

Prevalence of chest symptoms amongst brick kiln migrant workers and care seeking behaviour: a study from South India

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ABSTRACT

Background Early detection and treatment of tuberculosis (TB) have been key principles of TB control. However, this can be a challenge with 'hard to reach' populations such as migrants. Brick kiln workers are one such group of migrants who are exposed to smoke, heat and dust from brick kilns which are one of the major causes of respiratory illnesses.

Methodology A cross-sectional community based study was carried out in Thiruvallur, Tamil Nadu, South India, from August 2011 to June 2012. A total of 4002 individuals from 55 brick kiln chambers were interviewed to determine the prevalence of chest symptoms and care seeking behaviour patterns.

Results Three hundred and seventy-seven (9.4%) chest symptomatics were identified. The most significant variables associated with chest symptoms were illiteracy, alcohol abuse and heavy smoking. Of the chest symptomatics identified, 50.4% took action to get relief from their symptoms. The duration of over 6-month stay in the chamber was significantly associated with taking action (OR, 5.5, 95% CI: 2.3, 13.3).

Conclusions The TB control programme needs to further explore how to extend its services to such 'hard to reach' groups. Active case finding to ensure early diagnosis and treatment initiation amongst such groups needs consideration.

Keywords delay, migration, risk factor, tuberculosis

Background

The relationship between migration and the emergence of infectious diseases has been reported both at national and international levels.^{1,2} Although many developed countries have reported a decline in tuberculosis (TB) disease, studies have revealed a significant rise in the TB caseload contributed by the international migrant population.³ Migrant's social and economic circumstances can have a detrimental effect on TB's disease progression, diagnosis and treatment.⁴ Furthermore, migrants often do not have access to TB-related information on prevention, transmission due to language barriers as well as cultural beliefs. Factors affecting health seeking behaviour and treatment adherence are stigma-related fear, lack of awareness of entitlement to health services, lower capacity for healthcare expenditure in proportion to household income as well as migrant-unfriendly health services, all lead to reluctance in

seeking care or adhering to treatment.^{5–7} The cumulative effects of deprivation (including malnutrition, underemployment and poverty), healthcare costs and psychological stress associated with the resettlement process have been cited as barriers to access to health services amongst migrants with TB.⁸ Dearth of targeted TB prevention and control strategies for

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migrants create significant barriers in reaching TB elimination targets in several countries.

In India, the internal migrant population is ~30% of the country's total population of 1.2 billion. Of them, 70.3% had migrated within their own district and 29.7% within their own state. Tamil Nadu is one of the southern states in India, with a population of almost 56 million, of which 11.7% are migrants.⁹

Periodic screening and investigations of migrants for chest symptoms, in order to detect TB disease and treatment of these 'hard-to-reach' groups, remains a challenge in TB control programmes.¹⁰ Case detection under The Revised National TB Control Programme (RNTCP) in India is based on 'passive case finding', where 'chest symptomatics' (A chest symptomatic is defined as a patient who has productive cough for more than 2 weeks or more accompanied, with or without chest pain, intermittent fever and/or a history of haemoptysis) are encouraged to report to public health facilities for free investigations and subsequent TB treatment. As migrants belong to a 'mobile population', little is known about their health-seeking behaviour patterns, especially in the context of TB, and the factors influencing their initial responses and subsequent behaviour patterns. Brick kiln workers are 'seasonal migrants', working for 3–8 months every year in brick kilns. Brick manufacturing plant involves using many different raw materials and produces many intermediates, by-products and products. Many of these substances are potentially harmful to the health of brick kiln workers.¹¹ Though all the workers are exposed to dust and smoke, moulders are more likely to be directly exposed to dust while bakers have more proximal exposure to smoke.¹² Smoke, heat and dust from brick kilns are one of the major causes of respiratory illnesses and symptoms. It was therefore felt that this group could be at risk for TB and an understanding of the factors that expose them to risk would be beneficial for timely interventions. It is against this background that this study was conducted. The objectives of this study were to estimate the prevalence of chest symptoms amongst migrant brick kiln workers and to gain insight to the health-seeking behaviour of the identified chest symptomatics. The study also aimed to identify the social and environmental determinants that influence the development of chest symptoms in this population. This information could provide insights on their risk for TB, identify the barriers to TB diagnosis and management and help evolve effective strategies for early detection and prompt TB treatment amongst migrants.

