

# BMJ Open Predictors of healthcare seeking for tuberculosis symptoms in the private healthcare facilities: findings from a cross-sectional population-based survey in Tamil Nadu

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## ABSTRACT

**Objectives** To identify the factors influencing the choice of private healthcare facilities among individuals experiencing tuberculosis (TB) symptoms.

**Design** Cross-sectional study.

**Setting** The data for this study were obtained from a cross-sectional population-based TB prevalence survey conducted in 33 districts of Tamil Nadu, a state in southern India, between February 2021 to July 2022.

**Participants** 130 932 individuals, 15 years and above, residents of the selected cluster for the past 1 month, were included. Hospitalised patients, sick/morbid individuals and the institutional population were excluded.

**Results** Of 143 005 eligible individuals, 130 932 (91.6%) participated. Among them, 9540 individuals were found to have at least one TB symptom. Of these symptomatic individuals, 2678 sought healthcare, with 62.7% in the public facilities and 37.3% in private facilities. Factors associated with seeking care in the private healthcare facilities included working in organised sector (aOR: 1.3; 95% CI 1.0 to 1.7;  $p < 0.05$ ), being a housewife (aOR: 1.3; 95% CI 1.0 to 1.7;  $p < 0.05$ ), having symptom of expectoration (aOR: 1.3; 95% CI 1.1 to 1.6;  $p < 0.05$ ) and fatigue (aOR: 1.5; 95% CI 1.2 to 1.9;  $p < 0.05$ ).

Conversely, individual with symptom of weight loss (aOR: 0.4; 95% CI 0.3 to 0.6;  $p < 0.05$ ), loss of appetite (aOR: 0.8; 95% CI 0.6 to 0.9;  $p < 0.05$ ), chest pain (aOR: 0.6; 95% CI 0.5 to 0.7;  $p < 0.05$ ), history of past TB care (aOR: 0.4; 95% CI 0.3 to 0.5;  $p < 0.05$ ), age  $> 25$  years (aOR: 0.6; 95% CI 0.4 to 0.9;  $p < 0.05$ ), living in a rural area (aOR: 0.7; 95% CI 0.6 to 0.8;  $p < 0.05$ ) and living below the poverty line (aOR: 0.7; 95% CI 0.6 to 0.9;  $p < 0.05$ ) were less likely to seek care in the private healthcare facilities.

**Conclusion** The study highlights the distinct factors that could affect healthcare seeking for TB symptoms in the public and private healthcare settings for TB and the need for tailored interventions and customised healthcare policies to address such gaps and distinctions in care seeking.

## INTRODUCTION

Tuberculosis (TB) continues to remain a global health problem affecting diverse

### STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The study used a large, representative sample (over 2500 presumptive tuberculosis (TB) cases) from a high TB burden state in India, encompassing both public and private healthcare services for TB across rural and urban areas, which enabled us to assess healthcare-seeking behaviour that reflects the real-world situations.
- ⇒ The study followed a standardised methodology aligned with WHO guidelines to ensure high-quality data.
- ⇒ Reliance on self-reported data introduces the possibility of respondent bias, which could have influenced the reporting of healthcare choices for TB.
- ⇒ The study is confined to individuals  $\geq 15$  years of age in the state of Tamil Nadu, which may limit the generalisability of the findings to other settings.
- ⇒ Cross-sectional design does not allow for the establishment of causation, and further longitudinal research is needed to explore the dynamics between lifestyle choices and healthcare-seeking behaviour.

communities, with a significant burden in India, accounting for more than one-fourth (26%) of the worldwide TB burden.<sup>1</sup> Although the India National TB Elimination Program (NTEP) has continued to make concerted efforts for decades, including providing free services, delays in seeking care and underutilisation of public health services remain key barriers to early diagnosis and effective management of TB treatment. In India, almost half of all persons with TB symptoms seek initial care in the private healthcare facilities,<sup>2</sup> often resulting in missed or delayed diagnosis, inadequate treatment, lack of patient support and contact investigations, lack of a system for ensuring treatment adherence and poor reporting to the national TB control programme.<sup>3–9</sup>



The private healthcare facilities in India are vast, complex and diverse, comprising formal and informal providers, both licensed and unlicensed practitioners, that provide health services at various levels, ranging from traditional healers and chemists to superspecialists, private clinics and large tertiary hospitals.<sup>10–13</sup> This sector continues to be the first point of contact for individuals who develop TB symptoms<sup>14 15</sup> due to accessibility, perceived better quality of care, convenience with date and time, shorter waiting time, proximity to residence,<sup>15–18</sup> wanting to conceal their identity/health status due to the stigma associated with the disease<sup>17 19–22</sup> dissatisfaction with the government facilities<sup>16 23 24</sup> and other sociodemographic factors like rural and urban areas, age, gender, literacy and family income.<sup>24–27</sup> However, the private healthcare sector providers often do not adhere to the national and international standard TB diagnosis and treatment guidelines, posing challenges to TB control efforts.<sup>7 28</sup> Understanding the predictors of care-seeking behaviours for TB symptoms, particularly in the private healthcare facilities, is essential for developing effective strategies to engage private providers and improve TB case detection and notification.

