ANALYSIS OF FACTORS INFLUENCING MEDICATION ADHERENCE AMONG PULMONARY TUBERCULOSIS PATIENTS IN THE EAST KOLAKA REGENCY

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ABSTRACT

Introduction: Tuberculosis (TB) remains a significant global health challenge, with treatment success heavily dependent on patient adherence to a long-term medication regimen. Non-adherence contributes to treatment failure, the emergence of drug-resistant strains, and continued community transmission. This study aimed to analyze the factors associated with medication adherence among pulmonary tuberculosis patients in the East Kolaka Regency.

Methods: This research employed an analytical survey method with a cross-sectional design. The study was conducted in six working areas of the East Kolaka Regency Health Service. The population consisted of all 59 registered pulmonary TB patients undergoing treatment. Data were collected using a structured questionnaire measuring medication adherence and several independent variables, including knowledge, family support, role of health workers, stigma, access to health services, income, and medical costs. Data were analyzed using univariate, bivariate (Chi-Square test), and multivariate logistic regression.

Results: A majority of patients (69.5%) exhibited low adherence. Bivariate analysis indicated statistically significant relationships between adherence and knowledge (p=0.004), family support (p<0.001), stigma (p=0.008), access to health facilities (p<0.001), income (p=0.002), and medical costs (p=0.003). The role of health workers was not significant (p=0.325). Multivariate analysis identified difficult access to health facilities (OR=22.818) and less family support (OR=18.452) as the most dominant predictors of non-adherence.

Discussion: The findings underscore the multifactorial nature of medication adherence in TB treatment. The dominant influence of structural barriers, such as difficult access to healthcare, and psychosocial factors, like inadequate family support, indicates that adherence is not merely an issue of individual responsibility. The study concludes that improving medication adherence in East Kolaka requires a multi-pronged approach that addresses patient education, strengthens family and community support systems, actively works to reduce disease-related stigma, and mitigates structural and economic barriers.

Keywords: Tuberculosis, Medication Adherence, Compliance, Patient Compliance, Knowledge, Family Support, Social Stigma, Health Service Accessibility, East Kolaka, Indonesia.

INTRODUCTION

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, persists as a primary global health concern and a leading cause of mortality from a single infectious agent (25). The World Health Organization (WHO) reported an estimated 7.5 million new diagnoses in 2022, underscoring the ongoing high burden of the disease. The successful control of TB is a key target within the UN Sustainable Development Goals, but progress is significantly impeded by challenges related to treatment adherence.

Indonesia is among the countries with the highest TB burden globally, with an estimated 1,060,000 cases in 2023 (7). The national response is coordinated through the National Tuberculosis Program, which provides comprehensive guidelines for diagnosis and management, including the Directly Observed Treatment, Short-course (DOTS) strategy (8, 14, 15). A central component of DOTS is the designation of a treatment supervisor (Pengawas Minum Obat - PMO), typically a family member, to ensure patient adherence.

At the sub-national level, the East Kolaka Regency in Southeast Sulawesi has reported a rising number of TB cases, from 112 in 2021 to 140 in 2023 (6). Preliminary data indicate high rates of treatment default, attributed to

factors such as remote access to health services and insufficient family monitoring (6). The standard six-month, multi-drug regimen for TB presents considerable challenges for patients, and non-adherence can lead to severe consequences, including treatment failure, disease relapse, and the development of Multidrug-Resistant Tuberculosis (TB-MDR) (9, 10, 18).

A multitude of factors are known to influence medication adherence. These can be broadly categorized as patient-related factors, such as knowledge and beliefs (3, 12); social and community factors, including family support and stigma (11, 13, 19, 22); socio-economic factors like income and treatment-related costs (5, 21); and health system factors, such as physical access to care (27). While these factors are well-documented, their specific interplay and relative importance within the rural context of East Kolaka have not been systematically investigated. This study, therefore, aimed to conduct a comprehensive analysis of the determinants of medication adherence among pulmonary TB patients in this regency to inform the development of targeted public health interventions.

