

## THE IMPACT OF ENVIRONMENTAL HEALTH SERVICES IN PRIMARY HEALTH CARE ON IMPROVING THE BEHAVIOR OF PULMONARY TUBERCULOSIS PATIENTS IN BANYUWANGI REGENCY

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### Abstract

**Introduction:** Tuberculosis (TB) is a global health crisis. Environmental health services in Primary health care provide counseling services, inspections and environmental health interventions. Research aims to determine the impact of environmental health services in Primary health care on the behavior of TB patients that includes the knowledge, attitudes and actions of pulmonary tuberculosis patients in the prevention of the transmission of pulmonary tuberculosis disease. **Method:** The method in this study was experimental quasi. Respondents were a new case of pulmonary TB at 6 Primary health care in Banyuwangi Regency April S/d June 2019. Pre test before obtaining environmental health services. Post test was given after counseling, inspection and environmental health intervention. **Result and Discussion:** The results showed a total of 24 respondents to the majority pulmonary tuberculosis patient was male (54.17%). Pre test knowledge of pulmonary TB patient is good (4.16%), enough (8.33%) and less (87.50%). Category Post test knowledge of TB patients acquired good (20.83%), sufficient category (75.00%) and less (4.20%). The average Pre test knowledge score is 37.70 and the Post test is 67.20. Category Prettest Action patients TB is good (4.16%) and less (95.83%). Category Post Test action patients pulmonary TB is good (54.17%), enough (41.67%) and less (4.16%) Which is an improvement in the form of masks, hand washing soap, the habit of spitting, the use of individual cutlery and drinking equipment, washing dinnerware and drinking with hot water/drying, drying the sleeping tools, opening a window every day, separate sleeping habits. **Conclusion:** The conclusion of this research is environmental health services in Primary health care in patients with pulmonary tuberculosis improves the behavior of TB patients in the form of increased knowledge, attitudes and actions of the patient in the prevention of disease transmission of TB.

## INTRODUCTION

Tuberculosis (TB) is a chronic infectious disease caused by *Mycobacterium tuberculosis*. Although TB control has achieved great development, TB remains one of the biggest health problems (1-4). The top three countries are contributors to the most TB cases in 2017 are India (26%), Indonesia (11%) and Nigeria (9%). TB cases exist in all countries throughout the age group, but overall the best estimate of the year 2017 is 90% of the cases are adults (age  $\geq$  15 years) and 6.9% are children (aged < 15 years) (1, 3).

In the year 2016, TB was the 4th cause of death in Indonesia after ischemic heart disease, cerebrovascular disease, and diabetes. Ministry of Health Republic Indonesia reported the number of cases in the year 2017 increased by 2.52% the number of highest reported cases in West Java, East Java, and Central Java (1). In 2017, East Java province was ranked second as a contributor to TB case in Indonesia with the case of TB BTA positively ranked highest of 46.74% (1). Banyuwangi Regency in 2016, the number of patients with a positive pulmonary TB BTA 45.99% (5).

TB transmission can be influenced by natural lighting and ventilation or air circulation (17) and occupancy density (1). Pulmonary TB disease includes infectious diseases due to unhealthy environmental risk factors such as moisture levels, indoor natural lighting, room temperature, air/ventilation circulation and the state of the House floor (1).

Diagnosis and treatment of latent tuberculosis infections (LTBI) is important to eliminate TB (1). Health facilities play an increasingly important role in the diagnosis and treatment of patients with TB (2). Primary health care as a first-rate service facility performs TB countermeasures through promotive and preventive efforts with environmental health services in Primary health care. The implementation of environmental health services in primary health care consists of environmental health counseling services, environmental health inspections and environmental health interventions aimed at improving the patient's health behaviour including the knowledge, attitudes, awareness, ability and actions of patients to prevent diseases and health disorders caused by environmental risk factors including TB (10).

The priorities of TB's countermeasures were implemented in primary health care by prioritizing promotive and preventive aspects, without neglecting curative and rehabilitative aspects aimed at protecting public health, lowering pain, disability or mortality, deciding transmission to prevent drug resistance and reducing the negative impact caused by TB (5). Providing

information and education from healthcare providers can be a means of reminders, improvement of processes and incentives can be effective in improving the results of service delivery, especially screening TB (11).

