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Family-Based Prevention of Pulmonary Tuberculosis Transmission In Deli Serdang District North Sumatra

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ABSTRACT

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis and is one of the world's top 10 main causes of mortality. Pulmonary tuberculosis is caused by germs (Mycobacterium tuberculosis) that typically target the lungs and is preventable and curable. There were 3,259 instances of pulmonary tuberculosis in Deli Serdang in 2018, 7,836 cases in 2019, and 7,840 cases in 2020, with an incidence rate of 92.06 percent per 100,000 people and an annual mortality rate of 90. The implementation of prevention of pulmonary tuberculosis transmission in the family has not been properly carried out, and that in Deli Serdang Regency there has never been research on preventing transmission of pulmonary tuberculosis disease in families; therefore, the authors are interested in conducting research on prevention of tuberculosis transmission based on families in Deli Serdang Regency, North Sumatra.

The objective of this phenomenological study is to characterize in detail and with precision the significance of the experience of the closest family members living at home with tuberculosis patients in preventing transmission of pulmonary tuberculosis within the family. In-depth interviews performed to acquire information regarding informants' knowledge and experience with pulmonary tuberculosis and family measures to prevent TB transmission. Observations were conducted to get a knowledge of issue solving, including environmental variables, facial expressions, and observed behavior. Using the Nvivo 12 software, data processing was performed. The approach of phenomenological analysis for Interpretative Phenomenological Analysis (IPA) was used to analyze the data.

The research yielded a series of themes that provide insight into family-based pulmonary tuberculosis transmission prevention in families with pulmonary tuberculosis. These themes also serve as markers of family-based tuberculosis transmission prevention in the Deli Serdang Regency. The results of the study demonstrate the necessity of family engagement in preventing the transmission of pulmonary tuberculosis for patients with pulmonary tuberculosis. The researchers' model for the prevention of pulmonary tuberculosis transmission incorporates numerous pre-existing ideas to identify and explain the factors that influence the prevention of pulmonary tuberculosis transmission in families.

Some research limitations: 1. Pulmonary TB cadres have not been maximally empowered in the Gunung Meriah area, so that health workers are more optimal in monitoring pulmonary TB treatment

in the area 2. Most of the informants worked in the fields as farmers, so the researchers waited from the afternoon and finished until late at night, in areas where the distance was quite far between families of pulmonary TB sufferers as informants 3. In this study, no disease analysis was carried out. For further research, researchers suggest covering a wider area or using other methods, such as case studies.

This study has developed a new conceptual framework for comprehending family-based tuberculosis transmission prevention strategies. The result will be the prevention of tuberculosis transmission in families that are able to deal with it.

Keywords: *pulmonary tuberculosis, prevention, Interpretative Phenomenological Analysis (IPA), family engagement*

INTRODUCTION

Globally, pulmonary tuberculosis (TB) is a major public health concern. In 2020, the World Health Organization (WHO) projects 1,2 million fatalities, 10 million new cases, and 1,3 million deaths from pulmonary tuberculosis in developing nations. Poor and middle-income nations are disproportionately affected by pulmonary tuberculosis. (Shamanewadi et al., 2020). In 2020, pulmonary tuberculosis will be the thirteenth leading cause of death worldwide. (WHO, 2020).

In 2020, there will be 845,000 cases of pulmonary tuberculosis in Indonesia, with 301 new cases per 100,000 people and 98,000 deaths, or 11 each hour. 45–54 years old represent 17.3% of pulmonary TB cases, followed by 25–34 and 15–24 years old. Indonesian Ministry of Health, 2021).In 2020, North Sumatra Province ranked eighth in Indonesia with 33,779 cases of pulmonary tuberculosis and 782 fatalities per 100,000 persons (Ministry of Health of the Republic of Indonesia, 2021). Compared to the national average of 69.2%, 72.6% of patients with pulmonary tuberculosis for less than six months received treatment. (Ministry of Health RI, 2019). The rate of pulmonary TB transmission in North Sumatra remains high. In Deli Serdang, the Provincial Health Office of North Sumatra recorded a 23.2% incidence of pulmonary tuberculosis.