Tamil Nadu, a southern state in India with a relatively strong public health system and a high TB burden, offers a unique setting for exploring healthcare-seeking patterns based on TB symptoms. Previous studies in this region have highlighted similar factors and processes that drive healthcare seeking for TB symptoms in the private healthcare facilities, like other settings, including dissatisfaction with the public healthcare service<sup>10 15</sup> convenience, proximity to residence, perceived better quality of care,<sup>15–17</sup> sociodemographic factors such as literacy and family income.<sup>15 29</sup> However, limited population-based evidence was available to determine the factors that drive individuals to seek care from different health facilities based on different TB symptoms. Moreover, identifying predictors of healthcare-seeking behaviour based on TB symptoms in the private healthcare facilities remains a critical gap in the research literature. Therefore, this study aims to fill this gap by assessing the predictors of healthcare seeking for TB symptoms in the private healthcare facilities as compared with the public healthcare facilities by analysing data from a cross-sectional population-based survey conducted in Tamil Nadu. The study objective is to identify the key factors influencing the choice of private healthcare facilities among individuals experiencing TB symptoms. The study is significant, considering that private healthcare providers play a substantial role in TB care delivery in India.<sup>2 23 30</sup> Hence, understanding the factors influencing care seeking in the private healthcare facilities is crucial for optimising early diagnosis and treatment initiation. The study findings are expected to inform policies designed to enhance collaboration between the public and private sectors

in improving early diagnosis and treatment of TB within the broader framework of the NTEP.

## METHODOLOGY

### Study setting, sampling and population

The data for this study were obtained from a cross-sectional population-based TB prevalence survey conducted in 33 districts of Tamil Nadu, a state in southern India, between February 2021 and July 2022. The survey aimed to estimate the prevalence of microbiologically confirmed pulmonary TB among the general population and their health-seeking behaviour for their TB symptoms. A multi-stage cluster sampling survey was used to cover a total of 144 000 participants across 180 clusters (n=800). Population-proportionate-to-size methods were used to allot the number of clusters within each district. All individuals 15 years of age and above, residents of the selected cluster for the past 1 month, were included. The study was conducted in both rural and urban settings. Hospitalised patients, sick/morbid individuals and the institutional population were excluded. All the eligible participants were interviewed by trained interviewers for symptoms, and all participants except pregnant women underwent a chest X-ray. Participants who had any TB symptoms or those who had any X-ray abnormality were subjected to sputum examination. The detailed methodology is described elsewhere.<sup>31</sup>

### Study variables

The outcome measures were recorded dichotomously by asking participants whether they had sought healthcare for their TB-related symptoms, either in a public or private healthcare facility. Public healthcare facilities included primary health centres, community health centres, district hospitals and medical college hospitals. Private healthcare facilities comprised of hospitals and stand-alone clinics providing modern medicine and traditional medicine care, with chemists and traditional healers under this sector.

To account for factors that may affect patients' healthcare seeking, participants were asked about the presence of the individual TB symptoms like cough, expectoration or fever lasting for more than 2 weeks; blood in sputum within the past 6 months; chest pain, fatigue, loss of appetite and/or night sweats persisting for more than 1 month; weight loss in the past 6–12 months.

Age (categorised as  $\leq 25$  or  $> 25$  years), gender (categorical), place of residence (urban and rural) and occupation were categorised as predisposing factors. The socioeconomic status of persons with presumptive TB (measured above and below the poverty line based on possession of a ration card for receiving free commodities from the public distribution system) was defined as an individual-enabling factor for healthcare seeking. Self-reported alcohol consumption (measured categorically as present consumption or ever consumed and no consumption) and self-reported smoking status (measured categorically

as present smoking or ever smoked and no smoking) were defined as individual unhealthy factors. The presence of comorbidities such as diabetes, hypertension and a history of past TB care was included as a needs-based factor, given their potential to increase healthcare requirements.

We included two population-level enabling factors<sup>32 33</sup>

1. *Access to health information and communication in the study districts:* Based on secondary scores available (% of the population with internet use, level of access to online governance, mobile subscription per 100 population, and level of alternate sources of information in the public domain), a composite categorical measure of access to health information and communication in the study districts (low and high level) was computed. Further, we have computed quintiles for this composite score using STATA functions. Of the 32 districts included in the study, we categorised those districts that fell under the threshold of the first quintile ( $\leq 55.8$ ) as having low population access to health information and communication, and those districts with scores above 55.8 as having moderate or higher population access for the same.<sup>32</sup>

2. *Access to healthcare facilities in the study districts:* Based on secondary scores available (% of households with health insurance, % of households with no reported public health facility nearby, number of public hospitals per 10 000 population), a composite categorical measure of access to health information and communication in the study districts (low and high level) was computed. Further, we have computed quintiles for this composite score using STATA functions of the 32 districts included in the study. We categorised those districts that fell under the threshold of the first quintile ( $\leq 0.128$ ) as having higher access to healthcare facilities, and districts with scores above 0.128 as having lower or moderate levels of access for the same.<sup>33</sup>

### Statistical analysis

Participants' characteristics were described using mean, SD, for continuous variables, and frequency and proportion for categorical variables, each presented with corresponding 95% CIs.  $\chi^2$  test was used to assess the association between participant characteristics and care seeking for TB symptoms in the private and public healthcare facilities at a p-value significance of  $< 0.05$ .

Univariate and multivariable logistic regression models were used to assess the factors that were predictive of healthcare seeking for symptoms in the private and public healthcare facilities. The dependent variable was created dichotomously (seeking care in private=1 and seeking care in public as 0). Multivariate regression was adjusted for the presence of different TB symptoms, predisposing factors (age, sex, residence, history of past TB care), need-based factors (socioeconomic status), unhealthy factors (alcohol and smoking consumption), population-level enabling factors (access to health information and health facilities) and need-based factors (presence of

co-morbidities). Adjusted ORs with 95% CIs were calculated at a p-value significance of  $< 0.05$ . Variance inflation factors were estimated to assess the collinearity of independent variables with a threshold of  $< 2$ .

