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Risk Factors for Compliance with Anti-Tuberculosis Drugs in Pulmonary Tuberculosis Patients at the Central Market Health Center

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ABSTRACT

This study aims to analyze the determinants of compliance with OAT in pulmonary tuberculosis patients at the Central Market Health Center. This study used a cross-sectional design involving 158 pulmonary TB patients at the Pasar Sentral Health Center, Mimika Regency, whose samples were taken by a saturated sampling technique. Data analysis was carried out univariate, bivariate (Chi-square and Fisher Exact tests), and multivariate with logistic regression. Bivariate analysis found that age (p = 0.978), gender (p = 0.136), OAT side effects (p = 0.301), and distance to health facilities (p = 0.635) were not significant with adherence to OAT taking. Comorbidity variables were significantly related (p = 0.016; RP = 2,808; 95% CI: 1,445–5,457). Multivariate analysis confirmed comorbidity as a significant factor (p = 0.008; Exp(B) = 5.487), while gender showed a significant tendency (p = 0.058; Exp(B) = 2.428)

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INTRODUCTION

Efforts to control TB globally refer to the End TB Strategy launched by WHO, which targets a reduction in TB incidence by 80% and a reduction in mortality by 90% by 2030 compared to 2023. One of the main indicators of program success is the treatment success rate, which is greatly influenced by the patient's level of compliance in taking Anti-Tuberculosis Drugs (WHO, 2023).

Indonesia is one of the countries with the highest burden of TB in the world. WHO reports that Indonesia is in the group of countries with a high TB burden, along with India and China (WHO, 2023)

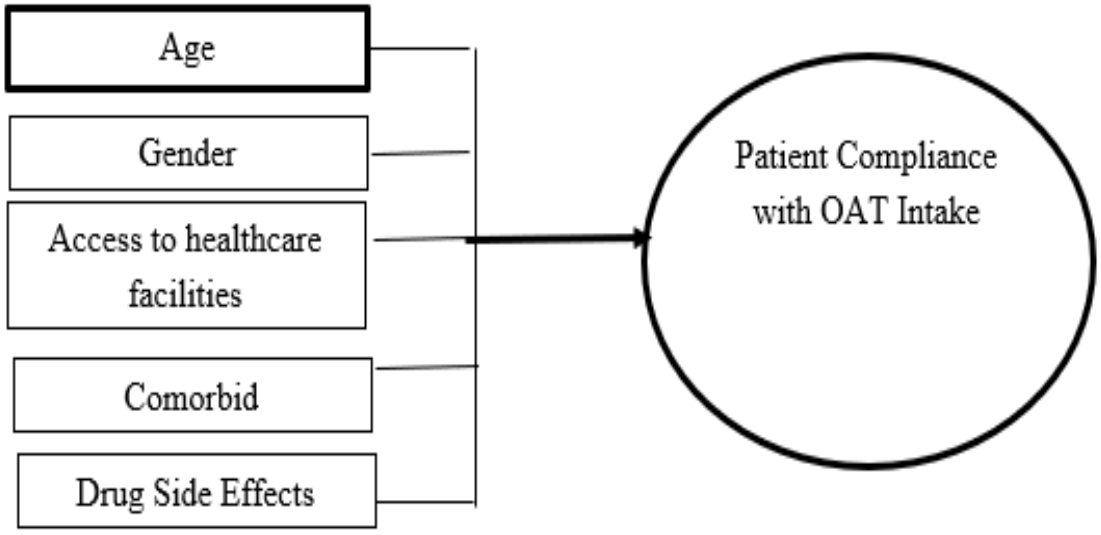
National data from the Indonesian Health Profile shows that the number of TB case notifications is still high and is a priority in infectious disease control programs. The high incidence rate of TB shows that the control of this disease still faces various challenges, especially in the success of treatment and patient compliance (Sari Dewi et al., 2024).

Based on a report by the World Health Organization (WHO), pulmonary TB is among the top ten causes of death in the world. In 2022, there are an estimated 10.6 million people in the world suffering from pulmonary TB, and about 1.4 million of them died from the disease. Indonesia itself is the country with the second-highest number of pulmonary TB cases after India, with an estimated 969,000 cases reported annually (Ministry of Health, 2024).

