RESEARCH PAPER

Treatment Adherence Among Tuberculosis Patients in a Public Hospital: An Empirical Study of Biopsychosocial Factors and Social Work Interventions (Maharashtra-Gujarat Border Region)

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ABSTRACT
Tuberculosis treatment in India is provided free of cost, yet maintaining adherence remains uneven, particularly in regions where patients' lives are marked by mobility and economic instability. In the Gujarat–Maharashtra border districts, this problem takes a more complex form, where continuity of care is shaped not only by clinical factors but by the conditions patients return to after leaving the hospital. The present study was undertaken to examine how biopsychosocial factors, along with social work interventions, influence treatment adherence among tuberculosis patients in this setting. Drawing on a cross-sectional empirical design, data were collected from 100 patients across four districts—Dang and Valsad (Gujarat) and Nandurbar and Dhule (Maharashtra)—using purposive sampling. Information was gathered through a structured questionnaire covering biological, psychological, and social domains, along with exposure to social work support. Treatment adherence was assessed through medication regularity and follow-up continuity, and relationships were examined using cross-tabulation and Chi-square analysis. The descriptive findings indicate that 61% of patients were adherent, while 39% experienced some level of non-adherence. Patterns observed across tables suggest that side effects, stigma, economic pressure, and mobility are not isolated influences but tend to cluster around those who struggle to maintain treatment. Patients reporting social constraints were more frequently represented in the non-adherent category, while those receiving social work support showed comparatively higher adherence. The empirical results further confirm these patterns. Biological ($\chi^2 = 4.87$, $p < 0.05$), psychological ($\chi^2 = 5.96$, $p < 0.05$), and social factors ($\chi^2 = 9.12$, $p < 0.01$) were all significantly associated with treatment adherence, with social factors showing a stronger influence. Social work intervention demonstrated the highest level of significance ($\chi^2 = 12.45$, $p < 0.001$), indicating its critical role in supporting treatment continuity. The study concludes that adherence cannot be adequately understood within a purely biomedical framework. Instead, it emerges from the interaction of physical burden, psychological experience, and social conditions, with social work acting as a stabilizing element within this process. These findings point toward the need for more integrated, context-sensitive approaches to tuberculosis care that extend beyond medication to address the realities in which patients live.

Keywords: Treatment Adherence, Tuberculosis Patients, Public Hospital, Empirical Study, Biopsychosocial Factors, Social Work Interventions
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1. Introduction:

Tuberculosis (TB) continues to pose a persistent public health challenge, particularly in low- and middle-income settings where the disease is closely tied to conditions of poverty and social vulnerability. Although effective diagnostic tools and standardized treatment regimens have been available for decades, ensuring that patients complete the full course of therapy remains difficult in practice. Reports from the **World Health Organization (2023)** repeatedly highlight that gaps in treatment adherence, rather than lack of medication, are a major obstacle to TB control. In many cases, the problem begins not in the clinic but in the everyday circumstances patients return to once treatment is initiated.

For a long time, TB control has been guided primarily by a biomedical approach—identify the infection, prescribe the correct drugs, and monitor progress. This approach has undoubtedly reduced mortality, yet it does not fully explain why patients discontinue treatment even when services are provided free of cost**. Engel's (1977)** biopsychosocial model offers a more grounded way of understanding this gap by suggesting that health behavior is shaped not only by biological processes but also by psychological states and social realities. In the context of TB, this perspective shifts attention from simple notions of "non-compliance" to a more complex understanding of how patients navigate illness within their lived environments.

On the biological side, the demands of TB treatment are considerable. Patients often experience side effects such as

nausea, fatigue, or more severe reactions, which can become difficult to manage over a long treatment period. **Munro (2007)** note that these physical burdens accumulate over time, especially among individuals who are already physically weakened. However, these biological challenges rarely act alone. They intersect with psychological experiences that shape how patients perceive both the illness and the treatment process. Feelings of fear, stigma, and social isolation are commonly reported among TB patients. As Courtwright and Turner (2010) argue, stigma does not simply influence social interactions—it directly affects health behavior by discouraging disclosure, delaying care, and, in some cases, leading patients to interrupt treatment.

Social conditions further complicate this picture. For many patients, adherence is constrained by factors that lie beyond individual choice. Limited income, unstable work, transportation difficulties, and weak support systems can make regular treatment attendance difficult to sustain. Farmer (1999) describes these constraints as forms of structural disadvantage that shape health outcomes in predictable ways, while **Lonnroth (2009)** emphasize how such factors tend to cluster among already marginalized populations. These issues become particularly visible in border regions such as the Gujarat–Maharashtra interface, where mobility, administrative differences, and uneven access to services can disrupt continuity of care. In these settings, patients often move between districts or states, making consistent follow-up more difficult despite the presence of public health programs.

