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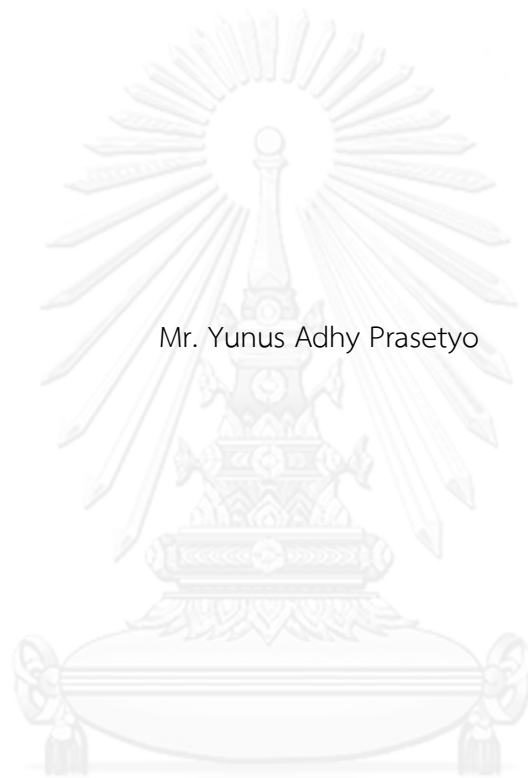
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THE EFFECT OF TUBERCULOSIS HEALTH PROMOTION PROGRAM ON MEDICATION  
ADHERENCE AMONG TUBERCULOSIS PATIENTS IN INDONESIA

Mr. Yunus Adhy Prasetyo



จุฬาลงกรณ์มหาวิทยาลัย

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ยูนูส อาดี พรากาเซทโย : ผลของโปรแกรมส่งเสริมสุขภาพต่อการใช้จ่ายตามรักษาในผู้ป่วยวัณโรคประเทศอินโดนีเซีย. (THE EFFECT OF TUBERCULOSIS HEALTH PROMOTION PROGRAM ON MEDICATION ADHERENCE AMONG TUBERCULOSIS PATIENTS IN INDONESIA) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร.สุนิดา ปริชาวงษ์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ. ดร.จินตนา ยูนิพันธุ์, 121 หน้า.

การศึกษาวิจัยครั้งนี้เป็นการวิจัยแบบกึ่งทดลองมีวัตถุประสงค์เพื่อศึกษาผลของโปรแกรมส่งเสริมสุขภาพต่อความร่วมมือในการรับประทานยาในผู้ป่วยวัณโรคปอด กลุ่มตัวอย่างคือ ผู้ป่วยวัณโรคปอด จำนวน 68 คน ซึ่งมารับการรักษาที่โรงพยาบาลคารี คาราวาง ชาวตะวันตก ประเทศอินโดนีเซีย โดยสุ่มเข้ากลุ่มทดลอง 34 คน กลุ่มควบคุม 34 คน กลุ่มทดลองได้รับโปรแกรมการส่งเสริมสุขภาพ ส่วนกลุ่มควบคุมได้รับการพยาบาลตามปกติ เครื่องมือที่ใช้ในการทดลอง คือ โปรแกรมการส่งเสริมสุขภาพ ที่ผู้วิจัยพัฒนาตามกรอบแนวคิดของเพนเดอร์ ใช้ระยะเวลา 8 สัปดาห์ประกอบด้วย การให้ความรู้เกี่ยวกับวัณโรค การให้คำปรึกษา การแลกเปลี่ยนความรู้แบบกลุ่มและการส่งข้อความเตือนทางโทรศัพท์ เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่ แบบประเมิน Morisky Medication Adherence Scale วิเคราะห์ข้อมูลโดยใช้สถิติเชิงบรรยายและการทดสอบค่าที

ผลการวิจัยสรุปได้ดังนี้

1. คะแนนความร่วมมือในการรับประทานยาของผู้ป่วยกลุ่มทดลองภายหลังเข้าร่วมโปรแกรมส่งเสริมสุขภาพสูงกว่าก่อนเข้าร่วมโปรแกรมอย่างมีนัยสำคัญทางสถิติที่ระดับ .01
2. คะแนนความร่วมมือในการรับประทานยาของผู้ป่วยกลุ่มทดลองภายหลังเข้าร่วมโปรแกรมส่งเสริมสุขภาพสูงกว่ากลุ่มที่ได้รับการพยาบาลตามปกติอย่างมีนัยสำคัญทางสถิติที่ระดับ .01

จุฬาลงกรณ์มหาวิทยาลัย  
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ลายมือชื่อนิสิต .....

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....

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ADHERENCE / TUBERCULOSIS PATIENTS

YUNUS ADHY PRASETYO: THE EFFECT OF TUBERCULOSIS HEALTH PROMOTION PROGRAM ON MEDICATION ADHERENCE AMONG TUBERCULOSIS PATIENTS IN INDONESIA. ADVISOR: ASST. PROF. SUNIDA PREECHAWONG, Ph.D., CO-ADVISOR: ASSOC. PROF. JINTANA YUNIBHAND, Ph.D., 121 pp.

The purpose of this quasi-experimental study was to examine the effect of a tuberculosis health promotion program on medication adherence among tuberculosis sufferers. Sixty-eight persons with tuberculosis, recruited from the Klari, Karawang public health center in West Java, Indonesia, were randomly assigned to an experimental or control group, with 34 persons assigned to each group. The participants in the experimental group participated in the Tuberculosis Health Promotion Program, whereas, those in the control group received conventional nursing care. Based on the Pender's Health Promotion Model, the 8-week tuberculosis health promotion program comprised health education related to TB, personal counseling, group discussion and individual monitoring. The outcome was assessed by the 8-item Morisky Medication Adherence Scale. Data were analyzed using Dependent t-test and Independent t-test. The results indicated that after participating in the tuberculosis health promotion program, medication adherence among persons with tuberculosis in the experimental group significantly improved. In addition, after participating in the program, there was a significant difference between the experimental group ( $\bar{x}=1.61$ ,  $SD=0.85$ ) and the control group ( $\bar{x}=3.64$ ,  $SD=1.04$ ),  $p<0.001$ . This finding suggests that a TB health promotion program is effective in improving medication adherence among TB patients.

Field of Study: Nursing Science

Student's Signature .....

Academic Year: 2013

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Co-Advisor's Signature .....

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## CHAPTER I

### INTRODUCTION

#### **Background and significance of the study**

Tuberculosis (TB) remains a major problem worldwide. Over the world, the incidence rate of the diseases is 128 cases per 100,000 populations. Consequently, it arises a global health concern with the incidence rate of the disease is still increasing over the years (WHO, 2012). According to the report from the World Health Organization (WHO), there were 5.8 million newly diagnosed cases worldwide in 2011, which is higher than the 3.4 million incident case in 1995 (WHO, 2012). A long duration of standard TB treatment, which generally lasts for at least six months, has shown a higher risk of treatment default (Munro et al., 2007). Consequently, persons with TB are facing difficulties in taking appropriate medication for some reasons such as: feeling better or having medication side effects; thus, lack of the quality of adhering the medication is elevated. This condition may result in the emergence of resistant strains of *Mycobacterium tuberculosis*, increasing mortality and prolonging the treatment duration. It escalates the risk of morbidity, mortality, medication resistance at both individual and community, and also contributes to failure in eradicating the disease globally.

Directly Observed Therapy-Short Course (DOTS) is promoted by World Health Organization to figure out problems associated with TB in developing countries which consists of five elements strategy for TB control: 1) political commitment, 2) improved laboratory analysis, 3) direct patient observation while taking medication, 4) a drug supply that provides for the correct complete short-course anti-TB drug combination for free, and 5) a reporting system that documents the progress in curing the patient. DOTS strategy is recommended and considered to be the most effective method for increasing treatment adherence (WHO, 2006). The positive effect of the strategy can be strengthened by combination with other interventions, such as provision of health education and incentives (Volmink & Garner, 2006).

According to WHO report, Indonesia was distinguished the country's fourth largest TB population in the world. It is the second cause of death after cardiovascular disease, and the first cause of death from all infectious diseases. The estimated prevalence and incidence rates of all forms of TB were 297 and 185 per 100 000 population, respectively, in 2012 (WHO, 2014).

Incomplete treatment of TB is highly resulted in prolonged infection, relapse, drug resistance and death (WHO, 2011, 2012; Widjanarko, Prabamurti, & Widyaningsih, 2006). DOTS strategy has been employed on a government service basis since early 1970s. Although this strategy has been implemented for over thirty years, the treatment completion rate and incident number fails to meet the WHO standard, the number of TB patient is still remained (Widjanarko et al., 2006). Over the years, DOTS program has improved to adopt a multiple approach which includes the provision of patient health training, incentives, client-focused regimens, defaulter tracing and referral of social support.

Nevertheless, there are some challenges in the implementation of the DOT strategy in Indonesia. New tasks to be faced is to increase the need for training of the DOTS strategy and the need for teaching with new topics related to TB such as administration of MDR-TB, and others. In addition, the limited number of staff, rotation of personnel in health care facilities and health services as well as continuity between the training, is also a challenge in the development of human resources in a decentralized environment. Consequently, several tasks related to TB treatment could not be well implemented.

Another challenge associate to TB treatment is in providing a proper health promotion program that will strengthen the whole medication planning. Such program is rarely implemented on a continuous basis in Indonesia due to limitations of resources, manpower, and finances of the public health centers, as it mentioned before. Limitation of nurses in the public health center also becomes the reason why information about TB treatment can only be given at the time the patient come to a public health center for medical assessment; there are no further TB health promotion program related to how to take proper medication and how to deal with the effect of medication after that (Chani, 2010; Munro et al., 2007; Widjanarko et al.,

2006). A study revealed remained problems in the implementation of the public health center care for patients with pulmonary tuberculosis in Indonesia. Nursing care focused only on individuals who diagnosed with active TB with deficiency of family members caring. The activity centered only on curative aspects with passive case finding. As a result of overloaded task, nurses did not effectively work as part of an integrated team of TB care. This condition is also encountered the Public Health Center Klari, Karawang, West Java, Indonesia. According to 2004 Tuberculosis National Survey, it was estimated that there is 2.295 new cases of TB every year in Karawang. The Case Detection Rate (CDR) for 2012 also decreased from 94 cases to 78 cases from the target of 100 cases per year. The CDR number was one of factors that related to the success of TB treatment; more closer the CDR from the expected target more successful the TB treatment.

Holding through this situation, nursing role conducted a crucial point. Nurses are at the forefront of tuberculosis prevention, care, and treatment (Ghebrehiwet, 2006). They play an important role in working collaboratively with the patient/ client to change behaviors and achieve a healthy lifestyle. It is expected that patients would comply the treatment regimen when they were addressed with proper information about the treatment process. When caring for TB patients, nurses provide treatment information, including medication benefits and side effects in order to improve medication adherence.

Medication adherence is defined as "the extent to which a person's behavior [in] taking medication corresponds with agreed recommendations from a health care provider" (WHO, 2003, p. 3). Gochman (1997) said that medication adherence is recognized as a health behavior for its patterns, actions and habits that relate to health maintenance, health restoration, and health improvement. Munro and colleagues (2007) revealed four main structural factors that may impact patient medication adherence: poverty and gender discrimination, social factors, health service factors and personal factors including knowledge, attitude, and beliefs about the treatment. Thus, efforts to improve medication adherence could be more effective when multiple factors that influence adherence behaviors are addressed. A number of interventions have been developed to improve medication adherence in

persons with TB, but few have ever been implemented in Indonesia. For example, participation of community health workers in direct observed treatment (DOT), implementation of DOT strategy throughout treatment, and provide patients with education have been identified to be associated with lower medication default rates (Toczek et al., 2012).

Adherence to a daily medication regimen requires a proper behavior from TB patients. Some TB sufferers experience a chronic condition that requires a long-term treatment of daily medication in order to optimize medication adherence for a maximum result. Pender (2006) described health-promoting behaviors as "behavior motivated by the desire to increase well-being and actualize human health potential"; in that sense, medication adherence can be seen as a health-promoting behavior (p. 7). Pender, through his Health Promotion Model, hypothesized that the determinants of health promotion behaviors include: individual perceptions, modifying factors and other variables that influence the likelihood of a patient engaging in activities that can achieve well-being and self-actualization, thereby, preventing risk factors from developing. The HPM has been effectively implemented in several studies related to not only predict healthy behavior, but also to develop programs in health promotion. Pender's Health Promotion model focuses on interventions that affect the community, therefore, producing a healthier population. Pender defined health as not only the absence of disease merely a positive dynamic state of wellbeing. The model illustrates the multifaceted nature of persons interrelating to their environment in pursuit of health.

A better understanding of TB treatment among active TB patients will lead to a greater success of whole TB treatment (Widjanarko et al., 2009). Poor understanding of the treatment will lead not only failure of TB treatment but also spread the infection rapidly. Several studies related to TB health promotion intervention described that medication adherence can be improved by providing proper health promotion to TB patients (Volmink et al., 2006). Hence, to enhance medication adherence behaviors, persons with TB should have adequate knowledge and skills regarding the disease and the treatment through a health promotion program. The purpose of this study, based on Pender's Health Promotion Model, is to examine the

effect of the Tuberculosis Health Promotion Program on medication adherence among persons with tuberculosis.

### **Objective of the study**

1. To compare medication adherence of the experimental group before and after participating in the Tuberculosis Health Promotion Program among TB patients
2. To compare medication adherence between the experimental group and the control group after the Tuberculosis Health Promotion Program among TB patients

### **Research questions**

The research questions are:

1. Would medication adherence of TB patients in the experimental group be better after the implementation of the Tuberculosis Health Promotion Program?
2. Would medication adherence of TB patients in the experimental group be better after the implementation of the Tuberculosis Health Promotion Program than those in the control group?

### **Conceptual framework, Rationale, and Hypothesis**

Medication adherence has been critically discussed and mentioned in many studies on regimen treatments. As a health behavior, medication adherence is distinguished for its' patterns, actions and habits that colligate to health maintenance, health restoration, and health improvement. Several factors related to medication adherence with four main structural factors: poverty and gender discrimination, social factors, health service factors and personal factors including knowledge, attitude, and beliefs about the treatment, may impact patient medication adherence (Munro, et al., 2007). Medication interaction and medication side effects become the two main reasons of personal factors why TB sufferers do not finish the medication. Several researches indicated those with TB incline to absence their medication after 1-2 months of feeling better (Kaona et al., 2007; Widjanarko et al., 2009). Furthermore, medication side effects during the process



highly induce TB patients continuing their medication (Mittal & Gupta, 2011; Vijay et al., 2010; Xu et al., 2009). Hence, by applying multiple approaches that influence adherence behaviors, attempts to improve medication adherence could be more effective.

According to the Pender's Health Promotion Model (HPM), "understanding the major determinants of health behaviors" is a fundament to promote healthy lifestyles (Pender, 2011, p. 2). The model identifies any related background factors that influence health behavior. The expectancy value of HPM is individuals engage in actions to achieve goals that are perceived as possible and that result in valued outcomes. The endpoint or action outcome directed toward attaining positive health outcome such as optimal wellbeing, personal fulfillment, and productive living. This study engages three concepts of Pender's model: perceived barrier to action, perceived benefit, and perceived self-efficacy. The three concepts were found to have positive significant differences in several studies related to health promotion program. These studies, which utilized Pender's Health Promotion Model, revealed that the concept of perceived self-efficacy, perceived benefit to action, and perceived barrier tended to engage in health-promoting more frequently than other concepts. Perceived self-efficacy and perceived benefits were positively associated to health-promoting behavior, while perceived self-efficacy was positively related to perceive benefits (Wu et al., 2002; Kwong et al., 2007; Shin et al., 2005). The three concepts were explained as follows:

Pender et al. (2006) described barriers as the blocks, hurdles and personal costs of undertaking a certain behavior and may be real or imagined. Barrier rises up the motive of avoidance in relation to a specific behavior. As consequence, expected action is likely to occur. Through commitment decrement, perceived barriers to action trouble health-promoting behavior directly as well as indirectly. For this study, it is hypothesized that as perceived barriers related to medication adherence among tuberculosis patients.

Perceived benefit refers to positive outcome expectations that a person believes will increase from engaging in certain behaviors. It is the individual's perception or belief of the benefit of a health promoting behavior that directly acts a

person to employ the behavior. The benefits of the behavior may be intrinsic or extrinsic (Pender et al., 2006). For this study, it is hypothesized that perceived benefit has a positive impact on medication adherence.

Another component of the model is perceived self-efficacy. It represented as a judgment of one's abilities to accomplish a certain level of performance, whereas an outcome expectation is a judgment of the likely consequences. Self-efficacy concerns with the personal decision of what people can do with whatever skills one possesses in term of health behaviors (Pender et al., 2006). Perceived self-efficacy on medication adherence recommits to the level of confidence in the ability of TB patients to organize and carry out specific tasks and behaviors related to medication adherence. For this study, it is hypothesized that self-efficacy has a positive influence on medication adherence.

The focus intervention of the study is behavior specific cognitive and affects related to TB medication adherence. Patients' positive behavior toward TB medication gives an enormous impact in TB treatment completion; the greater the commitment of TB patient to treatment the more likely TB medication behaviors are to be maintained over time. Nurses hold an important role in working collaboratively with the patient/client to change behaviors and achieve a healthy lifestyle. The HPM has proved to help nurses in giving proper intervention to change health behavior (Lusk et al., 1999; Lusk et al., 1994; McCullagh, Lusk & Ronis, 2002).

Thus, the researcher proposes the Tuberculosis Health Promotion Program as guideline for nursing practices to assess medication adherence among TB patients by using a health promotion process in conducting an effective care. The program consists of a number of activities that help nurse to improve medication adherence among TB patients. This includes: health education, personal counseling, group discussion, and individual monitoring, which adapted from Pender's Health Promotion Model. Applying this conceptual theory, the hypotheses of the study are as follows:

1. TB patients who received the Tuberculosis Health Promotion Program have better medication adherence than those who don't receive the program.

2. TB patients who received the Tuberculosis Health Promotion Program don't have better medication adherence than those who don't receive the program.

### **The Scope of the study**

The researcher specified the scope of the study as follows:

1. A quasi-experimental design was conducted to develop and evaluate effects of the Tuberculosis Health Promotion program on medication adherence among TB patients.

2. The population of this study was active TB patients who received medical treatment, and lack of complication to cooperate in this study. The participants in the control group received the usual care, while those in the experimental group obtained the usual care and the Tuberculosis Health Promotion Program during the 8 weeks periods.

3. The independent variable of the study was the Tuberculosis Health Promotion Program while medication adherence of TB patients became the dependent variable.

### **Operational definitions**

1. Tuberculosis Medication Adherence refers to TB patients behaviors that required to be adherent to tuberculosis medication regimen, including storing tuberculosis medications properly, taking the correct amount of tuberculosis medication at the correct times, and being consistent with the tuberculosis regimen for 6 months. With permission, the Morisky Scale of Medication Adherence was used to measure the level of medication adherence.

2. TB Health Promotion Program refers to multi-components nursing intervention that promoted medication adherence in TB patients on the basis of Penders' Health Promotion Model (HPM). The program incorporated three components HPM, which are: perceived benefit to action, perceived barrier to action, and self-efficacy. The Tuberculosis Health Promotion Program was emphasized in

patients' medication adherence behavior that consisted of several approaches, which were: health education related to TB, personal counseling, group discussion, and individual monitoring during the program. The content of the information in this study was adapted from TB training Program of Central Disease Control (CDC). The Tuberculosis Health Promotion Program provides the knowledge and skills to manage tuberculosis medication adherence that significantly related to improving health status. Thus, quality of life could be optimally achieved.

3. TB Usual Care defined as the conventional health care that was given by nurses, physician, and other health care provider, for caring tuberculosis patients at the public health center. The usual care consists of measuring blood pressure and body weight, providing the medicine, giving basic health information related to medication taking, and scheduling patients' visitation in the public health center Klari, Karawang.

4. Tuberculosis Patients refers to persons that diagnosed with active TB disease, in adult aged, both male and female, and following the TB treatment at public health center.

