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Community Assistance Through the Cyclone Ventilator Modification (CVM) Application in Reducing Cases of Tuberculosis Transmission at The Pegirian Health Center in Surabaya City In 2024

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ABSTRACT The risk of TB transmission in family's needs to be paid attention to, especially toddlers and the elderly who have lower immunity. The TB death rate in East Java is still high, including the city of Surabaya. In preventing TB transmission, the role of the family is very important, because one of the tasks of the family is to provide care for sick family members and prevent transmission to healthy family members through efforts that must be applied in their daily lives. Efforts to prevent the transmission of diseases, especially tuberculosis, can be made by improving the air quality in patients' homes and sanitation facilities so as to support the realization of healthy homes. A healthy house is a house with physical facilities that meet the requirements for the health of its occupants such as the fulfilment of ventilation, lighting, humidity, residential density, which as a whole must meet the requirements according to the standards of the Ministry of Health No.829 of 1999 so that the house does not become a medium for disease transmission. The purpose of community service is to increase public knowledge about environment-based infectious diseases including TBC, PHBS, CTPS diseases, and improve the air quality of patients' home rooms by installing Cyclone Ventilator Modification (CVM) to prevent the transmission of tuberculosis in the work area of the Pegirian Health Center in Surabaya in 2024. The target of the activity is aimed specifically at residents with tuberculosis in the Working Area of the Pegirian Health Center, Surabaya City. The approach is carried out by observation, interviews, counseling, demonstrations of the installation of CVM devices in the homes of TB patients, motivating residents in realizing healthy homes and environments by helping in the form of CVM devices, CTPS souvenrs.

INDEX TERMS Cyclone Ventilator Modification, Tuberculosis, Air Quality, Healthy Home

I. INTRODUCTION

An association called The United States Environmental Protection Agency (US EPA) states that long-term exposure to unhealthy indoor air can end up in lung, heart and cancer diseases, which are difficult to treat and fatal. Meanwhile, according to Saragih [1], the presence of pollutants in the indoor air can cause health disturbances both in the long term or short term with the source of air pollution can come from household activities from the kitchen, cigarette smoke, building materials and others. Healthy air is needed by humans to realize a better quality of life, but with the situation that has now become the opposite, housing land is getting narrower, so air sanitation is needed.

Home as a place to live that can meet the spiritual and physical needs of humans, home functions as a place that can provide a feeling of security and peace for the whole family. The house as an arrangement of living spaces that are closed or separate from the influence of the outside environment, the house must be able to keep people away from health problems caused by epidemics of infectious diseases such as dengue fever, tuberculosis, cholera, and dysentery (Rencana Rumah Sehat, 2009) [2].

The requirements of a healthy house are to meet physiological needs, including lighting, ventilation, noise disturbances, and enough children's playgrounds. Meeting psychological needs, including being safe and comfortable for each resident, a sitting room that can be used as a family dining room, and so on. Preventing the spread of diseases includes water supply, free of insect and rat life, garbage disposal, wastewater disposal, fecal disposal, and free of food and beverage contamination. Another requirement is to be able to prevent accidents [3].

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Housing/settlement is a group of houses that function as a residential environment or residential environment that is equipped with environmental facilities and infrastructure. Housing health is a physical, chemical and biological condition in the house, in the home and residential environment so as to enable residents or people who live in housing and or the surrounding community from health hazards or disorders. Environmental Health Infrastructure is the basic physical completeness of the environment that allows the residential environment to function as it should. Environmental Health Facilities are supporting facilities that function for the implementation and development of economic, social and cultural life [4].

The requirements for a healthy home include being able to prevent the transmission of diseases. Physical facilities of the house such as ventilation, lighting, humidity, and residential density, must meet health requirements so that the house does not become a medium for disease transmission, especially environment-based infectious diseases. Home sanitation conditions are sought to reduce the transmission of infectious diseases or other health problems, especially tuberculosis.

