Factors driving the knowledge of tuberculosis in Pakistani men: evidence from a nationally representative survey

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Abstract: Tuberculosis (TB) is among the leading infectious diseases worldwide. The burden of TB in Pakistan remains high, and a proper analysis of the knowledge of population about TB may assist in limiting the transmission of the disease. We aimed to outline several demographic and socioeconomic variables and analyze their influence on the knowledge of TB among Pakistani men (n=3691). We used secondary data collected between November 2017 and April 2018 by the demographic and health survey (DHS) of Pakistan. Participants were surveyed regarding TB transmission, curability, the length of the disease, and a knowledge index was allocated for each respondent to evaluate TB knowledge. Data was analyzed using one-way ANOVA and Student's t-test. Most of participants were between the ages of 15 and 34 years (48.2%) and had secondary school education (35.8%). Overall, 94.3% of participants had heard of TB, with the highest awareness among those with higher education (98.7%). Higher knowledge of TB was associated with reading newspapers or magazines at least once or less than once a week (7.22 ± 1.14 and 7.31 ± 1.11, respectively), watching television at least once or less than once a week (7.22 ± 1.13 and 7.22 ± 1.06 respectively), owning a mobile/telephone (7.15 ± 1.1), and having a bank account (7.33 ± 1.14) (all p<0.01). Knowledge about TB was significantly higher in participants with a higher educational

status, access to newspapers/magazines or television, mobile/telephone, or a bank account.

Introduction

Tuberculosis (TB) is a debilitating disease that causes severe adverse health, social and economic consequences. In 2020, it was estimated that TB affected around 10 million people globally, 56% of whom were men, making it the second most fatal infectious disease worldwide (1). Two-thirds of the cases were reported in eight developing countries, including Pakistan (1). However, other relevant data from low-income countries, including prevalence and knowledge about preventive measures, are scarce.

A study carried out in 2010-2011 amongst the adult Pakistani population revealed that the prevalence-to-notification ratio of smear-positive TB was 3.1 and was higher among men than women (2). This indicates that the actual number of cases is likely to be underestimated. The prevalence of TB cases was also 1.8 times higher in men than in women (2).

While TB is a treatable condition, multiple barriers can reduce the treatment efficacy and adherence, such as poor accessibility to health services in developing countries, and costs or duration of treatment (3-6). Recent data from four South African

countries indicate that stigmatization, as a social determinant, may adversely affect TB control and treatment (7). This is partly because the infected individuals may choose to isolate themselves rather than seek medical attention. Therefore, proper knowledge and awareness of TB are likely to improve treatment seeking and adherence, as well as efforts to control propagation within communities (7).

Additionally, the existence of several misperceptions regarding TB, such as the exact modes of transmission, presenting symptoms, prognosis, or the misconception that it can only affect the lungs can have a significant impact on the spread of TB and the willingness to seek treatment (8, 9). Factors and determinants such as age, sex, socioeconomic status, literacy status, and access to mass media platforms are likely to influence the perception and knowledge of TB (10, 11) . Hence, it is important to thoroughly dissect those factors in the context of knowledge and awareness of TB. However, most of the relevant surveys are limited and/or involve a small sample size or a specific geographical region (10, 12-14).

In this study, we aimed to define several demographic and socioeconomic variables and analyze their influence on the knowledge of TB among Pakistani men. We hypothesized that the knowledge of TB is significantly influenced by the demography and socioeconomic characteristics of the respondents.

Methods

<u>Study design:</u> This is a cross-sectional study conducted using secondary data obtained from the demographic and health survey (DHS) of Pakistan, 2017-18 (15). The DHS Program collects data on various public health domains, demographic, and socioeconomic factors of the general population in domestic settings, with a focus on health-related variables.

<u>Study setting:</u> The study represents data collected from 22nd November 2017 to 30th April 2018 from various geographical locations within Pakistan.

<u>Study participants and data procurement:</u> The study participants include 3691 Pakistani men, ages 15 to 49 (mean age = 35 ± 7.8 years). Data was collected using the DHS household questionnaire, which identifies eligible household members and was used to acquire various information. The Man's household questionnaire topics included information about demographics, reproduction and contraception, employment status, gender roles, and several health matters.

Multiple nominal questions relevant to this study were asked to evaluate TB knowledge. Firstly, participants were asked if they had heard of TB, then a series of questions about the characteristics of the disease followed. Those questions required the

respondents to identify the possible modes of transmission, state whether they thought TB was curable, and to determine the length of the disease in months. Finally, participants were asked if they had ever been diagnosed with TB.

