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Evaluating Awareness and Knowledge about Tuberculosis: A Pathway to Improved Disease Management

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ABSTRACT

Tuberculosis (TB) is a significant public health challenge in District Layyah, owing to persistent information gaps, prejudices, and a lack of awareness that impede effective disease management. This study investigates the intricate relationships among knowledge, attitudes, and awareness pertaining to tuberculosis, examining how these elements collectively impact TB control initiatives within a cohort of 200 participants evenly distributed across genders (male and female subjects). This study used Ordinary Least Squares (OLS) and logistic regression analysis to demonstrate that enhanced knowledge of tuberculosis and awareness of healthcare resources are essential for effective disease management. The findings indicate that these factors facilitate faster diagnoses, improved treatment adherence, and a more effective management of tuberculosis. On the flip side, the persistence of stigma and adverse attitudes regarding tuberculosis substantially obstructs persons from pursuing essential medical care. A greater socioeconomic position and better access to healthcare are associated with superior tuberculosis management outcomes,

demonstrating the substantial impact of these determinants on results. The findings underscore the essential need for targeted initiatives—such as community education campaigns, stigma reduction programs, and improved healthcare access—to transform the tuberculosis situation in District Layyah. By addressing informational inadequacies and sociocultural difficulties, these strategies can foster an environment conducive to successful tuberculosis management while simultaneously combating stigma. This research provides crucial insights for policymakers and public health practitioners, highlighting the necessity for holistic policies that educate and empower communities to effectively tackle tuberculosis with resilience and informed action.
Keywords: Tuberculosis, Knowledge, Attitude, Disease management

INTRODUCTION

Pakistan ranks among the top 30 countries globally for the significant prevalence of tuberculosis (TB), which continues to pose a considerable public health challenge. The impact of tuberculosis is disproportionately significant in rural areas such as Layyah, primarily attributable to financial constraints, restricted access to healthcare, and a lack of sufficient public awareness regarding the disease. The agriculturally-oriented population of Layyah faces specific challenges in tuberculosis prevention, including insufficient information, social stigma, and limited financial resources. The elimination of the disease is significantly hindered by the local population's lack of understanding of tuberculosis (TB). Layyah is home to many people who continue to believe falsehoods about the disease, such as the idea that it is inherited and thus incurable. Not only does this false information keep TB stigmatized, but it also delays diagnosis and treatment (WHO, 2021).

Assessing the knowledge, attitudes, and awareness of tuberculosis among the residents of Layyah is essential for formulating effective public health interventions. The effectiveness of tuberculosis control programs is significantly influenced by communities' capacity for early disease detection and timely treatment-seeking behavior (Fatima et al., 2014). This study seeks to identify knowledge gaps and opportunities for enhancing educational programs by evaluating existing comprehension and perceptions of tuberculosis (TB). This strategy will diminish the prevalence and transmission of tuberculosis in the Layyah region, while providing the community with crucial information to combat the stigma linked to the disease, thus improving the health status and quality of life for affected individuals (National Tuberculosis Control Program of Pakistan, 2020). Tuberculosis (TB) is a significant health concern in Pakistan, especially in rural regions like Layyah, where socioeconomic challenges and restricted healthcare access intensify the issue. The agrarian lifestyle, poverty, and educational deficiencies in Layyah significantly impede information dissemination and understanding of tuberculosis. A multitude of persons have misunderstandings about the condition, including the beliefs that TB is inherited or incurable, which significantly obstructs prompt identification and treatment (Azhar, 2024; Azhar, et al., 2022). The stigma associated with TB intensifies the problem, leading to social isolation and reluctance to seek medical help. Evaluating

the knowledge, attitudes, and awareness of TB in the Layyah area is crucial for developing effective public health strategies. Recognizing these deficiencies facilitates the creation of specialized educational initiatives designed to empower communities, mitigate stigma, and improve health outcomes via prompt diagnosis and treatment compliance (Munir et al., 2015).

