Evaluation of Tuberculosis Treatment Results in Comparison of Indonesia and Neighboring Countries

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Keywords: Tuberculosis, Directly Observed Treatment Short, Health.

Abstract: Tuberculosis is a type of respiratory infection originating from the bacteria M. tuberculosis which targets countries with tropical climates such as Indonesia and several countries in Asia. The bacteria that caused TB are spread when an infected person coughs or sneezes but most people infected with the bacteria are asymptomatic. Treatment is not always necessary for people without symptoms. Patients with active symptoms will require a long course of treatment involving several antibiotics. This research uses the PRISMA method by collecting data obtained from several research journals. PRISMA helps writers and researchers in compiling quality systematic reviews and meta-analyses. The results obtained in this journal are from the data obtained, it can be seen that the highest TB rate for Indonesia's neighboring countries is in India 1,045,269 cases as ranked 1st in the world and the country with the least number is Thailand with 143 cases. Meanwhile, Indonesia is in second place after India in terms of the number of cases respectively 969,000 cases in the period 2022. For evaluation and treatment of TB in countries, priority is given to personnel with family internalization in maintaining health, in addition to using the DOTS method, which is referred to as strategi Directly Observed Treatment Short Course.

1 INTRODUCTION

Tuberculosis is one of the most important public health problems worldwide, especially in developing countries. TB is a complex problem because it is not just a concern about the disease. but also socio-economic aspects which have a very strong correlation in fighting this disease. For many years, TB has mostly been a disease associated with poverty, while TB mostly infects people in developing countries or poor countries where the quality of sanitation is very low.

Moreover, this situation becomes more complicated when it comes to multidrug resistance to Mycobacterium tuberculosis in many countries, making it difficult to achieve successful control goals. Efforts to detect early detection of TB cases are still a big challenge, especially in countries with limited health resources and TB cases in HIV patients where HIV is marked with a negative stigma in society. WHO has established a new global TB approach to achieve worldwide TB elimination by 2035. TB easily spreads from one area to another due to population movements. It cannot be denied that these migrants are the main reservoir of TB infection in various low endemic areas. Even though these people were in good health upon arrival in their destination country, they were suffering from the latent disease Mycobacterium tuberculosis. Among these new cases, the majority come from highly endemic countries where TB has previously been a major prevalence. Management of TB disease is a multi-aspect management, starting from early detection, immediate treatment, to patient control due to the long period of time. Moreover, TB management is struggling with the stigma that mostly occurs in people with weak immune systems or immunodeficiency (Juan Espinosa, 2022).

In neighboring countries, Indonesia is one of the TB endemic countries with high TB cases. which is not only caused by the high prevalence and incidence of TB, but is also influenced by the very high and dense population in Indonesia. In recent years, the incidence rate has decreased significantly, but is offset by an increase in population. The main reservoir of Mycobacterium tuberculosis is humans. It is very important to know about TB transmission to

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Nopridayanti, . and Ramatillah, D.
Evaluation of Tuberculosis Treatment Results in Comparison of Indonesia and Neighboring Countries.
DOI: 10.5220/0012642300003821

In *Proceedings of the 4th International Seminar and Call for Paper (ISCP UTA '45 JAKARTA 2023)*, pages 214-223
ISBN: 978-989-758-691-0; ISSN: 2828-853X

prevent the spread of the disease. This disease is transmitted through inhalation of TB droplets when sufferers cough, laugh and sneeze. Furthermore, TB can also be transmitted if sufferers use the same nebulizer and can occur with open abscess drainage. The possibility of transmission depends on several factors, for examples duration of exposure, infectivity of the bacteria, sufficient exposure of the bacteria to sunlight and ventilation. The prevalence of TB with a positive chest x-ray is higher in those aged 15-24 years, higher in men than women, and higher in rural areas. The proportion of participants aged 65 years and over who underwent a chest X-ray was lower than younger people. The biggest reason is that they cannot visit the research site because they are sick, disabled, or unable to walk. The proportion of female participants who underwent chest X-rays was lower than men because some pregnant women did not undergo chest X-rays. The prevalence of TB is higher in other regions in Indonesia compared to the islands of Sumatra and Java-Bali (Putra IG, 2022).

