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Relationship Nutritional Status and Pulmonary Tuberculosis: Literature Review

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ABSTRACT

Background: The incidence of tuberculosis is an important problem now. One of the risk factors that influence tuberculosis is nutritional status. Malnutrition and tuberculosis are interrelated problems. Aims of the study is to clearly understand the relationship between nutritional status and the incidence of pulmonary tuberculosis literature. **Method:** A literature review was carried out by searching articles through electronic databases (Google Scholar, PubMed, ScienceDirect, and SpringerLink) using the keywords nutritional status, tuberculosis, risk factors for the incidence of tuberculosis, and nutritional status incidence of pulmonary tuberculosis. The inclusion criteria for the articles used were articles published in accredited National and International publications articles, year of publication of the articles in the range 2017-20123, full text, open access, and cross-sectional study research design. Seven articles were selected for analysis. Articles were analyzed following Prisma Guidelines. **Results:** Based on a literature review, it was found that there was a relationship between nutritional status and the incidence of pulmonary tuberculosis. Nutritional status affects a person's immune system. When nutritional status is in poor condition, the body's immune system will be low, making it susceptible to disease, one of which is pulmonary tuberculosis. On the other hand, tuberculosis can worsen a person's nutrition due to the disease process. **Conclusion**: Based on studies, it is explained that nutritional status has a significant relationship and a high risk of the incidence of pulmonary tuberculosis. Nutritional status and pulmonary tuberculosis have a reciprocal relationship.

Introduction

Tuberculosis (TB) is a contagious infectious disease caused by infection with the bacteria Mycobacterium tuberculosis and is still a health problem of concern in the world. The incidence of tuberculosis according to the 2017 Global Tuberculosis Report shows that as many as 500,000 children were infected with TB in 2016 [1]. Based on the TB Prevalence Survey in Indonesia in 2016, the prevalence of pulmonary TB was 156,723 cases with 61% male cases and most cases occurring in the 45-54 years age group [2]. The high incidence of TB has an impact on increasing mortality rates [3].

Several risk factors for TB infection are low immunity, being in close contact with adults infected with TB, poor nutritional status, lack of access to medical services, and unhealthy environmental conditions [4]. Previous research has proven that there is a relationship between risk factors and the incidence of pulmonary TB, namely knowledge (p-value 0.018), nutritional status (p-value 0.012), and smoking habits (p-value 0.000) [5]. According to Binongko in 2012 in Maksalmina in 2013, one of the risk factors that influence tuberculosis is the nutritional status [6]. Analysis of risk factors for

pulmonary tuberculosis explains that the BMI variable influences the incidence of pulmonary tuberculosis. A BMI in the underweight category will affect a person's immune system, thereby increasing the risk of pulmonary tuberculosis [7].

Malnutrition and tuberculosis are interrelated problems. Nutritional status is one of the most important factors in the body's defense against tuberculosis infection. In poor nutritional conditions, the body's immune response will weaken so that the body's ability to defend itself against infection will decrease. Based on previous research, it is clear that there is a significant relationship between nutritional status and the incidence of pulmonary tuberculosis. This explains that poor nutritional status is 3.4 times more likely to suffer from pulmonary tuberculosis than adequate nutritional status [6].

There are many main factors in maintaining the body's immunity against tuberculosis transmission, one of which is being exposed to poor nutrition. Poor nutrition will cause the body's immunity to decrease so that the protective function to fight infection will decrease. Nutritional status will also influence recovery from tuberculosis treatment. Previous research found that the majority of pulmonary tuberculosis patients had very poor nutritional status, namely around 40.6%. Malnutrition will worsen the condition of TB patients which results in malnutrition. Another study explains that the majority of TB patients have poor nutritional status, namely 53.7% [8]. Based on this research, nutritional status is one of the factors that influences the occurrence of tuberculosis [9, 18, 19]. Several related literature have discussed the nutritional status of pulmonary tuberculosis of various ages including from the elderly, adults, teenagers, and children. However, some of these articles only explore the relationship between nutritional status and tuberculosis in general and only mention it as a risk factor for tuberculosis. Most of the previous literature used the case-control method. Literature regarding the relationship between nutritional status and pulmonary tuberculosis is still limited. Therefore, this research will explore various previous scientific literature and obtain information specifically regarding the relationship between nutritional status and pulmonary tuberculosis [14, 15]. Based on this background, researchers tried to analyze the relationship between nutritional status and tuberculosis using the literature study method. This research aimed to clearly understand the relationship between nutritional status and the incidence of pulmonary tuberculosis based on literature published previously [16, 17].