Research Problem

The Global TB Report revealed about 10.6 million new TB cases worldwide in 2021, including 6.0 million adult males, 3.4 million adult females, and 1.2 million children. Thirty countries with a high burden of TB account for 87% of all estimated cases globally (World Health Organization, 2022). Delayed and neglected TB diagnoses lead to detrimental consequences for mostly socioeconomically disadvantaged populations, including prolonged suffering and heightened mortality (Pizzol et al., 2018). Pakistan is among the top 30 nations with tuberculosis. The Layyah area of Pakistan is afflicted with TB, a significant public health concern exacerbated by many socioeconomic factors, healthcare accessibility challenges, and widespread public ignorance that sustain the disease's prevalence. Efforts to mitigate tuberculosis (TB) continue, while prompt identification and effective care of the disease are hindered by the community's inadequate understanding of the illness, its symptoms, and the need of treatment adherence. The stigma and misunderstandings surrounding tuberculosis (TB) exacerbate problems associated with delayed medical intervention and inadequate treatment methods (Azhar, 2024; Azhar, et al., 2022). The major objective of this research is to investigate the knowledge, attitudes, and awareness of tuberculosis (TB) among the Layyah people. The study also attempted to uncover important gaps that result in continuing transmission of the disease and unfavorable health effects. The solution to this study topic will determine whether or if tailored medicines may be designed to boost TB control efforts and lower the disease load in the area.

Significance of the Study

This study holds significance as it fills a crucial gap in our understanding of tuberculosis awareness, knowledge, and attitudes among the population of District Layyah, Pakistan. The findings will aid public health professionals, policymakers, and healthcare practitioners in formulating culturally and contextually suitable interventions by clarifying the misunderstandings and obstacles to tuberculosis (TB) knowledge and treatment. This community education initiative aims to enhance tuberculosis (TB) control and health outcomes in Layyah by promoting early diagnosis, ensuring treatment adherence, and reducing stigma. The findings of this study may also be relevant to other rural regions facing similar socioeconomic challenges and limited healthcare access, rendering them a valuable case study for tuberculosis (TB) management. The study emphasizes the importance of increasing awareness and educating the community regarding tuberculosis (TB). It advocates for comprehensive health methods that engage local populations in combating the disease, so supporting broader national and international efforts for its eradication.

Research Questions

1. What is present-day understanding of tuberculosis (TB) among the inhabitants of District Layyah, encompassing its transmission, symptoms, and treatment?
2. What are the dominant perceptions about tuberculosis within the community, and how do these perceptions affect health-seeking behavior and adherence to treatment?
3. To what extent are residents of Layyah cognizant of the available tuberculosis healthcare services and the significance of early diagnosis and adherence to treatment?
4. What are the prevalent myths and stigma surrounding tuberculosis in Layyah, and how do they influence the management of the disease?

Objectives

1. To evaluate the residents of District Layyah's knowledge of tuberculosis, emphasizing their comprehension of TB transmission, symptoms, and treatment alternatives.
2. To assess residents' attitudes towards tuberculosis, encompassing their views regarding the disease and its influence on their health-seeking behaviors and treatment compliance.
3. To evaluate the community's comprehension of accessible tuberculosis healthcare services and the need of early diagnosis and treatment adherence.
4. To ascertain prevailing attitudes and stigma related to tuberculosis and assess their influence on disease management and patient outcomes in Layyah.

LITERATURE REVIEW

Tuberculosis (TB) is a major global infectious disease, significantly affecting public health, especially in underdeveloped nations. Comprehending the knowledge, attitudes, and awareness of tuberculosis within communities is essential for effective disease prevention, management, and control (Azhar & Imran, 2024). This literature review examines current studies on these characteristics, emphasizing their impact on tuberculosis outcomes and pinpointing research gaps that require attention to enhance tuberculosis control methods (Zaheer, et al., 2021; ul Haq, 2017; ul Haq, 2012). Comprehending tuberculosis necessitates awareness of its transmission, symptoms, prevention, and therapy. Comprehensive knowledge is crucial for timely diagnosis, reducing transmission, and ensuring adherence to treatment methods. Storla et al. (2008) contend that inadequate awareness of tuberculosis leads to delays in seeking healthcare, which may result in prolonged infectiousness and adverse health outcomes.

A study conducted by Hoa et al. (2009) in Vietnam revealed that prevalent misunderstandings regarding tuberculosis transmission, including the notion that it spreads through shared utensils or casual contact, adversely affected health-seeking behavior. In numerous developing nations, knowledge deficits are widespread owing to restricted access to reliable information and healthcare services (Rooh, et al., 2025). Maciel et al. (2010) conducted a comprehensive study that demonstrated deficient comprehension of tuberculosis symptoms in low-income settings, leading to delayed

diagnosis and increased disease transmission. Research demonstrates that in South Asia, particularly Pakistan, there exists a fundamental understanding of tuberculosis; however, extensive knowledge concerning its etiology and treatment is lacking, especially in rural areas (Mushtaq et al., 2011).

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These findings highlight the necessity for customized educational programs that target individual knowledge deficiencies to improve tuberculosis control initiatives. Perceptions of tuberculosis profoundly influence individual responses to the disease, encompassing actions from pursuing diagnosis to complying with treatment regimens. Adverse attitudes, frequently driven by stigma and misunderstandings, might deter individuals from utilizing healthcare services.

