENDITURE BY TRACKING PATIENT PATHWAY: A REAL BURDEN TO TUBERCULOSIS PATIENTS IN RAIPUR DISTRICT OF CHHATTISGARH

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ABSTRACT

Background: Out-of-Pocket expenditure (OOPE) is defined as the money spent by the patient on transport, consultation fees, medical investigations (laboratory, X-ray, or other), and any medicines during TB care. Free TB care at all health facilities could reduce OOPE to the minimum possible levels. **Objective:** To estimate the Out-of-Pocket expenditure and associated factors among pulmonary TB Patients of public health facilities of Raipur district. **Material and Method:** Cross-sectional Observational Study, randomly selected 252 Pulmonary tuberculosis Patients in the Raipur district, from November 2020-November 2022 and an estimate of their Out-of-Pocket expenditure was documented by interviews after taking informed verbal consent using a predesigned pretested proforma. Mean, Standard deviation, median, interquartile range, and association were calculated by using the chi-square test and relative risks including odds ratios. **Results:** The Median total expenses were 6155(IQR: 2625-15175) rupees. More than half 141 (56%) of the study participants had expenses >5000 rupees. The Median transport expenses were 525(IQR: 200-1012) rupees, the Median consultation expenses were 700(IQR: 200-1600) rupees, the Median investigation expenses were 1000 (IQR: 0-3025) rupees and the Median medicine expenses were 3350(IQR: 1300-7525). Out-of-pocket expenses were significantly higher among patients who ignored classical signs & symptoms of TB, repeated private health facility visits, and self-medication practice. **Conclusion:** Despite of centrally sponsored Programme, the financial burden on TB patients is still in the unacceptable range. Out-of-pocket expenses could be reduced as much low as possible by intervening in the factors linked to it.

KEYWORDS : Out-of-Pocket expenditure, Tuberculosis.

Introduction

TUBERCULOSIS (TB) estimated that 436000 Indians died of TB in 2019, although this number is staggering, it does not completely reflect the social burden of the disease^[1]. The annual economic loss to the country is estimated to be US\$5 billion, with over 70% of cases occurring in the most economically productive age group (15–54 years)^[2]. The National TB Elimination Programme (NTEP) in India has been very successful at implementing the End-TB strategy, based on free diagnosis and a reliable supply of good quality drugs provided at no cost to the patient but extra diagnostic services, such as chest X-ray, CT scan, and other laboratory tests have to be paid by the patient^[2]. People with TB symptoms take self-medication and can also present to a private practitioner or hospital where patients themselves incur most of the costs.

Patients with TB encounter numerous barriers to seeking diagnosis and treatment. One such barrier is the cost incurred by patients and their families. Costs according to when they occurred such as paying for transport consultation investigation and medication costs can constitute a significant proportion of household income, it leads to delays in seeking care and diagnosis a real burden to tuberculosis patients and families

Methodology

This Cross-sectional observational, community-based study was planned for the purpose of evaluating the incurred cost /expenses in recently diagnosed smear-positive pulmonary TB patients in all eight Tuberculosis Units of public health facilities of Raipur District, Chhattisgarh from November 2020 to October 2022

Inclusion criteria: Recently diagnosed sputum-positive TB patients (i.e., Within 15 days of the start of treatment).

Exclusion criteria: Extra pulmonary TB, Sputum smears-negative pulmonary TB patients, and study subjects who are not willing to participate in the study.

Sample size- The sample size in the present study was 252 pulmonary TB patients with 10% non-responsive rate^[4]. Recently diagnosed sputum-positive TB patients were interviewed in the study to reduce

the recall bias. In this study, the study subjects were chosen by using simple random sampling method.

Study tool

Semi-structured questionnaire proforma was designed with the help of literature review, endorsing NTEP guidelines and adopting questionnaire from USAID TB CARE II.^[5]

Operational definition:

Out-of-pocket expenditure payments are regarded as the direct medical costs paid by patients themselves. OOPE are categorized into travel charges, consultation fees, investigation charges (laboratory tests, X-rays, medical tests) and drugs during the period of pre-diagnosis, diagnosis and treatment^[6].

WHO has defined Catastrophic OOPE payment for direct healthcare spending that exceeds 40% of a household's capacity, Thus, the family may have to sacrifice the consumption of other goods and services necessary for their well-being, while many studies defined OOPE for healthcare that exceeds a specified proportion of annual household income which often set the threshold at 10%–25%.^[7,8] According to the end TB strategy, it is now recommended to measure catastrophic costs incurred when the total costs exceed 20% of the annual household income^[6].

