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INSIGHTS INTO TUBERCULOSIS IN LAHORE, PAKISTAN: EVALUATING PREVALENCE, AWARENESS, AND PUBLIC ATTITUDES

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ABSTRACT

Objective: This mixed-method, cross-sectional study aimed to assess the prevalence and attitudes toward the spread and treatment of Tuberculosis (TB) in the Lahore district of Pakistan. **Design:** A mixed-method approach was employed, incorporating quantitative data analysis from surveys of 500 residents and thematic analysis of 500 interviews involving TB patients, health workers, and authorities. **Methodology:** Conducted from April 6, 2022, to August 8, 2022, in three towns of the Lahore district, this analytical cross-sectional study utilized convenience sampling. A self-structured pre-tested questionnaire facilitated data collection. Quantitative data were analyzed using SPSS version 21, with mean and standard deviation calculated for quantitative variables. Qualitative variables were expressed through frequency and percentage. The Chi-Square test assessed associations between variables, considering a P value ≤ 0.05 as significant. **Results:** The mean age of respondents was 35 ± 13.23 years. Among the total respondents, 19 (3.8%) were identified TB cases, with 47.37%, 42.10%, and 10.53% in the age groups of 18–30, 30–50, and above 50 years, respectively. Approximately 43.8% were aware of all TB symptoms, and 61.4% recognized severe cough for two weeks as a potential TB symptom. About 220 respondents believed they could contract TB through close contact, while 111 knew someone with TB in their social circle. In the case of suspected TB infection, 93.2% would seek medical attention, 2% would consult a traditional healer (Hakeem), 1.6% would attempt home-based remedies, and 3.2% would ignore it. Respondents displayed varied attitudes toward TB patients, with 48.0% offering sympathies, 3% remaining neutral, 38.0% providing financial assistance, and 11.0% avoiding TB patients due to infection fears. **Conclusion:** Lack of awareness regarding TB symptoms in these areas is attributed to insufficient governmental focus and funding. Adequate funding and a sustained medication regimen are crucial to prevent the epidemic spread of TB.

KEYWORDS: Tuberculosis, Pakistan, Prevalence, Attitude, Awareness, DOT, Hussainabad, Khaliqabad, Nawazishabad, Lahore.

INTRODUCTION

Tuberculosis (TB), a disease predominantly afflicting developing nations, is instigated by the pathogenic bacterium Mycobacterium tuberculosis, primarily targeting the respiratory system. Transmitted through airborne particles from coughs, sneezes, or spitting, TB ranks among the top 10 global causes of mortality.[1] In 2017 alone, approximately 10 million individuals contracted TB, leading to 1.3 million fatalities. Those with active TB can annually transmit the disease to 10-15 individuals. Pakistan, boasting an approximate population of 220 million[3], held the disconcerting fifth position globally for the highest TB incidence in 2016[4], as per the WHO tuberculosis report. The 2020 report recorded a total TB incidence of 573,000 cases.[5] Punjab, a province in Pakistan, shoulders 60% of the country's TB burden, with 46% of its 80 million inhabitants being

illiterate, and 16.5% residing in the lowest economic quintile.[6]

The World Health Organization (WHO) responded to the TB challenge with a comprehensive strategy, emphasizing six pivotal components: (1) the expansion and enhancement of high-quality Directly Observed Therapy Short Course (DOTS); (2) addressing TB-HIV, MDR-TB, and the needs of vulnerable populations; (3) contributing to health system strengthening through primary healthcare; (4) involving all care providers; (5) empowering TB patients and communities through partnerships; and (6) fostering research.[8] Crucial to every health facility are Tuberculosis Infection Control (TBIC) programs. In 2009, WHO issued TBIC policies encompassing administrative, environmental, and personal protection measures to mitigate TB transmission risks in healthcare settings.[9] Pakistan, aligning with these guidelines, adopted national TBIC guidelines; however, a systematic evaluation of their implementation is lacking, contributing to the persistent health threat posed by TB.