Materials and Method

This research employed a literature review sourced from several databases i.e. Google Scholar, PubMed, ScienceDirect, and SpringerLink. The keywords used are “nutritional status”, “pulmonary tuberculosis”, “risk factors for pulmonary tuberculosis”, “nutritional status” and "incidence of pulmonary tuberculosis”. The inclusion criteria for the articles used were articles published in accredited national and international publications articles, year of publication of the article in the range 2017-2023, full text, open access, pulmonary TB, not explain TB prevention, and cross-sectional study research design.

Searching for articles with these keywords produces around 5,640 articles from several databases. After identifying the relevance of titles and duplication of articles, a total of 102 articles were obtained. Then as many as 7 selected articles were analyzed in full text. The article analysis process can be seen in the Prisma scheme in Figure 1.

Results and Discussion

Results

Seven articles were analyzed using a matrix table (Table 1) to identify each variable studied regarding the relationship between nutritional status and the incidence of pulmonary tuberculosis. A literature study from seven focused and analyzed literature proves that nutritional status is related to the incidence of pulmonary TB. Previous research explains that the variable that has the most influence on the incidence of pulmonary tuberculosis is the nutritional status variable. Someone with poor nutritional status has a higher risk of suffering from pulmonary tuberculosis compared to people who do not have these risk factors.

The variable that is the focus of this literature review is the relationship between nutritional status and the incidence of pulmonary tuberculosis. The results of the article analysis found that nutritional status increases the incidence of pulmonary tuberculosis and conversely pulmonary tuberculosis can affect the nutritional status of sufferers. The results of the article synthesis analysis can be seen in Table 1.