Primary health care was also instrumental in providing counseling services. environmental health counseling services occur reciprocal communication measures that interrelate interpersonal communication to help patients make decisions to address their health problems (10). Counseling can be done on the family or accompanying party. Officers explain systematically about TB disease, symptoms, transmission and prevention of diseases. The use of props can provide an overview/explanation that is easily acceptable to patients (12). The follow-up of environmental health counseling is the officer with the patient agreement determining the time of environmental health inspection in the patient's home at the agreed time (10).

Environmental health counseling to patients to improve the patient's knowledge and attitude in preventing the transmission of pulmonary tuberculosis (9). Increased knowledge of patients to be the principal thing to do in primary health care for TB patients undergoing treatment programs in primary health care. Health education, counseling and health promotion to patients in primary health care increased the effort to control infectious diseases including TB (13). Lack of health knowledge and bad health behaviors in patients will pose a serious threat to the patient's health condition and may cause transmission to others (14).

Then, the control and prevention of TB at the national level also interventions from TB detection to the successful completion of treatment (11). Environmental health intervention is necessary to prevent and control the transmission of TB. Intervention can be an act of health, safety and countermeasures to realize the quality of healthy environment from both physical, chemical, biological and social aspects. Environmental health interventions are also conducted by providing communication, information, and education related to TB disease in patients and families. The implementation of communication, information and education (KIE) is generally done to improve the patient's knowledge, awareness, and behaviour to health problems. Follow-up advice can be an immediate environmental health intervention that is easy to implement (4).

The intervention of social support in patients with TB is recommended by the WHO for the management of TB programmatic (1, 15-16). Interventions need to be evaluated in combination rather than independently. Knowledge of TB and its treatment, the distance to the nearest health facility, the perception of the stigma,

perception of the disease and its treatment, psychological distress, change of residence, and economic status are the factors that affect control TB (17). TB's knowledge and awareness of medical care is important for the successful prevention and control of TB (18). Social support through various educational interventions, psychosocial has also been implemented to improve treatment compliance.

Previous studies showed significant correlation between patient behaviour and patient roles in the early detection of new TB cases, meaning that the better the patient's behaviour, the better and the greater the detection of cases (19). In addition, friendly healthcare providers can improve patient motivation and compliance. Good communication between patients and healthcare providers and politeness officers are expected to improve patient's compliance with treatment (2,20). Health education interventions are effective in enhancing the knowledge, attitude, and practices of TB as well as lowering the transmission of TB (1, 11, 21-22).

However research conducted in Pacar Keling and Gading of Surabaya City 2015 showed that environmental health interventions did not cause a differences in attitude but only knowledge (23). TB control programs are unable to succeed with extensive service availability only. Thus, the results of successful treatment, especially requiring better and deeper understanding of the obstacles and the expressed factor of the patient during the entire treatment period (20). There are a variety of public health programs that do not succeed drastically due to limited and unstable funding, lack of automated means to track and improve performance, labor limitations, and inadequate political commitments can all cause public health programs to fail (24) control management can be highly dependent on the active participation of patients in themselves than self-care behaviors (25). Existing research gaps open the way for this research to examine environmental health services to improve the behavior of tuberculosis patients.

## METHOD

This research used descriptive observational methods by observing cross-sectional study draft by conducting pre-test and post-test design. Research sampling was done by nonprobability sampling techniques. Measurements were conducted in a group with twice the measurement, the first measurement was pre-test before the environmental health service, and the second measurement is post-test after environmental health services in primary health care. Environmental health services in primary health care include environmental health counseling, environmental health inspection and intervention. Selection of respondents was using

purposive sampling of pulmonary TB patients in primary health care. The respondents of this research were new cases of pulmonary TB patients amounting to 24 people from Primary Health Care of Klatak as many as 4 people, Primary Health Care of Mojopanggung as many as 3 people, Primary Health Care of Sobo showed 4 people, the Primary Health Care of Kabat showed 4 people, Gitik Primary Health Care showed 2 people and the Primary Health Care of Songgon 7 people in Banyuwangi District. The six health centers were chosen because they have a good health care assessment (PKP) result, Case Notification Rate (CNR) above the provincial CNR value, and have organized environmental health services with TB patients from different sub-districts.

