

Modelling Optimally to the Treatment of TB Patients for Increase Medical Knowledge

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ABSTRACT

The DOTS strategy is an important element in the international policy program recommended for TB control. This strategy ensures TB patients to take anti-TB drugs correctly, at appropriate dosages and intervals. The implementation of DOTS depends on the settings, facilities, resources and environment. There must be flexibility in implementing the DOTS strategy. The results of the research level of knowledge based on the level of education, obtained data where patients with junior and senior high school education have good knowledge of (54.5%). Obtained men with a good level of knowledge 8 people (72.7%). Whereas in women, there were 3 people who were well-informed (27.3%). Based on the work found that those who work have a sufficient level of knowledge there are 30 people (66.7%). While those who did not work had 1 person lacking knowledge and there were 15 people who were knowledgeable (33.3%). Based on the latest level of education, high school has enough knowledge of 22 people (48.9%) and good as many as 6 people (54.5%).

Keywords: DOTS, IMK, Knowledge Medical, TB Control.

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INTRODUCTION

Tuberculosis (TB) is a contagious lung disease due to *Mycobacterium tuberculosis* infection. Pulmonary tuberculosis accounts for 80% of all tuberculosis events. It is estimated that one third of the world's population has been infected with *M. Tuberculosis* in Indonesia, pulmonary TB disease ranks 4th for the morbidity rate while as a cause of death ranks 5th; attacks most of the productive age groups from weak socio-economic groups. Although efforts to eradicate TB have been made, the incidence and prevalence of pulmonary TB in Indonesia has never dropped [1]. The source of transmission is positive acid-fast bacillus (TB smear) patients. When coughing or sneezing, the patient spreads germs into the air in the form of sputum droplets (droplet nuclei) and in a single cough can produce about 3000 sputum splashes [2]. TB eradication has actually started a long time ago but the results have not been encouraging. Before there was a DOTS (Directly Observe Treatment Shortcourse) strategy, program coverage was 56% with a cure rate of only 40-60%. Because of irregular treatment and inadequate drug combinations in the past, it is likely that TB germs or multi drug resistance (MDR) immunity has become widespread against Anti Tuberculosis Drugs.2 According to the World Bank the DOTS strategy is the most cost-effective health strategy. Experience in various countries shows this. In Bangladesh with the DOTS strategy, the cure rate for TB patients can reach around 80% [2]. In 1994, Indonesia adopted the DOTS (directly observed treatment short-course) strategy for TB control, and in 2001 all provinces and more than 95% of Puskesmas, and 30% of Hospitals / BP.4 had adopted the DOTS strategy. The success of the treatment is low because it is likely that the patient who came alone or was referred was already in an advanced condition and the patient had gone to another health facility. It turns out that something that often happens in various health centres, pulmonary TB

sufferers who use DOTS only get drugs for free without any laboratory tests, sputum smear examination and no home visits. The pulmonary polyclinic is limited to administering drugs and the recording of the Drug Supervisor (PMO) is usually his own family and has never been trained in pulmonary TB for a certain period of time. Patients with pulmonary TB lack adequate counselling and education, causing non-compliance and treatment failure due to lack of knowledge about TB disease. Knowledge is as a level of sufferer carrying out ways of treatment and behaviour suggested by doctors or others. The patient's knowledge in taking anti-tuberculosis drugs means that the patient is obedient in carrying out the treatment program, if the patient takes the medicine on time and does not forget to take the medicine [5].

In a previous study, it was stated that the majority of respondents did not know about treatment as much as (62.5%). Lack of or minimal knowledge could cause patients to harm the treatment efforts and prevent recurrence of pulmonary TB disease. Generally, pulmonary TB patients do not know the treatment due to lack of information from health services about symptoms, danger, and prevention of pulmonary TB disease [6].

The success of pulmonary TB treatment in the DOTS strategy is largely determined by the regularity of taking anti-tuberculosis drugs. This can be achieved by the awareness of pulmonary TB patients to take medication regularly through efforts to increase the knowledge of pulmonary TB patients about the prevention and treatment of pulmonary TB through health education. Thus, in achieving pulmonary TB treatment, the patient must know about the treatment.