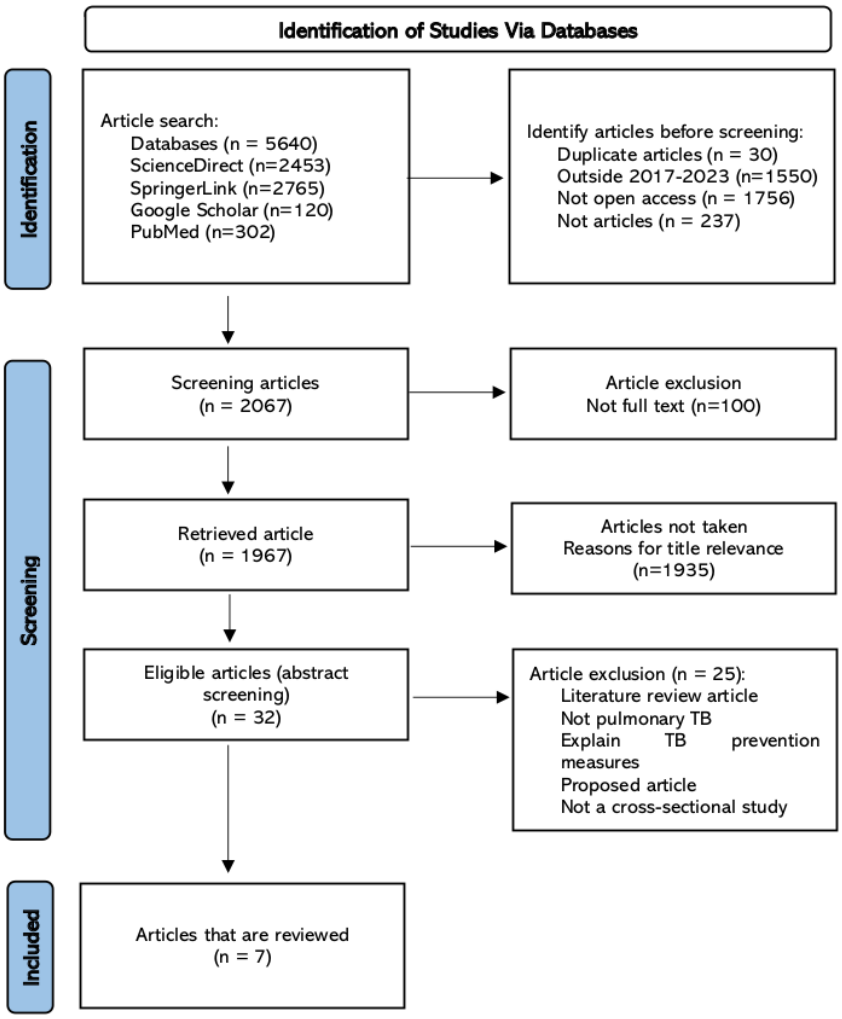

Figure 1. Article selection scheme using Prisma Guideline Flowchart

Discussion

A literature study from seven focused and analyzed literature proves that nutritional status is related to the incidence of pulmonary TB. Someone with poor nutritional status or underweight has a 1.6 times risk of suffering from pulmonary TB compared to someone who has normal nutritional status [5, 25, 26]. Previous research shows that subjects with poor nutritional status experience more cases of pulmonary TB, this is in accordance with the theory which explains that inadequate nutritional intake results in low body resistance, making it susceptible to attack by pulmonary TB

bacteria [10]. In general, nutritional status can be an important measure in determining disease [20]. Insufficient nutritional status can cause the body's immune system to be weak so that *Microbacterium tuberculosis* bacteria can easily reproduce and inhibit conversion [9].

Table 1. Analysis of Article Synthesis

No	Citation	Method	Sample/Place	Results
1	Feleke, B.E., Feleke, T.E., & Biadglegne, F. (2019)	Cross-sectional study	Sample: 5045 participants Place: Ethiopia	The research results show that most TB patients experience malnutrition. TB sufferers are very vulnerable to malnutrition and malnutrition is the cause of TB in patients
2	Amalia, R., Lestari, R., & Cholidah, R. (2022)	Cross-sectional study	Sample: 61 respondents Place: Cakranegara Health Center	The relationship between the tuberculosis treatment phase was not significant with the nutritional status of pulmonary tuberculosis patients (p=0.9660). This means that there is no relationship between the tuberculosis treatment phase and nutritional status
3	Gurung, L.M., Bhatt, L.D., Karmacharya, I., & Yadav, D.K. (2018)	Cross-sectional study	Sample: 133 respondents Place: Nepal	The number of calories, frequency of meals per day, type of TB, and nutritional status are related to current nutritional status. Nutritional counseling needs to be given to TB patients with nutritional support for severe malnutrition.
4	Mursudarinah & Sari, D, (2019)	Analytical observational cross-sectional study	Sample: 69 respondents Place: Surakarta	The statistical test results showed that the level of education was with a nutritional status p-value of 0.000 and the results of the treatment phase test were with a nutritional status p-value of 0.000. There is a relationship between the level of education the phase of tuberculosis treatment and the nutritional status of tuberculosis sufferers
5	Pakpahan, JY (2019)	Cross-sectional study	Sample: 30 respondents Place: Dumai	Bivariate, it shows that there is a relationship between smoking behavior (p-value 0.000) and nutritional status (p-value 0.000) with the incidence of pulmonary tuberculosis.
6	Aghnia, Q., Yusroh, Y., & Husin, U. (2018)	Observational retrospective used cross-sectional design	Sample: 98 child respondents Place: Al-Ihsan Regional Hospital	There is a relationship between tuberculosis and nutritional status in children (p=0.001). Research shows that children suffering from tuberculosis can suffer from malnutrition or malnutrition
7	Erpiono, Demmalewa, J., Dhesa, D., Ihsan, H., & Abadi, E. (2023)	Cross-sectional study	Sample: 47 respondents Place: Benu-Benua	There is a relationship between diet status and the frequency of pulmonary TB with a value of p = 0.015.

