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DETERMINANTS OF DRUG-SENSITIVE TUBERCULOSIS THERAPY SUCCESS IN WAMENA COMMUNITY HEALTH CENTER, JAYAWIJAYA REGENCY, PAPUA PROVINCE, MOUNTAINS

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Abstract

Based on data from the Global Tuberculosis Report 2024, Indonesia ranks second in the world after India in the number of TB cases. The success of tuberculosis therapy is an important indicator in evaluating TB control programs. This study aims to analyze the determinants of therapy success in patients with Drug-Sensitive Tuberculosis at the Wamena City Public Health Center (BLUD). The study used a quantitative analytical design with a cross-sectional approach, involving 288 patients recruited using a saturated sampling technique. Data analysis was performed using univariate analysis, bivariate analysis using the chi-square test, and multivariate analysis using logistic regression. The results showed that variables significantly related to therapy success were age (p=0.032; RP=0.800), occupation (p=0.005; RP=1.227), HIV status (p=0.006; RP=1.450), history of DM (p=0.005; RP=1.692), domicile (p<0.001; RP=2.148), and Medication supervisor (p<0.001; RP=2.252). Meanwhile, gender (p=0.089), education (p=0.370), and history of previous TB treatment (p=0.109) were not significantly related to therapy success. The most dominant factor related to therapy success was domicile (p<0.001; RP=37.188).

Keywords: Tuberculosis, Successful Therapy, Treatment Failure

Introduction

According to data from the Global Tuberculosis Report 2024, Indonesia ranks second in the world after India in the number of TB cases, with an estimated 1,060,000 cases and 134,000 deaths annually. This figure indicates that approximately 17 people die from TB every hour in Indonesia. Despite control efforts, significant challenges remain in achieving TB elimination by 2030. One of the main challenges is the low rate of detection and treatment [(1)]. By 2030, Indonesia targets a reduction in the number of pulmonary TB sufferers to 65 cases per 100,000 population. The goal of the Pulmonary TB control initiative in Indonesia in 2020–2024 is to accelerate efforts to eradicate TB by 2030 and end the pandemic by 2050. Nevertheless, among the five main causes of the disease burden, TB remains a persistent problem [(2)]. The high burden of TB in Indonesia requires an effective control strategy to ensure successful treatment and prevent further transmission. One approach, in accordance with the World Health Organization (WHO) guidelines for TB treatment, is the Directly Observed Treatment, Short-course (DOTS) strategy, which focuses on patient compliance during treatment under the direct supervision of healthcare workers or Medication Supervisors. Implementing this strategy can increase cure rates, prevent treatment failure, and reduce the risk of MDR-TB. This can be seen from the treatment success rate, which is one of the main indicators for evaluating TB control. According to the 2024 Indonesian Health Profile, the TB treatment success rate in Indonesia reached 85.5%, which means it has not yet reached the target of 90% [(3)].

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The treatment success rate (TSR) is an indicator used to evaluate tuberculosis treatment. The treatment success rate is the number of cured and completed TB cases among all treated and reported TB cases. TB treatment success is a crucial indicator in TB control programs because it not only determines patient recovery but also plays a role in breaking the chain of transmission in the community. The WHO targets a TB treatment success rate of at least 90% as part of the global TB control strategy[4].

In the 2024 Indonesian Health Profile, the reported treatment success rate for tuberculosis patients in Indonesia in 2024 was 85.5%. This figure still falls short of the Ministry of Health's 2024 Strategic Plan target of 90%. Five provinces achieved a treatment success rate of at least 90% for all TB cases in 2024: Lampung (93%), South Sumatra (92%), Banten (90.5%), Gorontalo (90.5%), and Riau (90.4%). Meanwhile, the success rate of treatment for tuberculosis patients in Papua Mountains Province in 2024 was 43.6% [3].