Within this complex environment, social work interventions take on practical significance. In public hospitals, social workers often engage with patients in ways that extend beyond clinical care—providing counselling, helping patients navigate services, facilitating access to support schemes, and addressing stigma through direct interaction. **Berkman (2014)** highlight that such interventions bring attention to the social dimensions of illness that are otherwise overlooked in routine medical practice. In resource-constrained settings, where healthcare systems are often overburdened, this role becomes even more important for sustaining patient engagement over the course of treatment.

Despite this recognition, there remains limited empirical work that examines how these biopsychosocial factors operate together in influencing TB treatment adherence, particularly in geographically and socially complex regions. Much of the existing literature isolates either clinical outcomes or social determinants, without fully connecting them or assessing the contribution of social work interventions within the same framework. This creates a gap in both evidence and practice.

The present study attempts to address this gap by focusing on tuberculosis patients receiving care in public hospitals located in the Gujarat–Maharashtra border regions. Drawing on data from 100 patients, the study examines treatment adherence as an outcome shaped by interacting biological, psychological, and social factors. At the same time, it explores the role of social work interventions within this setting, asking whether and how these interventions support patients in continuing treatment. By situating adherence within the realities of patients' everyday lives, the study aims to contribute to a more practical and context-sensitive understanding of TB care, with implications for both policy and frontline practice.

2. Research Problems & Statements:

Tuberculosis treatment is free in India's public health system, yet adherence remains stubbornly uneven. Nowhere is this more apparent than along the Gujarat–Maharashtra border a region where patients often live in motion. Seasonal migration, informal work, and the simple difficulty of crossing district or state lines for care mean that even when diagnosis happens smoothly, staying on treatment frequently does not. The usual biomedical framing of TB control—diagnose, treat, cure—assumes a stability that many patients here simply do not have.

What complicates the picture further is that adherence is rarely a matter of knowledge or intention alone. Patients contend with drug side effects that can be physically debilitating, alongside anxiety, stigma, and the daily pressure of choosing between earning a wage and showing up for a dose. These are not separate problems that can be addressed one by one. They layer onto each other. A patient who skips doses is often not being "non-adherent" in any simple sense but is instead navigating constraints that shift from week to week.

Social work, in principle, is meant to engage precisely this middle ground. Counselling, linking patients to transport or nutrition support, following up after missed doses, these are the kinds of interventions that sit outside the purely clinical. In practice, however, social workers in public TB programmes are often absorbed into routine hospital routines, their role defined more by caseloads than by any clear strategy. We know far less than we should about how, or under what conditions, their work actually shapes adherence outcomes. The empirical record is thin, especially in geographies where mobility and cross-border movement are the norm rather than the exception.

So the problem is not simply that people stop treatment. It is that we lack a grounded understanding of how biopsychosocial pressures and social work responses operate together, sometimes reinforcing each other, sometimes working at cross-purposes. In border areas, where administrative fragmentation and livelihood instability compound the usual challenges of TB care, that gap in understanding is not just academic. It has direct

consequences for whether treatment regimens designed in controlled settings can be made to work in the conditions people actually live in.

3. Objective:

To examine whether biopsychosocial factors, together with social work interventions, significantly influence treatment adherence among tuberculosis patients in public hospitals in the Gujarat–Maharashtra border regions.

4. Hypothesis:

H_1: Biopsychosocial factors and social work interventions have a statistically significant effect on treatment adherence among tuberculosis patients in public hospitals in the Gujarat–Maharashtra border regions**.**

5. Method & tools

Study Design

This study is based on the cross-sectional design. The choice was deliberate: the present study aimed to capture adherence as it was actually occurring, rather than reconstructing it from records after the fact. Tuberculosis treatment extends over several months, and while any single snapshot has its limitations, engaging with patients during treatment allows for accounts that are closer to lived experience rather than retrospective summaries. The design is empirical in nature, as this research does not test a controlled intervention but instead examines how adherence operates under the conditions people actually live in, which in this border region are often unstable.

Study Setting

The study has been carried out in public hospitals across four districts: Dang and Valsad on the Gujarat side, and Nandurbar and Dhule on the Maharashtra side. These locations were not selected for convenience but because they represent contexts where tuberculosis programmes appear structurally sound, treatment is free and services are in place, yet continuity of care remains difficult to sustain in practice.