At the regional level, Mimika Regency is an area with a burden of TB cases that still requires attention in terms of treatment success. Data from the TB program at the Central Market Health Center shows that there are still patients who have lost their medication (loss to follow-up) and compliance in undergoing treatment to completion. This condition has the potential to hinder the achievement of TB elimination targets and increase the risk of drug resistance. At the Central Papua Province level, in 2025, the highest TB cases will be in Mimika district with 2,789 cases, followed by Nabire province, which has 2,390 cases (Provincial Data, 2025).

Until now, there has been no analytical study that specifically identifies factors related to compliance with OAT in pulmonary TB patients at the Central Market Health Center, Mimika Regency. The following is data on TB patients at health centers in Mimika Regency, where the highest cases in 2024 were obtained at the Timika Health Center with 117 cases, followed by the Kwakki Health Center with 108 cases and the Central Market Health Center with 98 cases (Provincial Data, 2025).

Frame of Mind



Picture 1. Conceptual Framework

THEORETICAL REVIEW

The concept of patient adherence to treatment can be explained through the Health Belief Model (HBM), which posits that individual behavior is influenced by perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. In the context of tuberculosis (TB) treatment, patients are more likely to adhere to Anti-Tuberculosis Drug (OAT) regimens when they believe that TB is a serious disease, recognize their vulnerability to complications, and perceive that the benefits of completing treatment outweigh the barriers such as side effects or long treatment duration. Additionally, cues to action, such as support from healthcare workers and family, as well as self-efficacy, play a crucial role in shaping adherence behavior. This theoretical framework highlights that adherence is not solely determined by clinical factors but also by psychological and social perceptions.

METHODOLOGY

This research is a quantitative analytical research with a cross-sectional approach. (Hasmi 2023). This study involved 158 pulmonary TB patients at the Pasar Sentral Health Center, Mimika Regency, whose samples were taken using saturated sampling techniques. Data analysis was carried out univariate, bivariate (Chi-square and Fisher Exact tests), and multivariate with logistic regression.

RESEARCH RESULTS

Univariate Analysis

Table 1. Independent variable distribution

No	Variabel	Frekuensi (n)	Presentase (%)
1	**Age**		
	Risk (< 25 tahun atau > 55)	67	42.4
	No Risk (25-55)	91	57.6
2	**Gender**		
	Male	98	62
	Female	60	38
3	**Comorbid**		
	Yes	12	7.6
	None	146	92.4
4	**Side Effects of OAT**		
	Yes	27	17,1
	Non	131	82.9
5	**Access to healthcare :**		
	Far Away	2	1.3
	Nearby	156	98.7
6	**OAT drinking adherence**		
	Yes	32	20.3
	None	126	79.7
	Total	158	100,0

Based on univariate analysis, the distribution of respondents showed that the majority of patients were in the non-risk age group (57.6%) and were dominated by men (62%). Almost all respondents had no comorbidities (92.4%) and did not experience OAT side effects (82.9%). The distance variable, 98.7%, is close to health facilities. The compliance rate of taking OAT is relatively high, with 79.7% adherence.

Bivariate Analysis

Table 2. Chi-Square Analysis and Prevalence Ratio

No	Variable	*Adherence to taking anti-tuberculosis drugs (OAT)*				n	*p-value*	*RP*
		Non-adherence		Adherence				Lower-Upper
		n	%	n	%			
1	**Age**							
	Risky	13	19.4	54	80.6	67	0.97	0.9
	No Risk	19	20.9	72	79.1	91		(0.4-1.7)
2	Gender							
	Male	24	24.5	74	75.5	98	0.13	1.83
	Female	8	13.3	52	86.7	60		(0.8-3.8)
3	Comorbidities							
	Yes	6	50	6	50	12		2.8
	None	26	17.8	120	82.2	146	0.01	(1.4-5.57)

4	Side Effects of Anti-Tuberculosis Drugs						
	Yes	3	11.1	24	88.9	27	0.30	0.5 (0.1-1.5)
	None	29	22.2	102	77.8	131		
6	Access to healthcare facilities						
	Far away	0	0	2	100	2	0.63	none
	Nearby	3	20.5	124	79.5	156		

Multivariate Analysis

Based on the results of bivariate analysis, only 2 variables are eligible for multivariate analysis < 0.25, namely gender variables and the presence of comorbidities.