There were 3,259 instances of pulmonary tuberculosis in Deli Serdang in 2018, 7,836 cases in 2019, and 7,840 cases in 2020, with an incidence rate of 92.06 percent per 100,000 people and an annual mortality rate of 90. New cases of pulmonary TB were highest among those aged 45-54 (20.6%) and lowest among those aged 0-4 (1.6%). 62.7 percent of cases of pulmonary tuberculosis were male, while 32.7% were female (Deli Serdang District Health Office, 2020). The statistics of Deli Serdang Regency indicate expansion.

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis and is one of the world's top 10 main causes of mortality. Pulmonary tuberculosis is caused by germs (Mycobacterium tuberculosis) that typically target the lungs and is preventable and curable. It is spread through the air by coughing and speaking. The germs that cause pulmonary tuberculosis can travel through the bloodstream and infect other organs, including as the kidneys, spine, and brain. (CDC, 2020b). Chronic cough, sputum production, lack of appetite, weight loss, fever, night sweats, and hemoptysis are frequent classic symptoms. (Loddenkemper et al., 2016). Tuberculosis prevention and control measures must target socioeconomic issues such as poverty, overpopulation, smoking, and infection control in healthcare facilities. (Shimeles et al., 2019).

According to Wingfield & Verguet (2019), families constitute a prevalent tuberculosis transmission scenario. Most TB recurrences in families occur within two years of first diagnosis. According to Sasilia (2013), 20.7% of pulmonary TB transmissions occur within families. According to Koziska and Augustynowicz-Kope (2016), TB is transferred by the closest relative. According to Puri (2018), family members are responsible for caring for ill family members and

preventing transmission. Participation, collaboration, negotiation, counseling, information exchange, and support from family members aid in the recovery and prevention of TB in patients (Rakhmawati et al., 2020). Family participation in TB prevention increases health consciousness and motivation. (Prasad et al., 2016).

The preliminary study was conducted by distributing questionnaires to forty individuals with pulmonary tuberculosis in the working area of the Mulyorejo Health Center in Deli Serdang Regency in order to determine the transmission prevention of pulmonary TB within families. Seventy percent of respondents had a low level of education, 52 percent were male, and the majority were from middle-class to low-income families. 30 percent of families have more than one member with pulmonary tuberculosis. Twelve individuals with pulmonary tuberculosis who were interviewed thought they did not receive enough assistance from their family. Patients frequently seek therapy at health center without being accompanied by family members, and family monitoring of drug intake is uncommon.

Prevention of pulmonary TB in families based on indicators of prevention of transmission of pulmonary TB in families, it was determined that the lowest percentage was a family that brought the patient to the health service if the family had symptoms of prolonged coughing and fever of seven people, disposed of sputum in an open container of nine people, the family did not use masks in the house of 10 people, opening windows and ventilation every day for seven people, and almost all family members had symptoms of prolonged coughing and fever. The complete family of a person with pulmonary tuberculosis does not separate when sleeping with a person with pulmonary tuberculosis, and they continue to use cutlery and cough with their mouths covered. The family maintained that the TB medication was purchased from the health center and that the patient was responsible for taking the medication regularly. Only three families were able to accompany the patient to the health center if the patient sought therapy.

On the basis of the preceding information, it can be concluded that the implementation of prevention of pulmonary TB transmission in the family has not been properly carried out, and that in Deli Serdang Regency there has never been research on preventing transmission of pulmonary TB disease in families; therefore, the authors are interested in conducting research on prevention of TB transmission based on families in Deli Serdang Regency, North Sumatra.