Data Compilation and statical analysis: After capturing data from the field, collected data were checked for quality, correctness and completeness before analysis. Data of all 252 study participants were entered and analysed using Microsoft excel sheet and SPSS V.20.0. Continuous variables were presented as medians and IQRs, while categorical variables were presented as numbers and percentages (%). All costs were reported in 2019 Indian Rupees (US\$1 = 70 Indian rupees [INR]). Association between total expenses and relevant sociodemographic factors and other risk factors. Pearson's χ^2 test was used in univariate analyses to identify factors associated with the out-of-pocket expenditure and ORs with 95% CIs were computed p-value of <0.05 was considered statistically significant.

Result:

Table 1: Socio-demographic profile of study participants (n=252).

S.N.	Variables	Frequency	Percentage
1	Age (In years)	>25	179 71.0%
		<25	73 29.0%
2	Gender	Male	168 66.7%
		Female	84 33.3%
3	Religion	Hindu	232 92.06%
		Muslim	19 7.54%
		Christian	1 0.4%
4	Category	Gen	33 13.0%
		OBC	144 57.10%
		SC	30 11.9%
		ST	45 17.8%
5	Place of residence	Rural	141 56.0%
		Urban	111 44.0%
6	Education	Illiterate	64 25.39%
		Up to Primary	27 10.71%
		Up to Higher Secondary	136 53.96%
		Graduate and above	45 17.85%
7	Occupation	Unemployed	100 39.7
		Employed	152 60.3
8	Type of family	Nuclear	178 70.6%
		Joint	74 29.4%
9	Socioeconomic status	Upper Class	42 16.6%
		Middle Class	60 23.8%
		Lower Class	150 59.6%

Table 1 summaries the clinical and demographic parameters of the cohort. The mean age of study participants was 36.7 ± 16 , Majority 179(70.8%) of study participants were in the age group >25 years. 66.6% of the study participants were male. In the current study majority of study participants were belongs to Hindu (92.06%) and more than half (56%) of study participants lived in rural areas, one-fourth (25.39%) were illiterate, 39.7% were unemployed, the majority 69.04% of study participants were belonging to the nuclear families followed by 29.36% were belongs to the joint family. As per the updated BG Prasad Socioeconomic Status Classification, the Socioeconomic Status of this study observed that the majority 59.60% belongs to the lower class followed by 23.8% middle class and 16.6% from the upper class.

Table No.2 Distribution of total expenses and average categorical expenses among study participants during the pathway of TB care (n=252)

S.N.	Total expenses in Rs.	Frequency	Percentage (%)
1.	0-5000	111	44
2.	5001-10000	54	21.48
3.	>10000	87	34.52
Total		252	100
Mean $\pm$ SD		13683 $\pm$ 26789	
Median (IQR Range)		6155(2625-15175)	
Average expenses in different categories			
Transportati on charges	Consultation charges	Investigatio nal charges	Medicine charges
525 (IQR 200-1012)	700 (IQR 200-1600)	1000 (IQR 0-3025)	3350 (IQR 1300-7525)

The current study reveals that the mean total expenses were 13683 $\pm$ 26789 Rupees, Median total expenses were 6155(2625-15175) Rupees, and more than half 141 (56%) of the study participants had expenses >5000 Rupees. In the present study, the Median transportation charges were 525 Rupees (IQR: 200 Rupees to 1012 Rupees), the Median Consultation charges were 700 Rupees (IQR: 200 Rupees to 1600 Rupees), Median investigational charges were 1000 Rupees (IQR: 0 Rupees to 3025 Rupees), Median Medicine charges were 3350 Rupees (IQR: 1300 Rupees to 7525 Rupees), and Median Total charges were 6155 Rupees (IQR: 2625 Rupees to 15175 Rupees), among the 252 patients studied (Table 2)

Table No.3: Association between total expenses and socio-demographic profile among study participants (n=252).

S.N	Characteristics		Total Expenses in Rs		Chi-square, df, p-value	OR (CI 95%)
			>5000	0-5000		
1	Age (in years)	<25	40(54.8 %)	33(45.20%)	0.056,1, 0.889	0.936(0.541-1.618)
		>25	101(56.4 %)	78(43.6%)		
2	Gender	Male	88(52.4 %)	80(47.6%)	2.608,1, 0.139	1.554(0.909-2.658)
		Female	53(63.1 %)	31(36.9%)		
3	Place of residence	Urban	62(55.9 %)	49(44.1%)	0.001,1, 1.000	1.007(0.610-1.662)
		Rural	79(56.0 %)	62(44.0%)		
4	Category	General	22(66.7 %)	11(33.30%)	1.769,1, 0.184	1.681(0.771-3.634)
		OBC/S T/SC	119(54.3 %)	100(45.7%)		
5	Marital Status	Married	99(55.3 %)	80(44.70%)	0.104,1, 0.747	0.913(0.527-1.583)
		Single	42(57.5 %)	31(42.5%)		
6	Type of family	Nuclear	92(51.7 %)	86(48.30%)	4.478,1, 0.034	1.832(1.042-3.221)
		Joint	49(66.2 %)	25(33.8%)		
7	Occupati on	Employ ed	78(51.3 %)	74(48.7%)	3.341,1, 0.066	0.612(0.370-1.037)
		Unempl oyment	63(63.0 %)	37(37.0%)		
8	Educatio n	Literate	111(59.0 %)	77(41.0%)	2.868,1, 0.090	0.619(0.346-1.083)
		Illiterate	30(46.90 %)	34(53.10%)		
9	Socioeco nomic status	Upper Class	33(78.6 %)	9(21.4%)	10.463,1, 0.001	0.289(0.132-0.633)
		Middle and lower class	108(51.4 %)	102(48.6%)		

