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THE EFFECT OF RISK FACTORS ON TRANSMISSION OF PULMONARY TUBERCULOSIS DISEASE FAMILY MEMBERS IN BAUCAU DISTRICT IN 2019

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ABSTRACT

Tuberculosis is an infectious disease caused by the bacteria *Mycobacterium tuberculosis* which is easily transmitted quickly through the air (droplet nuclei) when a tuberculosis patient coughs and the saliva containing the bacteria is inhaled by other people. According to the WHO report in 2017, around 1.3 million people died from tuberculosis, where the highest mortality rate in Asia occurred in Timor-Leste, namely 100/100 000 population with an incidence rate of 489/100 000 population. The discovery of new TB cases in Baucau Regency in 2017 was 329 and 518 new cases of tuberculosis in 2018, where pulmonary TB patients with positive Acid Resistant Bacillus cases have the potential to infect others. The purpose of this study was to analyze the effect of behavioral risk factors, home environment, and the number of family members with a history of tuberculosis (+) on the transmission of pulmonary tuberculosis in Baucau District. This type of research is analytic observational quantitatively with a Cross-Sectional approach, with a sample of 154 people. Data obtained by interview then analyzed by univariate and bivariate using Chi-Square test. The results of univariate data analysis showed that the influence of risk factors from behavior, environment, and family members with a history of tuberculosis (+) showed that 62.3% coughing did not cover the mouth, 74% expelled phlegm in any place, 54.5% did not open the window in the morning, 51% the floor does not meet the requirements, 29.2% of the occupancy density does not meet the requirements, 31.8% of the lighting does not meet the requirements, 32.5% of family members are suspected of tuberculosis and 21.4% are positive for tuberculosis. Meanwhile, the results of bivariate data analysis using the Chi-squared test showed that the three variables had a significant influence, namely behavioral risk factors with CI=95%, RP=2.775 (1,495-5,153), 2,775 risks of transmitting tuberculosis, home environment with CI=95%, RP = 1,619 (0.884 -2,964), the risk is 1,619 for transmitting tuberculosis and the number of family members with a positive history of TB CI=95% RP=4,315 (2,589 - 7,192), the risk is 4,315 for transmitting tuberculosis. It can be concluded that the risk factors of the behavior of patients with pulmonary tuberculosis, the home environment, and the number of family members with a positive history of tuberculosis (+) can contribute to the transmission of pulmonary tuberculosis to others. So the suggestions that can be given are increasing public and family knowledge about tuberculosis, increasing disease prevention behavior, namely coughing and covering your mouth, removing phlegm in a safe place, health workers routinely carrying out screening activities, and immediately implementing preventive treatment programs for family members who are in contact with smear-positive tuberculosis patients and supervise patients who are DOTs.

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INTRODUCTION

Tuberculosis is an infection caused by *Mycobacterium tuberculosis* that can attack various organs of the body ranging from the lungs and organs outside the lungs such as skin, bones, joints, membranes of the brain, intestines, and kidneys which is often referred to as extrapulmonary tuberculosis (Chandra, 2012).

Tuberculosis is a directly infectious disease caused by *Mycobacterium tuberculosis* germs that are transmitted through the air (droplet nuclei) when a tuberculosis patient coughs, sneezes laughs and the droplets of saliva containing these bacteria are inhaled by others when breathing (Crofton, 1999). Tuberculosis (TB) is an infectious disease that spreads quickly, until now, tuberculosis is still the most dangerous infectious disease in the world. The World Health Organization (WHO) reports that TB is one of the top 10 causes of

death and the leading cause of one infectious agent (above HIV/AIDS). Millions of people continue to suffer from TB disease every year. In 2017, TB caused an estimated 1.3 million deaths (range, 1.2-1.4 million), people were Human Immunodeficiency Virus (HIV) negative and there were an additional 300,000 deaths from TB (range, 266,000-335,000) among HIV positive people (WHO, 2018). The 2018 Global Tuberculosis Report TB estimates that 10.0 million people (range, 9.0-11.1 million) had TB disease in 2017, of which 5.8 million men, 3.2 million women, and 1.0 million children child. Regionally, the highest incidence of TB occurred in Asia at 44%, Africa at 20%, Western Pacific at 21%, and smaller in Europe and America at 4%. There were cases in all countries and all age groups, but overall 90% were adults (aged 15 years), 9% were people living with HIV (72% in Africa) and two-thirds were in eight countries: India (27 %), China (9%), Indonesia (8%), Philippines (6%), Pakistan (5%), Nigeria (4%), Bangladesh (4%) and South Africa (3%), (WHO, 2018). The 2018 Global Tuberculosis Report TB estimates that 10.0 million people (range, 9.0-11.1 million) had TB disease in 2017, of which 5.8 million men, 3.2 million women, and 1.0 million children child. Regionally, the highest incidence of TB occurred in Asia at 44%, Africa at 20%, Western Pacific at 21%, and smaller in Europe and America at 4%. There were cases in all countries and all age groups, but overall 90% were adults (aged 15 years), 9% were people living with HIV (72% in Africa) and two-thirds were in eight countries: India (27 %), China (9%), Indonesia (8%), Philippines (6%), Pakistan (5%), Nigeria (4%), Bangladesh (4%) and South Africa (3%), (WHO, 2018).

Timor-Leste is one of the countries with the incidence of new TB cases for all diagnoses in 2018 which is 498 per 100 000 population. The development of all tuberculosis cases has continued to increase in the last five years, indicating that the findings for all new TB cases in 2014 were 3778 cases with a Case Detection Rate (CDR) of 65%, in 2015 there were 3532 cases with a CDR of 60%, in 2016 there were 3731 cases with a CDR of 62%, in 2017 there were 3579 cases with a CDR of 59% and in 2018 as many as 3906 63%. While the number of positive smear TB cases in 2014 was 1838 cases with a CDR of 74%, in 2015 there were 1572 cases with a CDR of 76%, in 2016 there were 1761 with a CDR of 84%, in 2017 there were 1862 with a CDR of 87%, and in 2018 there were as many as 1655 with 76% CDR, (NTP, 2018). Data from Serviços Municipal Saúde de Baucau regarding the discovery of all new cases of tuberculosis shows that in the last 5 years starting from 2014 there were 287 cases or CDR 47%, in 2015 there were 333 cases or CDR 42%, in 2016 there were 333 cases CDR 52%, in 2017 there were 329 cases of CDR 52% and in 2018 there were 518 cases of CDR 81%. From the last five years, the highest CDR was in 2018 which reached 81%, this figure shows that the incidence of new cases of tuberculosis in the community is still increasing, (EIS, 2018). Since the 1990s WHO and the International Union Against Tuberculosis and Lung Disease (IUATLD) have developed a TB control strategy known as the Directly Observed Treatment Short-Course (DOTS) strategy and has proven to be the most economically effective (cost-effective) prevention strategy. . In 1993, WHO declared TB a global emergency and formulated a 'five-point plan' known as DOTS (for observed 'directly observed, short course treatment') to combat the disease. It consists of political commitment, case detection using sputum microscopy, standardized short-term chemotherapy under appropriate case management conditions including directly observed care, regular drug supply, and a standardized recording and reporting system that allows individual patient assessment and overall program performance. , (Martins, 2006). Recent treatment outcome data show treatment success rates of 82% for TB (2016 cohort), 77% for HIV-associated TB (2016 cohort), 55% for Multi-Drug Resistant (MDR) / Rifampicin Resistant Tuberculosis (RR-TB) (Cohort 2015) and 34% for widespread drug-resistant TB (XDR-TB) (2015 cohort) (WHO, 2018). Globally, TB treatment coverage was 64% (range 58-72%) in 2017, up from 53% (range 46-64%) in 2010 and 35% (range 30-43%) in 2000. above 75%: WHO Americas region, WHO Europe Region, and WHO Western Pacific Region. High TB burden countries with treatment coverage rates in 2017 (> 80%) Including Brazil, China, Namibia, Russian Federation, and Vietnam. The lowest rates, with the best