### Ethical considerations

The study was approved (017/NIRT-IEC/2021) by the Institutional Human Ethics Committee of Indian Council of Medical Research (ICMR)-National Institute for Research in Tuberculosis. Written informed consent/assent was obtained from eligible participants above 18 years and parents/guardians of 15- to 18-year participants. As the study also involved individuals aged 15–18, written assent was obtained for such participants.

### Patient and public involvement statement

Patients and/or the public had no role in the design, conduct, reporting or dissemination of this research.

### RESULT

A total of 223 709 individuals underwent screening for the survey, of which 143 005 (63.9%) individuals were eligible. Of the 143 005 individuals, 130 932 (91.6%) agreed to participate. Of 130 932 individuals, 9540 (07.3%) individuals were found to have at least one TB symptom. Of those showing symptoms, 2678 individuals (28.1%, 95% CI 27.1 to 28.9) had sought healthcare. Among them, 104 (3.8%) were not able to fully access care due to factors such as service delays and affordability to meet indirect costs (eg, transportation costs, loss of wages, etc). The remaining 2574 (26.9%, 95% CI 26.0 to 27.8) individuals with TB symptoms sought care. Among these, 1614 (62.7%, 95% CI 60.8 to 64.5) sought care from the public healthcare facilities, of which 28 (1.7%, 95% CI 1.1 to 2.5) were diagnosed with TB. While 960 (37.3%, 95% CI 35.4 to 39.1) sought care from the private healthcare facilities, of which 16 (1.6%, 95% CI 0.9 to 2.7) were diagnosed with TB.

Bivariate analysis indicates that healthcare seeking for TB symptoms from the private healthcare facilities, compared with the public healthcare facilities, was significantly lower among individuals aged  $> 25$  years (89.5% vs 93.0%;  $p < 0.05$ ), those living in poverty (41.1% vs 48.1%;  $p < 0.05$ ), labourers (26.8% vs 35.7%;  $p < 0.05$ ) and those living in rural areas (45.5% vs 55.1%;  $p < 0.05$ ). Females had significantly higher care seeking in the private healthcare facilities, as compared with the public healthcare facilities (53.4% vs 44.2%;  $p < 0.05$ ) (table 1).

The study results reveal that presumptive TB patients with alcohol use (21.9% vs 28.5%;  $p < 0.05$ ), smoking (18.8% vs 24.4%,  $p < 0.05$ ) and those with a history of past TB care (06.3% vs 14.2%;  $p < 0.05$ ) have sought less care in the private healthcare facilities as compared with the public healthcare facilities, which is statistically significant (table 1).

Additionally, care seeking for TB symptoms such as cough (59.6% vs 55.7%), expectoration (50.5% vs

**Table 1** Healthcare seeking for tuberculosis (TB) symptoms in the public and private healthcare facilities by socioeconomic status, access to health information and services, self-reported habits, comorbidities and types of TB symptoms

Healthcare seeking for TB symptoms (n=2574)							
Categories	Public healthcare facilities			Private healthcare facilities			P-value
	N	Percentage	95% CI	N	Percentage	95% CI	
Age							
15–24	112	6.9	5.7 to 8.2	100	10.4	8.6 to 12.4	0.002
25 and above	1502	93.0	91.7 to 94.2	860	89.5	87.4 to 91.3	
Gender							
Male	899	55.7	53.2 to 58.1	447	46.5	43.4 to 49.7	0.001
Female	714	44.2	41.8 to 46.7	513	53.4	50.2 to 56.5	
Area							
Urban	724	44.8	42.4 to 47.2	523	54.4	51.3 to 57.6	0.001
Rural	890	55.1	52.7 to 57.5	437	45.5	42.3 to 48.6	
Below poverty line							
No	837	51.8	49.4 to 54.2	565	58.8	55.7 to 61.9	0.001
Yes	777	48.1	45.7 to 50.5	395	41.1	38.0 to 44.2	
Occupations							
Unemployed/student	394	24.4	22.3 to 26.5	219	22.8	20.2 to 25.5	0.001
Labourer	577	35.7	33.4 to 38.1	258	26.8	24.1 to 29.7	
Working in an organised sector	255	15.8	14.0 to 17.6	192	20.0	17.5 to 22.6	
Housewife	388	24.0	22.0 to 26.1	291	30.3	27.4 to 33.2	
Healthcare access							
Higher healthcare access	1222	75.7	73.5 to 77.7	733	76.3	73.5 to 78.9	0.713
Lower healthcare access	392	24.2	22.2 to 26.4	227	23.6	21.0 to 26.4	
Access to healthcare information							
Higher access to healthcare information	434	26.8	24.7 to 29.1	258	26.8	24.2 to 29.7	0.994
Lower access to healthcare information	1180	73.1	70.2 to 75.8	702	73.1	70.8 to 75.2	
History of past TB care							
No	1384	85.7	83.9 to 87.3	899	93.6	91.9 to 95.0	0.001
Yes	230	14.2	12.6 to 16.0	61	6.3	4.9 to 8.0	
Self-reported alcohol status							
No	1153	71.4	69.1 to 73.5	749	78.0	75.2 to 80.5	0.001
Yes	461	28.5	26.4 to 30.8	211	21.9	19.4 to 24.7	
Self-reported smoking status							
No	1222	75.7	73.5 to 77.7	779	81.1	78.5 to 83.4	0.001
Yes	392	24.2	22.2 to 26.4	181	18.8	16.5 to 21.4	
Comorbidities							
No	1261	78.1	76.0 to 80.0	734	76.4	73.6 to 79.0	0.326
Yes	353	21.8	19.9 to 23.9	226	23.5	20.9 to 26.3	
Cough							
No	714	44.2	41.8 to 46.6	387	40.3	37.2 to 43.4	0.052
Yes	900	55.7	53.3 to 58.1	573	59.6	56.5 to 62.7	
Fever							
No	1546	95.7	94.6 to 96.6	925	96.3	94.9 to 97.3	0.478
Yes	68	04.2	3.3 to 5.3	35	03.6	2.6 to 5.0	
Loss of weight							
No	1172	72.6	70.3 to 74.7	817	85.1	82.7 to 87.2	0.001
Yes	442	27.3	25.2 to 29.6	143	14.9	12.7 to 17.2	