Table 3. Multiple Logistic Regression Variable Analysis

No	Variabel	*p-value*	Exp(B)	95% CI	
				Lower	*Upper*
1	Gender	0.058	2.42	0,969	6.084
2	comorbid	1.702	5.48	1.559	19.32

DISCUSSION

Age is a measure of the time of existence of an object or creature, both living and dead. In terms of public beliefs, older people show more maturity in acting. This maturity of mind helps in implementing a healthy life because diseases can attack at any age (Fitriana 2022). Age can affect the body's defenses; the higher the age, the weaker the body's defense system and the body's ability to react with OAT, due to inefficient drug metabolism and organ function at an older age (Nurwajdaini Nurfa 2022).

The results of this study are in line with research conducted by Anisah et al. (2021, stating that age does not affect the failure of RO TB treatment, and the older the age of RO TB patients, the more likely they are to have a risk of failure/death,/drop out. This is because the older a person lives, the body's immune system decreases, so that it is susceptible to disease. And at an old age, they are less motivated to be healthy and less concerned about their health, and there is a decline in social functions such as intellectual, memory, and problem-solving skills (Aminah and Djuwita 2021).

The results of this study are not in line with those of (in 2024 reporting that the productive age group has a higher risk of TB treatment failure than the unproductive age group. This is due to high activity levels, workload, and the tendency of patients of productive age to stop treatment prematurely.

The results of this study show that the relationship between age and treatment failure in RO tuberculosis patients in Papua Province is not significant because the number of respondents with a risk age (0-14 years, >55 years) is less in treatment compared to the number of non-risk age due to respondents who are absent and do not return to follow up.

While a person's gender variable indicates a person's busyness and activity routine, where men have higher activities, most of them go out of the house to earn a living, so they do not pay attention to their health, compared to

women, who are more at risk of succeeding in treatment. Men also have the habit of smoking and drinking alcoholic beverages, which lowers immunity and affects success in treating drug-resistant TB (Afriani and Edianto, 2024).

The results of this study are not in line with (Mahartati and Syahrizal Syarif 2024), which states that gender has a relationship with treatment success, where men have lower regularity of treatment compared to women because men are more likely to leave the house to earn a living and smoke. In smokers, macrophage disorders occur and increase the resistance of the airways and pulmonary epithelium, because cigarettes aggravate and worsen lung health.

The results of this study show that the relationship between gender and treatment failure in RO tuberculosis patients is not significant, traditional customs in Papua women also have the task of working for a living, gardening, so that women do not pay attention to their health and reduce their immunity so that they are at risk of failing treatment compared to men (Womsiwor et al. 2024)).

According to epidemiological research conducted in Houston, Texas, United States, tuberculosis in blacks is associated with younger age, living in urban centers, HIV positive status, and drug-resistant tuberculosis. Tuberculosis cases in black (82%) and white (77%) groups (Serpa et al. 2009).

The results of this study are in line with Priscillia Ryani Tutuhatunewa and Lukman Hardia in 2024, who stated that there was no relationship between tribes and treatment failures in RO tuberculosis patients. Based on ethnographic studies, the Papuan tribe has cultural diversity, knows about overcoming various health problems that have been passed down from generation to generation with traditional medicine approaches due to customary factors, more trust in the habits of their ancestors, close to direct practitioners such as shamans, or relatives who are experienced in dealing with traditional health problems. The Papuan tribe emphasizes more the symptoms of disease caused by supernatural factors or the intervention of supernatural forces, evil spirits, and suanggi, which can all be overcome with traditional treatment systems (Womsiwor et al. 2024).

The results of this study show that the relationship between tribalism and treatment failure in drug-resistant tuberculosis patients in Papua Province is not significant because RO TB treatment failure can occur in all tribal groups and is not only influenced by the patient's ethnic background.

Based on the results of this study, it shows that the relationship between work and treatment failure in RO tuberculosis patients in Papua Province is significant.

Work is an activity carried out by individuals to earn income that can affect their time, energy, and consistency in undergoing treatment (Anisah, Sumekar, and Budiarti 2021).