Study variables: The outcome variable was participants' knowledge of TB. The exposure variables included the type of residence, educational level, access to the internet, owning a mobile phone, having a bank account, and their preferred use, if any, of mass media consumption.

Statistical analysis: Microsoft Excel (version 2016) was used to arrange and categorize the exposure variables along with the corresponding respondents' answers to the questions that assessed TB knowledge. Correct and incorrect answers were assigned scores of "1" and "0", respectively. Based on the number of correctly answered questions, each participant was assigned a knowledge index that ranged from 0 to 9. Data were then exported to GraphPad prism 8 for statistical analysis using one-way ANOVA to determine the influence of the different factors on TB knowledge, and Student's t-test was used for dichotomous questions. A value of $p < 0.05$ was considered statistically significant.

Results

The basic characteristics of the study population are summarized in table 1. The majority (48.2%) of respondents were between the ages of 15 and 34. In the rural area, there were higher number of respondents without any formal education. Conversely, in the urban area, there were significantly more respondents with higher education. While the employment status remained largely unchanged, more respondents in rural areas worked in the agricultural sector, whereas in urban areas, more people were engaged in the clerical, sales, and technical sectors. The wealth quintile was noticeably different, with the richest people living in urban areas and the poorest in rural ones.

We next investigated the knowledge of participants about TB. Altogether, 94.3% of participants had heard of TB. Among the categories based on education levels, the highest awareness of TB was among those with higher education (table 2). When compared to men with lower levels of education, those with higher education correctly identified the mode of transmission as predominantly airborne (70.4% *vs.* 43.3% respectively) (table 2). However, the proportions of respondents who believed that sharing cutlery and food could transmit the disease was comparable between men with low and high education levels (46.4% *vs.* 39.7% respectively) (table 2). Touch, sexual contact, and mosquito bite were identified as modes of transmission by a small proportion of men with no effects of educational backgrounds (table 2).

Although most of the respondents with higher and secondary education believed that TB is a treatable disease (97.4% and 93.6%, respectively), those with primary or no education also believed that the TB could be cured (87.7% and 80%, respectively) (table 2).

Around 11% of participants from all educational backgrounds thought that it takes 1-3 months to treat TB, whereas 34% participants thought it required 4-6 months to treat TB. The duration of TB therapy was accurately identified by 25% of participants as being seven or more months, while the remaining participants simply did not know about the duration of treatment. About 4% of the participants in this study were diagnosed with TB (table 2).

In general, every participant had access to some form of media for information. Regarding age groups, the people aged 30-44 years (56.3%) had the most access to media followed by age groups of 15-30 years (27.5%) and 45 and older (16.2%).

The frequency of usage of different media was consistent throughout all the age groups. Among different media of knowledge, the possession of a mobile or telephone was highest (93.2%) amongst all the age groups (table 3). The relative proportions of participants were 56.1% and 29% for the use of television or newspaper on weekly basis, respectively, and 31.4% for using internet in the past 12 months. Conversely, the use of radio was the lowest (9.83%) among all the age groups (table 3).

There was a statistically significant difference in the knowledge indices of participants in relation to their preferred form of mass media (figure 1). Participants who read newspapers or magazines at least once a week scored higher knowledge indices compared to non-readers (7.22 ± 1.14 vs. 7 ± 1.03, respectively, p<0.0001). Similarly, those who read the newspaper/magazines less than once a week had a significantly higher knowledge index of TB (7.31 ± 1.11) than those who never read newspapers/magazines (p<0.0001) (figure 1A).

Overall, participants who watched television at least once a week or less than once a week had a higher knowledge index (7.22 ± 1.13 and 7.22 ± 1.06, respectively) than those who never watched television (6.86 ± 0.96, p<0.0001) (figure 1B).

Among the 3,691 respondents, those who possessed a mobile or telephone exhibited higher knowledge indices than those who did not own a mobile/telephone (7.15 ± 1.09 vs. 6.8 ± 0.94, respectively) (figure 1C).

Having an account in a bank or other financial institution was identified as another factor associated with the knowledge of TB. The participants who owned a bank account had a significantly higher knowledge index than participants who did not have

an account in the bank/other financial institution (7.33 ± 1.14 vs. 7.01 ± 1.04) (figure 1D).

Conversely, we found no statistically significant difference in the knowledge of respondents in relation to the use of radio, the internet, a mobile/telephone for financial transactions, or in the type of residence (figures 1 E— H).