The observed variable was the behavior of pulmonary TB patients consisting of knowledge, attitudes and actions of pulmonary TB patients. Research (18, 20-21) used knowledge, attitudes and practices as an indicator of individual health behaviors.

Research was conducted for 3 months start in April to June 2019 by conducting interviews directly to patients new cases of pulmonary TB that came in primary health care before intervention by the officer carried out the pre-test and after-intervention by the officers, will be carried out the post-test conducted by researchers related to environmental health services in primary health care.

## Questionnaires Knowledge, Attitude and Action of Pulmonary Tuberculosis (TB) Patients

The questionnaire consisted of three categories of 13 knowledge-related questions, 10 attitudes-related questions and 10 practice or action questions. For a knowledge questionnaire on the disease of TB understanding, symptoms, causes, transmission, treatment and prevention of diseases of TB patient questionnaires the knowledge of pulmonary TB was carried out with several phases of index score namely:

First, assigned a score on each question with a correct total value is 40. Secondly, summed the earned score so that it displays the earned score. Third, calculated the index score with the formula = number of score earned / total score x 100.

The patient attitude questionnaire used a five-point likert scale (very concur, agrees, neutral, disapproving, and highly disapproving). Questionnaires included the acceptance, responsibilities, adherence, beliefs and willingness of respondents in relation to pulmonary TB disease. Assessment of the attitude of pulmonary TB patients also grouped in positive statements (very concur and concur), neutral and negative statements (disagree and strongly disagree).

Questionnaire pulmonary TB Measures included the habit of wearing masks, handwashing disposable soap, habit spitting, the use of cutlery and drinking and the process of ignition, the habit of drying sleep tools, opening windows, spacious windows and separate sleeping habits. Action questionnaire pulmonary TB patients conducted with several phases of the index score namely:

First, gave a score of 1 = yes or 0 = not on each question with a total score of 10. Secondly, summed the earned score so that it displays the earned score. Third, calculated the index score with the formula = number of score earned/Total score x 100%. Then also the survey results were grouped into 3 categories: either (76%-100%), enough (56%-75%), and less (< 55%) (13).

The pretest awarding was done against 24 pulmonary tuberculosis patients before obtaining environmental health services in primary health care. Respondents were asked to choose the answer that is considered correct for each question. Respondents who had difficulty reading or writing were verbally assisted. Furthermore, patients would get environmental health services in primary health care, in the form of environmental health counseling. Environmental health counseling was provided with interviews and questions about the environmental risk factors of TB disease in patients, providing systematic explanation of TB disease, symptoms, transmission and prevention of tuberculosis. Based on the results of environmental health interviews and counseling in pulmonary tuberculosis patients, officers analyzed the risk factors of the disease and provide solutions to the health problems faced by the patient. Based on the agreed time, the health worker conducted an environmental health inspection / home visit on pulmonary TB patients. Health workers made observations and measurements of the physical environment media and behavior of patients at home. Furthermore, officers provided interventions in the form of health education, information and advice regarding the results of environmental health inspections. Environmental health interventions motivated and encouraged patients to make behavioral changes and improve the sanitation of the physical environment needed to break the chain of disease transmission.

Patients were given the freedom to determine solutions to health problems. Ending the process of environmental health counseling, officers followed up with an agreement between health workers and TB patients time to conduct environmental health inspections in the form of home visits of pulmonary TB patients.

Based on the agreed time of health care personnel was conducting environmental health inspections/home visits in pulmonary TB patients. Healthcare officers performed observations and measurements of physical environmental media and patient behaviour at home. Furthermore, officers give intervention in the form of health education, information and advice related to environmental health inspection. Environmental health interventions motivated and encouraged patients to conduct behavioral changes and improvements in physical environmental sanitation needed to break the chain of disease transmission.