RESEARCH AND METHODOLOGY

In this study, tuberculosis is caused by *Mycobacterium tuberculosis* infection. The form of *Mycobacterium tuberculosis* is a straight or slightly bent stem measuring 0.2-0.4 x 1-4 μm . Ziehl-Neelsen's staining is used to identify acid resistant bacteria. The nature of *Mycobacterium* is not heat resistant, will die at 6 ° C for 15-20 minutes. Culture can die if exposed to direct sunlight for 2 hours. In sputum can last 20-30 hours. Basil which is in a splash of material can survive 8-10 days. This basil culture at room temperature can live 6-8 months and can be stored in a cabinet with a temperature of 20 ° C for 2 years. *Mycobacterium* is resistant to various chemicals and disinfectants including phenol 5%, sulfuric acid 15%, citric acid 3% and NaOH 4%. This basil is destroyed by iodine tincture in 5 minutes, with 80% alcohol will be destroyed in 2-10 minutes [7].

2.1 TB Classification

A. BTA (+) pulmonary tuberculosis

- At least 2 out of 3 sputum specimens show positive smear results
- The results of the examination of one sputum specimen show a positive smear and radiological abnormalities show a positive tuberculosis picture.
- The result of examination of one sputum specimen shows a positive smear and a positive culture.

B. BTA (-) pulmonary tuberculosis

- Sputum examination results 3 times showed smear negative, clinical features and radiological abnormalities showed active tuberculosis.
- Sputum examination results 3 times showed negative smear of the culture of *Mycobacterium tuberculosis*.

2.2 Treatment

Table 1. Anti-Tuberculosis Drugs (OAT)

OAT	Character	Dose			
		Daily		3 x / week	
		Dosage range (mg/kg BB)	Maximum (mg)	Dosage range (mg/kg BB)	Maximum /daily (mg)
Isoniazid	Bactericidal	5 (4-6)	300	10 (8-12)	900
Rifampicin	Bactericidal	10 (8-12)	600	10 (8-12)	600
Pyrazinamide	Bactericidal	25 (20-30)	-	35 (30-40)	-
Ethambutol	Bactericidal	15 (15-20)	-	30 (25-35)	-
Streptomycin	Bacteriostatic	15 (12-18)	-	15 (12-18)	1000

Note:

Administration of streptomycin for patients aged > 60 years or patients weighing <50 kg may not be able to tolerate doses > 500 mg / day.5.

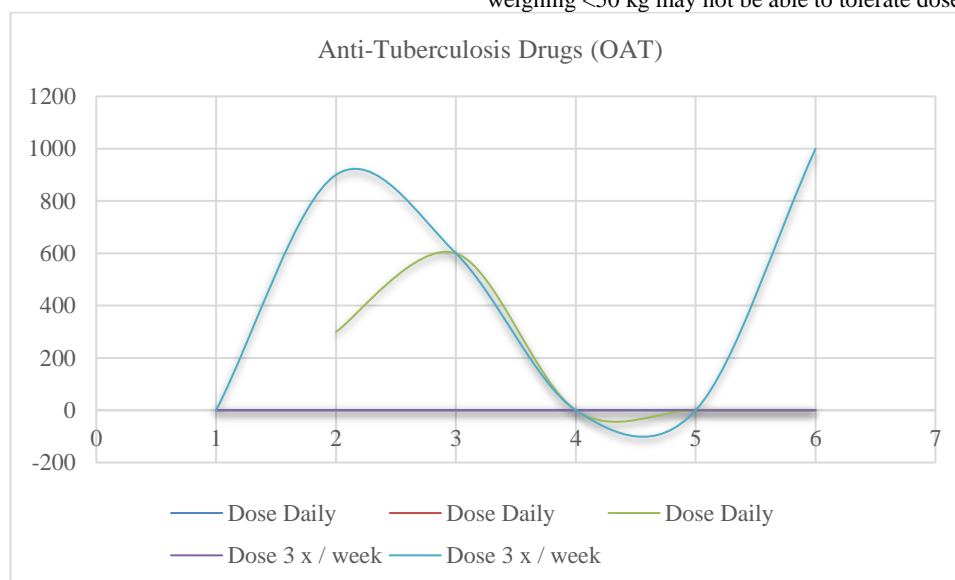


Figure 1. Anti-Tuberculosis Drugs (OAT)