Discussion

The goal of this study was to assess the knowledge levels of TB patients and the contributions of socio-demographic variables to variations in knowledge levels among Pakistani men. We identified a number of variables that might affect the knowledge of TB among Pakistani men. Owning a higher education, reading newspapers, watching TV, possessing a mobile phone, and having a bank account were identified as critical factors associated with a higher knowledge of TB. Additionally, living in an urban region and working in the clerical/sales/technical sectors were linked to greater understanding of TB.

We established a positive link between knowledge of TB and educational level. Specifically, a higher knowledge of TB was found in the respondents with higher education. This finding is consistent with studies from Nigeria (16) and Bangladesh (10) that found that respondents with higher education had greater knowledge of TB. These findings suggest that education can play a significant role in increasing public knowledge of health issues, including TB. It also underlines the importance of education in helping people make well-informed decisions about matters of health.

Access to mass media, including newspapers, TV, and using mobile phones was associated with significantly higher levels of TB knowledge. Certain sources of media generally play a critical role in providing health awareness about common communicable diseases, including TB. This finding agrees with studies from Nepal (17) and Gambia (18), where participants with access to mass media demonstrated higher knowledge of TB than participants without access to mass media. Additionally, participants who had access to the newspaper, TV, and mobile devices also scored higher on knowledge indices than participants who had none of these sources of media available to them. However, the association of the usage of internet and radio with the knowledge of TB was not discovered.

We also probed into people's knowledge of several TB-related domains, such as the mode of transmission, common symptoms, and treatment modalities. We found that a significant proportion of participants recognised that TB spreads through coughing or sneezing. We also discovered a strong educational influence since higher levels of

education were linked to a greater likelihood of correctly identifying coughing and sneezing as transmission routes of TB. A small percentage of respondents, nevertheless, incorrectly identified that touching, eating, sharing utensils, and sexual contact were possible modes for TB to spread. This data may point to a potential weakness in health awareness and/or education programmes that contributes to the false beliefs regarding the spread of TB. The results of a study done in Lagos are broadly in agreement with ours (19).

Strengths and limitations of the study: To the best of our knowledge, this study is the first to use an internationally standardized survey to assess the respondent's knowledge, attitude, and related aspects on TB among Pakistani men. Our novel findings are from a sizable sample size. Our results can therefore have a significant impact on activities intended to raise public awareness about TB and foster a favourable attitude toward it. Additionally, our findings can have significant ramifications for how policymakers should develop and implement public health plans and initiatives.

However, this study also has certain limitations. Women and the elderly were not included in this study. In addition, several factors such as knowledge regarding access to medical facilities were not investigated and may have an impact on people's knowledge and attitudes toward TB.

Conclusion and Suggestions: This study demonstrates a satisfactory amount of knowledge about TB in Pakistani men. Various factors, including the level of education, exposure to media platforms such as TV and newspaper, area of residence, and possessing a bank account were identified in relation to superior knowledge of TB. To raise general public awareness of TB, it is essential to put into practice techniques that will aid in enhancing and strengthening information about the mode of transmission, duration, and cure of TB. Controlling the above-mentioned illness requires improving access to high-quality healthcare services, increasing exposure to sound education and mass media, such as TV and newspapers, and having a grasp of the methods that help stop the development of TB.

