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The Social Determinants of an Infectious Disease Outcome: Age, Occupation, and Stigma in Drug-Resistant Tuberculosis in Indonesia

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Abstract: This study examines the associations between socioeconomic factors, including age, occupation, and stigma, and treatment outcomes among patients with drug-resistant tuberculosis in Indonesia. Drug-resistant tuberculosis (DR-TB) remains a major obstacle to global tuberculosis elimination efforts, with lower treatment success rates compared to drug-susceptible TB. This study aims to analyze the social determinants of infectious disease outcomes specifically age, occupation, and stigma in relation to cure status among DR-TB patients in Indonesia. This study was conducted using an observational study with a cross-sectional design in 10 cities of 8 provinces, with a sample size of 214 subjects. Data collection was conducted using structured interviews and questionnaires. The inclusion criteria for this study were patients aged ≥ 17 years, who signed the informed consent. Exclusion criteria were extrapulmonary drug-resistant tuberculosis patients. Data analysis was performed using SPSS 23.0 and bivariate analysis using chi-square or Fisher's test with a p-significance value < 0.05 . The bivariate analysis showed significant associations between cure status and age ($p = 0.020$), occupational status ($p = 0.004$), income ($p = 0.015$), and occupational ostracization ($p = 0.013$). Age, employment status, income, and workplace ostracization were significantly associated with cure status among patients with drug-resistant tuberculosis. Addressing these determinants is essential to improving DR-TB cure rates in Indonesia.

Penelitian ini menganalisis faktor-faktor sosial yang memengaruhi hasil pengobatan penyakit menular, yaitu usia, pekerjaan, dan stigma pada tuberkulosis resisten obat di Indonesia. Tuberkulosis resisten obat (TB-DR) tetap menjadi hambatan utama dalam upaya eliminasi tuberkulosis secara global, dengan tingkat keberhasilan pengobatan yang lebih rendah dibandingkan dengan TB yang sensitif terhadap obat. Penelitian ini bertujuan untuk menganalisis faktor-faktor sosial yang memengaruhi hasil penyakit menular, khususnya usia, pekerjaan, dan stigma dalam kaitannya dengan status kesembuhan di antara pasien TB-DR di Indonesia. Penelitian ini dilakukan dengan menggunakan studi observasional dengan desain cross-sectional di 10 kota di 8 provinsi, dengan ukuran sampel sebanyak 214 subjek. Pengumpulan data dilakukan melalui wawancara terstruktur dan kuesioner. Kriteria inklusi dalam studi ini adalah pasien berusia ≥ 17 tahun yang telah menandatangani formulir persetujuan. Kriteria eksklusi adalah pasien tuberkulosis resisten obat ekstrapulmoner. Analisis data dilakukan menggunakan SPSS 23.0 dan analisis bivariat dengan uji chi-square atau uji Fisher dengan nilai signifikansi $p < 0,05$. Analisis bivariat menunjukkan adanya hubungan yang signifikan antara status kesembuhan dan usia ($p = 0,020$), status pekerjaan ($p = 0,004$), pendapatan ($p = 0,015$), serta pengucilan di tempat kerja ($p = 0,013$). Faktor-faktor sosioekonomi, termasuk usia, pekerjaan, pendapatan, dan stigma di tempat kerja, secara signifikan memengaruhi hasil pengobatan pada pasien TB-DR. Mengatasi faktor-faktor penentu ini sangat penting untuk meningkatkan tingkat kesembuhan TB-DR di Indonesia.

Keyword: Adherence, Social, Economic, Drug-resistant

INTRODUCTION

Indonesia is currently ranked second in the world in terms of tuberculosis (TB) burden. Based on data from the Global Tuberculosis Report in 2022, the number of TB cases in Indonesia is 969,000 (354 per 100,000 population), and 28,000 of the 969,000 instances are drug-resistant tuberculosis (DR-TB). (Dirjen P2P, 2022) Drug-resistant tuberculosis is a major obstacle in the global elimination of the disease with lower treatment success rates. Medication adherence largely determines patients' cured status, and various factors are associated with medication adherence. Sputum smear conversion from positive to negative during treatment is an important indicator of treatment response, although additional clinical and microbiological criteria are required to establish cure. (World Health Organization, 2022) Long-term treatment with various combinations of drugs that need to be taken during treatment, as well as drug side effects, are factors that cause drug withdrawal from the therapeutic dimension, resulting in treatment failure. Treatment failure will increase the incidence of drug-resistant TB. The increase in DR-TB cases is a significant public health problem that has a major impact on the health system and socioeconomic well-being of the community and even the economic burden on the country. Other factors such as unequal distribution and accessibility of health services across the region, different economic levels, and social disparities are associated with TB patient cure.

