

Relationship Between Clean Water Sources, Waste Management, and Availability of Healthy Latrines with the Incidence of Pulmonary TB in Marginal Community

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ABSTRACT

Pulmonary TB is a disease that can attack anyone because the source of this disease is very broad, especially in the environmental aspect. These environmental aspects include rubbish, clean water sources, and healthy latrines. The incidence of pulmonary TB in the Minasatene Community Health Center working area is still found. This research aims to determine the relationship between waste management, availability of latrines, and clean water sources with the incidence of pulmonary TB in Minasatene District, Pangkajene Islands Regency. This type of research is a quantitative analytical survey with a cross-sectional study design. The sampling technique used in this research was a simple random technique (Simple Random Sampling) with a sample size of 163 respondents. The results of the research are that there is a relationship between waste management and the incidence of diarrhea with a value of $p = 0.006$, there is a relationship between clean water sources and the incidence of diarrhea with a value of $p = 0.000$, there is a relationship between the availability of healthy latrines and the incidence of diarrhea with a value of $p = 0.000$, there is a need to manage community waste through counseling or outreach organized by the government or private sector.

Keywords: Clean water sources, Healthy Latrines, Tuberculosis, Waste management,

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1. INTRODUCTION

The residential environment is a place where a community group lives and carries out its life. A settlement is part of a residential environment that consists of more than one housing unit that has infrastructure, facilities, and public utilities, and supports other functional activities in urban or rural areas.[1]. Environmental sanitation is monitoring environmental factors that can affect human health. Environmental sanitation is aimed at meeting the requirements for a healthy and comfortable environment. Basic sanitation efforts include human waste disposal facilities, waste disposal facilities, wastewater disposal channels, and the provision of clean water[2]. As a place for human habitation, the residential environment must be free from anything that could harm the health of the environment. Environmental conditions, especially poor basic sanitation, are found in almost all regions in Indonesia, especially in slum residential areas, as well as several residential areas along the coast.[3]. In general, environmental health problems faced are still focused on providing clean water, adequate housing, and waste disposal that does not cause environmental pollution.[4]

The provision of clean water sometimes does not meet health requirements, as well as the disposal of sewage, especially feces, is still not found and functioning properly. [5] Poor sanitation allows various infectious diseases to continue to spread and can also cause water around the environment to be contaminated by viruses,

bacteria, and other parasites as a result of poor waste management. Sanitation determines the success of environmental health development which places more emphasis on prevention rather than treatment. Therefore, society must realize the importance of maintaining environmental health, because environmental health greatly influences the health of individuals or the community itself[6].

Research conducted by Ni Komang Ayu, 2018 stated that the state of house sanitation is generally related to the incidence of pulmonary TB cases with a value of $\rho < 0.05$, except for temperature and residential density which are not related to a value of $\rho \geq 0.05$. [7] Based on data from the World Health Organization (WHO), there will be an increase in pulmonary TB globally in 2021 to 10.6 million cases or an increase of around 600,000 cases from 2020, which was estimated at 10 million TB cases. Of the 10.6 million cases, there are 6.4 million (60.3%) people who have been reported and undergoing treatment and 4.2 million (39.7%) people and the remainder have not been diagnosed and reported. Of the total 10.6 million cases in 2021, at least 6 million cases are adult men, then 3.4 million cases are adult women and the other TB cases are children, namely 1.2 million cases. Overall deaths due to TB were found to be 1.6 million people who died due to TB, this figure increased from the previous year, namely around 1.3 million people. There were also 187,000 people who died from TB and HIV. Indonesia ranks second with the highest number of TB sufferers in the world after India, followed by China, the Philippines, Pakistan, Nigeria, Bangladesh and the Democratic Republic of Congo respectively. In 2020, Indonesia was in third place with the highest number of cases, so 2021 will clearly not be better. TB cases in Indonesia are estimated at 969,000 TB cases (one person every 33 seconds). This figure is up 17% from 2020, namely 824,000 cases. The incidence of TB cases in Indonesia is 354 per 100,000 population, which means that for every 100,000 people in Indonesia there are 354 people who suffer from TB. [8]

2. METHOD

The research design used in this study was analytical observational with a cross sectional study design, the number of samples in this study were all heads of families in Pangkajene District, the working area of the Pangkajene Health Center, Pangkajene and Islands Regency, totaling 276 heads of families. Primary data was obtained directly from respondents using using a list of questions that are available. Secondary data was obtained from the Community Health Center.