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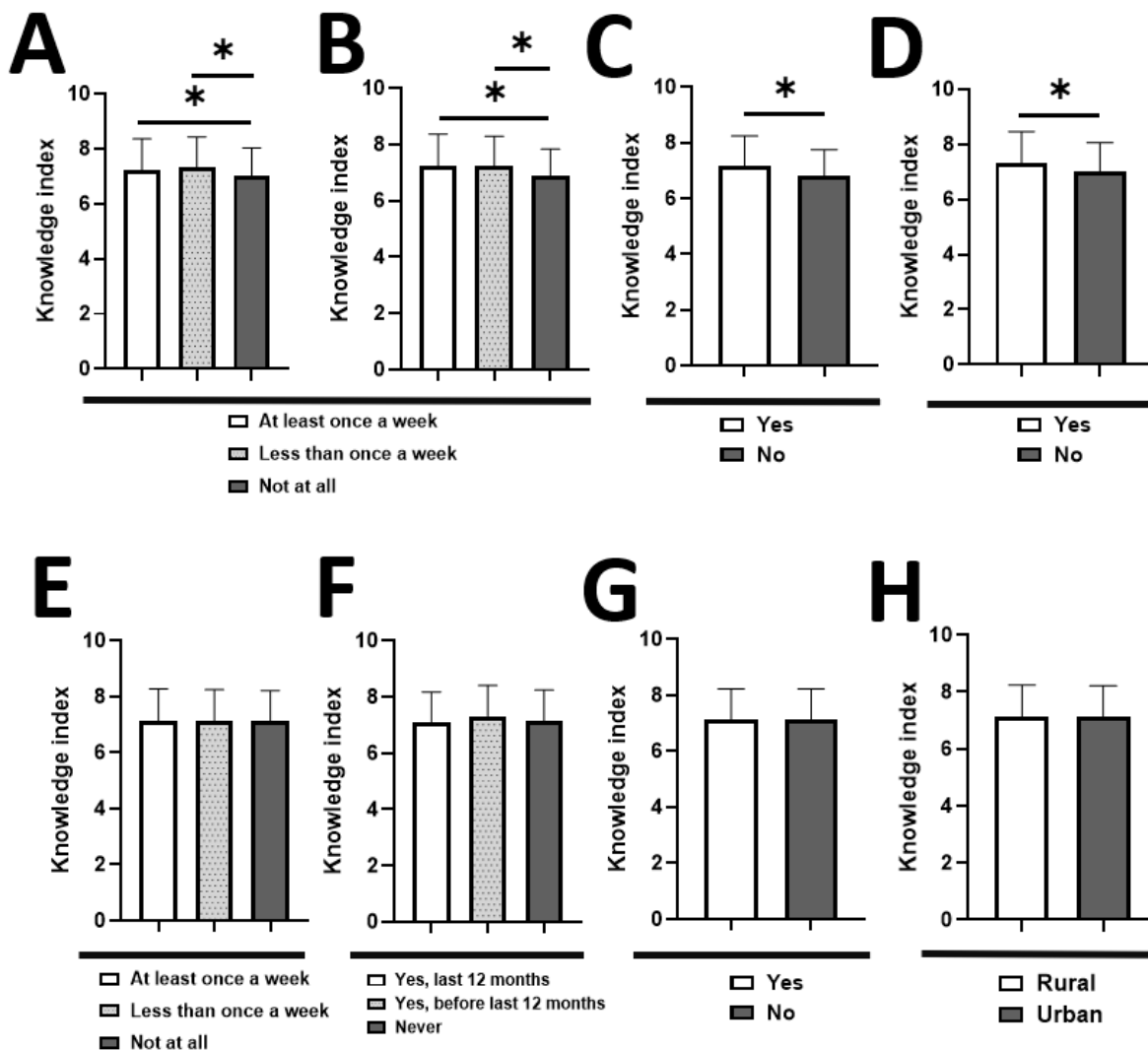
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Figure 1 Knowledge indices of tuberculosis (TB) among participants who read Newspaper/Magazine (A), watched the Television (B), owned a Mobile/Telephone (C), had an account in a bank or other financial institution (D), listened to the Radio (E), used the Internet (F), or used a Mobile/Telephone for financial transactions (G), and lived in a(n) rural/urban area (H), One-way analysis of variance; *$p < 0.05$.

Table 1. Socio-demographic characteristics of study participants by type of residence, Pakistan. The numbers on parenthesis indicate percent values (n = 3691).

Characteristic	Rural, n (%)	Urban, n (%)	Total, n (%)
Age (years)			
15-34	912 (50.5)	867 (46.0)	1779 (48.2)
35-44	612 (33.9)	704 (37.4)	1316 (35.7)
≥45	283 (15.7)	313 (16.6)	596 (16.1)
Educational level			
No Education	567 (19.4)	302 (34.8)	869 (23.5)
Primary	351 (33.2)	277 (44.1)	628 (17.0)
Secondary	600 (16.0)	723 (54.6)	1323 (35.8)
Higher	289 (31.4)	582 (66.8)	871 (23.6)
Number of wives/partners			
1	1742 (96.4)	1825 (51.2)	3567 (96.6)
2 or more	33 (1.8)	28 (1.5)	5 (1.7)
No wives/partners	32 (1.8)	31 (1.6)	63 (1.7)
Occupation			