According to the World Health Organisation's (WHO) five dimensional model of medication adherence, socioeconomic factors including age, occupation, income and education play a critical role in treatment success. (Peh et al., 2021) Medical interventions, socioeconomic conditions, the patient's place of residence as well as the patient's relationship with medical personnel are associated with drug-resistant TB treatment outcomes. In addition to medical issues, drug-resistant tuberculosis patients in the real world face challenges in the recovery process due to tuberculosis-related stigma, community perceptions of the disease, and gender and economic inequalities. Tuberculosis-related stigma may discourage patients from seeking

timely medical care and maintaining treatment adherence. Delayed diagnosis and treatment interruption may contribute to continued transmission within households and communities. (Iskandar et al., 2023; Jiang et al., 2023; Nezenega et al., 2020)

Previous studies have yielded inconsistent findings. Several studies have concluded that socioeconomic dimensions correlate with recovery to achieve successful TB treatment; higher socioeconomic levels have better treatment outcomes, and they may have more access to available health services and facilities. However, other studies suggest that social support, health system, distance traveled to health services and drug therapy are more related to successful treatment than socio-economic factors. Patients with a low socioeconomic level are associated with a lower recovery rate, this is due to the inability to obtain medical care or medication, as well as economic conditions related to poor nutrition which will result in a decrease in body strength. This decrease in body power will slow down the healing process of the disease. (Imam et al., 2021; Nidoi et al., 2021; Putra & Toonsiri, 2019) These inconsistent findings highlight the need for further investigation into the relationship between socioeconomic factors and treatment outcomes among patients with drug-resistant tuberculosis in Indonesia. Therefore, this study aims to identify socioeconomic factors associated with cure status in this population. The findings are expected to inform policy intervention aimed at improving treatment success rates and reducing TB transmission.

METHOD

This study is an observational study with a cross-sectional design. Data were collected from October to November 2019. The selection of research locations was determined based on the needs of the Principal Recipient (Global Fund partner). This study was conducted in 8 provinces consisting of 10 cities namely Medan, Bengkulu, Palembang, Semarang, Cilacap, Surabaya, Jember, Pontianak, Makassar, and Kupang. Data collection was conducted using structured interviews and questionnaires.

The inclusion criteria for this study were DR-TB patients aged ≥ 17 years and signed the informed consent. Exclusion criteria were extrapulmonary DR-TB patients. The sample size was calculated using formulas for infinite and finite populations, with a 95% confidence level ($Z = 1.96$). The calculation used a population size of 143,025 TB patients across the eight selected provinces and a prevalence estimate of 13.39%. The minimum required sample size was 178 participants. After allowing for a 20% increase to account for potential nonresponse, the final target sample size was 214

$$\text{participants}_{n_0} = \frac{z^2 \times p \times q}{d^2}$$

Using a finite population formula with a 95% confidence level, the minimum sample size was calculated as 178. An additional 20% was added to account for potential dropout, resulting in a total sample of 214 participants. Consecutive non-random sampling was used to select respondents proportionally from each province (Table 1). Data collection was conducted using structured interviews and questionnaires. Variables included demographics (age, gender, marital status, education), economic factors (occupation, income), lifestyle (alcohol, drug use), and social factors (medication supervisor, ventilation, stigma, occupational ostracization). Data analysis was performed using SPSS 23.0 and bivariate analysis using chi-square or Fisher's test with a p-significance value < 0.05 . Multivariate analysis was not conducted due to the exploratory nature of the study and the limited sample size for certain subgroups.

Table 1. Sample size calculation table for each province

Province	Number of TB cases	Sample calculation /province	Number of Samples
East Java	48.323	48323/143.025x214	67
Surabaya			49
Jember			18
Central Java	42.272	42.272/143.025x214	62
Semarang			48
Cilacap			14
Bengkulu	1.971	1.971/143.025x214	8
Bengkulu			8
North Sumatera	20.429	20.429/143.025x214	31
Medan			31
South Sulawesi	8.508	8.508/143.025x214	13
Makasar			13
South Sumatera	11.107	11.107/143.025x214	17
Palembang			17
East Nusa Tenggara	5.350	5.350/143.025x214	8
Kupang			8
West Kalimantan	5.065	5.065/143.025x214	8
Pontianak			8
TOTAL			214

This research has passed ethical review by the Research Ethics Committee of the Faculty of Medicine, Universitas Trisakti (No. 147/KER/FK/VIII/2019). Research permits and support have also been requested from the Ministry of Home Affairs, the TB Sub-Directorate of the Ministry of Health, the hospital, and the local health office.