The global burden of TB, reported by WHO in 2010, highlighted 8.8 million incident cases, with 82% originating from 22 high-burden countries, predominantly classified as low-income nations.[11] In Pakistan, a distinct socio-economic backdrop perpetuates a pattern unfavorable to combatting the endemic Mycobacterium tuberculosis, marked by diagnostic delays, irresponsible drug regimes, and insufficient social and economic support. Limited awareness and knowledge, particularly among the impoverished, facilitate the disease's spread, necessitating political commitment and a financially robust healthcare system to bridge this gap. Focused dedication to underprivileged areas emerges as a crucial solution to curbing the disease's propagation.

Despite a decrease in TB prevalence in Pakistan from 2010 to 2020, with incidence and mortality rates per 100,000 population dropping to 259 and 19, respectively, the persisting figures remain substantially higher compared to countries like Canada, the United States, Australia, and New Zealand, where incidence rates are less than 10 cases per 100,000 population annually.[13][14] While a wealth of information is available, the unsatisfactory decline in TB prevalence prompts an investigation into the persisting issue. Scarce relevant studies and limited literature addressing the problem underscore the need for our research. This study aims to uncover the reasons behind the enduring prevalence of TB in Pakistan, specifically in Lahore, Punjab, despite available information and resources.

Our research delves into the general perspective on TB, its spread, the reasons for its high prevalence, the extent of information available regarding symptoms and dissemination, and crucially, the accessibility of treatment to the general population. Focusing on the rural areas of Lahore, Punjab, is paramount, as these areas are disproportionately affected due to inadequate ventilation, overcrowded working conditions, and the confluence of TB with HIV resulting from poor sanitation practices.[15]

MATERIAL AND METHODS
In light of Pakistan's position as one of the countries grappling with the highest burdens of Tuberculosis (TB), a critical reassessment of intervention program designs becomes imperative. The primary objective of this study is to comprehensively understand and evaluate the knowledge, awareness, perceptions, and health-seeking behavior within the general TB-affected population.[16] Conducted in Lahore, Province Punjab, this mixed-method study involved 500 individuals. The research included a household survey and five focus group discussions encompassing TB patients, health workers, and authorities. Employing a cross-sectional approach, the study utilized a meticulously administered questionnaire, and the resultant data was meticulously organized into pie charts and graphical representations to maximize transparency and efficacy. The statistical tools SPSS version 21 and MATLAB R2021b were employed for analysis.[17][18]

Basis of Selection
Three villages—Khaliqabad, Hussainabad, and Nawazishabad—were selected based on socio-economic conditions and a high probability of persistent disease. The quantitative aspect involved 81 responses from Khaliqabad, 225 from Hussainabad, and 194 from Nawazishabad, culminating in a total sample size of 500. The qualitative inquiry focused on key aspects such as knowledge of TB transmission, handling of TB patients, understanding the necessity of precautions, awareness of TB symptoms, and experiences with affected individuals. Acknowledging ethical considerations, the study adhered rigorously to principles of consent, addressed language barriers, and recognized potential challenges stemming from a lack of understanding and cooperation.[20]

Exclusion Criteria
To maintain precision and relevance, individuals above 80 and below 18 years of age, as well as those with mental and physical disabilities, were excluded from the study.[21]

Data Acqusition
The research team initiated data collection on April 2nd, 2022, in Khaliqabad, following comprehensive discussions on ethical aspects and the study's framework. Initial challenges, including nervousness and feelings of alienation, prompted a strategic shift towards individual surveys for subsequent sites. Despite these hurdles, Khaliqabad respondents demonstrated commendable awareness of TB, sharing personal experiences, and expressing a proactive stance towards seeking medical attention. Approximately 4 hours were spent collecting 81 responses. On April 3rd, 2022, the team encountered challenges in Nawazishabad, intensified by the onset of