METHODS

This study employs qualitative research with a phenomenological approach, which is a method for identifying the nature of human experience for certain occurrences. The objective of this phenomenological study is to characterize in detail and with precision the significance of the experience of the closest family members living at home with tuberculosis patients in preventing transmission of pulmonary tuberculosis within the family. This qualitative study also gathers data on the factors related with preventing the transmission of pulmonary tuberculosis within the family (Polit & Beck, 2012).

This study's interviewees were the closest relatives of pulmonary tuberculosis patients who resided in one residence in Gunung Meriah District, Deli Serdang Province. Other helpful informants included cadres with tuberculosis and health personnel involved. The selection of research participants was conducted with intent. This research was undertaken in Gunung Meriah District because, among the 34 operating areas of the health center in Deli Serdang Regency, this area has the greatest frequency of pulmonary tuberculosis. The goal for pulmonary tuberculosis is 12 informants who test positive for pulmonary tuberculosis. Five pulmonary TB cadres and five health workers are present. Focus Group Discussion (FGD) groups were utilized for data collection in both of these groups. Patients with pulmonary tuberculosis are utilized as a foundation for evaluating perceptions of preventing pulmonary TB transmission.

We performed in-depth interviews to acquire information regarding informants' knowledge and experience with pulmonary tuberculosis and

family measures to prevent TB transmission. Observations were conducted to get a knowledge of issue solving, including environmental variables, facial expressions, and observed behavior. FGDs were held with health care professionals and pulmonary TB cadres. The instrument for research was a guide for in-depth interviews created by the researcher utilizing open-ended questions based on pertinent theoretical premises. Questions centered on the role of families with pulmonary tuberculosis in preventing transmission of pulmonary tuberculosis. These questions inquired about family experiences in preventing transmission of pulmonary tuberculosis and the actions taken by families in caring for family members with pulmonary tuberculosis.

Using the Nvivo 12 software, data processing was performed. The approach of phenomenological analysis (Smith, Flowers, & Larkin, 2009) for Interpretative Phenomenological Analysis (IPA) was used to analyze the data. This method was adopted in order to conduct in-depth testing of a person's direct experience. The heart of IPA resides in the emphasis of analysis, which directs attention on the statements made by informants in order to interpret the experiences they have had. In this study, the researchers aimed to reveal a direct experience that occurred, namely the experience of preeclamptic pregnant women whose families were prepared for an emergency eclampsia without aggravating symptoms.

This study utilized source triangulation to cross-check informant data with health workers who handled TB cases at the Gunung Meriah Health Center in the Deli Serdang Regency. Method triangulation was performed by comparing data from in-depth interviews with informants and health professionals, cadres in the vicinity of the Gunung Meriah Health Center.

This research was presented to the ethics committee on 20 June 2022 under the number 2876/UN5.2.1.10/KRK/2022 in order to examine the viability of research based on applicable ethical standards, namely respect, justice, and kindness. The research was conducted after receiving approval to pass the ethical review on July 7, 2022 Number 603/KEPK/USU/2022 during a meeting of the University of North Sumatra's ethics panel. All informants in this study signed an informed consent form indicating their agreement to participate. Researchers ensure the secrecy of all information provided by informants and only disclose specific data groups based on their study needs. The code and research subjects are protected from public view.

RESULTS

The research yielded a series of themes that provide insight into family-based pulmonary TB transmission prevention in families with pulmonary TB. These themes also serve as markers of family-based tuberculosis transmission prevention in the Deli Serdang Regency. Based on the findings of interviews and focus groups, six themes, twenty subthemes, and forty categories were identified.