RESULTS AND DISCUSSION

The results showed that 139 (65%) were < 50 years old, 119 (55.6%) were male, with 63.6% of married status. Only 91 (42.5%) of respondents were working. Most have medication monitors and peer educators. Eight subjects (3.7%) experienced stigma and 12 respondents (5.6%) were ostracized in the work. (Table 2)

The results of the bivariate analysis showed that there was a significant relationship between age, employment, income, and cured status with p-values of 0.020; 0.004, and 0.015 respectively. It was also found that there was a statistically significant relationship between the experience of being ostracized at work and the outcome cured status with a p-value of 0.013. (Table 3)

Table 2. Characteristics of the subjects (n=214)

Variable	n	%
Demographics		
Age (year)		
< 50	139	65.0

≥ 50	75	35.0
Gender		
Male	119	55.6
Female	95	44.4
Marital status		
Not married	54	25.2
Married	136	63.6
Widow/widower	24	11.2
Education Level		
Not graduated	88	41.1
High school graduate	126	58.9
Economy		
Occupational status		
Not working	123	57.5
Working	91	42.5
Income		
< UMR	62	29.0
$\geq$ UMR	24	11.2
No income	128	59.8
Lifestyle		
Drinking alcohol		
Yes	49	22.9
No	165	77.1
Drugs		
Yes	15	7.0
No	199	93.0
Social		
Has medication supervisor		
Yes	186	86.9
No	28	13.1
Ventilation and lighting		
Yes	180	84.1
No	34	15.9
Stigma present		
Yes	8	3.7
No	206	96.3
Occupational ostracization		
Yes	12	5.6
No	202	94.4

UMR: regional minimum wage

Table 3. The relationship between socioeconomic factors and patient cure

Table 5: The relationship between socioeconomic factors and patient care				
Variable	Treatment Status		n	p
	Cured	Not Cured		
Demographics				
Age (year)				
< 50	28	111	139	0,020*
≥ 50	6	69	75	
Gender				

Male	16	103	119	0,274
Female	18	77	95	
Marital status				
Not married	9	45	54	0,561
Married	23	113	136	
Widow/widower	2	22	24	
Education Level				
Not graduated	10	78	88	0,139
High school graduate	24	102	126	
Economy				
Occupational status				
Not working	12	111	123	0,004*
Working	22	69	91	
Income				
< UMR	14	48	62	0,015*
≥ UMR	7	17	24	
No income	13	115	128	
Lifestyle				
Drinking alcohol				
Yes	9	40	49	0,703
No	29	136	165	
Drugs				
Yes	1	14	15	0,540
No	34	165	199	
Social				
Has a medication supervisor				
Yes	31	155	186	0,917
No	8	20	28	
Ventilation and lighting				
Yes	28	152	180	0,695
No	6	28	34	
Stigma present				
Yes	3	5	8	0,088
No	31	175	206	
Occupational ostracization				
Yes	5	7	12	0,013*
No	35	167	202	

This study confirms that socioeconomic factors particularly age, occupation, income, and occupational ostracization are significantly associated with cure status among DR-TB patients in Indonesia. These findings align with the WHO's socioeconomic dimension of medication adherence and support the Social Determinants of Health framework, which posits that health outcomes are shaped by broader social and economic conditions. Patients with pulmonary TB are found more in the male gender, and at productive age (Harfiani et al., 2020; Nasrullah et al., 2023; Ulfah et al., 2018) TB patients are more prevalent in men, which is associated with a history of smoking habits and daily activities outside the home and

breadwinners for the family. Age shows a relationship with acceptance and commitment to undergo therapy so that it will increase adherence to taking medication. Types of outdoor work and occupational environmental factors increase the risk of possible. It is also interesting to observe that based on gender, treatment dropout rates in men may be higher than in women. This could be attributed to the fact that men are often engaged in work that requires them to be busy, which may result in less time for them to visit health facilities. On the other hand, women may be more concerned about their health and may therefore be more likely to undergo treatment regularly. (Diesty et al., 2020; Nasrullah et al., 2023) Dropping out of treatment will increase the risk of DR-TB and will cause more complex problems in the treatment of patients and sources of transmission for family members, work environments, and communities.