3. RESULTS AND DISCUSSION

Waste management in marginalized communities is very simple and many do not meet the requirements. Waste management generally only involves collecting it and throwing it in the front yard, then burning it or throwing it into the garden or empty land. Community waste management still has very few places to dispose of waste as well as waste transportation equipment. The results of the analysis of the relationship between waste management and the incidence of pulmonary TB in Pangkep Regency showed that the incidence of pulmonary TB was related to waste management carried out by residents. [9] If waste management is done well, the environment will be kept clean and disease vectors will find it difficult to develop so that the incidence of pulmonary TB can be avoided. On the other hand, if waste management is not managed properly or poorly, disease vectors will develop very easily and the risk of pulmonary TB incidence will be very high. Based on table 1, the majority of TB sufferers are in the 41 – 50 year age group, 31.9%, while TB sufferers in the smallest age group are 20-30 (6.1%), more male TB sufferers. The number is large, namely 95 (58.3%) compared to women who only number 68 (41.7%), TB sufferers. Most of the educational level is junior high school, 40.5%, while TB sufferers with the least educational level are degree 37%. 40.5% of TB sufferers are farmers, while 3.1% are employees.

Table 1. Frequency Analysis of Characteristics of Pulmonary TB Sufferers in Marginal Communities

Age	Total	%
20-30	10	6,1
31-40	29	17,8
41-50	52	31,9
51-60	42	25,8
more than 60	30	18,4
Total	163	100
Sex		
Women	68	41,7
Man	95	58,3
Total	163	100
Education		
	(n)	(%)

Elementary	13	8,0
Yunior	66	40,5
High	60	36,8
Diploma	18	11,0
Degree	6	3,7
Total	163	100
Work		
Housewife	44	27,0
Farmer	66	40,5
Fisherman	33	20,2
Businessman	15	9,2
Employee	5	3,1
Total	163	100,0
TB		
TB	69	42,3
Not TB	94	57,7
Total	163	100,0
Waste Management		
Good	65	39,9
Less	98	60,1
Total	163	100,0
Clean Water Source		
Fulfill	90	55,2
Not Fulfill	73	44,8
Total	163	100,0

Source: Primary Data

In Table 2 Based on the results of statistical tests on waste management and the incidence of TB chi-square, the value obtained is $p = 0.006$ and compared with the value $\alpha = 0.05$, there is a relationship between waste management and the incidence of TB in marginalized communities. Based on the results of statistical tests between sources of clean water chi-square, the value obtained is $p = 0.000$ and the value $\alpha = 0.05$, so there is a relationship between clean water sources and the incidence of TB. Chi-square statistical test, the value obtained is $p = 0.000$ and compared with $\alpha = 0.05$, the value obtained is $0.000 < 0.05$. There is a relationship between the availability of healthy or qualified toilets and the incidence of TB in marginalized communities. The results of the chi-square statistical test, obtained a value of $p = 0.000$ and compared with $\alpha = 0.05$, the value obtained was $0.000 < 0.05$, so H_0 was rejected. Thus, it can be interpreted that there is a relationship between the availability of healthy latrines or those that meet the requirements for TB incidence in marginalized communities.

Table 2. Risk factors for TB incidence in Marginal Community

Waste Management	Incident TB				Total		Sig (p)
	TB		Not TB		n	%	
	n	%	n	%			
Good	19	29,2	46	70,8	65	100	$p = 0.006$ $X^2 = 7.601$
Less	50	51,0	48	49,0	98	100	
Total	69	42,3	94	57,7	163	100	
Clean Water	Incident TB				Total		Sig (p)

Source	TB		Not TB		n	%	
	n	%	n	%			
Good	25	27,8	65	72,2	90	100	<i>p</i> = 0.000 $X^2=17,436$
Less	44	60,3	29	39,7	73	100	
Total	69	42,3	94	57,7	163	100	

Healthy Latrines	Incident TB				Total	Sig (<i>p</i>)	
	TB		Not TB				
	n	%	n	%	n	%	
Good	27	29,7	64	70,3	91	100	<i>p</i> = 0.000 $X^2= 13,528$
Less	42	58,3	30	41,7	72	100	
Total	69	43,5	94	56,5	163	100	

Source: Primary Data

Human environmental factors will be related to disease, nutrition and health services. Environmental conditions that do not meet health requirements will have an impact on pulmonary tuberculosis (TB), dengue hemorrhagic fever (DHF) and acute respiratory infections (ARI), so there is a need to improve the environment, improve air quality and improve public health to prevent these environmentally based infectious diseases. Environmentally based disease prevention programs will be able to be implemented if there are institutions, activities, work procedures and resources.[10] [11] Waste processing involves the utilization and use of facilities and infrastructure to place waste in available containers, the process of collecting waste, moving and transporting waste, as well as processing waste until the final disposal process.[12] Health problems arise due to the accumulation of waste which becomes a nest for vectors and rodents. If waste management is done well, the environment will be kept clean and disease vectors will find it difficult to develop so that TB incidents can be avoided. On the other hand, if waste management is not managed properly or poorly then disease vectors will develop very easily and the risk of diarrhea is very high.[13] . Environmental factors and house conditions are also one of the factors causing the spread of TB patients consist of house that has a healthy toilet, clean water facilities, rubbish dumps, waste water disposal facilities, good ventilation, appropriate housing density and house floors that are not made of dirt. The aim of this research is to find out the relationship between the physical condition of the house and PHBS (Clean and Healthy Living Behavior) with the incidence of Pulmonary Tuberculosis.[14]