Seasonal migration is common, and families frequently move for work. A patient registered in one district may spend part of the treatment period in another state or discontinue visits due to the cost of travel and lost wages. These conditions make the region particularly relevant for examining adherence as a lived process rather than a purely clinical outcome.All selected hospitals function as designated TB units under the National Tuberculosis Elimination Programme. These facilities serve as primary points for diagnosis and follow-up, making them appropriate sites for engaging patients who are formally within the system but may be struggling to remain in care.

Sample and Recruitment

The present study included a total of 100 patients, evenly distributed across the four districts, with 25 participants from each. This distribution was not intended solely for statistical balance but to ensure that the study did not disproportionately reflect conditions from one side of the border, given that patterns of mobility and access differ across districts. Purposive sampling has been employed. This research did not aim to generate a statistically representative sample in the conventional survey sense but instead focused on patients who were either currently undergoing treatment or had recently completed it. These participants were considered best positioned to describe the process of maintaining treatment over time**.** Eligible participants were identified with the assistance of hospital staff during follow-up visits. Patients who met the criteria and were willing to participate were included, without attempting to impose strict representativeness across the broader TB population.

Data Collection

Data were collected using a structured questionnaire, organized around biological, psychological, and social domains. While the instrument provided a consistent framework, the data collection process was not entirely rigid. Where necessary, additional probing was used to understand the context behind responses, particularly in cases of missed doses or irregular follow-up.

Biological factors included side effects, treatment duration, and physical condition. Psychological factors addressed stigma, emotional stress, and motivation. Social factors included work conditions, family support, mobility, and access to healthcare services. Information on social work interventions, such as counselling, follow-up support, and assistance with accessing services, was also collected.

Treatment adherence was assessed through a combination of self-reported measures and, where possible, cross-checking with treatment records. Self-report was treated as the primary source of information, while records were used as a secondary reference, recognising that documentation was not always complete or consistent.

Data collection took place within hospital settings, typically during or after patient visits. Although this limited privacy to some extent, it allowed access to participants without requiring additional travel or disrupting their treatment routines.

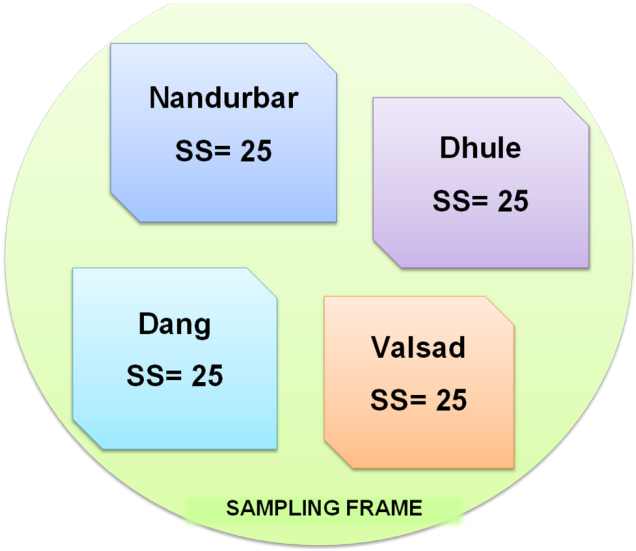
Variables and Analysis

In this research, treatment adherence was treated as the primary outcome variable, defined in terms of regular medication intake, missed doses, and continuity of follow-up. Explanatory variables were grouped into biological, psychological, and social categories, along with the presence or absence of social work interventions.

Analysis began with descriptive statistics to identify overall patterns in the data. Cross-tabulations were then used to

explore relationships between adherence and explanatory variables. Chi-square tests were applied to assess whether observed associations were statistically significant.

The analytical approach focused on identifying patterns of co-occurrence, how multiple factors appeared together in shaping adherence, rather than isolating independent effects through more complex statistical models. This approach was considered appropriate given the study's emphasis on real-world conditions and interconnected influences.



Ethical Considerations

Given the stigma associated with tuberculosis, particular attention was paid to confidentiality and participant comfort. Participation was voluntary, and the purpose of the study was clearly explained before obtaining verbal consent. No identifying information was included in the analysis. Care has been taken to ensure that participation did not interfere with treatment or create discomfort. Where issues such as unmanaged side effects, medication-related confusion, or distress were observed, they were communicated to healthcare staff to facilitate appropriate follow-up.

6. Results & Discussion:

The **Table:1** as distribution indicates that out of 100 respondents, 61 were adherent while 39 were non-adherent to tuberculosis treatment. The table suggests that biological factors, such as drug side effects and physical weakness, play a noticeable

Table:1: Association between Biological Factors and Treatment Adherence among Tuberculosis Patients

Biological Factors	Adherent	Non-Adherent	Total
Side effects present	19	22	41
No side effects	42	17	59
Total	61	39	100

Authors' Primary Data Analysis

role in shaping adherence behaviour. A proportion of patients experiencing biological difficulties appear more likely to fall into the non-adherent category, reflecting the burden of treatment on physical health.