TABLE 1: Matrix of Family-Based Prevention of Pulmonary TB Transmission Themes in Deli Serdang Regency in 2022

Themes	
Subhemes	Categories
Theme 1: Prevention of Droplet Spread	
Covering mouth when coughing and sneezing	Covering mouth every time cough and sneeze in an open space When coughing and sneezing, covering mouth is a must
Using separate cutlery	Families and sufferers separate cutlery from each other
Compliance with wearing masks	Compliance with using masks must still be worn by patients and families in every activity, especially when interacting with other people
Prepare a container containing disinfectant and cover it	Throw phlegm directly into the toilet and flush it with a disinfectant solution

	Prepare a closed pot Using a bucket Throw directly into the bathroom Prepare a closed container containing disinfectant
Washing hands with soapy water	Washing hands with soap in running water Washing hands regularly using soap and antiseptic after every activity (such as eating, waking up, etc.)
Theme 2: Limiting social contact	
Prepare a special room for TB sufferers	There is a special room on the 2nd floor The wife joins the children, a pulmonary TB patient in his own room Instead of being infected in his own room
Not having sexual intercourse	Sexual intercourse is avoided while experiencing pulmonary TB disease
Sleep separately	Maintain distance between spouse and family Sleep separately separate families to use bedrooms, watching TV with other families Maintain distance at home with family members
Theme 3: Medication adherence	
Remind the patient to take tuberculosis medications.	Always remind each other in terms of taking anti-pulmonary TB medications The family monitors the accuracy of taking anti-TB medications The family prepares the medicine according to the time it is given Remind patients to take pulmonary TB medication by involving health workers by always communicating through electronic media Make a checklist procedure on the calendar
Supervise taking anti-tuberculosis medications	Collect medicine packs every day Each week the drug packs are handed over to the health workers
Scheduling of taking anti-tuberculosis medications	Three days before the medicine ran out, went to the health center to pick up the medicine. Make a checklist procedure on the calendar
Theme 4: Facilitate physical activity	
Exercises	Doing morning exercise
Activities in the fields	Carry out normal activities such as hoeing and farming
Theme 5 : Environmental modification	
1. Environmental sanitation	1. Always maintain cleanliness
2. Ventilate the room	2. Environmental sanitation must be maintained
3. Avoid cold air	1. When you wake up, all the windows are open
4. Letting sunlight into the room	1. The weather on Mount Meriah is cold
5. Basking in the sun	1. Every morning open windows and doors
6. Drying mattresses, pillows and beds	1. There is mom early in the morning
Theme 6 : Local wisdom	
Complementer medicine	Giving Parem to keep warm because the area is cold to avoid coughing Parem – parem consists of spices Drinking the concoction of Tawar is done every day Using traditional oil

The six themes listed in Table 1 are markers for family-based TB transmission prevention.

Community understanding of tuberculosis involves communication, education, and information. More information is received, the more knowledge is acquired. (Offi Miranda M & Arfiza Ridwan, 2019). In this scenario, understanding of the etiology of pulmonary tuberculosis is always related with excessive use of time, anorexia, lowered nutrition, or reduced nutrition will result in poor body resistance and heightened disease transmission susceptibility. (Edza Aria Wikurendra, 2010). This claim is supported by in-depth interviews with informant

1, informant 4, informant 10, informant 7, and informant 12, all of whom concur that pulmonary tuberculosis is caused by excessive time use, which leads to malnutrition. The etiology of pulmonary TB is attributable to physical weariness, malnutrition, airborne transmission, smoking, and tuberculosis bacteria, according to knowledge of pulmonary TB.

According to the results of the interviews about the etiology of pulmonary tuberculosis, a number of informants cited work-related physical weariness as a contributing factor.

"After that because I'm tired of working Mrs. Informant 10"

"I think the cause of staying up late, if he stays up late, catches a cold, relapses Informant 7"

"Because he's tired, whether he drinks or smokes like that. Informant 12"

Several other informants answered that it was due to malnutrition, as stated in the following statement:

"That's too much... not enough... not enough pudding, maybe because I work more. Informant 4"

According to the informant, another etiology causes pulmonary TB due to airborne transmission as stated by the following informant:

"As far as I know, ma'am, pulmonary TB is caused by direct contact with breath, like mouth to mouth, ma'am, my husband, I think he often goes to the shop, ma'am, we don't know at the shop."