2.3 DOTS Strategy

DOTS Strategy Planning, since 1994, the TB Eradication Program has been carried out in stages at the Puskesmas by implementing the DOTS (Directly Observed Treatment Short course) strategy recommended by WHO. There are five components to the DOTS strategy:

- Political commitment from the government to run a national TB program.
- Diagnosis of TB through sputum examination microscopically.
- Treatment of TB with a combination of Anti-Tuberculosis Drugs (OAT) which is supervised directly by the Drugs Supervisor (PMO).
- OAT inventory continuity.

- e. Standard recording and reporting to facilitate monitoring and evaluation of pulmonary TB control programs.

In Indonesia, the DOTS strategy was first trialled in 1994 and then widely implemented in the basic health care system. The focus now is to increase the coverage of DOTS to all health care providers in Indonesia along with improving the quality of services. The initial step is to strengthen the puskesmas network, then other innovation strategies such as regional specific planning in an effort to reach populations that are difficult to get access to services (due to socio-economic and geographical).

Achievement of the P2TB program indicators can be achieved by implementing the P2TB program according to the "DOTS STRATEGY" standard. If P2TB officers have implemented according to existing program standards, but TB performance is still low then it can be pursued through community empowerment as proclaimed by the Ministry of Health in the STOP TB PATNERSHIP strategy, the intervention is an effort to empower the community so that people are aware of TB disease and how to prevent and treat it.

The pulmonary TB disease control program is implemented by a health implementing unit (UPK) consisting of five Microscopic Referral Health centres (PRM), 11 Satellite Health centres (PS), and 13 Independent Implementing Health centres (PPM). The results of activities in the period 2004 - 2008 which included CDR decreased from 2004 except in 2006 which increased to 33.58%. The conversion rate in 2004 (81.12%) decreased in 2005 and 2006 and only increased in 2007 (85.16%). Cure rates fluctuated starting in 2004 (73.72%), increased in 2005 (91.18%), and in 2006 to 2008 again declined.

2.4 DOTS in Hospitals and Health Centre's

Based on the results of a study by the Ministry of Health, 49% of TB patients in Java, 44% of TB patients in Sumatra and 31% of TB patients in Eastern Indonesia visited their hospitals for the first time. This shows that hospital opportunities are very important in eradicating TB, among others in increasing CDR (Case Detection Rate) and CR (Cure Rate). The hospital has several advantages including having enough experts, diagnostic and therapeutic equipment that is quite complete, the number of patients is large, etc. the time cannot be done home visits. TB disease can attack various organs of the human body so that TB patients in the hospital can come to various specialists in the hospital, therefore to coordinate TB services in the hospital it is necessary to form a Hospital DOTS Team. The team is tasked with coordinating activities in the hospital through the internal network (internal linkage) of the hospital and coordination of activities outside the hospital through an external network (external linkage)

2.5 Steps to start implementing DOTS at the hospital include:

- a. Conduct a situation assessment and analysis, whether the hospital is willing to carry out the DOTS program.

- b. Obtain a strong commitment, especially from management and specialist doctors who will implement DOTS.
- c. Forming a Memorandum of Understanding between the local Health Office and hospital management.
- d. Prepare DOTS implementing staff including doctors, nurses, laboratory staff, pharmacy officers, recording and reporting officers, and others.
- e. Form a DOTS team at the hospital. The team will coordinate the activities of internal linkage or external linkage.
- f. Provide a place for DOTS units inside the hospital. This place is the centre of TB patient service activities at the hospital.
- g. Providing storage area for OAT packages in DOTS room.
- h. Prepare laboratories for sputum microbiological examination according to standards.
- i. Using the recording format in accordance with the national tuberculosis program.

