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Analysis of Pulmonary Tuberculosis Incidence in Productive Age and Family Role in its Management: Literature Review

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Abstract: Tuberculosis (TB) is an infectious disease that remains a major health problem in Indonesia, particularly among productive age groups. This study aims to analyze various factors influencing the incidence of pulmonary TB in productive age and review the role of families in its management. The method used is a literature review of 30 national scientific articles published between 2017 and 2024. The review results show that internal factors such as knowledge, attitude, motivation, nutritional status, and treatment adherence play important roles in TB control. External factors such as home ventilation, housing density, socioeconomic conditions, and family support also significantly influence TB incidence and management. Family support has been proven to strengthen patients' positive behaviors, including undergoing treatment and implementing Clean and Healthy Living Behaviors (PHBS). Therefore, TB control requires a multidimensional approach involving educational interventions, environmental quality improvement, and cross-sector collaboration between healthcare workers, families, and communities.Tuberculosis (TB) is an infectious disease that remains a major health problem in Indonesia, particularly among productive age groups. This study aims to analyze various factors influencing the incidence of pulmonary TB in productive age and review the role of families in its management. The method used is a literature review of 30 national scientific articles published between 2017 and 2024. The review results show that internal factors such as knowledge, attitude, motivation, nutritional status, and treatment adherence play important roles in TB control. External factors such as home ventilation, housing density, socioeconomic conditions, and family support also significantly influence TB incidence and management. Family support has been proven to strengthen patients' positive behaviors, including undergoing treatment and implementing Clean and Healthy Living Behaviors (PHBS). Therefore, TB control requires a multidimensional approach involving educational interventions, environmental quality improvement, and cross-sector collaboration between healthcare workers, families, and communities.

Keyword: TB, family role, productive age, tuberculosis, cough etiquette

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis and remains a serious challenge for global public health, including in Indonesia. This disease commonly attacks the lungs but can spread to other body organs. TB frequently affects productive age groups between 15-49 years, causing loss of national productivity potential (Agus Nurjana. Made 2018). The disease spreads through droplets when patients cough or sneeze and is highly contagious, especially in dense environments (Mufti et al. 2024). Patient adherence to treatment for 6-8 months is an absolute requirement for recovery and prevention of drug resistance (Widyaningtyas et al. 2020). WHO notes that 1 in 3 people worldwide are already infected with latent TB, showing the urgency of early disease control (Trisno dan Nurhakim 2023).

The impact of tuberculosis is very broad, not only medically but also psychologically, socially, and economically. TB patients who are not adherent to medication tend to become sources of transmission in the community and are at risk of experiencing more deadly drug resistance (Widyaningtyas et al. 2020). Socioeconomic status such as low income and poor nutrition increases vulnerability to TB infection, which can even worsen patients' body conditions (Yuniar dan Lestari 2017). Additionally, long-term treatment can cause patients to experience anxiety and depression, which impacts decreased motivation to recover and can even cause patients to stop treatment prematurely (Setyaningsih 2021).

The main cause of tuberculosis is infection by Mycobacterium tuberculosis bacteria transmitted through airborne droplets when patients cough, sneeze, or speak (Making et al. 2023). Transmission occurs more easily in individuals who frequently interact with patients or live in dense environments such as prisons, dense settlements, and poor households, which become ideal places for disease spread, and difficulty accessing healthcare facilities worsens the situation (Mufti et al 2024). Several other risk factors also influence TB incidence, such as low immune status due to HIV/AIDS, diabetes, or asthma, which make individuals more susceptible to infection (Pralambang dan Setiawan 2021). Sociodemographic factors such as productive age, male gender, low educational status, and certain occupations also play roles in increasing TB risk, where smoking habits and poor nutrition contribute to weakening body resistance (Febrilia et al. 2022). Thus, TB causes are not only limited to bacterial infection but are also influenced by environmental, behavioral, and individual health condition factors as a whole.

Prevention of Tuberculosis (TB) transmission is a crucial step in breaking the chain of transmission in the community. Prevention efforts can be carried out by implementing cough etiquette such as covering the mouth when sneezing and not spitting carelessly (Nainggolan 2022). Maintaining room ventilation to stay open and receive direct sunlight has also proven effective in killing TB-causing bacteria. Clean and Healthy Living Behaviors (PHBS) such as hand washing, maintaining environmental cleanliness, and not smoking are highly recommended to prevent transmission. Regular mask use by TB patients and adequate sleep while avoiding stress also support prevention success (Yanti 2021). Family support plays a very important role in shaping patient habits such as taking medication regularly and implementing PHBS daily (Nainggolan 2022). Additionally, health education to the community has proven capable of increasing knowledge and encouraging preventive behavior toward TB. Family support, health education, and community approaches are important factors influencing treatment success and disease control (Nainggolan 2022).