The results of this study are in line with the research conducted by Research by Setiawan et al., in 2024 stating that there is a relationship between work and treatment failure of RO TB patients, where patients who are at risk of failure in treatment are those who do not work. Employment status is considered to be one of the indicators of socioeconomic status that affects the success of treatment. Work status can be used as an illustration of the fixed income ability

generated by tuberculosis patients that can support the success of treatment (Fitriana 2022).

The results of this study show that the relationship between work and treatment failure in RO tuberculosis patients in Papua Province is significant because the number of respondents who fail in RO TB treatment by not working is higher (58.2%) compared to the number of respondents who work.

Based on the results of this study, it is shown that the relationship between OAT side effects and treatment failure in drug-resistant tuberculosis patients in Papua Province is significant.

All OATs used for the treatment of drug-resistant TB patients have the possibility of mild, moderate, or severe side effects. If more severe side effects of treatment appear, it is likely that the patient will stop treatment without notifying the TAK/health facility officer (Lost to follow-up) (Ministry of Health of the Republic of Indonesia, 2024).

The results of this study are in line with those conducted by Aminah & Djuwita (2021), stating that there is a relationship between the respondents' OAT side effects and adherence and failure to treat Drug-Resistant TB, because with severe side effects causing patients to feel afraid to consume drugs that cause the patient to stop taking medication, the more severe the side effects of OAT, the more non-compliant they are with taking medication, and the milder the side effects of OAT, the more obedient you will be to take the medication.

The results of this study showed that the relationship between OAT side effects and treatment failure in patients with Drug-Resistant Tuberculosis was significant, because of the 194 respondents with severe side effects who failed treatment, 179 respondents (92.3%).

Based on the results of this study, it is shown that the relationship between Comorbid Diabetes mellitus and treatment failure in Drug-Resistant Tuberculosis patients in Papua Province is not significant.

Diabetes mellitus can decrease cellular immunity, specifically the function of macrophages and lymphocytes, which are important components of the body's defenses against Mycobacterium tuberculosis infection. Therefore, patients with comorbid DM have a higher risk of developing a severe form of tuberculosis, a slower response to treatment, and a greater likelihood of recurrence or failure to treat (Anisah, Sumekar, and Budiarti 2021).

The results of this study are in line with those conducted by stating that there is no relationship between the respondents' comorbid DM and the failure of Drug-Resistant TB treatment, because patients with comorbid DM have received routine management of comorbidities, so that blood sugar levels are more controlled and do not directly affect the success of drug-resistant TB treatment. Good diabetes management helps prevent complications that can worsen the patient's condition during treatment for drug-resistant TB.

The results of this study show that the relationship between comorbid DM and treatment failure in patients with drug-resistant tuberculosis in Papua Province is not significant. This is suspected because patients with comorbid DM have received good disease management since the beginning of treatment, accompanied by routine health monitoring during treatment for drug-resistant

tuberculosis until completion, according to the prescribed program. Good management of DM can help keep the patient's condition stable, so that the treatment of Drug-Resistant TB can be carried out optimally and the chances of recovery are greater.

Based on the results of this study, it is shown that the relationship between HIV/AIDS comorbidities and treatment failure in drug-resistant tuberculosis patients in Papua Province is not significant.

RO TB patients with HIV/AIDS comorbidities have a very weak immune system, so TB treatment becomes more complex, has a longer duration, and the risk of death increases to experience RO TB treatment failure compared to patients without TB-HIV co-infection due to decreased immune response to therapy and the high potential for side effects of interactions between ARV drugs and OAT (Ministry of Health of the Republic of Indonesia, 2024).

The results of this study are not in line with the study (Laili, Murtiani, and Ronoatmodjo 2024) which states that people with TB-HIV co-infection will be at a 2.3 times higher risk of experiencing RO TB treatment failure in Indonesia, where decreased immune conditions in HIV patients can accelerate disease progression, increase the risk of opportunistic infections, and worsen the body's response to TB treatment.

The results of this study showed that the relationship between HIV/AIDS comorbidities and treatment failure in drug-resistant tuberculosis patients in Papua Province was not significant, because the number of respondents with HIV/AIDS comorbidities was less (19.5%) compared to the number of non-HIV/AIDS comorbidities (80.5%).