2.6 Factors Associated with Knowledge

- a. Education, education means guidance given by one person to another on a matter so that they can understand. It is undeniable that the higher a person's education the easier they will receive information, and in the end the more knowledge he has. Conversely, if someone's level of education is low, it will hamper the development of one's attitude towards receiving information and introducing new values.
- b. Profession
The work environment can make a person gain experience and knowledge both directly and indirectly.
- c. Age, with increasing age someone will change in psychological and psychological aspects (mental). There are four broad categories of physical growth, change in size, change in proportion, loss of old features and emergence of new features. This occurs due to maturation of organ function. In psychological and mental aspects, the level of thinking of a person is more mature and mature.
- d. Interest, as a tendency or high desire for something. Interest makes someone to try and pursue something and ultimately deeper knowledge is obtained.
- e. Experience, is an event that someone has experienced in interacting with their environment. There is a tendency for a good experience someone will try to forget, but if the experience of the object is pleasant then psychologically there will be an impression that imprints an emotion so that it creates a positive attitude.
- f. Culture, the culture of the surrounding environment, if in a region has a culture to maintain environmental cleanliness then it is very possible the surrounding community has an attitude to always maintain the cleanliness of the environment. University of Sumatera Utara.
- g. Information, the ease of obtaining information can help speed someone to gain new knowledge

Table 2 Operational Definition

Variable	Operational Definition	Measure	Measuring instrument	Results Measuring	Scale Measuring
Gender	Differences in the form, nature, and functions of male and female biology that determine differences in roles.	Questionnaire field	Questionnaire	Female Male	Ordinal
Job status	An active activity carried out by humans.	Questionnaire field	Questionnaire	Work Does not work	Ordinal
Age	The age of the individual counted from birth until the time of the birthday	Questionnaire field	Questionnaire	Age in years	Ordinal 17-24, 25-34, 35-44, 45-54, >55
last education	A conscious and planned effort to create an atmosphere of learning and learning process.	Questionnaire field	Questionnaire	SD SMP SMA PT	Ordinal
Science	Various symptoms encountered and obtained by humans through observations of reason.	Questionnaire field	Questionnaire	Low 0-7 Medium 8-14 Hight 15-21	Ordinal

ACHIEVED MODEL

The optimally model for increase medical knowledge, if the pattern of the uncertainty disruption has a discrete probability distribution can be expressed formula as follows:

$$\begin{aligned} \text{Min } cx + \sum_{s=1}^S P^s Q^s(x) \\ \text{Subject to:} \\ Ax = b \\ x \geq 0 \\ \text{Where} \\ Q^s = \text{Min} \{f^s y | D^s y \geq h^s + T^s x\} \end{aligned}$$

P^s is the possible distribution of TB patient management. x is a vector of primary stage variables where there is no knowledge. Because of the increased knowledge of TB patients, we will have a variable vector as the IMK Process. S is the situation expected to describe parameters for knowledge. Variable x vector can be seen as one of the results that accompany the IMK process, for example, efficiency, benefits, development of treatment, or anticipation of handling TB patients. Leave until further notice x is considered profitability. At the main stage, it is accepted that the model for increasing the largest profitability is in a

straight program, as illustrated in Eq. (1) and (2), without terms.

RESULT AND DISCUSSION (1)

This research was conducted at Medan Johor Health Centre which is located at Jalan Karya Jasa no.5, Medan Johor District, Johor Building District, with telephone number (061) 75041273 which is one of 2 Health Centers located in Medan Johor a (2) main Health Centre in Medan Johor This puske (2) vides general treatment services that can use J ias, BPJS and Mandiri facilities. Medical exai (3) is by general practitioners, obstetrical examinations, laboratory examinations, and dental examinations. TB patients can come on working days and hours at the health centre to pick up or come for TB treatment, at each health centre has been given special days and hours for TB treatment. In this study, 57 respondents were surveyed from the total number of patients who sought treatment at Medan Johor Health Centre based on patients who came when taking further anti-TB drugs. This research was conducted in October and November at Medan Johor Health Centre. Sampling is done every Tuesday starting at 08.00 until 12.00 WIB.