### **Expected benefits of the study**

The effective treatment in an ideal world should be matched with patients' condition and situation. Through this research, hopefully, a systematic TB treatment can be implemented well. Health providers who responsible with TB treatment (ex: physician and nurse) will discuss medications plan with patients and provide them as well with a list of information sources, such as written materials (booklet, leaflet, poster, etc.). More in-depth discussion about medications and information sources, double benefit should be achieved and then increase patients perceived benefit. By the increase of patients perceived benefit about treatment, any perceived barrier related to medication can be also reduced, the perceived self-efficacy will also increase, and reducing the probability of non-adherence.

Nurses could also provide more range of topics that cover the information regarding TB. A specific knowledge of TB from nurses is required to certain the quality of information. The session can be implemented during a typical office visit.

Identifying high quality sources may be more difficult than it seems. Expert panels of health provider may need to convene to create consensus-based treatment guidelines; thus, proper treatment can be implemented successfully.



## CHAPTER II

### LITERATURE REVIEW

To develop a comprehensive tuberculosis health promotion program and examine the effect of this program on medication adherence among TB patients, a consolidative review of literature finding was accommodated in this chapter with the state of the summarization that associated with the concept of the research. For that purposes, this chapter addresses the followings:

1. Tuberculosis Patients
  - 1.1. Factors Related to Tuberculosis
  - 1.2. Tuberculosis Patients' Characteristics
  - 1.3. Tuberculosis in Indonesia, DOTS, and the Implementation of Public Health
2. Medication Adherence
  - 2.1. Definition
  - 2.2. Medication adherence as health behavior
  - 2.3. Factors related to medication adherence in persons with TB
  - 2.4. Measurement of medication adherence
3. Previous studies related to medication adherence in TB
4. Overview of Pender's Health Promotion Model
5. Previous studies related to the application of HPM to promote health behaviors

## 1. Tuberculosis Patients

### 1.1. Factors Related to Tuberculosis

#### Etiology of Tuberculosis

Tuberculosis defines as a bacterial disease caused by *Mycobacterium tuberculosis* (and occasionally by *Mycobacterium bovis* and *Mycobacterium africanum*); the organisms are also recognized as tubercle bacilli (they induce lesions called tubercles) or as acid-fast bacilli (AFB). Tubercle bacilli are able to remain dormant in tissues for years (Harries, Maher, & Graham, 2004). The infection of tuberculous advances at the time the tubercle bacilli invade a person's body. Nevertheless, the bacteria are in insignificant numbers and continue inactive. Some people experience tuberculous infection and are fine. Tuberculosis is a condition where one or more tissues of the body convert attacked as exposed by clinical indicators. The condition happened as the result of the multiplication of tubercle bacilli in the body and reaching enough number to astound the body's immunity (Harries et al., 2004).

Persons with pulmonary tuberculosis are the most important source of infections. This sufferer typically is identified with sputum smear-positive resulted from coughing that produces tiny infectious droplet nuclei (infectious particles of respiratory secretions commonly less than 5  $\mu\text{m}$  in diameter and comprising tubercle bacilli). From some activities such as talking, sneezing, spitting and singing, droplet nuclei are able to be spread into the air and persist adjourned in the air for extended periods. Tubercle bacilli could be stopped by direct sunlight in 5 minutes. However, they are able to live in the gloomy area for long phases.

Two factors are determinant for individual's risk of contact: the attentiveness of droplet nuclei in polluted air and the length of time he or she breathe that air. TB of cattle (bovine TB) appears in several nations. Milk-borne *M. bovis* might contaminate the tonsils presenting as scrofula (cervical lymphadenitis), or the intestinal region, developing abdominal tuberculosis (Harries et al., 2004).

### **Risk of infection**

A risk of infection will be reckons on the level of exposure to droplet nuclei and persons' vulnerability to infection. This risk is high with close, prolonged, indoor exposure to a person with sputum smear-positive pulmonary tuberculosis. Those sufferers who identified with sputum smear-negative pulmonary tuberculosis have lesser threat of transmission, even lower from those with extra pulmonary TB (EPTB) (Harries et al., 2004).

### **Risk of progression of infection to disease**

Infection with *M. tuberculosis* is able to develop at all ages. The minute a person infected with *M. tuberculosis*, it could stay infested for years. Persons who have tuberculosis infection are possible to develop the disease at any time. The disease affects most tissues and organs, especially the lungs. The chance of growing disease is greatest shortly after infection and steadily lessens as time goes by. Older people have lower risk of developing the disease than infected infants and young children who have an immature immune system. Several physical or emotional pressures might activate regression of infection to disease. The most important trigger is flagging of immune system, particularly by HIV infection.

### **Natural history of untreated TB**

By the end of 5 years, 50% of pulmonary TB patients will be deceased, 25% will stay fit (self-cured by a robust immune defense), and 25% will develop chronic infectious if there is no proper treatment for TB (Harries et al., 2004).

### **Epidemiology**

A third of the world's residents were contaminated by *M. tuberculosis*. With approximately 8.3 million new cases of TB, globally. Most of the cases occur in developing countries. Third quarter of TB cases is happen in the economically productive age group (15–50 years). In 2000, there were 1.8 million deaths from tuberculosis; 226,000 associated with HIV (12%). TB deaths consist 25% of all mature demises in developing countries.

As consequence, there is an increase of children with tuberculosis. BCG immunization for neonatal has had limited effect in keeping children from TB in developing countries; infants and young children are, consequently, at particular risk



of infection and disease (Harries et al., 2004).

### **TB Medication**

TB medication is provided in two stages, intensive phase and continuous phases. In the intensive phase (initial), patients received a daily-based medication. Patients, in this phase, should be monitored directly to prevent the occurrence of drug resistance. Patients with TB commonly become non-infectious in 2 weeks of medication if the treatment is addressed correctly. The majority of patients with smear positive tuberculosis will convert to smear negative within 2 months. After this phase, patients will receive fewer drugs during continuous phase in the longer term. This phase is important to terminate persistent bacteria that prevent recurrence.

Along with the development of knowledge in the field of pharmacology, currently, there is tablet combination OAT known as "fixed-dose combination" or abbreviated with OAT-FDC (often called FDC only). With this regimen, it is expected patient adherence in taking OAT can be improved so that it will improve the patient's recovery (Harries et al., 2004).

### **TB Evaluation**

The evaluation of TB medication will be established on bacteriological evaluation. Bacteriological evaluation is required for patients with smear positive sputum microscopy. The evaluation is addressed for several times, at the time before treatment begins, at the end of the intensive phase, at one month before the end of treatment, and at the end of treatment. The aim of this evaluation is to detect the presence or absence of sputum conversion and to determine the follow-up care. The evaluation of drug side effects is also important. Continuous treatment is important because irregular medication taking will develop problems of resistance. All the procedures that have done well would be useless without a good evaluation system. Therefore the role of education is very important in the treatment of TB and cannot be separated from the DOTS (Widjanarko, Gompelman, Dijkers, & Werf, 2009).

### **Strategies Used to Control Tuberculosis (STOP TB Strategy)**

At The World Health Assembly (WHA) in 1991, a resolution that acknowledged TB as a key of universal public health problem was declared as well as followed by the launch of DOTS as the internationally recommended TB control strategy (WHO, 2006). A major progress in TB control happened when the DOTS strategy implemented by those who has experienced by most National TB Control Programs (NTCP) (WHO, 2006). There were two targets made as part of this resolution, first is recognition of 70% of new smear-positive cases, and second is 85% cure successful of TB through the year 2000 (WHO, 2006). The DOTS strategy was expanded to form the Stop TB strategy in order to solve problems related to TB control and build on the successes of the DOTS strategy. Stop TB strategy is believed in enabling existing achievements to be sustained, accurately focuses the remaining problems and challenges, and support in strengthening health systems, reduce poverty and improve human rights. (WHO, 2006)

Globally, most of the successes in TB control were happened by the implementation of DOTS strategy, especially in high TB burden countries. In contrary, by reflecting the current rate of progress, it's not adequate to keep on target of sharing TB mortality and prevalence by 2015 (WHO, 2006). A new strategy to address the remaining challenges, especially in areas where the TB epidemic has been deteriorating, and to realize the Millennium Development Goal (MDG) and related Stop TB partnership goals by 2015, was developed, namely the Stop TB Strategy (WHO, 2006). The DOTS strategy then expands with six additional components, as follows:

#### **1. Pursue high quality DOTS expansion and enhancement**

Further DOTS strengthening is needed in the following areas, namely: political pledge with increased and sustained funding; case exposure through excellence guaranteed bacteriology; standardized management with control and support; effective medication supply and management systems; monitoring and assessment systems; and impact assessment (WHO, 2006).

## **2. Address TB/ HIV, MDR-TB and other challenges**

The global burden of TB has been being exacerbated by the epidemic of HIV. It increased the need to focus attention on strengthening the global TB and HIV programs to tackle the two problems effectively (Harries et al., 2004).

## **3. Prevent and control Multi Drug-Resistant TB**

Finding and curing of all forms of MDR-TB should be an important portion of NTP actions. The vigorous actions for preventing and controlling medication-resistant TB includes use of suggested treatment regimens, a consistent resource of quality-assured first-and second-line anti-TB medication, and adherence to treatment by sufferers and to its appropriate facility by health-care providers.

## **4. Address prisoner, refugees, and other high-risk groups and special situations**

TB control programs require to provide special responsiveness to certain population groups and exceptional conditions that are allied with an upper TB threat in health care and congregate sites, where those with TB and HIV are regularly crowded together, the jeopardy of contracting TB is greater than before. The risk groups who require special care comprise prisoners, refugees and other displaced people, migratory workers, illegal immigrants, cross-border populations, the orphaned and homeless, ethnic minorities, other sidelined groups, alcohol abusers and injecting drug users (WHO, 2006).

## **5. Contribute to health systems strengthening**

Improving access to quality health care services will benefit TB control, therefore TB control programs should actively expand system-wide strategy, human resources, funding, management, service provision and information systems (WHO, 2006).

## **6. Engage all care providers, Public-Private Mix (PPM)**

Engagement of all health care providers (both private and public) is of paramount importance. Evidence proposes that catastrophe to engage all care workers used by TB suspects and patients hampers TB case finding, postponed diagnosis, leads to incorrect analysis as well as unsuitable and unfinished treatment, surges medication resistance and forms excessive financial problem on the patients.

### **7. International Standards for Tuberculosis Care (ISTC)**

In order to standardize the diagnosis and treatment of TB both in the public and private sector, the Tuberculosis Coalition for Technical Assistance (TBCTA) developed a tool known as the International Standards for Tuberculosis Care (ISTC) to guide these sectors (WHO, 2006). The tool was designed with the idea of having the health care provider at the center of TB control activities and the patient at the center of care (WHO, 2006).

### **8. Empower people with Tuberculosis and communities**

To achieve greater commitment to fight TB, Advocacy Communication and Social Mobilization (ACSM) embraces the following: advocacy to impact regulation alterations and ensure sustained financial and political word; facilitation of communication between health care providers, TB patients and their communities in order to improve knowledge of TB and subsequently compliance to treatment; and social recruitment to participate the communities, partners and stakeholders in the fight against TB (WHO, 2006).

### **9. Enable and promote Tuberculosis research**

Conducting locally relevant operational research can identify challenges and practical solutions that can be tested in the field before scaling up the activities (WHO 2006). NTCP's can thus develop new and effective strategies for TB control. The WHO (2006) advocates TB programs to facilitate and actively support research to advance innovative diagnostics, medication and vaccines.

## 1.2. Tuberculosis Patients' Characteristics

Those who infected with TB bacteria would not always sick. As a result, two TB-related conditions might happened as the result: latent TB infection or active TB disease-both of which are treatable and curable

**Table 1 TB Patients Characteristics**

A Person with Latent TB Infection	A Person with Active TB Disease
<ul style="list-style-type: none"> <li>• Has TB bacteria in his/her body that are alive but inactive</li> <li>• Has a positive TB skin test</li> <li>• Has a normal chest x-ray</li> <li>• Doesn't feel sick and is not contagious</li> <li>• May become sick if the bacteria become active in his/ her body</li> <li>• Should consider treatment for latent TB infection to prevent active TB disease</li> </ul>	<ul style="list-style-type: none"> <li>• Has active TB bacteria in his/her body</li> <li>• Has a positive TB skin test</li> <li>• May have an abnormal chest x-ray</li> <li>• May spread TB bacteria to others</li> <li>• Feels sick and experiences symptoms such as coughing, fever, and weight loss</li> <li>• Needs treatment to cure active TB disease</li> </ul>

(Bloch, 1995)

Those who infected by TB mostly do not experience clinical illness, however usual asymptomatic and noninfectious signs might be appeared. The only sign of infection may come from a response to a tuberculin skin test. Nevertheless, infection can persevere for years, and infected persons could persist at threat for developing clinical TB, particularly if the immune system becomes impaired. Because of a greater incidence of infection or a higher risk for disease for any given commonness of infection among certain groups, the incidence of TB may be greater among these groups than among the total population.

Three fundamental strategies are important to the prevention and control of TB. The first main concern is recognizing and wholly treating all sufferers with active tuberculosis. The second is contact examination (i.e., finding and evaluating those who have had contact with TB patients, determining if they have TB infection or disease, and curing them properly). The third priority is screening residents at high risk for TB to trace persons infected with TB and giving complete therapy to stop the infection from moving ahead to active. This screening may detect cases of active disease.

### **High-Risk Groups**

Regarding on published reports in the medical literature and CDC surveillance data, the Advisory Council for the Elimination of Tuberculosis (ACET) recommends that the following groups be screened for TB and TB infection: 1) close contacts (i.e., those sharing the same household or other enclosed environments) of persons known or suspected to have TB, 2) persons infected with HIV, 3) persons who inject illicit drugs or other locally identified high-risk substance users (e.g., crack cocaine users), 4) persons who have medical risk factors known to increase the risk for disease if infection occurs (see Persons Having Other Medical Risk Factors), 5) residents and employees of high-risk congregate settings (e.g., correctional institutions, nursing homes, mental institutions, other long-term residential facilities, and shelters for the homeless), 6) health-care workers who serve high-risk clients, 7) foreign-born persons, including children, recently arrived (within 5 years) from countries that have a high TB incidence or prevalence, 8) some medically underserved, low-income populations, 9) high-risk racial or ethnic minority populations, as defined locally; and 10) infants, children, and adolescents exposed to adults in high-risk categories.

The changing epidemiology of TB indicates that the risk for TB among groups currently considered high priority may decrease over time, and groups currently not identified as at risk subsequently may be considered as high priority. Identification of these groups requires collecting and analyzing a) data on newly reported cases available as part of TB surveillance (e.g., residence, occupation, race/ethnicity,

country of origin, and status of HIV infection, injecting drug use, homelessness, and congregate settings), b) data not routinely collected and/or analyzed (e.g., indicators of socioeconomic status), and c) data from tuberculin screening programs (e.g., at correctional institutions and health-care facilities). These data will enable health departments and other local facilities to target screening and treatment programs to locally defined high-risk populations and areas.

### **Recommendation for Specific High-Risk Groups**

#### **a. Contacts of Persons Who Have Infectious TB**

Because the risk for infection and disease is particularly high among close contacts of persons having TB, these persons should be identified promptly (usually within 3 days) and examined soon (usually within 7 days) after identification of the potentially infectious patient.

#### **b. Persons Who Have HIV Infection**

HIV infection is the strongest risk factor yet identified for the development of TB disease in persons having TB infection. All HIV-infected persons should receive a PPD-tuberculin skin test. Those HIV-infected patients at high risk for continuing exposure to patients who have TB should be screened periodically for TB infection. Because active disease can develop rapidly in HIV-infected persons, the highest priority for contact investigation should be given to persons potentially co-infected with HIV and TB.

#### **c. Persons Who Inject Drugs**

Because they are at high risk for TB and HIV infection, the priority for screening is high for persons who inject illicit drugs. Drug treatment programs and other settings that provide care for persons who inject drugs should skin test injecting-drug users. If further evaluation and case management is necessary, adequate referral mechanisms should be in place.

#### **d. Persons Who Have Other Medical Risk Factors**

Health-care providers should administer tuberculin tests to all patients who have medical risk factors that substantially increase the risk for TB. These patients should be screened in settings where they receive primary or subspecialty

care or on admission to a hospital. These medical risk factors include the following: 1) HIV infection, 2) diabetes mellitus, 3) conditions requiring prolonged high-dose corticosteroid therapy and other immunosuppressive therapy (including bone marrow and organ transplantation), 4) chronic renal failure, 5) some hematologic disorders (e.g., leukemias and lymphomas), 6) other specific malignancies (e.g., carcinoma of the head or neck), 7) weight of greater than or equal to 10% below ideal body weight, 8) silicosis, 9) gastrectomy, and 10) jejunioileal bypass.

#### **e. Residents and Employees of High-Risk Congregate Settings**

These environments include prisons and jails, nursing homes and other long-term facilities for the elderly, health-care facilities, homeless shelters, and residential settings for HIV-infected persons. Persons working in these settings should be educated about the risk for transmission, the signs and symptoms of TB, and proper procedures for minimizing the risk for transmitting TB infection.

#### **f. Residents and Employees of Prisons and Jails**

Recommendations for screening, treatment, and prevention in correctional facilities advise that on entry, all inmates should be screened for TB symptoms by a standardized interview process. Persons who have symptoms suggesting pulmonary TB should be immediately isolated and evaluated for active TB. Medical units within correctional facilities should conduct a thorough risk assessment and follow recommendations for prevention of transmission of TB infection in health-care facilities.

#### **g. Residents and Employees of Nursing Homes/Facilities for the Elderly**

Because TB case rates increase with age among all racial and ethnic groups and both sexes, screening for TB in facilities providing long-term care to the elderly is recommended. The incidence of disease is two to seven times higher among nursing home residents in some areas than among demographically similar persons in other settings.

#### **h. Residents and Workers at Homeless Shelters**

Screening to find cases of active TB among the homeless consists of a chest radiograph (and possibly a sputum smear and culture) to determine current



disease. A special effort should be made to identify homeless persons co-infected with TB and HIV infection and to provide directly observed preventive therapy.

#### **i. Health-Care Workers**

Recent TB outbreaks in health-care facilities, including outbreaks of multi drug-resistant TB, have created heightened concern about nosocomial transmission. Health administrators and infection control departments in hospitals are responsible for ensuring the implementation of these recommendations. Implementing an effective TB control program requires risk assessment; early identification, isolation, and complete treatment of infectious TB patients; effective engineering controls; an appropriate respiratory protection program; and education, counseling, screening, and evaluation for health-care workers.

#### **j. The Foreign-Born**

Foreign-born persons at risk include immigrants (documented and undocumented), refugees, and some migrant workers and students. Culturally and linguistically sensitive evaluation and treatment programs should be provided to help ensure a successful treatment outcome. Services should not be denied because of a real or perceived undocumented immigration status.

#### **k. Other High-Incidence Population Groups**

The incidence of TB is closely related to socioeconomic status; higher rates occur among persons in low-income groups. Special control strategies targeted toward these low-income groups are needed. In addition, community leaders from high-risk populations and service providers (e.g., health, welfare, and housing) for these groups should be involved in planning and implementing programs.

#### **l. Persons Who Use Alcohol and Other Non-injecting Drugs**

Persons who use alcohol and other non-injecting drugs should be included in screening activities if they also belong to a high-risk group. Persons who use alcohol and other non-injecting drugs may be at risk for repeated exposure to others who have TB. Screening for TB infection should be administered on admission to a treatment program and on an annual basis, unless these persons are known to be tuberculin positive (Bloch, 1995).

### 1.3. Tuberculosis in Indonesia, DOTS, and the Implementation of Public Health

#### History of the National TB Control

Initiation of TB control in Indonesia could be traced from the pre-independence period. Four important milestones mark the progress of implementation and achievement of TB control programs.

##### a. Before the DOTS strategy Phase (pre-1995)

This phase began in the early 20th century and was marked by the establishment of diagnostic and sanatorium facilities in major cities. With the support of the Dutch government, the diagnosis of TB was done with X-ray examination, followed by treatment of TB through hospitalization. TB prevalence study was first conducted in 1964 in the city of Malang and Yogyakarta. Five years later (1969), the national TB control program with standard TB management guidelines began in Indonesia. In the period, 1972-1995, the grounded of TB control is no longer hospitalization, but through diagnosis and TB services in primary health care facilities, ex. at the public health center. In 1993, the Royal Netherlands TB Association (KNVC) tested the DOTS strategy in four districts in Sulawesi; one year after the NTP in collaboration with WHO and KNVC examined DOTS implementation in the province of Jambi and East Java.