Description of study site

The study site selected was Thiruvallur, which is a one of the 33 districts in Tamil Nadu, South India, which houses a number of brick kiln chambers.

The total population of the district is around 2.75 million, with 704 villages. There are ~450 brick kiln chambers in the area. Each chamber has a population of 80–150 workers, mainly from adjoining districts within Tamil Nadu, who reside at the chamber for 3–8 months each year. Male workers come to work in the brick kiln chambers most often accompanied by their wives and children. Most often husbands and wives work in the same chamber, with their salaries being paid usually 6 months in advance. Thus they are de facto bonded labourers, who need to work to repay the advance payment. The distance between the villages and chambers ranges from 2 to 8 km.

Methodology

This was a cross-sectional community-based study conducted from August 2011 to June 2012. The study was conducted in phases following a sequential approach, with quantitative and qualitative phases. This manuscript reports the quantitative phase of the study covering 4002 brick kiln workers.

According to a study in and around Chennai, the prevalence of chest symptomatic amongst the general rural population is 4.9%.¹³ Assuming a precision of 20% and $\alpha = 5\%$, the required minimum sample size is 1825. Adjusting for clustering at the chamber level, with design effect = 2, the sample size is 3650. For an earlier situational analysis, a total of 170 chambers out of 455 chambers were randomly selected. It was found at the initiation of the study that only 350 chambers were functional, of which 130 chambers were already selected for the situational analysis. Hence these 130 were excluded from this list of 350 chambers. Out of the 220 chambers, 25% of the chambers, i.e., 55 chambers, were randomly selected for the study. In each chamber, an average of 62 brick kiln workers were enrolled covering 4002 individuals.

Eligible participants included workers above 18 years of age who lived and worked in the brick kiln chambers for a minimum period of 3 months and who were willing to be a part of the study. Participants were recruited with the help of the brick kiln owners who were initially briefed on the need and importance of the study. The eligible brick kiln workers were met and briefed about the study with the help of a participant information sheet. If willing to participate and provide written consent they were asked to participate in an interview at the time convenient to them which was most often the same day. Efforts were taken to cover one chamber at a time by the same field worker. This helped to establish a rapport with the workers and also help in assuring privacy and confidentiality. The interviews were conducted at their chamber and the participant was required to spare about 30–35 min for this purpose.

The pre-coded interview schedule covered information on the socio-demographic details, chest symptoms, health seeking patterns, knowledge and perceptions on TB disease and facts on smoking and alcohol consumption. When an individual sought care from a health provider for his chest symptoms, he is reported as having 'taken action'. If the time interval between the onset of symptoms and action taking is more than 7 days, it is defined as delay in action taking. An AUDIT scale¹⁴ (Alcohol Use Disorders Identification Test) was administered to measure the alcohol use. Based on the AUDIT total score, three categories of risk level were ascertained as low risk (scoring of 0–7), risky or hazardous (8–15) and high risk (16 or more). Depending on the number of cigarettes used per day, smoking was categorized as 'moderate' (5–10 cigarettes) or 'heavy' (>10 cigarettes).

Based on the interview, chest symptomatics identified were referred to the nearby health facility for investigations.

Data analysis

Data was entered, checked and analysed using SPSS Software Version 14.0 (SPSS Inc, Chicago, IL, USA). Chi-square test was used to examine associations between socio-demographic characteristics and other covariates of interest with chest symptoms. Multiple logistic regression analysis was used to determine the predictors of chest symptoms. Variables entered into the regression models were selected based on the significance within the bivariate analyses. A 95% confidence interval and a 5% level of significance were used to interpret statistical significance. The *P*-values were adjusted for clustering at the brick kiln level. All the statistical tests were two-tailed.

Ethics statement

This study was approved by the Institutional Ethics Committee of the National Institute for Research in Tuberculosis, Indian Council of Medical Research, Chennai. The study was also discussed with the Brick Kiln Owners Association, the District TB Officer of RNTCP, and their approval was obtained before the initiation of the study. Written consent was obtained from all participants willing to be part of the study.

Results

Prevalence and factors associated with chest symptoms

Of the 4002 respondents, 52% were male, >50% below 34 years of age, and a similar number of illiterate participants. More than 90% stayed in the chamber below 6 months, of which 42% stayed less than 4 months in the chamber.