Previous research explains that the variable that has the most influence on the incidence of pulmonary tuberculosis is the nutritional status variable. Someone with poor nutritional status has a higher risk of suffering from pulmonary tuberculosis compared to people who do not have these risk factors. Malnutrition, such as a lack of calories, protein, vitamins, iron, etc., will affect a person's immune system, making them susceptible to infectious diseases such as pulmonary TB [27]. A person's nutritional status greatly determines a person's body's resistance to diseases that arise [11, 12].

There is a reciprocal relationship between malnutrition status and the risk of contracting tuberculosis. Poor nutritional status will increase the risk of tuberculosis [28, 29]. On the other hand, TB will contribute to poor nutritional status due to the course of the disease affecting the body's

immune system. Poor nutritional status will disrupt the immune system mediated by T lymphocytes, which facilitates the occurrence of infectious diseases, especially tuberculosis [13]. Tuberculosis infection can cause increased energy requirements and changes in metabolism which can worsen nutritional status, resulting in malnutrition. On the other hand, malnutrition can affect the clinical manifestations of tuberculosis as a result of a weakened immune system [8].

Literature studies also explain the relationship between nutritional status in children and pulmonary tuberculosis. Based on other research, it is inconsistent with the literature to explain that children's nutritional status is not a risk factor for the incidence of tuberculosis. This can happen to children with a positive or negative diagnosis of TB who have good nutritional status due to regular monitoring of nutritional status using the Healthy Way Card. Apart from that, there are many programs related to monitoring the nutritional status of toddlers so that more and more children have good nutritional status [13].

The body's immune system will function well if it provides adequate nutrition and food [21, 22]. In this case, what needs to be considered is the quality of food consumption which is determined by the composition of the type of food. Poor nutritional conditions can reduce resistance to tuberculosis in both adults and children. Normal body weight changes are also a predictor of successful pulmonary TB treatment. The nutritional status of TB patients generally improves during treatment. This can be caused by several factors, including increased food intake and appetite, as well as the body's metabolic processes starting to improve [9, 23, 30].

Conclusion

Based on the result, it is explained that nutritional status has a reciprocal relationship with pulmonary tuberculosis. Poor nutritional status will increase the risk of tuberculosis due to low immunity. On the other hand, tuberculosis will contribute to poor nutritional status because the disease process affects the body's immune system. Given the reciprocal relationship between nutritional status and pulmonary tuberculosis, it is recommended to implement comprehensive health interventions that address both aspects concurrently, focusing on improving nutritional support to boost immunity and, in turn, reduce the risk of tuberculosis, while also ensuring adequate nutritional care for individuals already affected by the disease to mitigate its impact on their overall health.

Declaration

Acknowledgments: None
Conflicts of Interest: There is no conflict of interest in this research