Continued

**Table 1** Continued

Healthcare seeking for TB symptoms (n=2574)							
Expectoration							
No	941	58.3	55.8 to 60.6	475	49.4	46.3 to 52.6	0.001
Yes	673	41.7	39.3 to 44.1	485	50.5	47.3 to 53.6	
Fatigue							
No	1321	81.8	79.8 to 83.6	737	76.7	73.9 to 79.3	0.002
Yes	293	18.1	16.3 to 20.1	223	23.2	20.6 to 26.0	
Loss of appetite							
No	1176	72.8	70.6 to 74.9	733	76.3	73.5 to 78.9	0.050
Yes	438	27.1	25.0 to 29.3	227	23.6	21.0 to 26.4	
Blood in sputum							
No	1410	87.3	85.6 to 88.8	853	88.8	86.7 to 90.6	0.261
Yes	204	12.6	11.1 to 14.3	107	11.1	9.3 to 13.2	
Chest pain							
No	834	51.6	49.2 to 54.1	624	65.0	61.9 to 67.9	0.001
Yes	780	48.3	45.8 to 50.7	336	35.0	32.0 to 38.0	
Night sweat							
No	1454	90.0	88.5 to 91.4	852	88.7	86.5 to 90.6	0.283
Yes	160	09.9	8.5 to 11.4	108	11.2	9.4 to 13.4	

41.7%;  $p < 0.05$ ) and fatigue (23.3% vs 18.1%;  $p < 0.05$ ) was significantly higher in the private healthcare facilities as compared with the public healthcare facilities. Conversely, care seeking for TB symptoms like loss of weight (14.9% vs 27.3%;  $p < 0.05$ ) and chest pain (35.0% vs 48.3%;  $p < 0.05$ ) was significantly lower in the private healthcare facilities as compared with the public healthcare facilities (table 1).

Multivariable logistic regression analysis shows that individuals working in an organised sector (aOR: 1.3; 95% CI 1.0 to 1.7;  $p < 0.05$ ), being a housewife (aOR: 1.3; 95% CI 1.0 to 1.7;  $p < 0.05$ ), having symptoms of expectoration (aOR: 1.3; 95% CI 1.1 to 1.6;  $p < 0.05$ ) and fatigue (aOR: 1.5; 95% CI 1.2 to 1.9;  $p < 0.05$ ) had higher odds of seeking care from the private healthcare facilities (table 2).

Inversely, being in the age category of 25 years and above (aOR: 0.6; 95% CI 0.4 to 0.9;  $p < 0.05$ ), living in rural area (aOR: 0.7; 95% CI 0.6 to 0.8;  $p < 0.05$ ) and living below poverty line (aOR: 0.7; 95% CI 0.6 to 0.9;  $p < 0.05$ ) were associated with lower odds of seeking care from the private healthcare facilities (table 2).

Further, our findings indicated that the individual who had a history of past TB care (aOR: 0.4; 95% CI 0.3 to 0.5;  $p < 0.05$ ), having a symptom of weight loss (aOR: 0.4; 95% CI 0.3 to 0.6;  $p < 0.05$ ), loss of appetite (aOR: 0.8; 95% CI 0.6 to 0.9;  $p < 0.05$ ) and chest pain (aOR: 0.6; 95% CI 0.5 to 0.7;  $p < 0.05$ ) had lower odds of seeking care from the private healthcare facilities (table 2).

Bivariate analysis indicates that healthcare seeking for TB symptoms was significantly higher among females (47.6% vs 44.9%;  $p < 0.05$ ), those living in rural areas (51.5% vs 54.8%;  $p < 0.05$ ), those with lower healthcare access (24.5% vs 19.2%;  $p < 0.05$ ), those with a history of

past TB care (11.3% vs 4.3%;  $p < 0.05$ ) and with comorbidities (22.4% vs 18.9%;  $p < 0.05$ ). Individuals working in an organised sector (17.3% vs 13.4%;  $p < 0.05$ ) and being a housewife (26.3% vs 24.9%;  $p < 0.05$ ) had higher access to healthcare seeking (table 3).

Additionally, care seeking was significantly higher among those who had TB symptoms such as cough (57.2% vs 54.3%), expectoration (44.9% vs 38.7%;  $p < 0.05$ ), fever (4.0% vs 3.3%;  $p < 0.05$ ) and fatigue (20.0% vs 16.4%;  $p < 0.05$ ). Care seeking was significantly lower among those who had night sweats (20.0% vs 16.4%;  $p < 0.05$ ) (table 3).

Multivariable logistic regression analysis shows that working in an organised sector (aOR: 1.4; 95% CI 1.2 to 1.6;  $p < 0.05$ ), being a female (aOR: 1.2; 95% CI 1.1 to 1.3;  $p < 0.05$ ), higher healthcare access (aOR: 1.3; 95% CI 1.2 to 1.5;  $p < 0.05$ ), having comorbidity (aOR: 1.2; 95% CI 2.4 to 3.4;  $p < 0.05$ ) and having a history of past TB care (aOR: 2.9; 95% CI 2.4 to 3.4;  $p < 0.05$ ) had higher odds of seeking care as compared with those not seeking care in general (table 4).