##### b. Preparation and implementation of the DOTS strategy (1995-2000)

After successful trials in these two provinces, the Ministry of Health finally adapted the DOTS strategy to be implemented nationally in 1995. Before, from 1995 to 2000, national guidelines compiled and DOTS strategy was implemented at the health center. As well as the implementation of a new strategy, there are various challenges in the field in implementing the five DOTS strategy. To encourage increased coverage of the DOTS strategy and the achievement of the target, a team of international experts conducted two Joint External Monitoring Missions.

c. DOTS expansion and intensification (2000-2005)

National strategy for TB control plan was first assembled in this period as a guide for the provincial and district/ city to plan and implement TB control programs. The main achievement during this period were: (1) Development of a strategic plan 2002-2006; (2) Strengthening managerial capacity with the addition of staff at central and provincial levels; (3) tiered training and ongoing as part of the development of human resources; (4) International cooperation in providing technical support and funding (the Dutch government, WHO, TBCTA-CIDA, USAID, GDF, GFATM, KNVC, UAB, IUATLD, etc.); (5) Training plans and budgets at the local level; (6) Repair supervision and monitoring of the central and provincial levels; and (7) Engagement BP4 and government and private hospitals in implementing the DOTS strategy through the trials of HDL in Jogjakarta.

d. Consolidation and Implementation of Innovation in the DOTS strategy (2006-2010)

The phase was marked by success in achieving global targets early detection and cure rate in 2006. Moreover, new challenges arise in the implementation of the DOTS strategy. These challenges include the deployment of co-infection of TB-HIV, an increase in drug resistance TB, types of TB care providers were very diverse, lack of TB infection control in health facilities, as well as the management of TB varies. The new partners were actively involved in the control of TB in this phase include the Directorate General of Health Services in the Ministry of Health, the Indonesian Doctors Association, and the Ministry of Justice and Human Rights. Although Indonesia was experiencing layoffs funding, but the TB service activities (especially inside a building) still take place because of personnel readiness, by using funds from the central government and local governments as well as the source of funding from various international donors such as USAID, WHO, can still be maintained (DirJen P3L, 2011).

**TB Control Program Management**

The success of the DOTS strategy in Indonesia requires strong managerial support. Decentralization of health services negatively affects the capacity of human resources and the development of TB control programs. Although

it was reported that 98% of staffs at the health center and approximately 24% of TB hospital staff have been trained, the TB program must still perform human resource development staff due to high rotation of personnel.

New challenges to be faced by the TB program is to increase the need for training of the DOTS strategy and the need for training with new topics such as administration of MDR-TB, PAL, PPI TB, and others. Training DOTS strategy is still needed by assuming the expansion of the DOTS strategy. It can be done by expanding the type and amount of health care facilities as well as a variety of innovations to strengthen the implementation of the DOTS strategy (ex, new diagnostic tools, electronic TB, ACSM, logistics management). In addition, the limited number of staff, rotation of personnel in health care facilities and health services as well as continuity between the training, is also a challenge in the development of human resources in a decentralized environment. Consequently, high training requirement is needed for the availability of adequate number of additional facilitators, specific skills and expertise.

Furthermore, human resource development can also be done through on-the-job training and supervision. Although supervision is an integral part of each program, but the paradigm used in the supervision of TB control programs are still focused on data collection. Supervision as a method for enhancing the performance of human resources has not been optimized. With the lack of human resources information systems in TB control programs and practices of supervision at this time, then the dependence on training programs remains high. The consequences are the training needs assessment, development of appropriate training methods, as well as the evaluation of the effectiveness and cost-effectiveness of training is a priority for operational research.

Monitoring and evaluation should be done through supervision (on the job training) and quarterly meetings at various levels. Due to lack of resources (human, financial and logistical) supervision at provincial and district/ city is not carried out regularly, while the challenges of TB programs is getting more complex. The development of electronic information systems and geographic information systems are planned to improve the quality of planning and better treatment of patients. In addition, quarterly monitoring and evaluation meetings are also held at the health center level, in an effort to improve the quality of the laboratory, to validate the data and optimize networking TB.

TB treatment regimens in national TB control programs have used the package Fixed Dose Combination (FDC); however, CombiPack packages still available for patients with drug side effects. The availability of all types of first-line TB drugs is part of the five main DOTS strategy, and should be guaranteed by the government in an amount to meet demand in Indonesia with supplies for the buffer stock.

Currently, only 13 of the 32 provinces have been getting direct FDC drug distribution from central level. At the local level, anti-TB drug procurement system that is integrated with the basic drug services have started to be implemented, and drug warehouse area will include the TB drug program from the distribution center to the regular route of essential drugs to health centers with quarterly reporting system (DirJen P3L, 2011).

### **Coverage and quality of DOTS services**

#### **a. The Network Laboratory**

Over the last decade there has been an increase in the diagnostic capacity of national TB control programs. Nevertheless quality of service of the diagnosis is still a challenge. External quality assurance system is still limited because there are still many health services who have not followed the laboratory cross-check on a regular basis due to the limited capacity in supervision, feedback is not timely and the unavailability of reference laboratories in seven new provinces. Strengthening plan has been prepared as a referral laboratory for TB clinic. National reference laboratory and provinces should be formally defined with clear lines of

authority. Reduction of the gap (quantity and quality) in laboratory human resources needs to be pursued continuously.

b. Logistics drug

Overall, drug logistics system is not running optimally in ensuring continuous availability of TB drugs in health services. Data national drug stock-out category 1 shows the level of availability of drugs that are unstable in certain months. Similarly, inadequate buffer stock of the situation based on the availability of the drug in early 2010. While the availability of second-line drugs/ treatments for MDR cases are being pursued to obtain approval from the GLC (Green Light Committee). Thus, health services for the treatment of MDR cases should be prepared as early as possible. Improvements in the management of TB drugs at the provincial and district/ city must be done continuously to prevent stock-outs (DirJen P3L, 2011).

**The Challenges of TB**

a. The TB-HIV

TB-HIV coordination in general still needs to be strengthened. Coverage of TB-HIV services integrated facility services in TB and HIV / AIDS is still low. Most ART Hospital has not engaged in national TB control program. TB screening on persons with HIV were not routinely performed as well as TB-HIV surveillance. In addition, Isoniazid preventive therapy has not been part of the policy of national TB-HIV collaboration. Coverage of TB-HIV programs in prisons is still limited. Public understanding and access to TB-HIV IEC materials is still low and still less empowered.

b. Tuberculosis drug resistance

As the result of medication non-adherence, TB drug resistance becomes important issue. Efforts to address the dual TB-HIV require collaboration, especially at executive level. Furthermore, the intensification of socialization and advocacy are necessary, as well as improved access and HR competencies. The threat of MDR raises the awareness on need for regulation of anti-tuberculosis drugs and emphasized the urgency of the availability of second-line drugs. Both of these

efforts require support, capacity building, and involvement of professional organizations.

The main issue is the urgency to improve access especially for the poor and isolated. These efforts need to be supported by a variety of things, including partnerships, rural development idle TB care, delegation of authority to the midwife/ nurse to closer TB medication for the poor, increasing the involvement of relevant sectors with a clear job description, as well as the involvement of relevant sectors in reducing risk factors (Infrastructure, agriculture department). Increasing the quality of TB services in prisons across sectors require special attention, especially in relation to the threat of TB-HIV and MDR-TB.

c. Tuberculosis in Children

TB in children reflects the ongoing transmission of TB in the population. This problem still requires better attention in TB control programs. In general, the main challenge in TB control programs is the tendency of children to excessive diagnosis (over diagnosis), as well the persistence of under diagnosis, lack of proper case management, tracking cases were not routinely performed as well as the lack of reporting of childhood TB patients. These challenges are also faced by the hospital or health facilities that have implemented the DOTS strategy.

d. The Poor and Other Vulnerable Groups

Limited access to DOTS services is still found mainly on the poor and vulnerable urban populations in prisons, and residents of the remote region, border and island areas, especially in eastern Indonesia in particular. Urban poor are facing socio-economic constraints to have access to DOTS services. Most of the prisons have not been integrated in TB control programs and has yet to implement TB infection control, thus, access to DOTS services is also limited. In addition to the poor-specific vulnerable, special attention needs to be given to the eastern part of Indonesia in general, including people living in remote areas of the region. Papua in particular require specific approaches associated with widespread HIV epidemic. Gaps quantity and quality of human resources in the province are still so wide that require substantial investment to meet the personnel requirements. Another challenge in

this area is the high number of cases lost to follow up due to problems of access and high transportation costs and opportunity costs (DirJen P3L, 2011).

## **2. Medication Adherence**

### **2.1. Definition**

Medication adherence is defined as, “the extent to which patients follow the instructions they are given for a prescribed treatment” (Haynes et al, 2005, p. 2). In this study, adherence is defined when the patient takes TB treatments without interruption for more than two months and completes the course. Non-adherence is defined if patient interrupts treatment for more than two months. Adherence to TB treatment is one of the most important factors that determine the outcome of treatment, and the extent to which a patient’s behavior while on TB treatment coincides with medical advice (Pandit et al., 2006).

### **2.2. Medication Adherence as Health Behavior**

Adherence is the level of conformity between the patient behavior and clinical recommendations, such as using medications properly, following prescribed diet and incorporating relevant lifestyle behavior changes (Coleman, 2005). Changes in lifestyle and adoption of a healthy lifestyle are crucially important in the prevention or amelioration of Tuberculosis.

Successfully managing TB requires that patients make a commitment to achieving and maintaining control of their medication target. They must keep follow-up appointments and adhere to non-pharmacologic treatment recommendations as well as pharmacotherapy regimens. Effective efforts to maintain TB medication and improve the quality of life of TB patients include appropriate combinations of health care services, information, counseling, reminders, self-monitoring, and family support.

### **2.3. Factors related to medication adherence in persons with TB**

Several decades of research have demonstrated that patient adherence to medication regimens is suboptimal, with adherence rates ranging from 7% to 85% (Haynes et al., 2002). Medication adherence for persons with chronic disease is no exception, with one review article reporting an average medication non-adherence



rate of 24.8%. Thus, attention should be paid to diagnosis and prompt treatment of side effects, as well as educating patients about the possible side effects.

The following factors will be discussed as contributing factors to adherence or non-adherence to TB treatment that are: patient attitudes towards treatment, stigma and discrimination, co-morbidities, feeling better, and medication side effects.

#### **Patient attitude towards treatment**

Self-efficacy defines as the belief that one can perform at a certain level to achieve certain goals, can determine a patient's attitude towards treatment (Ormrod, 2006). In the context of TB treatment the self- efficacy model could be a method for TB control focusing on motivating the patient to take the treatment until completion. Healthcare providers, treatment supporters or family members, other patients currently taking treatment or those who took treatment previously and completed it, would act as motivators through verbal persuasion. Patients need to believe that if they comply with TB treatment they can achieve the desired outcome, which is to be cured (outcome expectations).

#### **Stigma and discrimination**

The presence of stigma and discrimination in a community may become barriers to patients disclosing their disease to family or community members (Eastwood & Hill, 2004). A qualitative study in Gambia demonstrated that patients often consulted traditional healers initially due to perceived stigma from health workers and the community. The study interviewed health workers and TB patients (male and female). Stigma therefore, may result in delays in seeking treatment or taking treatment consistently and correctly.

It is concluded that stigma and discrimination of TB patients result in patients delaying seeking testing and treatment and thus poorer health outcomes also. In Africa societies, TB is associated with immoral behavior and patients suffering from these conditions would be hesitant to disclose their status to their family members, a situation which may result in these patients not complying with their treatments as they do not want to be seen taking the medicines (Kaona et al. 2004).

### **Co-morbidities**

Co-morbidities are defined as illnesses occurring together, usually with one of the medical conditions or illness leading to the occurrence of the other (ITECH, 2008). Psychiatric patients are not only at risk of getting TB infection, as they are often homeless or have unstable housing conditions and lack food security, but they also frequently fail to comply with treatment for the same reasons (Fullilove et al., 1993).

In order to improve medication adherence, nurses can assist patients in understanding the major determinants of their health behaviors. The aim is to promote healthy lifestyles. Regarding to this point, Pender's Health Promotion model is proved in its' effectiveness to guide the interventions that affect communities, therefore producing a healthier population. Pender's stated that every individual in all their psychosocial complexity will interact with environment progressively "transforming the environment" while at the same time being transformed (Pender, 2011). Below will be described an overview of Pender's Health Promotion Model that become the guideline for this study.

### **Feeling better**

When the treatment progresses and their condition are getting better, symptoms start to regress, the improvement itself may become a barrier to continue the treatment. The patient might not see the need to continue with treatment when they are feeling better or well (Williams et al., 2008).

### **Medication Side Effects**

According to the WHO, most TB patients are able to complete treatment without experiencing significant side effects from taking the TB medicines. Some side effects that reported by patients are skin rashes, visual and auditory disturbances, jaundice, burning sensations in the limbs and painful limbs. These side effects potentially cause patients to comply poorly with their treatment (WHO, 2011).

## 2.4. Measurement of medication adherence

Since the era of Hippocrates, adherence to medication regimens has been monitored, with the effects of various potions were recorded with notations of whether the patient had taken them or not. Nowadays, patients' self-reports can effectively measure adherence to regimen and it's simple. There are two patterns of methods that available for measuring adherence, direct and indirect methods of measurement. Each pattern has advantages and disadvantages.

Some techniques in direct methods are directly observed therapy, measurement of concentrations of a drug or its metabolite in blood or urine, and detection or measurement in blood of a biologic marker added to the drug formulation. Direct methods are expensive, limited to the health care provider, and susceptible to distortion by the patient. Indirect methods include collecting patient questionnaires, using electronic medication monitors, and asking the patient to keep a medication diary. Questioning the patient directly or by using a questionnaire, patient diaries, and assessment of clinical response are relatively easy to use and quite popular among researchers nowadays. Several adherence scales were described as the following:

### **Morisky Medication Adherence Scale (MMAS).**

Self-reported questionnaires have widely been used because of low in both cost and time expenditure. Some researchers suggest that the self-report method may provide a reasonably accurate estimate of adherence. Among structured, self-reported scales, a four-item self-reported questionnaire (the Morisky Medication Adherence Scale-MMAS-4) developed by Prof. Morisky to assess medication adherence. The original Morisky, Green and Levine adherence scale appeared in Medical Care in 1986, but subsequent research on this scale identified one of the scale constructs to be perceived as pejorative and victim blaming, so another item addressing unintentional determinants was substituted.

The MMAS-4 (Morisky Medication Adherence Scale) is a modification of the original publication in Medical Care, 1986. One of the items related to "carelessness regarding taking one's medication" was changed due to many patients indicating this was pejorative and victim blaming. Now the MMAS-4 is comprised of

four items, assessing non-intentional and intentional reasons for not taking one's medication, and is mainly used today in the office setting where provider/patient communication is used to assess adherence behavior.

An eight-item self-reported scale (MMAS-8) has been developed for widely use in different kind of studies. It is an updated scale with higher reliability (internal consistency) and predictive and concurrent validity and has been assessed with two criterion related validations, namely a physiological outcome marker such as blood pressure control, HgA1c, and pharmacy fill data. The MMAS-8 consists of 8 items of questions on the scale use of binary response (yes/no). The two instruments (MMAS-4 and MMAS-8) have being used in the assessment of self-reported medication taking behavior. The scale is a generic measure assessing long-term chronic and infectious medical regimens, such as high blood pressure, diabetes, tuberculosis, HIV, elevated serum lipids, osteoporosis, immuno-suppressant medication, etc (Morisky, 2011).

#### **The Self-efficacy for Appropriate Medication Use Scale (SEAMS)**

Self-efficacy, delineated as the belief or confidence that a person is able to successfully perform a specific action required to accomplish a desired outcome. This statement has been noticed to be an important predictor of medication adherence. Based on this concept, Risser et al., (2007) formulated The Self-efficacy for Appropriate Medication Use Scale (SEAMS) to integrate the measurement of self-efficacy in evaluating medication adherence. The scale was originally a 21-item scale that was reduced to 13 items. The items are assessed using a three-point Likert-type scale (1, not confident; 2, somewhat confident; and 3, very confident). SEAMS was utilized and validated in patients with chronic disease such as coronary heart disease. It also associated conditions such as hypertension and diabetes.

The scales has a high internal consistency and reliability in low-and high-literacy patients ( $\alpha=0.89$  and  $0.88$ , respectively). Yet, there is no report about the sensitivity and specificity of SEAMS. There is a lack of ability to quickly score at the point of care although SEAMS is conceptualized to estimate useful barriers to adherence (specifically self-efficacy domains) and let responses via a three-point response scale. SEAMS is appropriate to be applied in a setting of medication

management clinic devoted to focusing on medication adherence (Risser et al., 2007).

### **The Brief Medication Questionnaire (BMQ)**

The Brief Medication Questionnaire (BMQ) was developed by Svarstad et al., with the purpose of creating an instrument that is brief, sensitive, and capable to discover different types of non-adherence. It consists of a five-item regimen screen to observe repeat and sporadic non-adherence. BMQ was first performed and validated in patients prescribed the angiotensin-converting enzyme inhibitors enalapril or captopril. It also has been utilized for diabetes patients, patients with depression, and other chronic diseases (Krass et al., 2005; Rickles, NM. & Svarstad., 2007; Cook, CL. et al., 2005). BMQ advances on the sensitivity and specificity of other adherence scales. It also permits assessment of barriers to adherence. Scoring at the point of care is difficult even though the test accurately assesses three domains (regimen, beliefs, and recall). Furthermore, BMQ needs specific list of medication regimens made by patient and considers this list is comprehensive. BMQ may be utile to review medication lists and medication adherence in a clinic setting with dedicated time.

### **The Hill-Bone Compliance Scale**

The Hill-Bone Compliance Scale was constructed by Kim et al. to give a simple method for health care professionals to define patient-reported compliance levels. Originally, it was tested in an urban black population. Later, it was applied in community-dwelling patients attending an internal medicine clinic (Krousel-Wood, M. et al., 2005). The scale consists 14 items in three subscales that measure medication adherence, sodium intake, and appointment keeping.

Each item is evaluated on a four-point Likert-type scale. For the 14-item scale, internal consistency reliability was high ( $\alpha=0.74$ ), applied in the black population. An internal consistency reliability of  $\alpha=0.68$  was noticed in the community-dwelling population using the nine-item medication adherence subscale. The Hill-Bone Compliance Scale has similarity with the MAQ in regard to defining barriers to non-adherence (ex. forgetfulness and adverse effects). The nine adherence items of the Hill-Bone Compliance Scale are formulated specifically in regard to high

blood pressure medications. The scale is popular in a cardiovascular practice or cardiovascular clinic setting.

### **Medication Adherence Rating Scale (MARS)**

Thompson et al. originated MARS for adherence assessment in psychiatric patients. The 10 items of the scale was first tested in schizophrenia patients; an internal consistency reliability of  $\alpha=0.75$  was found. In the second validation study with a larger population of patients with schizophrenia, schizoaffective disorder, or delusional disorder, it found an internal consistency reliability of  $\alpha=0.60$  (Fialko, L. et al., 2008). Yet, the sensitivity and specificity of MARS have not been reported. The scale assesses adherence behaviors and attitudes toward medication with simple scoring. Nonetheless, the application is limited to chronic mental illness such as in psychiatric practices or psychiatric clinic settings.

The study utilized Morisky Medication Adherence Scales 8-items for its' frequently used and low in both cost and time expenditure. Early studies found that the self-report method was underestimating non-adherence when compared with pill counts or biological assays. Among structured, self-reported scales, an eight-item self-reported scale (MMAS-8) has been developed and widely use in different kind of studies. The advantages of MMAS include simplicity of questions and ease of scoring. The predictive value of the scale is greater for those scoring high compared those with low medication adherence. Overall, MMAS is the fastest scale to direct and the simplest for health professional to score. Furthermore, MMAS has been validated in the largest range of population, cases, and diseases. This scale is a sensible choice to readily and consistently identify patient non adherence at the point of care (Morisky, 2011).