According to the World Health Organization (WHO), approximately one-third of the global population has been infected with tuberculosis-causing germs (Mycobacterium tuberculosis). Annually, approximately four million new cases of pulmonary tuberculosis are found globally, with deaths from this disease reaching approximately 3 million people per year. Indonesia ranks third among five countries with the highest number of tuberculosis

cases. In 2015, an estimated 10.4 million new TB cases occurred worldwide. Of this number, approximately 5.9 million (56%) occurred in men, 3.5 million (34%) in women, and 1 million (10%) in children. Based on the Global Tuberculosis Report of 2017, the number of new TB cases identified globally reached 6.3 million, or approximately 61% of the total estimated incidence (10.4 million cases) (Diantara et al. 2022).

In Indonesia, 425,089 TB cases were recorded in 2017, showing an increase compared to the previous year. In the third quarter of 2018, there were 370,838 notified TB cases. Based on the Indonesian Health Profile, the prevalence of diagnosed pulmonary tuberculosis reached 0.4% of the total population, or approximately 400 cases per 100,000 population diagnosed by healthcare workers. By gender, bacteriologically confirmed TB cases in Indonesia reached 759 per 100,000 population aged 15 years and above, while positive smear TB cases were 257 per 100,000 population aged 15 years and above (Chomaerah 2020).

METHOD

This article uses a literature review method by reviewing and summarizing results from previous research that has been published regarding factors related to pulmonary tuberculosis incidence in productive age and family roles in its management. This method is descriptive and aims to provide a comprehensive general overview of the discussed topic. The literature search process was conducted through the Google Scholar platform using several relevant keywords such as: "Tuberculosis", "productive age", "TB risk factors", and "family role". The purpose of this research is to identify and evaluate various factors contributing to pulmonary tuberculosis incidence in productive age groups, as well as review the extent to which family roles influence the disease management and control process. This study examines 30 nationally indexed scientific articles within the last nine years (2017-2024), so it is expected to provide strong theoretical foundations and empirical insights in understanding the dynamics of pulmonary tuberculosis spread and management among productive age groups.

RESULT AND DISCUSSION

The research methods used in the 30 articles summarized in this document are a combination of quantitative and qualitative approaches, dominated by cross-sectional and case control designs. These studies examine various factors contributing to the incidence and prevention of Tuberculosis (TB) in Indonesia, including knowledge, attitudes, environment, nutritional status, and family role. Some studies use analytical surveys, analytical observational methods, and even path analysis to assess relationships between variables. Sample sizes vary from dozens to hundreds of respondents, with sampling techniques such as total sampling, accidental sampling, systematic random, and cluster sampling. Data collection is mostly conducted through questionnaires, interviews, and observations, with data processing using statistical tests such as Chi-Square and Spearman.