One of the main obstacles to TB control in Indonesia is the low treatment success rate for TB patients. The suboptimal achievement of TB treatment success despite the implementation of the DOTS program demonstrates that therapy success is not solely determined by the implementation of treatment strategies, but is also influenced by various other, more complex factors. Individual factors and socioeconomic conditions can influence a patient's ability to understand the disease and consistently undergo treatment. Furthermore, clinical factors such as HIV status, previous treatment history, and the presence of comorbidities such as diabetes mellitus can also affect the body's response to TB therapy, potentially reducing treatment success. Furthermore, health service factors such as access to health facilities, drug availability, quality of health services, and the effectiveness of medication monitoring also play a crucial role in determining the success of TB therapy [5]. In addition to these factors, geographic and sociocultural conditions can also influence the success of TB control programs. In areas with limited access to health services, remote distances to health facilities, and limited health personnel, the DOTS strategy often fails to be implemented optimally. This leads to delays in treatment for some patients, discontinuation of treatment, or failure to complete therapy according to established standards[6].

The low success rate of TB treatment in Indonesia can also be influenced by reinforcing factors such as motivation, family support, and enabling factors such as family support and the availability of facilities and infrastructure in health facilities. In most cases, TB patients feel cured after taking anti-TB medication for two months, as their symptoms have significantly reduced. They feel reluctant to continue their treatment until declared cured by health workers, so they decide to stop treatment in the second month of their treatment program [7].

Age significantly influences activity, immune response, and patient compliance with treatment. Research conducted by Qoirun Nisa found that age is significantly associated with the success of pulmonary TB treatment. Younger patients have higher cure rates than older patients [8].

In addition to age, gender also plays a role in determining the success of TB treatment. Several studies have shown that men tend to have a higher risk of treatment failure than women [9]. Men are less likely to succeed in TB treatment, which is associated with lower adherence compared to women [10]. A 2023 study at the Siatas Barita Community Health Center found a significant association between employment status and the success of pulmonary TB treatment. Patients who were employed had a higher success rate of therapy than those who were unemployed [11].

HIV status is a clinical factor consistently reported to be associated with TB treatment outcomes. Patients with TB and HIV coinfection have a higher risk of treatment failure, death, or discontinuation than TB patients without HIV [12]. Another study in Sumatra, Indonesia, by Fitria found a significant relationship between previous treatment history, diabetes mellitus history, and HIV status and the success of pulmonary TB treatment. However, the variables of age, gender, occupation, and treatment status did not have a significant relationship [13].

Local Health Office data shows that in 2024, there were 879 cases handled in Jayawijaya; this number is only around 54.76% of the estimated target of TB cases that should be found and treated (1,605 cases). And of the 879 treated SO TB cases, the treatment success rate was only 64.96%. Meanwhile, in 2025, the number of SO TB cases in Jayawijaya Regency was 918 cases, and the success rate was 29.30% [(14)]. According to the Health Center Performance data source, the success rate of SO TB treatment at the Wamena City Health Center in 2024 was 71.21%, and the success rate of SO TB therapy in 2025 at the Wamena City Health Center was 31.71% [(15)].

Method

This quantitative study used a cross-sectional design, where the study was conducted without following the course of the disease, but only conducted observations for a short time or within a certain period, and each study subject was only observed once during the study [(16)]. The population was all 288 drug-sensitive TB patients at the Wamena City Community Health Center from January 2025 to September 2025, which were then used as a sample or saturated sampling. Data were analyzed using the Chi-Square test and the Prevalence Ratio Test.

Results

1. Univariate analysis

Table 1. Independent variable distribution

Variabel	Kategori	Frekuensi (n)	Persentase (%)
Age	Productif	250	86,8
	Unproduktif	38	13,2
Gender	Female	110	38,2
	Male	178	61,8
Education	High	126	43,8
	Low	162	56,3
Jobs	Worker	130	45,1
	Doesn’t Work	158	54,9
HIV Status	Negatif HIV	254	88,2
	Positif HIV	34	11,8
DM Status	Non DM	268	93,1
	DM	20	6,9
TBC History	New Cases	271	94,1
	Retreatment	17	5,9
Domicile	Within the region	158	54,9
	outside the region	130	45,1
Medication Supervisor	Yes	206	71,5
	None	82	28,5
Therapy success	Succes	213	74,0
	Failure	75	26,0
	Total	288	100,0

Based on Table 1, the distribution of respondents of Drug-Sensitive Tuberculosis (TB-SO) patients at the Wamena City Health Center shows that of the total of 288 respondents, the majority were in the productive age group of 250 (86.8%). The most respondents were male, with 178 people (61.8%). Based on education level, the majority of respondents were in the category of not attending school up to junior high school, namely 162 people (56.3%). In the employment variable, there were more

unemployed respondents, namely 158 people (54.9%). In the HIV status variable, the majority of respondents were not HIV positive, namely 254 people (88.2%). For the history of diabetes mellitus (DM), the majority of respondents did not have a history of DM, namely 268 people (93.1%).