Table 3. Characteristics of TB Patients

Gender	n	%
Man	35	61,4
Female	22	38,6
Total	57	100,0
Age	n	%
17-24 year	10	17,5
25-34 year	18	31,6
35-44 year	7	12,3
45-54 year	15	26,3
> 55	7	12,3
Total	57	100,0
Job Status	n	%
Work	41	71,9
Does not Work	16	28,1
Total	57	100,0
Last Education	n	%

SD	2	3,5
SMP	14	24,6
SMA	29	50,9
PT	12	21,1
Total	57	100,0

there are more male TB patients at 61.4% compared to 38.6% of female TB patients. Most pulmonary TB patients at Medan Johor Health Centre have ages between 25-34 years which is 31.6%, TB patients who work more than those who do not work that is as much as 71.9% compared with patients who

work as much as 28.1%. There are the most TB patients with the highest education level of 50.9% and with the most recent elementary school education are the patients with the lowest score of 3.5%.

Table 4. Level of TB Patient Knowledge About DOTS Strategies Based on Gender

Gender		Knowledge level			Total
		Low	Medium	High	
Man	n	1	26	8	35
	%	1,8	45,6	19	33,3
Female	n	0	19	3	22
	%	0	33,3	5,3	38,6
Total	n	1	45	11	57
	%	1,8	78,9	19,3	100,0

From Table 4. it is found that male TB patients have better knowledge of 72.7%.

Table 5. Level of TB Patient Knowledge About DOTS Strategies by Age

Age		Knowledge level			Total
		Low	Medium	High	
17-24	n	1	8	1	10
	%	100,0	17,8	9,1	17,5
25-34	n	0	12	6	18
	%	0	26,7	54,5	31,6
35-44	n	0	4	3	7
	%	0	8,9	27,3	12,3
45-54	n	0	14	1	15
	%	0	31,1	9,1	26,3
>55	n	0	7	0	7
	%	0	15,6	0	12,3
Total	n	1	45	11	57
	%	1,8	78,9	19,3	100,0

Based on the results of Table 5. above, obtained the most good knowledge found at the age of 25-34 years by 54.5%.

Table 6. Level of TB Patient Knowledge About DOTS Strategies Based on Employment Status

Job Status		Knowledge level			Total
		Low	Medium	High	
Work	n	0	30	11	41
	%	0	66,7	100,0	71,9
Does not Work	n	1	15	0	16
	%	100,0	33,3	0	28,1
Total	n	1	45	11	57
	%	100,0	100,0	100,0	100,0

From Table 6. there are TB patients with sufficient knowledge in working TB patients 66.7%

Table 7. Level of TB Patient Knowledge About DOTS Strategies Based on Last Educational Level

Education		Knowledge level			Total
		Low	Medium	High	
SD	n	0	2	0	2
	%	0	4,4	0	3,5
SMP	n	0	9	5	15
	%	0	20	45,5	24,6
SMA	n	1	22	6	29
	%	100,0	48,9	54,5	50,9
PT	n	0	12	0	12
	%	0	26,7	0	21,1
Total	n	1	45	11	57
	%	100,0	100,0	100,0	100,0

From Table 7. there are TB patients with the last high school education level with better knowledge of (54.5%), in junior high school education (45.5%), there is enough knowledge in

the latest tertiary education level of (26.7%), and at the elementary school level is the lowest level (3.5%).

From the results of the study, it was found that the level of knowledge of men was better (72.7%) than women (27.3%). This is in accordance with the research of Bhatt, et al., Who said that in almost all regions where TB is a common health problem, the incidence of TB in women is less than in men because sex is not only a biological difference but is different in behaviour, expectations, opportunities in cultural contexts and ekonomi.¹³ Furthermore, according to Jianmingwang, et al women are less aware of information about TB and tend to be difficult to share information with others. Another influential factor is that women are more likely to visit lower-level health services such as traditional healers, alternative medicine, and go directly to pharmacies to buy their own medicines.