Table 1. Literature Study Findings

No	Article Name	Researcher name & year	Research Title	Research methods	Research Location	Research purposes	Research result
1	Journal of Professional Nursing Research	(Making et al. 2023)	Analysis of Knowledge and Attitude Factors with Preventive Behavior Pulmonary TB in Household Contacts During the New Normal Covid 19 Era	This study uses an analytical survey approach with a cross-sectional design.	Research location in Indonesia with a sample of 60 respondents	This study aims to obtain information on the relationship between attitudes and knowledge with behavior in efforts to prevent the transmission of TB disease during the new normal Covid 19.	Based on the results of data analysis, it can be concluded that a person's behavior is greatly influenced by knowledge and attitude. Good knowledge is obtained through information from the right place, so the more information received, the more positive a person's attitude tends to be and encourages the emergence of positive behavior.
2	Public Health Perspectives Journal	(Nurjannah and Sudana 2017)	Analysis of the Influence of Treatment Phase, Depression Level and Food Consumption on Nutritional Status of Pulmonary Tuberculosis (TB) Patients in the Work Area of Health Centers in Genuk District, Semarang City	This study applies a quantitative approach with a cross-sectional design and uses path analysis as a data analysis method.	The population in this study included all pulmonary TB patients registered as outpatients in the working area of the Health Centers throughout Genuk District. The research sample consisted of 30 people from two Health Centers, namely Bangetayu Health Center and Genuk Health Center.	The aim of this study was to evaluate the direct and indirect effects of treatment phase, depression level, and food intake on the nutritional status of pulmonary tuberculosis patients.	The results showed that the treatment phase had a direct effect on hemoglobin levels of 15.7% and albumin of 34.9%, as well as an indirect effect on hemoglobin through food consumption of 7%. Food consumption affected BMI by 40.1%, LILA by 29.6%, and hemoglobin by 23.3%. Meanwhile, the level of depression did not show a significant effect. In total, the effect on BMI was 40.1%, on LILA by 29.6%, on hemoglobin by 46%, and on albumin by 34.9%.
3	Public Health Journal	(Tangkilisan, Langi, and Kalesaran 2020)	Pulmonary Tuberculosis Case Discovery Rate in Indonesia in 2015-2018	This study used an ecological or correlational study design, which was conducted in all provinces in Indonesia during the period 2015 to 2018.	This study used the entire population.	This study aims to determine the number of cases of Pulmonary Tuberculosis in Indonesia from 2015 to 2018.	The majority of respondents were aged 45–54 years (18.2%) and male (59.21%). The highest CDR was recorded in 2015 (73.75%) and the lowest in 2017 (46.68%). The highest CNR was in 2018 (193 cases), the lowest in 2016 (115 cases).
4	Asta's Journal	(Trisno and Nurhakim 2023)	Effectiveness of Refresher Training for TB Cadres in TB Control	The approach used in this activity includes the teaching process, simulation	This refresher training was attended by 45 long-serving TB cadres from 18 SSR YABHYSA	The aim of this refresher training is to improve the understanding and skills of cadres in	The results of the study showed that Cadre Refreshment Training with the ASPEK method effectively improved the knowledge and performance of cadres in case finding,

			Efforts in Sumenep Regency	implementation, direct practice in the field, and evaluation which is carried out continuously.	Sumenep intervention health center areas.	carrying out case finding activities and providing treatment assistance for TB patients.	treatment, and prevention of TB. The success of the activity requires coordination and collaboration with health workers.
5	The 11 th University Research Colloquium 2020 University ;Aisyiyah Yogyakarta	(Widyaningtyas et al. 2020)	Self-Efficacy and Education Level Influence Treatment Compliance of Tuberculosis Patients	This study uses an analytical observational method with a cross-sectional design.	The population of this study included all adult tuberculosis patients undergoing treatment at BBKPM Surakarta in 2019, with a sample of 50 respondents selected using the quota sampling technique.	To determine whether there is a relationship between self-efficacy and education level with treatment compliance in tuberculosis patients.	It can be concluded that there is a relationship between self-efficacy and education level with patient medication adherence, where education level has the greatest influence. Both self-efficacy and education level significantly affect medication adherence in tuberculosis patients. The biggest risk factor affecting medication adherence in tuberculosis patients is education level.
6	Heading to: Malahayati Nursing Journal	(Janah et al. 2023)	Relationship Between Treatment Status and Previous Treatment History and Treatment Success of Productive Age TB Patients in Palembang City	This study was conducted using analytical methods with a cross-sectional design.	The research sample consisted of post-TB treatment patients aged 15-54 years (productive age) who underwent treatment at health facilities in Palembang City, with a sample size of 4,123 people.	This study aims to determine the relationship between treatment status and previous treatment history with the success of treatment of productive-age TB patients in Palembang City in 2022.	Data analysis in this study used the Chi Square test. The P-Value obtained was 0.000 for treatment status and 0.001 for previous treatment history, both of which were less than α. This shows that there is a relationship between treatment status and previous treatment history with the success rate of treatment of productive-age TB patients in Palembang City in 2022.
7	Research and Development Media	(Agus Nurjana. Made 2018)	Risk Factors for Tuberculosis Productive Age Lungs (15-49 Years) In Indonesia	A cross-sectional study was conducted	The data used came from Riskesdas 2013 conducted by the Health Research and Development Agency. The samples analyzed were aged 15–49 years old, totaling 522,670 people.	This study aims to analyze the risk factors for pulmonary TB in productive age in Indonesia and to identify the most dominant risk factors.	Risk factors for pulmonary TB in productive age in Indonesia include education level, ownership index, type of cooking fuel, room ventilation conditions, and smoking behavior, with education as the most dominant factor. To reduce the number of cases and deaths due to pulmonary TB, it is necessary to increase education early on at the Elementary School level and optimally utilize information media.
8	Indonesian Community Health Journal.	(Goddess, Saraswati, and Maywati 2024)	Risk Factors Associated with the Event	The type of research design is a case-control study, with case	Comparison between samples cases and	The purpose of this study is to determine the factors risks	Results research shows there is a relationship between contact history (p-value 0.039), and