2. Bivariate Analysis

Table 2. Risk Attribute, Chi-Square Analysis, and Prevalence Ratio

No	Variable	Therapy success				P value	PR	Lower-Upper
		success		Failure				
		n	%	n	%			
1	Age							
	Productive	179	71.6	71	28.4	0.032	0.800	0.70-0.91
	Unproductive	34	89.5	4	10.5			
2	Gender							
	Female	88	80	22	20	0.089	1.139	0.99-1.30
	Male	125	70.2	53	29.8			
3	Education							
	High	97	77	29	23	0.370	1.075	0.93-1.23
	Low	116	71.6	46	28.4			
4	Jobs							
	Worker	107	82.3	23	17.7	0.005	1.227	1.07-1.40
	Doesn’t work	‘’106	67.1	52	32.9			
5	HIV Status							
	Negatif	195	76	59	24	0.006	1.450	1.04-2.00
	Positif	18	58.8	16	41.2			
6	DM Status							
	No DM	204	76.1	64	23.9	0.005	1.692	1.03-2.75
	DM	9	45	11	55			
7	TB Treatment History							
	New Cases	202	75.1	67	24.9	0.109	1.297	0.87-1.91
	Retreatment	11	57.9	8	42.1			
8	Domicile							
	Within the region	154	97.5	4	2.5	0.000	2.148	1.77-2.59
	outside the region	59	45.4	71	54.6			
9	Medication Supervisor							
	Yes	181	87.9	25	12.1	0.000	2.252	1.71-2.96
	None	32	39	50	61			

Based on the table above, it is known that the variables that have a significant relationship with the success of treatment in sequence are age, p value = 0.032, Occupation p value = 0.000, HIV Status p value = 0.006, DM Status p value = 0.005, Domicile p value = 0.000, Medication Supervisor p value = 0.000. Meanwhile, the variables that are not significant with the success of treatment are gender, education, and treatment history because the p-value is> 0.05.

Multivariat

Table 3. Candidate Variables for Multivariate Analysis

Variable	p-value	PR	95% CI	
			Lower	Upper
Age	0.032	0.800	0.70	0.91
Gender	0,089	1.139	0.99	1,30
Jobs	0.005	1.227	1,07	1,40
HIV Status	0.006	1.450	1.04	2.00
DM History	0.005	1.692	1.03	2.75
Domicile	0,000	2.148	1.77-	2.59
Medication supervisor	0.000	2.25	1.71	2.96

Table 4. Result Variables for Multivariate Analysis

Variable	**p-value**	**PR**	**95% CI**	
			Lower	**Upper**
Domicile	0.000	38.5	12.4	119.8
Medication supervisor	0.000	9.322	4.16	20.8
DM History	0.009	5.201	1.52	1.77
Jobs	0.002	3.504	1.558	7.88

Discussion

Based on the research results, the productive age group had a good therapeutic success rate of 71.6%, while the non-productive age group had a therapeutic success rate of 89.5%. Statistical tests showed a significant relationship between age and therapeutic success in drug-sensitive tuberculosis patients at the Wamena City Community Health Center.

This finding is interesting because many studies generally show that younger people tend to have better TB treatment outcomes than older people. A national Indonesian cohort study of over 1 million drug-sensitive TB cases from 2020–2022 reported that younger age was associated with a higher chance of treatment success, while older age groups tended to have worse outcomes. The study also showed regional disparities, with Eastern Indonesia having lower therapeutic success rates than Western and central regions. Therefore, the geographic context of services remains important when interpreting the research findings in Papua [(17)]. Therefore, when compared to national trends, the results of this study show a different trend, with the productive age group actually having lower therapeutic success rates than the non-productive age group. This difference in direction of findings can be explained contextually.