References

1. Harding E. WHO global progress report on tuberculosis elimination. *Lancet Respir Med*. 2020 Jan;8(1):19. doi: 10.1016/S2213-2600(19)30418-7. Epub 2019 Nov 6. Erratum in: Lancet Respir Med. 2019 Nov 15;: PMID: 31706931.
2. Lestari T, Fuady A, Yani FF, Putra IWGAE, Pradipta IS, Chaidir L, Handayani D, Fitriangga A, Loprang MR, Pambudi I, Ruslami R, Probandari A. The development of the national tuberculosis research priority in Indonesia: A comprehensive mixed-method approach. *PLoS One*. 2023 Feb 9;18(2):e0281591. doi: 10.1371/journal.pone.0281591. PMID: 36758064; PMCID: PMC9910756.
3. Kasznia-Brown J. Global resources in the fight against tuberculosis. *Pediatr Radiol*. 2023 Aug;53(9):1746-1752. doi: 10.1007/s00247-023-05663-0. Epub 2023 May 9. PMID: 37160457; PMCID: PMC10169137.
4. Dwenger LV, Funke N, Stephany P, Suarez I, Wiesmüller GA, Neuhann F. Latente Tuberkulose unter Kontaktpersonen inzidenter Tuberkulosepatienten: Häufigkeit und Risikofaktoren in Köln 2012–2016 [Frequency Distribution and Risk Factors for Latent Tuberculosis in Contact Persons: Cologne 2012-2016]. *Pneumologie*. 2021 Aug;75(8):567-576. German. doi: 10.1055/a-1479-0168. Epub 2021 May 10. PMID: 33971674.
5. Sousa GJB, Monte GLA, Sousa DG, Maranhão TA, Pereira MLD. Spatiotemporal pattern of the incidence of tuberculosis and associated factors. *Rev Bras Epidemiol*. 2022 Apr 22;25:e220006. English, Portuguese. doi: 10.1590/1980-549720220006. PMID: 35475902.
6. Bhargava A, Bhargava M, Velayutham B, Thiruvengadam K, Watson B, Kulkarni B, Singh M, Dayal R, Pathak RR, Mitra A, Rade K, Sachdeva KS. The RATIONS (Reducing Activation of Tuberculosis by Improvement of Nutritional Status) study: a cluster randomised trial of nutritional support (food rations) to reduce TB incidence in household contacts of patients with microbiologically confirmed pulmonary tuberculosis in communities with a high prevalence of undernutrition, Jharkhand, India. *BMJ Open*. 2021 May 20;11(5):e047210. doi: 10.1136/bmjopen-2020-047210. PMID: 34016663; PMCID: PMC8141431..
7. Yang DL, Li W, Pan MH, Su HX, Li YN, Tang MY, Song XK. Spatial analysis and influencing factors of pulmonary tuberculosis among students in Nanning, during 2012-2018. *PLoS One*. 2022 May 24;17(5):e0268472. doi: 10.1371/journal.pone.0268472. PMID: 35609085; PMCID: PMC9129035.