Ramadan. Safety protocols were diligently implemented, with female researchers accompanied by male counterparts, and teams were strategically divided. Respondents in Nawazishabad displayed a commendable understanding of TB, with 194 surveys collected over 2 hours. The subsequent visit to Hussainabad, though demanding, resulted in the collection of 225 surveys over 7 hours. Challenges included team exhaustion and the difficulty of finding new respondents. After two days of intensive fieldwork across three diverse locations, the research team successfully acquired data from 500 surveys. Despite challenges posed by inexperienced team members, academic commitments, and logistical issues, the sample size was deemed fitting for the population size of the visited towns. The team's assessment revealed a surprising depth of familiarity with TB among rural populations, emphasizing adherence to precautions and a proactive readiness to seek medical attention. The study illuminates the resilience and adaptability of the team in overcoming challenges and achieving the study's research objectives.

RESULTS
Out of the 500 respondents, 81 (16.2%) were from Khaliqabad, 225 (45.0%) from Hussainabad, and 194 (38.8%) from Nawazishabad. The average age of the respondents was 35 ± 13.23 years. Further, the mean age in Khaliqabad was 37 ± 12.90, in Hussainabad, it was 34 ± 11.35, and in Nawazishabad, it was 36 ± 15.16 (Table-1).

TB Infection Rates
Approximately 3.8% of respondents were infected with TB, with variations among towns. In Khaliqabad, 3 (15.79%) respondents were infected, in Hussainabad, 10 (52.63%), and in Nawazishabad, 6 (10.53%). Conversely, 78 (16.22%) in Khaliqabad, 215 (44.70%) in Hussainabad, and 188 (39.08%) in Nawazishabad did not have Tuberculosis. Among the infected, 9 (47.37%) were aged 18–30, 8 (42.10%) were aged 30–50, and 2 (10.53%) were over 50. Of the total respondents, 208 (43.24%) uninfected individuals were between 18 and 30, 216 (44.91%) were between 30 and 50, and 57 (11.8%) were over 50.

Knowledge about TB
Regarding knowledge of TB patients' symptoms, 219 (43.8%) were aware, while 281 (56.2%) were not. Awareness varied among towns, with 42 (19.18%) in Khaliqabad, 102 (46.57%) in Hussainabad, and 75 (34.25%) in Nawazishabad being aware. However, 39 (13.88%) in Khaliqabad, 123 (43.77%) in Hussainabad, and 119 (42.35%) in Nawazishabad were not aware of the symptoms.

Perception of Severe Cough and TB
A total of 307 respondents (61.4%) considered severe cough for more than two weeks as a possible symptom of TB, while 193 (38.5%) disagreed. In Khaliqabad, 46 (14.98%) believed in it, in Hussainabad, 139 (45.28%), and in Nawazishabad, 122 (39.54%). Conversely, 39 (13.93%) in Khaliqabad, 136 (48.57%) in Hussainabad, and 105 (37.50%) in Nawazishabad did not think a severe cough for more than two weeks indicated TB.

Perceived Risk of Proximity to TB Patient
Concerning the belief that one can be easily affected by TB through proximity to a patient, 220 respondents (44.0%) agreed, while 280 disagreed. In Khaliqabad, 42 (19.10%) agreed, in Hussainabad, 89 (40.45%), and in Nawazishabad, 89 (40.45%). Conversely, 39 (13.93%) in Khaliqabad, 136 (48.57%) in Hussainabad, and 105 (37.50%) in Nawazishabad did not believe in adverse effects from being close to a TB patient.

Knowledge of Individuals with TB
Out of 500 respondents, 111 knew someone with TB, while 389 did not. In Khaliqabad, 23 (20.72%) knew someone, in Hussainabad, 50 (45.05%), and in Nawazishabad, 38 (34.23%) had family members with TB.

Behavioral Responses
Table 2 presented respondents' actions when suspecting TB and their behavior towards close relatives affected by TB. When suspecting TB, 466 (93.2%) respondents would seek medical attention, 10 (2%) would consult a traditional healer (Hakeem), 8 (1.6%) would try home-based remedies, and 16 (3.2%) would ignore it. The majority in each town would seek medical attention: Khaliqabad (93%), Hussainabad (91%), and Nawazishabad (94%).