Essentially, knowledge is one of the components that determine action (behavior). Knowledge is a crucial factor in determining one's behavior. The majority of respondents were able to answer questions about the etiology, signs and symptoms, diagnostic tests, and factors that influence the transmission of pulmonary tuberculosis, according to the results of informant interviews.

Several interviewees' responses showed that the genesis of pulmonary tuberculosis was attributable to the lifestyle of those who engaged in rigorous physical activity. Excessive physical exercise might result in weariness and immunological suppression.

A research study from (Sasono Mardiono, 2013) said that based on the results of interviews he conducted with 7 people with pulmonary tuberculosis, the results were that most complained of signs and symptoms of cough, fever accompanied by shortness of breath, and lethargy and no appetite, weak body for ± 2 month. This is the same as the statements of informants who were interviewed about the signs and symptoms of pulmonary TB, the majority of informants answered that they had cough with phlegm, shortness of breath and fever. This is proven based on the results of the following informant statements:

"In the past he often had fever, night sweats, coughing, but my brother-in-law used to lose weight because sometimes he was Informant 3"

"He coughs like that, coughs like that, doesn't he have shortness of breath? "So why this child huh?" I said that Informant 5"

Other signs and symptoms described by several informants were weight loss and loss of appetite from the interview results, namely from informants one, two, four and eight as follows:

"Then my body is getting weaker and weaker. If my appetite is normal, but my body is decreasing, ma'am, I'm getting thinner and thinner"

The society culture who suffer from pulmonary tuberculosis use a variety of supplemental herbal treatments by applying oil or a similar parem to various body areas. (Simamora et al., 2022). According to Pratiwi et al. (2012), culture is a factor in the transmission of pulmonary tuberculosis, specifically the beliefs/beliefs of the community in the Pariaman city region of West Sumatra, as evidenced by the habit, the behavior of people throwing saliva carelessly on the ground, on the floors of earthen houses. Culture of preventing the propagation of pulmonary TB.

The health belief model is a form of behavior in which an individual provides a socio-psychological assessment and description of health. Value. The value of health refers to a condition of complete physical, mental, and

social well-being, as opposed to merely the absence of disease or other forms of infirmity.

On the basis of many study sources pertaining to the prevention of pulmonary tuberculosis transmission, additional indicators of the prevention of pulmonary tuberculosis transmission, namely culture, were discovered through participant interviews. The culture of the Gunung Meriah people acknowledges the presence of components such haggling, spraying, and param. Fresh ingredients, including shallots, garlic, turmeric, black pepper, white pepper, kemcur, silebur dish leaves, dragon scales leaves, silebur kumpa leaves, and ginger, are blended with oranges, brewed, and consumed at least twice day. All of the components for Sembur are roasted over low heat: pepper, rice, coriander, candlenut, nutmeg, ginger, turmeric, kencur, shallots, garlic, and pandan leaves. Ginger, kaffir lime, candlenut, and rice flour were sun-dried, ground, and coated with rice flour as a binder.

Almost all available products comprise garlic containing diallyt thiosulfinate (alicin) and diallyl disulfide as active components. Alicin is an antibacterial chemical that is effective against gram-positive and gram-negative bacteria, including Mycobacterium tuberculosis.

DISCUSSIONS

This study's phenomenological design is a technique for collecting data in order to describe and explain in depth the significance of family experience in avoiding family-based pulmonary tuberculosis transmission. Those who have the most interaction with pulmonary tuberculosis patients are at the greatest risk of contracting the disease; in this case, the family has the most contact with pulmonary TB patients. (Tode et al., 2019). In this study, researchers identified family guidelines for limiting the transmission of pulmonary tuberculosis. From an ethnomedicine or research subject perspective, these guidelines include: 1. Pulmonary Tuberculosis Prevention Behavior in the Family. 2. Knowledge of Pulmonary Tuberculosis. 3. Attitudes Regarding the Care of Family Members with Pulmonary Tuberculosis. 4. Family Support. 5. Health Service Support. 6. Sources of information on family tuberculosis prevention. 7. Region of residence.

