

Empowering Community Leaders to Prevent and Control Lung Tuberculosis in Manado City: A Quasi-experimental Study

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ABSTRACT

Background: Lung tuberculosis (TB) is a global public health problem as it continues to be a major cause of morbidity and mortality worldwide. According to WHO, as many as 44% of lung TB cases were in the Southeast Asian region. A previous study showed the importance of the support of community leaders and health cadres in increasing knowledge and improving public attitudes towards the prevention and control of lung TB. **Objective:** This study aims to determine the effectiveness of health education in empowering community leaders to prevent and control lung TB in four Public Health Centres in Manado City. **Methods:** A quasi-experiment with pre and post-design was used to answer the research hypothesis. With cluster sampling, four Public Health Centres in Manado City were selected based on their geographical location. Community leaders were selected according to the inclusion criteria using a convenience sampling technique. One hundred community leaders from the four Public Health Centres agreed to participate. Health education used the newly developed printed and e-posters accessed through YouTube. The health education was conducted once for each group according to the respondents' convenient time. Questionnaires collected knowledge and attitudes data before and after the educational program from July to August 2021. **Results:** Sixty percent of respondents were women, and most of their education level was Senior High School. Wilcoxon signed-rank test results for the knowledge variable and paired t-test for the attitude variable showed a significant difference (P -value < 0.05). Results indicated an increase in knowledge and a positive change in attitudes of the community leaders after the health education. **Conclusion:** Findings from this study showed that the educational program was highly effective in empowering community leaders to prevent and control lung TB in four Public Health Centers in Manado. **Keywords:** community leaders, education, empowerment, lung TB.

INTRODUCTION

Lung Tuberculosis (TB) is a global public health problem as it continues to be a significant cause of morbidity and mortality worldwide. According to predictions, 1.2 million people with lung TB would die in the population without Human Immunodeficiency Virus (HIV) in 2018 and 1.5 million in 2020, including 214,000 people with HIV (World Health Organization, 2020). World Health Organization (WHO) stated that lung TB would be the 13th leading cause of death and the 2nd leading infectious killer after COVID-19 (above HIV/AIDS). Approximately 57% were men of all lung TB cases in 2018, women about 32% and children (aged 15 years) as much as 11%. Similarly, 10 million people fell ill with lung TB worldwide; they were 5.6 million

men, 3.3 million women and 1.1 million children. Thus, lung TB affects both sexes in all age groups but was higher in men (>15 years of age). Geographically, most lung TB cases in 2018 were in the WHO regions of South-East Asia (44%), Africa (24%) and the Western Pacific (18%), while the lowest percentage of cases was in the Eastern Mediterranean (8%), America (3%). Eight countries were included in the group of two-thirds of global total lung TB cases, namely; India (27%), China (9%), Indonesia (8%), Philippines (6%), Pakistan (6%), Nigeria (4%), Bangladesh (4%) and South Africa (3%) (World Health Organization, 2020).

Lung TB cases fell by 200 thousand cases. Hence, the lung TB incidence rate in 2019 became 842,000 cases in Indonesia, making Indonesia the country with the third-largest lung TB burden in

the world after India and China. According to patient cost survey data, nearly 50% of lung TB-affected households globally needed to spend an extra 20% of their household income (Pedrazzoli et al., 2018). Similarly, the target was approximately US\$13 billion annually needed for lung TB prevention, diagnosis and treatment to achieve the agreed global target. Although lung TB is a curable and preventable disease, children and adolescents are frequently neglected by health providers and consequently become challenging to diagnose and cure (Mbuti et al., 2020).