Regarding respondent behavior toward close relatives affected by TB, 240 (48.0%) would offer sympathies, 15 (3%) would remain neutral, 190 (38.0%) would provide financial help, and 55 (11.0%) would avoid them due to fear. The majority in each town responded differently: Khaliqabad (49.38% offered sympathies), Hussainabad (44.89% helped financially), and Nawazishabad (52.06% offered sympathies).

TB Cases in Lahore
Table 3 provided an overview of TB cases in the three towns, with a total of 111 documented cases, affecting 62 males and 49 females. The distribution across towns was as follows: Khaliqabad - 11 men and 12 women, Hussainabad - 27 men and 23 women, and Nawazishabad - 24 men and 14 women.

Visual Aids
Table 4 and Graphs 1, 2, and 3 offered visual representations to enhance the understanding of the case summaries and age distribution of TB patients in each town. The comprehensive analysis elucidates the prevalence of TB, knowledge levels, and behavioral responses among residents of Khaliqabad, Hussainabad, and Nawazishabad. The findings underscore the need for targeted awareness campaigns and interventions to curb the impact of TB in these communities.

Table 1: Details of respondents infected by TB.

Characteristics	Have you been infected by TB?		Do you know about the symptoms that such patient's face?		Do you think a person having severe coughs for more than two weeks is affected by TB?		Do you think you can easily be affected by TB by coming near a TB patient?		Do you know anyone who has had or has TB?	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Khaliqabad	3 (15.79)	78 (16.22)	42 (19.18)	39 (13.88)	46 (14.98)	35 (18.13)	42 (19.10)	39 (13.93)	23 (20.72)	58 (14.91)
Hussainabad	10 (52.63)	215 (44.70)	102 (46.57)	123 (43.77)	139 (45.28)	86 (44.56)	89 (40.45)	136 (48.57)	50 (45.05)	175 (44.99)
Nawazishabad	6 (31.58)	188 (39.08)	75 (34.25)	119 (42.35)	122 (39.74)	72 (37.31)	89 (40.45)	105 (37.50)	38 (34.23)	156 (40.10)
Total	19	481	219	281	307	193	220	280	111	389
18-30 Years	9 (47.37)	208 (43.24)	89 (40.64)	128 (45.55)	139 (45.28)	78 (40.42)	92 (41.82)	125 (44.64)	44 (39.64)	153 (39.33)
30-50 Years	8 (42.10)	216 (44.91)	98 (44.75)	126 (44.84)	134 (43.65)	90 (46.63)	109 (49.54)	115 (41.07)	55 (49.55)	189 (48.59)
> 50 Years	2 (10.53)	57 (11.85)	32 (14.61)	27 (9.61)	34 (11.07)	25 (12.95)	19 (8.64)	40 (14.29)	12 (10.81)	47 (12.08)
Total	19	481	219	281	307	193	220	280	111	389

Table 2: Analysis of Respondents' Actions, Suspicions, and Behaviors in Response to Tuberculosis: Insights.

Scenario	Khaliqabad (n = 81) n (%)		Hussainabad (n = 225) n (%)		Nawazishabad (n = 194) n (%)		Total
What will you do when you suspect you have Tuberculosis?							
Seek medical attention	76	(93.83)	206	(91.56)	184	(94.84)	**466 (93.2)**
Go to Hakeem	0	(0.00)	5	(2.22)	5	(2.58)	**10 (2.0)**
Try home-based remedies	1	(1.23)	4	(1.78)	3	(1.55)	**8 (1.6)**
Ignore and live as usual	4	(4.94)	10	(4.44)	2	(1.03)	**16 (3.2)**
What will be your behaviour towards a close relative affected with Tuberculosis?							
Offer sympathies	40	(49.38)	99	(44.00)	101	(52.06)	**240 (48.0)**
Remain neutral as if nothing happened	2	(2.47)	3	(1.33)	10	(11.59)	**15 (3.0)**
Try to help them financially	31	(38.27)	101	(44.89)	58	(25.78)	**190 (38.0)**
Avoid them out of fear of being affected by it as well	8	(9.88)	22	(9.78)	25	(12.89)	**55 (11.0)**
							500

Table 3: Exploration of Tuberculosis Cases Across Lahore's Three Towns: Gender-Based Analysis of Affected Individuals.