Apart from the possibility that participants in these areas are more frequently exposed to TB germs and TB risk factors, this may be because these areas are still underdeveloped so that low education could be one of the determining factors. Because case detection based on symptoms is not yet optimal, the passive detection of TB cases that has been carried out so far may also contribute to delays in TB diagnosis and treatment. Limited case finding or symptom detection tools and access to health services need to be improved. Increasing the potential of human resources needs to be considered, because educational background can be part of understanding tuberculosis, and limited transportation facilities are caused by the location of the islands which are quite far from each other. Apart from that, the limited number of health workers, health facilities and medical equipment can be a significant problem for Indonesia (Deni Iskandar , 2023).

Health has an important role in the economic development of a nation. In this way, advanced economic development will never be achieved if there is a prevalence of infectious diseases in a society or country. The better the social security program, health service facilities and health resources that are available, the better the health management will be when an outbreak occurs that impacts the community or nation. One epidemic that is still of concern to the world is tuberculosis (TB). Until now, no country has been free from TB. Building health infrastructure such as hospitals, health centers, doctors and nurses is very important in treating TB. For this reason, the efficiency of reforms in the health sector and the Sustainable Development Goals (SDGs) accompanied by a detailed analysis of each reform component must be carried out (Boyacioğlu, 2012). In the provisions of the Health Law (UU No. 36/2009), expenditure allocations in the health sector must be fulfilled. This article states that the budget allocation for health spending is at least 5% of the State Revenue and Expenditure Budget (APBN) excluding salaries, and for regional governments, both levels I and II, the health budget allocation is at least 10% of the Regional Government. The Regional Revenue and Expenditure Budget (APBD) does not include salaries. With Indonesia's high population, there is a tendency to increase the number of TB cases in Indonesia. Provinces that have a high population have a high number of TB cases. West Java, East Java, Central Java, DKI Jakarta and North Sumatra are provinces that have a high number of TB cases. Apart from having a high population, these five provinces have a high population density.

Public health conditions are correlated with demographic conditions. The higher the population growth trend and population density, the worse the public health condition will be if there are many outbreaks such as tuberculosis which is quickly transmitted through droplets. This phenomenon can illustrate that the number of TB cases is related to the economy, there is a negative relationship between TB cases and a country's per capita income. If people's per capita income is high, people's purchasing power for employment opportunities will increase so that nutritional, educational and health needs will increase the level and quality of people's lives and reduce poverty. TB can be seen as a public health problem and a population and environmental problem in which people live. This research will examine the role of socio-economic and environmental factors on the number of TB cases. The problem of respiratory tract infections such as tuberculosis is a crucial problem for developing countries like Indonesia. the large number of infected patients will burden the people and will indirectly burden the government indirectly. Therefore, research related to this matter is very important to carry out as an initial benchmark in determining Indonesia's tuberculosis status. (Ismail, A., Prasetya, H., & Ichsan, B, 2023).

2 METHOD

The research method in this journal uses the PRISMA method which is a minimum set of evidence-based items for reporting in systematic reviews and meta-analyses. PRISMA primarily focuses on reporting

reviews that evaluate the impact of interventions, but can also be used as a basis for reporting systematic reviews with purposes other than evaluating interventions (e.g. evaluating etiology, prevalence, diagnosis, or prognosis). Systematic reviews have many important roles. Researchers can provide a synthesis of the state of knowledge in a field, so that future research priorities can be identified, researchers can answer questions that cannot be answered through individual studies, researchers can identify problems in main research that must be corrected in further research and researchers can generating or evaluating theories about how or why phenomena occur.