Living in a rural area (aOR: 0.9; 95% CI 0.8 to 0.9;  $p < 0.05$ ) had lower odds for seeking care as compared with those not seeking in general (table 4).

In terms of presence of symptoms, having fatigue (aOR: 1.4; 95% CI 1.0 to 1.3;  $p < 0.05$ ), expectoration (aOR: 1.2; 95% CI 1.1 to 1.3;  $p < 0.05$ ), cough (aOR: 1.1; 95% CI 1.0 to 1.4;  $p < 0.05$ ), fever (aOR: 1.4; 95% CI 1.1 to 1.8;  $p < 0.05$ ) and loss of appetite (aOR: 1.2; 95% CI 1.1 to 1.4;  $p < 0.05$ ) was associated with higher odds of seeking care as compared with those not seeking. Having night sweats (aOR: 0.6; 95% CI 0.5 to 0.7;  $p < 0.05$ ) was associated with lower odds of seeking care as compared with those not seeking in general (table 4).

**Table 2** Care seeking in private healthcare facilities by socioeconomic status, access to health information and services, self-reported habits, comorbidities and types of tuberculosis (TB) symptoms

Categories	Univariate logistic regression			Multivariable logistic regression		
	OR	95% CI	P-value	aOR	95% CI	P-value
Age						
25 and above	0.6	0.4 to 0.8	0.002	0.6	0.4 to 0.9	0.017
15–24	Reference					
Gender						
Female	1.4	1.2 to 1.6	0.001	1.2	0.9 to 1.5	0.090
Male	Reference					
Area						
Rural	0.6	0.5 to 0.7	0.001	0.7	0.6 to 0.8	0.001
Urban	Reference					
Below poverty line						
Yes	0.7	0.6 to 0.8	0.001	0.7	0.6 to 0.9	0.002
No	Reference					
Occupation						
Labourer	0.8	0.6 to 1.0	0.054	1.0	0.7 to 1.3	0.911
Working in an organised sector	1.3	1.0 to 1.7	0.017	1.3	1.0 to 1.7	0.035
Housewife	1.3	1.0 to 1.6	0.009	1.3	1.0 to 1.7	0.027
Unemployed/student	Reference					
Healthcare access						
Higher healthcare access	0.9	0.8 to 1.1	0.713	–	–	–
Lower healthcare access	Reference					
Access to healthcare information						
Higher access to healthcare information	1.0	0.8 to 0.5	0.990	–	–	–
Lower access to healthcare information	Reference					
History of past TB care						
Yes	0.4	0.3 to 0.5	0.001	0.4	0.3 to 0.5	0.001
No	Reference					
Self-reported alcohol status						
Yes	7	0.5 to 0.8	0.001	0.9	0.6 to 1.2	0.619
No	Reference					
Self-reported smoking status						
Yes	0.7	0.5 to 0.8	0.001	0.8	0.6 to 1.1	0.431
No	Reference					
Comorbidities						
Yes	1.0	0.9 to 1.3	0.326	–	–	–
No	Reference					
Cough						
Yes	1.17	0.9 to 1.3	0.052	1.1	0.9 to 1.3	0.188
No	Reference					
Fever						
Yes	0.8	0.5 to 1.3	0.478	–	–	–
No	Reference					
Weight loss						
Yes	0.4	0.3 to 0.5	0.001	0.4	0.3 to 0.6	0.001
No	Reference					
Expectoration						
Yes	1.4	1.2 to 1.6	0.001	1.3	1.1 to 1.6	0.001
No	Reference					

Continued

**Table 2** Continued

Categories	Univariate logistic regression			Multivariable logistic regression		
Fatigue						
Yes	1.3	1.1 to 1.6	0.002	1.5	1.2 to 1.9	0.001
No	Reference					
Loss of appetite						
Yes	0.8	0.6 to 1.0	0.050	0.8	0.6 to 0.9	0.046
No	Reference					
Blood in sputum						
Yes	0.8	0.6 to 1.1	0.261	–	–	–
No	Reference					
Chest pain						
Yes	0.5	0.4 to 0.6	0.001	0.6	0.5 to 0.7	0.001
No	Reference					
Night sweat						
Yes	1.1	0.8 to 1.4	0.283	–	–	–
No	Reference					

## DISCUSSION

The present research highlights that more than one-third of individuals with TB symptoms have accessed the private healthcare facilities as the first point of care. We found a significant distinction in terms of predisposing, enabling and need-based factors, which were driving healthcare seeking in the private healthcare facilities. In particular, better socioeconomic status, stable employment status and being female were associated with higher access to care in private health facilities. Higher age group, rural residence, informal employment and involvement in behavioural risk factors were associated with less access to private health facilities. In terms of TB symptoms, individuals having expectoration and fatigue were more likely to seek care from the private healthcare facilities, and those with weight loss, loss of appetite and chest pain were less likely to seek care from the private healthcare facilities.