### 3. Previous studies related to medication adherence in TB

When a person is diagnosed with a chronic disease, medical professionals often suggest a myriad of lifestyle changes. Of all the behaviors a newly diagnosed patient is asked to engage in, taking prescribed medications may seem the easiest to perform. However, the seemingly simple act of taking medications is associated with multiple tasks, such as getting prescriptions filled and refilled, remembering how and when to take medications, and monitoring positive and negative medication effects. In addition to the logistical aspects of starting a medication regimen, patients must adapt to new psychosocial demands, which, depending on the disease, may include feeling stigmatized by taking medications and dealing with the disruptions medication-taking may cause to one's routine. Given that medication-taking is not as simple as it seems, it is unsurprising that patient medication adherence is a major issue that spans all ages and diseases. The description of previous studies is explained as the follows:

#### **Factors Affecting Medication Adherence in persons with TB**

Several factor related to TB medication adherence have been identified from previous studies described as the following:

#### **Personal factors**

The following factors have been identified as personal factors to TB medication adherence.

##### **1. Patient literacy or educational level**

A better understanding of the causes that associated with a disease seems important to support positive actions in order to prevent the disease. Some studies have proved it by looking at the relationship of the patient's educational level to their health status. Patients at risk of such disease will develop appropriate interventions to prevent the disease (DeWalt et al., 2004).

A study of predicting factors that determine successful treatment in Thailand described that 81% patients with higher educational levels and better knowledge of tuberculosis were successfully treated. It is proved that education level and knowledge are associated with better TB medication adherence (Okanurak et al., 2008). Other studies have demonstrated educational levels of TB patients as

significant predictors of medication adherence (Balasubramanian et al., 2004; Date & Okita, 2005; Johansson et al., 1999). Conversely, a study in Ndola (Zambia), found that age, marital status, and educational levels were not significantly associated with compliance (Kaona et al., 2004).

## **2. Alcohol and substance abuse**

In some studies, alcohol and substance abuse have often been cited as reasons for poor adherence to medication. Patients who are under the influence of alcohol tend to forget to take their medication, and more over if developed side effects are happened, it can lead to poor adherence (Sansone et al., 2008). A study in Tomsk (Russia) identified that substance abuse as a barrier to TB treatment and it leads to non-adherence in TB medication (Gelmanova et al., 2007). Physicians and other healthcare workers who are responsible in treating patients need to be careful of the alcohol and substance use potential impact on medication adherence. They should always explore any possibilities of alcohol and substance use in all their patients (Sansone et al., 2008).

Related to this condition, DOTS program is believed to achieve better TB control outcomes if it includes interventions aimed at improving diagnosis of alcohol and substance abuse and treating it concurrently with TB. In Namibia, alcohol use has been identified as a major reason for poor adherence to treatment, with adults drinking an average of 2.39 litres of alcohol per capita (Namibia, 2009).

## **3. Knowledge of TB disease and treatment (treatment literacy)**

Knowledge and attitudes about TB disease and treatment vary widely due to different cultural, religious or traditional beliefs, and access to education and information about the disease. Lack of knowledge related to TB symptoms or failure to recognize the symptoms results in delaying of seeking healthcare disease (Smart, 2010). Stigmatization of TB disease might be results in denial amongst misinformed communities. Those reasons becomes barriers to early diagnosis and treatment, resulting in increased risk of transmitting TB to other close contacts and the general community, as well as poor health outcomes for people with the disease (Afari-Twunamasi, 2005). Lack of treatment literacy is also associated with poor health outcomes. Some studies proved that better treatment literacy



improves health outcomes and medication adherence. Adherence to treatment was also related to the availability of information, material and emotional support from family members (Kgatlwane et al., 2005).

Several studies have shown that knowledge of TB is generally low in many settings, even among healthcare workers (Afari-Twunamasi, 2005). A study in India found that from 200 nurses only 40% of TB nurses and 10% of general hospital nurses had a satisfactory knowledge of TB, and only 56% of general nurses knew that TB was caused by mycobacterium TB (Singla et al., 1998). In Kenya, it showed that most private medical practitioners were unaware of the correct methods of diagnosing TB and most of them don't use recommended treatment regimens from the National TB Program (NTP) (Ayaya et al., 2003). Since most TB patient and their families receive TB information from their healthcare providers, poor knowledge among the health providers will translate to lower knowledge among the patients and family themselves (Afari-Twunamasi, 2005).

#### **4. Feeling better**

It is often when patients follow the procedure of treatment they will be very sick and may be inactive. A cross-sectional study of 130 compliant and 25 non-compliant TB patients in Nepal, 48% of the patients were more likely to think that they could stop TB treatment once they were feeling well, because they thought they were cured (Bam et al., 2005). It was showed that non-compliance was associated with being free of symptoms (O'Boyle et al., 2002; Kaona et al., 2004). Patient's defaulting behavior occurs when they feel well and don't have any symptoms (Pushpanathan et al., 2000; Peltzer et al., 2002). Therefore adherence to TB treatment is possible to be improved by providing more information about among those with TB disease, their families and communities, through empowering the healthcare provider with knowledge of TB (Ndimande, 2009).

## **Socio-economic factors**

Socio economic factors involve employment status and socio-economic status, and cost of transport that used to be barriers for patients to seek healthcare.

### **1. Employment and socio economic status**

Employment and socio-economic status and their relationship with TB medication adherence are still debatable. Some said that being employed may be associated with better socio-economic status, which enables to afford cost of transport and healthcare fees, increasing the chances of medication adherence (Okanurak et al., 2008). However, another study in India stated that there is no significant association between socio-economic status and TB medication adherence (Pandit et al., 2006).

### **2. Cost of transport**

Several studies indicated that cost of transport related to non-adherence to TB treatment, especially once the patient feels better (Bam et al., 2006; O'Boyle et al., 2002; Pushpananthan et al., 2000; Needham et al., 1998). A study in Malaysia stated that cost and time of travelling to the healthcare center were major contributory factors associated with adherence to treatment (O'Boyle et al., 2002). A prospective cohort study in Southern Ethiopia found that among 404 TB patients on treatment of smear positive pulmonary tuberculosis, 20% defaulted treatment. In addition, 91% of all treatment interruptions occurred in the continue phase, when the patient felt better and had higher cost of transport to a treatment facility (Shargie et al., 2007).

## **Health system factors**

Health system factors are also believed as one factor that related to TB medication adherence. It includes correlation between patient and program needs, structural factors and staff knowledge and attitudes.

### **1. Correlation between patient and program needs**

In-depth interviews study in India showed that reasons for default are linked to poor correlation between patient and program needs or priorities, and to particular characteristics of disease and its treatment. Convenient clinic timings,

arrangements for provision of treatment in family emergencies, and provision for complicated cases such as alcoholics are needed by patients to support their treatment (Jaiswal et al., 2003). In a study in Nepal inconvenient opening times of TB clinics and those clinics were located far from patients homes become the reasons for defaulting in 28% of non-compliant TB patients (Bam et al., 2005). Both studies recommended to develop flexible opening times of TB clinics and to accommodate patients staying at a distance in order to improve adherence to treatment.

## **2. Social condition**

A systematic review of qualitative research on patient adherence to TB treatment identified that poverty, gender discrimination, social, health service-related, and personal as structural barriers in social condition to complete TB treatment (Munro et al., 2007).

## **3. Staff knowledge and attitudes**

A lot of studies have shown the importance of the relationship between healthcare workers and the patients in TB medication adherence. A study conducted in Nepal found that the quality of the healthcare provider, patient interaction, and relationship contributed to differences in treatment adherence (Bam et al., 2005). Another study in South Africa established that the quality of healthcare provider and patient communication, coupled with correct causative belief, were associated with TB treatment compliance (Peltzer et al., 2002). A study in India found that poor interpersonal communication with health staff, lack of attention and support at the clinic, difficulties for patients to re-enter the system if they missed treatment, and long distances to the health facilities (inaccessibility) become problems facing by patients (Jaiswal et al., 2003). A Madagascar study also identified quality of relationships between patients and medical staff, also staff knowledge and attitudes regarding TB, as contributing factors to compliance or non-compliance to TB treatment (Comolet et al., 1998). In this study, quality of relationships and attitudes of healthcare workers had a significant bearing on TB treatment compliance, as they determined whether a patient would return for treatments in the facility.

### **Reminder System**

A study in a population of people screened for TB Mantoux test in the United States described that those patients in the experimental group who received an automated telephone message reminding them to return for reading in two or three days has significant improvement. Return failures were lower in the experimental group (7%) than the control group (12%) in a total of 701 participants (RR 1.05, 95% CI 1.00 to 1.10). Reminders to patients to attend clinic appointments or to take medication properly should be considered as a part of TB control programs (Volmink & Garner, 2006). Simple measures such as reminder letters to defaulters were found to be of benefit even when patients were illiterate. There is also some evidence prospective telephone reminders are useful for helping people keep scheduled appointments. These findings are consistent with those of a previous review which concluded that reminders are useful in reducing broken appointments in a variety of settings (Volmink & Garner, 2006).

### **4. Overview of Pender's Health Promotion Model**

Pender states that health-promoting behavior is interaction result of persons and the environment in several dimensions. The purpose of the interaction is to maintain persons' wellbeing, fulfillment, and the self-actualization of the individual. Pender's Health Promotion Model (HPM), which a middle range theory, was first developed by Pender in 1982, and revised for twice, in 1987 and 1996. It was a derivative concept of the Social Cognitive Theory of Bandura, which explains the interrelationship of environmental, personal and behavioral elements. The model was developed to explain, predict health-promoting behavior and purposes to increase the state of clients' health. It stated that health-promoting behaviors are a result of intellectual processes in interpretation and decision-making given as information from the internal and external environment, and the response to the perception through behaviors. Furthermore, behaviors are also a result of value expectancy or goals to be achieved.

The first application of the HPM in nursing literature in the early 1980s became a significant step in nursing field as it was proposed as a framework to

integrate nursing and behaviors science perspectives on factors influencing health-promoting behaviors. The theory offered a guideline for exploration of the complex bio-psychosocial processes that motivate individuals to pursue desire behaviors toward the enhancement of health.

The revised Health Promotion Model (HPM) describes five aspects of Health promotion behavior (HPB) including health responsibility, physical activity, nutrition, interpersonal relationship, spiritual growth, and stress management. Disease prevention and health promotion were important issues in health care policy in the United States due to the increasing prevalence of chronic diseases after 1950s. Under this circumstance, HPM was offered as a guideline to predict health-promoting behaviors. The revised HPM applies ten concepts to predict an outcome variable, health-promoting behavior by direct effect or indirectly effect (Pender et. al., 2006)

Pender's Health Promotion Model consists of three constructs: individual's characteristics and experiences, behavior-specific cognition and affect, and behavior outcome. Individual's characteristic and experiences incorporates two concepts; prior related behavior and personal factors. The construct of behavior-specific cognition and affect comprises six concepts; perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences.

There are three concepts that contained in the behavioral outcome: immediate competing demands and preferences, commitment to a plan of action, and health-promoting behavior. Individual characteristics and experiences which consist of prior related behavior, frequency of the same or similar health behavior in the past, personal factors (biological, psychological, socio-cultural), general characteristics of the individual that influence health behavior such as age, personality structure, race, ethnicity, and socio-economic status.

Pender proposed that individuals engage in health-promoting behaviors through a cognitive process that is related to the individual's intention to accomplish the health-promoting behavior. Developing awareness of relevant past behaviors and being able to either directly or indirectly affect the HPM through the behavior-specific cognitions are the process for predicting future health-promoting behaviors.

These variables are major motivational significance because they are subject to medication. The individual variables of perceived benefits of action, personal barriers of action, perceived self-efficacy, activity-related affects, situational influences, and interpersonal influences can be modified to increase health-promoting behaviors.

Perceived benefits of action are defined as perceptions of the positive or reinforcing consequences of undertaking a health behavior.

Perceived barriers to action are defined as perceptions of the blocks, hurdles, and personal costs of undertaking a health behavior.

Perceived self-efficacy is defined as judgment of personal capability to organize and execute a particular health behavior; self-confidence in performing the health behavior successfully.

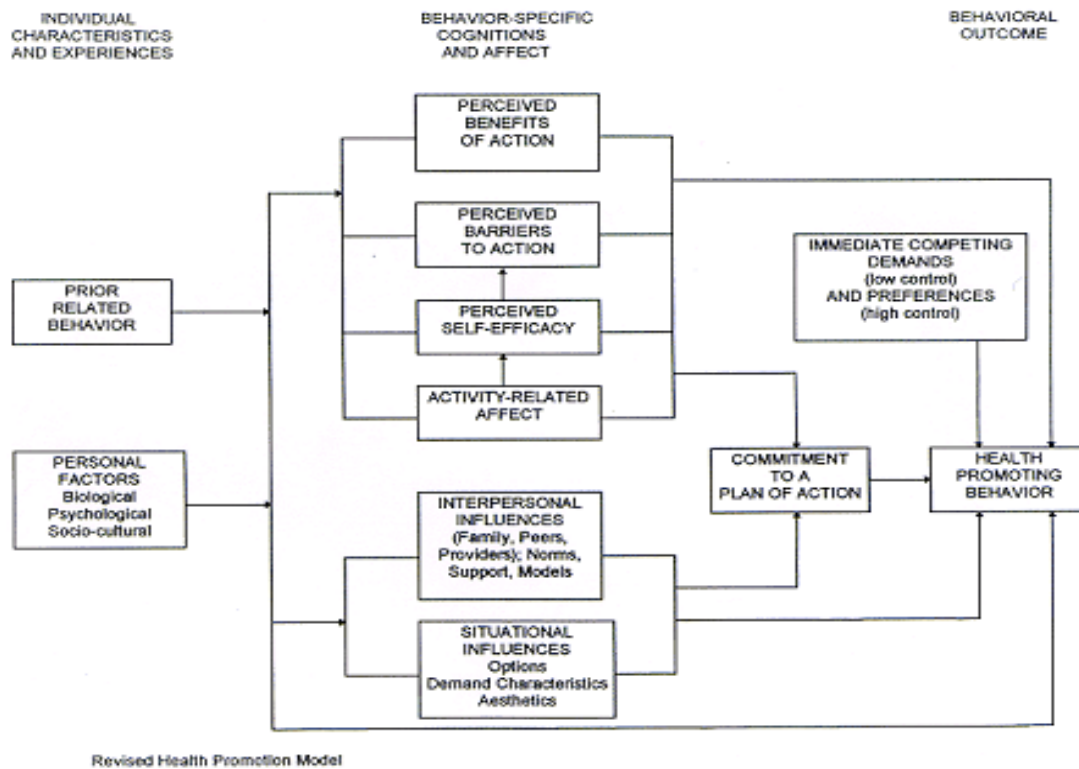
Activity-related affect is defined as subjective feeling states or emotions occurring prior to, during and following a specific health behavior.

Interpersonal influences (ex. social support from family, peers/ friends, and health providers) impact health-promoting behavior directly or indirectly through social pressures, leading to perform a desired behavior.

Situational influences are personal perceptions and cognitions of situation or context that can facilitate or impede behavior. Behavior-specific cognitions and affects are influenced by immediate competing demands and preferences that can lead to a commitment to a plan of action and to health-promoting behavior, which is the desired outcome of the HPM.

The behavior outcome construct consists of commitment to a plan of action, immediate competing demands and preferences, and health promoting behavior. Commitment to a plan of action starts health-promoting behavior. It implicates fundamental cognitive processes, which is commitment to carry out a specific action at a given time and place, and with particular person or alone (Pender, 2011).

## Pender's Health Promotion Model



Pender, N. (2006). Health promotion in nursing practice. (5<sup>th</sup> ed.). Prentice Hall: Upper Saddle River, New Jersey.

Figure 1 Pender's Health Promotion Model

## **5. Previous studies related to the application of HPM to promote health behaviors**

In order to improve medication adherence, nurses can assist patients in understanding the major determinants of their health behaviors. The aim is to promote healthy lifestyles. Regarding to this point, Pender's Health Promotion model is proved in its' effectiveness to guide the interventions that affect communities, therefore producing a healthier population. Pender's stated that every individual in all their psychosocial complexity will interact with environment progressively "transforming the environment" while at the same time being transformed (Pender et al, 2011).

Many previous studies have worked effectively with Pender's Health Promotion Model. The model has been used as a framework by many researchers to collect information about values and cultural beliefs, and also figure out a need for culturally diverse health promotion programs. Many program developments (for special populations, health care provider evaluation, and instrument development) have been accomplished by involving this model.

A descriptive study for the purpose of illustrating the explanatory models of promoting health and preventing diabetes used by Mexican American youths between ages 12 to 14 and their mothers conducted by May and Rew (2010). The focus of study was on healthy nutrition and physical activity of health promotion. The researchers intervened both the youths and their mothers; a mutual accountability for health promoting behaviors related to diabetes prevention was the outcome. Both targets, youths and their mothers, claimed emotional factors as a cause of diabetes. The authors suggested the need for health promotion strategies to be culturally congruent.

Another study that involved Pender's Health Promotion Model conducted by Eschiti (2008). The study examined complementary and alternative modality (CAM) use by women with gender specific cancer. The aim was to establish which personal factors influence the use of CAM. The researcher focused on biological, socio-cultural, and psychological factors as a fundamental for the study. The samples were those women with age 40 and older, who have high levels of education, pain, and



the presence of depression or anxiety were more likely to use CAM. The result described that those females who are likely to use CAM for female-specific cancers should be targeted for educational programs that teach safety in the use of CAM.

In 2003, Wu, Pender, and Nouredine worked together in a study of Taiwanese adolescents with the purpose of identifying gender differences associated with physical activity. The HPM was also involved as the framework of the study. They revealed out the significance of factors affecting perceived self-efficacy in Taiwanese adolescents participating in physical activity. Behavior specific cognitions of self-efficacy, benefits, barriers, and interpersonal influences became the focus of the study. It found perceived self-efficacy was the strongest correlate of physical activity for these adolescents.

HPM has also been tested as a causal model to predict factory workers behavior of using hearing protection. It reported that high perceived self-efficacy and low perceived barriers were the most compelling factor in hearing protection use. The results of this study support the use of the HPM for predicting health protecting behaviors (Lusk et al., 1994).

In a study of outpatients with HIV/AIDS, HPM was used to examine perceived health and self-care learning needs, barriers, and preferred learning modalities. The samples were HIV positive adult patients. They were surveyed regarding their self-care learning needs, educational interests, barriers to learning, and preferred modalities of learning. The results of the study showed that 97% of the participants interested in learning about being healthy. According to the study, it is important to empower patients and to plan appropriate intervention not only for the patients but also for the clinic, and its resources (Mendias & Paar, 2007).

Another study employed the HPM as the framework for assessing, and implementing the concept of a medical home in rural localities for children with special healthcare needs (CSHCN) (McClune, 2009). The study explored barriers confronting this population that coincide with the behavior specific cognitions and affects as described by Pender. The result showed that many issues associated with the health of CSHCN fit well with the HPM. The researcher implemented the findings and said that medical home is the optimal solution for rural areas.

The HPM has also been used in several studies related to health promotion behavior. All the studies concluded that HPM is effective to be implemented not only to predict health behavior but also to develop programs in health promotion. The HPM was selected because it relates individual characteristics and behavior specific cognitions and affect to health and health behavior (Kelly et al., 2009; Thanavaro et al., 2010).

In Pender's health promotion model, cognitive perception factors affect the appearance of terminal behavior change such as: the importance of medication to health, health control, perception of self-efficacy, definition of health by the individual subject, perceived benefits of health-promoting behavior, perceived supports or hindrances to health promotion behavior. All of these factors are sensitive to change and can be improved by education.

Perceived medication adherence self-efficacy is one of the cognitive perception factors in this model that can be improved by education. Through education, a nurse can teach the TB patient appropriate behaviors to help control their healthy. Education can improve patients' expectations regarding self-medication adherence, such as on time administration, regular medication use, procuring more medication before the previous prescription is completely consumed and continuing to use the medication even if there are some slight side effects. Education also enables the patient to understand TB better, its complications, effects of regular medication adherence on the TB, and the role of their own behaviors in TB medication. Such education further affects other cognitive factors in the model further enabling behavioral change. There are many studies in the literature demonstrating that educational interventions increases medication adherence and improves healthy lifestyle behaviors. Scores on measures of self-efficacy for specific health behaviors have been linked to outcomes in a variety of medical contexts, including hypertension, asthma, diabetes, pain management, and depression, and self-efficacy is an important component in many theoretical models of health behavior.

