

# Improved completing-treatment support among tuberculosis support group members through the CERMAT (Smart Against TB Transmission) program

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**ABSTRACT** Tuberculosis (TB) was declared a global emergency for humanity by the World Health Organization in 2015. According to Global Report TB data in 2016, Indonesia is one of the 30 countries in the world that has the highest TB caseload, especially Human Immunodeficiency Virus (HIV)-TB and (Multi Drug Resistant Tuberculosis (MDR) TB) cases during the 2016-2020 period (Global Tuberculosis Report, 2016). The high rise of MDR TB cases has great potential for transmission and an increase in the number of new TB cases. Efforts to optimize the handling of care and treatment, as well as to accelerate the determination of the diagnosis need to be conducted vigilantly on all lines, especially efforts to increase the ability to prevent transmission, provide quality follow-up care, and community-based treatment. Forming support groups is one of community health nursing strategies for TB prevention. A support group provides assistance to increase TB medication adherence and reduce TB transmission. TB control strategies are conducted by implementing CERMAT (Smart Against TB Transmission) to TB support groups that combine education intervention and skills to prevent TB transmission in the community setting. Community health nursing through the nursing process has established a system with recognition of the variables that affect health status and individual behaviors against TB disease. The nursing strategy intervention in the community is done at all levels, such as health education, group process, partnership, and community empowerment. The CERMAT package implemented in the TB support group is an evidence-based nursing practice. It was applied to 70 samples of adult TB clients at Curug, Cimanggis, Depok. The sampling was selected with a non-probability quota sampling technique. This study used an experimental design with paired t-test data analysis to determine the improvement in the skills of the TB support group after the support group intervention was done. It showed there was influence of the CERMAT method on the level of good support for completing TB treatment in Curug Village, with increased the mean of completed treatment by 2.42 with a p value 0.00 ( $p < 0.05$ ). The CERMAT method can be applied as one of the nursing interventions to increase TB clients' adherence. This intervention can be done by the person who is responsible for the TB program at the Community Health Center. The CERMAT method needs to be continued and evaluated regularly by involving health care volunteers.

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## 1. Introduction

Tuberculosis (TB) has become a health problem that is sustainably handled by the United Nations. Elimination of TB is continuously followed by the

United Nation's new goal through Sustainable Development Goals (SDG's) that should be achieved in 2030.<sup>1</sup> The Strategic Plan of Indonesia Ministry of Health targeted on increasing TB prevention control by 17.5% per 100,000 individuals in 2019.<sup>1</sup> Furthermore, TB prevention control was also mentioned in Ministry of Health Statement Letter No.25 year 2015 as the priority of communicable disease management along with the Human Immunodeficiency Virus/Acquired

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Immunodeficiency Syndrome (HIV/AIDS).

TB was described as a global emergency by World Health Organization.<sup>2</sup> The WHO also reported 10.4 million people were diagnosed with TB and 1.8 million were killed by this disease. Global Report TB 2016 stated that Indonesia has become one amongst 30 other countries with the highest TB case burden, especially TB-HIV and multi-drug resistant (MDR) TB cases in 2016-2020.<sup>3</sup>

Positive TB cases in West Java was the highest in Indonesia as documented in 2016 reaching 59,446 cases. Moreover, Depok, a city in West Java was the 3rd highest number of TB cases with a case finding of 1,996.<sup>4</sup> More specifically, Curug Municipality in Depok had 98 new cases in 2017 with positive TB cases of 24.5% and 1 case of death during treatment.<sup>5</sup>

This phenomenon became worse as MDR TB cases in Indonesia reportedly increased by 6,600 cases annually, with 88% of those in recurrent treatment groups.<sup>1</sup> These seemingly high cases of MDR TB simultaneously lead to the likeliness of TB transmission and new cases of TB. These added to the high case burden, fatality ratio which is estimated to 11%, and the lack of private institutions reporting TB to the TB national service.<sup>6</sup> Other findings also contribute to this TB problem such as delayed diagnostic system and inadequate care and treatment response.<sup>7</sup>

The WHO program of TB management which was previously called STOP TB strategy was changed into END TB strategy following various updated vision, goals, and indicators.<sup>2</sup> The END TB strategy is aimed to end the TB epidemic globally with the 3 main target indicators: declined 80% incidents, declined 90% mortality rate, and relieve all the payments spent on TB treatment by 2030 compared to 2015.<sup>2</sup> To achieve this, END TB strategy has 3 main pillars: integrated patient-centered TB care and prevention, bold policies and supportive systems, and also intensified research and innovation.<sup>2</sup> This END TB program connects SDGs parameters on TB management in every country.