Location * Gender Crosstabulation

Count

		Gender		
		male	female	Total
Location	Khaliqabad	11	12	23
	Husainabad	27	23	50
	Nawazishabad	24	14	38
Total		62	49	111

Case Summaries^a

Location				Age of people infected with TB	Gender
Location	Khaliqabad	1		50	female
		2		40	female
		3		30	male
		4		12	male
		5		25	female
		6		0	female
		7		32	female
		8		38	female
		9		11	female
		10		21	male
		11		65	female
		12		35	male
		13		18	male
		14		28	female
		15		60	male
		16		50	female
		17		55	male
		18		26	male
		19		19	male
		20		20	male
		21		25	male
		22		85	female
		23		35	female
	Total	N		23	23
		Mean		33.91	1.52
		Median		30.00	2.00
		Maximum		85	female
		Minimum		0	male
		Std. Deviation		19.704	.511
	Husainabad	1		10	female
		2		54	female
		3		61	female
		4		23	male
		5		2	male

6	10	male
7	25	female
8	18	male
9	34	male
10	32	male
11	72	male
12	15	female
13	50	male
14	17	female
15	23	female
16	14	female
17	30	male
18	43	female
19	84	male
20	56	female
21	65	male
22	75	female
23	80	female
24	22	male
25	80	female
26	36	male
27	34	male
28	8	male
29	25	female
30	50	female
31	45	male
32	65	female
33	16	female
34	60	male
35	30	male
36	42	male
37	30	female
38	25	female
39	50	female
40	10	female
41	16	male
42	35	female
43	46	male

	44		45	male
	45		60	female
	46		55	male
	47		75	male
	48		45	male
	49		31	male
	50		18	male
	Total	N	50	50
		Mean	38.94	1.46
		Median	34.50	1.00
		Maximum	84	female
		Minimum	2	male
		Std. Deviation	21.852	.503
Nawazishabad	1		48	male
	2		20	male
	3		16	male
	4		30	female
	5		63	male
	6		6	male
	7		60	female
	8		70	male
	9		7	female
	10		33	male
	11		30	female
	12		40	male
	13		61	male
	14		32	female
	15		72	female
	16		16	male
	17		41	female
	18		40	male
	19		32	male
	20		12	male
	21		25	female
	22		50	male
	23		8	male
	24		60	male
	25		45	male
	26		31	female
	27		55	male
	28		20	female
	29		54	female
	30		63	male
	31		70	female
	32		23	male
	33		60	male
	34		32	male
	35		42	male
	36		61	male
	37		23	female
	38		25	female
	Total	N	38	38
		Mean	38.84	1.37
		Median	36.50	1.00
		Maximum	72	female
		Minimum	6	male
		Std. Deviation	19.510	.489
Total		N	111	111
		Mean	37.86	1.44
		Median	34.00	1.00
		Maximum	85	female
		Minimum	0	male
		Std. Deviation	20.555	.499

a. Limited to first 111 cases.