estimates of 50% or less, are in the Central African Republic, Lesotho, Nigeria, and the Republic of Tanzania (WHO, 2018). Meanwhile, treatment outcome data in Timor-Leste showed a treatment success rate of 89% for all TB cases (2016 cohort) and 89% for all TB cases (2017 cohort). These data show that 11% of reported TB cases were not successfully treated due to drop out, died, and were not evaluated at the end of the treatment outcome (NTP, 2018). While the Município de Baucau success rate in the treatment of TB cases reached 92% (Cohort, 2016 and 89% (Cohort 2017). These data show that in 2017 treatment outcomes only reached 89% and 11% failed to be treated because 5% died in the process. treatment, 3% DO no 3% was not evaluated (EIS, 2018). The risk factors for increasing the incidence of tuberculosis and transmission of pulmonary tuberculosis caused by the home environment are residential density, ventilation conditions, lighting, and the behavior of TB patients, namely coughing or sneezing not covering the mouth, throwing phlegm in random places, smoking habits and the habit of not opening the mouth. window in the morning. The results of research conducted in Indonesia showed that the risk of pulmonary tuberculosis transmission caused by residential density was 7,841 times greater, the room temperature was 8,048 times greater, room humidity was 4,705, house floor type was 5,266, a habit of throwing phlegm carelessly in place 4,402 and coughing or coughing habits. sneezing without covering the mouth by 9.137, (Agustina, 2015).

Tuberculosis is an infectious disease that is almost exclusively transmitted through the air from patients with lung disease. The risk of transmission is contact with tuberculosis patients with Acid Resistant Basillus (+), the population density is very susceptible to being easily infected with tuberculosis. Those who have contact in the same house have a high risk of infection, young age, and also low immunity is very vulnerable to having the risk of being infected with tuberculosis (Singh, 2014). Therefore, the Government of Timor-Leste through the Ministerio da Saúde decided to intensify efforts to control TB and adopt the Direct Observation Treatment Strategy (DOTS). The National Tuberculosis Program (NTP) introduced a DOT strategy to break the chain of transmission of tuberculosis bacteria in the community, but the incidence of tuberculosis is increasing. Several risk factors or sources of transmission of tuberculosis bacteria, namely from patients with pulmonary tuberculosis who are not treated, diagnosed late, and failed to be treated or drop out are factors that can contribute to the transmission of tuberculosis in the community. Where patients with pulmonary TB BTA (+) have the potential to infect 10-15 people per year, so every contact with the patient may be infected. If a patient with pulmonary TB AFB (+) coughs, thousands of tuberculosis bacteria will scatter together with the breath "droplets" of the patient concerned so that they have the potential to infect other people. Until now, it is not known which risk factors contribute the most to the potential transmission of pulmonary tuberculosis in the community and no researcher has researched the risk factors and transmission of pulmonary tuberculosis in Timor-Leste, especially Município de Baucau. Thus the authors are interested in researching risk factors, namely the behavior of pulmonary TB sufferers, the home environment, and the number of family members with a positive TB history that affect the transmission of tuberculosis to family members in the work area of Serviços Municipal Saúde de Baucau Município Baucau in 2019.

Literature Review: The history of tuberculosis predates most other infectious diseases, examination of Egyptian mummies shows evidence of extrapulmonary bone tuberculosis, and the disease was recognized in Greece in 429 BC and described by Hippocrates. Sylvius (1614-1672), a French anatomist, gave the name "tubercle" to nodular lesions found during autopsies, and the present name "tuberculosis" comes from the tubercle. In 1865 Jean Antoine Villemin (1827-1892), a French Surgeon outlined the belief that tuberculosis was an infectious disease, but it was not until 1882 that Robert Koch identified the etiologic agent as the tubercle bacillus, (Elisabeth, 1975). The National TB Program (NTP) in Timor-Leste was integrated with primary health care services by the state at all levels since 2006. Caritas Dili, an NGO carried out TB control

activities through the country's network of Catholic Clinics and public health facilities during the period 1996-2005 (Martins, 2011). This later formed the basis for the establishment of the National Tuberculosis Program in the country. Despite the challenges of the transition, the National Tuberculosis Program (NTP) was established quickly and achieved a detection rate of more than 90% of NSP cases and a treatment success rate of more than 80% consistently. The SISCa approach contributed significantly to this improvement. There is a need to move towards utilizing new methods for measuring TB incidence and prevalence in countries developed by WHO in the context of assessing the impact of the SISCa strategy. In addition, this report also calls for a greater focus on investment in operational research to generate evidence on approaches to improve and maintain quality healthcare delivery, (Martins, 2011). Detection of new positive pulmonary tuberculosis was very low for the period from 2005 to 2008. In 2009, Timor-Leste began receiving financial assistance from the Global Fund for the implementation of the tuberculosis program throughout Timor-Leste. Since then, there has been a significant increase in the case detection rate from 75% and above, to 94% of the estimated cases in 2011 (Martins, 2011). The National Tuberculosis Program (NTP) has reactivated the involvement of private clinics and NGOs that was previously discontinued when NTP was handed over to the Ministry of Health, expanded diagnostic and treatment facilities to all sub-districts, and mobilized communities to participate in case detection and provision of DOT through the Servisu Integradu Saúde Comunitária program. (SISCa). Other important steps taken by NTP include the organization of training for health professionals in public health facilities, NGOs, and private clinics in the country to improve their skills and capacities in terms of diagnostic and treatment management, (Martins, 2011). The cure rate for the cohort enrolled since 2006 has remained around 69%, following a decline for the cohort enrolled in 2005. However, treatment completion was averaged 75%, indicating that a final sputum smear examination was not performed. The cure rate has increased significantly over the past 5 years, after completion of treatment, and the default rate, the mortality rate has shown a significant decrease, as well as a 3% reduction in outgoing transfer cases. Most cases of outbound transfers originate from the national capital (Dili district) (Martins, 2011). The results of a study in Timor-Leste conducted by Silva V, (2016) regarding the profile of pulmonary tuberculosis patients and risk factors for TB drug withdrawal cases in Timor-Leste, showed that one of the causes of dropouts was the lack of supervision during DOTs and the availability of drugs. TB in-service facilities. The results of data analysis showed that the risk factors for drug withdrawal by DOTs supervision were OR=3.891 (CI=95% 1.205-12,567, P=0.023) and availability of TB drugs OR=2.577 (CI=95%, 1.037-6.404, P=0.041). This means that the risk factors that lead to withdrawal of TB drugs, namely DOT supervision, are 3,891 times greater and the availability of TB drugs 2,577 times greater than other risk factors, namely feelings of recovery, traditional treatment, and migration, (Silva, 2016). A case notification number is a number that shows the number of new patients found and recorded among 100 000 residents in a certain area. The case notification number serves to show a trend of increasing or decreasing findings in an area, (Rer, 2016). In 2018 the notification of the number of new cases of tuberculosis in Timor-Leste was 498 per 100 000 population and the notification of the number of new cases of bacteriologically confirmed pulmonary tuberculosis was 175 per 100 000 population (NTP, 2018). Timor-Leste has a tuberculosis prevalence rate of 820 per 100,000 populations with an incidence rate of 498 per 100,000 population and a mortality rate of 100 per 100,000 population (WHO, 2018). Tuberculosis cases in 2018 increased from 3579 cases to 3906 cases in the following year, (NTP, 2018).

Clinical symptoms of pulmonary tuberculosis according to the NTP-TL include (Mds, 2014):

- Cough more than 2 weeks, coughing up phlegm and mixed with blood
- Body temperature or body heat can reach 40-41 0 C and pain in the chest

- Weakness and reduced appetite
- Sweating at night.
- Thus, a tuberculosis suspect is someone who suffers from one of the above symptoms, especially a cough with a long period or more than two weeks (Mds, 2014).