This study aligns with research conducted by Bakhtiar et al. (2020), which showed that 66.7% of TB patients were in the productive age range. A p-value of >0.05 indicated that age was not significantly associated with TB treatment outcomes. Patients in the elderly category will receive dosage adjustments and close monitoring to ensure safe and effective treatment. Meanwhile, patients in their productive age tend to have less rest, resulting in disrupted metabolism and decreased immunity. Busy activities such as work, school, and other activities can lead to forgetting to take medication [(18)].

In this study, the productive age group is highly likely to face higher daily demands, such as work and high mobility, as Wamena is the parent area of other newly established districts in the surrounding Papua Highlands Province. In contrast, non-productive age groups experience high levels of family support, which likely impacts medication monitoring and, thus, impacts the success of therapy in this

age group. The researchers' opinion is supported by data obtained: of 250 productive age respondents, only 170 (68%) had a Medication supervisor. Meanwhile, of the 38 respondents in the non-productive age group, 36 (94.7%) had a Medication supervisor. This analysis indicates that the relationship between age and therapy success in this study is likely influenced by other contributing factors, particularly the presence of a companion and a Medication supervisor.

In the context of this study, these differences are likely influenced by socioeconomic factors, mobility, activity burden, access to services, and treatment adherence in the productive age group. Therefore, age, in relation to TB program implementation, reflects not only biological factors but also social and behavioral conditions that can influence therapy success. Therefore, the productive age group should be considered a priority group in efforts to improve TB therapy success at the Wamena City Community Health Center. Therefore, further research is recommended to analyze factors other than age, namely socioeconomic factors, mobility, activity burden, access to services, and treatment adherence in the productive age group.

Based on the research results, gender was not significantly associated with treatment success in patients with Drug-Sensitive Tuberculosis at the Wamena City Community Health Center. Although female patients had a higher proportion of successful treatment than male patients, at 80.0% compared to 70.2%, statistical tests showed that the difference was not significant.

These results align with research by Pascahana Lintang (2019), which showed no association between gender and the success of pulmonary tuberculosis treatment at Karsa Husada Batu General Hospital. The p-value was 0.466, which is greater than the significance level of 0.05 (p>0.05), indicating no association between gender and the success of pulmonary tuberculosis treatment at Karsa Husada Batu General Hospital. The odds ratio calculation showed an PR of 1.5 (PR>1) with an interval of 0.502-4.479 (including 1), indicating that gender is not necessarily a risk factor [(19)].

The findings of this study are consistent with global trends reported by the WHO. In its report on TB and gender (Gender disparities in TB burden and outcomes), the WHO stated that in 31 high-burden TB countries that reported sex-disaggregated treatment outcomes, the treatment success rate for women and girls was 90%, slightly higher than the 87% for men and boys. The WHO also reported that the proportion of TB patients who died after starting treatment was 45% higher in men than in women. This means that globally, women do tend to show better treatment outcomes, but the difference is relatively small. Therefore, your study's findings, which show women to be more successful descriptively, but not statistically significantly, are consistent with this international trend [(20)].

Based on the research results, education level was not shown to be significantly related to the success of therapy in patients with Drug-Sensitive Tuberculosis at the Wamena City Public Health Center. This study aligns with research in Kupang City by Maria Agnes (2023), which also showed no relationship between education level and TB treatment success. This can be explained by the possibility that patients receive relatively equal TB education from healthcare workers, making formal education not the sole determinant of therapy success. Therefore, the study explains that education is more accurately understood as a patient's social characteristic, rather than as the primary determinant of TB therapy success [(21)].

Based on the research results, employment was shown to be significantly related to the success of therapy in patients with Drug-Sensitive Tuberculosis at the Wamena City Community Health Center. This finding can be explained from a socioeconomic perspective, where employment is generally related to income availability, purchasing power, the ability to cover transportation to health facilities, nutritional needs, and the sustainability of indirect costs during treatment.