Table 4: assistive visuals and case summaries.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.493[a]	2	.474
Likelihood Ratio	1.501	2	.472
N of Valid Cases	111		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.15.
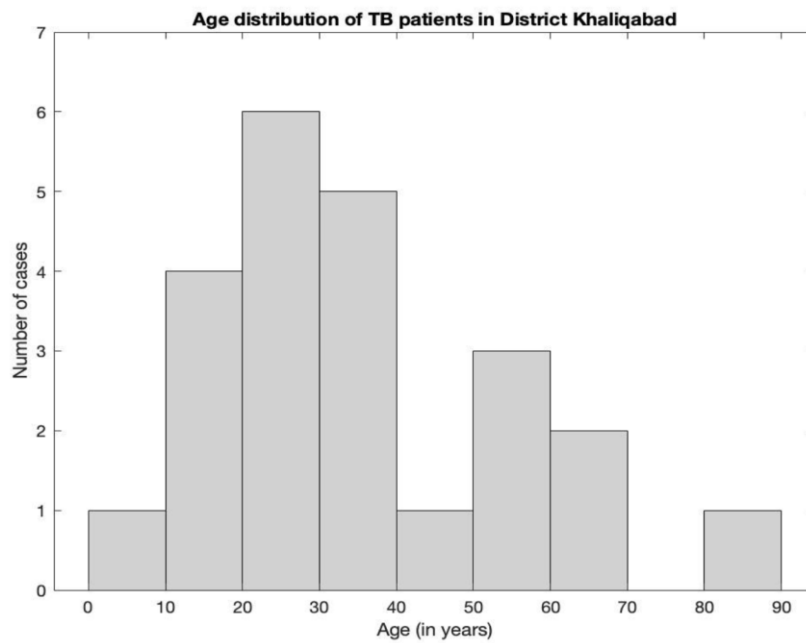

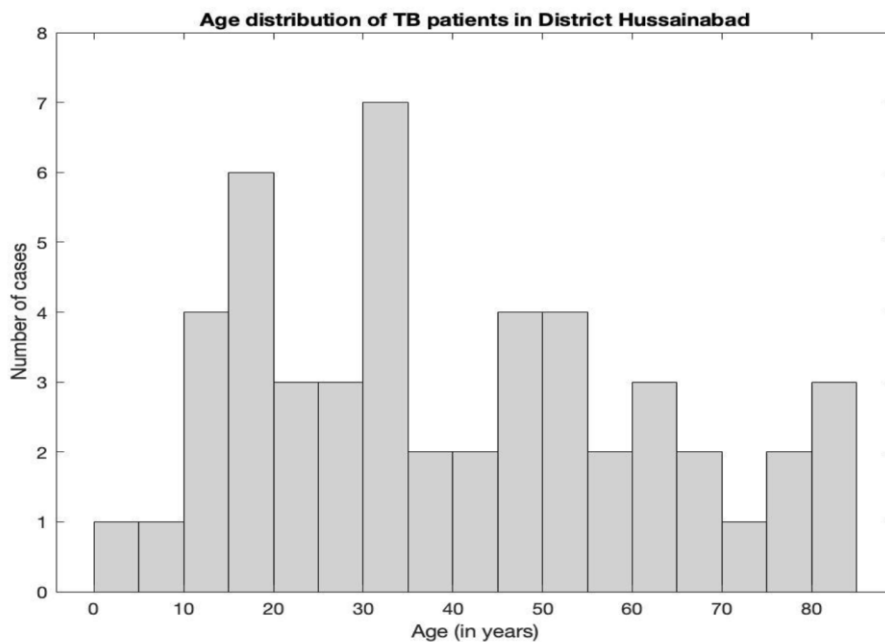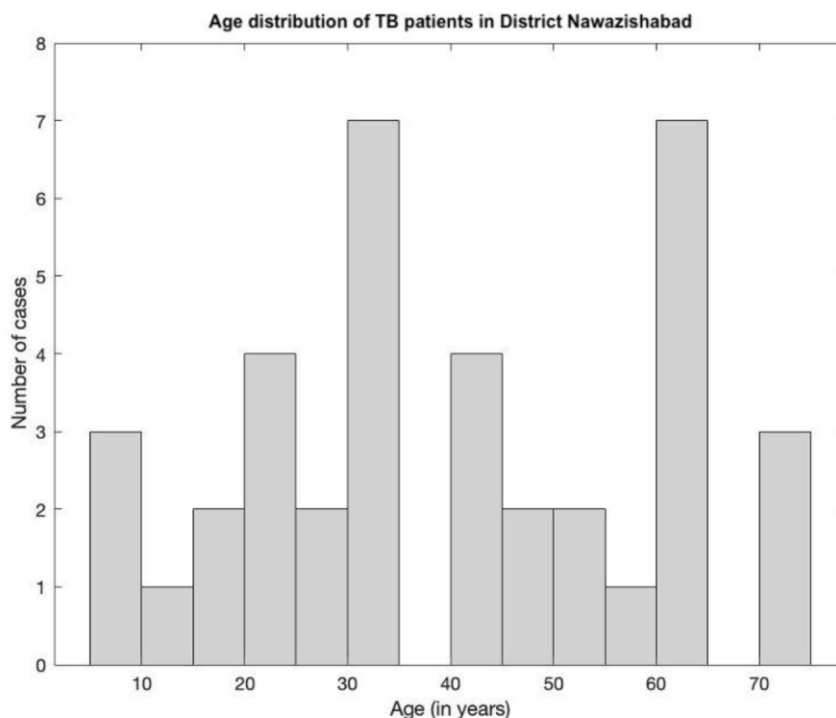**Figure 1: Age distribution of TB patients in District Khaliqabad.**