			Pulmonary Tuberculosis in the Working Area of the Uptd Puskesmas Purbaratu City of Tasikmalaya in 2023	and control populations taken from the period January 2018 to June 2020.	controls, namely 1:2 (the case group consisted of 43 people with the method total sampling and control of 86 people using the method accidental sampling. So the total sample is 129 respondents.	associated with the occurrence of pulmonary tuberculosis.	humidity (p-value 0.039) with the incidence of tuberculosis. Meanwhile, there is no there is a relationship between smoking habits (p-value 0.282) and the incidence of Pulmonary tuberculosis in the working area of the Purbaratu Health Center UPTD, Tasikmalaya City Year 2023.
9	Journal of Community Health	(Febrilia et al. 2022)	Relationship between Human Factors and Home Environment Regarding Tuberculosis Incidents in the Work Area Rejosari Community Health Center, Pekanbaru City	This study is an analytical observational study using a cross-sectional design. What is the nature of this study? What is the research method? Examples of similar studies?	A case sample of 223 people was selected from a case population of 255 people, while a control sample of 223 people was taken from a control population of 566 people, using the systematic random sampling technique.	This study aims to determine the relationship between human factors and home environmental conditions with the incidence of tuberculosis in the work area of Rejosari Health Center, Pekanbaru City, in 2020.	There are 8 independent variables related to the incidence of tuberculosis. The most dominant factor is age (OR=2.8), followed by BCG immunization (OR=2.2), room humidity (OR=2.2), ventilation area (OR=1.7), gender (OR=1.7), asset ownership (OR=2.9), history of household contact (OR=2.7), and housing density (OR=2.0). The interaction between age and gender shows that men of productive age have a 4.32 times higher risk of contracting TB than women.
10	Pharmaceutical Magazine	(Bakhtiar et al. 2021)	Relationship between Characteristics, Compliance, and Clinical Outcomes of Tuberculosis Patients Lungs at Bantul District Health Center	This type of research is quantitative research with a cross-sectional design.	This study was conducted in Bantul Regency covering 15 Health Centers in the period March to June 2020. Treatment compliance was measured using the Morisky Green Levine Test (MGLT) questionnaire. The total subjects in this study were 57 respondents.	The purpose of this study was to describe the level of knowledge of pulmonary TB patients, determine the level of treatment compliance, and analyze the relationship between treatment compliance and clinical outcomes.	Of the 57 respondents with high knowledge, 89.5% were compliant with pulmonary TB treatment, 10.5% were non-compliant for various reasons. There was no significant difference between compliance and clinical improvement of patients.
11	Dohara Publisher Open Access Journal.	(Nainggolan 2022)	Relationship between Knowledge, Attitude and Family	This study uses a descriptive analytical design with a cross-sectional	The population of this study consisted of 124 TB patients who	The aim of this study was to determine the relationship between	The results of the study showed that there was no relationship between the knowledge and attitudes of TB patients and the behavior