In addition, Multidrug-resistant lung TB (MDR-TB) was still a public health problem. However, in 2020 only about one in three people with drug-resistant lung TB accessed treatment (Mbuti et al., 2020). A study showed that families perceived the signs and symptoms as normal, so specific treatment was not needed (Febrina, 2018). Others believed lung TB was hereditary and non-communicable (Deswinda et al., 2019). This perception made them not seek help from health workers. Similarly, other studies found that knowledge, attitudes and actions of the community, families, groups, and individuals about ways to prevent lung TB transmission, treatment and control of lung TB were the critical factors in dealing with lung TB in the community (Adane et al., 2017; Nyasulu et al., 2018; Datiko et al., 2019).

Another study showed that in 2018 the North Sulawesi Province was the four highest Case Notification Rates (CNR=273) for TB disease in Indonesia after DKI Jakarta, South Sulawesi and Papua Province (Hansun, 2020). More importantly, the Indonesian Health Profile 2020 reported that the North Sulawesi Province was the third-highest of Case Notification Rate (CNR=189) after Papua (CNR=244) and DKI Jakarta (CNR=228). CNR is the number of new and relapse notified TB cases in a given year per 100,000 population. Consistent with the treatment success rate of the North Sulawesi Province in 2020, which was only 82.6% (below the national standard of 90%) (Kemenkes Republik Indonesia, 2020). In Manado City, the number of new TB cases in 2017 was 990 while new cases of BTA+ were 888 cases (Dinas Kesehatan Kota Manado., 2018). Improving lung TB care cadre groups' knowledge, attitudes,

and skills can strengthen lung TB control programs in the community (Yanti, 2016). In line with this, The Indonesian Health Department has declared a "Wanted: Leader for a TB Free World" commitment so everyone can be a leader in ending TB both at work and in their respective places of residence (Indah, 2018; Indah, 2018 p.2). Several intervention studies have been done to promote family knowledge and attitudes toward lung TB prevention and control (Brownlie, 2007; Hasanica et al., 2020; Saputra & Fajriani, 2021). These evidences showed that empowerment of the community, including community leaders, in promoting knowledge about lung TB prevention and control among people and families with lung TB was a crucial intervention. However, preliminary observation in several Public Health Centres in Manado City indicated that not all TB cadres made regular monthly reports on medication supervisors' (PMO) activities and findings of new suspected cases in their area. In addition, health education only occurred occasionally. The religious and village leaders were the key persons for all health promotions and preventions in the villages. The health education on TB lung prevention and control typically occurred within religious and community activities attended by the village leaders. However, not all the community leaders had done these regularly in their activities. Therefore, these activities did not occur optimally. It was predicted that their knowledge and attitudes towards TB prevention and control played a critical role in this situation. However, there were limited studies regarding empowering community leaders to end lung TB in North Sulawesi Province.

Community empowerment is an effort to make people have opportunities and the ability and skills to increase their capacity to determine their future by mobilizing and utilizing all available resources. Community empowerment is the element that enables a society to survive and, in a dynamic sense, develop itself and achieve goals (Popay, 2021; Yanti, 2016). Additionally, empowering the community is also an effort to increase the dignity of the people who cannot escape the trap of poverty and underdevelopment. In other words, empowering the community is enabling

and empowering people. Therefore, this study aims to determine the impact of printed and electronic posters in empowering community leaders.

METHODS

A quasi-experimental study with a pre and post-test one-group design approach was used to determine community leaders' differences in knowledge and attitudes before and after the education program to prevent and control the spread of Lung TB. The study was conducted in four working areas of public health centres with the highest lung TB incidence in Manado City, namely Ranotana Weru Public Health Centre, Tuminting Public Health Centre, Tikala Public Health Centre, and Wawonasa Public Health Centre. The total sampling strategy was used to increase the external validity of the study. Twenty-five community leaders from each Public Health Center area were identified based on the inclusion criteria, including serving as religious leaders, heads of villages and TB cadres. So, a total of 100 community leaders participated in this study. Respondents' agreement to participate in the study was shown by signing the informed consent.