METHODS

Research Design

This study utilized a quantitative, analytical survey design with a cross-sectional approach. This design was selected to concurrently assess the relationship between multiple independent variables and the dependent variable (medication adherence) within the study population at a single point in time (23).

Study Setting and Population

The research was conducted from May to June 2024 across six working areas of the East Kolaka Regency Health Service: Tirawuta, Tinondo, Lalolae, Mowewe, Sanggona, and Ueesi. The study population comprised all 59 registered pulmonary tuberculosis patients undergoing treatment in these areas. A total sampling technique was employed, wherein the entire population was included as the study sample to eliminate sampling error and provide a complete census of the target group.

Variables and Data Collection

A structured questionnaire was administered through face-to-face interviews to collect primary data.

- **Dependent Variable:** Medication adherence was assessed and categorized into 'Low Compliance' and 'Medium Compliance'.
- **Independent Variables:** Data were collected on seven potential influencing factors: Knowledge (Sufficient/Insufficient), Family Support (Good/Less), Role of Health Workers (Good/Less), Stigma (Good/Bad), Access to Health Facilities (Easy/Difficult), Income (High/Low), and Medical Costs (Able/Unable).

Data Analysis

The collected data were analyzed using SPSS software. The analysis proceeded in three stages:

1. **Univariate Analysis:** Frequencies and percentages were calculated to describe the distribution of all variables.
2. **Bivariate Analysis:** The Chi-Square test was used to examine the association between each independent variable and medication adherence. A p-value < 0.05 was considered statistically significant.
3. **Multivariate Analysis:** A multiple logistic regression with backward stepwise elimination was performed to identify the most dominant predictors of non-adherence. Variables with a p-value > 0.25 were removed sequentially to produce a final model. Odds Ratios (OR) and 95% Confidence Intervals (CI) were calculated for the variables in the final model.

RESULTS

Descriptive Findings

The univariate analysis (Table 4.1) revealed that a majority of the 59 respondents (69.5%) exhibited 'Low Compliance' with their medication regimen. The distribution of independent variables indicated significant challenges within the population: 74.6% had insufficient knowledge, 83.1% reported less family support, 62.7% faced difficult access to health facilities, 62.7% had low income, and 86.4% felt unable to cover indirect medical costs. In contrast, 81.4% of respondents perceived the role of health workers as good.

Table 4.1: Frequency Distribution of Respondent Characteristics (N=59)

Variable	Category	Frequency (n)	Percentage (%)
Compliance	Low	41	69.5
	Medium	18	30.5
Knowledge	Insufficient	44	74.6

	Sufficient	15	25.4
Family Support	Less	49	83.1
	Good	10	16.9
Role of Health Workers	Good	48	81.4
	Less	11	18.6
Stigma	Bad (High Stigma)	25	42.4
	Good (Low Stigma)	34	57.6
Access to Health Facilities	Difficult	37	62.7
	Easy	22	37.3
Income	Low	37	62.7
	High	22	37.3
Medical Costs	Unable	51	86.4
	Able	8	13.6

Bivariate Analysis

The results of the Chi-Square tests (Table 4.2) indicated statistically significant associations between medication compliance and six of the seven independent variables: Knowledge (p=0.004), Family Support (p<0.001), Stigma (p=0.008), Access to Health Facilities (p<0.001), Income (p=0.002), and Medical Costs (p=0.003). The 'Role of Health Workers' was the only variable that did not show a significant association (p=0.325).