Therefore, systematic reviews generate different types of knowledge for different users of reviews (such as patients, healthcare providers, researchers, and policy makers). To ensure a systematic review is useful to users, authors should prepare a transparent, complete and accurate explanation of why the review was conducted, what they did (such as how the studies were identified and selected) and what they found (such as the characteristics of the studies). study contributions and meta-analysis results). Current reporting guidelines make it easier for authors to achieve this. PRISMA flow diagrams visually summarize the screening process. Initially the agency recorded the number of articles found and then made the selection process transparent by reporting decisions taken at various stages of the systematic review. (Ortiz-Martínez, 2019)

The number of articles was recorded at different stages, and in this journal 50 journals are presented which discuss comparative studies of TB cases in Indonesia and neighboring countries, namely India, Singapore, Malaysia, Thailand, Vietnam, the Philippines, Palau, Australia, Timor Leste. and Papua New Guinea. PRISMA flow diagram for studies including qualitative and quantitative analysis. PRISMA, preferred reporting items for systematic reviews and meta-analyses. background: Kidney transplantation in adults is most often performed in the potential extraperitoneal space, and surgical channels are used routinely in many medical centers. Based on an extension of the PRISMA abstract adapted to the PRISMA method approach, a structured abstract should include important details of the method and results. (ML Hedstrom, 2023).

3 RESULTS

This journal discusses the comparison of TB cases in Indonesia and neighboring countries, namely India, Singapore, Malaysia, Thailand, Vietnam, the Philippines, Palau, Australia, Timor Leste and Papua New Guinea (Kementerian ESDM, 2023).

Table 1.

No	Country	Amount	Rating
1.	Indonesia	969,000 cases	2 worlds (Kementerian Kesehatan Republik Indonesia, 2023)
2.	India	1,045,269 cases	1 world (Ministry of Health and Family Welfare, 2022)
3.	Singapore	1,251 cases	Last ranking in ASEAN (Ministry of Health Singapore, 2023)
4.	Malaysia	25,391 cases	97 world (CGTN, 2023)
5.	Thailand	143 cases	150 ASEAN (Knoema, 2023)
6.	Vietnamese	416 cases	176 ASEAN (Thang Phuoc Dao, 2022)
No	**Country**	**Amount**	**Rating**
7.	Palau	8300 cases	51 world(South Dakota Department of Health, 2022)
8.	Australia	1300 cases	56 world(National Centre for edpidemiology and population health, 2023)
9.	East Timor	508 cases	127 world(United Nations in Timor Leste, 2022)
10.	Papua New Guinea	30000 cases	153 of 185 versions of the Human Development Index (MSF Australia, 2022).
11	Philippines	119,558 cases	4 Worlds (Ma. Teresa Montemayor, 2023)

4 DISCUSSION

To identify TB infection, healthcare providers will screen at-risk patients to rule out active TB, and they may use skin or blood tests to check for infection. TB disease is curable with 4 standard antibiotics for 6 months. Common drugs include rifampicin and isoniazid. The desired impact of the WHO normative guidelines regarding the management of TB in children and adolescents is to reduce the burden of TB morbidity and mortality in children and adolescents. Tuberculosis (TB) is a preventable and curable disease, but it continues to impact the lives and development of millions of children and adolescents.

Children and young adolescents under 15 years of age represent approximately 11% of all TB sufferers globally. This means that 1.1 million children and teenagers under 15 years old are infected with TB every year, and more than 225,000 of them die. Since the publication of WHO Guidelines for national tuberculosis programs on the management of tuberculosis in children in its second edition in 2014, new recommendations have been published in WHO guidelines and other policy documents regarding TB prevention, screening, diagnosis, treatment, management and models. Many of these recommendations also apply to children and adolescents. Monitoring and evaluation are essential to measure the burden of tuberculosis (TB), as well as to track progress made in fighting this epidemic. Having access to timely and verified data helps policymakers and stakeholders make more informed decisions to accelerate their efforts to end TB. WHO collects, compiles and validates TB data annually as part of its global TB report. This report provides a comprehensive and up-to-date assessment of the TB epidemic, as well as progress made at global, regional and country levels.