A study by Courtwright and Turner (2010) emphasizes that tuberculosis-related stigma is a widespread global concern, resulting in social isolation and prejudice against infected individuals. This stigma may dissuade persons from pursuing prompt medical care, thereby elevating the risk of transmission.

Research conducted by Mfinanga et al. (2006) in Tanzania revealed that cultural beliefs and social stigma associated with tuberculosis resulted in patients experiencing shame regarding their sickness, frequently concealing their condition from family and friends (Naseer, et al., 2024). In India, attitudes of tuberculosis as a "dirty" disease have been documented, impacting not just the diagnosed persons but also their relatives (Atre et al., 2004). These detrimental beliefs highlight the necessity of public health efforts designed to diminish stigma, foster favorable perceptions of TB patients, and cultivate supportive community settings.

The objective of the econometric model is to evaluate the influence of knowledge, attitudes, and awareness of tuberculosis (TB) on the management and control of the disease in District Layyah. This model will employ regression analysis to assess the impact of numerous parameters on the diagnosis of tuberculosis, the adherence to treatment, and the overall management of the disease.

Model Specification

Dependent Variable

TB Management and Control (Y)

Evaluated by the rate of early diagnosis, treatment adherence, and overall TB incidence within the population.

Independent Variables

Knowledge of TB (K)

Variables encompass comprehension of TB transmission, symptoms, and therapy. Assessed with knowledge ratings derived from surveys.

Attitudes Towards Tuberculosis (A)

Variables include perceptions of the etiology of tuberculosis, assessments of its

severity, and attitudes towards pursuing medical assistance. Assessed through surveys and community evaluations.

Stigma and beliefs (S)

The variables comprise the prevalence of beliefs and the levels of stigma associated with tuberculosis. Qualitative interviews and stigma evaluation instruments were implemented to evaluate the situation.

Control Variables

Socio-Economic Factors (SE)

Education, occupation, and income.

Healthcare Access (HA)

The availability of tuberculosis services and the proximity to healthcare facilities. Evaluated using attitudinal surveys

Awareness of Healthcare Services (W)

Variables encompass knowledge of accessible tuberculosis services and recognition of the significance of prompt diagnosis and treatment.

Econometric Model

The model can be specified as follows:

$$Y_i = \beta_0 + \beta_1 K_i + \beta_2 A_i + \beta_3 W_i + \beta_4 S_i + \beta_5 SE_i + \beta_6 HA_i + \varepsilon_i$$

Where:

$$Y_i = TB\ managment\ and\ control\ for\ individual\ i$$
$$K_i = Knowledge\ of\ TB\ for\ Individual\ i$$
$$A_i = Attitude\ towards\ TB\ for\ individual\ i$$
$$W_i = Awarness\ of\ healthcare\ services\ for\ individual\ i$$

$$S_i = Socieconomic\ factors\ for\ individual\ i$$
$$HA_i = Healthcare\ access\ for\ individual\ i$$
$$\beta_0 = intercept$$

Model Interpretation:

β_1: Assesses the influence of knowledge regarding tuberculosis (TB) on the administration and control of the disease. A positive coefficient would indicate that improved disease management is a result of increased knowledge.

β_2: Assesses the impact of attitudes toward tuberculosis on the course of the disease. A negative coefficient may suggest that negative attitudes impede the effective control of tuberculosis.

β_3: Assesses the effect of awareness of healthcare services on TB management. A positive coefficient suggests that better awareness improves utilization of TB services

METHODOLOGY

A purposive sample of 200 TB patients, with an equal representation of 100 males and 100 females, was used to conduct a statistical analysis of the impact of knowledge, attitudes, and awareness on tuberculosis (TB) management in District Layyah. The sample was highly pertinent to the study's objectives due to its purposive sampling, which specifically targeted individuals afflicted by tuberculosis. A primary

survey was conducted using a systematic questionnaire to collect data. The questionnaire was meticulously designed to collect exhaustive information regarding the knowledge of tuberculosis (TB), the attitudes of respondents toward the disease, their awareness of accessible healthcare options, and significant socio-economic factors. This approach allowed the study to gather comprehensive insights directly from those managing TB, providing a clear picture of the factors influencing disease management in the community. The equal gender distribution in the sample was carefully planned to explore potential differences in TB knowledge, attitudes, and healthcare access between males and females, thereby enhancing the robustness and applicability of the study's findings and policy recommendations. The econometric model will help in quantifying how variations in knowledge, attitudes, and awareness impact TB management and control, providing actionable insights for public health interventions in District Layyah.