Post-test was done after the intervention by the officer in the form of environmental health counseling services, inspections and environmental health interventions, post-test was done by giving the same questionnaire as the pre-test. It was expected that the pre-test and post-test on knowledge, attitudes and actions can improve the behavior of pulmonary tuberculosis (TB) patients.

**RESULT**

This study used a total of 24 respondents of pulmonary tuberculosis patients consisting of Primary Health Care of Klatak as many as 4 people (16.67%), the Primary Health Care of Mojopanggung showed 3 people (12.50%), Primary Health Care of Sobo showed 4 people (16.67%), Primary Health Care of Kabat showed 4 people (16.67%), Gitik Primary health care showed 2 people (8.33%) and Songgon Primary Health Care as many as 7 people (29.16%) In Banyuwangi.

**Table 1. Demographic Characteristics of TB Patient Respondents in Environmental Health Services at Primary Health Care**

Variabel	n	%
<b>Gender</b>		
Male	13	54.17
Female	11	45.83
<b>Age</b>		
18 – 28	9	37.5
29 – 39	1	4.20
40 – 50	6	25.00
51 – 61	7	29.20
<b>Levels of education</b>		
Elementary school	12	50.00
Middle School	5	20.83
High school	4	16.67
Academy of Private Limited	3	12.50
Work	21	87.50
No work	3	12.50
<b>Profession</b>		
Farmer	3	12.50
Trader	3	12.50
General employee	5	20.80
The crew	1	4.160
Student	1	4.160
No work	6	25.00
Labor	3	12.50
Construction laborer	2	8.33



According to table 1, the majority of respondents were 13 (54.17%) patients with pulmonary tuberculosis are men and 11 (45.83%) are women. The age range of patients with pulmonary tuberculosis is > 18 years old – 60 years with a majority aged 18 years – 28 years as many as 9 patients (37.50%). The level of education of pulmonary TB patients is varied, the majority of elementary school is 12 (50.00%), junior high school showed 5 (20.83%), senior high school showed 4 (16.67%) and universities showed 3 (12.50%)

Based on table 2, the process of environmental health counseling service in primary health care in pulmonary TB patients in Banyuwangi regency at 5 primary health care including "good" category namely Primary Health Care of Klatak, Mojopanggung, Sobo, Kabat and Gitik because it has been in accordance with the components of activity. Songgon Primary Health Care belongs to the category "Enough" because it only meets 6 components of activity.

**Table 2. Data and Information about Counseling Services of Environmental Health at Primary Health Care for Pulmonary TB Patients in Banyuwangi Regency 2018-2019**

Process of Environmental Health Services at Primary Health Care in Banyuwangi Regency	Skoring			Category
	Value	Weight	Scores	
<b>Klatak</b>				
Carrying out mathematically on 7 components	3	33	99	Good
<b>Mojopanggung</b>				
Carrying out mathematically on 7 components	3	33	99	Good
<b>Sobo</b>				
Carry out mathematically on 7 components	3	33	99	Good
<b>Kabat</b>				
Carrying out mathematically on 7 components	3	33	99	Good
<b>Gitik</b>				
Carrying out mathematically on 7 components	3	33	99	Good
<b>Songgon</b>				
Carrying out mathematically on 6 components	2	33	66	Enough

**Assessment of Knowledge, Attitudes and Actions of Pulmonary Tuberculosis Patients**

**Knowledge of Pulmonary Tuberculosis Patients**

Knowledge enhancement is expected to change the patient's attitude and actions to make changes in clean and healthy life behavior as well as to improve the physical environment of a healthy home.

**Table 3. Distribution of the Levels of Patient Knowledge during the Pre-test and Post-test**

Category	Pre-test		Post-test		Information
	n	%	n	%	
Good	1	4.20	5	20.80	Increase
Enough	2	8.30	18	75.00	Increase
Less	21	87.50	1	4.20	Decrease
Total	24	100.00	24	100.00	

Table 3 showed the patient's knowledge level distribution when the pre-test obtained a good category 1 (4.2%), enough 2 (8.33%) and less 21 (87.50%). As well, in the post-test obtained a good category 5 (20.8%), enough 18 (75.00%) and less 1 (4.2%). The post-test showed an increase in knowledge by a good category showed 4 (16.6%) and category quite 16 (66.67%) And in the category of less declining (83.3%).