8. Nguyen TH, Nguyen THN, Le Xuan H, Nguyen PT, Nguyen KC, Le Thi TN. Nutritional status and dietary intake before hospital admission of pulmonary tuberculosis patients. *AIMS Public Health*. 2023 May 23;10(2):443-455. doi: 10.3934/publichealth.2023031. PMID: 37304581; PMCID: PMC10251045.
9. Akkerman OW, Ter Beek L, Centis R, Maeurer M, Visca D, Muñoz-Torrico M, Tiberi S, Migliori GB. Rehabilitation, optimized nutritional care, and boosting host internal milieu to improve long-term treatment outcomes in tuberculosis patients. *Int J Infect Dis*. 2020 Mar;92S:S10-S14. doi: 10.1016/j.ijid.2020.01.029. Epub 2020 Jan 23. PMID: 31982628.
10. Park HY, Kang D, Shin SH, Choi H, Jang SH, Lee CH, Kim H, Kwon OJ, Rhee CK, Cho J. Pulmonary Tuberculosis and the Incidence of Lung Cancer among Patients with Chronic Obstructive Pulmonary Disease. *Ann Am Thorac Soc*. 2022 Apr;19(4):640-648. doi: 10.1513/AnnalsATS.202010-1240OC. PMID: 34478360.
11. Messias A, Pasquadibisceglie A, Alonso de Armiño D, De Simone G, Polticelli F, Coletta M, Ascenzi P, Estrin DA. Nitric oxide binding to ferrous nitrobindins: A computer simulation investigation. *J Inorg Biochem*. 2023 Nov;248:112336. doi: 10.1016/j.jinorgbio.2023.112336. Epub 2023 Aug 5. PMID: 37572543.
12. Tamara L, Kartasasmita CB, Alam A, Gurnida DA. Effects of Vitamin D supplementation on resolution of fever and cough in children with pulmonary tuberculosis: A randomized double-blind controlled trial in Indonesia. *J Glob Health*. 2022 Feb 18;12:04015. doi: 10.7189/jogh.12.04015. PMID: 35198149; PMCID: PMC8855907.
13. Wang JL, Zhou M, Zhang YA, Wang MS. Loculations and Associated Risk Factors of Childhood Pleural Tuberculosis. *Front Pediatr*. 2021 Dec 16;9:781042. doi: 10.3389/fped.2021.781042. PMID: 34976895; PMCID: PMC8716631.
14. Tucker E, Luscombe-Marsh N, Ambrosi C, Lushington K. Nutritional status and quality-of-life of older adults in aged care: A systematic review and meta-analysis. *Exp Gerontol*. 2022 Jun 1;162:111764. doi: 10.1016/j.exger.2022.111764. Epub 2022 Mar 7. PMID: 35271944.
15. Chhabra S, Kashyap A, Bhagat M, Mahajan R, Sethi S. Anemia and Nutritional Status in Tuberculosis Patients. *Int J Appl Basic Med Res*. 2021 Oct-Dec;11(4):226-230. doi: 10.4103/ijabmr.ijabmr_76_21. Epub 2021 Nov 17. PMID: 34912685; PMCID: PMC8633694.
16. Prieto-Huecas L, Piera-Jordán CÁ, Serrano De La Cruz-Delgado V, Zaragoza-Martí A, García-Velert MB, Tordera-Terrades C, Sánchez-Sansegundo M, Martín-Manchado L. Assessment of Nutritional Status and Its Influence on Ovarian Reserve: A Systematic Review. *Nutrients*. 2023 May 12;15(10):2280. doi: 10.3390/nu15102280. PMID: 37242163; PMCID: PMC10224518.
17. Jaganath D, Beaudry J, Salazar-Austin N. Tuberculosis in Children. *Infect Dis Clin North Am*. 2022 Mar;36(1):49-71. doi: 10.1016/j.idc.2021.11.008. PMID: 35168714; PMCID: PMC8867883.
18. Koegelenberg CFN, Schoch OD, Lange C. Tuberculosis: The Past, the Present and the Future. *Respiration*. 2021;100(7):553-556. doi: 10.1159/000516509. Epub 2021 May 25. PMID: 34034257.
19. Appiah PK, Osei B, Amu H. Factors associated with nutritional status, knowledge and attitudes among tuberculosis patients receiving treatment in Ghana: A cross-sectional study in the Tema Metropolis. *PLoS One*. 2021 Oct 14;16(10):e0258033. doi: 10.1371/journal.pone.0258033. PMID: 34648547; PMCID: PMC8516225.