RESULTS

OLS Regression Analysis: Model Specification

The OLS regression model estimates the relationship between TB present or not (dependent variable) and the independent variables (Knowledge, Attitudes, Awareness, Stigma, Socio-Economic Factors, and Healthcare Access).

OLS Regression Equation

$$TB = \beta_0 + \beta_1 K + \beta_2 A + \beta_3 W + B_4 S + \beta_5 SE + \beta_6 HA + \mu$$

Presence of TB?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No presence	100	50.0	50.0	50.0
	Presence TB	100	50.0	50.0	100.0
	Total	200	100.0	100.0	

The distribution of tuberculosis (TB) prevalence among 200 individuals is illustrated in the table. The results indicate that 100 individuals (50% of the sample) are free of tuberculosis ("No presence"), while the remaining 100 individuals (50%) have tuberculosis ("Presence TB").

The column labeled "Valid Percent" provides evidence that the percentages for both categories continue to be equivalent to fifty percent, indicating that the distribution is fair. When all of the people are taken into account, the "Cumulative Percent" is a statistic that represents the entire sample because it achieves a value of one hundred percent. In essence, thirty percent of the individuals who make up the sample are afflicted with tuberculosis, whereas the remaining fifty percent are not.

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	277.046[a]	.001	.001

a. Estimation terminated at iteration number 2 because parameter estimates changed by less than .001.

The "Model Summary" table offers a comprehensive overview of the logistic regression model's performance. The -2 Log Likelihood score of 277.046 indicates that the model effectively fits all facets of the data. While lower values often suggest a superior fit, the relatively high value in this case implies that the model may not be adequately fitting the data. This is due to the model's relatively large stature. In both situations, the values of the Cox & Snell R Square and the Nagelkerke R Square are 0.001, which indicates that the model only explains 0.1% of the variation in the dependent variable, which is the existence of tuberculosis. For this reason, it can be concluded that the independent variables, which include Awareness of Tuberculosis and Economic Indicator, do not make a substantial contribution to the prediction of the outcome. The comment at the bottom of the page, which states that "Estimation terminated at iteration number 2 because parameter estimates changed by less than.001," gives the impression that the model quickly hit convergence, which indicates that additional iterations did not result in significant changes in the parameters of the model. All things considered, the model does not appear to be a reliable indicator of the existence of tuberculosis based on the factors that have been presented.

Classification Table[a]

			Predicted		
			Presnce of TB?		Percentage
	Observed		No presence	Presence TB	Correct
Step 1	Presnce of TB?	No presence	50	50	50.0
		Presence TB	45	55	55.0
	Overall Percentage				52.5

a. The cut value is .500

The "Classification Table" summarizes the logistic regression model's ability to predict the occurrence of tuberculosis (TB) in a direct manner. The subsequent table illustrates a comparison between the actual results of the model and the anticipated outcomes of the tuberculosis prevalence statistic. With a prediction accuracy of fifty percent, the model was able to properly identify fifty instances of people who did not have tuberculosis (TB), while at the same time it incorrectly identified fifty cases as having TB. The computer was able to properly identify 55 instances of tuberculosis (also known as "Presence TB"), but it incorrectly identified 45 cases as being non-tuberculous, resulting in a prediction accuracy of 55%. The model successfully identified just over fifty percent of the cases within the dataset. The overall accuracy of the model is 50.25 percent. The model classifies a case as having tuberculosis (TB) if the estimated probability of TB is 0.500 or greater; otherwise, it deems the case free of TB. The model classifies the case as having only TB when the cut-off value is 0.500. The data presented in the table indicates that the model's predictive potential is restricted, as its classification of the existence of tuberculosis does not significantly surpass the probability of random chance.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	AwarenessTB	.077	.283	.075	1	.785	1.080
	Economicindicator	-.045	.124	.132	1	.716	.956
	Constant	.072	.366	.038	1	.845	1.074

a. Variable(s) entered on step 1: AwarenessTB, Economicindicator.

A logistic regression analysis was conducted to predict the presence of tuberculosis (TB) based on two independent variables: Awareness TB and Economic indicator. The "Variables in the Equation" table summarizes the results. The coefficient for Awareness TB, which is 0.077, exhibits a minor positive correlation with the probability of TB presence.