**Table 4. Lists of TB Patient Knowledge Pre-test and Post-test**

Public Health Center	Average of Knowledge Score		Increase
	Pre-test	Post-test	
Klatak	49.38	72.50	23.12
Mojopanggung	33.33	75.00	41.67
Sobo	34.80	70.63	36.25
Kabat	33.75	68.13	34.38
Gitik	32.50	56.25	23.75
Songgon	42.85	60.70	17.85
Average	37.70	67.20	29.50

There was an increase in the average respondents knowledge of 29.50 at the pre-test and post-test. The average value of the respondent's knowledge rate when the pre-test is 37.70 which belongs to the less category. The average post-test value is 67.20 including enough categories. From increasing knowledge the expected behavior can increase.

**Attitude of the Pulmonary Tuberculosis Patient**

In table 5, the average attitude score of pre-test and post-test does not show there is a big difference despite the change in the attitude of pulmonary TB patients become healthier

**Table 5. Distributions of TB Patient Attitudes in Pre-test and Post-test**

Category	Pre-test		Post-test	
	n	%	n	%
Strongly agree	6	31.37	15	60.90
Agree	15	62.64	9	39.10
Neutral	1	6.01	0	0.00
Disagree	0	0.00	0	0.00
Total	24	100.00	24	100.00

The majority of the attitudes of TB patients are positively covering agree and strongly agree. The statement of the respondent's attitude expressed in a very concur (5), agrees (4), neutral (3), disagrees (2) and strongly disagrees (1). If before the pre-test there is a "neutral" stance of 6.01% but the post-test stated concur. Respondents gave a statement of positive attitude toward pulmonary TB disease which he suffered expressed "agree" 62.64% and "very agreed" 31.37% during pre-test. The post-test showed a more positive attitude change from the respondent that was 60.90% stating "Agree" and 39.10% said "very concur".

**Action of Pulmonary Tuberculosis Patients**

Good knowledge affects the attitudes and actions of pulmonary tuberculosis patients in the prevention of infection with tuberculosis.

**Table 6. Distribution of Healthy Actions of TB Patients Pre-test and Post-test**

Category	Pre-test		Post-test	
	n	%	n	%
Good	1	4.17	13	54.17
Enough	0	0.00	10	41.67
Less	23	95.83	1	4.17
Total	24	100.00	24	100.00

Table 6 shows a healthy action distribution of TB patients when pre test is grouped into good and lacking, a good category 1 (4.17%) and less 23 (95.83%). Distribution of healthy action patients TB post-test gained good category 13 (5s4, 17%), quite 10 (41.67%) and less 1 (4.16%).

**Table 7. Healthy Actions for TB Patients Pre-test and Post-test for Environmental Health Services at Primary Health Care**

Patient's Actions	Post- test		Pre-test	
	n	%	n	%
Wearing a mask every day	2	8.33	14	58.33
CTPS	2	8.33	19	79.17
Not spitting carelessly	4	16.67	19	79.17
Cutlery and drinking alone and separately	5	20.83	18	75.00
Washing cutlery with hot water / drying	0	0.00	7	29.17
Drying bedding (mattresses, pillows, bolsters)	2	8.33	18	75.00
Opening the bedroom window every day	12	50.00	15	62.50
Natural lighting into the bedroom	0	41.67	19	79.17
The window that is quite wide and can be opened	8	33.33	13	54.17
Sleeping separately	14	58.33	19	79.17
Total	24	100.00	24	100.00

Based on table 7, there is an increase in pre-test and post-test. Pre-test shows the action of the patient in the form of wearing a mask of 8.33%. Hand wash with soap of 8.33%, the habit of spitting by 16.67%, the

use of individual cutlery and drink of 20.83%, washing equipment and drinking with hot water/drying of 0.00%, drying the sleeping equipment by 8.33%, open a daily window of 50.00%, separate sleeping habits of 58.33%.