This study also shows that although most patients have a high level of education, the cure rate of patients is still low. This is possible due to side effects that arise during treatment. Studies in Pakistan reported as many as 20.3% of patients experienced at least 3 side effects of drugs, and 19.6% experienced 4 side effects of drugs. (Massud et al., 2022) Some of the side effects reported by patients undergoing DR-TB treatment are gastrointestinal disorders, nervous system disorders, electrolyte disorders, arthralgia, ototoxicity, tinnitus, and skin rashes. (Caminero et al., 2023; Massud et al., 2022; Ngoc et al., 2021) Some significant risk factors for causing nephrotoxicity in patients include diabetes mellitus, impaired kidney function, alcohol consumption habits, and higher average daily doses of injected drugs. (Ngoc et al., 2021) Pharmacological therapy DR-Tb with second-line antituberculosis drugs is reported to have a high prevalence of side effects, ototoxicity side effects, and neuropsychiatric symptoms are the main side effects that cause patients to stop treatment themselves. (Caminero et al., 2023)

Pharmacotherapy has the potential to cause unwanted medical events during drug use, but not all of these events are caused by drugs. This is defined as an adverse event (AE), in contrast to drug side effects where unwanted events are associated with drug use. AE is currently a worldwide health problem. AE can aggravate a patient's medical condition, prolong the number of days of hospitalization, and even contribute to morbidity and even death. Although medicines undergo safety and efficacy evaluations before receiving marketing authorization, clinical trials cannot identify every potential adverse reaction. Differences in genetics, comorbidities, dietary patterns, and environmental exposures may influence medication responses in routine clinical practice. Continuous pharmacovigilance is therefore essential for identifying and evaluating adverse drug reactions after medicines enter the market. In addition to drug response, other important aspects that need to be monitored are consistency in the quality of drugs produced, misuse, and medical errors. (WHO, 2002, 2006) To ensure the quality and safety of patients related to the use of drugs, WHO has launched pharmacovigilance activities. The purpose of pharmacovigilance activities is to provide surveillance through observation, monitoring, and evaluation of data on unwanted drug reactions, both actively and spontaneously. Data reporting is sent directly to the coordination center in Uppsala, Sweden. (Güner & Ekmekci, 2019). AE reports are not only limited to being reported by patients but can be submitted by family members, and medication supervisors.

It would be beneficial to monitor complaints that arise during drug use, as this is part of pharmacovigilance. For this to be effective, all complaints submitted need to be recorded and analyzed further. The implementation of pharmacovigilance by health workers has been shown to provide numerous advantages for patient safety. (Ravichandran et al., 2022) It would be beneficial to convey information about side effects to medical staff in a way that encourages a positive response, as this can help to reassure patients about the use of drugs. Drug supervisors play an important role in ensuring that patients receive the best possible care, and it is, therefore, essential that they are well-informed about drug side effects and the need to communicate them to health workers. (Alharbi et al., 2016; Merid et al., 2020) It is important

to note that the side effects of drugs can have a significant impact on daily activities, which may lead patients to stop self-medication.(Aït Moussa et al., 2016; Avong et al., 2018; Duga et al., 2023; El Bouazzi et al., 2016)

Although some studies have concluded, the level of education of the patient is closely related to knowledge. The patient's knowledge of the symptoms of the disease, mode of transmission, and treatment of the disease will improve treatment adherence. Someone with a higher level of education will find it easier to understand disease information obtained independently through social media and other information media so that it will be easier to access health facilities and seek treatment and dangers if not undergoing treatment. The level of education in several studies was concluded to be related to medication adherence.(Hamidi et al., 2019; Lucya & Arief, 2022; Nasrullah et al., 2023; Perwitasari et al., 2022)

Employment and adequate income were positively associated with cure. Stable employment enables access to transportation, nutritious food, and treatment resources, while income insecurity may lead to treatment interruption. The patient's economic status and income are also a factor related to treatment compliance to get cured treatment results. Living conditions, costs for treatment, and nutritional status are directly related to income. (Ahdiyah et al., 2022; Hamidi et al., 2019) Socioeconomic factors are one of the reasons for treatment failure, especially in poor countries, high unemployment, and low income will increase patient non-compliance with taking medication and have a negative impact on TB disease including inadequate housing conditions, overcrowding, malnutrition, poor ventilation, limited education and poor quality of life. Decent housing provisions are more than just buildings but must have the security of ownership, location, facilities, infrastructure, availability of services, accessibility, and reachability. Too dense housing, indoor qualities such as ventilation, and humidity are risk factors for this disease. Affordability and inadequate quality of housing aspects are associated with TB exposure (TB bacilli inhalation), incidence, and medication adherence.(Lee et al., 2022; Mayasari et al., 2022; Singh et al., 2018; Yuniar et al., 2023) Nutritional needs, especially protein, are needed for successful treatment, nutrition will have an impact on immune status indirectly.