The results of the study demonstrate the necessity of family engagement in preventing the transmission of pulmonary tuberculosis for patients with pulmonary tuberculosis, namely: a. Recognize health problems related to family knowledge and attitudes in the prevention and transmission of pulmonary tuberculosis; and b. Recognize health problems related to family knowledge and attitudes in the prevention and transmission of pulmonary tuberculosis c. Determining the best course of action for the family to avoid the spread of pulmonary tuberculosis, d. Provide care to sick families during treatment e. Modifying the family environment to ensure family health in preventing transmission of pulmonary tuberculosis to families, such as room ventilation and sanitizing the home environment f. Utilize health services if complications arise or if transmission is detected in family members affected by pulmonary tuberculosis.

The researchers' model for the prevention of pulmonary tuberculosis transmission incorporates numerous pre-existing ideas to identify and explain the factors that influence the prevention of pulmonary tuberculosis transmission in families. In addition, the results of the study were transformed into a new conceptual theory that serves as the foundation for a series of preventive actions against the transmission of pulmonary tuberculosis. Local knowledge becomes a mediating variable between the success of preventing transmission and transmission of pulmonary tuberculosis, according to a new finding in the research that created the successful model for preventing transmission of pulmonary tuberculosis. The mediating variable, which in this paradigm is described as the fundamental determinant preceding the adoption or modification of behavior to avoid the transmission of pulmonary tuberculosis.

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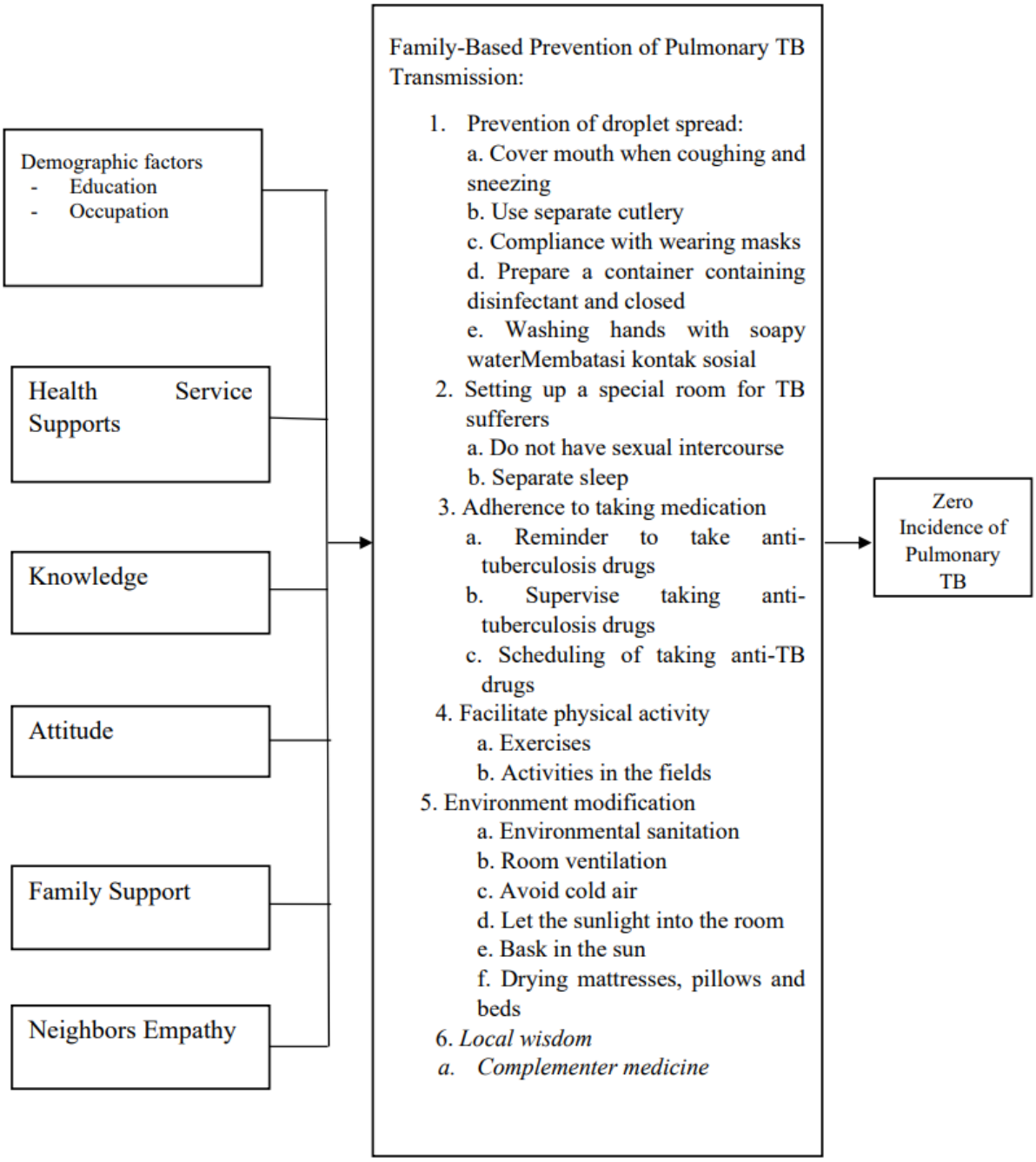