The results of the best level of knowledge research is at the age of 25-34 years which is as much productive age (54.5%). This is because the productive age has a fast grasp of power, an active learning process, and a good memory making it easier to receive the knowledge provided. Whereas in the elderly there is a decrease in intellectual, comprehension, and mindset as a result of increasing age so that there is a decrease in the ability of knowledge.

The results of the research level of knowledge based on work found that the working group of respondents had a sufficient level of knowledge (66.7%) than TB patients who did not work as much (33.3%).

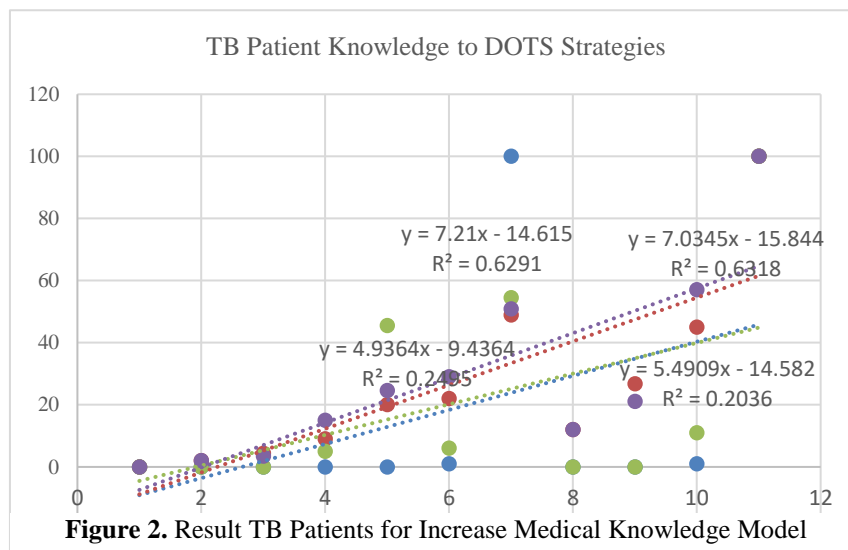


Figure 2. Result TB Patients for Increase Medical Knowledge Model

CONCLUSION

In this study, the DOTS strategy is the most effective strategy for controlling TB. The DOTS strategy is an important element in the international policy program recommended for TB control. This strategy ensures TB patients to take anti-TB drugs correctly, at appropriate dosages and intervals. The implementation of DOTS depends on the settings, facilities, resources and environment. Therefore, there must be flexibility in implementing the DOTS strategy

1. Obtained men with a good level of knowledge 8 people (72.7%). Whereas in women, there were 3 people who were well-informed (27.3%).
2. Based on age, there are 12 people (25.7%) who have 25-34 years knowledgeable, while there are 6 people who have good knowledge (54.5%).
3. Based on the work found that those who work have a sufficient level of knowledge there are 30 people (66.7%). While those who did not work had 1 person lacking knowledge and there were 15 people who were knowledgeable (33.3%). Based on the latest level of education, high school has enough knowledge of 22 people (48.9%) and good as many as 6 people (54.5%).

REFERENCES

1. Sis, H. Y., Jannati, A., AsghariJafarabadi, M., Ebrahimi-kalan, M., Taheri, A., & Koosha, A. (2014). The effectiveness of family-based DOTS versus professional-family mix DOTS in treating smears positive tuberculosis. *Health promotion perspectives*, 4(1), 98.
2. Lv, X., Tang, S., Xia, Y., Wang, X., Yuan, Y., Hu, D., ... & Tu, D. (2013). Adverse reactions due to directly observed treatment strategy therapy in Chinese

tuberculosis patients: a prospective study. *PloS one*, 8(6), e65037.