Nutritional deficiencies increase the risk of TB because it lowers the immune system. and facilitates aggravation of tuberculosis This disease will cause less appetite so it will affect nutrient intake causing changes in metabolic processes. The body will use 60-70% of the total energy requirement for basal metabolism. Chronically inadequate energy consumption will result in the utilization of energy reserves and have an impact on weight loss and biochemical abnormalities in TB patients. In addition, some micronutrients such as Vitamin A and Zinc help the immune system. Nutritional status can be measured using body mass index.(Cho et al., 2022; Irawan et al., 2017)

Occupational ostracization was significantly associated with cure status. However, the small number of participants reporting workplace ostracization and inconsistencies in the reported treatment outcomes require further examination before the direction of this association can be established. Disease stigma needs more attention from the community and health workers because it greatly contributes to delaying someone getting treatment so that it can become a source of transmission in the community. As a result of this stigma, a patient is afraid of being ostracized and losing their job, which will have an impact on the family's economy and access to drugs and long-term treatment is also a factor in a person's consideration of undergoing treatment.(Khaitan et al., 2022; Kolte et al., 2020; Mbuthia et al., 2020) Education about the disease, disease transmission, and healthy behavior to prevent disease needs to be done thoroughly to support the success of treatment.

Social support and health care systems as well as the quality of health services will affect the level of education related to health and disease. Providing health education will increase social support from the surrounding community and will improve the quality of care

for better medication adherence.(Dilas et al., 2023) Family support works to reduce stress and increase family resilience to improve treatment adherence of family members who are undergoing treatment. Stressors can come from inside and outside the family so a good coping mechanism is needed. An adaptive attitude will have a positive influence on medication adherence. Support from the surrounding environment is also needed by patients during treatment. The duration of treatment and the boredom of taking medication is a stressor for patients and families, but also the risk of drug withdrawal.(Dilas et al., 2023; Putra & Toonsiri, 2019; Rachmawati et al., 2020) This study is limited by several dimensions related to medication adherence were not included in this study, including healthcare systems, diagnosis support facilities, and patient motivation.

CONCLUSION

This study concluded that socioeconomic determinant including age, occupation, income, and occupational ostracization significantly influence cure outcomes in DR-TB patients in Indonesia. It is important to address these socioeconomic factors to improve DR-TB recovery through poverty alleviation, improving living and working conditions, and implementing workplace anti-stigma programs. Policymakers should integrate social support mechanisms into national TB programs to enhance adherence and reduce transmission. Future research should explore the mediating role of social support and healthcare system factors in the relationship between socioeconomic status and treatment outcomes.

Declarations

Ethics approval and consent to participate, this study has passed the ethical review of the Ethics Review Committee of the Faculty of Medicine, Universitas Trisakti No. 147/KER/FK/VIII/2019. Research permission was also obtained from the Ministry of Home Affairs, the TB Sub-Directorate of the Ministry of Health, PMDT Hospital, and the local Health Office.

Consent for publication Not applicable.

Competing interests the authors certify that they have no conflicts of interest.

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REFERENCE

- Ahdiyah, N. N., Andriani, M., & Andriani, L. (2022). Tingkat Kepatuhan Penggunaan Obat Anti Tuberkulosis Pada Pasien TB Paru Dewasa Di Puskesmas Putri Ayu. *Lambung Farmasi: Jurnal Ilmu Kefarmasian*, 3(1), 23. <https://doi.org/10.31764/lf.v3i1.6817>
- Aït Moussa, L., El Bouazzi, O., Serragui, S., Soussi Tanani, D., Soulaymani, A., & Soulaymani, R. (2016). Rifampicin and isoniazid plasma concentrations in relation to adverse reactions in tuberculosis patients: a retrospective analysis. *Therapeutic Advances in Drug Safety*, 7(6), 239–247. <https://doi.org/10.1177/2042098616667704>
- Alharbi, F., Bahnassi, A., & Alonazie, W. (2016). Attitude, knowledge and experience of hospital pharmacists with pharmacovigilance in a region in Saudi Arabia: A cross-sectional study. *Tropical Journal of Pharmaceutical Research*, 15(8), 1773–1779. <https://doi.org/10.4314/tjpr.v15i8.25>
- Avong, Y. K., Jatau, B., Gurumnaan, R., Danat, N., Okuma, J., Usman, I., Mordi, D., Ukpabi, B., Kayode, G. A., Dutt, S., El-Tayeb, O., Afolabi, B., Ambrose, I., Agbaji, O., Osakwe, A., Ibrahim, A., Ogar, C., Nosiri, H., Avong, E. B., ... Ogundahunsi, O. A. T. (2018). Addressing the under-reporting of adverse drug reactions in public health programs controlling HIV/AIDS, Tuberculosis and Malaria: A prospective cohort study. *PloS One*, 13(8), e0200810. <https://doi.org/10.1371/journal.pone.0200810>