			Support to Preventive Behavior Transmissio n in TB Patients	approach.	visited Sukaraja Health Center, Bogor Regency. The sample taken was 54 TB patients from the total population.	knowledge, attitudes and family support with transmission prevention behavior in TB patients.	of preventing transmission to families at the Sukaraja Health Center, Bogor Regency, in 2021. However, a significant relationship was found between family support for TB patients and the behavior of preventing transmission to families at the same location and period.
12	Journal of Public Health and Communit y Medicine	(Baliasa et al. 2020)	Relationship between Knowledge, Attitudes and Actions of Tuberculosi s Patients with Therapy Results at Biak Banggai Health Center	This research is a quantitative research that uses analytical survey method with a case control approach.	The population of this study consisted of 49 pulmonary TB patients spread across 9 villages and 2 sub-districts in the working area of the Biak Health Center, North Luwuk District, Banggai Regency.	The aim of this studyis to determine whether there is a relationship between knowledge, attitudes and actions of TB patients with TB therapy results.	Based on the Spearman correlation test, it was found that the knowledge variable had a significant and positive relationship with therapy results ($p < 0.05$; $r = 0.374$). While the attitude and action variables did not show a significant relationship with therapy results.
13	Indonesian Nursing Journal.	(Yuniar and Lestari 2017)	Relationship between Nutritional Status and Income Pulmonary Tuberculosi s Incident	This research is a quantitative research that uses an analytical survey method with a case control approach.	Population of cases in research These are all Tuberculosis sufferers BTA positive lungs in the work area Sempor 1 Health Center, in 2015 – 2016 as many as 40 people.	The aim of the study was to determine the relationship between income and nutritional status. against the occurrence of pulmonary tuberculosis.	Research shows that poor nutritional status increases the risk of pulmonary TB 3.4 times compared to adequate nutritional status (OR=3.484), and low income increases the risk 4.4 times compared to high income (OR=4.421).
14	Journal of Herbal Pharmacy Research	(Dasopang et al. 2019)	Descriptive Analysis of Side Effects of Anti-Anti-Inflammator y Drug Use Tuberculosi s in TB Patients at Dr. Pirngadi Medan Regional Hospital	The sampling technique was carried out prospectively on TB patients who took OAT for two months, and analyzed using statistical methods.	Inclusion criteria include patients diagnosed with TB and receiving OAT fixed dose combination in 11 patients.	The aim of this study was to analyze the side effects that occurred during treatment using OAT.	The results of the study showed that the most common side effects due to the use of OAT were itching, headache, and nausea with a percentage of 72% each; joint pain 45%; stomach ache 36.4%; decreased appetite and rashes each 27.3%; and reddish urine 18.2%.
15	Journal of Nursing Suaka Insan (JKSI)	(Mary 2020)	Relationship between Family Knowledge and	This research was conducted by using analytical methods with a	sampling technique with total sampling of 30	to find out the relationship between family knowledge and behavior to	The results of data analysis using the Chi-Square test showed a relationship between family knowledge and behavior in preventing

			Preventive Behavior Transmission of Pulmonary Tuberculosis in the Martapura II Health Center Work Area	correlation research design,	respondents.	prevent transmission of pulmonary TB in the Martapura II Health Center work area in 2019.	transmission of Pulmonary TB in the Martapura II Health Center work area in 2019, indicated by a p value = 0.009 which is smaller than α = 0.05 so that the alternative hypothesis is accepted. Therefore, optimization of counseling activities and provision of information about Pulmonary TB disease to sufferers and families needs to be increased in order to reduce the increase in the number of new cases of Pulmonary TB.
16	Journal of Pharmamedica	(Barza, Damanik, and Wahyuningsih 2021)	Relationship Between Knowledge Level and Level Treatment Compliance in Patients Tuberculosis at Dramaga Medika Hospital	This study uses an observational quantitative method.	The research population was taken from all pulmonary TB patients at Medika Dramaga Hospital. The sample of this study used 72 respondents with a questionnaire instrument.	The aim of this study is to determine the relationship between levels of knowledge with the level of treatment compliance in pulmonary TB patients at Medika Dramaga Hospital.	The results of the study showed that there was no significant relationship between the level of knowledge and treatment compliance in tuberculosis patients at Medika Dramaga Hospital with a Chi-square table value of 0.800.
17	Muhammadiyah Nursing Journal	(Erfan and Caturia 2021)	Coughing Ethics for Tuberculosis Patients with the Incident of Disease Transmission in the Family	The design of this study is cross sectional	a sample of 36 tuberculosis patients using simple random sampling technique	To analyze the relationship between cough etiquette and the transmission of tuberculosis to families in the Sidotopo Wetan Public Health Center area, Surabaya.	The results of the statistical test obtained a P value of 0.014 (α<0.05), which means that there is a relationship between cough etiquette and the transmission of tuberculosis to the family.
18	Journal of Education and Community Service	(Wind and Wind 2022)	Health Education for Families of Pulmonary TB Patients Prevention of Infectious Risks in Huta III Tanjung Pasir, Tanah Jawa District, Kab. Simalungun	The research design used is Pre experimental with one group pre test and post test design.	The aim of this community service activity (PKM) is to the community in Huta III Tanjung Pasir District, Tanah Jawa Regency Simalungun	Increasing public knowledge	It can be concluded that there has been an increase in knowledge or understanding of the people of Huta III Tanjung Pasir, Tanah Jawa District, Simalungun Regency.