The authors developed printed posters and e-posters. The language used in the posters was the local language so that respondents would quickly apprehend the message in the posters. All respondents were given the printed poster and access to the e-poster simultaneously for 30-40 minutes during the educational program. The health education was carried out once in each group according to the respondents' convenient time in each public health centre.

Data collection on the knowledge and attitudes of community leaders towards the prevention and control of lung TB occurred before and after the intervention from July to August 2021. Both of these questionnaires were developed by the research team and were tested for validity and reliability. Five questions underwent revision because the r-count did not reach the r-table. The reliability test obtained Cronbach=0.70. Thus, the two instruments were considered valid and reliable for this study.

The knowledge questionnaire consisted of 30 questions with two answer choices, namely 'Yes' and 'No'. Each correct answer had a score of 2 and the wrong answer of 1. Thus the highest score for the knowledge questionnaire was $2 \times 30 = 60$. The final score of each respondent was in the form of an interval scale.

Furthermore, attitudes data of community leaders were collected using 25 attitude statements on a Likert scale with a range of 1-5 and with choices of strongly agree, agree, unsure, disagree, and strongly disagree. Answers with positive attitudes to the statements in the questionnaire received a score of 5; on the contrary, negative attitudes received a score of 1. Thus, the highest score for the knowledge questionnaire was $5 \times 25 = 125$. The final scores of each respondent were in the form of an interval scale.

However, respondents' knowledge and attitudes scores were included in the three categories to facilitate the interpretation of descriptive data. The classification of the categories is depicted in Table 1.

Table 1. Categorization of the knowledge and attitudes scores

Classification	Attitudes (Normally Distributed)	Knowledge (Not Normally Distributed)
Good	$\text{Data} > \text{Mean} + \text{SD}$	$\text{Data} > \text{Q}_3$
Moderate	$\text{Mean} - \text{SD} \leq \text{Data} \leq \text{Mean} + \text{SD}$	$\text{Q}_1 \leq \text{Data} \leq \text{Q}_3$
Low	$\text{Data} < \text{Mean} - \text{SD}$	$\text{Data} < \text{Q}_1$

(Hasanah, 2020)

Ethical approval number 01/07/188/2021 was granted by the Health Research Ethics Committee of Manado Health Polytechnic Ministry of Health.

RESULTS AND DISCUSSION

Out of the 100 respondents, 60% were women. According to the largest age group distribution, 36% were 41-50 years old, and 27% were 51-70 years old. Most respondents had a high school education (57%), followed by Bachelor's or Diploma IV (25%). The distribution of the

demographic characteristics of the respondents is shown in Table 1.

Table 2. Demographic Characteristics Subjects Based on Age, Sex, Education

Characteristics	n	(%)
Gender		
Women	60	60
Men	40	40
Age (years old)		
20-30	5	5
31-40	19	19
41-50	36	36
51-60	27	27
61-70	13	13
Education		
Elementary	2	2
Junior High School	0	0
Senior High School	5	5
Diploma	56	56
Bachelor	25	25
Master	2	2
Total	100	100

The demographic picture shows that 60% of the respondents were women. And the proportion of the most age was 41-50 years (36%). Other studies also found that more women participated in social activities than men (Kim et al., 2017). From the distribution of education levels, 57% of respondents were high school graduates, and 25% had an educational background equivalent to a bachelor's. There were still 2% of respondents with elementary school education levels. The highest proportion (34%) of respondents with the type of work as household workers was in line with the proportion of respondents' gender. COVID-19 pandemic situation had significantly changed women's type of work, length of work and salaries (Pratiwi et al., 2020). The author explained that one of the reasons was that women were responsible for caring for their children. The distribution of gender, age, education level and occupation had provided an overview of the demographic characteristics of respondents in this study.