The source of transmission is smear-positive tuberculosis patients through the sprinkling of phlegm they expel. However, it does not mean that TB patients with negative smear results do not contain germs in their sputum. This could have happened because the number of germs contained in the test sample was 5,000 germs/cc sputum so it was difficult to detect through direct microscopic examination (Kemenkes-RI, 2014). The risk of transmission every year is indicated by the Annual Risk of Tuberculosis Infection (ARTI), which is the proportion of the population at risk of being infected with TB for one year. The ARTI is 1%, meaning 10 (ten) people out of 1000 people are infected every year (Rer, 2016). Prevention of transmission of tuberculosis bacteria according to NTP-TL in the community can be done as follows, (Mds, 2014) including:

- Patients cover their mouths when coughing with their hands or with a handkerchief
- Patients sleeping separately from their families during transmission
- The patient does not spit in any place but spits in a place that has been filled with water with soap or Lysol
- Try to get sunlight into the patient's room as much as possible and dry sleeping tools as often as possible.

At the time of prophylactic therapy it is recommended for: (1) all children under 3 years of age who are reactive for tuberculosis (2) all adolescents with recent infection (3) all age groups veiled from negative to positive tuberculin reactions; (4) people whose disease appears to be cured, but on whom reactivation is possible, and (5) all people with conditions that could predispose them to tuberculosis.

Risk Factors of the Behavior of Patients with Pulmonary Tuberculosis: A risk factor is a necessary determinant so that it can reduce the possibility of health problems or disease (Supriyanto, 2012). Risk factors are factors or conditions that influence the development of a particular disease or health status. Factors that allow people to be easily infected with pulmonary TB, there are several characteristics of population groups who have a greater risk of getting pulmonary TB than other groups (Notoatmodjo, 2010). According to Robert Kwick (1974) states that behavior is an action or act of an organism that can be observed and even studied, which is quoted by (Notoatmodjo, 2007). When you cough or sneeze, a person with TB can spread the germs in the phlegm into the air. In one cough, TB sufferers can expel about 3000 sputum sprinklings. TB bacteria in the air can last for hours, especially if the room is dark and humid, before being inhaled by other people. Generally, transmission occurs in a room where sputum sprinkling is in a long time. People who are at high risk of contracting TB are those who often meet or live in the same place with TB sufferers, such as family, work friends, our classmates, (Alodokter, 2018). The results of research in Indonesia show that the behavior of tuberculosis patients who cough does not cover their mouths has the opportunity to transmit tuberculosis to family members, which is 9.13 times greater than those who cover their mouths when coughing or sneezing (Agustina, 2015). Sputum or sputum is mucus that comes out when coughing from the upper respiratory tract. Purulent Sputum or pus containing pus consisting of white blood cells, dead cells and tissue, serous fluid, and thick mucus fluid (mucus). This phlegm is generally yellow or green and is usually associated with symptoms of bronchiectasis, lung abscess, advanced bronchitis, or acute upper respiratory tract infections such as the common cold (Alodokter, 2018). can transmit tuberculosis bacteria to other family members, which is 4.402 times more (Agustina, 2015).

Opening the bedroom window in the morning so that fresh air and sunlight can enter the room turns out to be a healthy habit. A study proves that it can help reduce the risk of bacterial contamination. The

function of the opening or window is to let light and air into the room so that bacteria die in the sun. Sunlight in the morning can kill disease-causing bacteria that live in the dust. Meanwhile, darker conditions make them thrive, (Com, 2018). The results of research in Indonesia show that the behavior of tuberculosis sufferers who do not open windows every day by 67.7% has the potential to transmit tuberculosis bacteria to other family members (Agustina, 2015). The results of other studies in Indonesia show that behavioral factors are one of the risk factors for the occurrence of tuberculosis, namely (p-value = 0.001, OR = 4.011) times greater than causing tuberculosis (Fitriani, 2013).

Risk Factors of the Home Environment: Home environmental factors play an important role in determining the occurrence of the interaction process between the host and the causative element in the disease process. The physical environment of housing affects humans both directly and indirectly. The house is one of the basic human needs that functions as a place to live or live. A bad or slum house or residence can support the occurrence of disease transmission and other health problems, including tuberculosis (Chandra, 2012). The results of research in Indonesia show that the risk factor from the home environment that can contribute to the occurrence of tuberculosis is OR = 5,439 times greater (p-value = 0.000) (Fitriani, 2013). In the case of pulmonary TB, conditions in the home environment can indicate that the condition of the house does not meet the requirements of a healthy home and is very risky for the occurrence of pulmonary TB (Maheasy U, 2013). Room conditions are related to the incidence of pulmonary TB where people with room conditions that do not meet the requirements have a 1.18 times chance of contracting pulmonary TB compared to homes with room conditions that meet the requirements, (Rukmini, 2011). Occupant density is the ratio between the floor area of the house and the number of family members in one residence (Lubis&Pandapotan, 1989) (Lubis, 1989). The occupancy density requirement for all ordinary housing is expressed in m² per person. Respondents who have an unqualified occupancy density have a risk of suffering from smear-positive pulmonary TB 8 times greater than respondents who have an eligible occupancy density (Rohayu N, 2016). Ventilation is an effort to meet atmospheric conditions that are pleasant and healthy for humans. In general, home ventilation is assessed by comparing the ventilation area and the floor area of the house, using a Rolemeter. In general, according to the Decree of the Minister of Health of the Republic of Indonesia No. 829/Menkes/SK/VII/1999 the ventilation area that meets the requirements is 10-20% of the floor area (Ministry of Health, 1999). This is understandable because ventilation has various functions such as freeing the room from pathogenic bacteria, especially tuberculosis germs. TB germs that are transmitted through droplet nuclei can float in the air because they have a very small size (50 microns). Lack of ventilation will lead to a lack of dissolution/elimination of nuclear droplets (Rer, 2016). Houses that have ventilation that does not meet the standards are at risk of developing smear-positive pulmonary TB 16.9 times greater than houses that have ventilation that meet the requirements (Rusnoto, 2007). The important condition here is that it is not dusty in the dry season and not wet in the rainy season. To get a solid (not dusty) earth floor, it can be reached by pouring water and then compacting it with heavy objects, and this is done many times. Wet and dusty floors cause disease nests (Notoatmodjo, 2007). The results of research in Indonesia show that the type of floor that does not meet the requirements can transmit tuberculosis bacteria to other family members, which is 5.266 times greater than the floor of a house that meets the requirements, (Agustina, 2015). The results of other studies show that the risk factor for the type of floor that can cause tuberculosis is OR = 6,217 times greater on floors that do not meet standards (Dhilah Harfadilah., 2012). A healthy house requires sufficient light, not too little and not too much, the lack of light that enters the room, especially sunlight, besides being uncomfortable, is also a medium or a good place to live and develop germs. TB bacteria will die when exposed to direct sunlight takes about 6-8 hours and less room light about 2-7 days. Sputum-containing TB bacteria in a dark room can live for weeks or months (Crofton, 1999). Room lighting that does not meet the requirements will have a 3.7 times

chance of contracting pulmonary TB compared to houses with conditions that meet the requirements (Kurniasari RAS, 2012).