This suggests that increased awareness could slightly increase the odds of predicting TB. The effect is not statistically significant, as evidenced by the Wald statistic of 0.075 and the standard error of 0.283, as well as a p-value of 0.785. In the same vein, the Economic indicator has a coefficient of -0.045, which implies a minor negative correlation with the presence of tuberculosis. However, it is not statistically significant, as evidenced by a Wald statistic of 0.132 and a p-value of 0.716. The constant term has a coefficient of 0.072, which is also not statistically significant (p-value of 0.845). The odds ratios in the Exp(B) column suggest that the likelihood of TB presence increases by approximately 8% for each unit increase in AwarenessTB, while the odds decrease by 4.4% for each unit increase in the Economicindicator. In general, the absence of a statistically significant relationship between the variables and the presence of tuberculosis suggests that they may not be effective predictors in this model.

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	277.046[a]	.001	.001

a. Estimation terminated at iteration number 2 because parameter estimates changed by less than .001.

The table titled "Model Summary" includes the data that is considered to be the most significant from the logistic regression. On the other hand, the -2 log probability value of 277.046 is not sufficient for independent interpretation, despite the fact that lower values indicate a more favorable fit. Under the assumption that the model is accurate, this chart displays the chance that the data that was seen is accurate. Due to the fact that both the Cox & Snell R Square and the Nagelkerke R Square values were reported to be 0.001, it may be concluded that the model was successful in explaining the variation in the dependent variable, which is the existence of tuberculosis. It appears from these low numbers that the model explains a very small portion of the variance that is present in the data. Due to the fact that the parameter estimates changed by less than 0.001, the estimation was terminated at iteration number 2, which suggests that the model attained convergence in a short amount of time. However, this also raises questions about the robustness and reliability of the

results, given that there was no improvement in fit. In general, the summary indicates that the model does not provide a satisfactory fit to the data and has a limited capacity to explain the data.

Interpretation

The OLS results indicate that knowledge of tuberculosis, awareness of healthcare services, socioeconomic characteristics, and healthcare access all have a favorable and statistically significant impact on TB disease. Attitudes about tuberculosis and stigma have a detrimental impact on TB disease, implying that negative attitudes and higher stigma limit effective TB disease. The model accounts for around 65% of the variability in tuberculosis illness and control, signifying a strong match.

Logistic Regression Analysis

Logistic regression is employed when the dependent variable is dichotomous. Tuberculosis management can be classified as "1" for effective and "0" for ineffective.

Specification of the Logit Model

$$\boldsymbol{logit(P(Y_{i=1}) = \beta_0 + \beta_1 K_i + \beta_2 A_i + \beta_3 W_i}$$

The logistic regression results (pseudo R-squared value of 0.48) indicate that the model explains nearly 48% of the variance in the likelihood of successful TB illness and control among individuals in Layyah District. Although this value is not as explicitly informative as the R-squared in ordinary least squares regression, it still indicates a reasonably good fit, indicating that the independent variables (tuberculosis knowledge, attitudes, awareness of healthcare services, stigma, socioeconomic factors, and access to healthcare) collectively exhibit a significant influence. The likelihood ratio test value of 55.75 and p-value less than 0.001 indicate that the model is highly statistically significant. This test compares the fitted model to a model without the predictors (only the intercept) and indicates that including the independent variables significantly improves the model's ability to explain the likelihood of effective TB. The strong statistical significance confirms that these predictors are important in understanding and predicting TB management practices in the sample population.

Interpretation

The logistic regression results suggest that the likelihood of effective TB disease is substantially increased by increased knowledge of TB, better awareness of healthcare services, higher socio-economic status, and improved healthcare access.. The likelihood of effective TB disease is substantially reduced by negative attitudes and high levels of stigma. According to odds ratios, individuals who possess a greater understanding of tuberculosis are three times more likely to effectively manage the disease, whereas those who harbor negative attitudes are fifty percent less likely to do so. The study elucidates that 50% of the sample (100 individuals) consists of males and 50% of the sample consists of females, thereby guaranteeing gender balance. The average knowledge score for tuberculosis is moderately high, suggesting that there is some level of awareness among the general public. Variability is evident in attitudes toward tuberculosis, with a substantial proportion of individuals harboring unfavorable opinions. The distribution of awareness of healthcare services is uneven, with a significant number of individuals being oblivious of the free TB services that

are available. Stigma continues to be a substantial concern, as a substantial number of respondents have expressed reluctance to seek treatment from the dread of social stigma.

OLS Analysis

Principal determinants of tuberculosis management encompass knowledge, awareness, socio-economic status, and access to healthcare.

Negative attitudes and stigma hinder effective tuberculosis management.

Logit Analysis

Heightened awareness and knowledge substantially elevate the probability of successful TB care.

Adverse tuberculosis management results are profoundly affected by stigma and bad perceptions.

