## The Relationship Between the Characteristics of Directly Observed Treatment and the Implementation of Directly Observed Treatment Tasks and Adherence to Treatment for Pulmonary TB Patients at the Andalas Health Center, Padang City

Sri Mardlaniah<sup>1</sup>, Irvan Medison<sup>2</sup>, Julizar<sup>3</sup>

<sup>1</sup>Department of Emergency, BKM Hospital, Painan, Indonesia. <sup>2</sup>Department of Pulmonology, Dr. M. Djamil Hospital, Andalas University, Padang, Indonesia. <sup>3</sup>Departement of Physics, Andalas University, Andalas University, Padang, Indonesia.

Corresponding Author: Sri Mardlaniah

DOI: https://doi.org/10.52403/ijrr.20250626

### ABSTRACT

**Background:** Pulmonary tuberculosis (TB) continues to pose a significant global public health concern. A key determinant of successful TB treatment is the patient's adherence to a prolonged therapeutic regimen. The Directly Observed Treatment (DOT) strategy serves as a core component of the DOTS (Directly Observed Treatment, Short-course) framework, as endorsed by the World Health Organization (WHO). The efficiency with which DOT responsibilities are carried out may vary based on the personal attributes of the DOT providers themselves.

**Objective:** This study aims to evaluate how specific characteristics of DOT providers relate to their performance of DOT responsibilities and the treatment adherence levels of pulmonary TB patients at the Andalas Health Center in Padang City.

**Methods:** Employing a cross-sectional study design, the research involved 56 matched pairs of pulmonary TB patients and their respective DOT providers. The total sampling technique was applied to recruit participants. Data were collected through structured interviews using validated questionnaires. Statistical analysis was conducted using the chi-square test, with a 5% significance threshold to determine relationships between variables.

**Results:** The majority of DOT providers were female (62.5%), aged 18 years or older (94.6%), held a higher level of education (69.6%), were employed (55.4%), were relatives of the patients (96.4%), and resided in the same household as the patients (92.9%). Among them, 73.2% effectively fulfilled their DOT responsibilities, while 69.6% of patients demonstrated adherence to their treatment regimens. Significant associations were found between the educational background of DOT providers and the quality of their task implementation (p=0.001). Furthermore, both the age (p=0.025) and educational level (p=0.002)of DOT providers, along with their task performance (p<0.001), showed strong patient correlations with treatment adherence.

**Conclusion:** The findings indicate that specific DOT characteristics, particularly

age and level of education, play a crucial role in both the effectiveness of DOT task implementation and in promoting treatment adherence among pulmonary TB patients. It is therefore recommended that healthcare providers consider these factors when selecting individuals to serve as DOT providers.

*Keywords:* Pulmonary TB, Treatment Adherence, Medication Adherence Supervisor, DOT Characteristics, DOTS

### **INTRODUCTION**

Tuberculosis (TB) is an infectious disease that continues to pose a serious challenge to the global health system. Based on the *Global Tuberculosis Report 2023* by WHO, an estimated 10.6 million people will suffer from TB in 2022, with approximately 1.3 million deaths occurring in non-HIV populations worldwide. Indonesia still ranks second highest with an estimated 969,000 new TB cases annually.<sup>[1]</sup>

At the local level, data from the Padang City Health Department in 2014 recorded 1,105 new cases of pulmonary TB with a treatment success rate of 93.3%. Although official data for 2022-2023 is not yet publicly available, regional epidemiology reports indicate that TB case finding rates in the West Sumatra region, including Padang City, are still quite high, with consistent implementation of the DOTS (Directly Observed Treatment Short-course) strategy. [2,3]

One of the key components in the DOTS strategy is the role of the **Directly Observed Treatment (DOT)**, who is responsible for ensuring that patients take anti-TB drugs on time and regularly until treatment is completed. The success of this program is greatly influenced by the implementation of DOT tasks, which in turn can be influenced by the characteristics of the DOT itself, such as age, education, employment status, family relationship with the patient, and place of residence. <sup>[4,5]</sup> Previous studies have shown mixed results. Sidy (2012) found that a high level of education, kinship, and living in the same house between DOTs and Lung TB patients were closely related to patient treatment adherence.<sup>[6]</sup> In contrast, Rohmana et al (2014) found no significant association between DOT demographic characteristics and patient adherence.<sup>[7]</sup> These findings suggest that local contextual factors must be considered when evaluating DOT effectiveness.