Risk Factors of Family Members with a Positive History of TB: The family according to Salvicion G Bailon and AracelisMaglaya (1989) cited by Nasrul (1998) is two or more than two individuals who are joined because of blood relations, marital relations, or adoption and they live in a house of hands, interact with each other, and in the community. in their respective roles to create and maintain culture (Effendy, 1998). The source of infection comes from human sputum is the most important source, coughing, talking, and spitting produce very small droplets containing TB that float in the air. Possibly can be inhaled and cause disease. The closer a person lives to a patient, the greater the dose of TB he or she may inhale (Crofton, 1999). According to the results of the study, the risk of the respondent's contact history on the incidence of positive smear pulmonary TB obtained an OR of 5 after controlling for residence. This means that respondents who have a history of high-risk contacts have a 5 times greater risk of suffering from positive smear pulmonary TB compared to respondents who have a history of low-risk contacts (Rohayu N, 2016). TB is usually transmitted by inhaling tubercle bacilli that are expelled from people who have an active disease when they cough or sneeze. Droplets expelled from the respiratory tract during coughing, sneezing, or laughing remain suspended in the air as tiny droplets. These nuclei can be carried by air currents, and a single nucleus containing tubercles can be inhaled and deposited deeply in the alveoli of the lungs, where it implants and begins to multiply (Elisabeth, 1975). History of contact with family members who live in the same house and contact is more than or equal to 3 months is at risk for pulmonary TB, especially excessive contact through kissing, hugging, direct talking. The results showed that 63.8% were detected as suffering from pulmonary TB which came from household contact with family or parents suffering from pulmonary TB (Rusnoto, 2007).

Epidemiological studies in the mid-20th century showed that smear-positive cases were more infectious than other cases. Untreated sputum-positive patients can infect approximately 10 individuals per year and each smear-positive case can trigger 2 new TB cases. At least 1 of the 2 new cases will be contagious (Narasimhan, 2013). The level of bacilli in the patient's sputum is positively related to the level of transmission of the patient. The higher the bacilli content in the sputum, the higher the tendency for transmission. Smear-negative patients have fewer bacilli numbers than smear-positive patients but the infection can still be transmitted (Crofton, 1999). The results of studies in the United States, Britain, and India underline that the prevalence of infection and disease is higher among contacts of smear-positive cases than smear-negative but the rate is higher among smear-negative than the general population, (Narasimhan, 2013). Close contact with infectious TB cases includes contacts within the household and with health care workers. These people have a higher risk of contracting MTB. Latent tuberculosis infection (LTBI) was found in 51.4% of these people. Mycobacterium tuberculosis can be spread in short contact times, in unusual locations, and with high opportunities for interaction and other risks such as poverty, overcrowding, and high infection pressure (Rer, 2016). For comparison, the United States has case-notification rates of 5 per 100,000 per year. HIV coinfection increases the chance of activation of latent TB infection and progression of TB following primary infection or re-infection of TB. Studies in countries with a high prevalence of TB also show that variations in the time and place of TB incidence are strongly associated with the prevalence of HIV infection. Individual studies in high and low burden countries have increased the incidence of TB due to HIV infection (Narasimhan et al., 2013). The source of positive sputum in the household is the most important risk factor for children up to the age of 10 years. The highest risk of death from TB occurs following primary infection during pregnancy. The risk decreases by 1% at ages 1 and 4 years and increases again by 2% at ages 15 to 25. Therefore, investigations are more focused on children less than 5 years old and developing countries and household contacts in countries with the most industrial activities (Narasimhan, 2013).

Socio-Economic Factors: The relationship between smoking and TB has been studied in several systematic reviews. Bates & colleagues in a meta-analysis of 24 studies of the effect of smoking on TB revealed a high risk of TB in smokers than in nonsmokers. Smoking is a risk factor for TB infection and disease as well as an additional risk of death in someone with active TB (Narasimhan, 2013). Alcohol has been recognized as a strong risk factor for TB disease. There is an increased risk of active TB in people who consume alcohol more than 40 g per day. Changes in the immune system especially change in signaling molecules that are responsible for the production of cytokines are the cause of an increased risk of TB (Szabo, 1997 cited in Rer, 2016). Tobacco smoking and high alcohol intake are important in reducing the body's defenses, as well as corticosteroid drugs and other immunosuppressants used to treat certain diseases (Narasimhan, 2013). The use of solid fuels for cooking in developing countries reaches more than 80%. Wood burning smoke or biomass is recognized as an independent risk factor for TB disease based on case-control studies in India and Brazil. Wood smoke can weaken the function of macrophages, adhere to surfaces and remove bacteria. Meanwhile, biomass smoke is known to release large particulates such as carbon monoxide, nitrogen oxides, formaldehyde, and polyaromatic hydrocarbons which can be deposited deep in the alveoli, causing damage (Narasimhan, 2013).

RESEARCH METHOD

This type of research is quantitative analytical observational with a cross-sectional approach. The cross-sectional approach is a study to assess risk factors and the occurrence of the effects of risk factors and to study how risk factors are studied (Notoatmodjo, 2010). The research subjects or samples in the study were 154 cases of pulmonary tuberculosis. The research variables consisted of independent variables, namely the behavior of patients with pulmonary tuberculosis, the home environment, the number of family members with a history of TB (+), and the dependent variable, namely the transmission of pulmonary tuberculosis. The data analysis technique in this research is univariate analysis to describe the research variables and bivariate to analyze or estimate the relative risk expressed by the prevalence ratio (RP) with the Chi-Square test. The prevalence ratio is the ratio between the prevalence in the exposed group and the unexposed group, (Tangking Widarsa, 2016). With the explanation that the comparison between the number of subjects with the disease at one time with all existing subjects. The analysis can be done by testing the hypothesis or obtaining a relative risk. Therefore, the analysis only on the transmission of tuberculosis to families who suffer from tuberculosis and who do not suffer from tuberculosis which is calculated is the prevalence ratio with bivariate analysis and crosstabulation with a 2x2 table with the following formula:

$$RP = \frac{A}{(A+B)} : \frac{C}{(C+D)}$$

RESULTS

The distribution of research results is a descriptive analysis of respondents' characteristics, research variables on the behavior of patients with pulmonary tuberculosis, home environment, and family members with a positive history of TB as well as the bivariate analysis between the independent variable and the dependent variable. Table 1 shows the results of a descriptive analysis on the transmission of pulmonary tuberculosis that occurred as many as 48 respondents (31.2%) of the 154 respondents who participated in this study. The results of the descriptive analysis showed that the risk of transmission was most prevalent in the working area of the Venilale Health Center, namely 16.7%, Laga, Riamare, and Uailili Health Centers each 12.5%. The age of the respondent has a risk of transmitting pulmonary tuberculosis, namely those aged over 65 years (27.1%) and 45-55 years, namely 25%. Respondents who work as farmers and housewives have more potential to transmit pulmonary tuberculosis to family members, where 45.8% of transmission of pulmonary

tuberculosis to farmers and housewives is 22.9%. The risk of transmission of pulmonary tuberculosis is more common in traditional housing types, namely 47.9% and in the number of family members between 6-9 people who live in the same house at most, namely 47.9%, and families who are supervising patients while taking anti-tuberculosis drugs, which is 62.5% transmission of tuberculosis. The results of the existing descriptive analysis about the transmission of pulmonary tuberculosis occurred at the most in the Venilale Public Health Center, namely 8 people (16.7%). The majority of respondents who participated in this study came from the working area of Centro Saúde Riamare 32 respondents, Centro Saúde Uailili 26 respondents, Centro Saúde Laga 20 respondents and Centro Sade Venilale as many as 18 respondents. Where the highest proportion of pulmonary tuberculosis transmission occurred in Centro Saúde Venilale, Bucoli, Bagua, and Vemassee. Therefore, it is recommended for health workers who work in the Centro Saúde area to routinely carry out health education and screening activities for people or families who have a high risk of getting tuberculosis. Following the descriptive results of the respondent's characteristics of the transmission of tuberculosis, it shows that the transmission of tuberculosis cases occurs at the age above 65 years. The age that occurred was in the age group of 65 years, 13 people (27.1%), the transmission of pulmonary tuberculosis occurred. Following the results of data processing on the characteristics of respondents to the transmission of tuberculosis, it showed that transmission of tuberculosis cases occurred at the age above 65 years. This means that people aged >55 years have a greater risk of transmitting pulmonary tuberculosis to people, due to ignorance in preventing the transmission of tuberculosis. The results of this study can be compared with the article put forward by Narsimhan (2013), that the risk of being infected with tuberculosis is aged 15-24 years if you have been in contact with tuberculosis sufferers for a long time. Thus, it is necessary to pay attention to every elderly patient who is checking his health at a health facility and asks about the symptoms of tuberculosis. Transmission of tuberculosis in respondents who work as farmers (45.8%) and housewives. This means that the profession as a farmer has a risk of transmitting tuberculosis to other people, due to ignorance in preventing the transmission of pulmonary tuberculosis and IRT who are often in the home and contact with family members. According to Rer (2016), tuberculosis mycobacteria can be spread in short contact times, in unusual locations, and have high opportunities for interaction and other risks such as poverty, overcrowding, and high infection pressure. Transmission of tuberculosis disease based on the type of house where there is a lot of transmission of tuberculosis is the traditional house type (47.9%) where the simple house type has the requirements of a healthy house. Unhealthy homes have the opportunity to transmit tuberculosis bacteria to other people. Following Budiman's (2012) statement, an unhealthy house or settlement will transmit disease both between the family and to others, including tuberculosis. Pulmonary tuberculosis is most commonly transmitted by the number of family members between 6-9 people (47.9%). The results of Rusnoto's research (2007) showed that 63.8% were detected as suffering from pulmonary TB from household contact with family or parents suffering from pulmonary TB disease. And the results of the study according to Rohayu N (2016) showed that the risk of the respondent's contact history to the incidence of positive smear-positive pulmonary TB was obtained by 5 times greater OR compared to respondents who had a history of low-risk contacts.