Tuberculosis is an infectious disease caused by the bacterium Mycobacterium tuberculosis. The spread of tuberculosis through the air is in the form of sputum splashes when coughing or sneezing. According to Mandal et al. (2004:220), Tuberculosis is the most common infectious disease in the world, with an estimated one-third of the population infected by tuberculosis and 2.5 million people dying every year [5]. Tuberculosis can affect all age groups and genders and begins to penetrate not only the lower socioeconomic groups. The whole world shows that morbidity and mortality increase with age. According to the Ministry of Health of the Republic of Indonesia (2008:3), globally it is estimated that TB in the world occurs in developing countries and deaths in women due to TB are more than deaths due to pregnancy, childbirth, and postpartum [6].

Transmission of this disease is due to contact with phlegm or inhalation of water droplets from sneezing or coughing from people infected with tuberculosis germs, children often get transmission from adults around the house or while in public facilities such as public transportation, hospitals and from the environment around the house. Therefore, people in Indonesia need to be aware that if they are diagnosed with tuberculosis, they should be careful when interacting with others so as not to cough and spit carelessly and it is highly recommended to be willing to wear a mask or at least a handkerchief or tissue.

The data of TB patients in 2013 is that the city of Surabaya ranks second in East Java after the city of Jember. The areas with the 3rd highest ranking of TB patients in the last 3 months (January, February, and March 2013) in Surabaya are Perak Timur (94), Dupak (75), and Pegirian (45) (Surabaya City Health Office, 2013) and 70 in 2014 [7], [8]. Residents of Surabaya, East Java, are vulnerable to Mycobacterium tuberculosis (TB) bacteria. At least 4,493 Surabaya residents are infected with Mycobacterium tuberculosis bacteria [9].

This is in accordance with the competence of the academic community of the Surabaya environmental health study program, which carries out the Tri Dharma of Higher Education activity program in the form of community service. Various research results that support these activities are the implementation of research conducted by Lecturers of the Surabaya Environmental Health Study Program in 2017 (Rachmaniyah, Umi Rahayu, Imam Thohari) entitled: "The Role of Guava Extract (Psidium Guajava L.) As an Antioxidant for the Protection of Lung and Kidney Organs in mice exposed to cigarette smoke [10]. As well as a 2015 study: "The Relationship between Air Quality and Home Sanitation and the Incidence of Tuberculosis Disease in the Pegirian Health Center Area" [11]. The implementation of the two studies is very suitable to be applied in the community service activities in question.

The results of a study on the relationship between air quality and home sanitation and the incidence of tuberculosis in the Pegirian Health Center area of Surabaya City in 2015 [11] showed that: 1) The quality of home air bacteriology of TB patients mostly did not meet the requirements of healthy home air bacteriology. 2) Sanitation of the house of tuberculosis patients: a) Ventilation: most of the ventilation of the house of tuberculosis patients does not meet the home health requirements, only some of them meet the health requirements. b) Lighting: most of the home lighting of tuberculosis patients do not meet the home health requirements, only some of them meet the health requirements. c) Humidity: most of the home humidity of people with tuberculosis does not meet the home health requirements, only some meet the health requirements. d) Temperature: most of the home temperatures of TB patients do not meet the home health requirements, only some meet the health requirements. e) Housing density: most of the housing density of TB patients is not dense or has met health requirements, only a small part is dense or does not meet health requirements.

The results of Umi Rahayu, et al. [11] on the relationship between sanitation and the quality of home bacteriology of TB patients in the Pegirian City Health Center area of Surabaya City obtained the results a) there is a significant relationship between the quality of air bacteriology and the ventilation of TB patients' houses. b) there is a significant relationship between the bacteriological quality of the air and the lighting of the home of TB patients. c) There is no relationship between the bacteriological quality of the air and the home temperature of TB patients. d) There was no relationship between the bacteriological quality of the air and the humidity of the house of TB patients. e) There was no relationship between the bacteriological quality of the air and the density of houses of TB patients. f) There is a relationship between home sanitation and the quality of home bacteriology of TB patients.

Community empowerment efforts (Teachers and Students) to improve residential sanitation in the work area of the Pegirian Health Center. This effort is expected to

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create conditions that lead to the realization of a healthy house in accordance with the Ministry of Health No. 829 of 1999 which is clean and healthy which provides comfort, peace and health for its residents and the community.

Based on the results of the survey of the residential environment conducted in the working area of the Pegirian Health Center, most of the population is the Madura tribe and with a low level of knowledge about health promotion efforts, so the data on tuberculosis disease in the area is very high. The working area of the Pegirian Health Center is in Semampir District with a total of 5 villages, with a population of 155,741 people.