Table 3 summarizes direct costs, reported by period of illness. Study participants from Joint families were more likely to have total expenses (>5000 Rupees) than their comparable counterparts respectively. Odds ratio 1.832 [CI 95% (1.042-3.221)]. There was significant association between Total expenses and upper socioeconomic class [p-value <0.05]. There was no significant association between Total expenses and (age group, gender, place of residence, category, marital status, occupation and education status) [p-value $\geq$ 0.05]. Female study participants were at higher risk of experiencing total expenses (>5000 Rupees) than male. Odds ratio 1.554 [CI 95% (0.909-2.658)].

Table No.4: Association of factors linked to expense among study participants (n=252).

S.N.	Characteristics	Expense		Chi-square, df, p-value	OR (CI 95%)
		>5000	0-5000		

1	Distance of facility house (in Kms)	>5	58(61.1 %)	37(38.9 %)	1.609, 1, 0.205	0.716(0.426-1.201)
		<5	83(52.9 %)	74(47.1 %)		
2	Health facility visited 1st	Private	137(66.2 %)	70(33.8 %)	49.235, 1, <0.001	20.061(6.907-58.268)
		Public	4.0(8.9 %)	41(91.1 %)		
3	Symptoms noticed 1st time	Cough and fever	124(56.1 %)	97(43.9 %)	0.018, 1, 0.894	1.053(0.495-2.241)
		Other	17(54.8 %)	14(45.2 %)		
4	Awareness about above symptoms	Aware	141(57.6 %)	104(42.4 %)	9.146, 1, 0.003	0.424(0.367-0.491)
		Unaware	0.0(0.0 %)	07(100%)		
5	Fear perception	Present	22(61.1 %)	14(38.9 %)	0.454, 1, 0.501	0.781(0.379-1.607)
		Absent	119(55.1 %)	97(44.9 %)		
6	Self-medication	Present	53(47.3 %)	59(52.7 %)	6.094, 1, 0.014	1.884(1.137-3.122)
		Absent	88(62.9 %)	52(37.1 %)		
7	Total consultation before diagnosis	1-2	59(39.6 %)	90(60.4 %)	39.5 01 65, 1, <0.0	5.956(3.332-10.649)
		>2	82(79.6 %)	21(20.4 %)		
8	Appropriate referral	Provided	24(29.6 %)	57(70.4 %)	33.559, 1, <0.001	5.146(2.894-9.151)
		Not provided	117(68.4 %)	54(31.6 %)		

Total Expense (>5000Rupee) was significantly high among study participants who contacted private health facilities, were not aware of signs and symptoms of TB, adopted self-medication, had more than two consultations with the health facility, and could not get appropriate referral. [p-value ≤ 0.05]. Study participants who contacted private health facilities had 20 times high total expenses (>5000 Rupees) than their comparable counterparts.20.061 [CI 95% (6.907-58.268)]. Study participants who consulted >2 physicians and not getting appropriate referrals had 5 times high total expenses (>5000 Rupees) than their comparable counterparts. 5.956[CI 95% (3.332-10.649)] 5.146[CI 95% (2.894-9.151)] (Table 4)

Table No.5 Association between total expenses and different delays among study participants (n=252).

S.N.	DELAY	Total expenses in Rs.			Chi-square, d f, p-
		0-5000	5000-10000	>10000	
1.	Patient delay	>30 Days	48(50%)	14(14.6%)	4.674, 2, 0.097
		≤ 30 Days	63(40.4%)	40(25.6%)	
2.	Diagnostic delay	>30 Days	47(30.5%)	43(27.9%)	29.922, 2, <0.001*
		≤ 30 Days	64(65.3%)	11(11.2%)	
3.	Treatment delay	>7 Days	9 (39.1%)	5 (21.7%)	0.296, 2, 0.863
		0-7 Days	102(44.5%)	49(21.4%)	
4.	Total delay	>60 Days	50 (31.4%)	41(25.8%)	27.830, 2, <0.001*
		0-60Days	61 (65.6%)	13 (14%)	

Total expenses >10000 were as significantly associated with high Diagnostic delay (> 30 days) and Total delay of > 60 days duration among study participants for TB care [p-value ≤ 0.05]. (Table 5)

Table No.6 Correlation between out-of-pocket expenses and delays among study participants (n=252).