To elaborate, our analysis reveals noteworthy patterns, emphasising the role of predisposing and needs-based factors in shaping healthcare preferences. More than half (58.85%) of individuals with presumptive TB who lived above the poverty line sought care from the private healthcare facilities, which is consistent with earlier findings that linked higher and lower socioeconomic status with care seeking in private and public healthcare facilities, respectively.<sup>16 23 25 34–36</sup> The preference for private healthcare facilities could be indicative of financial wellness, perceived quality and preferences for a personalised healthcare experience.<sup>16 37</sup> Poverty and low socioeconomic status are considered to drive the differential access to public and private healthcare facilities in general in India. The out-of-pocket expenditure associated with accessing private healthcare facilities in TB context could be an important determinant that drives differential healthcare access among persons with TB.<sup>38</sup>

Being female and working as a housewife were predictive of seeking care in the private healthcare facilities.<sup>26 35 39</sup> This could be explained by women's perception of stigma and disclosure concerns in accessing the public healthcare facilities.<sup>23 40–42</sup> Also in India, women face financial constraints, inhibiting social norms and household responsibilities, which place them at a significant disadvantage and lead to delays in diagnosis and treatment, which is reflected in our findings. Notably, the NTEP of India had emphasised gender-sensitive TB care to address inequities.<sup>43</sup>

Findings show that employment in the organised sector was predictive of seeking care in the private healthcare facilities, which could be linked to better-paying capacity and access to employer-sponsored health coverage.<sup>44</sup> Workplace-related constraints have been noted to impact access to TB care in India and globally. In particular, the static timings of public health facilities and their outreach services have been noted to cause significant delay in care access for TB. Thus, the flexible operating hours of the private healthcare facilities could have influenced the preference of individuals working in the organised sector.<sup>45</sup> The findings emphasise the role of employment-related factors in influencing healthcare choices.

In terms of other predisposing characteristics, those with higher age (>25 years), rural residents, and working as labourers had lower odds of seeking care from the private healthcare facilities, which is consistent with previous studies.<sup>16 23 25 34 35</sup> Urban-rural and socioeconomic divide in TB healthcare utilisation reflects the underlying disparities in accessibility, infrastructure and healthcare awareness for TB.<sup>23 46</sup> Private healthcare services in rural areas are scarce compared with public health facilities in India. Such discrepancy could drive lower access to private healthcare facilities in rural areas in general and also in the TB context.

**Table 3** Healthcare seeking for tuberculosis (TB) symptoms in general by socioeconomic status, access to health information and services, self-reported habits, comorbidities and types of TB symptoms

Healthcare seeking for TB symptoms in general (n=9540)							
Categories	Sought care 1			Sought no care 0			P-value
	N	Percentage	95% CI	N	Percentage	95% CI	
Age							
15–24	212	8.24	7.2 to 9.3	582	8.35	7.7 to 9.0	0.852
25 and above	2362	91.76	90.6 to 92.7	6384	91.65	90.9 to 92.2	
Gender							
Male	1346	52.31	50.3 to 54.2	3836	55.08	53.8 to 56.2	0.016
Female	1227	47.69	45.7 to 49.6	3128	44.93	43.7 to 46.0	
Area							
Urban	1247	48.45	46.4 to 50.3	3146	45.16	43.9 to 46.3	0.004
Rural	1327	51.55	49.6 to 53.5	3820	54.84	53.6 to 56.0	
Below poverty line							
No	1402	54.47	52.5 to 56.4	3686	52.91	51.7 to 54.0	0.177
Yes	1172	45.53	43.5 to 47.4	3280	47.09	55.9 to 48.2	
Occupations							
Unemployed/student	613	23.82	22.1 to 25.5	1778	25.52	24.5 to 26.5	0.001
Labourer	835	32.44	30.6 to 34.2	2513	36.08	34.9 to 37.2	
Working in an organised sector	447	17.37	15.9 to 18.8	937	13.45	12.6 to 14.2	
Housewife	679	26.38	24.6 to 28.1	1738	24.95	23.9 to 24.9	
Healthcare access							
Higher healthcare access	1955	75.95	74.2 to 77.5	5626	80.76	79.8 to 81.6	0.001
Lower healthcare access	619	24.05	22.4 to 25.7	1340	19.24	18.3 to 20.1	
Access to healthcare information							
Higher access to healthcare information	692	26.88	25.1 to 28.6	1752	25.15	24.1 to 26.1	0.085
Lower access to healthcare information	1882	73.12	71.3 to 74.8	5214	74.85	73.8 to 75.8	
History of past TB care							
No	2283	88.69	87.4 to 89.8	6664	95.66	95.1 to 96.1	0.001
Yes	291	11.31	10.1 to 12.5	302	4.34	3.8 to 4.8	
Self-reported alcohol status alc1							
No	1902	73.89	72.1 to 75.5	5206	74.73	73.6 to 75.7	0.402
Yes	672	26.11	24.4 to 27.8	1760	25.27	24.2 to 26.3	
Self-reported smoking status							
No	2001	77.74	76.0 to 79.3	5443	78.14	77.1 to 79.1	0.677
Yes	573	22.26	20.6 to 23.9	1523	21.86	20.8 to 22.8	
Comorbidities							
No	1995	77.51	75.8 to 79.1	5645	81.04	80.0 to 81.9	0.001
Yes	579	22.49	20.8 to 24.1	1321	18.96	18.0 to 19.9	
Cough							
No	1101	42.77	40.8 to 44.7	3179	45.64	44.4 to 46.8	0.013
Yes	1473	57.23	55.2 to 59.1	3787	54.36	53.1 to 55.5	
Fever							
No	2471	96.00	95.1 to 96.7	6755	96.97	96.5 to 97.3	0.018
Yes	103	4.00	3.2 to 4.2	211	3.03	2.6 to 3.4	
Loss of weight							
No	1989	77.27	75.6 to 78.8	5486	78.75	77.7 to 79.7	0.119
Yes	585	22.73	21.1 to 24.3	1480	21.25	20.2 to 22.2	