- Caminero, J. A., Singla, R., Scardigli, A., Gupta, A., Pérez-Mendoza, G., & Mendoza-Ticona, A. (2023). The basis of tuberculosis treatment: fundamental concepts before treating a patient. *ERS Monograph*, 2023(101), 104–116. <https://doi.org/10.1183/2312508X.10024522>
- Cho, S. H., Lee, H., Kwon, H., Shin, D. W., Joh, H. K., Han, K., Park, J. H., & Cho, B. (2022). Association of underweight status with the risk of tuberculosis: a nationwide population-based cohort study. *Scientific Reports*, 12(1), 1–8. <https://doi.org/10.1038/s41598-022-20550-8>
- Diesty, U. A. F., Tjekyan, R. S., & Zulkarnain, M. Z. (2020). Medical Compliance Determinants for Tuberculosis Patients in Palembang. *Jurnal Ilmu Kesehatan Masyarakat*, 11(3), 272–284. <https://doi.org/10.26553/jikm.2020.11.3.272-284>
- Dilas, D., Flores, R., Morales-García, W. C., Calizaya-Milla, Y. E., Morales-García, M., Sairitupa-Sanchez, L., & Saintila, J. (2023). Social Support, Quality of Care, and Patient Adherence to Tuberculosis Treatment in Peru: The Mediating Role of Nurse Health Education. *Patient Preference and Adherence*, 17(January), 175–186. <https://doi.org/10.2147/PPA.S391930>
- Dirjen P2P. (2022). Laporan Program Penanggulangan Tuberkulosis Tahun 2021. *Kemenkes RI*, 1–147. https://tbindonesia.or.id/pustaka_tbc/laporan-tahunan-program-tbc-2021/
- Duga, A. L., Salvo, F., Kay, A., & Figueras, A. (2023). Safety Profile of Medicines Used for the Treatment of Drug-Resistant Tuberculosis: A Descriptive Study Based on the WHO Database (VigiBase®). *Antibiotics (Basel, Switzerland)*, 12(5). <https://doi.org/10.3390/antibiotics12050811>
- El Bouazzi, O., Hammi, S., Bourkadi, J. E., Tebaa, A., Tanani, D. S., Soulaymani-Bencheikh, R., Badrane, N., & Bengueddour, R. (2016). First line anti-tuberculosis induced hepatotoxicity: Incidence and risk factors. *Pan African Medical Journal*, 25. <https://doi.org/10.11604/pamj.2016.25.167.10060>
- Güner, M. D., & Ekmekci, P. E. (2019). Healthcare professionals' pharmacovigilance knowledge and adverse drug reaction reporting behavior and factors determining the reporting rates. *Journal of Drug Assessment*, 8(1), 13–20. <https://doi.org/10.1080/21556660.2019.1566137>
- Hamidi, S., Raharjo, S. S., & Wijaya, M. (2019). Path Analysis on the Determinants of Adherence to Anti Tuberculosis Drug Treatment in Kaur District, Bengkulu, Indonesia. *Journal of Epidemiology and Public Health*, 4(3), 205–214. <https://doi.org/10.26911/jepublichealth.2019.04.03.08>
- Harfiani, E., . M., & Nurhakim, A. D. (2020). Faktor Apa Yang Mempengaruhi Rendahnya Tingkat Pengobatan Tuberkulosis di Lagoa Jakarta? *JURNAL ILMIAH KESEHATAN MASYARAKAT: Media Komunikasi Komunitas Kesehatan Masyarakat*, 12(3), 110–117. <https://doi.org/10.52022/jikm.v12i3.80>
- Imam, F., Sharma, M., Obaid Al-Harbi, N., Rashid Khan, M., Qamar, W., Iqbal, M., Daud Ali, M., Ali, N., & Khalid Anwar, M. (2021). The possible impact of socioeconomic, income, and educational status on adverse effects of drug and their therapeutic episodes in patients targeted with a combination of tuberculosis interventions. *Saudi Journal of Biological Sciences*, 28(4), 2041–2048. <https://doi.org/10.1016/j.sjbs.2021.02.004>
- Irawan, G. C., Margawati, A., & Rosidi, A. (2017). Underweight increases the risk of pulmonary tuberculosis in adult. *Universa Medicina*, 36(1), 4. <https://doi.org/10.18051/univmed.2017.v36.4-10>
- Iskandar, J., Setiyowati, E., & Zahroh, C. (2023). Medication adherence and visiting compliance: interventions self-management education based on health belief model. *Bali Medical Journal*, 12(2), 1211–1216. <https://doi.org/10.15562/bmj.v12i2.4302>