Conceptually, employment can influence the success of therapy through several mechanisms. Patients who work are more likely to have economic stability, making them more able to access health facilities, afford nutritious food, and maintain treatment for six months or more. On the other hand, unemployed patients are more vulnerable to difficulties with transportation costs, dependence on

family, limitations in meeting basic living needs, and psychosocial stress due to loss of economic role. The research results align with Meiyanti's (2024) study, which identified these issues as part of the social determinants that influence the course of TB, including access to services and adherence to therapy. Therefore, your research findings support the view that the success of TB therapy is not solely determined by clinical factors but is also significantly influenced by the patient's socioeconomic conditions [(22)].

Based on the research results, HIV status has been shown to have a significant effect on the success of therapy in Drug-Sensitive Tuberculosis patients at the Wamena City Community Health Center. This research is in line with the research conducted by Ni Putu E Adelina (2024) between HIV and treatment success where the results of the study p-value is (p = 0.004; OR = 9.167; CI 95% 2.158 - 38.943), this means there is a significant relationship between HIV and treatment success in pulmonary TB patients at the Sukasada 1 Community Health Center for the period 2021-2023. This condition poses one of the challenges in managing the TB program control in Indonesia [(23)].

Therefore, in this study, HIV status is a clinical factor that significantly influences the success of TB therapy. Therefore, HIV-positive TB patients require more intensive attention, monitoring, and service integration.

Based on the study results, a history of diabetes mellitus (DM) was shown to significantly influence the success of therapy in patients with Drug-Sensitive Tuberculosis (DST) at the Wamena City Community Health Center. Patients without a history of DM had a higher proportion of successful therapy than those with a history of DM, namely 76.1% compared to 45.0%. The p-value = 0.005, RP = 1.692, and 95% CI = 1.037–2.759 indicate that patients without DM had a 69.2% higher probability of successful therapy than patients with DM, and this relationship was statistically significant.

This study aligns with research conducted by Andi Muhamad & Setiawan (2023) that found a significant association between comorbid diabetes mellitus (DM) and pulmonary TB treatment failure in South Kalimantan, both in the overall TB-SO and TB-RO categories. (24). Biologically, the relationship between diabetes mellitus (DM) and low TB therapy success can be explained through several mechanisms. In DM patients, especially when glucose levels are uncontrolled, immune function is impaired, including cellular responses and phagocytosis, resulting in a less-than-optimal response to Mycobacterium tuberculosis infection. Furthermore, DM can slow clinical improvement, increase disease severity, and complicate response to therapy.

Based on the study results, new cases had a 75.1% success rate, while patients with a history of retreatment/previous treatment had a 57.9% success rate. However, statistical tests showed a p-value of 0.109, with a RP of 1.297 and a 95% CI of 0.879–1.915. Therefore, prior TB treatment history was not statistically significantly associated with therapy success in patients with Drug-Sensitive Tuberculosis at the Wamena City Community Health Center. The Prevalence Ratio value indicates that new cases have a prevalence of therapy success approximately 29.7% higher than retreatment patients. However, because the confidence interval still encompasses 1, this difference is not strong enough to be considered significant.

Therefore, in this study, prior TB treatment history is more accurately understood as a risk factor, but has not been proven to be a significant determinant of therapy success in the study population. This possible influence was not significant due to the limited sample size in the retreatment group, which was relatively small compared to the new cases.

Based on the study results, domicile significantly influenced therapy success in patients with Drug-Sensitive Tuberculosis at the Wamena City Community Health Center, namely 97.5% compared to 45.4%. The p-value <0.001, PR = 2.148, and 95% CI = 1.776–2.598 indicate that patients within the region have a probability of therapy success approximately 2.1 times greater than patients outside the region.

These results make perfect sense from the perspective of healthcare access. Domicile not only indicates a patient's residence but also reflects proximity to healthcare facilities, ease of transportation, travel costs, regularity of check-ups, and the opportunity to be monitored by healthcare workers.

This research aligns with research by Rafiah Maharani Pulungan (2025) that found a significant association between domicile and TB treatment success. Patients living close to healthcare facilities had a higher chance of successful treatment than those living far from them, with a p-value <0.05 and an odds ratio of 8.88 [(25)].