## Conceptual Framework

Medication adherence to a regular regimen necessitates proper behaviors. Persons with TB experience assorted chronic conditions involving a long-term treatment of daily medication as the consequence. Through his Health Promotion Model, Pender hypothesized that the determinants of health promotion behaviors include: individual perceptions, modifying factors and other variables that influence the likelihood of a patient engaging in activities that can achieve well-being and self-actualization, thereby, preventing risk factors from developing. To enhance medication adherence behaviors, persons with TB should have adequate knowledge and skills regarding the disease and the treatment through a health promotion program.

By incorporating three concepts of Pender's Health Promotion Program, this study was employed to appraise TB medication adherence. The individual variables of perceived benefits of action, personal barriers of action, perceived self-efficacy, activity-related affects, situational influences, and interpersonal influences were modified to increase health-promoting behaviors. These variables are major motivational significance because they are subject to medication. Pender argued that individuals' engage in health-promoting behaviors through a cognitive process that is related to the individual's intention to accomplish the health-promoting behavior. Assessments that involved in this study were delineated as follows:

1. Perceived benefit to action

The focus of the assessment was increasing TB patients' knowledge of the importance of medication adherence behavior. They were also motivated to figure out any opportunities for social interaction, sense of belonging, and unity that strongly help them during their medication. The outcomes were an improved quality of life and longevity in health and psychosocial. Through the assessment, it also expected there will be a decrease of chronic diseases and other adverse health problems.

## 2. Perceived barrier to action

Through activities in this concept, TB sufferers were propelled to explore any blocks, hurdles and personal costs of undertaking medication adherence behavior they were facing during TB treatment such as: communication difficulties, low literacy levels, inadequate knowledge and low awareness of TB disease, patient attitudes and beliefs in treatment efficacy, unstable living conditions, negative health provider attitudes, stigma and discrimination, and overcrowding and difficult to access the health provider. Hence, they are able to identify the strategies that can be utilized for any unpredictable situation.

## 3. Self-Efficacy

Self-efficacy concerns with the personal decision of what person can do with whatever skills one possesses in term of health behaviors (Pender et al., 2006). Perceived self-efficacy on medication adherence recommits to the level of confidence in the ability of TB patients to organize and carry out specific tasks and behaviors related to medication adherence. Through the assessment in this concept, persons with TB were guided to improve their self-efficacy due to TB medication adherence behavior. Hence, they are able to created positive perception, due to TB medication adherence program.

The study will be focus on behavior specific cognitive and affects related to TB medication adherence. According to literature review, it found that training program for TB medication adherence can be implemented by applying the Pender Health Promotion Model. This is the conceptual framework of the study:

**Tuberculosis Health Promotion Program:****1. Health Education**

Increase knowledge of the importance of medication adherence behavior

Decrease in chronic diseases and other adverse health outcomes

**2. Personal Counseling**

Explore opportunities for social interaction, sense of belonging and unity

Improve quality of life and longevity

Improvement in personal health and psychosocial outcomes

Organize strategy to handle communication difficulties

**3. Group Discussion**

Improve self-efficacy due to TB medication adherence behavior

Created positive perception due to TB medication adherence program

Increase skills related to TB medication adherence

Explore strategy to cope with stigma and discrimination

Discover tactic to manage negative health provider attitudes

Reinforce patient positive attitudes and beliefs in treatment efficacy

**4. Individual Monitoring**

Remembrance patients to take the medication and support by assessing motivational through SMS texting

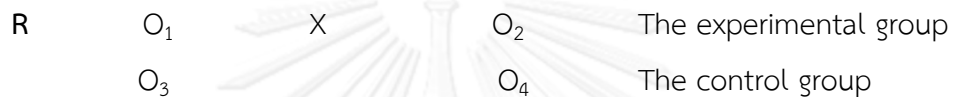
Medication  
Adherence

## CHAPTER III METHODOLOGY

### Research design and Setting

This study is a quasi-experimental study. A non-equivalent group design was used in this study. The participants in this study were assigned randomly into the experimental group or the control group. The intervention (X) was given to the participant in the experimental group.

This design diagrammed as follows:



X = The Tuberculosis Health Promotion Program

O<sub>1</sub> = Gathering pre-test of the experimental group after the day of recruitment for the study, one week before intervention provided.

O<sub>2</sub> = Post-test of the experimental group at 8<sup>th</sup> weeks after Pre-test.

O<sub>3</sub> = Gathering pre-test of the control group after the day of recruitment to the study.

O<sub>4</sub> = Post-test of the control group at 8<sup>th</sup> weeks after Pre-test.

### Setting

This study was conducted at Public Health Center Klari, Karawang, West Java, Indonesia.

## Population and sample

### Population

The population for the study was TB patients who are registered to receive general TB treatment from the public health center in Indonesia.

### Sample

The samples in this study were outpatients with active Tuberculosis both who are living in the area of responsibility of Public Health Center Klari, Karawang, West Java, Indonesia. Sample was recruited through the eligibility criteria as follows:

- 1) Those who diagnosed with active Tuberculosis,
- 2) Patient aged 20-59 years,
- 3) Registered as the citizen of Indonesia,
- 4) Having Tuberculosis medication treatment,
- 5) Inexperience with other complicated diseases,
- 6) Capable to read and write in Indonesian, and
- 7) Willing to participate in the program
- 8) Be able to be contacted by phone

### Sample size

The sample size of the study was calculated based on the power analysis by using G Power Program. According to the power analysis, with the effect size of 0.90,  $\alpha=0.05$ , and power=0.95 the sample size resulted in this study is 56 (Cohen, 1988). By assuming the attrition rate of 20% as anticipation, therefore, 68 participants were needed. Those participants randomly selected in the experimental and control group with 34 participants in each group.

### Sampling procedures

Systematic random sampling procedure was used in this study. The researcher divided the participants who met the eligibility criteria in the experimental group or the control group. Participants who admitted the public health center from Monday to Wednesday were selected into the experimental group. Those who visited from Thursday to Saturday were in the control group. After receiving brief

information related to the study, the eligible participants who agree to join this study signed the form consent.

## **Research Instruments**

The instruments that were employed in this study composed of three types; 1) instrument for data collection, 2) instrument for intervention, and 3) instrument for validity check. The content validity of instruments was examined by five experts, including two faculty members from the Faculty of Nursing Chulalongkorn University, who expert in research methodology, two advanced community nurse specialist who expert in nursing community and tuberculosis disease, and one physician who experts in lung diseases (pulmonologist).

### **1. The instrument for data collection**

#### **1.1. Socio-Demographic Characteristic Instrument**

Socio-demographic characteristic instrument was attained to determine a picture of the TB patient population in the community. It was collected before the programs and measured by using the frequency and percentage of categorical variables. This instrument was developed by the researcher based on a literature review about socio-demographic factors associated with tuberculosis disease. This instrument concerning personal data were asked including sex, age, marital status, education, distance to the public health center Klari (km), residence area, occupation, and monthly income. The participants have to check only one of the following answer options, in each question that mostly related to their situation.

#### **1.2. Morisky Medication Adherence Scale 8-items**

With permission, the Morisky Medication Adherence Scale was used to measure the level of medication adherence. The MMAS consists of 8 items of questions with binary response (yes/ no) scales. Several studies, for example, a study of Malaysian patients with diabetes, showed that the eight-item MMAS had good test-retest reliability (0.816) with good convergent validity and sensitivity (77.61%) but lower specificity (45.37%). For the convergent validity, a high correlation ( $r = 0.792$ ) indicates that the translated eight-item MMAS correlates well with the translation of the previous four-item Morisky scale, and this improved convergent



validity. The MMAS-8 is a generic assessment tool that can be utilized for specific health conditions. The instruments were examined prior to use for clarity, language appropriateness and content validity, by five experts: 2 faculty members, who are experts in research design; 2 nursing lecturers who are experts in TB; and 1 physician, who is an expert in lung disease (pulmonologist). The content validity was validated by those experts which resulted in CVI=0.875. The reliability of the instrument was tested to establish each questionnaire internal consistency, using 30 persons who had the same characteristics as the sample (Cronbach's  $\alpha$ = 0.848) (Morisky, 2011).

#### Coding Instructions for the Morisky Medication Adherence Scale

There are 8-items of question in the Morisky Medication Adherence Scale. Item number 1 to item number 7 with “yes” and “no” answer, and the last item, number 8, with 4 options of answer: never/ seldom, occasionally, sometimes, usually, every time. For item 1, 2, 3, 4, 6, 7, those who choose “yes” answer will get 0, while the “no” answer will be score “1”. For item 5, the code response should be reversed in a positive direction, 1 point for “yes” answer and 0 for “no”. Code response for item 8 (0-4), resulting in a scale from low adherence to high adherence. Item 8 is divided by 4 when calculating a summated score. This procedure standardizes the 5-point Likert scale. The total scale has a range of 0 to 8.0.

Adherence Level	score
Low Adherence	<6
Medium Adherence	6-8
High Adherence	8

## 2. The instrument for Intervention

Tuberculosis Health Promotion Program is a multi-components intervention that promoted tuberculosis medication adherence on the basis of Penders' Health Promotion Model (HPM). The program incorporated three components HPM, which are: perceived benefit to action, perceived barrier to action, and self-efficacy. The Tuberculosis Health Promotion Program was emphasized in patients' medication adherence behavior that consisted of several approaches: health education related to TB, personal counseling, group discussion, and individual monitoring during the program. The program was described as follows:

### 2.1 Program Development

The content of the information in this study was adapted from TB Training Program of Central Disease Control (CDC). This intervention incorporated three components of Pender's Health Promotion Model, which are: Perceived benefit to action, Perceived barrier to action, and self-efficacy. Thus, all activities that involved in this program were guided by the three components. The Tuberculosis Health Promotion Program provides the knowledge and skills to manage tuberculosis medication adherence that significantly related to improving health status. Hence, quality of life could be optimally achieved. This program consisted of 4 parts that covered the 7 sessions of the meeting within 8 weeks of intervention. The 4 parts of this program were 1) health education related to TB, 2) personal counseling, group discussion, and 4) individual monitoring. Each part was described as follows:

#### Health education related to TB

The aim of this part is to increase knowledge and skills related to TB medication. By increasing knowledge and skill of participants, the perceived benefit related to TB medication can be improved while perceived barrier can also be decreased. The activities in this part were cooperated in the 1<sup>st</sup> and 2<sup>nd</sup> sessions of the program which consisted of providing information related to tuberculosis. The estimated time for each session was 60 minutes of presentation and discussion; power point slides were used as the media. The contents are: "What is tuberculosis?", "Is TB a common disease?", "How is the disease transmitted?", "What happens after infection with the tubercle bacilli?", "What are the symptoms

of TB?”, “How can TB be diagnosed?”, “What is the treatment for TB?”, “Adverse reactions to anti-TB drugs”, “DOT (directly observed treatment)”, “How can TB be prevented?”, and “Some common misunderstandings about TB”. The participants were also trained and practiced the skills that associated to tuberculosis medication adherence. In addition, intervener support the participants by providing tuberculosis handbook contains information related to tuberculosis.

#### Individual counseling

Two personal counseling with each participant were scheduled during the program. It set for 30 minutes at each meeting. The meeting was held on the 3<sup>rd</sup> and 4<sup>th</sup> sessions of the program. The counseling sessions help participants through problem solve activities, regarding issues they might encounter during their TB medication (i.e., barriers to take the medication properly such as: side effects of the medication; feeling much better after several first taken). The participants were helped in how to manage the barriers; set the proper time for medication; adjust their activity during the medication and set realistic goals related to TB medication.

#### Group Discussion

The group discussion consisted of two targets of action; the first target was to increase perceived self-efficacy; and the second was to increase perceived benefit and reduce perceived barriers. It held for three times meeting. The activity that aimed to increase self-efficacy was scheduled on 5<sup>th</sup> session. It includes: demonstration of taking TB medication properly, training and guidance on personal goal setting, verbal reinforcement/ support related to medication taking, and group discussions that talk about experiences of participants during the medication. On the 6<sup>th</sup> session, the activity focused on how to increase perceived benefits and decrease perceived barriers to TB medication. The activity includes: group discussion about the benefits of taking medication properly, personal experience about positive effects and problems/ barriers regarding TB medication. On the 7<sup>th</sup> session, the participants were assisted on how they can manage barriers during the medication and stay with the medication.

### Individual Monitoring

The participants received SMS motivation and medication taking reminder during the first month. The aim is to monitor the medication and also to support participants. The SMS was given 6 times in a week. The text contains are provided motivation in staying with TB medication.

### **2.2 Media of Intervention**

The media of this program were composed of patients' handbook, power point slides, and manual of the program. The patients' handbook is developed and adapted from TB Training Program of Central Disease Control (CDC). It contains the information related to health education related TB part. The power point contains all information in patients' handbook. It was used in all sessions as the main media of the researcher. Programs' manual was addressed to guide the researcher in implementing the program.

### **3. Instrument for experimental monitoring**

Medication Adherence Self Efficacy Scale (MASES) (Ogedegbe et al., 2003) was used in this study to assess patients' confidence in following the medication process. It consists of 13 items scale of confidence in taking medications and ability to carry out the following tasks. The instrument explores patients' confidence in their ability to take their medications in a variety of situations. Some examples of situations include "when busy at home," "while at work," "when they cause some side effects". Each item is scored from 1 (not at all sure) to 4 (extremely sure). The total scores were ranged 0-52. The higher scores were meant the participants have more confidence in following the medication process than the lower score. The total score of all items is calculated by averaging across responses to all items. Higher scores indicate a greater level of self-efficacy in medication adherence. Cronbach's alpha for the measure is 0.95.

**Coding Instructions for the Medication Adherence Self Efficacy Scale (MASES)**

This part composed of 13 statement of rating scale with the score range of 13-52. There choices for each statement were provided, as very confident, fairly confident, a little confident, and not confident. The total score was divided into 3 levels by subtract the highest score by the lowest score and divided by the number of groups of score levels needed (Katmanee, 2004).

The interpretation of the score was presented as follows:

Scoring Criteria	Score
13-26	low self-efficacy
27-40	moderate self-efficacy
>40	high self-efficacy

**Comparison of the Mean Scores and Standard Deviation of Perceived Self-efficacy in the Experimental Group, Before and After Participating in the Program**

To analyze the difference of the mean scores and standard deviation of perceived self-efficacy in the experimental group, before and after participating in the program, dependent t-test was used. It showed that

There was a significant difference of the mean scores of perceived self-efficacy in the experimental group between pre-test ( $\bar{X} = 27.70$ ,  $SD = 1.48$ ) and post-test ( $\bar{X} = 37.29$ ,  $SD = 1.36$ ) with  $p < 0.01$ .

**Table 2 Comparison of the mean scores and standard deviation of perceived self-efficacy in the experimental group, before and after participating in the program**

Medication adherence	$\bar{X}$	SD	df	t	p - value
Experimental group (N = 34)					
Before	27.70	1.48	33	-24.91	0.01
After	37.29	1.36			

The Morisky Medication Adherence Scale (MMAS) and the Medication Adherence Self Efficacy Scale (MASES) were validated by five experts. Two community nurse specialists who have expertise in TB, two faculty members who has expertise in conceptual framework and theory, and one physician who is an expert in respiratory disease, were asked to validate the structure and the content of the program related to the theoretical framework of the study. The psychometric property of the instruments was tested using content validity and internal consistency reliability. This questionnaire was brought to 5 experts that composed of 2 faculty members, who are experts in research design; 2 nursing lecturers who are experts in TB; and 1 physician, who is an expert in lung disease (pulmonologist). The content validity would be validated by those experts which resulted in CVI=0.83. The internal consistency reliability of this instrument was also tested in another 30 TB patients who had the same characteristics with Cronbach's alpha coefficient was 0.8.

## **Experimental Procedure**

The TB Health Promotion Program was delivered in three phases consist of preparation, implementation, and evaluation phase.

### **1. Preparation Phase**

#### **1.1. Instrument preparation**

The instruments that have been reviewed by experts then translated into Bahasa. The process was begun started by translating the original English version of the instruments into Bahasa. The result, then reviewed by Indonesia reviewers, including translator, and the researcher. The instruments then translated to English by one bilingual person who is not familiar with the original English version and has adequate knowledge of and experience with translation from Bahasa to English. The back-translated instruments reviewed again by Indonesia reviewers to ensure linguistic and conceptual equivalence.

#### **1.2 Researcher and research assistant preparation**

Two research assistants helped with this study. Research assistants were nurses who have experience in Tuberculosis program with minimum requirement of education are bachelor in nurse and have at least 2 years of clinical experiences. They helped in data collection during the program. Before each session of the intervention, the assistant informed about the component of intervention.

#### **1.3 Place preparation**

Due to sub-district regulation, the researcher informed the head of sub-district health department about the program. Thus, the recommendation from the health department was addressed to the head of public health center Klari. The researcher then collaborated with the head nurse of the tuberculosis clinic at public health center Klari. The objectives, procedures, and the approximately length of time for the program were informed. The researcher also requested and prepared the meeting room at the public health center for the tuberculosis health promotion program implementation.

## 2. Implementation Phase

### 2.1 Procedures in the control group

Those participants in the control group were received pre-test and post-test. Pre-test phase was conducted after the participants were provided with information explaining the study's purpose, procedure and benefits. Those who agreed to take part in the study indicated their consent by signing a consent form. The participants in the control group were completed the questionnaire for pre-test including socio-demographic characteristic, and Morisky Medication Adherence Scale (MMAS). They were received the usual care during the 8 weeks since the commitment. The usual care was consisted of information that the nurse gives during patients' visitation, provides health information related to medication taking, and scheduling patients' visitation. The participants in the control group were complete the Morisky Medication Adherence Scale (MMAS) for post-test at 8 weeks after the program.

### 2.2 Procedure in the experimental group

Those participants in the experimental group were received the usual care and the Tuberculosis Health Promotion Program. The program covered 7 sessions of implementation within 8 weeks. All activities of this program were described as following:

**Session 1:** the first session was held in the meeting room of the public health center Klari. The aim of this session is to increase knowledge and skills related to TB medication. Before the session started, the participants completed the Medication Adherence Self-efficacy Scales instrument (MASES) for validity check. The health education was divided into 2 sessions. The estimated time for the session was 60 minutes of presentation and discussion. The information provided were: "What is tuberculosis?", "Is TB a common disease?", "How is the disease transmitted?", "What happens after infection with the tubercle bacilli?", and "What are the symptoms of TB?" The major activity of this phase was emphasized about providing information for enhancing participant's knowledge related to tuberculosis disease. The participants were given tuberculosis handbook information related to tuberculosis.



At the last of the session, the researcher asked some questions related to the 1<sup>st</sup> session's topics. The majority of the participants were able to answer the questions. Those, who still didn't understand some information were explained again and motivated to memorize the information. The researcher communicated the participants he was able to be contacted for further information needed.

**Session 2:** the second session was also held in the meeting room of the public health center Klari. The estimated time for the session was 60 minutes of presentation and discussion. The information provided: "How can TB be diagnosed?", "What is the treatment for TB?", "Adverse reactions to anti-TB drugs", "DOT (directly observed treatment)", "How can TB be prevented?", and "Some common misunderstandings about TB". The major activity of this phase was emphasized about providing information for enhancing participant's knowledge and also skills related to tuberculosis medication.

Similar with the 1<sup>st</sup> session, participants were also asked some questions related to the 2<sup>nd</sup> session's topics. Almost all who were questioned by the researcher able to answer it. Furthermore, the researcher also communicated that he was able to be phoned for more information needed.

**Session 3:** the third session was implemented in the TB clinic room of the public health center Klari. The session was part of personal counseling with each participant was 30 minutes of face-to-face meeting. The session helps participants through problem solve activities focus on how to manage the barriers and set the proper time for medication.

The researcher re-informed the whole discussion at the last session by asking the participant to explain problems their facing with and what method can be used to solve it. Those who still have problems in understanding the topics were given additional explanation by the researcher.

**Session 4:** The session was 30 minutes of face-to-face meeting that discussed about how to adjust their activity during the medication and set realistic goals related to TB medication. This session was also held in the TB clinic room of the public health center Klari.