TB management strategy was still prioritized on physical and curative aspects as medication adherence, suspected finding, free medication giveaway, health officer training, and also providing

diagnostic facilities.<sup>8</sup> Promotive and preventive activities were not actively pursued by the health care providers and caused inadequate information for the community to deal with and prevent TB transmission.<sup>9</sup> Community empowering through forming TB self-help groups and support groups was effective to safeguard the completed treatment programs in the community.<sup>10</sup> Based on these findings, community empowerment is essential for mass mobilization to actively seek for TB health care service and increasing both formal and informal support for a better quality of TB service.

Community assistance and involvement were previously studied in Sub-Saharan Africa to be a great contributor to universal TB service, preventive transmission, case finding, treatments support and impact mitigation of TB disease.<sup>11</sup> Community assistance as an advocacy form of health care providers might bring broader health service coverage and maximize human resource usage.<sup>12</sup> Social connection also affected long-term disease care.<sup>11</sup>

The urgency to combat the TB transmission and the importance of community involvement are the essential factors of this research. Several data were found in Curug Municipality similarly associated with the phenomena that happened both globally and nationally. These data include only 60.7% Case Notification Rate (CNR) from the 80% national target, 14 cases of active TB clients in treatment, 2 MDR TB cases, 1 death of TB client, 2 TB suspected TB clients who were not visited and 4 noncompliance TB clients. The data describe how the completed treatment support and TB suspected detection were not optimal. This study aimed to describe the implementation of the nursing intervention package called CERMAT (CERdas MelAwan TB Paru in Indonesia or Smart Against TB Transmission) in increasing completed treatment support for TB clients in the community.

## 2. Method

This quantitative study was conducted using a case study design with pre and posttests. This type of study allows in-depth case understanding that is strictly measured through an evaluation so that the