Based on the results of this study, it is shown that the relationship between TB treatment history and treatment failure in RO TB patients in Papua Province is not significant.

Tuberculosis treatment history refers to conditions in which RO TB patients have undergone previous TB treatment therapy, either completed completely, discontinued treatment, or failed treatment (Ministry of Health of the Republic of Indonesia, 2024).

The results of this study are not in line with the research conducted by (Wulandari 2024) which states that the presence of a history of previous TB treatment will increase the chance of experiencing treatment failure by 3.6 times compared to new TB patients, where in patients with a history of previous TB treatment the level of adherence to taking the drug is lower than that of new TB patients, possibly due to lack of knowledge, the presence of drug side effects or lack of supervision, and TB bacteria may have developed a resistance to previous OATs which resulted in the eventual failure of the treatment. The previous history of TB treatment provides an overview of the effectiveness and quality of previous treatment in the patient. Patients who have a previous history of TB treatment have a better picture of the treatment model and the body's side effects on drugs (Setiawan et al. 2024).

The results of this study showed that the relationship between TB treatment history and treatment failure in RO TB patients in Papua Province was not significant because the number of respondents with a history of TB treatment

in RO TB treatment was less (33%) compared to the number of respondents with no history of TB treatment (67%).

Based on the results of this study, it is shown that the relationship between treatment combination and treatment failure in patients with Drug-Resistant Tuberculosis in Papua Province is significant.

Drug-Resistant TB (TB RO) treatment combination is a combination of second-line anti-TB drugs given to patients who have been shown to be resistant to rifampicin (RR TB) or to more than one type of major TB drug (MDR TB). This combination can be short-term (Shorter Regimen) or long-term (Longer Regimen), depending on the type and level of resistance the patient has (Ministry of Health of the Republic of Indonesia, 2024).

The results of this study are in line with the research conducted by Research by Setiawan et al., in 2024 stating that there is a relationship between treatment alloys and treatment failure of RO TB patients, where long-term alloys have greater challenges due to the very long duration of treatment.

Research shows that patients who receive a combination of short-term treatment with strict monitoring have a higher therapy success rate (above 70%) compared to patients with long regimens who often have more side effects and a risk of discontinuation.

The results of this study showed that the relationship between treatment combinations and treatment failure in drug-resistant tuberculosis patients in Papua Province was significant, because the number of respondents who used long-term combinations who failed treatment was higher (69.6%) compared to short-term ones who failed treatment (43.6%).

Based on the results of this study, it is shown that the relationship between OAT adherence to OAT and treatment failure in drug-resistant tuberculosis patients in Papua Province is significant.

Compliance with OAT is the extent to which the patient's behavior in taking medication is in accordance with the instructions, dosage, and schedule that have been set by health workers. In the context of Drug-Resistant Tuberculosis (TB RO), compliance is very important because treatment usually lasts more than 9 months, with a combination of several types of drugs that have the potential to cause side effects (Mega, Gama, and Ramadhan M 2016).

According to the compliance with RO TB patients is regularity in consuming all types of second-line OATs during a predetermined treatment period, including timeliness, frequency, and absence of pauses in drug consumption, that risk causing ineffective treatment.

The results of this study are in line with the research; there is a relationship between adherence to taking OAT and RO TB treatment failure. Adherence greatly affects TB treatment because patients who refer to TB therapy procedures and carry out all the instructions given by medical personnel will give good therapy results. Patients who do not comply with taking OAT are at risk of failure in the treatment of RO tuberculosis (Ministry of Health of the Republic of Indonesia, 2024).

The results of this study show that the relationship between OAT adherence to treatment failure in patients with drug-resistant tuberculosis in

Papua Province is significant, because patients who do not comply with OAT are at risk of 18 times the failure of RO TB treatment in Papua Province where 98% of the number of non-compliant respondents who fail in RO TB treatment compared to those who comply.

The results of this study showed that comorbid HIV/AIDS is the most dominant factor in the failure of RO TB treatment in Papua Province. The results of this study show that the relationship between OAT adherence to treatment failure in patients with drug-resistant tuberculosis in Papua Province is significant, because patients who do not comply with OAT are at risk of 18 times the failure of RO TB treatment in Papua Province where 98% of the number of non-compliant respondents who fail in RO TB treatment compared to those who comply.