Results of a descriptive analysis of behavioral risk factors for tuberculosis sufferers in Baucau Regency in 2019: The results of the descriptive analysis of the behavioral risk factors for tuberculosis sufferers about the causes of TB disease, the transmission of TB disease, symptoms of TB disease, cure for TB disease, coughing habits, habits of expelling phlegm, habits of opening windows, habits of prevention, smoking habits and habits of consuming alcohol. The results of interviews with respondents about the cause of tuberculosis were 109 people (70.9%) did not know the cause of TB, 46 people (29.9%) did not know how TB was transmitted, 65 people (42.2%)

Table 1. Descriptive analysis of respondents' characteristics of tuberculosis transmission in Baucau district in 2019

Nu	Characteristics of Respondents	Pulmonary Tuberculosis Disease Transmission				Total	
		Yes		No		F	%
		F	%	F	%		
a. Address							
	o Baguia	5	10,4	6	5,7	11	7,1
	o Bucoli	5	10,4	6	5,7	11	7,1
	o Laga	6	12,5	14	13,2	20	13,0
	o Ossoqueli	5	10,4	7	6,6	12	7,8
	o Quelicai	2	4,2	14	13,2	16	10,4
	o Riamare	6	12,5	26	24,5	32	20,8
	o Uailili	6	12,5	18	17,0	24	15,6
	o Vemassee	5	10,4	5	4,7	10	6,5
	o Venilale	8	16,7	10	9,4	18	11,7
	Total	48	100,0	106	100,0	154	100,0
b. Respondent Age							
	o 18-25 Years Old	3	6,3	21	19,8	24	15,6
	o 25-34 Years Old	8	16,7	19	17,9	27	17,5
	o 35-44 Years Old	3	6,3	12	11,3	15	9,7
	o 45-54 Years Old	12	25,0	17	16,0	29	18,8
	o 55-64 Years Old	9	18,8	20	18,9	29	18,8
	o > 65 Years Old	13	27,1	17	16,0	30	19,5
	Total	48	100	106	100	154	100
c. Respondent's Type of Work							
	o No permanent job	3	6,3	13	12,3	16	10,4
	o Housewife	11	22,9	27	25,5	38	24,7
	o Student	2	4,2	10	9,4	12	7,8
	o Privat	9	18,8	15	14,2	24	15,6
	o Agriculture	22	45,8	39	36,8	61	39,6
	o Government employees	1	2,1	2	1,9	3	1,9
	Total	48	100	106	100	154	100
d. Respondent's House Type							
	o Permanent	14	29,2	29	27,4	43	27,9
	o Semi-Permanent	11	22,9	46	43,4	57	37,0
	o Tradisional	23	47,9	31	29,2	54	35,1
	Total	48	100	106	100	154	100
e. Number of Family Members of Respondents							
	o < 5 orang	15	31,3	36	34,0	51	33,1
	o 6-9 orang	23	47,9	60	56,6	83	53,9
	o > 10 orang	10	20,8	10	9,4	20	13,0
	Total	48	100	106	100	154	100

Source: Primary Data Research Results 2020

Characteristics of Respondents	Pulmonary Tuberculosis Disease Transmission		Total (n=%)	Prevalence Ratio (RP)	CI=95%	
	Yes (n=%)	No (n=%)			Lower	Upper
Gender						
Man	28 (58.3)	60 (56.6)	88 (57.1)	1.050	0.652	1.692
Women	20 (41.7)	46 (43.4)	66 (42.9)			
Total	48 (100)	106 (100)	154 (100)			
Level of education						
Lower Education	37 (77.1)	75 (70.8)	112 (72.7)	1.261	0.712	2.235
Upper Education	11 (22.9)	31 (29.2)	42 (27.3)			
Total	48 (100)	106 (100)	154 (100)			
Tuberculosis Diagnosis Status						
BTA Positif	28 (58.3)	46 (43.4)	74 (48.1)	1.514	0.938	2.443
BTA negative	20 (41.7)	60 (56.6)	80 (51.9)			
Total	48 (100)	106 (100)	154 (100)			

Source: Primary data 2020

Results of bivariate analysis of risk factors for pulmonary tuberculosis transmission

Risk Factors for Transmission of Pulmonary Tuberculosis	Prevalence Ratio/Risk of Transmission	CI=90%	
		Lower	Upper
Risk factors for the behavior of patients with pulmonary TB	2.775	1.495	5.153
Risk factors from the home environment	1.619	0.0884	2.964
Risk factors from family members with a history of TB (+)	4.315	2.589	7.192

Source: Primary Data 2020

did not know the symptoms of TB, 31 people (20.1%) stated that TB was incurable and 100 people (64.9%) stated that they did not know how to prevent tuberculosis. The results of interviews with respondents who have the habit of coughing not covering their mouths are 98 people (62.3%), the habit of making phlegm in any place or unsafe places 114 people (74%), the habit of not opening the

window in the morning 84 people (54.4%), the habit of not opening the window in the morning. smoking 59 people (38.3%) and drinking alcohol 47 people (30.5%). From the available data, it can be concluded that ignorance about the causes of tuberculosis, that tuberculosis is caused by the bacterium *Mycobacterium tuberculosis* which is easily transmitted to others if someone who has tuberculosis

is not treated when coughing will emit bacterial germs that scatter with the air so that it can be transmitted to people when breathing contaminated air. The habit of removing phlegm in an unsafe place will help spread germs if the window is not opened in the morning so that the conditions in the room have irregular air circulation and lack of sunlight that penetrates the house to kill the existing germs.

The results of a descriptive analysis of the risk factors of the home environment on the transmission of pulmonary tuberculosis: The results of a descriptive analysis of the risk factors from the home environment, namely the length of time the patient lived in the house, family members were living in the same room with TB sufferers, residential density, type of floor of the house, lighting in the house, ventilation of the house, there were family members who smoked in the house, and equipment used. used when cooking. The results of interviews with observations revealed that 139 people (89%), family members lived in the same room with the patient as many as 107 people (69.5%) and there were family members who smoked in the house, namely 100 people (64.9%). %, the density of occupancy does not meet the standard as many as 45 people (29.2%), the type of floor does not meet the requirements of 80 people (51.9%), the ventilation area does not meet the standard 62 people (40.3%), lighting that does not meet the requirements 49 people (31.8%) and utensils used for cooking, namely firewood as many as 128 people (83.1%). From the available data, it can be concluded that the contact with tuberculosis patients in the home between family members and TB patients has occurred for a long time, thus allowing the transmission of tuberculosis to other family members. Because there are 69.5% sleeping and living with sufferers in one room and 29% occupancy density does not meet the standards, so family members who sleep and live with sufferers in one room are at risk for contracting tuberculosis and the type of floor that does not meet the standards and lighting in the house which is lacking.