Table 4.2: Bivariate Analysis of Factors Associated with Medication Compliance

Variable	Category	Low Compliance (n, %)	Medium Compliance (n, %)	Total	p-value
Knowledge	Less	35 (79.5%)	9 (20.5%)	44	**0.004**
	Sufficient	6 (40.0%)	9 (60.0%)	15	
Family Support	Less	40 (81.6%)	9 (18.4%)	49	**<0.001**
	Good	1 (10.0%)	9 (90.0%)	10	
Role of Health Workers	Good	32 (66.7%)	16 (33.3%)	48	0.325

	Less	9 (81.8%)	2 (18.2%)	11	
Stigma	Bad (High)	22 (88.0%)	3 (12.0%)	25	**0.008**
	Good (Low)	19 (55.9%)	15 (44.1%)	34	
Access	Difficult	35 (94.6%)	2 (5.4%)	37	**<0.001**
	Easy	6 (27.3%)	16 (72.7%)	22	
Income	Low	31 (83.8%)	6 (16.2%)	37	**0.002**
	High	10 (45.5%)	12 (54.5%)	22	
Medical Costs	Unable	39 (76.5%)	12 (23.5%)	51	**0.003**
	Able	2 (25.0%)	6 (75.0%)	8	

Multivariate Analysis

The final model of the multiple logistic regression analysis (Table 4.3) identified two factors as the most dominant predictors of low compliance. Patients with 'Difficult' access to health facilities had 22.8 times the odds of low compliance compared to those with easy access (OR = 22.818, p=0.002). Patients with 'Less' family support had 18.4 times the odds of low compliance compared to those with good support (OR = 18.452, p=0.020).

Table 4.3: Final Model of Multivariate Logistic Regression for Predictors of Low Compliance

Variable	Category	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Access to Health Facilities	Difficult (vs. Easy)	**22.818**	3.159 - 164.841	**0.002**
Family Support	Less (vs. Good)	**18.452**	1.587 - 214.534	**0.020**

DISCUSSION

The findings of this study indicate that poor medication adherence among pulmonary TB patients in the East Kolaka Regency is a critical issue driven by a combination of powerful structural, psychosocial, and economic factors. The multivariate analysis identified difficult physical access to health facilities and inadequate family support as the most significant determinants of non-adherence.

The exceptionally high odds ratio associated with **Access to Health Facilities** (OR=22.818) highlights this as the primary barrier to treatment success in this rural setting. This finding is consistent with previous research that identifies geographical barriers as a major impediment to care in resource-limited settings (18, 27). The logistical and financial burdens of travel for regular medication refills can be prohibitive for patients, particularly those with low incomes, leading directly to treatment interruption.

The second dominant factor, **Family Support** (OR=18.452), underscores the vital role of the patient's immediate social network in navigating the long course of TB treatment. This confirms the foundational principle of the DOTS strategy and aligns with studies emphasizing the effectiveness of a PMO in ensuring adherence (13, 19). The high prevalence of patients reporting less support (83.1%) suggests a potential weakness in the implementation or effectiveness of the PMO system in this region, which warrants further investigation.

While not as dominant in the final model, the significant associations found in the bivariate analysis for **Knowledge, Stigma, Income, and Medical Costs** demonstrate their important roles within the complex web of factors influencing patient behavior. Insufficient

knowledge can lead to a poor understanding of the necessity of treatment completion (3, 12). Perceived stigma can lead to social isolation and treatment avoidance (11, 22). Low income and the inability to cover indirect costs create significant financial stress that competes with health-seeking behaviors (9, 21).

The non-significant finding for the **Role of Health Workers** does not negate their importance. Rather, it may suggest that the positive efforts of healthcare providers are being superseded by the more formidable structural and social barriers that patients face outside the clinic.

In conclusion, this study demonstrates that non-adherence to TB medication in East Kolaka is not a matter of individual failing but is largely a consequence of systemic barriers. To improve treatment outcomes, interventions must move beyond the individual patient to address these broader determinants. This requires a multi-pronged public health strategy focused on decentralizing care to overcome access issues, strengthening community and family support systems, implementing anti-stigma campaigns, and providing socio-economic support to mitigate the financial burdens of treatment.

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