The results of this study showed that comorbid HIV/AIDS is the most dominant factor in the failure of RO TB treatment in Papua Province.

This research is in line with that conducted by Laili et al. (2024, HIV patients are the most vulnerable group to be infected with RO tuberculosis. This group is at high risk of developing into active tuberculosis with a very high mortality rate, and without treatment, death will usually occur within 1-3 months.

The existence of TB-HIV co-infection causes a person's immunity to be low, so that if treatment is not carried out carefully, of course, it will affect the success of treatment for the sufferer. This is caused by HIV infection, which makes the tuberculosis germ stronger to infect while a person's immune system continues to decline. The existence of tuberculosis germs will make the human body produce pro-inflammatory cytokines, which cause increased replication and diversity of the HIV virus, so that there is a release of the body's immunity (Ministry of Health of the Republic of Indonesia, 2024).

Treatment failure in RO tuberculosis patients with comorbidities of HIV/AIDS can also be affected by the complexity of the therapy undergone. Patients should take second-line anti-tuberculosis drugs for a long time, often in conjunction with antiretroviral therapy. This combination of medications can increase the risk of side effects, drug interactions, and decrease patient adherence to taking medication. If compliance is not maintained, the chances of treatment failure will be greater (Anisah, Sumekar, and Budiarti 2021).

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The results of the study were found to be 55.4% failed in the treatment of Drug-Resistant TB. The results *of the Chi-square* test showed a significant association with treatment failure with work (*p-value* 0.031; RP = 1.2; CI95% (1,016-1,596), OAT side effects (*p-value* 0.000; RP = 3.1; CI95% (2.588-3.754), treatment alloy (*p-value* 0.000; RP = 1.5; CI95% (1,355-1,884), adherence to taking OAT (*p-value* 0.000; RP = 18.0; CI95% (10,401-31,263) or *p*> *a* value (0.05). Insignificant variables were age, sex, ethnicity, comorbid DM, comorbid HIV/AIDS, and TB treatment history. Comorbid HIV AIDS is the most dominant factor for treatment failure in RO tuberculosis patients in Papua Province (*p-value* = 0.000 RP = 356, CI95% (12,011-10,588,890).

Recommendations

Public Health Center and Hospitals need to improve the supervision of taking medication in RO TB patients so that treatment adherence increases.

ADVANCED RESEARCH

Researchers can then examine other factors that affect the failure of RO TB treatment, such as family support, nutritional status, patient knowledge, and access to health services.

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REFERENCES

Afriani, Dina, and Edianto Edianto. 2024. "Analysis of Adherence Treatment Factors in Drug-Resistant Tuberculosis Patients with Acid-Resistant Bacillus Conversion." Jurnal Kesehatan Pasak Bumi Kalimantan 7(2): 168. doi:10.30872/j.kes.pasmi.kal.v7i2.16481.

Aminah, Nenden Siti, and Ratna Djuwita. 2021. "Tren dan Faktor yang Berhubungan dengan Keberhasilan Pengobatan Pasien TB MDR Paduan Jangka Pendek di Indonesia 2017–2019." Pro Health Jurnal Ilmiah Kesehatan 3(1): 109–17.

Anisah, Anisah, Dyah Wulan Sumekar, and Endang Budiarti. 2021. "Hubungan Demografi Dan Komorbid Dengan Kejadian Tuberkulosis Resisten Obat (TB RO)." Jurnal Ilmiah Kesehatan Sandi Husada 10(2): 568–74. doi:10.35816/jiskh.v10i2.655.

Dessritina, Pesona, Ravi Masitah, Irzal Fanany, Teuku Muhammad Rafsanjani, Eva Flourentina Kusumawati, and Maiza Duana. 2025. "Analisis Ketahanan Hidup Pada Pasien TB-MDR (Tuberkulosis Multi-Drug Resistant) Dengan Komorbid DM Dan/Atau HIV Di Kota Medan, Sumatera Utara." Jurnal Penelitian Inovatif 5(3): 2331–40. doi:10.54082/jupin. 1702.

Dinkes Provinsi Papua. 2025. "Laporan Kinerja Dinas Kesehatan Provinsi Papua." Lkj Provinsi Papua 7(2).