WHO also maintains an online database containing TB data at country level from 2000 onwards. WHO supports countries in strengthening national TB notification systems to measure and monitor the number of people who fall ill and die from TB. WHO assists countries in conducting a number of surveys to accurately measure the burden of TB. This includes surveys regarding national TB prevalence, drug resistance, mortality rates, and costs faced by TB patients and their households (WHO, 2023). The following is an evaluation and results of TB treatment in Indonesia and neighboring countries:

1. Indonesia

In 2021 the treatment outcome mortality decreased from 2% to 4%. In 2022 until November 1st, 2022, deaths due to treatment were 4%, while those not evaluated were 7%, this figure has increased compared to the previous year. The target success rate for DR-TB treatment in 2021 has not yet reached 75%. The current National Strategy for TB Care and Prevention in Indonesia 2020-2024 aims to accelerate efforts to eliminate TB in Indonesia by 2030 and end TB in Indonesia by 2050. To achieve this goal, the National Strategy will strengthen the leadership of district and city governments (Nur Rahmi Amanda, 2023). Programs to increase access to high-quality, patient-centred TB diagnostic and treatment services; controlling TB infection and optimizing the provision of TB preventive therapy (TPT) to increase the utilization of research results regarding screening technology , diagnostics and treatment regimens ; increase the participation of the community, partners and other multisectoral actors in TB control efforts; and strengthening program management by strengthening the health system as a whole (Muh Khindri Alwi , Asni Hasanuddin , Rony Setianto , Fidrotin Azizah , Belinda Arbitya Dewi , Nilam Fitriani Dai , Ardiansah Hasin , Jurnal Syarif, 2023).

2. India

In (Wakjira MK, Sandy PT, Mavhandu-Mudzusi AH, 2022)most cases, 97.0% of TB cases are newly diagnosed and all are treated as first-line treatment . The overall treatment success rate was 82.5% (28% cured, 54.3% completed), 11.2% lost to follow-up, 4.7% died, and 0.9% treatment failure. . The success rate for treating TB patients co-infected with HIV is 77.5%. If the problem of MDR-TB and the factors that determine the outcome of treatment for MDR-TB patients are to be addressed successfully, then the factors that determine the outcome of treatment for MDR-TB patients need to be identified. In this regard, this study has identified socio-demographic and clinical factors that determine treatment outcomes of MDR-TB patients.

Thus, the results of this study will enable health decision makers and MDR-TB caregivers in Ethiopia to make evidence-based decisions regarding MDR-TB program design as well as its management and resource allocation decisions in subsequent national efforts to expand program management and to improve socio-economic support. Economics and nutrition as well as the provision of integrated services against MDR-TB and HIV/AIDS are recommended to mitigate the high mortality rate among patients treated for MDR-TB (Dona Arlinda, 2020). To mitigate unintentional transmission of MDR-TB in the community, emphasis should be placed on efforts to control respiratory tract MDR-TB infections (Chaves Torres NM, Quijano Rodríguez

JJ, Porras Andrade PS, Arriaga MB, Netto EM, 2019).

3. Singapore

Singapore's BCG vaccination at birth is still useful for protecting babies and young children from tuberculous meningitis. Over the past decade, we have maintained high BCG coverage in infants of nearly 100%. Although the incidence of tuberculosis fell drastically in the decades after the National Tuberculosis Program was established until the end of the 1980s, the incidence of tuberculosis remained stable from 1987 to 1996, namely around 50-60 cases per 100,000 population (Andrew D. Kerkhoff, MD, PhD, MSc,Diane V. Havlir, MD, 2023). In response to the high incidence of tuberculosis, the National Tuberculosis Program was expanded to become the Singapore Tuberculosis Elimination Program (STEP) in April 1997. STEP focuses on the following strategies to control tuberculosis in Singapore:

a. Promotion of directly observed therapy (DOT) for tuberculosis patients (Nicholas I. Paton, M.D., Christopher Cousins, M.B., Ch.B., Celina Suresh, B.Sc., Erlina Burhan, M.D., Ka Lip Chew, F.R.C.P.A., Victoria B. Dalay, M.D., Qingshu Lu, Ph.D., Tutik Kusmiati, M.D., Vincent M. Balanag, M.D., Shu Ling Lee, B.Sc., Rovina Ruslami,, 2023)
b. Implementation of the National Treatment Monitoring Registry to monitor treatment progress and outcomes for all tuberculosis patients (Marley G, Zou X, Nie J, Cheng W, Xie Y, Liao H, 2023)
c. Contact investigations to identify recently infected close contacts with infectious cases of tuberculosis, and offer preventive therapy to reduce the risk of developing active tuberculosis (Ayenew Berha, 2023).