One-third consumed alcohol and nearly one-fourth of the respondents smoked tobacco (Tables 1 and 2).

Prevalence of chest symptoms amongst males and females was 10.4% and 8.3%, respectively (chi-square, $P < 0.05$), and was found to increase with age (chi-square for trend, $P < 0.01$) (Table 1). In a multiple regression analysis, the covariates associated with the prevalence of chest symptoms were illiteracy (A.O.R. of 1.9, 95% CI 1.4, 2.5), duration of stay >6 months in the current chamber (AOR 1.96, 95% CI 1.3–2.9), high risk of alcohol intake (AOR of 2.9, 95% CI 1.6, 5.2) and heavy smoking (1.6, 95% CI 1.2, 2.2).

Care seeking behaviour

Of the 4002 participants, a total of 377 (9.4%) chest symptomatics were identified. Of them 50.4% took action with 60% who approached private healthcare facilities and 20% government health facilities (Fig. 1).

Of the 190 individuals who sought care for chest symptoms, 96 (50.5%) of them took immediate action, 48 (25.3%) waited at least 1 week, 17 (8.9%) waited for a month and 24 (12.6%) waited longer than a month before seeking care. There was a considerable difference in action taking between men and women, with delayed action being more evident in men than women ($P = 0.04$) (data not tabulated).

Effect of duration of stay in the current chamber on chest symptoms, action taken and delay in action

Duration of over 6 months stay in the chamber was significantly associated with taking action (OR 5.5, 95% CI 2.3, 13.3) (Table 3). Nevertheless, it appeared to have no effect on the choice of healthcare provider approached (Table 3).

Amongst the 377 chest symptomatics, 194 (51.5%) had one or two symptoms, while 183 (48.5%) had ≥ 3 symptoms (TB symptoms included cough with expectoration for ≥ 2 weeks, chest pain, evening rise in temperature, weight loss, lack of appetite, blood stained sputum, fatigue, or breathlessness). However, there was no significant association between the number of symptoms with action taking (not tabulated). The most often reported symptoms were cough and chest pain.

Reasons given by chest symptomatics for not seeking healthcare ($n = 187$)

The major reason provided for not seeking healthcare was that the individuals did not consider their symptoms to be severe enough to seek care (47.6%). Another major reason was the inability to seek healthcare due to the pressure of work (44.4%). Other reasons given were the distance and lack

Table 1 Prevalence of chest symptoms by socio demographic characteristics ($n = 4002$)

	Total, N (%)	Chest symptoms		P-value*
		Yes n (%)	No n (%)	
Sex				
Male	2083 (52.0)	217 (10.4)	1866 (89.6)	0.046
Female	1919 (48.0)	160 (8.3)	1759 (91.7)	
Age				
15–24	1029 (25.7)	52 (5.1)	977 (94.9)	0.001
25–34	1166 (29.1)	98 (8.4)	1068 (91.6)	
35–44	861 (21.5)	97 (11.3)	764 (88.7)	
45–54	622 (15.5)	79 (12.7)	543 (87.3)	
≥55	324 (8.1)	51 (15.7)	273 (84.3)	
Education				
Illiterate/functional literacy	2066 (51.6)	231 (11.2)	1835 (88.8)	<0.01
Primary school	1148 (28.7)	98 (8.5)	1050 (91.5)	0.06
High school and more	788 (19.7)	48 (6.1)	740 (93.9)	
Alcohol				
Never	2696 (67.4)	211 (7.8)	2485 (92.2)	0.013
Low risk	978 (24.4)	104 (10.6)	874 (89.4)	
Risky or hazardous level	271 (6.8)	48 (17.7)	223 (82.3)	
High risk	57 (1.4)	14 (24.6)	43 (75.4)	
Smoke				
Never	3026 (75.6)	245 (8.1)	2781 (91.9)	0.783
Moderate	316 (7.9)	27 (8.5)	289 (91.5)	
Heavy	660 (16.5)	105 (15.9)	555 (84.1)	
Duration of stay in the current chamber				
≤4 months	1674 (41.8)	151 (9.0)	1523 (91.0)	0.97
5–6 months	2105 (52.6)	189 (8.9)	1916 (91.1)	
>6 months	223 (5.6)	37 (16.6)	186 (83.4)	

*P-value adjusted for clustering.

of transportation (10%), financial (8.6%) and barriers to seeking care (Data not tabulated).