FIGURE 1: The novelty of the prevention model for pulmonary TB transmission in families in Deli Serdang Regency

Empathy is the next crucial new finding in reducing the transmission of pulmonary tuberculosis. The significance of empathy in reducing the spread of pulmonary tuberculosis is recognized in the provision of material and emotional care for pulmonary tuberculosis patients and their relatives. Family members of active tuberculosis patients must be made aware of the high risk of transmission through the empowerment and social culture of families with tuberculosis patients in order for them to have a positive attitude and be active in efforts to

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prevent tuberculosis transmission at the family level.

This model widens the concept of preventing the transmission of pulmonary tuberculosis through family conduct, family support, health services, and information sources, in addition to dwelling location. Families must expand their understanding of pulmonary tuberculosis and their attitudes toward caring for family members with the disease. The greatest obstacle for the family is providing opportunities for getting pulmonary tuberculosis, therefore motivating sufferers to recover from their sickness requires a significant deal of attention from the family.

This research has been conducted optimally in accordance with its intended goals. However, its execution necessitates a few small limitations. Among the limitations that can arise are the following: 1. Pulmonary tuberculosis cadres have not been adequately empowered in the Gunung Meriah region, so that health professionals can oversee pulmonary tuberculosis therapy in the region more effectively. 2. The majority of informants were farmers, thus the researchers waited until late at night in locations where the distance between families of pulmonary tuberculosis patients who served as informants was fairly great. 3. No disease analysis was performed in this investigation. For further research, researchers suggest covering a wider area or using other methods, such as case studies.

CONCLUSION

This study has developed a new conceptual framework for comprehending family-based tuberculosis transmission prevention strategies. The result will be the prevention of tuberculosis transmission in families that are able to deal with it. To achieve this, families will need to increase their knowledge of pulmonary tuberculosis transmission in families, develop a positive attitude toward caring for family members with tuberculosis, optimally utilize health services, adhere to medication regimens, and prevent the emergence of tuberculosis drug resistance. This study employs a method with a thematic analysis approach to identify, analyze, and report themes contained in a phenomenon that is effective in preventing transmission of pulmonary tuberculosis in families, so that there are no additional cases among families of sufferers, as evidenced by the results of themes and sub-themes, as well as conclusions. These findings can be adopted as a model to prevent the transmission of pulmonary tuberculosis to families so that new cases can be eliminated, hence reducing the number of pulmonary tuberculosis cases.

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