Descriptive analysis of risk factors for family members with a positive history of tuberculosis: The results of the descriptive analysis of risk factors from family members with a positive history of tuberculosis are about family members who experience symptoms of tuberculosis, are suspected of having tuberculosis, are positive for tuberculosis and some toddlers suffer from tuberculosis. The results of interviews with respondents as many as 74 people (48.1%) experienced symptoms of pulmonary tuberculosis, there are family members who are suspected of tuberculosis as many as 50 people (32.5%) and family members who are positive for tuberculosis or suffer from the disease as many as 33 people (21.4%) and 5 people (3.2%) under five years old who suffer from tuberculosis.

Bivariate Data Analysis Results: Table 2. The results of the descriptive and bivariate analysis with the Chi-Squared Test on the characteristics of respondents to the transmission of pulmonary tuberculosis in Baucau district in 2019 (n = 154). Table 2 shows descriptive and bivariate analysis with Chi-Squared test regarding the gender of the respondents, education level, and status of tuberculosis diagnosis on the transmission of tuberculosis. Descriptive analysis shows that there are 88 men (57.1%) and 66 women (42.9%), low education level, which is 112 people (72.7%) and 42 people with higher education (27.3%) and diagnosis status. with AFB there are 74 people (48.2%) and negative BTA there are 80 people (51.9%). The results of the descriptive analysis of the transmission of tuberculosis occurred mostly in men 58.3% compared to women only 41.7%. Then the results of the chi-squared test analysis showed that the prevalence ratio (RP) was 1,050 (95% CI = 0.652-1,692), meaning that the risk of TB disease transmission was 1,050 times greater in men than women. Descriptive analysis of the low level of education transmits more pulmonary TB disease to the family as much as 77.1% compared to respondents with higher education. And the results of the Chi-Squared test analysis showed that the prevalence ratio (RP) was 1.262 (95% CI = 0.712-2.235), this means that the risk of transmission of pulmonary TB disease is 1.262 greater in low education compared to high education. While the descriptive analysis can be seen that the diagnosis status of patients with smear-positive is more likely to transmit pulmonary TB disease to others, namely

58.3% compared to smear-negative. And the results of the statistical analysis of the Chi-Squared Test showed that the prevalence ratio (RP) was 1.514 (95% CI = 0.938-2.443), which means that the risk of transmission of pulmonary TB disease is 1.514 greater in patients with smear-positive compared to patients with smear-negative. Table 3 Results of Research Data Analysis of the three variables (behavior, home environment, and the number of family members with a history of TB (+) on the transmission of tuberculosis in families in the Baucau SMS work area in 2019 (n = 154). Descriptive analysis shows that the behavior of patients with tuberculosis who have a risk and transmit the disease is 38 (79.2%) and does not transmit the disease there are 51 (41.1%), while the behavior of patients who do not have a risk but can transmit tuberculosis is as many as 10 people (20.8%). % and 55 people did not transmit tuberculosis (42.2%). So 89 people (57.8%) had a risky behavior and 55 people (42.2%) did not have a risky behavior to transmit tuberculosis. The results of the chi-squared statistical test analysis show that the prevalence ratio is 2.775 (95% CI = 1.495-2.964), this means that the transmission of pulmonary TB disease is 2.775 greater in the behavior of pulmonary TB patients who are at risk compared to respondents who do not have a risk of transmission. tuberculosis.

Descriptive analysis shows that the home environment that has a risk and transmits disease as many as 38 (79.2%) and does not transmit disease there are 70 houses (66%), while the home environment that does not have a risk but can transmit tuberculosis is as many as 10 houses (20.8%). % and did not transmit tuberculosis as many as 36 people (43.4%). So 108 houses (70.1%) have houses that are at risk and 46 houses (29.9%) do not have houses that are at risk for transmitting tuberculosis. The results of the Chi-Squared test analysis shows that the prevalence ratio is 1,619 (95% CI 95% = 0.884-2,964), this means that the transmission of pulmonary TB disease is 1,619 greater in the home environment where there is a risk of transmitting pulmonary tuberculosis to the family, compared to a home environment that does not have the risk of transmitting tuberculosis. Descriptive analysis showed that 33 (68.8%) family members who had risk and did not transmit the disease (17.9%), while family members who had no risk but could transmit tuberculosis were 15 (31.2%) and did not transmit tuberculosis as many as 87 people (82.1%). So 55 people (33.6%) were at risk of transmitting tuberculosis and 102 people (66.2%) were not at risk of transmitting tuberculosis. The results of the chi-squared test analysis show that the prevalence ratio (RP) is 4,315 (95% CI = 2,589-7,192), this means that the transmission of pulmonary TB disease is 4,315 greater in two or more family members, who have a risk of transmitting pulmonary tuberculosis, compared to with a family without a positive history of tuberculosis.

DISCUSSION

The results of descriptive data analysis of 154 respondents showed that the number of respondents who were male was 57.1% and female was 42.9%. The results of the bivariate analysis using the Chi-Squared test showed that the prevalence ratio (RP) was 1,050 (95% CI = 0.652-1.692), which means that men are 1,050 times more likely to transmit tuberculosis than women. The results of statistical tests on 154 respondents regarding the education level of respondents showed that the prevalence ratio was 1,261 (95% CI = 0.712-2.235), this means that there is an influence of risk factors for respondents with low education who have a 1,261 times chance of transmitting tuberculosis disease to others, from in respondents with higher education. Where a person's level of education greatly affects understanding and knowledge of something. The results of this study are following the research conducted by Tony (2009) where the statistical test results show that respondents with low education are 2.7 times more likely to transmit tuberculosis, compared to respondents with higher education. So the results of this study are compared with the results of research conducted by Tonny (2009), there is a difference in the magnitude of the risk of transmission, but has in common that low education has a risk compared to higher education on the transmission of tuberculosis.

The results of statistical tests on 154 respondents regarding the diagnosis status of tuberculosis in respondents showed that the prevalence ratio was 1.514 (95% CI = 0.938-2.443), this means that there is a significant effect of respondents who are diagnosed with bacteriological confirmation (BTA positive) have a chance of 1.514 times can transmit tuberculosis to other people than respondents who were diagnosed with smear-negative. The results of this study can prove epidemiological studies in the mid-20th century which showed that smear-positive cases (BTA positive) were more infectious than other cases. Because untreated positive sputum patients can infect approximately 10 individuals per year and each smear-positive case kills 2 new TB cases. At least 1 of the 2 new cases will be contagious (Narsimah, 2013). So the results of this study when compared with the results of studies in America, England, and India that the prevalence of infection and disease is higher between contacts of smear-positive cases compared to smear-negative.