Tuberculosis is diagnosed primarily through passive case finding when patients show symptoms. The National Tuberculosis Notification Registry, established in 1957, continues to collect and collate data on the incidence of tuberculosis in Singapore. All medical practitioners and laboratories who make a diagnosis of tuberculosis are required by law to notify the Ministry. Notification is mandatory for confirmed and suspected cases of tuberculosis (Dong Huang, Yan Wang, Yu Wang, Zongan Liang, 2020).

4. Malaysia

In research (Syafiq Sidqi Saidi, Rosliza Abdul Manaf, 2023)it is said that to improve the quality of life of PTB patients, it is very important to ensure they comply with and complete their treatment. Compliance with treatment is the main key to successful disease management, as well as breaking the chain of infection transmission. And to increase compliance behavior, patients and their immediate families must have good knowledge about their disease, which can be obtained from health education and awareness programs (Marley G, Zou X, Nie J, Cheng W, Xie Y, Liao H, 2023). Therefore, a comprehensive and effective health program must include an understanding of patients' perceptions of the impact of disease on their physical, mental, emotional and social well-being.

Social support can be defined as the process of interaction in relationships that enhances coping, self-esteem, belonging, and competence through the exchange of real or perceived physical or psychosocial resources. Family members have a very big responsibility in managing PTB patients, because of the long duration of treatment. The role of family members must be involved throughout the disease process, (Lika Apriani, Susan McAllister, Katrina Sharples, Bachti Alisjahbana, Rovina Ruslami, Philip C. Hill, Dick Menzies, 2019)from the initial diagnosis of the disease, continuing with the management of signs and symptoms, treatment seeking behavior, and ultimately achieving successful treatment results together (Erin Barker, Joe Moss, Hayden Holmes, Catherine Bowe, Vinay Suryaprakash, Riccardo Alagna, Vladyslav Nikolayevskyy, Marc Destito, Davide Manissero , 2023).

It has been proven that family support is very important in treatment adherence, quality of service, treatment completion, treatment outcomes, as well as psychosocial well-being among patients (Muhammad Saleh Nuwa, Stefanus Mendes Kiik, 2021). Family members who support patients through their illness make patients respond positively to the people they live with (Habtu Debash, 2023). This is also in line with WHO recommendations to include family support interventions in the management of TB patients, especially in cases of drug resistance (Jaraee, J., Awg Adeni, D.S., Bilung, L.M. and Azmin, P.A, 2023). Therefore, it is recommended that TB programs should involve the involvement of family members in patient management (Fadly Syah Arsad, Noor Hassim Ismail , 2022).

5. Thailand

Meanwhile, in this country, evaluations carried out with laboratory diagnosis are carried out at the Mycobacteriology and Mycology Laboratory, Department of Microbiology, Faculty of Medicine, Siriraj Hospital, Mahidol University. Stool specimens were digested and decontaminated via the N- acetyl - L- cysteine - NaOH and methods centrifuged at 3,000 times gravity for 15 minutes. Decontaminated stool

specimens and tissue biopsies were used for three different investigations. First, AFB detection was carried out via auramin acid-fast staining under a fluorescence microscope (Kawin Chinpong, 2022). Second, the specimens underwent direct extraction of total DNA via a magnetic bead-based method using MagDEA ® Reagent Dx SV (Precision System Science, Chiba, Japan) according to the manufacturer's instructions. The extracted DNA was then used as template DNA for the Anyplex ™ MTB/NTM Real-Time Detection assay (Seegene, Seoul, South Korea).

This assay relies on real-time multiplex PCR and differentiates between MTB and non-tuberculous mycobacteria. Third, MTB culture was carried out by inoculating specimens into egg-based (Löwenstein - Jensen; LJ) and liquid-based (Mycobacteria Growth Indicator Tube; MGIT) media. MTB-positive cultures were first examined via auramin staining and then confirmed by real-time PCR. The interferon-gamma release assay for tuberculosis was measured using Quantiferon-TB Gold Plus (Qiagen, Dusseldorf, Germany), a Sandwich enzyme-linked immunosorbent assay. The cut-off value is 0.35 IU/ml (Asawin Sudcharoen, 2023). Risk factors associated with negative IGRA results include advanced age, low peripheral lymphocyte counts, and immunosuppressive conditions (Siwadon Kumpuangdee , Chutima Roomruangwong , Jiratchaya Sophonphan , Pirapon J. Ohata , Gompol Suwanpimolkul, 2023).