- Jiang, Y., Chen, J., Ying, M., Liu, L., Li, M., Lu, S., Li, Z., Zhang, P., Xie, Q., Liu, X., & Lu, H. (2023). Factors associated with loss to follow-up before and after treatment initiation among patients with tuberculosis: A 5-year observation in China. *Frontiers in Medicine*, 10(April), 1–9. <https://doi.org/10.3389/fmed.2023.1136094>
- Khaitan, A., Rai, S. K., Krishnan, A., Gupta, S. K., Kant, S., & Khilnani, G. C. (2022). “Better to Die Than Take These Medicines”: A Community-Based Qualitative Study on the Determinants of Treatment Loss-to-Follow-Up in Tuberculosis Patients in District Faridabad, Haryana, India. *Cureus*, 14(5). <https://doi.org/10.7759/cureus.25030>
- Kolte, I. V., Pereira, L., Benites, A., De Sousa, I. M. C., & Basta, P. C. (2020). The contribution of stigma to the transmission and treatment of tuberculosis in a hyperendemic indigenous population in Brazil. *PLoS ONE*, 15(12 December), 1–13. <https://doi.org/10.1371/journal.pone.0243988>
- Lee, J. Y., Kwon, N., Goo, G. yeon, & Cho, S. il. (2022). Inadequate housing and pulmonary tuberculosis: a systematic review. *BMC Public Health*, 22(1), 1–12. <https://doi.org/10.1186/s12889-022-12879-6>
- Lucya, V., & Arief, N. T. (2022). Factor Affecting Treatment Compliance in TB Patients. *Jurnal Keperawatan Komprehensif (Comprehensive Nursing Journal)*, 8(4). <https://doi.org/10.33755/jkk.v8i4.442>
- Massud, A., Syed Sulaiman, S. A., Ahmad, N., Shafqat, M., Chiau Ming, L., & Khan, A. H. (2022). Frequency and Management of Adverse Drug Reactions Among Drug-Resistant Tuberculosis Patients: Analysis From a Prospective Study. *Frontiers in Pharmacology*, 13(June), 1–15. <https://doi.org/10.3389/fphar.2022.883483>
- Mayasari, E., Risnasari, D., & Chei, N. E. (2022). Analysis of Pulmonary Tuberculosis based on Home Sanitation in Sembung Hamlet, Margopatut East Java. *STRADA Jurnal Ilmiah Kesehatan*, 11(1), 78–83. <https://doi.org/10.30994/sjik.v11i1.894>
- Mbuthia, G. W., Nyamogoba, H. D. N., Chiang, S. S., & McGarvey, S. T. (2020). Burden of stigma among tuberculosis patients in a pastoralist community in Kenya: A mixed methods study. *PLoS ONE*, 15(10 October), 1–14. <https://doi.org/10.1371/journal.pone.0240457>
- Merid, M. W., Muluneh, A. G., Yenit, M. K., & Kassa, G. M. (2020). Treatment interruption and associated factors among patients registered on drug-resistant tuberculosis treatment in Amhara regional state, Ethiopia: 2010-2017. *PloS One*, 15(10), e0240564. <https://doi.org/10.1371/journal.pone.0240564>
- Nasrullah, D., Hasanah, U., Choliq, I., Purnamasari, I., Firman, F., Syaifurrahman, I., & Fitriyani, V. (2023). Factors Affecting Tuberculosis (Tb) Patient Adherence To Anti-Tuberculosis Drug Therapy in Surabaya. *Gaster*, 21(1), 20–32. <https://doi.org/10.30787/gaster.v21i1.1020>
- Nezenega, Z. S., Perimal-lewis, L., & Maeder, A. J. (2020). Factors influencing patient adherence to tuberculosis treatment in ethiopia: A literature review. *International Journal of Environmental Research and Public Health*, 17(15), 1–12. <https://doi.org/10.3390/ijerph17155626>
- Ngoc, N. B., Vu Dinh, H., Thuy, N. T., Quang, D. Van, Huyen, C. T. T., Hoa, N. M., Anh, N. H., Dat, P. T., Hoa, N. B., Tiemersma, E., & Nhung, N. V. (2021). Active surveillance for adverse events in patients on longer treatment regimens for multidrug-resistant tuberculosis in Viet Nam. *PloS One*, 16(9), e0255357. <https://doi.org/10.1371/journal.pone.0255357>
- Nidoi, J., Muttamba, W., Walusimbi, S., Imoko, J. F., Lochoro, P., Ichtho, J., Mugenyi, L., Sekibira, R., Turyahabwe, S., Byaruhanga, R., Putoto, G., Villa, S., Ravigliione, M. C., & Kirenga, B. (2021). Impact of socio-economic factors on Tuberculosis treatment outcomes in north-eastern Uganda: a mixed methods study. *BMC Public Health*,