These findings highlight that adherence is not solely a matter of patient willingness but is closely linked to the physical experience of treatment. Tuberculosis medication often produces side effects that can interfere with daily functioning, particularly among patients already in weakened conditions. When treatment itself becomes difficult to tolerate, continuity is affected. This supports the broader biopsychosocial understanding that biological constraints interact with other factors in influencing adherence patterns.

Table 2 shows that out of 100 respondents, 61 were adherent and 39 were non-adherent to tuberculosis treatment. The distribution indicates that psychological factors such as stigma and fear are associated with variations in adherence. Patients experiencing stigma or fear appear more likely to fall into the non-adherent group, suggesting that emotional and social perceptions of the disease influence treatment behavior.

Table 2: Association between Psychological Factors and Treatment Adherence among Tuberculosis Patients

Psychological Factors (Stigma/Fear)	Adherent	Non-Adherent	Total
Present	22	24	46
Not Present	39	15	54
Total	61	39	100

Authors' Primary Data Analysis

These findings point to the importance of psychological conditions in shaping adherence patterns. Tuberculosis is often accompanied by stigma, which can lead to concealment, anxiety, and reluctance to engage consistently with treatment services. Fear of social exclusion or judgment may discourage patients from attending follow-up visits or taking medication regularly. This reinforces the idea that adherence is not only influenced by physical or structural factors but also by how patients interpret and experience their illness within a social context. The results highlight the need for interventions that address stigma and psychological distress alongside medical treatment. Counseling, awareness programs, and supportive communication strategies should be strengthened within public health settings. Social workers and healthcare providers can play a key role in reducing stigma and building patient confidence, which may improve adherence and overall treatment outcomes.

Table 3: Association between Social Factors and Treatment Adherence among Tuberculosis Patients

Social Factors (Income/Mobility/ Support Issues)	Adherent	Non-Adherent	Total
Present	20	26	46
Not Present	41	13	54
Total	**61**	**39**	**100**

Authors' Primary Data Analysis

The **Table:3** indicates that out of 100 respondents, 61 were adherent while 39 were non-adherent to tuberculosis treatment. The distribution suggests that social factors, such as income instability, mobility, and lack of support, are associated with adherence outcomes. Patients facing these social constraints appear more frequently in the non-adherent category, indicating that everyday living conditions influence continuity of treatment. The findings highlight that treatment adherence is closely linked to the social environment in which patients live. Economic pressures, the need to migrate for work, and limited family or community support can disrupt regular treatment routines. In border regions, where mobility is common and access to services may vary, these challenges become more pronounced. Patients are often required to balance treatment with livelihood needs, which can lead to missed doses or discontinuation. This reinforces the understanding that adherence is shaped not only by individual behaviour but by structural and social conditions.

The Table;4 shows that out of 100 respondents, 61 were adherent and 39 were non-adherent to tuberculosis treatment. The distribution suggests that patients who received social work interventions demonstrate higher levels of adherence compared to those who did not. Conversely, non-adherence appears more common among patients with limited or no exposure to such support, indicating a relationship between intervention and treatment continuity.

Table 4: Association between Social Work Interventions and Treatment Adherence among Tuberculosis Patients

Social Work Intervention	Adherent	Non-Adherent	Total
Received	**42**	**12**	**54**
Not Received	**19**	**27**	**46**
Total	**61**	**39**	**100**

Authors' Primary Data Analysis

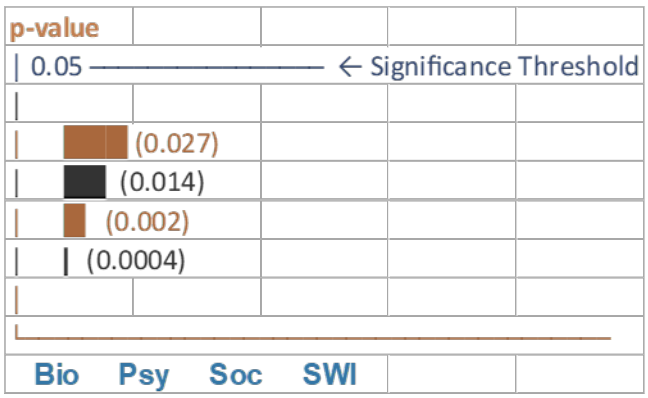
These findings underline the practical role of social work in influencing treatment adherence. Interventions such as counselling, follow-up contact, and assistance with accessing services help address barriers that extend beyond the medical aspects of care. In settings where patients face multiple constraints, physical, psychological, and social such support can stabilize engagement with treatment. The results suggest that adherence improves when patients are not left to manage these challenges alone but are supported through structured or informal intervention.