The Influence of Behavioral Risk Factors for TB Patients: The effect of risk factors from the behavior of patients with pulmonary tuberculosis on the transmission of tuberculosis following the results of statistical analysis of 154 respondents showed that respondents who answered yes (there were risk factors) were 89 respondents (57.8%) and did not have a risk of transmitting tuberculosis. 55 respondents (42.2%). From the statistical test results with bivariate analysis with the Chi-Squared test, it shows that the prevalence ratio (RP) is 2.775 (95% CI = 1.495-5.153), this means that there is a significant influence of behavioral risk factors for pulmonary TB patients 2.775 times to transmit tuberculosis. on other people. The behavior of patients who are at risk of transmitting tuberculosis disease is coughing not covering the mouth, throwing phlegm in random places, and not opening windows in the morning. The results of this study can also be strengthened by research conducted by Agustina, (2015) in Kendal district-Indonesia, there is a significant influence of behavioral factors that can transmit tuberculosis to others. Where the respondent's habit of throwing phlegm in random places can transmit tuberculosis 4,402 times greater than patients who expel phlegm in the provided place, coughing does not cover the mouth 9,137 transmits tuberculosis compared to respondents who cough cover their mouth. The results of a study conducted in Timor-Leste by Salsinha (2018), on the contributing factors to the occurrence of relapse cases in tuberculosis patients in Municipio Aileu, Ermera, and Liquica. Where the results of the statistical test analysis show that there is an influence from behavioral factors, namely CI = 95%, RP = 4,883 (3,072-33,375), this means that behavioral factors contribute 4,883 times, the occurrence of relapse cases in patients (Salsinha, 2018). So in this study, the data showed that the behavior of pulmonary TB patients who coughed not covering their mouths, throwing phlegm in random places, not opening windows in the morning, smoking habits, and consuming alcohol were risk factors that could contribute to transmitting tuberculosis to others. Although in this study, there is a difference in the magnitude of the risk of transmission, with other studies, behavioral factors are risk factors that can contribute to the transmission of tuberculosis. According to Robert Kwick (1974), behavior is the act or deed of an organism that can be observed and even studied, and behavior can be influenced by one's knowledge (Notoatmodjo, 2012). The behavior of coughing not covering the mouth is one of the risk factors for transmitting tuberculosis to other people, where a person who has TB disease when coughing can spread tuberculosis bacteria into the air, generally transmission occurs in a room where sputum sprinkling is in a long period. People who are at high risk of contracting tuberculosis are those who often meet or live in the same place. According to Croftong (1999) the closer a person is to a patient, the greater the dose of tuberculosis he or she may inhale. Meanwhile, according to Elisabeth (1975), TB is transmitted by inhaling tubercle bacilli, these nuclei can be carried by air currents, and a nucleus containing tubercles can be inhaled and stored deeply in the alveoli of the lungs, where it is implanted and begins to multiply. The behavior of throwing phlegm in random places is a risk factor for transmitting tuberculosis to others. Especially removing phlegm in an unsafe place, for example in a

house, especially a wet and dusty floor will easily help transmit bacteria because wet and dusty floors can cause disease.

The Influence of Risk Factors from the Home Environment: A home environment is a place of rest for family members to gather throughout life. The influence of risk factors from the home environment on the transmission of tuberculosis can be seen in the results of statistical tests on 154 respondents, where the results of 108 respondents (70.1%) showed that the condition of the home environment was a risk factor for tuberculosis transmission and 46 respondents (29.9%) indicated environmental conditions. Home is not a risk factor for transmission of tuberculosis. The results of statistical tests with Chi-Squared test bivariate analysis showed that the prevalence ratio (RP) was 1.619 (95% CI = 0.884-2.964), this means that there is a significant effect of risk factors in the home environment which is 1.619 times greater than it can contribute to the transmission of tuberculosis. compared to a home environment that has no risk. The influence of the risk factors of the home environment that can contribute to the transmission of tuberculosis is the density of the dwelling, the floor of the house, the extent of ventilation and lighting in the house. The results of the study are also strengthened by the results of research by DhillahHarfadilah, (2012) showing that the incidence of tuberculosis is influenced by risk factors for residential density (OR: 7,756, 95% CI = 3,546-16,967) and ventilation (OR: 6,651, 95% CI = 3,145). -14.068), type of house floor (OR=6.217, 95% CI=2.952-13.095). As for the results of research conducted by Dwi (2015), the risk factors for the incidence of pulmonary TB in the working area of the Liukang Public Health Center, Pangkep Regency, Indonesia are occupancy density (p-value = 0.747, OR = 1.522), ventilation area (p-value = 0.045, OR = 6.000), type of floor (p value=1.000, OR=1.1444).

So the results of research conducted in the working area of Serviços Municipal Saude de Baucau indicate that the influence of risk factors in the home environment can contribute to the transmission of tuberculosis in the family. Therefore, the density of housing that does not meet the standards, the type of floor, the ventilation area that does not meet the standards and the lack of lighting are risk factors for the transmission of pulmonary tuberculosis. The results of this study are related to the statement of Maheasy (2013), that in the case of pulmonary tuberculosis, the condition of the home environment does not meet the requirements of a healthy home and is very at risk for the occurrence of pulmonary tuberculosis. Occupancy density is the ratio between the floor area of the house and the number of family members. In general, the bedroom is at least 8 m² and it is not recommended that more than two people sleep in the same house, if the bedroom does not meet the requirements it will hinder the exchange of clean air, the more the number of occupants of the room, the faster the air in the room gets polluted and the number of bacteria in the air will increase. The results of this study indicate that the density of occupancy does not meet the standard where the room occupied by the patient and other family members is smaller than the number of family members, sometimes there are family members who sleep together with the patient in one room. The risk factor for the ventilation area that does not meet the standards will be difficult to free the room from pathogenic bacteria, especially tuberculosis bacteria because TB germs that are transmitted through droplet nuclei can float into the air. So that poor ventilation can block sunlight from entering the room, so ventilation that does not meet the standards is at risk for smear-positive pulmonary tuberculosis compared to houses that have ventilation that meets the standards. The risk factor for the floor of the house that does not meet the standards, namely dusty and wet will cause a nest of disease. And poor lighting also poses a risk of transmission of tuberculosis because TB bacteria will die when exposed to direct sunlight. Room lighting that does not meet standards will have the opportunity to transmit tuberculosis disease compared to houses that meet sufficient lighting.

The influence of risk factors from family members with a history of TB (+): The influence of risk factors from the number of family members with a positive history of tuberculosis more than 2 people who can transmit pulmonary tuberculosis to other family members,

can be seen from the results of a descriptive statistical test analysis of 154 respondents showing that 52 respondents stated the answer "Yes" (33.8 %), that there are 2 or more family members who suffer from tuberculosis and 102 respondents stated "No" (66.2%), that there are no family members with more than 2 people suffering from pulmonary TB disease in the family. From the statistical test results with bivariate analysis using the Chi-Squared test, it shows that the prevalence ratio (RP) is 4,315 (95% CI = 2,589 -7.192), this means that there is a significant effect of the risk factor for the number of family members 2 or more people are suffering from the disease. tuberculosis has a 4,315 chance of transmitting tuberculosis to other people compared to family members who do not have the risk of transmitting pulmonary tuberculosis. The results of this study can also be strengthened by research conducted by Rohayu, N (2016), which states that the risk of contact history on the incidence of smear-positive pulmonary TB obtained an OR of 5. This means that respondents who have a history of high-risk contacts have a risk of suffering from smear-positive pulmonary TB. times greater than respondents who have a history of low-risk contacts, (Rohayu N, 2016).

As for the results of another study conducted by DhilahHarfadilah (2015), regarding environmental risk factors for the incidence of pulmonary tuberculosis. The results showed that household contacts with families who had tuberculosis had a risk of developing tuberculosis (OR=18,962, 95% CI=2,426-148,192), compared to families who had no risk, i.e. no family members had tuberculosis. So the results of this study data indicate that the risk factor for the number of family members who suffer from tuberculosis has the opportunity to transmit tuberculosis to other family members. Risk factors from family members who experience symptoms of tuberculosis, family members diagnosed with tuberculosis with positive smear. From the results of existing research, compared to the results of research by Rohayu (2016) and DhilaHardila (2015), there is a difference in the magnitude of the risk, but the results of research by counseling have a significant influence. Family members who suffer from tuberculosis disease more than 2 people in the same household have the opportunity to transmit tuberculosis disease if diagnosed and treated late. Close contacts with infectious TB cases include contacts within the household; these people have a higher risk of contracting Mycobacterium tuberculosis. According to Narasimhan (2013), tuberculosis mycobacteria can be spread in short contact times, in inaccessible locations, and have high opportunities for interaction as well as other risks such as poverty, population density, and high infection pressure. A history of contact with patients in the same family with other family members who are suffering from pulmonary TB is a highly contagious disease to other family members when a tuberculosis patient coughs, sneezes or talks. Contact history of family members who live in the same house and contact is more or equal to 3 months is at risk for pulmonary tuberculosis.