Continued

Table 3 Continued

Healthcare seeking for TB symptoms in general (n=9540)							
Expectoration							
No	1416	55.01	53.0 to 56.9	4265	61.23	60.0 to 62.3	0.001
Yes	1158	44.99	43.0 to 46.9	2701	38.77	37.6 to 39.9	
Fatigue							
No	2058	79.95	78.3 to 81.4	5822	83.58	82.6 to 84.4	0.001
Yes	516	20.05	18.5 to 21.6	1144	16.42	15.5 to 17.3	
Loss of appetite							
No	1909	74.16	72.4 to 75.8	5472	78.55	77.5 to 79.5	0.001
Yes	665	25.84	24.1 to 27.5	1494	21.45	20.4 to 22.4	
Blood in sputum							
No	2263	87.92	86.5 to 89.1	6125	87.93	87.1 to 88.6	0.990
Yes	311	12.08	10.8 to 13.4	841	12.07	11.3 to 12.8	
Chest pain							
No	1458	56.64	54.7 to 58.5	4019	57.69	56.5 to 58.8	0.357
Yes	1116	43.36	41.4 to 45.2	2947	42.31	41.1 to 43.4	
Night sweat							
No	2306	89.59	88.3 to 90.7	6066	87.08	86.2 to 87.8	0.001
Yes	268	10.41	9.25 to 11.6	900	12.92	12.1 to 13.7	

Our present finding shows that self-reported alcohol and smoking use specifically leads to lower odds of seeking care from the private healthcare facilities, which aligns with earlier findings of Grotle *et al*<sup>47</sup> and Rana *et al*.<sup>48</sup> Behavioural and psychosocial risk factors (eg, alcohol use) among persons with TB are usually noted among poor and vulnerable populations who experience disease denial, stigma, poor mental health and poor health practices.<sup>45-49</sup> A combination of poverty and psychosocial risk factors could thus impact access to private healthcare facilities due to financial and social constraints. Our results underscore the need for targeted interventions for healthcare seeking for TB by way of understanding how individual habits influence service utilisation.

Those who had a history of past TB care were less likely to seek care from the private healthcare facilities. It is plausible that prior interactions with the healthcare system could have influenced individuals' perceptions of the efficacy and accessibility of public healthcare facilities, moving them away from the private healthcare facilities. Our findings are strengthened by findings from Myanmar, which reported that factors like cost and quality were the main reasons for patients shifting from the private healthcare facilities to the public healthcare facilities.<sup>50</sup>

While previous studies have identified that the presence of most TB symptoms (like cough, fever, blood in sputum, shortness of breath, weight loss and fever) was associated with care seeking for TB in general.<sup>51-54</sup> The present study identifies the differences in the type of TB symptoms and the choice of seeking care from different health facilities (private and public healthcare facilities). We found that having symptoms of expectoration and fatigue was associated with higher odds of seeking care from the private

healthcare facilities, and having symptoms of weight loss, loss of appetite and chest pain was associated with lower care seeking from the private healthcare facilities. The possible explanation could be that symptoms of expectoration and fatigue could be perceived as low-risk illness or sickness, which in turn could have led the persons to access the private healthcare facilities for short-term redressal.<sup>54-56</sup> It is commonly noted in India that over-the-counter purchase of antibiotics is usually practised when symptoms are considered mild and manageable.<sup>55-56</sup> It was notable that the symptoms of blood in sputum were not predictive of care seeking in the private healthcare facilities. This could be due to the perceived ambiguity of participants in understanding the difference between the blood in sputum symptom (which they were asked for) from that of the classic haemoptysis symptom (coughing up blood).

Contrarily, TB symptoms like chest pain, weight loss and loss of appetite, which might be perceived as major health issues, are associated with less care seeking in the private healthcare facilities. This lower utilisation of private healthcare services may be influenced by factors like perceived severity of symptoms or economic considerations associated with treating major illnesses in private healthcare facilities.<sup>51-54-56-57</sup> While the private sector might be preferred for its quality services, the severity of symptoms and expected high costs could be seen as a limitation in this context.

Comparison of predictors between individuals who have sought healthcare and those who did not seek care in any health facilities reveals a significant difference in care-seeking behaviour for TB symptoms. All the classic symptoms of TB (fatigue, expectoration, cough, fever

**Table 4** Predictors of care seeking in general by socioeconomic status, access to health information and services, self-reported habits, comorbidities and types of tuberculosis (TB) symptoms

Categories	Univariate logistic regression			Multivariable logistic regression		
	OR	95% CI	P-value	aOR	95% CI	P-value
Age						
25 and above	1.0	0.8 to 1.1	0.852	–	–	–
15–24	Reference					
Gender						
Female	1.1	1.0 to 1.2	0.016	1.2	1.1 to 1.3	0.001
Male	Reference					
Area						
Rural	0.9	0.8 to 0.9	0.004	0.9	0.8 to 0.9	0.027
Urban	Reference					
Below poverty line						
Yes	9	0.8 to 1.0	0.177	–	–	–
No	Reference					
Occupation						
Labourer	1.0	0.8 to 1.0	0.549	0.9	0.8 to 1.1	0.770
Working in an organised sector	1.4	1.2 to 1.6	0.001	1.4	1.2 to 1.6	0.001
Housewife	1.1	1.0 to 1.3	0.055	1.0	0.9 to 1.2	0.526
Unemployed/student	Reference					
Healthcare access						
Higher healthcare access	1.3	1.2 to 1.5	0.001	1.3	1.2 to 1.5	0.001
Lower healthcare access	Reference					
Access to healthcare information						
Higher access to healthcare information	0.9	0.8 to 1.0	0.085	–	–	–
Lower access to healthcare information	Reference					
History of past TB care						
Yes	2.8	2.4 to 3.3	0.001	2.9	2.4 to 3.4	0.001
No	Reference					
Self-reported alcohol status						
Yes	1.0	0.9 to 1.2	0.402	–	–	–
No	Reference					
Self-reported smoking status						
Yes	1.0	0.9 to 1.1	0.677	–	–	–
No	Reference					
Comorbidities						
Yes	1.2	1.1 to 1.3	0.001	1.2	2.4 to 3.4	0.001
No	Reference					
Cough						
Yes	1.12	1.0 to 1.2	0.013	1.1	1.0 to 1.4	0.007
No	Reference					
Fever						
Yes	1.3	1.0 to 1.7	0.018	1.4	1.1 to 1.8	0.004
No	Reference					
Weight loss						
Yes	1.1	1.0 to 1.2	0.119	–	–	–
No	Reference					
Expectoration						