Figure 2: Age distribution of TB patients in District Hussainabad.

Figure 3: Age distribution of TB patients in District Nawazishabad.

DISCUSSION

Key findings reveal that the majority of the public in Khaliqabad, Hussainabad, and Nawazishabad were uninfected by Tuberculosis, with these towns being on the outskirts of Lahore and moderately inhabited. The survey aimed to assess whether TB prevalence in these areas correlates with the national average or is higher. A notable 43.8% of the population was aware of TB, while 56.2% remained uninformed, suggesting a lack of infrastructure and institutional development in these peripheral towns contributing to unfamiliarity with the disease. Despite this lack of awareness about TB symptoms, respondents were quick to identify coughing as a potential TB symptom. This paradox may stem from a scarcity of governmental focus, inadequate spending, and low investment in these underdeveloped areas.

Moreover, the study highlighted that, despite limited awareness, the majority of the public knew to seek medical attention if they were to contract Tuberculosis. Fewer opted for traditional remedies, demonstrating a positive trend despite decreased awareness. Importantly, the study suggests a need for increased governmental focus on these areas to bridge the knowledge gap and promote early medical intervention. Respondents displayed an empathetic attitude, with a clear majority inclined to offer sympathies and financial assistance to those with TB, challenging the notion of isolating infected individuals. Contextualizing these findings with previous research, similar barriers to delayed biomedical diagnosis of TB were found in underdeveloped towns and villages in Ethiopia. The absence of major hospitals

in the surveyed towns further underscores the challenges in accessing formal health services. Unexpectedly, only 11% of the populace was aware of the need for social distancing, emphasizing the importance of public health education. However, a significant majority was willing to provide financial assistance, aligning with studies citing limited access to finances as a barrier to TB treatment initiation.

Acknowledging limitations, the study conducted during forenoon fasting hours in Ramadan might have hastened responses. Additionally, a more diverse sample distribution across five areas could enhance the study's robustness. Future research could focus on contact tracing in affected individuals and explore the effectiveness of raising awareness through primary education in these areas. To combat TB effectively, a collective, intra-and inter-provincial response is recommended, emphasizing governmental responsibility, integration of efforts, and a sustainable road map for awareness and protection. Implementing Pakistan's National TB Infection and Control guidelines, establishing strategic diagnostic centers, and allocating financial packages for TB-infected patients are crucial steps, as emphasized in studies conducted in China.

CONCLUSION

The study underscores the need for increased awareness in underdeveloped areas to combat TB effectively. Despite positive trends in seeking medical attention, operational and administrative funding for medications remains a challenge, especially in low-middle-class

families. The implementation of TB Infection control policy and guidelines is crucial for a sustainable solution to this public health issue in Pakistan.

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