- **The influence of behavioral risk factors, the home environment, and the number of family members with a positive history of TB on the transmission of pulmonary tuberculosis:** The results of statistical tests with descriptive analysis and Chi Squared test showed that behavioral variables with CI=95%, prevalence ratio /RP=2,775 (1,495-5,153), home environment with CI=95%, prevalence ratio/RP = 1,619 (0.884 - 2,964).), and number of family members with CI=95%, prevalence ratio/RP= 4,315 (2,589 – 7,192). So significantly the behavioral variables and the number of family members with a positive history of tuberculosis have a greater risk of influencing the transmission of cases of pulmonary tuberculosis. The variable that has a greater influence is the behavioral risk of tuberculosis sufferers, namely the statistical test results show CI = 95%, prevalence ratio / RP = 2.775 (1,495-5,153), and the number of family members who have 2 or more people suffering from tuberculosis because the test results statistics show that the variable number of family members with CI = 95%, prevalence ratio / RP = 4,315 (2,589 – 7,192). From the results of statistical analysis of

the three independent variables, it shows that all of them influence the transmission of pulmonary tuberculosis because there are things that are the main factors, namely:

- Lack of knowledge of patients about tuberculosis, thus affecting behavior in the prevention of tuberculosis.
- The behavior of tuberculosis sufferers, namely coughing does not cover the mouth with a tissue or a ladder, because it has become a person's habit where when coughing always does not cover the mouth
- The habit of disposing of phlegm in an unsafe place, where most tuberculosis patients expel phlegm at home, there is no proper place to dispose of existing phlegm when coughing.
- A home environment that does not meet standards, where the floor of the house becomes a breeding ground for disease when the patient coughs, expels phlegm on wet and dusty soil conditions, inadequate ventilation and lack of sunlight to penetrate the room for tuberculosis sufferers
- The delay of family members to check their health at health facilities when experiencing symptoms of tuberculosis.
- Have not implemented preventive treatment efforts for family members who are in direct contact with smear-positive tuberculosis patients over the age of five years and older as well as adults.
- Lack of activities to screen family members who are in household contact with tuberculosis sufferers.
- Lack of supervision from health workers to patients who are receiving DOTs during treatment.

Of the several things that are the main factors causing the transmission of pulmonary tuberculosis in families and communities, it requires serious treatment efforts to stop the chain of transmission of tuberculosis bacteria in families and communities.

- To increase the knowledge of tuberculosis sufferers and the general public, education and health promotion efforts are needed for the general public about tuberculosis.
- Conduct counseling to patients or all people who experience symptoms of tuberculosis, namely when coughing, they must cover their mouth with a ladder, a stair broom, or tissue when coughing, and immediately go for a health check to the nearest health facility.
- Provide direction to the patient or family to prepare a safe place for phlegm disposal, so that it can be used when there is phlegm coughing, and reduce the discharge of phlegm in any place.
- Giving directions to the family on how to maintain cleanliness in the house, namely watering the dusty floor of the house, opening the windows during the day, and drying all sleeping equipment used by sufferers.
- Advise family members to avoid contact with TB sufferers in the same room, when they are still active in treatment not yet
- Take preventive treatment for all family members, if they come into contact with a positive smear patient
- Routinely conduct screening efforts on family members who are in contact with tuberculosis sufferers.
- Routinely supervise patients who are on DOTs during treatment.

Promotion and prevention efforts are prioritized to prevent the transmission of tuberculosis in families and communities to break the chain of transmission of tuberculosis bacteria. Small things that must be done are coughing and covering the mouth, removing phlegm in a safe place, maintaining cleanliness in the house, checking health if there are symptoms of tuberculosis, carrying out preventive treatment, and routine screening activities. Timor-Leste has implemented various programs and activities to eradicate tuberculosis, one of the strategies that have been implemented so far is early detection of tuberculosis cases, early diagnosis of suspected cases, early treatment of positive TB cases, and treatment with the Directly Observations system. Treatment Shorts (DOTs). However, cases of tuberculosis still occur in society because of delays in early diagnosis and prompt

treatment. The focus of activities that must be implemented from now on is to break the chain of tuberculosis transmission in families and communities that are at risk of developing tuberculosis. The strategy for eradicating and tackling tuberculosis must focus on changing one's behavior, namely increasing everyone's knowledge about tuberculosis through education and health promotion about tuberculosis, changing behavior, namely coughing and covering one's mouth, not throwing phlegm in any place, maintaining healthy home conditions, if needed. there are family members diagnosed as positive for TB who must be isolated separately in the room, begin to apply the preventive treatment (Isoniazid) to family members who are in direct contact with smear-positive patients, carry out routine screening activities on family members who are at risk of developing tuberculosis and carry out regular supervision. routinely in patients receiving DOTs.

Conclusion

Following the results of the study and the results of statistical data analysis, the authors can conclude that:

- There is a significant influence of behavioral risk factors for pulmonary tuberculosis patients on the transmission of tuberculosis, namely 62.3% coughing does not cover the mouth, 74% throwing phlegm in any place, 54.5% not opening the window in the morning and 64.9% do not know about how to prevent disease transmission. Tuberculosis. Where the results of the bivariate statistical test showed that the prevalence ratio /RP = 2.775 (95% CI = 1.495-5.153), this means that the transmission of pulmonary tuberculosis is 2.775 times greater in risky behavior.
- There is a significant influence of the risk factors of the home environment on the transmission of tuberculosis, namely 51.9% of the floor does not meet the requirements, 40.4% of the ventilation area does not meet the requirements and 31.8% of the lighting does not meet the requirements. Where the results of the bivariate statistical analysis showed that the prevalence ratio /RP = 1.619 (95% CI = 0.884 - 2.964), this means that the transmission of pulmonary tuberculosis is 1.619 times greater in the home environment that has a risk.
- There is a significant effect of the risk factor of the number of family members on the transmission of pulmonary tuberculosis, namely 48.1% experiencing symptoms of TB disease and 21.4% suffering from TB disease. Where the results of statistical analysis showed that the prevalence/RP ratio = 4,315 (95% CI = 2,589 – 7,192), this means that the transmission of pulmonary tuberculosis is 4,315 times greater in the number of family members at risk.

Therefore, it can be concluded in general that the risk factors of the behavior of patients with pulmonary tuberculosis, the home environment, and the number of family members have a significant influence on the transmission of tuberculosis. The contribution of the low level of education and positive smear cases as supporting factors in the transmission of tuberculosis.

Recommendation

From the results of the existing conclusions, the author would like to provide some recommendations and suggestions to:

- For the National Tuberculosis Program to seek preventive treatment for family members who are in contact with smear-positive patients
- For the health office, namely ServiçosMunicipalSaúde de Baucau, to increase routine screening activities for families who have contact with tuberculosis sufferers and the community
- Health workers on duty at health facilities, namely Centro Saúde and Posts Saúde, continue to make efforts to educate and promote health to the public about tuberculosis, especially the prevention of tuberculosis transmission, namely coughing and covering the mouth with a tissue or handkerchief, throwing

phlegm in place and the importance of opening the mouth. Window in the morning and monitoring of DOTs during treatment.

- For the academy, to pay attention to the results of research that has not been described in this study, so that they can develop in the future.
- For the community to change bad habits, namely when coughing, don't forget to cover your mouth with a tissue or a ladder, and dispose of phlegm in a safe place and keep the floor clean in the house.
- For family members who are in contact with people with pulmonary tuberculosis, if they experience symptoms of tuberculosis, immediately check their health at a health facility so that they can diagnose it early.
- For further researchers, to use the results of this study as a reference to investigate further other risk factors.
- Thus the suggestion from the researcher, hopefully, the results of this thesis can be useful for further researchers and also related agencies so that they can make plans that are following the existing problems to break the chain of transmission of tuberculosis in society in the future.

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