The result of the post-test shows the action of the patient in the habit of wearing masks 58.33%, hand wash with soap of 79.17%, the habit of spitting by 79.17%, the use of individual eating and drinking equipment by 75.00%, washing equipment and drinking with hot water or drying at 29.17%, drying the sleeping equipment by 75.00%, open a daily window of 62.50%, separate sleeping habits of 79.17%.

**DISCUSSION**

The results of the pre-test and post-test assessment in this study indicate that there are differences in the results of the behavioral assessment including knowledge, attitudes, tastes and actions of pulmonary TB patients. These results indicate that environmental health counseling at primary health care improves the knowledge of lung patients.

The results show an increase in respondents' knowledge. These results are in accordance with previous studies at hospitals in India that health counseling in patients can increase patients' knowledge (26-27). It is not much different from the results of research in Primary Health Care of Baturaden, Banyumas Regency, Central Java, showing counseling on environmental health can improve community knowledge, attitudes and behavior (28). Giving counseling and forming trust in the clients or patients in counseling significantly influence the patient's health behavior, although not as a whole it can change the patient's behavior (29). A research in India shows that providing health education with a good social approach by health workers to TB patients during the treatment period increases patient knowledge and adherence to the behavior of infection prevention (30).

All primary health care in the study did not implement a following-up plan for environmental health inspection. However, prevention of TB transmission cannot be done by health workers alone, it is necessary the participation of TB patients and families in efforts to prevent transmission. Treatment of pulmonary TB patients kills the *Mycobacterium tuberculosis* bacteria in the body of TB patients, but it needs to control the presence of *Mycobacterium tuberculosis* in the air and the environment by managing the behavior of pulmonary TB patients and the physical environment of the home. The increasing of knowledge in patients with pulmonary tuberculosis also improves the attitudes and actions of patients and families in efforts to prevent transmission

of tuberculosis. After getting environmental health services, they have a more positive attitude and approval changes occurring. A positive attitude and a good level of knowledge about TB infection control are the main factors associated with the practices of good infection control. This is consistent with research conducted in Ethiopia; it means that knowledge is the basis for changing the behavior of a community (30). The level of knowledge influences patient behavior; it means the low level of knowledge in TB patients and families results in the low efforts made in TB prevention (9).

Another study in Maros, Indonesia found that there is a significant link between the knowledge and attitudes of patients and families in the prevention of tuberculosis disease (9). A positive attitude and a good level of knowledge about TB infection control are the main factors associated with good infection control practices. Measures of infection control include using personal protective equipment (30).

Providing information through counseling and support can improve one's knowledge so that it can change the behavior of someone who can be applied in daily life especially environmental health (29).

In addition to the knowledge and attitudes, healthy actions of TB patients showed improvement in the habit of wearing masks, hand wash soap, the habit of spitting, the use of individual eating and drinking equipment, washing dinnerware and drinking with hot water/drying, drying sleeping appliances, opening windows every day, separate sleeping habits. There is a significant link between the knowledge, attitudes and actions of TB patients, where good knowledge affects the attitudes and actions of tuberculosis patients in the prevention of the transmission of tuberculosis (19). TB patients who have gained environmental health services experience increased behavior in the form of knowledge, attitudes and healthy actions.

## CONCLUSION

These three domains can be used to determine the improvement of behavior towards the healthcare server environment. After obtaining environmental health services there is an increase in knowledge, attitudes and actions of pulmonary TB patients in the prevention of the disease transmission of TB.

Environmental health services in primary health care in the form of environmental health counseling, health inspection and environmental health intervention in patients with pulmonary tuberculosis improves the behavior of patients that can be measured by knowing the knowledge, attitudes and actions of pulmonary

tuberculosis patients in the prevention of transmission of pulmonary tuberculosis disease.

Future research is expected to implement eight compensators that have been compliant with the regulation by conducting counseling, intervention and inspection of pulmonary tuberculosis (TB) patients. From these actions can impact patients such as increased behaviour that includes knowledge, attitudes and actions related to environmental health services.

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