6. Vietnam

The development of tuberculous tenosynovitis is often dangerous. The most common symptoms are swelling of the hands and mild pain (Andrew D. Kerkhoff, 2023). Ultrasound is a useful tool to support diagnosis. Histological examination confirmed the diagnosis (Ian Wrohan, 2022). Most cases respond and give good results after 9-12 months of anti-tuberculosis treatment. Vietnam is an endemic country for TB and the overall estimated prevalence of bacteriologically confirmed TB among adults is 322 per 100,000 populations. With its atypical manifestations (Tracy R. Richardson, 2023), which can be confused with other diseases (Lan Huu Nguyen, 2020), TB tenosynovitis poses a significant challenge in diagnosis. In addition, waiting for histopathology results that confirm the diagnosis can delay treatment, causing many complications in the patient (Cao Thanh Ngoc, 2023).

7. Philippines

A report from the Philippine Institute for Development Studies also cited overcrowded living conditions as a factor exacerbating the spread of TB among the urban poor (Kimberly R. Schildknecht, 2022). Another problem that hinders the eradication of TB is financial barriers in treatment. Standard TB (Delia Goletti, 2022) treatment requires a minimum duration of 6 months for cases that are susceptible to drugs, while the overall duration can reach 2 years for cases that are resistant to drugs. Therefore, prolonged therapy is a major challenge in ensuring treatment compliance, which is the cornerstone of successful TB treatment (T. Yamanaka, 2023).

Discontinuation of treatment, negligence or non-compliance with treatment is complex, dynamic and caused by many interrelated causes. Apart from treatment-related factors (Fiona V.Cresswell, 2023), other factors such as socio-demographics, culture, economic burden, patient knowledge, attitudes and beliefs, family support, community and health system are several factors that can influence compliance status. Knowing the risk of stopping treatment early, which can affect treatment outcomes which is unprofitable (Ai Ling Oh, 2023).

8. East Timor

The prevalence of RR-TB in Timor-Leste is relatively low compared with the estimated proportion of RR-TB in the WHO Southeast Asia Region (2.5% [95% CI 1.9–3.3] among new cases and 14% [95 % CI 7.7–21] among previously treated cases). The rapid sputum collection and transport mechanism implemented in this survey demonstrated its feasibility in low-resource settings and should be replicated for routine transport of TB specimens from the microscope laboratory to GeneXpert sites. Establishment of domestic capacity for rapid molecular diagnostics for first- and second-line DST is an urgent need to achieve universal drug susceptibility testing (DST) to guide appropriate patient management. The primary aim of DRS is to determine the prevalence of DST (Constantino Lopes, Debashish Kundu, 2022).