Knowledge Aspect

Scores from the knowledge aspect were not normally distributed, so scores were classified into three groups according to their quartile (see Table 1). In the pre-test, 26% of respondents had low knowledge about the prevention and control of tuberculosis, and the majority

of respondents (56%) were in the moderate category. Those respondents with good knowledge were only 18%. Increased knowledge about the prevention and control of TB lung among community leaders can be seen in Table 2. It depicts the proportion of knowledge of community leaders in the good knowledge category increased from 18% to 98% of respondents or 80%. In comparison, the knowledge of community leaders in the category of moderate knowledge was reduced by 55%.

Table 3. Knowledge Scores Distribution Before and After Intervention

Knowledge categories	Pre-test		Post-test	
	f	%	f	%
Good	18	18	98	98
Moderate	56	56	1	1
Low	26	26	1	1
Total	100	100	100	100

The results of the bivariate test to see differences in the level of knowledge of the respondents were carried out using the alternative test, Wilcoxon Signed Rank Test because the data were not normally distributed. The test results were presented using the median value of the score and the range of the lowest and highest scores from the scores obtained at the stage before and after the intervention was carried out.

Table 4. Differences Between Pre and Post Knowledge Test Scores of the Community Leaders

Knowledge Score	Median	Min-max	z	P-value
Pre-test	46	38-56	8.65	0.000
Post-test	56	43-59		

The Wilcoxon Signed Rank Test results showed a significant difference in the level of knowledge before and before the health education intervention regarding the prevention and control of lung TB $z = 8.65$, $P\text{-value} < 0.001$. The increase can be seen from the respondents' scores at Median= 46 (38-56) to Median= 56 (43-59). The impact size is $r = 0.8$, meaning that the intervention in the form of health education using posters and e-posters had had a major impact on increasing public knowledge about the prevention and control of lung TB in the Public health care in Manado City.

Studies showed that in the 21st century, written and electronic

communication was needed in providing health education (Hasanica et al., 2020). In addition, several studies had also shown the effectiveness of printed posters and posters. It was also reported the effectiveness of printed posters in increasing knowledge about students' healthy lifestyles in Zenica-Doboj Canton (Hasanica et al., 2020). A study conducted in Kendari City found that posters could effectively be used as a medium for health promotion (Saputra & Fajriani, 2021). Printed posters would be stored for a long time in their place to enable the storage of knowledge, and positive attitudes in the long term after the education program was implemented (Hasanica et al., 2020). Furthermore, users' electronic posters could actively engage the message recipient and allow the sender to present it in various media and languages (Brownlie, 2007). As in previous studies, the results of this study had shown the effectiveness of printed and electronic posters in increasing community leaders' knowledge of lung TB.

Increasing the knowledge of community leaders about the prevention and control of lung TB can encourage the behavior of prevention and control of lung TB in the community. Knowledge is an important internal factor for the occurrence of a behavior. According to the Precede and Proceed Model, knowledge of predisposing factors could direct behavior (Hasanica et al., 2020). A study found that knowledge about lung TB was a predictor of self-management of lung TB patients, which means that improving patient knowledge about lung TB would improve self-management (Li et al., 2021). In addition, community leaders were key people in the community. Reinforcing factors can be in the form of support from family or people considered important for a behavior occurrence (Vera et al., 2018). Thus, community leaders play an important role in forming lung TB prevention and management behavior in the community.

Attitudes Aspect

Similar to the knowledge aspect, results from the attitudes aspect were classified into 3 groups. The mean and SD of the data were used to classify the attitudes' scores (see Table 1). In the pre-test, respondents who had attitudes about

prevention and control of tuberculosis in the less category were 15%, and the most in the moderate attitudes category were 77%. In comparison, those who had good attitudes were only 18%. After the pre-test, the researchers conducted an intervention by providing health education materials using printed posters and e-posters.

These results from the post-test showed that 66% of the participants had good attitudes. So there was a 48% increase after health education in the good category. There were no more respondents who had low attitudes.