In line with literature research which shows that around 20% of pulmonary TB patients may experience extra-pulmonary manifestations such as GITB, which results in the release of feces and urine. This has the potential to cause exposure to MTBC in wastewater. MTBC concentrations up to 5.5×10^5 ($\pm 3.9 \times 10^5$) copies/L wastewater Research has shown that wastewater can provide the nutrients these bacteria need for their growth and potentially lead to environmental transmission although some studies have observed the presence of MTBC in wastewater treated through culture-dependent and molecular techniques.[15].Inadequate resources to find TB cases, such as a lack of health service providers, inadequate basic infrastructure, inadequate diagnostic equipment and supplies, as well as limited access to TB diagnostic services such as the absence of nearby health facilities that provide TB diagnostic services. Service and health system delays in the diagnostic process were identified as obstacles in finding TB cases. We identified the absence of trained laboratory personnel in 11 health facilities, the absence of clean water supply in 13 health facilities, and electricity in seven health facilities. In addition, we found that difficult topography, lack of proper roads, lack of collaboration with other sectors (such as education), turnover of professionals in laboratories, and low community mobilization, were the causes of some of these obstacles.[16] Ventilation factor with Tuberculosis (TB), estimated Prevalence Ratio (PR) based on the Fixed Effect (FE) model. 95% CI is 0.92 with an impact range of -2.55 – 4.39. Furthermore, the pooled PR = $\ln(0.92) = -2.509$, indicating ventilation increases the risk of TB by 2.509 times. People who have inadequate ventilation are 2,509 times more at risk of developing TB than other people with adequate ventilation, improving the physical environment of the patient's home Pulmonary TB. Good home condition is important to create a healthy society.A house is said to be healthy if it fulfills it The four main requirements include; fulfill physiological needs such as lighting, ventilation, space for movement enough and free from noise annoying, fulfilling a need psychology like “Privacy” is enough and good communication between residents home, meeting preventive requirements infectious diseases that include providing clean water, feces and waste water household, free from disease vectors, excessive residential density, sufficient sunlight, food and protected drinks and contamination as well as lighting and ventilation sufficient and meets the requirements preventing good accidents originating from within and from outside [17] [18]

The availability of clean water sources is one of the efforts to improve the level of public health. Environmental health organized to create a healthy environment, namely a situation that is free of risks that endanger health and life safety man. Environmental health includes air sanitation, namely securing and determining air quality for various needs and human life. Thus, the air used for daily needs, apart from meeting or covering the quantity, must also meet the specified quality [19][20]. The importance of good quality air needs to be provided to meet basic needs in preventing the spread of airborne infectious diseases. This is in line with Investigations carried out on MAH reservoirs showing that household water is one of the possible sources of infection based on the similarity of genotypes between isolates from the patient's living environment (shower water, shower biofilm, bathroom and hot tub) and clinical isolates. Research conducted in the United States MAC are natural inhabitants of soils and surface waters, and enter urban water distribution systems through surface water. As this review will document, distribution systems and premise plumbing are ideal habitats for MAC. Thus, MAC and humans share the same habitats, and the likelihood of MAC-transmission via aerosols is high. Selection for the growth and survival of MAC occurs in water treatment plants, the distribution system and household plumbing. MAC are staggeringly disinfectant-resistant [21] People who are provided with truly clean water have a lower risk of suffering from Tuberculosis than other people who don't get clean water The public can reduce the risk of exposure to Mycobacterium Tuberculosis by using clean water and protecting the water from contamination from the source to storage at home [22]

Water is a good medium for bacterial growth, contamination easily occurs if hygiene and sanitation are not paid attention to. Using poor water sources can increase the risk of diarrhea. Clean water sources greatly influence the cleanliness of the eating and drinking utensils used. If the clean water source used is contaminated with pathogenic bacteria such as E.coli, eating and drinking utensils are at risk of being contaminated, especially if washing practices are not good[23] [24] The function of latrines from an environmental health aspect, among others, is to prevent the development of various diseases caused by human waste. Meanwhile, the serious impact of throwing feces in any place causes soil, water and air pollution because it causes odors. Faeces disposal sites that do not meet sanitation requirements will increase the risk of diarrhea by 2.55 times compared to families who dispose of their feces sanitarly.[25]

4. CONCLUSION

There is a relationship between waste management aspects, availability of clean water sources, aspects of the availability of healthy latrines and the incidence of pulmonary TB. So it is very important to maintain a healthy environment to prevent the transmission of tuberculosis. By paying attention to aspects of temperature, humidity and lighting, we can minimize its spread. Recommended to UPT Puskesmas should improve further health promotion in the housing sector health related to disease Pulmonary TB and not just stress in the treatment of patients only, but for the general public others and especially especially for communities at risk incidence of pulmonary TB, especially TB sufferers Lung and his family so that Get used to opening the window home every day so that there is light come into the room, clean ventilation holes so that occurs maximum air circulation. When possible for the long term for those whose ventilation is inadequate conditions can be met with adding ventilation holes such as window with placement on east wall.

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