Fitriana, Grace. 2022. "Faktor-Faktor Yang Mempengaruhi Keberhasilan Pengobatan Pasien Tuberkulosis Resistan Obat Di RSUP Dr. Sardjito Yogyakarta." Journal repository.

Hasmi. 2023. Metode Penelitian Epidemiologi Edisi 2.

Hasmi and Sarce Makaba. 2024. "Risk Attribute Analysis and Risk of Adherence to Taking Medication for Pulmonary TB Patients at the Jayapura Regency Office." 3(11): 2489–98.

Kemenkes RI. 2024a. Juknis Penatalaksanaan Tuberkulosis Resisten Obat Di Indonesia.

Kemenkes RI. 2024b. Petunjuk Teknis Penatalaksanaan TBC RO di Indonesia.

Laili, Fitrianur, Farida Murtiani, and Sudarto Ronoatmodjo. 2024. "Ko-Infeksi TB-HIV terhadap kegagalan pengobatan pasien tuberkulosis resisten obat di Indonesia." The Indonesian Journal Of Infection Diseases 10(2). doi:https://doi.org/10.32667/ijid.v10i2.309.

Mahartati, Ni Made Nujita, and Syahrizal Syarif. 2024. "Faktor Risiko Kegagalan Pengobatan Tuberkulosis: Systematic Review." Media Publikasi Promosi Kesehatan Indonesia (MPPKI) 7(4): 899–906. doi:10.56338/mppki.v7i4.5157.

Mega, Shinta, Sabania Injar; Gama, and Adam Ramadhan M. 2016. "Kajian Pengobatan dan Kepatuhan Pasien Multidrug-Resistant Tuberculosis (MDR-TB) di RSUD A. W. Sjahranie Samarinda." Prosiding Seminar Kefarmasian.

Nurwajdaini Nurfa. 2022. 2 tesis "Hubungan Faktor Demografis Dengan Keberhasilan Pengobatan Pasien TB-RO Di RSUD Dr.Saiful Anwar Malang."

Priscillia Ryani Tutuhatunewa, Lukman Hardia, Irwandi. 2024. "PENGARUH SOSIODEMOGRAFI TERHADAP KEBERHASILAN PENGOBATAN PASIEN TB-RO DI RSUD DR. J. P. WANANE." Jurnal Kesehatan Tambusai 5 (September): 9280–88.

Ruru, Yacob, Nur Nasry, Alimin Maidin, and Andi Zulkifli. 2017. "Model of Risk Factors of Multidrug-Resistant Tuberculosis (MDR-TB) in RSUD Dok II Jayapura." 4531(9): 237–48.

Serpa, Jose A., Larry D. Teeter, James M. Musser, and Edward A. Graviss. 2009. "Tuberculosis Disparity between US-Born Blacks and Whites, Houston, Texas, USA." Emerging Infectious Diseases 15(6): 899–904. doi:10.3201/eid1506.081617.

Setiawan, Budi, Tri Yunis Miko Wahyono, Dwi Oktavia, Fakultas Kesehatan Masyarakat, Universitas Indonesia, and Dinas Kesehatan Provinsi DKI Jakarta. 2024. "Hubungan Kepatuhan dan Riwayat Pengobatan terhadap Keberhasilan Pengobatan Tuberkulosis Resistan Obat dengan Paduan Obat Jangka Pendek 9-11 Bulan di Provinsi DKI Jakarta." Journal of Mandalika Literature 5(3): 210–21.

Womsiwor, P.S, Marlina Flassy, Usman Idris, Simon Abdi, and K Frank. 2024. "Science Midwifery Traditional Medicine of the Biak Tribe in Opuri Village, Biak Regency, Papua." Science Midwifery 12(2): 2721–9453.

World Health Organization. 2025. Blood Global Tuberculosis Report. doi:978 92 4 156450 2.

Wulandari, Elizabeth. 2024. "Determinan Kegagalan Pengobatan Pada Pasien Tuberkulosis Sensitif Obat Dewasa Di Provinsi Jawa Tengah Tahun 2022." Jurnal Epidemiologi Kesehatan Indonesia 8(1). doi:10.7454/epidkes.v8i1.1100.