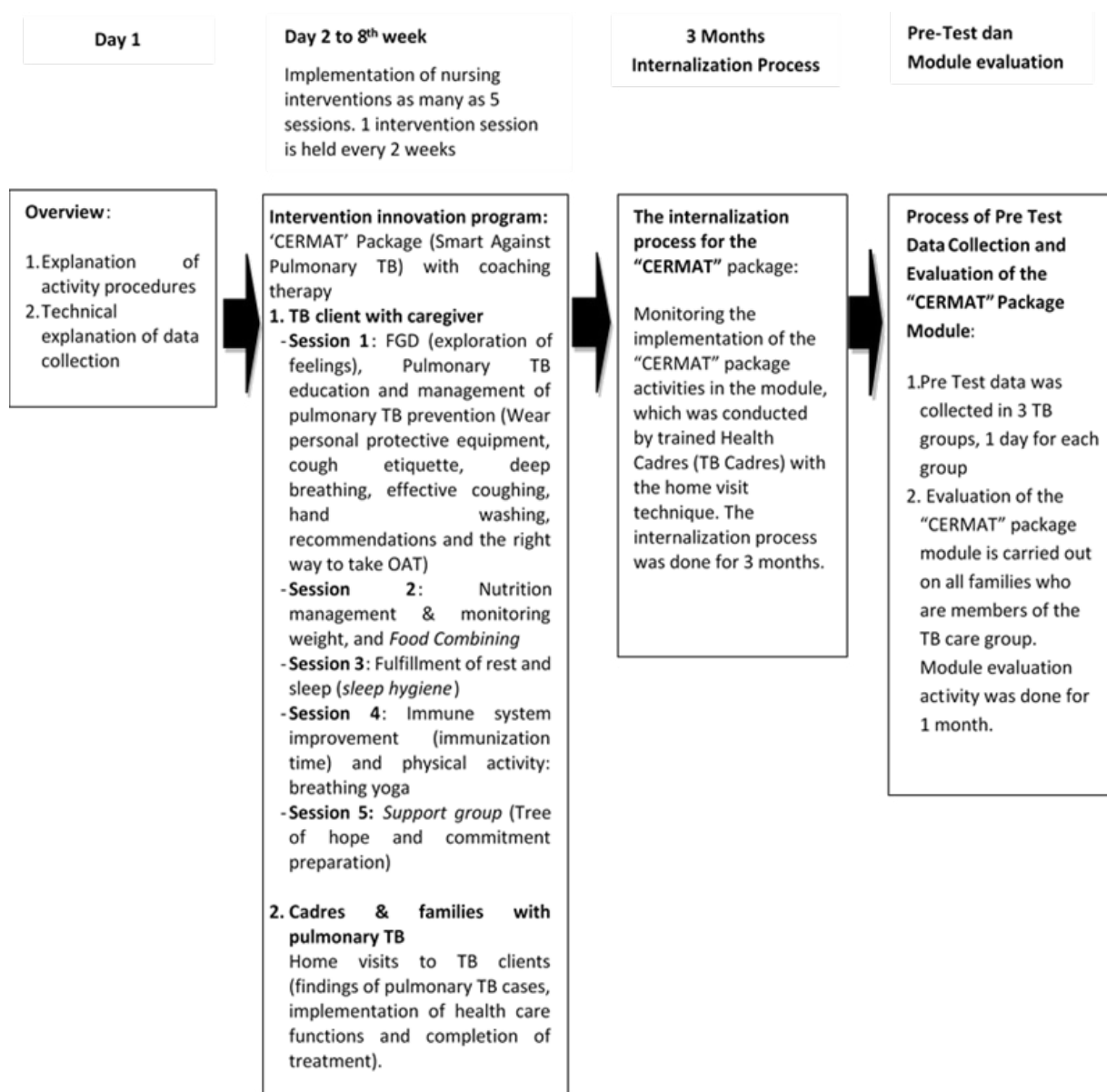


Figure 1. Research process.

study's main purpose can be attained. This study was conducted in Curug Municipality, Cimanggis District, Depok, which was previously mentioned as one of the poorly performed TB management sites. The given nursing intervention package was performed during this interval for 10 weeks, a session per 2 weeks, with 3 month phase of participants internalization. The research procedure and integration of nursing concept theory are described in the Figure 1.

The research procedures are described as follows: 1) Study explanation about the procedures

and data collecting through a pre-test for the participants; 2) CERMAT package was delivered with 3 sub-topics including disease preventive transmission management, immunity enhancement, and supportive techniques in dealing with completed treatment for TB clients in the community; and 3) 3 month evaluation, these participants were given observation checklists in the workbook and also Focus Group Discussion every week, and lastly 4) data collecting through a post-test.

This study population was caregivers and the

**Table 1.** Distribution of age, sex, education, and occupation of the TB support group in Curug Municipality, Cimanggis District, Depok, 2018 (n=54)

Indicators	F	Z p-value
Age:		
Young adult	5	9.3
Middle adult	49	90.7
Sex:		
Male	9	16.7
Female	45	83.3
Education:		
Basic education	21	38.9
Middle education	31	57.4
Higher education	2	3.7
Occupation:		
Private officer	10	18.5
Public officer	10	18.5
Entrepreneur	19	35.2
Others	15	27.8

**Table 2.** Results of the analysis relationship of family connectedness and nutritional status of under-five children in Public Health Center of Panti, Jember (n = 307)

Variable	Before (mean)	After (mean)	Mean	p value
Supportive attitude	21.90	24.50	2.54	0.00

\*significant if  $p < 0.005$ .

**Table 3.** TB support group impact on supportive attitude for TB clients before and after intervention in Curug Municipality, Cimanggis District, Depok, 2018 (n=54)

Variable	Mean	95% CI	p value
Supportive attitude	21.90	2.54	0.00

\*significant if  $p < 0.005$ ; CI, confidence interval.

community itself who contacted TB clients in the community. Sample size was determined by non-probability quota sampling targeting those population range within 100 meters from TB client's house, with the final number of 70 participants. These participants were called TB support groups in this study.