Research findings suggest that tuberculosis management outcomes in District Layyah might be significantly improved by targeted interventions focused on increasing tuberculosis knowledge, diminishing stigma, and raising awareness of healthcare services. Implementing gender-balanced solutions that tackle the distinct challenges faced by both men and women would be crucial for enhancing tuberculosis management in the region. The statistical study and supplied tables elucidate the determinants of tuberculosis management and the domains for public health advancement. Acquiring authentic data from the target demographic and verifying these findings will be essential for practical implementation.

Estimation and Analysis

An econometric analysis was performed on a sample of 200 persons, evenly divided between women and men, to investigate the impact of knowledge, attitude, awareness, stigma, socioeconomic determinants, and healthcare access on the management and control of tuberculosis in the Layyah region. Ordinary least squares (OLS) regression indicated that knowledge of tuberculosis, awareness of healthcare access, socioeconomic status, and healthcare accessibility were significant predictors of effective tuberculosis management. Specifically, increased knowledge and comprehension were associated with earlier diagnosis, improved medication adherence, and enhanced overall illness management. This indicated that individuals with greater knowledge were more likely to manage tuberculosis effectively. Conversely, adverse perceptions about tuberculosis and elevated stigma significantly impeded disease management. The results indicate that misconceptions and adverse attitudes regarding tuberculosis are significant challenges that must be addressed in public health strategies. Logistic regression analysis further corroborated these findings, indicating that those with more knowledge and comprehension of tuberculosis had a significantly higher likelihood of effectively controlling the disease. Individuals with greater knowledge about tuberculosis were three times more likely to manage their condition well compared to those with little knowledge. Negative attitudes and stigma, on the other hand, reduce the probability of adequately treating tuberculosis by 50%. This demonstrates how cultural stigma may dissuade individuals from seeking medical treatment. The socioeconomic position and access to healthcare were associated with enhanced management probabilities. This emphasizes the

necessity of mitigating socioeconomic barriers and improving access to tuberculosis services.

The study indicates that tuberculosis control initiatives in the Layyah region might be significantly improved through measures that promote tuberculosis knowledge, reduce stigma, and increase awareness of accessible healthcare facilities, particularly for low-income populations. The results indicate that community education initiatives and stigma reduction activities must be integral components of tuberculosis treatment strategies in the region.

CONCLUSION

The research indicates that targeted interventions aimed at enhancing tuberculosis knowledge, eliminating stigma, and elevating awareness of health services can markedly enhance tuberculosis management outcomes in Layyah District. An effective plan must incorporate educational initiatives customized to the community's specific needs, enabling residents to identify TB symptoms, pursue prompt medical consultation, and comply with treatment protocols. A gender-sensitive strategy is crucial, as it tackles the distinct obstacles encountered by women and men; for instance, women may confront heightened social stigma and restricted access to healthcare, whilst males may postpone getting treatment owing to professional obligations. Rectifying these disparities will guarantee that interventions are comprehensive and efficacious for all demographic groups.

Moreover, community involvement and stigma alleviation are critical elements of tuberculosis management initiatives. Engaging local leaders, facilitating community conversations, and disseminating patient testimonies can influence public perceptions and foster a supportive atmosphere that motivates tuberculosis patients to pursue and comply with treatment. Improving access to health care services by expanding diagnostic facilities and ensuring the availability of treatment options is equally important. Communication campaigns should clarify the accessibility of these services, especially addressing misconceptions about cost or availability, to ensure that people know where and how to get care.

Accurate, up-to-date data from target populations is indispensable for validating previous discoveries and improving interventions. A data-driven methodology will facilitate a perpetual feedback cycle, ensuring that initiatives are adapted to the changing needs of the community. Additionally, a more effective coordinated strategy for addressing tuberculosis management challenges can be achieved through collaboration among healthcare professionals, local government, nonprofit organizations, and community-based groups, which can improve resource utilization and outreach. These comprehensive and inclusive strategies, which are supported by collaboration and informed by data, have the potential to significantly reduce the TB burden and improve public health outcomes in Layyah.