Employed	1691 (93.6)	1805 (95.8)	3496 (94.7)
Agriculture	481 (28.4)	88 (4.9)	569 (16.3)
Clerical/sales/technical	425 (25.1)	846 (46.9)	1271 (36.4)
Skilled manual	271 (16.0)	464 (25.7)	735 (21.0)
Unskilled manual	416 (24.6)	270 (15.0)	686 (19.6)
Services	92 (5.4)	134 (7.4)	226 (6.5)
Others	6 (0.4)	3 (0.2)	9 (0.3)
Unemployed	116 (6.4)	79 (4.2)	195 (5.3)
Wealth quintile			
Richest	137 (7.6)	648 (34.4)	785 (21.3)
Richer	208 (11.5)	517 (27.4)	725 (19.6)
Middle	339 (18.8)	369 (19.6)	708 (19.2)
Poorer	532 (29.4)	269 (14.3)	801 (21.7)
Poorest	591 (32.7)	81 (4.3)	672 (18.2)
Total	1807 (49.0)	1884 (51.0)	3691

Table 2. Knowledge of the study participants about TB according to the levels of education. The numbers on parenthesis indicate percent values (n = 3691).

Questions		No education (N= 868)	Primary education (N= 628)	Secondary education (N= 1322)	Higher education (N= 870)
Have you heard of TB? *		769 (88.6%)	586 (93.3%)	1277 (96.6%)	859 (98.7%)
Mode of Transmission*					
	Air through cough/sneeze	282 (32.5%)	260 (41.4%)	741 (56%)	613 (70.4%)
	Sharing utensils	320 (37%)	256 (40.7%)	530 (39.3%)	421 (48.4%)
	Touch	95 (11%)	80 (12.7%)	170 (13%)	124 (14.2%)
	Food	355 (41%)	243 (38.7%)	550 (41.6%)	387 (44.5%)
	Sexual Contact	126 (14.5%)	79 (12.5%)	207 (15.6%)	150 (17.2%)
	Mosquito	14 (1.6%)	6 (1%)	9 (~ 1%)	11 (1%)

	Bites				
	Others	13 (1.5%)	14 (2%)	25 (2%)	19 (2.2%)
	Don't know	171 (19.7%)	127 (20.2%)	197 (15%)	68 (8%)
Do you think TB can be cured?					
	Yes	693 (80%)	551 (87.7%)	1238 (93.6%)	848 (97.4%)
	No	17 (2%)	10 (1.6%)	4 (0.3%)	3 (0.4%)
	Don't know	59 (7%)	25 (4%)	35 (3%)	8 (1%)
Length of Disease					
	1-3 months	75 (8.6%)	60 (9.5%)	172 (13%)	105 (12%)
	4-6 months	225 (26%)	202 (32.2%)	480 (36%)	355 (41%)
	7 months or above	183 (21%)	165 (26.2%)	338 (25.6%)	239 (27.4%)
	Don't know	203 (23.4%)	118 (19%)	231 (17.4%)	139 (16%)
Have you ever been told you have TB? *		27 (3%)	30 (4.7%)	50 (3.7%)	40 (4.6%)

*Only "Yes" responses are tabulated

Table 3. Access of study participants to different kinds of media sources (n = 3691).

Source/ Age	15-29 years (n = 1014)	30-44 years (n = 2081)	≥45 years (n = 596)
Use of Newspaper/			

Magazine			
More than once a week	0	2 (0.1%)	0
At least once a week	227 (22.4%)	651 (31.3%)	191 (32.1%)
Less than once a week	198 (19.5%)	401 (19.3%)	101 (16.9%)
Not at all	589 (58.1%)	1027 (49.3%)	304 (51.0%)
Use of Radio			
More than once a week	0	0	0
At least once a week	103 (10.2%)	205 (9.90%)	55 (9.20%)
Less than once a week	153 (15.1%)	265 (12.7%)	59 (9.90%)
Not at all	758 (74.8%)	1611 (77.4%)	482 (80.9%)
Use of Television			
More than once a week	0	1 (0.05%)	0
At least once a week	530 (52.3%)	1200 (57.7%)	340 (57.0%)
Less than once a week	169 (16.6%)	358 (17.2%)	103 (17.3%)
Not at all	315 (31.1%)	522 (25.1%)	153 (25.7%)
Mobile/ Telephone Owners			
Yes	942 (92.9%)	1954 (93.9%)	543 (91.1%)
No	72 (7.10%)	127 (6.10%)	53 (8.90%)
Use of internet			
In the last 12 months	356 (35.1%)	660 (31.7%)	142 (23.8%)

Before last 12 months	16 (1.6%)	50 (2.40%)	6 (1.00%)
Never	642 (63.3%)	1371 (65.9%)	448 (75.2%)