The number of new cases of tuberculosis in the city of Surabaya in 2018 was 2,382 people. The BTA+ recovery rate in 2018 was 74.12%, when compared to the previous year, it shows an increase in the BTA+ recovery rate of 3.68%. Meanwhile, the success rate of treatment in the city of Surabaya in 2018 was 83.35%. When compared to the previous year, it shows an increase in the treatment success rate of 4.15% [12].

The number of new cases of tuberculosis at the Pegirian Health Center in 2018 was 150 people. The BTA+ recovery rate in 201 was 65%. Meanwhile, the success rate of treatment in the city of Surabaya in 2018 was 75.35%. When compared to the previous year, it shows an increase in the treatment success rate of 4.15% [12].

Based on this background, it is necessary to carry out community service activities with the title "Assistance for the Pulmonary Allergy Prevention Program Through Improving Residential Sanitation in the Pegirian Health Center Area, Surabaya City in 2024.

II. METHODS

The methods used in the implementation of community service in the Pegirian City Health Center Work Area of Surabaya City include the delivery of physical assistance in the form of Cyclone Ventilator Modificaton (CVM), training/counseling (lectures and discussions) and practice. Community service activities at the Pegirian Health Center in Surabaya City are planned for 8 months with details of activities, namely health counseling by Lecturers of the Department of Environmental Health together with the Pegirian Regional Health Center of Surabaya City, activities to provide physical assistance for examples in improving home health and residential environmental cleanliness, motivation for home and residential environmental cleanliness movements.

III. IMPLEMENTATION

The results of community service activities that have been carried out at the Pegirian Health Center in Surabaya City on August 8, 2024, are in the form of counseling activities for TB patients and the installation of equipment at the home of TB patients at the Pegirian Health Center.

Community service activities of lecturers of the Department of Environmental Health in the form of counseling related to infectious disease prevention materials, especially tuberculosis, were successfully carried out at the Pegirian health center attended by TB patients, cadres, Sanitarians and coordinators of TB Disease Prevention, at the health center, a total of 40 people. The theme of our counseling "Community Assistance Through the Cyclone Ventilator Modification (CVM) Application at Home for TB Patients in Reducing TB Transmission Cases in 2024" which includes:

Health Counseling by Lecturers of the Department of Environmental Health together with the Pegirian Regional Health Center of Surabaya City.

Counseling to the community, especially the families of pulmonary TB patients, at the Pegirian health center, was attended by 46 people who are families of pulmonary TB patients in the work area of the health center. The health counseling activity was attended by the community of TB patients, families of TB patients and the community around the patient's house who were targeted in the activity. Counseling materials include.

A. INCREASING PUBLIC KNOWLEDGE ABOUT HEALTHY HOMES THAT CAN CUT OFF DISEASE TRANSMISSION, ESPECIALLY TUBERCULOSIS.

This material begins with the definition of a healthy house, floor construction requirements, roof walls, lighting, ventilation, temperature and humidity that meet health requirements. Residential density, basic sanitation facilities that should be in the house. Home security so that the residents of the house avoid accidents. No less important is to maintain the cleanliness of the house both inside the house and outside the house. If a healthy house is understood, then the collection of a group of houses is a settlement. Maintaining the cleanliness of the home environment is very important and is the responsibility of residents living in the settlement. FIGURE 1 The results of the posttest are as follows.

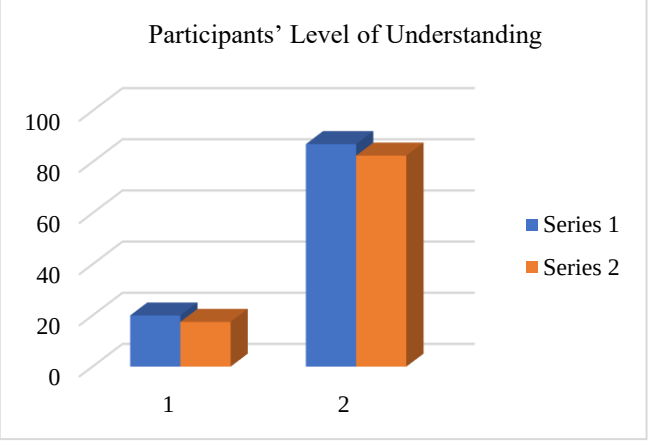

FIGURE 1. Participants' Level of Understanding on Healthy Housing After Counseling