19	Journal Articles	(Hilmi, Hurriyati, and Lisnawati 2018)	The Influence of Health Education on Family Behavior In Prevention of Transmission of Pulmonary Tuberculosis In the Inpatient Room of Jember Lung Hospital Year 2017	This research method is quantitative with a cross sectional study approach.	amount The sample taken was 33 respondents obtained using the accidental sampling technique. Data collection using questionnaires and Likert scales.	The purpose of This study aims to identify the influence of health education on Family behavior in preventing transmission of pulmonary tuberculosis in the treatment room hospitalization at Jember Lung Hospital.	The study showed that the average family behavior increased from 41.61 to 72.42 after health education. Statistical tests showed a p value of 0.000 (α <0.05), which means that health education has a significant effect on pulmonary TB prevention behavior.
20	Mkmi Journal.	(Rahman et al. 2017)	Public Knowledge and Attitudes About Efforts Tuberculosis Prevention	This study uses a design cross sectional. Using GIS for mapping and knowing the distribution pattern of BTA (+) Pulmonary TB cases.	The study population consisted of 24,410 people, with sampling using the cluster random sampling method. The number of samples was determined based on the Slovin formula, so that 100 people were obtained.	This study aims to determine the relationship between the level of knowledge and attitude with efforts to prevent tuberculosis in the work area of the Bawahan Selan Health Center in 2015.	The results of the study using the chi square test showed a significant relationship between knowledge (p=0.000) and attitude (p=0.000), so it can be concluded that knowledge and attitude are related to tuberculosis prevention efforts.
21	Journal of Information Systems for Public Health.	(Hasan 2021)	Use of Geographic Information Systems for Mapping Distribution of Cases and Risk Factors for Disease Occurrence TB. Lung BTA (+) in Majene Regency	This community service activity was carried out by delivering counseling materials and distributing leaflets about TB disease	This study involved 240 respondents with BTA (+) Pulmonary TB patients registered at health services from January to December 2016 for mapping purposes, as well as 244 respondents suspected of having TB in the same period to analyze the relationship between the	Knowing the distribution of cases and risk factors for TB disease occurrence	Statistically, there is a significant positive relationship between ventilation (p = 0.011), lighting (p = 0.013), housing density (p = 0.001), rainfall (p = 0.05 and p = 0.001), poor nutritional status (p = 0.000), and poverty (p = 0.000) with the incidence of BTA (+) Pulmonary TB. In addition, three clusters were found with p values of 0.026, 0.027, and 0.029 respectively in areas with high levels of unhealthy homes, poor nutritional status, and poverty.

					incidence of BTA (+) Pulmonary TB and risk factors.		
22	MARTABE: Journal of Community Service	(Yanti 2021)	Tuberculosis Disease Prevention Counseling (Tbc) New Normal Era	This research uses interview and observation methods.	The number of students who attended this event was around 30 people and attended by several teachers.	This community service aims to increase the knowledge of students regarding TB disease and steps to prevent its transmission in the Inshafuddin Integrated Islamic Boarding School environment, Banda Aceh.	All participants of the activity stated that this community service was very beneficial because it could broaden their knowledge about TB and of course had a positive impact on their daily habits.
23	Nursing Media Journal: Makassar Health Polytechnic	(Palupi 2020)	The Role of the Family as Supervisors in Taking Anti-Tuberculosis Drugs in Pulmonary TB Patients Relapsed	research using a qualitative approach.	In two families who served as supervisors of taking medication for TB patients with relapse cases	This study aims to describe the role of the family in supervising the treatment of pulmonary TB patients with relapse cases in the period from 16 to 23 December 2019.	The results of the study showed that the family plays a good role as a motivator, drug-taking supervisor, and educational companion in patients with relapsed pulmonary TB. However, the role of the family in reminding sputum re-examination is not optimal. The family can play a role as a PMO to ensure that patients take their medication regularly until treatment is complete, so that compliance and effectiveness of therapy can be achieved.
24	WATHAN: Journal of Social Sciences and Humanities	(Mufti Akbar1, Zaifi Yumna2, Verra Noviana3, Anjas Putra Pradana4, Ferdika Ananda5, Devin Akbar6, Husaini7 2024)	The Role of Class II B Meulaboh Prison Officers in Prevention of Tuberculosis (TB) in Inmates Community	Type of analytical observational research with an approach cross sectional.	Targets in research This is a prison officer at Class II-B Correctional Institution (Lapas) Meulaboh Bimkeswat Subsection, where the total number of prison officers This Bimkeswat subsection has 4 people.	This study aims to explain the characteristics of prison officers. subsection of class II-B Meulaboh health guidance, level of knowledge and attitude their knowledge about TB prevention, risk factors for TB transmission in prisons class II-B Meulaboh, and the role of officers in preventing TB.	The results of the study showed that prison officers play an active role in preventing TB by involving cross-agency medical teams. Inmates undergo a comprehensive examination, including symptom screening, mobile X-rays, and sputum tests. This effort is supported by transportation facilities and health services, according to the instructions of the Directorate General of Corrections, to reduce TB cases in prisons.