This indicates that distance from residence and ease of access to health facilities influence TB treatment adherence and outcomes. Therefore, in this study, domicile was a significant factor influencing therapy success. Therefore, patients from outside the region require special attention through enhanced service access, transportation support, and more intensive treatment monitoring.

Based on the study results, medication supervisors were shown to significantly influence therapy success in patients with Drug-Sensitive Tuberculosis at the Wamena City Community Health Center. Patients with medication supervisors had a significantly higher proportion of successful therapy than those without, at 87.9% compared to 39.0%. The pRP value = 2.252, and 95% CI = 1.710–2.965 indicate that patients with medication supervisors have a 2.25-fold greater likelihood of successful therapy compared to patients without.

This finding aligns with research conducted by Medy Purwanto (2025), which found that patients with medication supervisors had a 17.952-fold greater likelihood of supporting the success of the TB control program compared to patients without. The study concluded that there was a significant relationship between the role of medication supervisors and the success of TB treatment at Sekayu Regional Hospital [(26)].

The duties of medication supervisors include supervising patients to ensure they take their medications regularly until they are finished, encouraging patients to continue taking their medication, reminding patients to repeat sputum tests as scheduled, educating patients' families about the importance of seeking medical attention if they experience TB symptoms, accompanying patients to receive anti-TB drugs at health facilities, and assisting health workers in monitoring the progress of TB in their area.

Therefore, in this study, medication supervisors were a significant and strong factor influencing the success of TB therapy. Therefore, strengthening the role of drug monitors (Medication supervisor) needs to be a priority in implementing the TB program at the Wamena City Community Health Center.

Based on the results of multivariate logistic regression analysis, the dominant variable associated with therapy success was domicile ($p < 0.001$; RP = 37.188; 95% CI = 11.679–118.420), as it had the highest RP value, at 37.188. This indicates that patients with a specific domicile category have a 37.188 times greater chance of successful treatment compared to the reference category after controlling for other variables in the model.

The results of this study indicate that domicile plays a significant role in the success of TB therapy. This can be explained in the context of Jayawijaya Regency, which is the parent regency in the Papua Highlands Province and serves as the health service center for several new regencies, such as Yalimo, Tolikara, Yahukimo, Nduga, and Mamberamo. This situation results in some TB patients seeking treatment at the Wamena City Community Health Center coming from outside the region, with more difficult geographic access.

Patients residing outside the community health center (Puskesmas) coverage area tend to face barriers in accessing healthcare services, such as long distances, limited transportation, and mountainous terrain. These barriers can impact patient adherence to regular TB treatment, ultimately impacting the success of therapy. Conversely, patients residing within the community health center's coverage area have easier access to healthcare facilities, making it more likely to undergo routine check-ups, receive treatment monitoring, and receive support from healthcare workers and Medication supervisor. This contributes to the increased success of TB therapy.

Conclusion

1. There is a significant relationship between age and therapy success. P-value = 0.032, RP = 0.800, and 95% CI = 0.700–0.915.
2. There is no significant relationship between gender. P-value = 0.089, RP = 1.139, and 95% CI = 0.997–1.302.
3. There is no significant relationship between education level and therapy success. P-value = 0.370, RP = 1.075, and 95% CI = 0.938–1.232.
4. There is a significant relationship between occupation and therapy success. P-value = 0.005, RP = 1.227, and 95% CI = 1.072–1.404.
5. There is a significant relationship between HIV status and therapy success. The p-value = 0.006, RP = 1.450, and 95% CI = 1.049–2.005.
6. There is a significant association between a history of diabetes and therapy success. The p-value = 0.005, RP = 1.692, and 95% CI = 1.037–2.759.
7. There is no significant association between a history of previous TB treatment and therapy success. The p-value = 0.109, RP = 1.297, and 95% CI = 0.879–1.915.
8. There is a significant association between domicile and therapy success. The p-value < 0.001, RP = 2.148, and 95% CI = 1.776–2.598.
9. There is a significant association between the presence of Medication supervisor and therapy success. The p-value was <0.001, RP = 2.252, and 95% CI = 1.710–2.965.
10. The dominant factor associated with therapy success was domicile, with a p-value of 0.001; RP = 37.188; and 95% CI = 11.679–118.4.

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