The measuring variable in this study was

the given support. As previously mentioned, the TB program in Indonesia is still pivoting on the physical and curative aspects with a scarce amount of preventive support given to the TB clients. The variable was measured using a modified support instrument using social support theory.<sup>13</sup> The questionnaire contains questions related to attitudes and skills in preventing transmission and providing complete support for TB treatment, with a total of 20 items. The questionnaire was adopted from previous research conducted by Izzudin (2017) regarding efforts to prevent TB transmission and assist families with TB patients in treatment.<sup>14</sup> Data collecting was performed by the main researcher with the help of fellow community nursing specialist residents. The research assistant, however, was only responsible for distributing and collecting the instrument with the occasional monitoring participants who need further explanation. The research assistant along with the main researcher meticulously checked every submitted instrument to avoid missing data.

Participants' characteristics were analyzed using univariate frequency analysis. After that, the main variable was analyzed using paired t-test and pooled t-test for final measurements. This study was strictly performed with the Faculty of Nursing Ethical Committee rules as reference. No harm to clients was done during the intervention. All participants received a thorough explanation of the study procedures and had their own right accordingly to join this study.

### 3. Results

#### 3.1 Tables

The research lasted for 6 months (January to July 2018) divided into 2 activity stages, namely activity I: formation of TB support groups and providing education, and activity II: Internalization period of providing support to TB patients at home. In general, the results describe the sociodemographic variables and the impact analysis of the CERMAT program. The results of this study are shown in Table 1.

Most of the participants were middle adult females. Table 1 also shows that middle education and entrepreneurs had a large percentage. These results show that the middle adult female

group who is mostly entrepreneurs or housewife has the chance to be a key point of community empowerment through active participation and constant learning process. Arini (2012) in her study showed the characteristics of support groups are highest in productive age, the higher and middle level education. Formation of TB cadres can increase contributions of the community in TB control. TB cadres discovered a strategy to conduct support efforts passively with active promotion about TB treatment and transmission of TB bacterium.<sup>1</sup>

The distribution of participants' characteristics consists of age, sex, educational level, and current occupation. Even though the primary data retrieved from Cimanggis Public Health City the TB clients were mostly male, the supportive TB group was mostly female and all of them were middle-aged adults. This finding showed that the male clients were still working. With the characteristic of middle level of education, it will affect the supportive knowledge and attitude towards TB clients. This finding was aligned with a research that mentioned some contributor factors of TB preventive transmission include the level of education, occupation, age, experience, and information provided.<sup>12</sup>

Paired t-test analysis in Table 2 showed the increasing mean of the supportive attitude of TB support group after the CERMAT package intervention from 21.9 to 24.5. The measurement results illustrate that the participants had provided support to TB patients before implementing the "CERMAT" Package intervention, as evidenced by several items of attitude statements which were answered positively by the participants. The attitude in preventing transmission that has not been done by many participants is the adequacy of good nutritional needs for themselves and TB patients, as well as the low ability of participants in monitoring the timeliness of taking medication and managing side effects of drugs felt by TB patients. However, after the implementation of the "CERMAT" package intervention, the participants' abilities increased, especially in the implementation of attitudes in providing types of food according to the concept of "Piring Makan Ku", and monitoring the timing and side effect of OAT. This activity was monitored regularly by 62% of participants who were monitored

on the "CERMAT" package module. The evaluation was based on the filling out of the daily worksheets by the participants in the TB care group. Based on this result, the CERMAT program was statistically effective in improving the supportive attitudes. It means that various empowering education techniques adopted in this CERMAT program lead to a greater improvement of community insight regarding the needs for a supportive attitudes for TB clients. This TB support group is important because TB patients could no longer feel isolated from their environment. This study also ensured that the TB support group took the role to remind the TB clients of their scheduled check-ups, taking medicine, and also their feeling during the treatment. Support groups can improve knowledge, attitude, and behavior of TB preventive transmission.<sup>12</sup>

Table 3 shows the results of the analysis of the "CERMAT" package impact on supportive attitude. There was a significant impact of the delivered intervention with the increasing mean of 2.54 (p-value 0.00). The influences of the intervention that was conducted on the TB care group are evidenced by the results of the t-test which show the average effect of the implementation of the "CERMAT" package intervention on increasing the supportive attitude of 24.5. The results of the upper limit of CI are on questions related to the attitude of preventing TB transmission in families who are living in the same house, while the lower limit is found in several questions related to the attitude of providing complete support for the treatment of TB patients.