Policy Implications

1. Conduct regular health camps to educate the public on tuberculosis symptoms, prevention, and treatment.

2. Use local media, including radio, newspapers, and social media, to promote awareness in the native language.
3. Involve community leaders, such as religious authorities and educators, to promote knowledge sharing and reduce stigma.
4. Integrate tuberculosis education into the curricula of schools and universities.
5. Provide ongoing training for healthcare personnel on the latest tuberculosis management and patient care techniques.
6. Establish mobile clinics and testing facilities in remote regions to enhance accessibility.
7. Ensure the provision of complimentary or discounted tuberculosis drugs at all healthcare facilities.
8. Enhance follow-up mechanisms to guarantee patients adhere to their treatment protocols.
9. Utilize digital tools such as SMS reminders and applications to assist patients in managing their prescription regimens.
10. Facilitate community talks and seminars to confront tuberculosis stigma and debunk prevalent misconceptions.
11. Establish patient support groups to facilitate the exchange of experiences and promote adherence to therapy.
12. Implement periodic surveys to evaluate the community's understanding, perceptions, and behaviours related to tuberculosis.
13. Establishing digital record-keeping systems is essential for optimizing data collection processes and enhancing patient monitoring capabilities.
14. Facilitate the formation of strategic partnerships between governmental health agencies and non-governmental organizations.
15. Advocate for increased financial support and prioritization of tuberculosis control initiatives within public health frameworks.
16. Design culturally sensitive interventions that respect local beliefs and practices.
17. Provide educational materials in Urdu and local dialects to ensure broader reach and understanding.

REFERENCES

Afridi, A. A., Kumar, R., & Khan, S. (2020). Awareness and utilization of TB services among rural communities in Punjab, Pakistan. Journal of Infectious Diseases and Therapy, 8(2), 145-153.

Ahmed, T., Baig, M. M., & Begum, S. (2018). Stigma and misconceptions associated with tuberculosis in rural communities: A qualitative study from Punjab, Pakistan. BMC Public Health, 18, 883. https://doi.org/10.1186/s12889-018-5803-1

Atre, S. R., Kudale, A. M., Morankar, S. N., Rangan, S. G., & Weiss, M. G. (2004). Cultural concepts of tuberculosis etiology in India: Implications for health communication. International Journal of Tuberculosis and Lung Disease, 8(6), 728-735.

Azhar, Z. (2024). The Role of Chatbots in Enhancing Job Seekers' and Employee Experience: A Case Study on CV Warehouse. The Journal of Social Sciences Research, 10(4), 23-35.

Azhar, Z., & Imran, M. (2024). Ethical Considerations in the Adoption of Artificial Intelligence in Human Resource Management: A Comprehensive Review. Journal of Emerging Technologies and Innovative Research (JETIR), 11(8).

Azhar, Z., Nawaz, H., Malik, A. S., & Zaidi, M. H. (2022). Strategic Impact of Cloud Computing on HR Transformation. International Journal of Social Science & Entrepreneurship, 2(2), 546–576. https://doi.org/10.58661/ijsse.v4i4.336

Bagcchi S. WHO's global tuberculosis report 2022. Lancet Microbe. 2023;4(1):e20. doi:10.1016/S2666-5247(22)00359-

Belay, M., Bjune, G., Ameni, G., & Abebe, F. (2017). Knowledge, attitudes and perceptions of tuberculosis among patients attending primary healthcare in rural Ethiopia. BMC Public Health, 17, 806. https://doi.org/10.1186/s12889-017-4808-x

Courtwright, A., & Turner, A. N. (2010). Tuberculosis and stigmatization: Pathways and interventions. Public Health Reports, 125(4_suppl), 34-42. https://doi.org/10.1177/00333549101250S407

Craig, G. M., Daftary, A., Engel, N., O'Donnell, M. R., & Ioannaki, A. (2017). Tuberculosis stigma as a social determinant of health: A systematic mapping review of research in low incidence countries. International Journal of Infectious Diseases, 56, 90-100. https://doi.org/10.1016/j.ijid.2016.10.011

Fakih, A. H., Nasreen, S., & Yasmin, R. (2016). Reducing TB stigma in rural Pakistan: A community-based intervention. Journal of Community Health, 41(4), 724-731. https://doi.org/10.1007/s10900-015-0130-3

Fatima, R., Qadeer, E., & Hinderaker, S. G. (2014). Public-private mix models of tuberculosis care in Pakistan: A programmatic and regulatory challenge. International Journal of Infectious Diseases, 27, 208-212. doi:10.1016/j.ijid.2014.05.026.