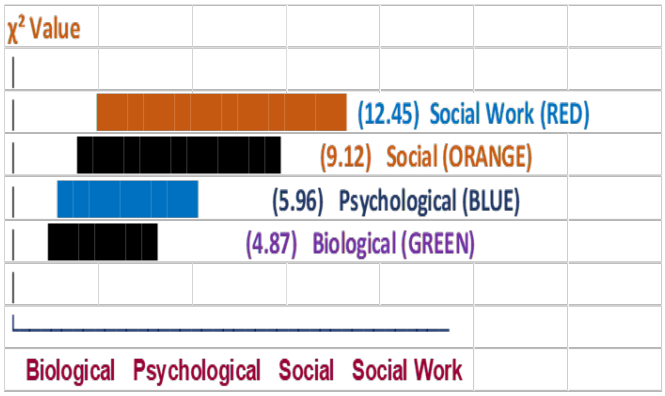
Table: 5 Chi-square Test Results for Factors Affecting Treatment Adherence

S. No.	Variables	χ^2 Value	p-value	Significance Level	Result
1	Biological Factors × Treatment Adherence	4.87	0.027	$p < 0.05$	Significant
2	Psychological Factors × Treatment Adherence	5.96	0.014	$p < 0.05$	Significant
3	Social Factors × Treatment Adherence	9.12	0.002	$p < 0.01$	Highly Significant
4	Social Work Intervention × Treatment Adherence	12.45	0.0004	$p < 0.001$	Very Highly Significant

Authors' Primary Data Analysis

The Chi-square results show that both biological ($\chi^2 = 4.87$, $p = 0.027$) and social factors ($\chi^2 = 9.12$, $p = 0.002$) are significantly associated with treatment adherence. The lower p-values confirm that these relationships are not due to chance. Notably, the higher χ^2 value for social factors indicates a stronger influence compared to biological factors. This suggests that while physical challenges affect adherence, social conditions such as income, mobility, and support play a more decisive role in whether patients continue treatment.





The Chi-square results indicate a significant association between biological ($\chi^2 = 4.87$, $p < 0.05$) and social factors

($\chi^2 = 9.12$, $p < 0.01$) with treatment adherence. The higher χ^2 value for social factors suggests a comparatively stronger influence on adherence behaviours.

7. Conclusion:

Here, this study is that treatment adherence, in this setting, does not break down at a single dimension. It unravels gradually, often under pressure. Patients begin treatment within a structured system, but sustaining it depends on conditions that lie outside that system. The data does not support a simple explanation of non-adherence as individual failure. Instead, it points to a set of overlapping constraints—physical strain from medication, psychological discomfort shaped by stigma, and social pressures tied to income and mobility.The statistical results reinforce this reading. Biological factors do matter, but their influence appears limited when compared with the weight of social conditions. The higher Chi-square values for social variables indicate that adherence is more consistently disrupted where everyday life is unstable. Movement across districts, irregular work, and lack of support do not just complicate treatment—they reorganize it around competing priorities. In such situations, missing doses is less an act of refusal and more an adjustment to circumstance.

At the same time, the findings around social work intervention introduce an important counterpoint. Patients who received some form of structured support—whether through counselling, follow-up, or assistance in navigating services—were more likely to remain adherent. This suggests that while structural constraints cannot be removed entirely, their impact can be moderated. Social work, in this sense, operates not as an add-on to clinical care but as a mechanism that holds treatment together when other conditions begin to pull it apart.There is a tendency in public health programmes to assume that once treatment is made available, adherence will follow. The evidence here suggests otherwise. Access may initiate treatment, but continuity depends on how well systems engage with the realities patients face. In border regions such as those examined in this study, those realities are fluid, often unpredictable, and not easily contained within administrative boundaries.

The implication is not simply to expand services, but to rethink how they are delivered. A more grounded approach would recognize adherence as something that is negotiated over time, not ensured at the point of prescription. Strengthening social work integration, improving follow-up mechanisms, and designing flexible support systems may be more effective than relying solely on standardized treatment models.In that sense, the contribution of this study is less about identifying new factors and more about situating known ones within a specific context. It shows that when biological, psychological, and social dimensions are considered together—and when support systems are actively engaged—adherence begins to look less like a problem of compliance and more like a reflection of how well health systems align with the conditions of everyday life.

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