25	Indonesian Journal of Public Health	(Kristini and Hamidah 2020)	Potential Transmission of Pulmonary Tuberculosis to Family Members of Sufferers	Literature Review	The population of this study consisted of 70 people, namely all family members of 35 patients with positive BTA pulmonary TB diagnosed between January and March 2019 and undergoing treatment in the Tlogosari Wetan Health Center working area. The research sample was taken using the total sampling method.	This study aims to determine the distribution of suspected and new cases of pulmonary TB in the environment around the residence of patients with positive BTA pulmonary TB.	Of the 70 family members of patients with positive BTA pulmonary TB, 5 people were found to be suspected of having pulmonary TB. However, there were no new cases of pulmonary TB confirmed among the five suspects.
26	Edu Dharma Journal: Journal Research and Community Service	(Tunny et al 2024)	Relationship Between Motivation and Prevention Methods Transmission of Tuberculosis in Tuberculosis Patients in Ambon City Water Health Center	This study uses a descriptive analytical design with a cross-sectional approach.	The research sample was taken using the total sampling method, namely all pulmonary tuberculosis patients at the Air Besar Health Center, Ambon City, as many as 40 patients were used as samples.	This study aims to determine the relationship between patient motivation in preventing transmission with the use of masks and cough etiquette in pulmonary tuberculosis patients at the Air Besar Ambon Health Center.	The results of the analysis showed no relationship between motivation and the implementation of coughing and sneezing etiquette in pulmonary tuberculosis patients at the Air Besar Health Center, Ambon City ($p = 0.750$). However, there was a significant relationship between motivation and the use of surgical masks in pulmonary tuberculosis patients ($p = 0.044$).
27	Public Health Journal (E-Journal)	(Nur et al. 2022)	Factors Associated with the Incidence of Pulmonary Tuberculosis At Productive Age At Pasar Minggu District Health Center In 2021	This research quantitative in nature using the Analytical Survey method and accidental sampling techniques.	The population of all patient medical records at the Pasar Minggu District Health Center was 441 medical records and the sample used was 117 medical records.	The purpose of this study was to determine the factors associated with the incidence of pulmonary tuberculosis at the Pasar Minggu District Health Center in 2021.	The results of univariate analysis showed that more patients suffering from tuberculosis were at risk age, male, highly educated, employed, and had good nutritional status. The results of bivariate analysis showed a relationship between age, gender, and nutritional status with the incidence of tuberculosis.
28	Journal of Applied Health	(Mardiono, Saputra, and Romadhon	Factors Related to the Role of	This research quantitative in nature using the	The population of this study was all TB	This study aims to determine the relationship	The results of the study using the Chi-Square test showed a relationship