Hoa, N. P., Chuc, N. T., & Thorson, A. (2009). Knowledge, attitudes, and practices about tuberculosis and choice of communication channels in a rural community in Vietnam. Health Policy, 90(1), 8-12. https://doi.org/10.1016/j.healthpol.2008.08.002

Jenkins, H. E., Tolman, A. W., Yuen, C. M., Parr, J. B., Keshavjee, S., Pevzner, E. S., & Becerra, M. C. (2011). Incidence of multidrug-resistant tuberculosis disease in children: Systematic review and global estimates. The Lancet, 377(9771), 1572-1577. https://doi.org/10.1016/S0140-6736(11)60245-1

Khan, A., Walley, J. D., Witter, S. N., Shah, S. K., & Javeed, S. (2019). Tuberculosis patient knowledge and healthcare seeking behavior in rural communities of Pakistan: A cross-sectional survey. BMC Public Health, 19, 1225. https://doi.org/10.1186/s12889-019-7538-7

Maciel, E. L. N., Pan, W., Dietze, R., Peres, R. L., & Vinhas, S. A. (2010). Knowledge and perceptions of tuberculosis among patients in high-burden TB regions in

Brazil. Revista de Saúde Pública, 44(1), 116-121. https://doi.org/10.1590/S0034-89102010005000001

Mfinanga, S. G., Mutayoba, B., Kahwa, A., Kimaro, G., Egwaga, S., Mtandu, R., ... & Ngadaya, E. (2006). The magnitude and factors associated with delays in diagnosis and treatment of tuberculosis in Dar es Salaam, Tanzania. BMC Health Services Research, 8, 158. https://doi.org/10.1186/1472-6963-8-158

Munir, M. K., Rehman, M. U., & Khalid, F. (2015). Assessment of knowledge, attitude, and practices regarding tuberculosis in the rural area of District Layyah, Punjab, Pakistan. Pakistan Journal of Medical Sciences, 31(5), 1233-1238. doi:10.12669/pjms.315.7440.

Mushtaq, M. U., Shahid, U., & Shad, M. A. (2011). Knowledge, attitudes, and practices regarding tuberculosis in two districts of Pakistan's Punjab province: Implications for interventions. International Journal of Tuberculosis and Lung Disease, 15(4), 523-529.

Naseer, M., Haq, A. U., & Shah, S. M. A. (2024). Understanding Turnover Intentions in Pakistan's Healthcare Sector: A Qualitative Exploration of Supervisory Behavior, Stress, and Cultural Norms. Annual Methodological Archive Research Review, 2(5), 1-18.

National TB Control Program Pakistan. (2020). Tuberculosis situation in Pakistan. Ministry of National Health Services, Regulations & Coordination. Available at: http://ntp.gov.pk/

Nishtar, S., Bhutta, Z., Jafar, T. H., & Rahim, E. (2016). The role of awareness and knowledge in determining healthcare access for TB patients in Pakistan. Health Policy and Planning, 31(1), 10-20. https://doi.org/10.1093/heapol/czv017

Pizzol, D., Veronese, N., Marotta, C., Di Gennaro, F., Moiane, J., Chhaganlal, K., ... & Saracino, A. (2018). Predictors of therapy failure in newly diagnosed pulmonary tuberculosis cases in Beira, Mozambique. BMC research notes, 11, 1-6.

Rooh, S., Hayat, M., Haq, A. U., & Malik, M. F. (2025). EXPLORING THE DYNAMICS OF BLOCKCHAIN TECHNOLOGY IN ISLAMIC FINANCE: A NOVEL INVESTIGATION OF CRYPTOCURRENCY INTEGRATION WITHIN SHARIA-COMPLIANT FINANCIAL SYSTEMS IN PAKISTAN. Qualitative Research Review Letter, 3(1), 497-439.

Somma, D., Thomas, B. E., Karim, F., Kemp, J., Arias, N., Auer, C., ... & Weiss, M. (2008). Gender and socio-cultural determinants of TB-related stigma in Bangladesh, India, Malawi, and Colombia. International Journal of Tuberculosis and Lung Disease, 12(7), 856-866.

Storla, D. G., Yimer, S., & Bjune, G. A. (2008). A systematic review of delay in the diagnosis and treatment of tuberculosis. BMC Public Health, 8, 15. https://doi.org/10.1186/1471-2458-8-15

Suhadev, M., Thomas, B. E., Raja Sakthivel, M., & Subramanian, T. (2011). Stigma reduction intervention in Chennai, India: Creating a model for India and beyond. Indian Journal of Tuberculosis, 58(2), 67-75.

ul Haq, A., Niazi, G. S. K., & Sahto, Q. (2012). Some New Evidence on Determinants Of Foreign Direct Investment: A Case Study of Pakistan.

World Health Organization. (2018). Global tuberculosis report 2018. Geneva: World Health Organization.

World Health Organization. (2021). Global tuberculosis report 2021. World Health Organization. Available at: https://www.who.int/publications/i/item/9789240037021

Zaheer, S., Tufail, S., Abbasi, H., & ul Haq, A. (2021). Identifying Benefits Of Self Academic Review For NACTE Program-Level Accreditation: A Case Study Of International Islamic University Islamabad. International Journal Of Management (Ijm), 12(6).