Awareness of TB (not tabulated)

Sixty six per cent of the respondents were not aware on how TB spread; 4% said that it was caused by germs, while 26% said that it was caused by smoking. Forty seven per cent of the respondents did not know any symptoms of TB, 42% said that TB was curable and 47% said that they did not know.

Discussion

Main findings

The study found a significantly higher proportion of chest symptomatics amongst brick kiln workers when compared with the general population ($P \leq 0.001$). A significant association

was found with the duration of stay in brick kiln chamber and the number of chest symptoms. This is not surprising as the workers and their families live in overcrowded poorly ventilated one-roomed houses, with the workers exposed to smoke from cooking within the houses as well as outdoor pollution from the brick kilns. Both indoor air pollution and overcrowding have been reported as being risk factors for TB disease.¹⁵ Furthermore, the study reconfirmed the findings of other studies that report an association, of chest symptoms with excessive smoking and higher alcohol consumption.^{16–19} Prevalence of chest symptoms increased with age as reported in former studies from South India.^{13,20}

It is worrying that despite nearly 50% chest symptomatics who reported more than three TB symptoms; only half of them took action to get relief from their symptoms. It is also paradoxical that the reason stated by 40% of the

Table 2 Risk factors for chest symptoms by multiple logistic regressions

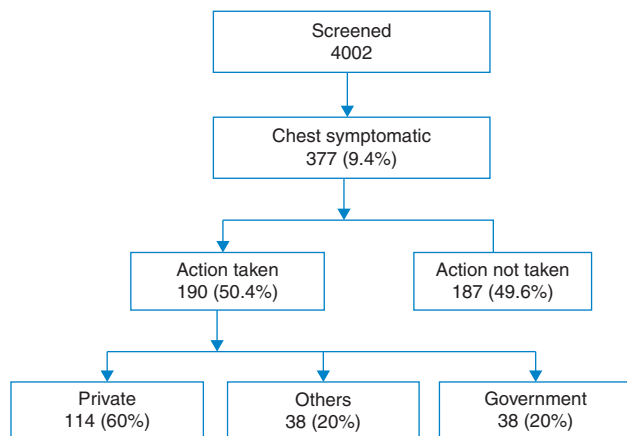
	Multiple regression	
	A.O.R.	P-value [^]
Education*		
Illiterate	1.9 (1.4, 2.5)	<0.01
Primary school	1.3 (0.9, 1.9)	0.148
High school and more	1.0 (Reference)	
Duration of stay in the current chamber		
≤4 months	1.0 (Reference)	
5–6 months	1.03 (0.8, 1.4)	0.87
>6 months	1.96 (1.3, 2.9)	<0.01
Alcohol		
Never	1.0 (Reference)	
Low risk	1.2 (0.9, 1.6) (95% C.I.)	0.216
Risky or hazardous level	2.0 (1.3, 3.0)	0.001
High risk	2.9 (1.6, 5.2)	<0.01
Smoke		
Never	1.0 (Reference)	
Moderate	0.91 (0.6, 1.4)	0.645
Heavy	1.6 (1.2, 2.2)	0.002

Primary school: Grade 1 to 5.

High school and more: from Grade 6 and above.

*Illiterate: inability to read and write.

[^]P-value adjusted for clustering.

**Fig. 1** Action taken for chest symptoms.

symptomatics who did not seek healthcare that they did not consider their symptoms severe enough to seek care. This is similar to earlier studies from India^{13,20} and perhaps this could be due to the lack of awareness on TB coupled with work pressure and inaccessibility to health facilities.