		2023)	the Family in Supervision Swallowing Medicines in Pulmonary Tuberculosis Patients	Analytical Survey method,	patients in the Opi Palembang Health Center area. In 2020, there were 40 cases of TB, and the study sample consisted of 40 respondents.	between PMO (Drug Swallowing Supervisor) and medication adherence in Pulmonary Tuberculosis patients.	between education and the role of the family in supervising TB patients taking medication (p = 0.001), a relationship between work and the role of the family in this supervision (p = 0.001), and a relationship between the level of knowledge of respondents and the role of the family in supervising the taking of medication in TB patients (p = 0.003).
29	Public Health Journal	(Konde, Asrifuddin, and Langi 2020)	The Relationship Between Age, Nutritional Status and Housing Density With Pulmonary Tuberculosis at Tuminting Health Center, Manado City	This type of research uses a case control study design and was conducted in the Tuminting Health Center work area, Manado City, from November 2019 to January 2020.	The number of samples in this study was 84 respondents, with 42 respondents in the case group and 42 respondents in the control group.	This study aims to see the relationship between age, nutritional status, and housing density with pulmonary tuberculosis at the Tuminting Health Center, Manado City.	The results showed a significant relationship between age (p = 0.003), nutritional status (p = 0.003), and housing density (p = 0.002) with pulmonary tuberculosis. In conclusion, age, nutritional status, and housing density are related to the incidence of pulmonary tuberculosis.
30	GEMA Health Environment	(Adinda Mega Putri, Imam Thohari, and Ernita Sari 2022)	Physical Conditions of Houses (Wall Type, Floor Type, Lighting, Humidity, Ventilation, Temperature, and Occupancy Density) Affect the Incidence of Tuberculosis in the Work Area of the Krian Sidoarjo Health Center in 2021	This research method is case control analysis research.	respondents as many as 94 respondents. Respondents have complied inclusion and exclusion criteria.	The purpose of this study was to analyze the relationship between the physical condition of the house and the incidence of pulmonary tuberculosis (TB) in the Krian Health Center work area in 2021.	The results of the chi-square statistical test showed a p value = 0.037, so Ha was rejected. It can be concluded that the respondent's house category is related to the incidence of pulmonary TB disease, with the results of the odds ratio calculation of 2.424 (CI: 1.047–5.611), so that respondents who have a poor house category are 2.424 times more at risk of contracting pulmonary TB compared to respondents who have a good house category.

Based on the analysis results, it is known that knowledge, attitudes, and family support play important roles in encouraging TB transmission prevention behavior. Research by (Making et al. 2023) and (Nainggolan 2022) shows that individuals with good levels of knowledge and attitudes tend to have more positive prevention behaviors, especially during the COVID-19 new normal period. However, research at Sukaraja Health Center (Nainggolan

2022) reveals that although knowledge and attitudes are not always directly related to behavior, family support becomes a key factor influencing patient compliance with transmission prevention. This is also reinforced by findings from (Maria 2020) and (Barza, et al 2021) who highlight the importance of the family's role as treatment supervisors (PMO) in TB therapy.

Furthermore, environmental and socioeconomic factors have proven to contribute significantly to pulmonary TB incidence. Research by (Febrilia et al. 2022) notes that humidity, housing density, ventilation, and poor lighting increase TB risk. Social factors such as education level and income also have major effects, as explained in studies by Yuniar and (Yuniar dan Lestari 2017). Those living in low socioeconomic conditions are more vulnerable to TB infection. These results support the idea that TB preventive approaches should include community-based interventions and housing quality improvement to reduce transmission risk.

Several studies reveal inconsistencies between independent and dependent variables, especially in the context of treatment adherence. A study by (Bakhtiar et al. 2021) shows that although most patients have high knowledge, not all show high adherence to treatment, so clinical results are not always significant. This indicates that variables such as personal motivation and access to healthcare facilities also need to be considered. Similar findings were also found by (Tunny at al 2024) in Ambon, where patient motivation was not significantly related to cough etiquette implementation, although it was related to mask use.

The effectiveness of training and education-based interventions becomes an important strategy proven to improve TB treatment and prevention outcomes. A study by (Trisno dan Nurhakim 2023) shows that refresher training for TB cadres can improve case detection and patient support. Similarly, health education interventions conducted by (Hilmi, Hurriyati, dan Lisnawati 2018) were able to significantly improve family behavior. Counseling programs in Islamic boarding schools (Yanti 2021) and the use of GIS-based mapping technology (Hasan 2021) also provide evidence that education and technology are complementary approaches to reducing TB case numbers in the community.

CONCLUSION

Based on the review of 30 scientific articles, it can be concluded that the incidence of pulmonary tuberculosis in productive age is greatly influenced by various factors, both internal and external. Internal factors include knowledge, attitudes, motivation, nutritional status, and patient adherence levels to treatment. Meanwhile, significant external factors include the living environment (ventilation, lighting, housing density), socioeconomic status, and support from family and community.

From the various studies reviewed, it is evident that good knowledge does not necessarily guarantee adherence to treatment, indicating the need for a multidimensional approach in TB prevention and treatment interventions. The role of family has proven to be very important in accompanying patients during treatment. The family not only serves as a treatment supervisor (PMO), but also functions as a source of motivation and psychological support.

Training-based interventions for health cadres, community counseling, and consistent implementation of clean and healthy living habits (PHBS) have been proven to increase the effectiveness of TB control in communities. These findings show that successful TB control does not only depend on healthcare facilities, but is also greatly influenced by the active involvement of individuals, families, and the social environment.

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