The majority of participants were clearly understood on how to change some activities to optimize their TB treatment. They knew how to take more resting time, reduce some stress, and modify their daily tasks.

**Session 5:** the fifth session was part of the group discussion. The aim was to increase perceived self-efficacy and perceived benefit, also reduce perceived barriers. The session was held for three times meeting at the public health center Klari meeting room. The focus of the 5<sup>th</sup> session aims to increase self-efficacy which includes several activities: demonstration of taking TB medication properly, training and guidance on personal goal setting (ex: created personal daily schedule), verbal reinforcement/ support related to medication taking, and group discussions that talk about experiences of participants during the medication. The estimated time was 30 minutes. At the last of the 5<sup>th</sup> session, the researcher asked several participants to redo the medication taking process. The majority of those participants were able to do the process correctly.

**Session 6:** This session focused on how to increase perceived benefits and decrease perceived barriers to TB medication. The activity includes: group discussion about the benefits of taking medication properly, personal experience about positive effects and problems/ barriers regarding TB medication.

In this session, the researcher invited a TB patient who has been cured. He shared his experience on how to deal with barriers during his medication planning. He also told the participants on how family have important role in his treatment. His family totally supported him to finish the medication. Some participants were also given time to asked to the former TB patient.

**Session 7:** the seventh session was the last session, which also part of the group discussion. On this session the participants were assisted on how they can manage barriers during the medication and stay with the medication. The session was held in the meeting room of public health center Klari with estimated time was 30 minutes. At the end of the session, the participants completed the Medication Adherence Self-efficacy Scales instrument (MASES).

At the end of session, the participants were invited to share their feeling during the program and what knowledge they have received for 7 sessions.

Some participants described their opinion about the program. The majority of the participants were pleased to join the program because it helped them to know more and more about tuberculosis. The researcher also motivated them to share the knowledge to their family and also community, for example their closest neighborhood.

During the first 4 weeks of the program, those in the experimental group were received SMS motivation and medication taking reminder. The SMS was given 6 times in a week that contains motivation in staying with TB medication. The SMS text was stated ***“Tuberculosis is cured. Take your medication today and take steps to protect against TB. Fight against TB”***.

#### Evaluation phase

The evaluation phase was done in the 8th weeks of the intervention. At the evaluation phase, both the experimental group and the control group were received post-test evaluation related to TB medication adherence. The Morisky Medication Adherence Scale was utilized to assess the participant. At the end of the program, the researcher terminated the program.

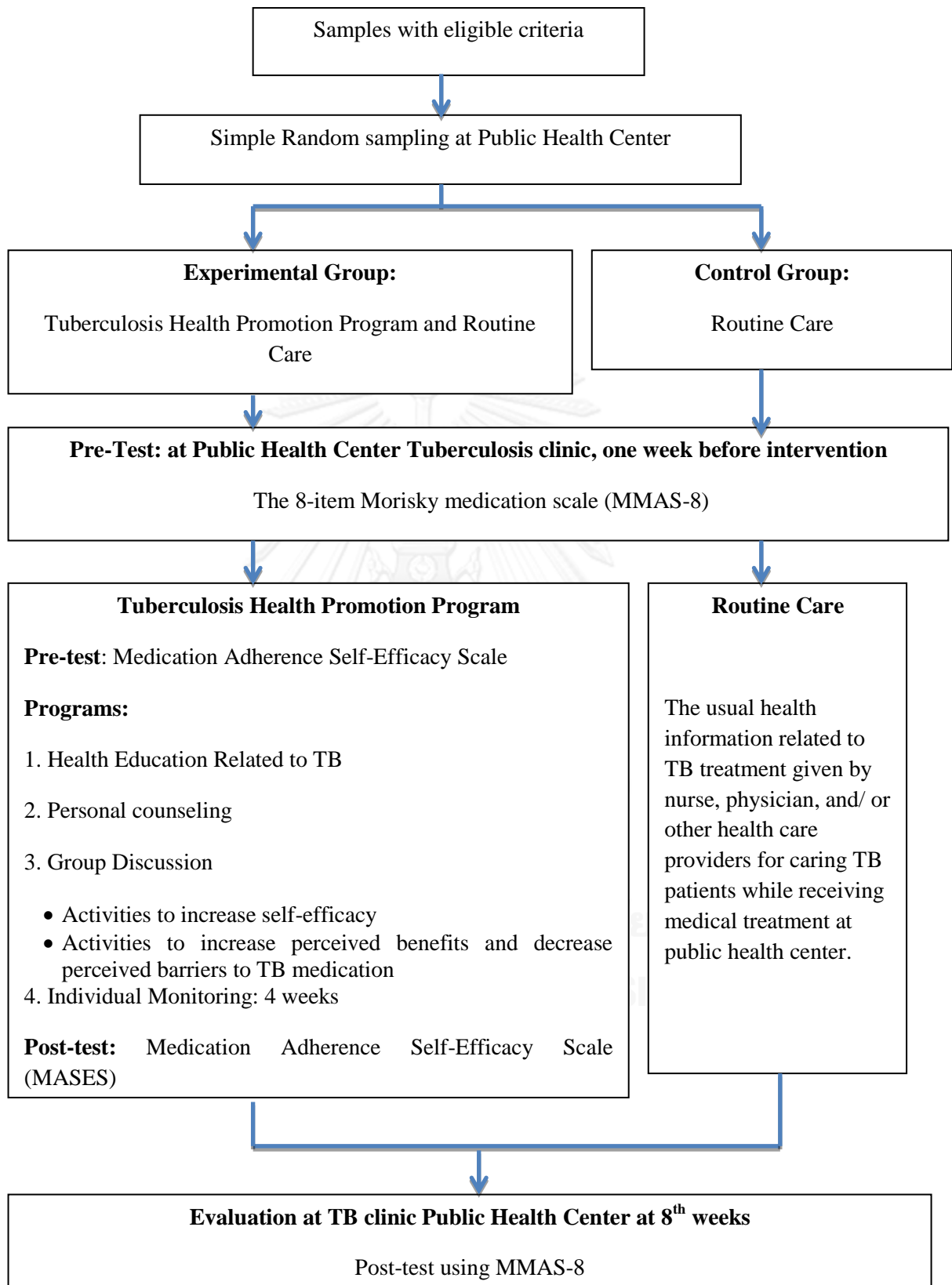


Figure 3 Scheme of the Tuberculosis Health Promotion Program

### **Human subject protection**

Ethical approval was obtained from the Ethical Committee in Karawang Subdistrict, west Java, Indonesia, as the place of the research, before collecting data process. Local health department was also informed about the research. Potential participants who meet with the criteria received detailed information related to the program. They can reject to take participate the program. Those who agreed to participate in this study assign content form that developed by the researcher. All the participants randomly assigned into the experimental group or the control group.

### **Data collection**

The procedures for data collection were described as following:

1. Researcher brought the letter from faculty of nursing, Chulalongkorn University to the Ethical Committee in Karawang Subdistrict, west Java, Indonesia, for the ethics approval and data collection permission.
2. The study, then, was approved the ethical from the ethical committee and given permission for the data collection.
3. The recommendation letter from the ethical committee was brought to Karawang Subdistrict Health Department for activity permission.
4. The approval letter from the head of the subdistrict health department then sent to the head of public health center Klari.
5. Researcher informed the head of public health center Klari all information related to the program and discussed any issues associated with it.
6. When the patients who met the eligibility criteria admitted at TB clinic, researcher and research assistant explained the objectives, procedures, and the protection of human right of the participants. Hence, they assigned the consent form to confirm the agreement.
7. The obtaining data for pre-test was conducted by research assistants which included socio-demographic characteristic and Morisky Medication Adherence Scale.
8. The participants in the control group received the usual care, while participants in the experimental group received the usual care and the Tuberculosis Health Promotion Program from the researcher. Those in the experimental group

were assessed by Medication Adherence Self Efficacy Scale (MASES) at the 1<sup>st</sup> session as the pre-test, and at 7<sup>th</sup> session as the post-test.

9. The obtaining data for post-test was conducted at the 8<sup>th</sup> week of the program.

10. The researcher checked the questionnaire and cleaned the data prior to data analysis.

### Data analysis

Demographic characteristics data were measured by using the frequency and percentage of categorical variables. To evaluate the effectiveness of the program, the mean scores of medication adherence and standard deviations in the control group and the experimental group were measured before and after participating in the program, using Independent t-test. The mean scores and standard deviation were also calculated before and after participating in the program, using Independent t-test with a level of significance  $<0.01$ .

## CHAPTER IV

### RESULTS

The purpose of this study was to examine the effect of tuberculosis health promotion program on medication adherence among TB patients. The sample was comprised of 68 active tuberculosis patients in public health center Klari, Karawang. All the participants who fulfilled the eligibility criteria were randomly assigned to either the experimental group or the control group by using simple random sampling which resulting 34 participants in each group. Participants in the experimental group were given the usual care and the Tuberculosis Health Promotion Program, whereas participants in the control group received the usual care from the public health center. The study was held for 8 weeks with the socio-demographic characteristics data and MMAS were collected from 2 groups. The obtained data were analyzed to answer the research question. The research findings were presented in three parts as following:

- Part 1: Socio-Demographic Characteristic of the active tuberculosis patients that classified to sex, age, marital status, educational level, distance from public health center Klari, home region, occupation, and family income
- Part 2: Comparison of the mean scores and standard deviation of medication adherence in the control group and the experimental group, before and after participating in the program by using dependent t-test
- Part 3: Comparison of the mean scores and standard deviation of medication adherence between the control group and the experimental group, before and after participating in the program by using independent t-test
- Part 4: Comparison of the mean scores and standard deviation of perceived self-efficacy in the experimental group, before and after participating in the program by using dependent t-test

Part 1. Socio-Demographic Characteristics of the Pulmonary Tuberculosis Patients

Table 3 Distribution of frequency and percentage of the experimental group and the control groups by socio-demographic characteristics

Socio-Demographic Characteristics	Experimental Group N = 34		Comparison Group N = 34	
	Number	Percent	Number	Percent
<b>Sex</b>				
Male	23	67.65	20	58.82
Female	11	32.35	14	41.18
<b>Age (years)</b>				
20-29	5	14.70	3	8.82
30-39	6	17.65	15	44.13
40-49	8	23.53	11	32.35
50-59	15	44.12	5	14.70
<b>Marital Status</b>				
Single	2	5.88	3	8.82
Married	31	91.18	30	88.24
Divorced/Separated	1	2.94	1	2.94
<b>Educational Level</b>				
Illiterate	1	2.94	4	11.77
Primary Education	15	44.12	5	14.70
Secondary Education	17	50	25	73.53
Bachelor Degree	1	2.94	0	0



Table 2 (Cont.)

Socio-Demographic Characteristics	Experimental Group N = 34		Comparison Group N = 34	
	Number	Percent	Number	Percent
<b>Distance home to public health center Klari (km):</b>				
0-< 5km	25	73.53	10	29.41
More than 5km	9	26.47	24	70.59
<b>Residence area:</b>				
Urban	25	73.53	24	70.59
Rural	9	26.47	10	29.41
<b>Occupation</b>				
Unemployed	17	50	12	35.30
Labor	9	26.47	10	29.41
Farmer	3	8.82	2	5.88
Trader	4	11.77	10	29.41
Government staff	1	2.94	0	0
<b>Monthly income:</b>				
< US\$87	20	58.82	21	61.77
US\$87 – US\$174	13	38.23	8	23.53
>US\$174	1	6.95	5	14.70
(1\$=Rp 11.500,-)				

The majority of participants were males (67.65% and 58.82%, respectively). Dividing age into four ranges, the majority in the experimental group were 50-59 years old (44.12%), compared to the control group with the majority aged 30-39 years (44.13%). More than 85% of the participants were married (91.18% and 88.24% respectively). Regarding education, the majority of both groups were secondary level (44.12% and 73.53% respectively). 73.53% of the patients in the experimental group were living less than 5 kilometers from the public health center, compared to 58.82% of those in the control group. The majority of participants lived in urban areas (73.53% and 70.59% respectively). Under occupation, the majority of the participants were unemployed (50% and 35.30% respectively) with a monthly salary under US\$87 (58.82% and 61.377% respectively).

## **Part 2. Comparison of the Mean Scores and Standard Deviation of Medication Adherence in the Experimental Group and the Control Group, Before and After Participating in the Program by using Dependent t-test**

To analyze the difference of the mean scores and standard deviation of medication adherence in the control group and the experimental group, before and after participating in the program, dependent t-test was used. It showed that:

There was a significant difference of the mean scores of medication adherence in the experimental group between pre-test ( $\bar{X} = 4.58$ ,  $SD = 1.04$ ) and post-test ( $\bar{X} = 6.38$ ,  $SD = 0.85$ ) with  $p < 0.01$ . Those in the control group remained almost the same between pre-test ( $\bar{X} = 4.29$ ,  $SD = 0.97$ ) and post-test ( $\bar{X} = 3.64$ ,  $SD = 1.04$ ),  $p > 0.01$ ; it shows there was no significant difference in the control group.

Table 4 Comparison of the mean scores and standard deviation of medication adherence in the experimental group and the control group, before and after participating in the program

Medication adherence	$\bar{X}$	SD	df	t	p - value
Experimental group (N = 34)					
Before	4.58	1.04	33	8.212	0.01
After	6.38	0.85			
Control group (N = 34)					
Before	4.29	0.97	33	1.888	0.68
After	3.64	1.04			

**Part 3. Comparison of the Mean Scores and Standard Deviation of Medication Adherence between the Experimental Group and the Control Group, Before and After Participating in the Program**

To analyze the difference of the mean scores and standard deviation of medication adherence between the control group and the experimental group, before and after participating in the program, independent t-test was used. It showed that:

It showed that there was no significant difference found between the two mean scores for medication adherence for the experimental group ( $\bar{X}=4.58$ ,  $SD=1.04$ ) and the control group ( $\bar{X}=4.29$ ,  $SD=0.97$ ),  $p>0.01$ . The result after the program showed that there was a significant difference of mean scores between the experimental group ( $\bar{X}=6.38$ ,  $SD=0.85$ ) and the control group ( $\bar{X}=3.64$ ,  $SD=1.04$ ),  $p<0.01$ .

**Table 5 Difference comparison of the mean scores and standard deviation of medication adherence between the control group and the experimental group, before and after participating in the program**

Medication adherence	$\bar{X}$	SD	t	df	p - value
Before					
Experimental group	4.58	1.04			
Control group	4.29	0.97	1.201	66	0.234
After					
Experimental group	6.38	0.85			
Control group	3.64	1.04	8.791	66	0.01

## CHAPTER V

### DISCUSSION

For its' significant role in almost all treatment programs which involving regiment therapy, medication adherence has been repeatedly mentioned and discussed. Tuberculosis (TB) remains a major problem globally. An enormous number of TB sufferers, with 128 cases per 100,000 persons, induce global awareness to improve any program associated with the disease. A standard long-duration TB treatment, which generally lasts for at least six months, has shown a high risk of treatment default (Munro et al., 2007). Consequently, poor adherence to TB treatment may result in the emergence of resistant strains of *Mycobacterium tuberculosis*, increasing mortality and prolonging treatment duration (WHO, 2006). A number of interventions have been developed to improve medication adherence in persons with TB, but few have ever been implemented in Indonesia. Thence, a quasi-experimental study was conducted with efforts to improve medication adherence among TB Patients with two objectives:

1. To compare medication adherence of the experimental group before and after participating in the Tuberculosis Health Promotion Program among TB patients
2. To compare medication adherence between the experimental group and the control group after the Tuberculosis Health Promotion Program among TB patients

This quasi-experimental study was conducted at the Klari, Karawang Public Health Center in West Java, Indonesia from January to March 2014. The study participants were TB patients registered at the public health center who met several required criteria: 1) those diagnosed with active Tuberculosis during the period of the study, 2) aged 20-59 years, 3) a citizen of Indonesia, 4) receiving Tuberculosis medication treatment, 5) free of suffering from any other disease, and 6) able to read and write in the Bahasa Indonesia language. Participants were randomly assigned to the intervention or control groups, with each group comprising 34 participants.

Data collection involved several measurement instruments. Demographic characteristics of the participants were attained before the program was started to determine a picture of the TB patient population in this community by using the frequency and percentage of categorical variables. Those in the experimental group participated in the TB health promotion program that included: 2 sessions of health education related to TB, 2 sessions of individual counseling, 3 sessions of motivational activities, with each session lasting 45-60 minutes, and monitoring via SMS texting for a month. Both groups underwent pre-test and post-test evaluations using the 8 items Morisky Medication Adherence Scale (MMAS). The MMAS consists of 8 items of questions with binary response (yes/ no) scales. The MMAS-8 is a generic assessment tool that can be utilized for specific health conditions (Morisky et al., 2011). The reliability of the Morisky Medication Adherence Scales was tested to establish each questionnaire internal consistency, using 30 persons who had the same characteristics as the sample (Cronbach's  $\alpha = 0.848$ ).

To evaluate the effectiveness of the program, the mean scores of medication adherence and standard deviations in the control group and the experimental group were measured before and after participating in the program, using Independent t-test. The mean scores and standard deviation were also calculated before and after participating in the program, using Independent t-test with a level of significance  $<0.01$ .

### Summary of the study

This study implicated 68 active tuberculosis patients who registered and receiving regular TB medication at the Klari, Karawang public health center in West Java, Indonesia. The majority of participants who participated in this study were males (67.65% and 58.82%, respectively). Regarding into age, the majority in the experimental group were 50-59 years old (44.12%), compared to the control group with the majority aged 30-39 years (44.13%). The participants were largely married (91.18% and 88.24% respectively). Considering education, the majority of both groups were secondary level (44.12% and 73.53% respectively). 73.53% of the patients in the experimental group live less than 5 kilometers from the public health center,

compared to 58.82% of those in the control group. The majority of participants lived in urban areas (73.53% and 70.59% respectively). Under occupation, the majority of the participants were unemployed (50% and 35.30% respectively) with a monthly salary under US\$87 (58.82% and 61.377% respectively).

The result indicated there was a significant difference of the mean scores of medication adherence in the experimental group between pre-test ( $\bar{X}=3.47$ ,  $SD=1.07$ ) and post-test ( $\bar{X}=1.61$ ,  $SD=0.85$ ) with  $p < 0.01$ . Those in the control group remained almost the same between pre-test ( $\bar{X}=3.70$ ,  $SD=0.97$ ) and post-test ( $\bar{X}=3.64$ ,  $SD=1.04$ ),  $p > 0.01$ ; this show there was no significant difference in the control group. No significant difference also found between the two mean scores for medication adherence for the experimental group ( $\bar{X}=3.47$ ,  $SD=1.07$ ) and the control group ( $\bar{X}=3.70$ ,  $SD=0.97$ ) before the program with  $p > 0.01$ . However, the result after the program showed a significant difference of mean scores between the experimental group ( $\bar{X}=1.61$ ,  $SD=0.85$ ) and the control group ( $\bar{X}=3.64$ ,  $SD=1.04$ ),  $p < 0.01$ . A significant difference discovered from the mean scores of perceived self-efficacy in the experimental group between pre-test ( $\bar{X}=27.70$ ,  $SD=1.48$ ) and post-test ( $\bar{X}=37.29$ ,  $SD=1.36$ ) with  $p < 0.01$ .

## Discussion

The findings of this study clearly suggest that TB health promotion contributes to improving medication adherence. The active TB patients assigned to the experimental group outperformed those who were provided general health care and health information by the public health center. From pre-test and post-test evaluation, those in the experimental group showed particular strengths in the task achievement element of the assessment, suggesting that the medication regimen assisted by the health promotion program definitely helped participants to understand and focus on the purpose of their TB medication. As pointed out by Pender and colleagues, individuals are more likely to adopt a recommended health promoting behavior in which the perceived benefits outweigh the perceived barriers (Pender et al., 2011). Thus, congruent with previous research, this study uncovered that the promotion and maintenance of medication adherence among TB patients

able to be influenced by addressing perceived benefits and barriers to medication adherence. It also seems that the individually directed nature of the information helps the TB patients to focus on their own specific needs, strengthen their perceived self-efficacy and assist in deciding how to proceed with their own medication plan and health status. Several studies have proven the effectiveness of information on improving health behavior (Kelley et al., 2009; Thanavaro et al., 2010). By providing some activities, TB patients more easily understood the information related to TB medication, and they were able to implement positive behavior into their medication plan. This led to increased awareness and endurance, followed by a decision to practice correctly.