- 21(1), 1–16. <https://doi.org/10.1186/s12889-021-12056-1>
- Peh, K. Q. E., Kwan, Y. H., Goh, H., Ramchandani, H., Phang, J. K., Lim, Z. Y., Loh, D. H. F., Østbye, T., Blalock, D. V., Yoon, S., Bosworth, H. B., Low, L. L., & Thumboo, J. (2021). An Adaptable Framework for Factors Contributing to Medication Adherence: Results from a Systematic Review of 102 Conceptual Frameworks. *Journal of General Internal Medicine*, 36(9), 2784–2795. <https://doi.org/10.1007/s11606-021-06648-1>
- Perwitasari, D. A., Setiawan, D., Nguyen, T., Pratiwi, A., Rahma Fauziah, L., Saebrinah, E., Safaria, T., Nurulita, N. A., & Arfianti Wiraagni, I. (2022). Investigating the Relationship between Knowledge and Hepatotoxic Effects with Medication Adherence of TB Patients in Banyumas Regency, Indonesia. *International Journal of Clinical Practice*, 2022. <https://doi.org/10.1155/2022/4044530>
- Putra, K. W. R., & Toonsiri, C. (2019). Factors related to the successful treatment of tuberculosis: A literature review. *Belitung Nursing Journal*, 5(4), 136–146. <https://doi.org/10.33546/bnj.749>
- Rachmawati, D. S., Priyantini, D., & Aini, Q. (2020). Family Factors and Their Relation to the Treatment Adherence of Pulmonary TB Patients in Surabaya. *Jurnal Ners*, 15(2 Special Issue), 45–49. <https://doi.org/10.20473/jn.v15i2.18909>
- Ravichandran, M., Rajaram, M., & Munusamy, M. (2022). Pharmacovigilance of Antitubercular Therapy in Tuberculosis. *Cureus*, 14(2), e21915. <https://doi.org/10.7759/cureus.21915>
- Singh, S. K., Kashyap, G. C., & Puri, P. (2018). Potential effect of household environment on prevalence of tuberculosis in India: Evidence from the recent round of a cross-sectional survey. *BMC Pulmonary Medicine*, 18(1), 1–10. <https://doi.org/10.1186/s12890-018-0627-3>
- Ulfah, U., Windiyaningsih, C., Abidin, Z., & Murtiani, F. (2018). Faktor-Faktor yang Berhubungan dengan Kepatuhan Berobat Pada Penderita Tuberkulosis Paru. *The Indonesian Journal of Infectious Diseases*, 4(1). <https://doi.org/10.32667/ijid.v4i1.44>
- WHO. (2002). Safety of Medicines. *World Health Organization Geneva*, 2002(2002), 20.
- WHO. (2006). The Safety of Medicines in Public health programmes: Pharmacovigilance an essential tool. *WHO Library Cataloguing-in-Publication Data*, 61. http://www.who.int/medicines/areas/quality_safety/safety_efficacy/Pharmacovigilance_B.pdf
- World Health Organization, (WHO). (2022). WHO consolidated guidelines on tuberculosis. In *WHO Press*.
- Yuniar, I., Wahyono, A., & Purnomo, H. (2023). Relationship of House Building Materials, Lighting and Occupational Density to the Incidence of Tuberculosis. *Proceedings of the 3rd Borobudur International Symposium on Humanities and Social Science 2021 (BIS-HSS 2021)*, 378–382. https://doi.org/10.2991/978-2-494069-49-7_63