3. Djojodibroto RD. RESPIROLOGI (Respiratory Medicine). Jakarta: EGC; 2012
4. Rondags, A., Himawan, A. B., Metsemakers, J. F., & Kristina, T. N. (2014). Factors influencing non-adherence to tuberculosis treatment in Jepara, Central Java, Indonesia. *Southeast Asian Journal of Tropical Medicine and Public Health*, 45(4), 859.
5. Kaona, F. A., Tuba, M., Siziya, S., & Sikaona, L. (2004). An assessment of factors contributing to treatment adherence and knowledge of TB transmission among patients on TB treatment. *BMC Public health*, 4(1), 1-8.
6. PDPI. Tuberculosis: Pedoman diagnosis & penatalaksanaan di Indonesia. Jakarta: PDPI; 2006.
7. Khan, J. A., Zahid, S., Khan, R., Hussain, S. F., Rizvi, N., Rab, A., ... & Enarson, D. A. (2005). Medical interns knowledge of TB in Pakistan. *Tropical doctor*, 35(3), 144-147.
8. Kemenkes RI. Pedoman nasional pengendalian tuberculosis. Jakarta: Kemenkes RI; 2011
9. Ibrahim, L. M., Hadejia, I. S., Nguku, P., Dankoli, R., Waziri, N. E., Akhimien, M. O., ... & Nsubuga, P. (2014). Factors associated with interruption of treatment among Pulmonary Tuberculosis patients in Plateau State, Nigeria. 2011. *Pan African Medical Journal*, 17(1).
10. Tasnim, S., Rahman, A., & Hoque, F. M. (2012). Patient's knowledge and attitude towards tuberculosis in an urban setting. *Pulmonary medicine*, 2012.
11. CHANG, K. C., & YEW, W. W. (2013). Management of difficult multidrug-resistant tuberculosis and extensively drug-resistant tuberculosis: update 2012. *Respirology*, 18(1), 8-21.