Other studies that have effectively examined with Pender's Health Promotion Model found that self-efficacy had a strong correlation with medication behavior (Pender et al., 2011; Lusk et al., 1994; Mendias & Paar, 2007; Wu et al., 2003). The result of this study showed similar revelations. In association with motivation factor, self-efficacy serves as a strong determinant and a predictor of the level of accomplishment one attains. In the context of TB treatment, the self-efficacy model could be a method for TB control, focusing on motivating the patient to follow the treatment through completion. Healthcare providers, treatment supporters or family members as well as other patients currently under treatment or who have previously completed it could act as motivators through verbal persuasion. Patients need to believe that if they comply with TB treatment, they can achieve the desired outcome, which is to be cured (outcome expectations). Self-efficacy was addressed in this study through step-by-step mastery experiences (i.e. demonstration of proper TB medication taking; guidance in maintaining TB medication adherence; and support in setting personal goals to achieve a healthy life through verbal persuasion and emotional focus.

Another key strategy in this study was personal counseling and group discussion. Personal counseling was carried out via face-to-face meetings with each participant. The purpose was to address personal needs and solve patients' personal problem related to TB medication adherence. Group discussions were also arranged to help participants improve their self-learning ability through others' experience.



Through these activities, participants were guided to gain positive perceptions of proper health behavior as they revealed their perceptions of barriers they faced during their treatments. It was expected that they would be able to make the right decision in any situation. Therefore, they would have better behavior related to TB medication (Munro et al., 2007)

Furthermore, SMS texting was employed to help maintain TB medication adherence among those in the experimental group. The effectiveness of SMS texting was not clearly identified, even though those in the experimental group who received SMS texting had a better score in medication adherence and perceived self-efficacy. This happened because there was no measurement in this study utilized to identify the correlation between SMS texting and medication adherence. Regarding perceived self-efficacy, 100% of participants in the experimental group showed significant difference. The participant's score were over the 80% of the standard point calculated from the highest score. However, interventions that support medical service delivery could be more effective using IT communications, like SMS text messages. This way information can be more easily and widely disseminated, making it more acceptable and efficacious for every individual. For example, text messages as reminder have led to increased clinic attendance for outpatients in developed and newly industrialized countries (Perron et al., 2010; Downer et al., 2006), and are acceptable for use as reminders for clinic return (Person et al., 2011). A study involving a population of people screened for TB Mantoux in the United States described how patients in the experimental group who received an automated telephone message reminding them to return for a follow up exam in two or three days showed significant improvement in their participation. The fast development in mobile telephone connections in developing countries shows an affordable and far-reaching avenue to improve health outcomes. Text messages are also effective for improving uptake of public health interventions (Free et al., 2011). Thus, reminders to patients to attend clinic appointments or to take medication properly should be considered as a part of any TB control program.

## Conclusion

This study suggests standard nursing preceded the TB health promotion program to promote and maintain medication adherence among TB patients in Karawang, West Java, Indonesia. Nurses who served in the public health center could start the program, which would include their regular services, working with other health professionals. Increasing the effectiveness of medication adherence could achieve a greater impact on the health of the population than any improvement in specific medical treatments. Studies consistently find significant cost-savings and increases in the effectiveness of health interventions that are attributable to low-cost interventions to improve medication adherence.

Due to challenge in nursing shortage, the government should increase the number of nurses in the public health center, especially who work in TB clinic. This regulation will definitely upraise the effectiveness of the implementation of the DOT strategy in Indonesia. Regarding this condition, new tasks to be faced is to upsurge the need for training of the DOTS strategy and the need for teaching with new topics related to TB such as administration of MDR-TB, and others. Consequently, training is required to make the program work effectively.

## Limitations

This study took an initial step in improving TB patients' medication adherence. However, it focused only on one public health center. It might be limitation for generalization the results of the study to other public health centers. The researcher also did not match the participant's characteristics between the participants in the experimental group and those in the control group.

## Recommendations

**For nursing practice:** The Health Promotion Model employed in this study has proven its effectiveness in raising medication adherence, especially for persons with active TB. This model could help nurse in guiding TB patients to learn how to improve their personal goal. Nurse could also help the patients to assess any problems their facing during the medication and take the best decision to cope with

it by organizing all benefits factors related to medication. Thus, patients are motivated to reach their goal to finish the medication.

**For Further Research:** The approach outlined in this study should be replicated with TB sufferers' persons being treated at other health centers to encourage the use of a TB Health Promotion Program in all subject areas. Furthermore, the handbook should be revised due to lack of some information related to the program.

**For nursing education:** This study's findings provide new knowledge about medication adherence, especially for TB patients. Appropriate nursing education curriculums related to TB can be developed to impart more knowledge to students. Thus, nursing students could then implement a proper health education program for patients in the future.

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APPENDIX

จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**



APPENDIX A  
ETHIC APPROVAL

จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**

**SUBDISTRICT GOVERNMENT OF KARAWANG  
OFFICE OF NATIONAL AND POLITICAL UNITY**

Jln. A. Yani No. 33 Karawang, Phone: (0267) 8454 724

Karawang, January 20, 2014

No. : 070.1/02/BIP/2014  
Attachment : -  
Subject : Access Request for  
Research/Observation/Data Capture

Attention:  
1. Head of Klari Community Health Clinic  
2. Head of Health Clinic Telukjambe Timur  
Community  
in **Karawang**

**RECOMMENDATIONS**

1. Based on
  - a. Regulation of Head of Karawang Subdistrict No. 40 of 2011 on Transfer of Some of Government Affairs from the Subdistrict Head-to the Apparatus of Karawang Subdistrict.
  - b. Regulation of Head of Karawang Subdistrict No. 25 of 2012 on the Details of Tasks, Functions and Procedures of the Office of National and Political Unity of Karawang Subdistrict.
  - c. Letter from the Student pursuing Master's Degree at the Faculty of Nursing of Chulalongkorn University Thailand on January 4, 2014 concerning Access Request for Research
2. Based on the above basis, we hereby inform the followings:
  - a. The above-mentioned student:
 

Name	: YUNUS ADHY PRASETYO
Age	: 28 years old
Address	: Puri Telukjambe Blok C7 No. 2 Telukjambe Karawang
Research Title	: <i>"The Effect of Tuberculosis Health Promotion Program on Medication Adherence among TB Patients in Karawang"</i>
Implementation Dates	: <b>January 13 to March 13, 2014</b>
  - b. If the situation permits, we recommend that such activities to be carried out in your region/place/work unit,
  - c. Follow the instructions of Leader/Chief/Head at your place in carrying out the research/observation/field work,
  - d. Please note, if the applicant has completed the activities, he has to inform the conclusion in writing.
3. Please be advised.

On behalf of  
**HEAD OF OFFICE OF NATIONAL AND  
POLITICAL UNITY  
KARAWANG SUBDISTRICT  
Head of Administration Subsection**

  
**ABU BAKAR, SH, MM**  
 Supervisor  
 NIP 19590904 198003 1 004



APPENDIX B

CONSENT FORM AND THE PARTICIPANT INFORMATION SHEET

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

**Form of  
Patient/ Participant Information Sheet**

***Instruction:***

*Need to use simple/lay language, avoid technical terms. (If used, give explanation in lay language)*

*Do not copy content of research proposal/thesis as information for participant.*

*The information must be consequently arranged as follows.*

**Title of research project** The Effect of Tuberculosis Health Promotion Program on Medication Adherence among TB Patients

**Principle researcher's name** Yunus Adhy Prasetyo      **Position** Lecture staff

**Office address** STIK Immanuel, jln. Kopo no.161, Bandung

**Home address** Puri Telukjambe, blok C7 no.2, Telukjambe, Karawang, Jawa Barat

**Telephone (office)** +62 22 5215236      **Telephone (home)** +62 267 640741

**Cell phone** +62 812 900 44813      **E-mail:** yz.ap\_13@rocketmail.com

1. You are being invited to take part in a research project. Before you decide to participate it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and do not hesitate to ask if anything is unclear or if you would like more information.
2. According to WHO report, Indonesia is the biggest fourth of TB population in the world. It is the second cause of death after cardiovascular disease, and the first cause of death from all infectious diseases. It is estimated that there are 591,000 new cases every year and 175,000 deaths from TB. Incomplete treatment of TB is highly resulted in prolonged infection, relapse, drug resistance and death (WHO, 2011, 2012; Widjanarko, Prabamurti, & Widyaningsih, 2006). DOTS strategy has been employed on a government service basis since early 1970s. Although this strategy has been implemented for over thirty years, the treatment completion rate and incident rate fail to meet the WHO standard, the number of TB

patient is still remained (Widjanarko et al., 2006). Over the years, DOTS program has improved to adopt a multiple approach which includes the provision of patient health training, incentives, client-focused regimens, defaulter tracing and referral of social support. Nevertheless, there are some challenges in the implementation of the DOT strategy in Indonesia. One of the challenge is providing health promotion program to strengthen the TB treatment. In order to improve medication adherence, nurses can assist patients in understanding the major determinants of their health behaviors as a basis for behavioral counseling to promote healthy lifestyles. Thus, proper health promotion program related to TB treatment among TB patient is appropriate to be implemented in Indonesia.

3. Objective (s) of the project.
  - a. To compare medication adherence of the experimental group before and after participating in the Tuberculosis Health Promotion Program among TB patients
  - b. To compare medication adherence between the experimental group and the control group after the Tuberculosis Health Promotion Program among TB patients

4. Details of participant.

The population for the study is TB patients who are registered and following TB treatment from several public health centers in Karawang, West Java, Indonesia during the period of the study. The samples in this study will be patients with active Tuberculosis both male and female who are living in the area of responsibility of Public Health Center Klari, Karawang, West Java, Indonesia. Sample will be recruited with several criteria, those are: 1) Those who diagnosed with active Tuberculosis during the period of the study, 2) Patient aged 20-59 years, 3) Registered as the citizen of Indonesia, 4) Having Tuberculosis medication treatment, 5) Having no other complication diseases, and 6) being able to read and write. The sample size will be calculated based on the power analysis by using G Power Program. According to the power analysis, with the effect

size of 0.90,  $\alpha=0.05$ , and power=0.95 the sample size resulted for this study is 56 (Cohen, 1988). By assuming the attrition rate of 20% as anticipation, therefore, 68 participants will be needed. Those participants will be randomized into the intervention and control groups with 34 participants in each group.

5. Procedure upon participants

The researcher will stay at TB clinic rooms. When the patients come, the researchers then introduce himself to subjects and ask for their cooperation. The patients will be asked whether they are able to join the program.. When the subjects agree to participate, the researcher will explain the purpose of the study and give the opportunity for the subjects to ask questions. Then, subjects will assure that their right will be fully protected.

6. The researcher explains the way to answer the questionnaires. When the subjects understand the method, the subject will answer all the questionnaires by themselves. No time limit will be set. When the questionnaires are handed back, the researcher will check that all the information will be completed. If any item will incomplete, the researcher will ask the subject to fill out the missing items.
7. There will be no harm for the patients in this study.
8. For **benefit** of the project, the researcher wants study in this topic with the expectance of the result may lead to change in appropriate health behaviors, decrease in recurrence of admission with tuberculosis, reduction in expenditure of patients' families and the hospital.
9. Protect the right of the individuals who volunteered as subjects by having each sign a consent form, which includes an explanation of the purpose of the research, assurance of confidentiality, informs about the questionnaire destruction when finishing the study as well as the option to withdraw from this study at any time with no consequence at all.
10. Information will include "if you have any question or would like to obtain more information, the researcher can be reached at all time. If the



researcher has new information regarding benefit or risk/harm, participants will be informed as soon as possible.” This practice will provide an opportunity for participants to decide whether to stay/not stay with the project. (**Exception**, in case of one time interview and unable to re-contact participants.)

11. Information will include “Information related directly to you will be kept **confidential**. Results of the study will be reported as total picture. Any information which could be able to identify you will not appear in the report.
12. State explicitly whether there is any compensation for time loss/inconveniences transportation fee etc. The amount should be appropriate, not too high as if to “buy” or not too low as to take advantage of participants.
13. State that if researcher does not perform upon participants as indicated in the information, the participants can report the incident to the Office of National and Political Unity of Subdistrict Government of Karawang, Jl. Ahmad Yani No.33, Karawang, phone: 62 267 8454 724

### Informed Consent Form

Address.....

Date .....

**Code number of participant** .....

I who have signed here below agree to participate in this research project

**Title** “The Effect of Tuberculosis Health Promotion Program on Medication Adherence among TB Patients”

**Principle researcher’s name:** Yunus Adhy Prasetyo

**Contact address:** Puri Telukjambe, blok C7 no.2, Telukjambe, Karawang

**Telephone:** +62 812 900 448 13

I have (read or been informed) about rationale and objectives of the project, what will be done upon me risk/ harm and benefit of this project. The researcher has explained to me and I clearly understand with satisfaction.

I willingly agree to participate in this project and consent the researcher to response to the questionnaires that the researcher gave me for once in about 15 to 20 minutes.

I have the right to withdraw from this research project at any time as I wish with no need to give any reason. This withdrawal will not have any negative impact upon me by all means.

I have been guaranteed that the researcher will act upon me exactly the same as indicated in the information. Any of my personal information will be kept confidential. Results of the study will be reported as total picture. Any of personal information which could be able to identify me will not appear in the report.

If I am not treated as indicated in the information sheet, I can report to the Office of National and Political Unity of Subdistrict Government of Karawang, Jl. Ahmad Yani No.33, Karawang, phone: 62 267 8454 724

I also have received a copy of information sheet and informed consent form.

Sign .....

(.....)

Yunus Adhy Prasetyo

Sign .....

(.....)

Participant

Sign .....

(.....)

Witness

**Formulir**  
**Pasien/ Lembar Informasi Peserta**

**Judul proyek penelitian:** Pengaruh Program Promosi Kesehatan Tuberculosis pada Kepatuhan minum obat Pasien TB

**Nama Peneliti:** Yunus Adhy Prasetyo

**Posisi:** staf pengajar

**Alamat kantor:** STIK Immanuel, jln . Kopo no.161, Bandung

**Alamat rumah:** Puri Telukjambe, blok C7 no.2, Telukjambe, Karawang , Jawa Barat

**Telepon (kantor):** +62 22 5215236

**Telepon (rumah):** +62 267 640741

**HP:** +62 812 900 44813

**E - mail:** yz.ap\_13 @ rocketmail.com

1. Anda diundang untuk mengambil bagian dalam proyek penelitian . Sebelum Anda memutuskan untuk berpartisipasi penting bagi Anda untuk memahami mengapa penelitian yang sedang dilakukan dan apa yang akan dilibatkan. Luangkan waktu untuk membaca informasi berikut dengan seksama dan jangan ragu untuk bertanya jika ada sesuatu yang tidak jelas atau jika Anda ingin informasi lebih lanjut.
2. Menurut laporan WHO, Indonesia merupakan populasi terbesar keempat TB di dunia. Ini adalah penyebab kematian kedua setelah penyakit kardiovaskular, dan penyebab pertama kematian dari semua penyakit infeksi. Diperkirakan bahwa ada 591.000 kasus baru setiap tahun dan 175.000 kematian akibat TB. Pengobatan yang tidak lengkap dari TB dapat mengakibatkan infeksi berkepanjangan, kekambuhan, resistensi obat dan kematian (WHO, 2011, 2012; Widjanarko, Prabamurti, & Widyaningsih, 2006). Strategi DOTS telah dipergunakan dalam pelayanan pemerintah sejak awal 1970-an. Meskipun strategi ini telah diterapkan selama lebih dari tiga puluh tahun, tingkat penyelesaian pengobatan dan tingkat insiden gagal memenuhi standar WHO, jumlah penderita TB masih tetap (Widjanarko et al., 2006). Selama bertahun-tahun, program DOTS telah ditingkatkan untuk mengadopsi pendekatan multipel yang mencakup penyediaan pelatihan pasien kesehatan, insentif, rejimen berfokus pada klien, melacak yang mangkir dan rujukan dukungan sosial. Namun demikian, ada beberapa tantangan dalam implementasi strategi

DOT di Indonesia. Pada tantangannya adalah menyediakan program promosi kesehatan untuk memperkuat pengobatan TB. Dalam rangka meningkatkan kepatuhan terhadap pengobatan, perawat dapat membantu pasien dalam memahami faktor penentu utama perilaku kesehatan mereka sebagai dasar untuk konseling perilaku untuk mempromosikan gaya hidup sehat. Dengan demikian, program promosi kesehatan yang tepat berhubungan dengan pengobatan TB di antara pasien TB yang sesuai untuk diterapkan di Indonesia.

3. Tujuan dari proyek

- a. Untuk membandingkan kepatuhan pengobatan dari kelompok eksperimen sebelum dan setelah berpartisipasi dalam Program Promosi Kesehatan Tuberculosis pada pasien TB
- b. Untuk membandingkan kepatuhan minum obat antara kelompok eksperimen dan kelompok kontrol setelah Program Promosi Kesehatan Tuberculosis pada pasien TB

4. Rincian peserta

Populasi dalam penelitian ini adalah pasien TB yang terdaftar dan mengikuti pengobatan TB dari beberapa pusat kesehatan masyarakat di Karawang, Jawa Barat, Indonesia selama periode penelitian. Sampel dalam penelitian ini adalah pasien dengan aktif Tuberculosis baik laki-laki dan perempuan yang tinggal di wilayah tanggung jawab Puskesmas Klari, Karawang, Jawa Barat, Indonesia. Sampel akan direkrut dengan beberapa kriteria, yaitu: 1). Mereka yang didiagnosis dengan aktif Tuberculosis selama periode penelitian, 2). Pasien berusia 20-59 tahun, 3). Terdaftar sebagai warga negara Indonesia, 4). Memiliki Tuberculosis pengobatan obat, 5). Tidak memiliki penyakit komplikasi lainnya, dan 6). mampu membaca dan menulis. Ukuran sampel akan dihitung berdasarkan analisis kekuatan dengan menggunakan G Power Program. Menurut analisis kekuatan , dengan ukuran efek 0,90,  $\alpha = 0,05$ , dan kekuatan = 0,95 ukuran sampel yang dihasilkan untuk penelitian ini adalah 56 (Cohen , 1988). Dengan asumsi tingkat erosi dari 20% sebagai antisipasi , karena itu, 68 peserta akan dibutuhkan. Mereka peserta akan acak ke dalam kelompok intervensi dan kontrol dengan 34 peserta di setiap kelompok.

5. Prosedur pada peserta

Peneliti akan berada di TB klinik. Ketika pasien datang, para peneliti kemudian memperkenalkan diri kepada subyek dan meminta kerjasama mereka. Para pasien akan ditanya apakah mereka mampu untuk mengikuti program ini. Ketika subyek setuju untuk berpartisipasi, peneliti akan menjelaskan tujuan penelitian dan memberikan kesempatan peserta untuk mengajukan pertanyaan. Kemudian peserta akan memastikan bahwa hak mereka akan dilindungi sepenuhnya.