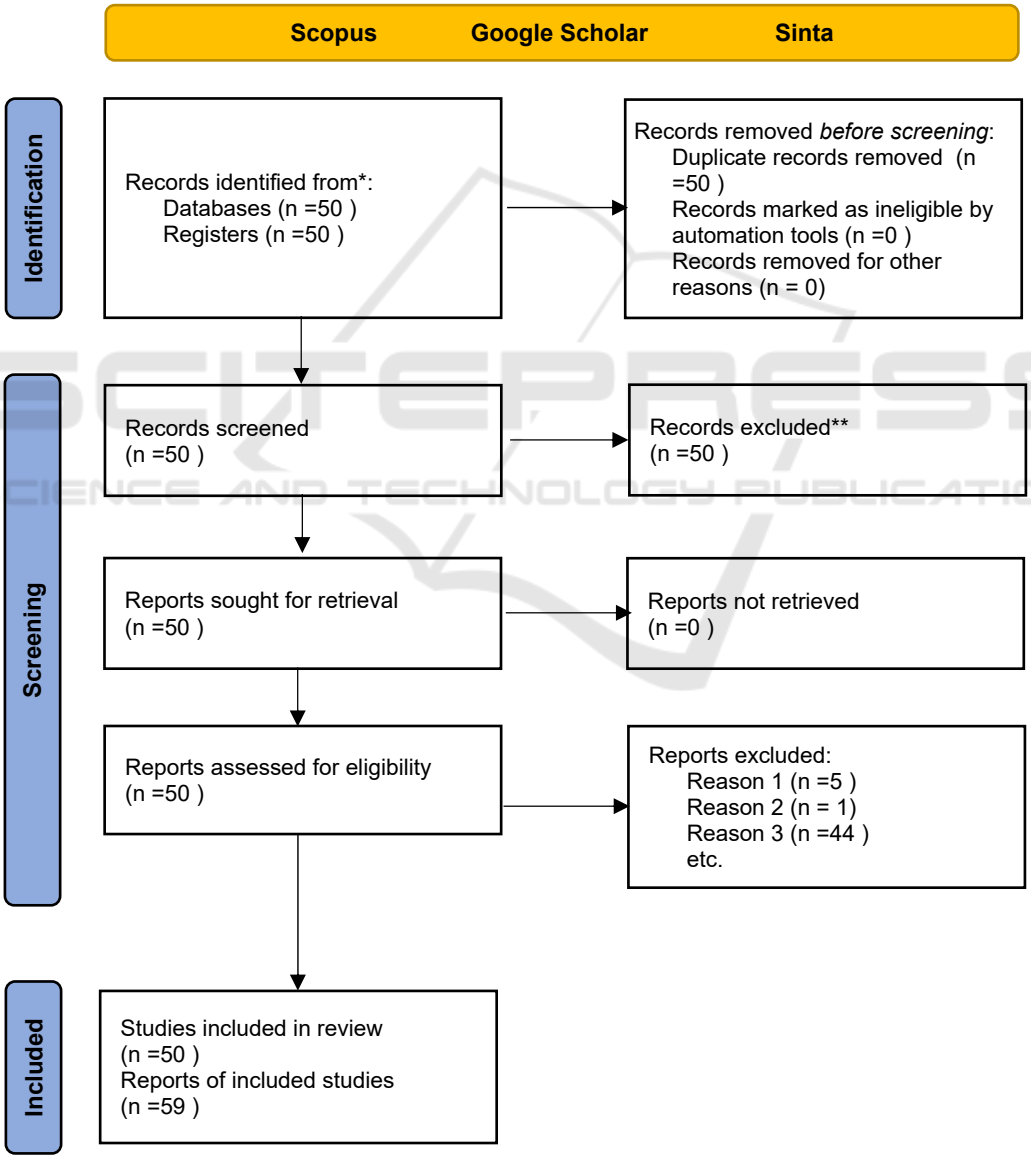
Resistance to rifampicin among new and previously treated sputum smear-positive pulmonary TB cases in Timor-Leste, to provide input for DR-TB programmed management (PMDT) planning, including the rollout of the WHO-recommended short oral treatment regimen for TB-RR, and guides resource requirements. Secondary objectives were to describe the sociodemographic and clinical characteristics of patients with bacteriologically confirmed pulmonary TB; investigate potential risk factors for RR-TB; establish baseline data for DR-TB surveillance to enable observations of trends over time and strengthen routine surveillance of anti-TB

drug resistance in Timor-Leste (Theresa Ryckman, PhD, 2023).

5 CONCLUSION

From the data obtained, it can be seen that the highest TB rate for Indonesia's neighboring countries is India, with 1,045,269 cases, 1st ranking in the world, and the country with the least is Thailand with 143 cases. Meanwhile, Indonesia is in the second place after India with a total of 969,000 cases in the 2022 period. Evaluation and treatment of TB in countries prioritizes personnel with family internalization in maintaining health, in addition to using the DOTS method. The Directly Observed Treatment Short Course (DOTS) strategy is direct supervision in the short term with the obligation for TB program managers to focus their attention on looking for sufferers using microscope examination This strategy is an effort to reduce morbidity and mortality due to TB.

6 FUNDING



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