Patient adherence to long-term TB treatment is critical to prevent drug resistance, relapse, and disease spread. Therefore, selecting the right DOT is a crucial aspect in community-based strengthening interventions.<sup>[9]</sup> Systematic education of DOTs can improve the quality of supervision and therapeutic outcomes.<sup>[10]</sup>

Based on this background, this study aims to determine whether there is a relationship between the characteristics of DOTs with the implementation of their tasks and adherence to treatment for Pulmonary TB patients at The Andalas Health Center, Padang City.

### **MATERIALS & METHODS**

This research employed an analytical approach utilizing a cross-sectional design to explore the relationship between the characteristics of Directly Observed Therapy (DOT) providers and both the execution of their tasks and the treatment adherence of pulmonary tuberculosis (TB) patients. Conducted at the Andalas Health Center in Padang City between January and April 2016, the study involved a sample of 56 participants. The independent variables consisted of various DOT characteristics, while the dependent variables included the performance of DOT responsibilities and the level of treatment adherence among TB patients. Data collection was carried out through face-to-face interviews involving both pulmonary TB patients and their respective DOT providers, using а structured questionnaire designed to gather

comprehensive information on DOT characteristics, their role implementation, and patient compliance with treatment protocols.

### STATISTICAL ANALYSIS

The results of the study were computerized using the *Statistical Package for the Social Science* (SPSS) application with the chi-Square test, whose significance value is 5%. Interpretation is based on the theory that the hypothesis is rejected if the probability is > 0.05, while if the probability is < 0.05, then the hypothesis is accepted.

### RESULT

#### **Univariate Analysis**

The results showed the frequency distribution of DOT characteristics as follows: 37.5% male, 94.6% aged  $\ge 18$  years, 69.6% highly educated, 55.4% employed, 96.4% family, and 92.9% lived in the same house as the patient. 73.2% of DOTs carry out their tasks well, and 69.6% of Lung TB patients are compliant with treatment.

Variabels	Category	n	%
Gender	Male	21	37,5
	Female	35	62,5
Age	$\geq$ 18 years old	53	94,6
	< 18 years old	3	5,4
Education	Higher Education	39	69,6
	Low Education	17	30,4
Employement Status	Work	31	55,4
	Not Working	25	44,6
Family Relationship	Family	54	96,4
	Not Family	2	3,6
Place of Residence	Housemates	54	92,9
	Not in the same house	4	7,1

<b>Sabel 1 Frequency</b>	distribution of DOT	characteristics

# Tabel 2 Frequency Distribution of DOT Task Implementation

<b>DOT Task Implementation</b>		%
Good	41	73,2
Not Good	15	26,8
Total	56	100

Tabel 3 Frequency distribution of adherence to treatment for pulmonary tuberculosis patients

<b>Treatment Adherence</b>	n	%	
Good	39	69,6	
Not Good	17	30,4	
Total	56	100	

Bivariate Analysis Relationship between DOT Characteristics and DOT Task Implementation

Table 4 P-value of Bivariate Analysis of theRelationship between DOT Characteristics andDOT Task Implementation

ask implementation			
	<b>DOT Characteristics</b>	<b>P-Value</b>	
	Gender	0,697	
	Age	0,172	
	Education	0,001	
	Working Status	0,162	
	Family Relationship	0,068	
	Place of Residence	0,289	

Based on the analysis presented in Table 4, it was observed that five out of six characteristics related to Directly Observed Therapy (DOT)—namely gender, age, employment status, family relationship, and place of residence—yielded p-values greater than 0.05. This statistical result indicates that these variables do not exhibit a significant association with the execution of DOT responsibilities. Conversely, the variable pertaining to DOT education demonstrated a p-value below the 0.05

threshold, signifying a statistically significant correlation. This finding highlight that the level or quality of education received by DOT providers plays a critical role in influencing their effectiveness in carrying out DOT-related tasks.

### Relationship between DOT Characteristics and Adherence to Treatment of Pulmonary TB Patients

 Table 5 P-value of Bivariate Analysis of the
 Relationship between DOT Characteristics and

 Adherence to Treatment of Pulmonary TB
 Patients

<b>DOT Characteristics</b>	<b>P-Value</b>		
Gender	0,329		
Age	0,025		
Education	0,002		
Working Status	0,410		
Family Relationship	0,519		
Place of Residence	0,125		

Referring to the findings in Table 5, it was revealed that four out of six characteristics of Directly Observed Therapy (DOT) providers-specifically gender, employment status, family relationship, and place of residence-produced p-values exceeding 0.05. This indicates that these factors do not have a statistically significant influence on the treatment adherence of patients with pulmonary tuberculosis. In contrast, both age and educational background of DOT providers showed p-values below 0.05, suggesting a meaningful association. These results imply that the age and level of education of individuals overseeing DOT play a crucial role in supporting and maintaining consistent treatment adherence among pulmonary TB patients.