12. Vijay, S., Kumar, P., Chauhan, L. S., Vollepore, B. H., Kizhakkethil, U. P., & Rao, S. G. (2010). Risk factors associated with default among new smear positive TB patients treated under DOTS in India. *PLoS one*, 5(4), e10043.
13. Elveny, M., Syah, R., M.K.M., Nasution. 2020. Taxonomy Business Model to Customer Behaviour in E-Metric Ecosystem. *Journal of Advanced Research in Dynamical and Control Systems*. 12(7), pp.99-104. DOI: 10.5373/JARDCS/V12I7/20201989.
14. Habteyes Hailu, T. O. L. A., Azar, T. O. L., & Davoud SHOJAEIZADEH, G. G. (2015). Tuberculosis treatment non-adherence and lost to follow up among TB patients with or without HIV in developing countries: a systematic review. *Iranian journal of public health*, 44(1), 1.
15. Adejumo, O. A., Daniel, O. J., Kuyinu, Y. A., Wright, K. O., Jaiyesimi, E. O., & Odusanya, O. O. (2016). Awareness and Knowledge of Health Care Workers at Dots Facilities on the Management of Tuberculosis in Lagos, Nigeria: A Public-Private Comparison. *Current Journal of Applied Science and Technology*, 1-8.
16. Permatasari A. Pemberantasan Penyakit TB Paru dan Strategi Dots. Medan: Bagian Paru Fakultas Kedokteran Universitas Sumatera Utara; 2005.
17. Syah, R., Nasution, M. K., Elveny, M., & Arbie, H. (2020). Optimization Model for Customer Behavior With Mars and KYC System. *Journal of Theoretical and Applied Information Technology*, 98(13).
18. Ngurah IGKG, Purwasi PAGK. Pengetahuan pasien tuberculosis dalam menjalankan program pengobatan obat anti tuberculosis (OAT). Bali: Jurusan Keperawatan Politeknik Kesehatan Denpasar; 2012
19. Akin, S., Gorak, G., Unsar, S., Mollaoglu, M., Ozdilli, K., & Durna, Z. (2011). Knowledge of and attitudes toward tuberculosis of Turkish nursing and midwifery students. *Nurse education today*, 31(8), 774-779.
20. Macq, J., Torfoss, T., & Getahun, H. (2007). Patient empowerment in tuberculosis control: reflecting on past documented experiences. *Tropical Medicine & International Health*, 12(7), 873-885.
21. Syah, R., Nasution, M. K. M., Nababan, E. B., & Efendi, S. (2020, June). Optimization Metrics Model: The Mobile Wallet for Merchant Ecosystem. In *Journal of Physics: Conference Series* (Vol. 1566, No. 1, p. 012124). IOP Publishing.
22. Wang, J., Fei, Y., Shen, H., & Xu, B. (2008). Gender difference in knowledge of tuberculosis and associated health-care seeking behaviors: a cross-sectional study in a rural area of China. *BMC public health*, 8(1), 354.
23. Syah, R., Nasution, M., Nababan, E. B., & Efendi, S. (2020). Knowledge Acceleration Estimator (KAE) Model to Customer Behavior Using Business Metrics. *Journal of Theoretical and Applied Information Technology*, 98(08).
24. Notoatmodjo S. Promosi kesehatan dan perilaku kesehatan. Jakarta: Rineka cipta; 2012.
25. Novita GY, Gambaran Pengetahuan, Sikap Dan Perilaku Penderita Tuberculosis Terhadap Ketidakpatuhan Dalam Pengobatan Menurut Sistem Dots Di Rsu Dr. Slamet Garut Periode 1 Januari 2011 –31 Desember 2011. Bandung : Univ. Kristen Maranatha; 2012.
26. Hemwati NBG dkk, Tuberculosis Patients Opinion For Directly Observed Treatment Short-Course (Dots) Rogramme Of Nepal. India : University Srinagar Garhwal;2009.
27. Jianming W Dkk, Gender Difference In Knowledge Of Tuberculosis And Associated Health-Care Seeking Behaviors: A Cross-Sectional Study In A Rural Area Of China. China : Bmc Public Health;2008.
28. Harper, M., Ahmadu, F. A., Ogden, J. A., McAdam, K. P., & Lienhardt, C. (2003). Identifying the determinants of tuberculosis control in resource-poor countries: insights from a qualitative study in The Gambia. *Transactions of the royal society of tropical medicine and hygiene*, 97(5), 506-510.
29. Husein, Ismail H Mawengkang, S Suwilo "Modeling the Transmission of Infectious Disease in a Dynamic Network" *Journal of Physics: Conference Series* 1255 (1), 012052, 2019.
30. Husein, Ismail, Herman Mawengkang, Saib Suwilo, and Mardiningsih. "Modelling Infectious Disease in Dynamic Networks Considering Vaccine." *Systematic Reviews in Pharmacy* 11.2, pp. 261-266, 2020.
31. Muqdad Irhaem Kadhim, Ismail Husein. "Pharmaceutical and Biological Application of New Synthetic Compounds of Pyranone, Pyridine, Pyrimidine, Pyrazole and Isoxazole Incorporating on 2-Flouroquinoline Moieties." *Systematic Reviews in Pharmacy* 11 (2020), 679-684. doi:10.5530/srp.2020.2.98.
32. Hamidah Nasution, Herlina Jusuf, Evi Ramadhani, Ismail Husein. "Model of Spread of Infectious Diseases." *Systematic Reviews in Pharmacy* 11 (2020), 685-689. doi:10.5530/srp.2020.2.99.
33. Husein, Ismail, Dwi Noerjoedianto, Muhammad Sakti, Abeer Hamoodi Jabbar. "Modeling of Epidemic Transmission and Predicting the Spread of Infectious Disease." *Systematic Reviews in Pharmacy* 11.6 (2020), 188-195. Print. doi:10.31838/srp.2020.6.30
34. Husein, Ismail, YD Prasetyo, S Suwilo "Upper generalized exponents of two-colored primitive extremal ministrong digraphs" *AIP Conference Proceedings* 1635 (1), 430-439, 2014
35. S Sitepu, H Mawengkang, I Husein "Optimization model for capacity management and bed scheduling for hospital" *IOP Conference Series: Materials Science and Engineering* 300 (1), 01,2016.
36. Atun, R. A., Baeza, J., Drobniewski, F., Levicheva, V., & Coker, R. J. (2005). Implementing WHO DOTS strategy in the Russian Federation: stakeholder attitudes. *Health policy*, 74(2), 122-132.