20. Chen W, Ding Q, Zhang SK, Tong ZW, Ren F, Hu CM, Su SF, Kan XH, Cao H, Li R, Fang G, Guo XZ, Chen XH, Zhu GQ, Yao Q, Luo HY, Tang HM, Lin JY, Bertolaccini L, Fan L. Nutritional status in patients with active pulmonary tuberculosis and new nutritional risk screening model for active tuberculosis: a national, multicenter, cross-sectional study in China. *J Thorac Dis*. 2023 May 30;15(5):2779-2799. doi: 10.21037/jtd-23-623. Epub 2023 May 25. PMID: 37324100; PMCID: PMC10267931.
21. Wang X, Luo L, Zhang D, Wang J, Ning X, Lin Y, Ke X, Li G. Factors Associated with Nutritional Risk in Patients with Pulmonary Tuberculosis and Structural Lung Disease: A Hospital-Based Cross-Sectional Study. *J Multidiscip Healthc*. 2022 Aug 26;15:1799-1807. doi: 10.2147/JMDH.S375441. PMID: 36052303; PMCID: PMC9426578.
22. Jindal SK. Is pulmonary tuberculosis a true risk-factor for chronic obstructive pulmonary disease? *Indian J Tuberc*. 2022 Apr;69(2):131-133. doi: 10.1016/j.ijtb.2021.09.013. Epub 2021 Oct 4. PMID: 35379391.
23. Meitei HN, Pandey A, Haobam R. Polymorphisms in drug metabolism genes as a risk factor for first-line anti-tuberculosis drug-induced liver injury. *Mol Biol Rep*. 2023 Mar;50(3):2893-2900. doi: 10.1007/s11033-022-08158-7. Epub 2022 Dec 23. PMID: 36562936.
24. Hu M, Feng Y, Li T, Zhao Y, Wang J, Xu C, Chen W. Unbalanced Risk of Pulmonary Tuberculosis in China at the Subnational Scale: Spatiotemporal Analysis. *JMIR Public Health Surveill*. 2022 Jul 1;8(7):e36242. doi: 10.2196/36242. PMID: 35776442; PMCID: PMC9288096.
25. Chakaya J, Khan M, Ntoumi F, Aklillu E, Fatima R, Mwaba P, Kapata N, Mfinanga S, Hasnain SE, Katoto PDMC, Bulabula ANH, Sam-Agudu NA, Nachega JB, Tiberi S, McHugh TD, Abubakar I, Zumla A. Global Tuberculosis Report 2020 - Reflections on the Global TB burden, treatment and prevention efforts. *Int J Infect Dis*. 2021 Dec;113 Suppl 1(Suppl 1):S7-S12. doi: 10.1016/j.ijid.2021.02.107. Epub 2021 Mar 11. PMID: 33716195; PMCID: PMC8433257.
26. Chakaya J, Petersen E, Nantanda R, Mungai BN, Migliori GB, Amanullah F, Lungu P, Ntoumi F, Kumarasamy N, Maeurer M, Zumla A. The WHO Global Tuberculosis 2021 Report - not so good news and turning the tide back to End TB. *Int J Infect Dis*. 2022 Nov;124 Suppl 1:S26-S29. doi: 10.1016/j.ijid.2022.03.011. Epub 2022 Mar 20. PMID: 35321845; PMCID: PMC8934249.
27. Eto F, Nezu T, Aoki S, Kamimura T, Naito H, Shiga Y, Hosomi N, Maruyama H. The association between nutritional intake one week after admission and outcome in acute ischemic stroke patients. *J Stroke Cerebrovasc Dis*. 2022 Nov;31(11):106812. doi: 10.1016/j.jstrokecerebrovasdis.2022.106812. Epub 2022 Sep 29. PMID: 36183518
28. Prinja S, Sharma A, Nadipally S, Rana SK, Bahuguna P, Rao N, Chakraborty G, Shankar M, Rai V. Impact and cost-effectiveness evaluation of nutritional supplementation and complementary interventions for tuberculosis treatment outcomes under mukti pay-for-performance model in Madhya Pradesh, India: A study protocol. *Int J Mycobacteriol*. 2023 Jan-Mar;12(1):82-91. doi: 10.4103/2212-5531.307071. PMID: 36926768.
29. Zidni IN, Istiqomah ZS, Lina H. Nutritional Status of Children Under Five Years in the Work Area of Puskesmas Cipadung. *Disease Prevention and Public Health Journal*. 2021. Vol. 15, No. 2. doi: https://doi.org/10.12928/dpphj.v15i2.4748
30. Lisnaini, Weeke B, Meliana C. Nutritional Intake of Children in Kebon PalaEast Jakarta. Disease Prevention and Public Health Journal. 2023. Vol.17, No. 1. doi: https://doi.org/10.12928/dpphj.v17i1.6512

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