### Relationship between DOT Task Implementation and Adherence to Treatment for Pulmonary TB Patients

 Table 6 P-value of Bivariate Analysis of the Relationship between DOT Task Implementation and

 Adherence to Treatment for Pulmonary TB Patients

DOT Task Implementation	Treatment Adherence		Total	P Value
	Compliant	Non-compliant		
Good	35	6	41	0,000
Not Good	4	11	15	
Total	39	17	56	

Table 6 presents the outcomes of statistical testing, which demonstrate a significant association between the performance of Observed Therapy Directly (DOT) responsibilities and treatment adherence among pulmonary tuberculosis (TB) patients, as indicated by a p-value less than 0.05. This finding underscores that the effectiveness and consistency with which DOT tasks are carried out have a measurable and meaningful impact on patients' commitment to following their prescribed TB treatment regimens.

### **DISCUSSION**

The results of this study indicate that there is a significant relationship between DOT education and task performance, as well as a relationship between age, education, and task performance of DOTs and treatment adherence of pulmonary TB patients. These findings underscore the importance of considering the personal and social characteristics of DOTs in their empowerment strategies in the field.

Education is an important predictor factor that contributes to the DOT's ability to understand treatment instructions, educate patients, and maintain effective two-way communication. As stated by Notoatmodjo (2003), the higher a person's level of education, the greater their ability to receive and process health information.<sup>[8]</sup> Research by Berger et all (2020) also proved that a systematic training and education program for DOTs significantly improved the

adherence of pulmonary TB patients at The Health Center.<sup>[10]</sup>

In a multicenter study conducted by Grecco et al. (2014) in Ribeirao Preto, Sao Paulo, and Sekandi et al in Uganda (2024), it was found that DOTs with secondary education backgrounds and above showed better performance in monitoring drug consumption, reporting side effects, and building therapeutic relationships with patients.<sup>[11,12]</sup> This is consistent with the results of the study at The Andalas Health Center, which showed that 73.2% of DOTs with higher education performed their tasks well. Mature age was also found to have a significant association with patient adherence.

Older DOTs are generally considered more responsible and able to create a positive social influence on patients, as described by Bart (1994) and reinforced by Eliska (2005).<sup>[13,14]</sup> A recent study by Arifin et al. (2029) in Pidie Aceh confirmed that DOT more mature tend to provide more stable moral support and supervision for TB patients.<sup>[15]</sup>

Although not statistically significant in this study, family relationships and cohabitation are of practical importance. DOTs from families living in the same house have a higher frequency of interaction, allowing for more intensive and continuous interventions. This was also expressed by Sidy (2012) and Firdaus (2012) who emphasized that emotional closeness strengthens the effectiveness of DOT supervision. [6,16]

One important finding is that the performance of DOT tasks acts as a significant mediator of adherence in patients with pulmonary tuberculosis. DOTs who perform their functions well are able to minimize the risk of patients dropping out and increase the success of therapy. Research by Yin et al. (2012) introduced a validation scale to assess DOT involvement in patient therapy and showed that high DOT involvement significantly reduced treatment failure rates. <sup>[17]</sup>

Overall, the results of this study are consistent with health behavior theory that interpersonal influences are significant in shaping patient adherence, especially in chronic diseases such as TB. Therefore, the selection and training of DOTs should be done selectively by considering the level of education, age, and emotional closeness to the patient. Implementation of competencybased training and regular supervision of DOTs will be a strategic step to improve the quality of TB treatment supervision at the primary level.

## CONCLUSION

Based on the results of the analysis and discussion that have been carried out, it can be concluded that the characteristics of the Directly Observed Treatment (DOT) play a significant role in determining the successful implementation of supervisory tasks and treatment adherence of Pulmonary TB patients at The Andalas Health Center, Padang City. DOT education is proven to have a significant relationship with the implementation of DOT tasks, while age, education, and implementation of DOT tasks collectively contribute to the level of patient treatment adherence.

This finding confirms that the higher the level of education and age maturity of DOTs, the better their capacity to carry out therapeutic supervision functions, including providing motivation, reminding drug consumption, and establishing effective communication with patients. The role of DOTs as facilitators of TB treatment adherence is crucial to the success of the DOTS program at the primary care level.