Table 5. Attitudes Score Distribution Before and After Intervention

Attitudes categories	Pre-test		Post-test	
	f	%	f	%
Good	18	18	66	66
Moderate	77	77	34	34
Low	15	15	0	0
Total	100	100	100	100

The results of the bivariate test to see differences in the level of respondents' attitudes were carried out using the paired t-test. The test results were presented using the mean value of the respondents' attitudes score. The distance or range of scores between respondents was indicated by the standard deviation (SD). The magnitude of the increase in scores from before and after the intervention is shown in the results of the Mean Difference.

Table 6. Differences between Pre and Post Attitudes Test Scores of the Community Leaders

Attitude Score	Mean	SD	Mean diff	P-value
Pre-test	93.13	9.66	-	0.000
Post-test	106	7.86	13.52	

The results of the paired t-test showed a significant difference, as indicated by an increase in attitude scores before ($M = 93.13$, $SD = 9.66$) and after the intervention ($M = 106$, $SD = 7.86$), $t(99) = -13.520$, $P\text{-value} < 0.001$. The increase in the mean before and after the intervention was 13.52, with a large impact showing eta-squared (η^2) = 0.65, which means that the intervention in the form of health education using posters and e-posters had had a major impact on improving the attitudes of community leaders towards the prevention and

control of lung TB at the Public Health Centre in Manado City.

Similar to the knowledge aspect, the results of the attitude aspect analysis showed the positive impact of health education using printed posters and e-posters in improving the attitudes of community leaders towards efforts to prevent and treat lung TB. This was indicated by a significant increase in attitude scores (P -value <0.001) before and after the education program.

Several studies also showed positive attitudes and changes after the provision of health education (Adane et al., 2017; Datiko et al., 2019; Fan et al., 2018). Making health education available for school children might increase their healthy living behaviour (Hasanica et al., 2020). A study conducted in Surabaya found a significant increase in the attitude aspect toward the behavior of preventing lung TB transmission from participants after receiving health education using brainstorming strategies and leaflets. This study used printed and electronic poster media, and the analysis results showed a significant impact on increasing the knowledge and attitudes of community

leaders towards the prevention and control of lung TB. Improving participant attitudes had a reciprocal relationship with increasing knowledge. The study said that knowledge might improve attitudes. If there was an improvement in individual attitudes, there would be an increase in curiosity and understanding of the things conveyed in the educational program (Sukartini & Makhfudli, 2020).

Community leaders were one of the reinforcing factors in the Precede and Proceeding Model. Several studies reported the important role of community leaders in developing community healthy lifestyle behaviors (World Health Organization., 2020a, 2020b). A study conducted in Jayaraga Village, Garut Regency, revealed a central role of community leaders in preventing and overcoming the COVID-19 pandemic (Rosidin et al., 2020). Empowering cadres and community leaders also might reduce maternal mortality (Beydokhti et al., 2021; Chasanah, 2017). Similarly, a study also showed the role of community and religious leaders in controlling dengue fever (Rosdiana, 2021).

In the lung TB context, several studies showed that inadequate case management, such as non-standard diagnosis and drug guidance and failure to cure diagnosed cases could also undermine the prevention and control of lung TB in the community (Meundi et al., 2021; Tola et al., 2016). These findings indicated that successful prevention and control of lung TB in the community required collaboration and cooperation among stakeholders, including community leaders. Therefore, empowering community leaders may enhance the prevention and control of lung TB programs in the North Sulawesi Province.

CONCLUSION

The results of this study had provided evidence-based information that the provision of health education using printed and electronic poster media would effectively increase knowledge and improves the attitudes of community leaders towards the prevention and control of lung TB disease. Thus, this health education could also be implemented in the work areas of other health centers. In addition, the results of this study had validated the ecological approach to health promotion. The linkage of the concepts in the Precede and Proceed Model in this study can be shown in aspects of knowledge and attitudes of community leaders as predisposing factors, health education programs as enabling factors and community leaders as reinforcing factors have functioned synergistically in achieving the objectives of this study.

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