These results indicate that completed treatment support can be given through a support group that was taught and trained for several topics needed to support TB clients in the community. The previous studies also suggested TB support group helps to strengthen the completed treatment effort. Completed treatment needs psychosocial support specifically for MDR-TB treatment to ensure the completion of complicated treatment regimens and enable psychosocial rehabilitation after treatment.<sup>15</sup>

#### 4. Discussion

Participants' characteristics consisted of age, sex, educational level, and current occupation. Even

though the primary data were retrieved from Cimanggis City Public Health Center, the TB clients were mostly male, the supportive TB group was mostly female and all of them were middle-aged adults, this finding showed that the male clients were still working. With the characteristic of the middle level of education, it will affect the supportive knowledge and attitude towards the TB clients. This finding was aligned with research that mentioned some contributor factors of TB preventive transmission include the level of education, occupation, age, experience, and information.<sup>16</sup>

Another study also described additional factors related to this completed treatment among TB clients such as poor economic status, 15-50 year old of age, sex (the male was more likely because of the smoking and alcohol consuming pattern), family history of TB occurrence, poorly informed, crowded and humid housing, and inadequate airflow.<sup>17,18</sup> Female gender was associated with the lower educational level and awareness which showed a poor supportive attitude for the TB family member.<sup>19</sup> This finding means that education can significantly determine preventive transmission measures followed by crowded housing and ventilation size.<sup>16</sup>

Support groups might also improve the positive attitudes of TB clients concerning medication adherence and their quality of life. The previous studies also suggested the making of TB support groups to strengthen the completed treatment effort. These support group efforts, based on the TB clients' expression, improved with increasing comfort, assurance, care, and love so that the TB clients can face their problem well.<sup>20,5</sup> Supportive attitudes also increased the TB clients' ability in finishing their treatment, different with high motivated TB clients with no adequate support that lead to non-compliance and even unfinished treatment.<sup>12</sup>

Social and cultural support systems from family members can become the psychosocial support as part of support groups and social mobilization. Patients' support groups will contribute to patient awareness to complete their treatment course. Most former patients with MDRTB stated that the patient support group is very important to help them in achieving recovery.<sup>21</sup>

Increasing supportive attitudes can improve TB clients' motivation on medication adherence to fulfilling the planned treatment.<sup>13</sup> The evidence indicated that social support is positively associated with health-seeking behaviors, treatment adherence, and health outcomes and that it can act as a stress buffer for the psychosocial well-being of patients. Social support has been implemented by educational and psychosocial interventions to enhance treatment adherence.<sup>22</sup> Community support will expand drug-resistant TB prevention, diagnosis, treatment, and care activities using peer support, social and livelihood support, and education. Providing support in the community can ensure patients to take their drugs and finish their treatment. Not only through support groups in the community, family members and health workers can be supported by a secondary support group who can also provide the nutritional and psychosocial support, if needed.<sup>6,23</sup>

## 5. Conclusions

There was a significant increase in supportive attitudes among TB support groups after the CERMAT package intervention. The lower amount of health information delivered by the participant can be improved by the scheduled monitoring and supervision from the responsible health care providers from the local Public Health Center. This scheduled supervision and monitoring will not only provide the ways to fulfill the sustainability of the TB program, but will also ensure long-lasting TB care in the community through empowering TB support groups and the local cadre.