B. INCREASE PUBLIC KNOWLEDGE ABOUT TB TRANSMISSION PREVENTION

This material begins with the definition of Pulmonary TB disease, the background of the occurrence of TB, the concept

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of disease transmission through hosts, agents and environments, and the way TB disease is transmitted. Prevention of transmission of tuberculosis by both patients and their families. The danger of TB transmission is if you neglect to wear a mask, cover your mouth and nose when coughing or sneezing, and do not spit in any place. Indoor lighting serves not only as a source of illumination but also contributes to environmental health by reducing the survival of certain pathogenic microorganisms, including Mycobacterium tuberculosis, the causative agent of tuberculosis. Adequate lighting may also help decrease room humidity levels and reduce the density of mosquitoes and other disease-carrying vectors, as illustrated in **FIGURE 2**

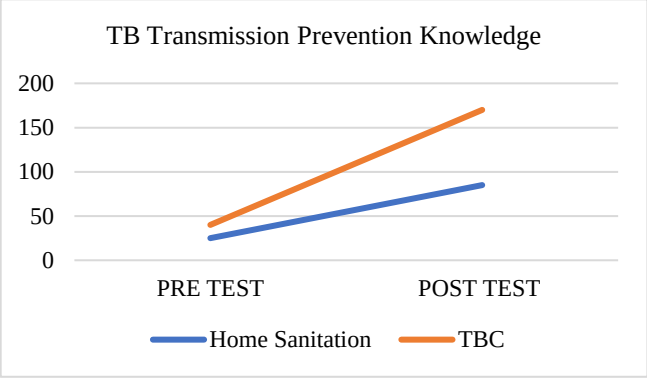

FIGURE 2. Comparison of Participants' Knowledge on Tuberculosis Transmission Prevention Before and After Counseling

C. INSTALLATION OF THE CYCLONE VENTILATOR MODIFICATION CVM DEVICE TO IMPROVE THE AIR QUALITY OF THE HOME ROOM OF TB PATIENTS (IN 3 THREE HOUSES OF TB PATIENTS IN THE HEALTH CENTER AREA), NAMELY:

The activity of providing physical assistance in the form of Cyclone Ventilator Modification (CVM) in the homes of TB patients aims to improve the air quality in the homes of TB patients. By installing CVM in the house, dirty air can be replaced with clean air so that patients get healthier air. The provision of CVM was demonstrated through the involvement of three patients as motivational role models for other patients. In addition, the implementation of CVM may contribute to improving air circulation within patients' homes, particularly in environments with inadequate ventilation, as illustrated in **FIGURE 3**.

IV. CONCLUSION

Counseling by the service team of lecturers, education staff and students was well followed by participants (TB patients at the Pegirian Health Center) with an attendance rate of 100%. Demonstration of the installation of the device in the patient's house, in 3 or three patient houses, in accordance with the work steps and can be installed perfectly. Motivation for the Home and Residential Environment Cleanliness Movement This motivational activity was carried out together with the community, cadres, health center officers and lecturers. Activities in the form of cleanliness movements.

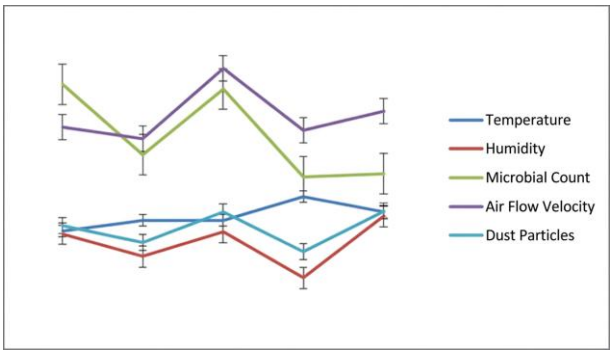

FIGURE 3. Trend Line Percentage of Cyclone Ventilator Modification Capabilities in Improving Indoor Air Quality

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