Continued

**Table 4** Continued

Categories	Univariate logistic regression			Multivariable logistic regression		
Yes	1.3	1.1 to 1.4	0.001	1.2	1.1 to 1.3	0.001
No	Reference					
Fatigue						
Yes	1.3	1.1 to 1.4	0.001	1.4	1.0 to 1.3	0.004
No	Reference					
Loss of appetite						
Yes	1.3	1.1 to 1.4	0.001	1.2	1.1 to 1.4	0.001
No	Reference					
Blood in sputum						
Yes	1.0	0.9 to 1.1	0.990	–	–	–
No	Reference					
Chest pain						
Yes	1.0	1.0 to 1.1	0.357	–	–	–
No	Reference					
Night sweat						
Yes	0.7	0.6 to 0.9	0.001	0.6	0.5 to 0.7	0.001
No	Reference					

and loss of appetite) were found to be associated with care seeking, except the symptom of night sweats. Lack of seeking care for the night sweats symptom could be attributed to misperception as a benign condition and limited awareness of the symptoms associated with TB. Previous literature has also documented similar findings where night sweats and limited TB symptom awareness delay care seeking.<sup>58</sup> Being female and working in the organised sector increased the odds of healthcare seeking, which mirrors the patterns observed in private care seeking. But the history of past TB care was associated with increased care seeking in general, in contrast to private care seeking, where the history of past TB care decreased care seeking. This underscores that experiences of past TB care may not be uniformly associated with an increase or decrease in care seeking, and the choice of healthcare facilities plays a role.

The study further highlights how past interactions with the health system influence the current choice of seeking care. Our study found that individuals with higher healthcare access and those with comorbidities had higher odds of seeking care, suggesting increased familiarity with health services through regular engagement and more health awareness.

Moreover, rural residents decreased the odds of healthcare seeking, which mirrors the patterns observed in private care seeking.

The differences in care-seeking behaviour for TB symptoms between the different healthcare facilities identified in this study underscore that healthcare seeking for TB symptoms is not uniform, and there is a need for having disaggregated data on care seeking from the private and public healthcare facilities separately. While the NTEP requires that TB care can be provided only by designated

diagnostic and treatment centres. However, we still find a significant proportion of people with symptoms were seeking the private healthcare facilities, which include traditional medicine practitioners or chemists.<sup>59</sup> While NTEP had mandated TB as a notifiable disease in 2012 to reduce inappropriate treatment for TB. However, still, there is a need for sensitisation in the private healthcare facilities and in the community to implement this mandate in an effective way.<sup>60</sup>

Our findings underscore the need for understanding the differences in factors that drive care seeking across public and private healthcare facilities and for developing tailored interventions to improve care seeking for TB based on differences in symptomatology, risk behaviours and demographic characteristics. Policymakers and healthcare providers should collaborate to create targeted awareness campaigns to improve access to TB care services in these two different healthcare facilities.

Exploration of qualitative aspects of public-private care seeking could offer deeper insights into the decision-making processes of individuals with TB-related symptoms. Understanding the nuanced relationship between TB-related symptoms and the choice of healthcare facilities is essential for formulating effective healthcare policies. Our findings call for a comprehensive approach that considers symptomatology, patient preferences and the interplay between public and private healthcare systems.

### Strength of the study

Our study's strengths include its large, representative sample size from a high TB burden state in India, which encompasses a strong mix of public and private healthcare services for TB. The study sample consisted



of over 2500 persons with presumptive TB from both urban and rural areas, and thus enabled us to assess their healthcare seeking, which reflects the real-world situations. The study also benefited from the robust and standard methodology, which was followed in conducting the survey and collecting quality-ensured data as per the WHO guidelines.

### Limitations

While our study contributes valuable insights, certain limitations warrant consideration. The reliance on self-reported data introduces the possibility of respondent bias, which could have influenced the reporting of healthcare choices for TB. Our study is limited to the state of Tamil Nadu among the age group of 15 years and above, so our findings may not be generalisable to other populations and settings. Additionally, the study's cross-sectional design does not allow for the establishment of causation, and further longitudinal research is needed to explore the dynamics between lifestyle choices and healthcare-seeking behaviour.

### CONCLUSION

The present study provides important insights into the diverse factors that likely drive healthcare seeking for TB symptoms in public and private healthcare settings. The common symptom of TB (expectoration) may lead to increased care in the private healthcare facilities, but symptoms characterised as chronic could lead to increased care in the public healthcare facilities. Age and place of residence significantly influence the choice of healthcare providers. The study also underscores the need for disaggregated data on care seeking from the private and public healthcare facilities to understand healthcare-seeking gaps for TB. The distinct patterns in symptomology and sociodemographic determinants between public and private healthcare utilisation underscore the need for context-specific strategies to improve healthcare seeking for TB symptoms.

Collaboration between policymakers and healthcare providers is crucial for developing awareness campaigns to enhance access to TB care services. Additional qualitative research could provide deeper insights into individuals' decision-making processes regarding healthcare seeking for TB symptoms, thus aiding in the formulation of more effective healthcare policies.

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