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## References

1. Arini, Atiek Tri. The effort of community

- empowerment in tuberculosis disease control program in Tambak Rejo Public Health Centre, Surabaya City. *Journal of Administration & Health Policy*. 2012;10(2).
2. Curug Village. Potential profile of Curug Village. 2015. Depok: Curug Village
  3. Depok City Health Office. Health profile of Depok city in 2014. Depok: Depok City Health Office. 2015.
  4. WHO. ENGAGE-TB: Integrating community-based TB activities into the work of nongovernmental organizations and other civil society organizations. 2012. Geneva: World Health Organization.
  5. Friedman MM, Bowden, Jones. *Family Nursing: Research, Theory, and Practice*. Connecticut: 2015. Appleton & Lange
  6. Getahun H, Raviglione M. Transforming the global tuberculosis response through effective engagement of civil society organizations: the role of the World Health Organization. *Bulletin of the World Health Organization* Ed. 2011;89:616–618.
  7. Hayati D, Musa E. The relationship between the performance of supervisors swallowing drugs with healing Tuberculosis at Puskesmas Racamanik Bandung. *Nursing Journal*. 2012;4 (1).
  8. Helvie C. *Advance Practice Nursing in the Community*. 1998. Thousand Oaks, California: Sage Publishing Co.
  9. Indonesia Ministry of Health. *Indonesia Health Profile 2016*. Indonesia Ministry of Health. 2016: Jakarta.
  10. Indonesia Ministry of Health. *National Guidelines for Tuberculosis Control*. Ministry of Health of the Republic of Indonesia. Issue 2, Print II. 2015.
  11. Kholifah SN, Minarti, Yumni H. Adaptif Conservation Model (ACM) in improving family support and compliance treatment in pulmonary TB patients in the City of Surabaya. *Jurnal Ners*. 2012;7(1).
  12. Kumakech E, Graae C, Maling S, Bajunirwe S. Peer group support interventions improve the psychosocial well-being of AIDS orphans [Internet]. *Journal of Social Science and Medicine*. 2009. Available from: <http://www.eresources.perpusnas.go.id>. [December 8, 2020 at 7:00 p.m. WIB]
  13. Rao D, Chen WT, Pearson CR, Simoni JM, Goldsen K, Nelson K, Zha, Zhang F. Social support mediates the relationship between HIV stigma and depression / quality of life among people living with HIV in Beijing, China. *International Journal of STD & AIDS*. 2012;23: 481–484.
  14. Izzudin MM. Sikap dengan perilaku pencegahan penularan pada keluarga penderita tuberkulosis [bachelor's thesis]. Indonesia. Insan Cendekia Medika Health Institute. 2017.
  15. Sweetland, Guerra D, Chalco K, Castillo H, Palacios. Psychosocial support groups for patients with multidrug-resistant tuberculosis: five years of experience. *International Journal for Research, Policy, and Practice*. 2017; 4.
  16. Wahyuni. Determinants of community behavior in prevention, transmission of tuberculosis in the Bendosari health center work area. *Gaster*. 2018;4(1).
  17. Rukmini, C. Factors that influence the incidence of adult pulmonary TB in Indonesia (Basic Health ResearchDataAnalysisin2010)[Internet]. *Ejournal Litbang Ministry of Health*. 2011. Available from: <http://www.litbang.kemkes.go.id:8080/handle/123456789/81550?show=full>.
  18. Rusnoto, Rahmatullah, Pasihan, Udiono, Ari. Factors associated with pulmonary TB occurrence in adults: case studies at the Center for Prevention and Treatment of Patient Lung Disease. Semarang. *Health Journal of FK UNDIP*. 2008.
  19. Yermi, Ardi M, Lahming, Tahmir S, Pertiwi N. Knowledge and attitudes with family role in prevention of pulmonary tuberculosis in Maros, Indonesia. *J Phys: Conf Ser*. 2018; 1028 012001.
  20. Norgbe GK, Smith JE, Du Toit HS. Factors influencing the default rates of tuberculosis patients in Ghana. *Afr J Nurs Midwifery*. 2011; 13(2):67-76.
  21. Muna, Latifatul & Soleha, Umdatus. Motivation and social support for families affecting compliance treatment on pulmonary TB patients at the Pamekasan BP4 Polyclinic. 2014. Bachelor thesis: Surabaya.

22. Li X, Wang B, Tan D, Li M, Zhang D, Tang C, et al. Effectiveness of comprehensive social support intervention among elderly patients with tuberculosis in communities in China: a community based trial. *J Epidemiol Community Health*. 2018;72(5):369-375.
23. WHO. Who Global Report on Falls Prevention in Older Age. 14 Januari 2017 [internet]. Available from: [http://www.who.int/ageing/publications/Falls\\_prevention7March.pdf](http://www.who.int/ageing/publications/Falls_prevention7March.pdf).