The practical implications of this study encourage the need for competency-based DOT selection and coaching, taking into account the variables of education and age maturity as key indicators. Structured training and regular monitoring of the implementation of DOT tasks need to be carried out to ensure the continuity and effectiveness of treatment of pulmonary TB

patients, as well as preventing therapy failure or drug resistance.

Declaration by Authors Ethical Approval: Approved Acknowledgement: None Source of Funding: None Conflict of Interest: No conflicts of interest declared.

#### REFERENCES

- 1. World Health Organization. *Global Tuberculosis Report 2023*. Geneva: WHO; 2023. Available from: https://www.who.int/publications/i/item/978 9240083851
- 2. Dinas Kesehatan Kota Padang. Profil Kesehatan Kota Padang Tahun 2014. Padang: Dinkes Padang; 2015.
- 3. Kementerian Kesehatan RI. Pedoman Nasional Pengendalian Tuberkulosis. Jakarta: Kemenkes RI; 2021.
- 4. S DE, Collie L, Neymour A, Martin-Chen NK, Moss K, Victor VM, et al. Factors Influencing Knowledge on the Completion of Treatment among Tuberculosis Patients under Directly Observed Treatment Strategy (DOTS) in a Selected Health Facility, the Bahamas. *Clinical journal of nursing care and practice*. 2024. 8: 022-030.
- 5. Elmuttalut M. The key factors influencing tuberculosis treatment outcomes: A literature review. *International Journal of Recent Innovations in Medicine and Clinical Research*. 2024. 6(3):76-79.
- 6. Sidy YN. Pengaruh Peran PMO Keluarga terhadap Kepatuhan Penderita TB di Pariaman. Tesis. Depok: FKM UI. Tesis. 2012.
- 7. Rohmana O, Suhartini, Suhendra A. Faktorfaktor PMO yang berhubungan dengan kepatuhan penderita TB Paru. *J Kesmas Indonesia*. 2014;10(1):931–941.
- 8. Notoatmodjo S. Pendidikan dan Perilaku Kesehatan. Jakarta: Rineka Cipta; 2003.
- Nabimanya T, Nyemara N, and Kazibwe F. The Effect of the Community-Based-Directly Observed Therapy on the Treatment Outcome of Tuberculosis Patients in Mitooma District, Western-

Uganda. International Journal of Public Health and Pharmacology. 2023; 3:17–32.

- Berger CA, Kityamuwesi A, Crowder R, et al. Variation in tuberculosis treatment outcomes and treatment supervision practices in Uganda. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*. 2020; 21:100184.
- 11. Grecco R, Borges de Oliveira C, Caetano da Silva LM, et al. Tratamento diretamente observado da tuberculose: processos de aprendizagem em uma instituição de ensino superior [Directly observed treatment of tuberculosis: learning process in a higher education institution]. 2014; 22:77–82.
- 12. Sekandi JN, Buregyeya E, Zalwango S, et al. Effectiveness of Enhanced Video Directly Observed Treatment (DOT Selfie), a Mobile Health Intervention to Increase Treatment Adherence Monitoring and Support for Patients with Tuberculosis in Uganda: A Randomized Controlled Trial. *Jmir mhealth and uhealth*. 2025;13: e57991
- 13. Bart S. Psikologi Kesehatan. Jakarta: PT Grasindo; 1994.
- Eliska. Pengaruh Karakteristik Individu dan Peran PMO terhadap Kepatuhan TB. Medan: FKM USU. Skripsi. 2005.
- 15. Arifin VN, Nur A, and Uzair FM. The Relationship of Social Support with Medication Adherence Pulmonary Tuberculosis Patients Through DOTS Strategy in Pidie Aceh Indonesia. IOP Conf. Series: Materials Science and Engineering. 2019; 469:012055.
- Firdaus KMZ. Peranan PMO terhadap Keberhasilan Pengobatan TB Paru. Surakarta: UMS. Skripsi. 2012.
- 17. Yin X, Tu X, Tong Y, et al. Development and Validation of a Tuberculosis Medication Adherence Scale. PLoS ONE. 2012. 7(12): e50328.

How to cite this article: Sri Mardlaniah, Irvan Medison, Julizar. The relationship between the characteristics of directly observed treatment and the implementation of directly observed treatment tasks and adherence to treatment for pulmonary TB patients at the Andalas Health Center, Padang City. *International Journal of Research and Review*. 2025; 12(6): 216-221. DOI: *https://doi.org/10.52403/ijrr.20250626* 

\*\*\*\*\*