Men with chest symptoms delayed action when compared with women, which is contrary to the findings of other

Table 3 Effect of duration of stay on chest symptoms, action taken and delayed action

	Duration of stay		
	≤4 months (N = 1674)	5–6 months (N = 2105)	>6 months (N = 223)
N = 4002			
Chest symptomatic [n (%)]	151 (9.0)	189 (8.9)	37 (16.6)
OR (95% CI)	1.0 (Reference)	0.9 (0.7, 1.4)	2.0 (1.4, 2.9)
P-value	–	0.97	<0.01
N = 377			
Action taken [n (%)]	60 (39.7)	101 (53.4)	29 (78.4)
OR (95% CI)	1.0 (Reference)	1.7 (1.1, 2.7)	5.5 (2.3, 13.3)
P-value	–	0.018	<0.01
Choice of service provider			
Private	35 (58.3)	64 (63.4)	15 (51.7)
Government	15 (25.0)	15 (14.9)	8 (27.6)
Others	10 (16.7)	22 (21.8)	6 (20.7)
N = 190			
Immediate action [n (%)]	27 (45.0)	54 (53.5)	20 (69.0)
OR (95% CI)	1.0 (Reference)	1.4 (0.7, 2.9)	2.7 (0.9, 7.8)
P-value	–	0.353	0.063

studies¹³ where delayed action was seen more in women.^{21,22} The study findings further report that longer the duration of stay in the chamber increased the likelihood of seeking care. Shorter durations of stay associated with frequent migration from one place to another, appear to pose a key challenge for timely seeking of healthcare.

The study further observed that 60% of chest symptomatics primarily sought care from private health facilities. This is contradictory to the positive findings of a recent study which reported that there was a definite increase in chest symptomatics reporting to a government facility after the introduction of RNTCP when compared with prior implementation of RNTCP.^{13,20} These findings could be due to the fact that most brick kilns provided healthcare to their workers through their own networks of contracted private practitioners who are more accessible to the workers. Public health facilities are inaccessible due to large distances and lack of transportation. Furthermore, the time taken to reach these facilities interferes with their work timings as these facilities operate only in the mornings. Health-seeking behaviour being influenced by transportation cost, distance to health facilities, and perceived loss of work time has also been reported in a study from Ghana.²³ This is a matter of concern as delayed diagnosis and initiation of TB

treatment may worsen the disease, increase mortality, and lead to continued transmission.²⁴

The study findings also point to poor awareness on TB amongst the brick kiln workers. This is a matter of concern taking into account the focus on TB awareness activities in the national TB programme to facilitate early diagnosis and treatment. Perhaps these awareness activities have focused on populations who are accessible as evident in a study from South India that reported more than half the respondents from both rural and urban areas were aware that TB was spread through germs and three-fourths had said that TB was curable.²⁰

What the study adds

Despite the RNTCP having made huge strides in expanding and decentralizing TB services across India,²⁵ it still faces major challenges in reaching the hard to reach groups such as brick kiln migrants. The study findings indicate higher prevalence of chest symptoms amongst brick kiln workers adding on to the fact that 60% of them access private care. This could lead to delays in diagnosis and missed cases that may not be notified to the programme. These migrants reside in areas away from the main towns and therefore not reached adequately by the TB programme.

Overall, the increased risk of TB amongst men with chest symptoms, added to a history of heavy smoking and alcohol consumption and longer delays in seeking care, calls for gender-sensitive TB intervention strategies.

Greater efforts are needed to reach this population and address these issues, so that effective interventions are undertaken for effective diagnosis and treatment. The application of evidence-based interventions to ensure timely diagnosis, improve treatment completion and infection control amongst these groups is needed, but will require more investment other than 'routine' interventions.

Limitations

This was a cross-sectional study on one specific group of migrants in Tamil Nadu district. Any extrapolation of the study findings to other groups of migrants should be done understanding the limitations of the population reported here. The data however have provided a preliminary insight into the care-seeking behaviour of brick kiln migrants in south India.

Another limitation is the interviewer bias and re-calls bias of the respondents with regard to the type of symptoms, time lines of care seeking, and type of health providers consulted. However, this bias was equally applicable across all respondents. The strength of the study was that the data were

obtained from a considerable number of chest symptomatics covering a wide number of brick kilns in the area.

Conclusion

The TB control programme needs to further explore how to extend its services to such 'hard to reach' groups and also explore switching from 'passive case finding methods' to 'active case finding methods' in populations such as brick kiln workers. There is a need for adequate follow-up services to ensure treatment initiation and care, as well availability of smooth transfer of treatment when required. Strengthening private public partnerships to extend RNTCP services to this migrant group would help minimize delays in diagnosis, initiate treatment and follow-up care in the places to which they migrate.

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