6. Peneliti menjelaskan cara untuk menjawab kuesioner. Ketika subyek memahami metode, subjek akan menjawab semua kuesioner sendiri. Tidak ada batas waktu akan ditetapkan. Ketika kuesioner diserahkan kembali, peneliti akan memeriksa bahwa semua informasi akan selesai. Peneliti akan meminta subjek untuk mengisi item yang belum lengkap.
7. Tidak akan ada tindakan merugikan kepada pasien dalam penelitian ini .
8. Untuk kepentingan proyek tersebut, peneliti ingin studi di topik ini dengan harapan hasilnya dapat menyebabkan perubahan dalam perilaku kesehatan yang tepat, penurunan kekambuhan tuberculosis, penurunan pengeluaran keluarga pasien dan rumah sakit.
9. Melindungi hak individu yang sukarela sebagai subyek dengan masing-masing menandatangani formulir persetujuan, yang mencakup penjelasan tentang tujuan penelitian, jaminan kerahasiaan, menginformasikan tentang penyelesaian kuesioner ketika menyelesaikan studi serta pilihan untuk menarik diri dari penelitian ini kapan saja tanpa konsekuensi sama sekali.
10. Informasi akan mencakup " jika Anda memiliki pertanyaan atau ingin memperoleh informasi lebih lanjut, peneliti dapat dihubungi di sepanjang waktu. Jika peneliti memiliki informasi baru mengenai manfaat risiko/ bahaya, peserta akan diinformasikan secepatnya. Hal ini akan memberikan kesempatan bagi peserta untuk memutuskan apakah akan tetap/ tidak dalam proyek (pengecualian, dalam kasus ketika peserta kesulitan untuk dikontak kembali)

11. Informasi akan mencakup "Informasi terkait langsung dengan Anda akan dijaga kerahasiaannya. Hasil penelitian akan dilaporkan sebagai gambaran keseluruhan. Setiap informasi yang dapat mengidentifikasi Anda tidak akan muncul dalam laporan.
12. Jelaskan secara eksplisit apakah ada kompensasi untuk biaya kehilangan waktu/ ketidaknyamanan transportasi dll. Jumlahnya harus tepat, tidak terlalu tinggi seolah-olah untuk " membeli" atau tidak terlalu rendah untuk mengambil keuntungan dari peserta.
13. Jelaskan bahwa jika peneliti tidak melakukan pada peserta seperti yang ditunjukkan dalam informasi para peserta dapat melaporkan kejadian tersebut kepada Kantor Kesatuan Bangsa dan Politik, Pemerintah Kabupaten Karawang, Jl. Ahmad Yani No.33, Karawang, telepon: 62 267 8454 724

### Formulir Informed Consent

Alamat :

Tanggal:

Nomor kode peserta :

Saya yang telah menandatangani di bawah ini setuju untuk berpartisipasi dalam proyek penelitian ini

Judul: Pengaruh Program Promosi Kesehatan Tuberculosis pada Kepatuhan minum obat Pasien TB

Nama peneliti : Yunus Adhy Prasetyo

Alamat kontak : Puri Telukjambe blok C7 no.2, Telukjambe, Karawang

Telepon: 081290044813

Saya telah (membaca atau diberitahu) tentang alasan dan tujuan dari proyek, bagaimana saya akan terlibat, resiko dan manfaat dari proyek ini. Peneliti telah menjelaskan kepada saya dan saya mengerti dengan jelas.

Saya setuju untuk berpartisipasi dalam proyek ini dan setuju untuk melaksanakan

#### **Berpartisipasi dalam program promosi kesehatan tentang TB**

misalnya: Mengisi kuesioner/ mendaftar dalam program pelatihan. Untuk berapa lama. Setelah selesai data pribadi akan dihapus. Jika akan disimpan untuk studi masa depan, harus dinyatakan dalam Formulir Informed Consent.

Saya memiliki hak untuk menarik diri dari proyek penelitian ini setiap saat tanpa perlu memberikan alasan apapun. Penarikan ini tidak akan memiliki dampak negatif pada saya (misalnya: masih menerima layanan biasa).

Peneliti menjamin bahwa prosedur tindakan atas saya akan persis sama seperti yang ditunjukkan dalam informasi. Setiap informasi pribadi saya akan dirahasiakan. Hasil penelitian akan dilaporkan sebagai gambaran keseluruhan. Setiap informasi pribadi yang dapat mengidentifikasi saya tidak akan muncul dalam laporan.

Jika saya tidak ditunjukkan lembar informasi, saya dapat melaporkan kepada Kantor Kantor Kesatuan Bangsa dan Politik, Pemerintah Kabupaten Karawang, Jl. Ahmad Yani No.33, Karawang, telepon: 62 267 8454 724

Saya juga telah menerima salinan lembar informasi dan formulir informed consent

Tanda tangan

Tanda tangan

Tanda tangan

(.....)

(.....)

(.....)

Peneliti


Peserta

Saksi

Catatan:

Jika penelitian membawa tidak lebih dari resiko minimal, risiko kemungkinan tidak lebih dari perawatan / hidup, misalnya rutin: survei telepon / wawancara / penelitian yang melibatkan data sekunder atau spesimen anonim yang nama dan alamat pemilik tidak dapat ditelusuri. Peneliti dapat meminta untuk melepaskan persetujuan ditandatangani. Selain itu, persetujuan yang ditandatangani mungkin dibebaskan ketika ancaman dibenarkan untuk kerahasiaan subyek tidak bisa dihindari, misalnya: penelitian dalam pelanggaran narkoba, mata pelajaran HIV, orang yang terinfeksi dengan penyakit kelamin, pekerja seks, dll pekerja illegal.





APPENDIX C  
INSTRUMENT OF RESEARCH

จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**

## MEDICATION ADHERENCE SELF EFFICACY QUESTIONNAIRE

### Instructions:

You certainly are undergoing treatment for your Tuberculosis (TB) disease. Some people have identified several issues related to medication-taking behavior and we are interested in your experience. Situations come up that make it difficult for people to take their medications as prescribed by their doctors. Below is a list of such situations. We want to know your opinion about taking your Tuberculosis medications under each of them. There is no right or wrong answers. For each of the situations listed below, please rate how sure you are that you can take your Tuberculosis medications **all of the time**. Please indicate your response by checking (✓) the box that most closely represents your opinion.

NO.	Questions	Rating			
		Not confident	A little confident	Fairly confident	Very Confident
1.	I am confident to take my TB medication when I'm busy at home				
2.	I am confident to take my TB medication when there is no one to remind me				
3.	I am confident to take my TB medication even I'm worry about taking it for such a long time				
4.	I am confident to take my TB medication when I don't have any symptoms				

NO.	Questions	Rating			
		Not confident	A little confident	Fairly confident	Very Confident
5.	I am confident to take my TB medication when I'm with family members				
6.	I am confident to take my TB medication when I'm in a public place				
7.	I am confident to take my TB medication when the time to take them is between meals				
8.	I am confident to take my TB medication when I'm traveling				
9.	I am confident to take my TB medication when I take them more than once a day				
10.	I am confident to take my TB medication when I have other medications to take				
11.	I am confident to take my TB medication when I feel well				

NO.	Questions	Rating			
		Not confident	A little confident	Fairly confident	Very Confident
12.	I am confident to take my TB medication even it causes some side effects				
13.	I am confident to take my TB medication and make it as part of my routine				

### Comparison of means scores of perceived self-efficacy to TB treatment of the experiment group, before and after the program

To analyze the difference of the mean scores of perceived self-efficacy, paired t-test was used. It showed that:

#### Perceived Self-Efficacy

The mean score before the program was 27.70 and the standard deviation was 1.48 while the after the program, the mean score was 37.29 and the standard deviation was 1.36. The mean score of the experimental group after the program was significantly higher than of the mean score measured before the program ( $p\text{-value} < 0.001$ ).

**Table of Difference Comparison of the Average Mean Scores of Perceived Self-Efficacy of Tuberculosis Medication, within the Experimental Groups, Before and After the Program**

Variables	$\bar{x}$	S.D	t-value	df	p-value
Perceived Self-Efficacy					
Before the Experimentation	27.70	1.48	-24.91	33	0.001
After the Experimentation	37.29	1.36			

The result showed participants in the experimental group have better perceived self-efficacy than those in the control group. By comparing the total score of the participants in the experimental group, it found that 100% of the participants have higher perceived self-efficacy.

**Morisky Medication Adherence Scale (MMAS-8)**

You certainly are undergoing treatment for your Tuberculosis (TB) disease. Some people have identified several issues related to medication-taking behavior and we are interested in your experience. There is no right or wrong answers. Answer each question based on your personal experience to the TB medication that you drink.

**Circle the answer that you think is correct.**

1. Do you sometimes forget to take your TB medication?      **No**      **Yes**
2. People sometimes neglect taking medications for various reasons, except for classical reasons such as forgotten. If you remember back in the last two weeks, were the days when you did not take your TB medication? **No**      **Yes**
3. Have you ever stopped taking TB medication without consulting a doctor because you would feel worse if you continue the medication? **No**      **Yes**
4. When you travel or leave home, do you sometimes forget to bring along your TB medications?      **No**      **Yes**
5. Did you take TB medication yesterday?      **No**      **Yes**
6. When you feel TB is resolved, do you sometimes stop taking the medication?  
**No**      **Yes**
7. Taking medication every day is something unusual for some people. Have you ever felt upset because you are fixated on the treatment plan? **No**      **Yes**
8. How often do you have trouble remembering to take medication?  
Never/seldom..... **4**  
Occasionally..... **3**  
Sometimes..... **2**  
Usually..... **1**  
Every time..... **0**

### MEDICATION ADHERENCE SELF EFFICACY QUESTIONNAIRE

#### Petunjuk:

Anda saat ini sedang dalam pengobatan Tuberculosis (TB). Beberapa orang mengalami beberapa hal yang berhubungan dengan perilaku minum obat dan kami tertarik terhadap pengalaman anda. Ada kondisi-kondisi yang membuat orang sulit untuk minum obat sesuai dengan resep dokter. Dibawah ini adalah beberapa kondisi-kondisi tersebut. Kami ingin mengetahui pendapat anda tentang kondisi-kondisi tersebut sesuai dengan pengalaman anda minum obat TB. Tidak ada jawaban benar atau salah. Untuk setiap situasi dibawah ini tolong berikan penilaian seberapa yakin anda dapat minum obat TB dalam setiap saatnya. Tolong berikan penilaian anda dengan mencentang (√) pada kotak yang sesuai dengan pendapat anda.

NO.	Pertanyaan	Nilai			
		Tidak yakin	Yakin	Cukup yakin	Sangat yakin
1.	Saya yakin saya dapat minum obat TB ketika Anda sedang sibuk di rumah				
2.	Saya yakin saya dapat minum obat TB ketika tidak ada seorangpun yang mengingatkan Anda				
3.	Saya yakin saya dapat minum obat TB meskipun saya khawatir akan meminumnya dalam jangka waktu yang cukup lama				
4.	Saya yakin saya dapat minum obat TB ketika saya tidak memiliki gejala apapun				
5.	Saya yakin saya dapat minum obat TB ketika saya sedang bersama keluarga saya				
6.	Saya yakin saya dapat minum obat TB ketika saya berada di tempat umum				

NO.	Pertanyaan	Nilai			
		Tidak yakin	Yakin	Cukup yakin	Sangat yakin
7.	Saya yakin saya dapat minum obat TB ketika saat untuk minum obat diantara waktu makan				
8.	Saya yakin saya dapat minum obat TB ketika saya bepergian				
9.	Saya yakin saya dapat minum obat TB ketika saya harus meminumnya lebih dari 1 kali/ hari				
10.	Saya yakin saya dapat minum obat TB ketika saya harus minum obat lain				
11.	Saya yakin saya dapat minum obat TB ketika saya merasa sehat				
12.	Saya yakin saya dapat minum obat TB meskipun dapat menyebabkan beberapa efek samping				
13.	Saya yakin saya dapat minum obat TB dan membuatnya sebagai rutinitas saya				



MMAS-8 Bahasa Indonesia copyright Donald E. Morisky 2008-2009

Lingkari jawaban yang anda anggap benar

Tidak = 1    Ya = 0

1. Apakah anda terkadang lupa minum obat Tuberculosis anda ? **Ya**            **Tidak**
2. Orang kadang-kadang lalai minum obat dengan berbagai alasan, selain alasan klasik seperti lupa. Bila anda ingat kembali dalam dua minggu terakhir, adakah hari-hari dimana anda tidak minum obat Tuberculosis anda? **Ya**            **Tidak**
3. Apakah anda sudah pernah menghentikan minum obat tanpa berkonsultasi dengan dokter karena anda merasa tambah parah bila meneruskan obatnya itu?  
**Ya**                            **Tidak**
4. Bila anda bepergian atau meninggalkan rumah apakah anda terkadang lupa membawa serta obat Tuberculosis anda? **Ya**                            **Tidak**
5. Apakah kemarin anda minum obat Tuberculosis? **Ya**                            **Tidak**
6. Ketika anda merasa Tuberculosis teratasi, apakah anda terkadang menghentikan minum obat?    **Ya**                            **Tidak**
7. Minum obat setiap hari merupakan sesuatu yang tidak lumrah untuk beberapa orang. Apakah anda pernah merasa kesal karena terpaksa pada rencana pengobatan itu? **Ya**                            **Tidak**
8. Seberapa sering anda mengalami kesulitan mengingat untuk minum obat?

Tidak pernah/jarang .....	4
Sesekali .....	3
Terkadang .....	2
Biasanya .....	1
Setiap waktu .....	0

### Pertanyaan Demografi

**Jenis Kelamin:**

- Laki-laki                       Perempuan

**Umur:**                      tahun

**Status Pernikahan:**

- Menikah                       Singel                       Bercerai/ berpisah

**Tingkat Pendidikan:**

- Tidak sekolah  
 SD  
 SMP  
 SMA  
 Perguruan tinggi

**Jarak dari rumah ke puskesmas Klari (km):**

- 0-<5 km                       5- < 10 km                       10 km atau

lebih

**Daerah tempat tinggal:**

- Pedesaan                       Perkotaan

**Status Pendidikan:**

- Tidak bekerja
- Buruh
- Petani
- Pedagang
- Pegawai negeri

**Pendapatan bulanan:**

- < Rp 1.000.000       Rp 1.000.000 – Rp 2.000.000       > Rp 2.000.000

**Apakah ada anggota keluarga yang sakit Tuberculosis:**

- Ya       Tidak

**Apakah pernah gagal dalam pengobatan TB:**

- Ya       Tidak

**TUBERCULOSIS  
HEALTH PROMOTION PROGRAM MANUAL**

**Presented by:**

Yunus Adhy Prasetyo

Student of Master In Nursing Science Program

**Advisor:**

Asst. Prof.,Dr., Sunida Preechawong

Assoc. Prof., Dr., Jintana Yunibhand

**Faculty of Nursing  
Chulalongkorn University**

**Thailand**

**2014**

จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**

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## Introduction

### Purpose

Tuberculosis (TB) is one of the disease that most feared for centuries. Many programs have been developed against this disease. Yet, TB remains capable of exciting major concern especially in developing countries such as Indonesia. Some areas in the world have much higher TB incidence and the disease is more common in those in deprived social circumstances. For all this background, giving a focus on management of TB program is still important. Thus, this manual is appropriate to help TB health educators in preparing a proper program for TB patients.

The manual can be used to do the following:

- Determine what information related to TB that can be given to TB patients
- Educate TB patients about any information related to the disease
- Identify which information is appropriate to educate TB patients.

Educating patients on how to take their TB medication is an important part of helping the patients. This means discussing with TB patients about information related to TB such as what is tuberculosis, is TB a common disease, how is the disease transmitted, what happens after infection with the tubercle bacilli, what are the symptoms of TB, how can TB be diagnosed, what is the treatment for TB, adverse reactions to anti-TB drugs, DOT (directly observed treatment), how can TB be prevented, and some common misunderstandings about TB. By informing above information we help the patients to have more understanding in the disease. They can't be expected to adhere to the treatment without having good information about TB. TB Patients need to understand the seriousness of the disease and the important to adhere the medication. To prevent relapse and drug resistance, adequate regimen should be prepared so TB patients can adhere to treatment. The public health center has to educate the patient, monitor the patient's adherence, and use incentives and enablers to ensure completion of treatment.

## General Guidelines

TABLE 1: GUIDELINES FOR THE HEALTH PROMOTION PROCESS

When Educating Tuberculosis (TB) Patients
<ul style="list-style-type: none"> <li>• Explore what patients know and believe about TB disease. Support and provide correct TB information, and help them in preventing any misconceptions about disease.</li> <li>• Use appropriate skills to interview and influence TB patients.</li> <li>• Help TB patients to solve any problems related to their disease.</li> <li>• Use the health promotion material with patients with an appropriate language to their level of understanding. If necessary, ask some help from those who familiar with the language.</li> <li>• Give patients with any information related to TB and its effects.</li> <li>• Provide the patients with a booklet and help them how to use the booklet.</li> </ul>

## Language Barriers

During the program, assess for and address any potential language barriers.

1. Assess the patients understanding related to the instructions, including potential barriers, such as not speaking Bahasa as primary language, deafness, speech deficit, or other language disability.
2. Provide all information, instructions, and communications in the appropriate language (such as: local language)
3. Use visuals, or other educational methods to provide the information.
4. Ask those who familiar with patients language to help in interpreting the language if needed.
5. Provide materials that appropriate to the patient's language.

## Education Topics

During the initial assessment, educate the patient as needed on the topics that follow.

### Information related to TB

In the initial interviews with the patient, provide information about TB and the patient's treatment plan. During DOT appointments and monthly monitoring, confirm and reinforce the patient's understanding of these topics.

1. Explain the definition of TB
2. Discuss how TB is spread out and explain them the seriousness of the disease.
3. Explain the signs and symptoms of TB
4. Explain how TB is transmitted and what happen after infection with the tubercle bacilli.
5. Discuss on how to prevent the disease.
6. Explain that TB is treatable and preventable.
7. Explain the importance of medication adherence.
8. Discuss the current medical treatment plan.
9. Explain the need for regular medical monitoring and follow-up during the disease process. Inform how treatment will be monitored (i.e., sputum test, weight check, etc.).
10. Encourage the patient to be an active participant in care and treatment.
11. Discuss the roles of the patient during the program and how they can engage in treatment.
12. Discuss the role of public health center (treatment, case management, monitoring, contact tracing, and supervision of treatment)
13. Encourage the patient to contact the public health center for any problems that arise during the treatment.
14. Explain the risks that arise if they don't complete or take the medication properly.
15. Explain the signs and symptoms of possible relapse or failure, and encourage the patient to report them immediately to the public health center.



### **Information related to TB Medication**

Educate all patients on anti-tuberculosis medications and about the medications potential side effects and adverse reactions.

1. Explain the names and dosages for the medication treatment plan as well as the importance of treatment.
2. Explain the common side effects that possible to arise during the treatment and methods to improve symptoms.
3. Explain about Directly Observed Treatment.

### **Information related to TB Medication Adherence**

If patients have the potential for not adhering the medication, educate the patients about the importance of the TB treatment, what patient's responsibilities during the treatment, and the consequences and any risks of non-adherence behavior.

1. Explain the importance of the treatment
2. Explain the importance of follow-up for active TB patients.
3. Explain the importance of regular visits to public health center.
4. Discuss the treatment plan with the patients and what they expect from the treatment.
5. Help the patients to strengthen their responsibilities and behavior regarding the treatment plan.

### **Individual counseling**

Personal counseling with each participant will be scheduled during the program. It will be set for 30 minutes in each meeting. The date will be set to meet the participants' time during the program.

1. Discuss any issues regarding to patients medication.
2. Discuss for any barriers possibility that arise during the treatment (such as: side effects, adverse reaction, etc.).
3. Re-informing the patients about TB if needed.
4. Encourage them to adhere their medication and tell them the importance of medication completion.
5. Help the patients to adjust their activity during the medication
6. Help the patients to set realistic goals related to TB medication.

### Group Discussion

The motivation activities to stay in TB medication is consisted of two targets of action; the first target is to increase perceived self-efficacy; and the second is to increase perceived benefit and reduce perceive barriers.

1. Demonstrate the patients on how to take TB medication properly.
2. Give verbal reinforcement/ support related to medication taking.
3. Discuss about experiences of participants during the medication.
4. Discuss about the benefits of taking medication properly.
5. Discuss about personal experience with positive effects and problems/ barriers regarding TB medication
6. Help the patients how they can manage barriers during the medication and stay with the medication.

### Monitoring TB medication

TB patients will take the medication for 6 months. Those who can't maintain their medication well mostly will drop out during the first month of medication. The monitoring process will help participants in maintain their medication. The participants will be given SMS motivation and medication taking reminder during the first month. The aim is to monitor the medication and also to support participants.

1. Provide the patients with a sms for 6 times in a week.
2. Support and motivate the patient to adhere their TB medication through the sms
3. Make the text for the sms as simple as possible, such as "*Tuberculosis is cured. Take your medication today and take steps to protect against TB. Fight against TB*".
4. Evaluate the patients with questions related to TB.

### Patient Education Materials

Information related to Tuberculosis included in Patients Handbook "All about Tuberculosis". The guideline is adopted from Tuberculosis module of The Centers for Disease Control and Prevention (CDC).

### References

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## VITA

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