S.N.	DELAY	Correlation coefficient (r-value)	p-value
1.	PATIENT DELAY	0.075	0.235
2.	DIAGNOSTIC DELAY	0.187	0.003
3.	TREATMENT DELAY	0.074	0.239
4.	TOTAL DELAY	0.209	0.001

Study participants who expense more on TB care were significantly correlated with Diagnostic delay and Total delay [p-value ≤ 0.05]. There is an increasing trend in the diagnostic and total delay of study participants who were expenses more money before the start of anti-TB treatment. (Table 6)

Discussion

In a similar study done in Tamil Nadu, India by John KR et al (in the year 2009). The majority of the participants (70.6%) belonged to low socioeconomic status^[2]. One more similar study Rajeswari R et al., in which Three hundred and four urban and rural TB patients were interviewed and reported total out-of-pocket expenditures of INR5986 (US\$171). This study suggests that direct costs are slightly lower in patients who are living in rural areas as compared to urban areas^[9]. In a study done in Kerala, India by Paramasivam S et al., (in the year 2017). Among the 302 patients studied, the majority were males, i.e., 231 (76.5%) and 71 (23.5%) were females. The mean age of the participants was 48.6 ± 14.5 years, and the majority (65.9%) of the participants were in the age group of 31–60 years^[4]. A study was done in the rural area of Tamil Nadu, India by John KR et al (in the year 2009). The patients incurred direct costs during the pre-diagnostic period, averaging 2890 ± 3805 rupees. The second highest cost was medication expenses during pre-diagnosis 890± 729 rupees average per patient-prescribed. A study was done in Bandung, Indonesia by McAllister SM et al (in the year 2020). The median pre-treatment direct cost per person was \$37.51 (IQR 20.79–71.25). The median was highest in patients at the time of their diagnosis (\$36.02) compared with medication expenses and travel expenses. The median pre-treatment direct cost was the highest in patients recruited through PPs (\$ 41.44, IQR 25.66–64.34) compared with public hospitals (\$34.82, IQR 20.72–64.78)^[10]. A study was done in rural China by Pan HQ et al (in the year 2020). The average per capita total out-of-pocket cost was 3024.0 Chinese yuan, with a median cost of 1086 yuan (interquartile range [IQR] 480–2456). Mean out-of-pocket medical and non-medical costs were respectively 2565.7 CNY and 458.3 CNY. Factors associated with out-of-pocket expenses included hospitalization, the cost of drugs, and diagnostic delay. The total median direct cost was estimated at US\$41.1 among a tribal population in India by Muniyandi et al.^[11]

The present study's estimate of direct cost is closer to the pooled estimate of US\$61 considered as the direct cost of base care for drug-sensitive TB Care by Verguet et al.^[12] Another study from Chennai, India reported a mean total cost of US\$48^[11]. Mean total costs for TB care in South Africa and Nigeria were US\$207 and \$157 respectively^[13,14]. In India, there is large prevalence of private providers, and the healthcare costs in private care are higher than in the public sector.^[15]

Recommendations

National Tuberculosis Elimination Programme (NTEP) is a centrally sponsored programme to ensure Zero expenses to patients for TB care. Out-of-pocket expenditure in the current study is not acceptable, suggesting the need to re-look at the subsidy coverage of tuberculosis treatment in the country. The avoidance of risk factors should be addressed in present study will ensure the reduction of out-of-pocket expenses to some extent. which may be the subject of future intervention to reduce the real burden to tuberculosis patients. National Tuberculosis Elimination Programme will need to consider the implications of these unmeasured patient costs in developing their National Tuberculosis Control Policies.

Limitation of the study:

1. The Recall bias is a concern when inquiring about the patient pathways, different delays and costs incurred during healthcare seeking.
2. The exclusion of extra-pulmonary (EPTB) and smear-negative TB might be due to its less concern as public health importance.

Conclusion:

Results of the current study reveal that mean expenditure prior to initiation of anti-TB was unacceptably high, despite the provision of free smears and drugs, especially those study participants who contacted private health facilities first, not aware of signs and symptoms of TB, adopted self-medication, more than two consultations to the health facility and could not get appropriate referral. Out-of-pocket expenses of more than five thousand Rupees especially before initiation of Anti-TB treatment were linked with Delay in seeking care and showed upward trend with duration of delay.

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