EFFECTIVENESS OF COMMUNICATION PROGRAM ON REDUCTION OF TB STIGMA AND DISCRIMINATION AMONG HIGH-SCHOOL STUDENTS IN BANGKOK: A QUASI-EXPERIMENTAL STUDY

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ประสิทธิผลโปรแกรมการสื่อสารเพื่อการลดการตีตราและการเลือกปฏิบัติเกี่ยวกับวัณโรคในกลุ่ม
เด็กนักเรียนระดับมัธยมศึกษาตอนปลายในเขตพื้นที่กรุงเทพมหานคร: การศึกษาแบบกึ่งทดลอง

น.ส.เสาวลักษณ์ มูลสาร

Thesis Title	EFFECTIVENESS OF COMMUNICATION PROGRAM ON REDUCTION OF TB STIGMA AND DISCRIMINATION AMONG HIGH-SCHOOL STUDENTS IN BANGKOK: A QUASI-EXPERIMENTAL STUDY
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เสาวลักษณ์ มูลสาร : ประสิทธิผลโปรแกรมการสื่อสารเพื่อการลดการตีตราและการเลือกปฏิบัติเกี่ยวกับวัณโรคใน กลุ่มเด็กนักเรียนระดับมัธยมศึกษาตอนปลายในเขตพื้นที่กรุงเทพมหานคร: การศึกษาแบบกึ่งทดลอง. (EFFECTIVENESS OF COMMUNICATION PROGRAM ON REDUCTION OF TB STIGMA AND DISCRIMINATION AMONG HIGH-SCHOOL STUDENTS IN BANGKOK: A QUASI-EXPERIMENTAL STUDY) อ.ที่ปรึกษาหลัก : ผศ. ดร.อนุชิต ภานุมาสวิวัฒน์, อ.ที่ปรึกษาร่วม : ศ. ดร.รัตนา สำโรงทอง

วัณโรคเป็นโรคติดต่อจากคนสู่คนผ่านทางอากาศ และวัณโรคยังคงเป็นสาเหตุหลักของการเจ็บป่วยในประเทศไทย นอกจากนี้ผู้ป่วยวัณโรคบางรายได้รับความทุกข์ทรมานจากการตีตราและการเลือกปฏิบัติอันเนื่องมาจากการเจ็บป่วยด้วยวัณโรค ถึงอย่างไรก็ตามการตีตราต่อผู้ป่วยวัณโรคพบว่ามีการรายงานที่สูงในนักเรียนมัธยมศึกษาตอนปลาย การศึกษาครั้งนี้มี วัตถุประสงค์เพื่อสำรวจประสิทธิผลโปรแกรมการสื่อสารเพื่อการลดการตีตราและการเลือกปฏิบัติ เกี่ยวกับวัณโรคของนักเรียน มัธยมศึกษาตอนปลายในเขตพื้นที่กรุงเทพมหานคร การศึกษาเป็นแบบกึ่งทดลองในโรงเรียนมัธยมศึกษาตอนปลาย 2 แห่ง กลุ่ม ตัวอย่าง คือ นักเรียนมัธยมศึกษาตอนปลายทั้งหมด 212 คน ซึ่งแบ่งออกเป็นกลุ่มทดลอง 108 คน และกลุ่มควบคุม 104 คน โดยใช้เทคนิคในการสุ่มโรงเรียนที่ใช้ในการศึกษาด้วยวิธีแบบจำเพาะเจาะจง และการสุ่มกลุ่มตัวอย่างเข้าสู่การศึกษาด้วย วิธีการสุ่มแบบระบบ กลุ่มทดลองได้รับโปรแกรมการสื่อสารโดยใช้เวลาดำเนินกิจกรรมทั้งหมด 3 เดือน ในขณะที่กลุ่มควบคุม จะไม่ได้รับโปรแกรมการสื่อสาร ใช้แบบสอบถามในการประเมินกลุ่มตัวอย่างทั้งหมด 3 ครั้ง ประกอบด้วย ก่อนเริ่ม กิจกรรม ในเดือนที่ 3 และเดือนที่ 5 สถิติที่ใช้ในการวิเคราะห์ข้อมูล ประกอบด้วย Chi-square test, Fisher's exact test, Paired t-test, Independent sample t-test, and Generalized Estimating Equations (GEE) ผลการศึกษาพบว่า โปรแกรมการสื่อสารส่งผลต่อการตีตราวัณโรคที่ลดลง (p-value <0.05,CI=4.962, -1.723) การเพิ่มความรู้เกี่ยวกับวัณโรค (p-value <0.05, CI=1.825, 2.537) ทัศนคติเกี่ยวกับวัณโรค (p-value <0.05, CI=4.493, 6.280) และการรับรู้ความสามารถตนเองเกี่ยวกับการตีตรา และการเลือกปฏิบัติเกี่ยวกับวัณโรค(p-value <0.05, CI=7.133, 9.483) เมื่อเปรียบเทียบกับกลุ่มควบคุม อย่างไร ก็ตามการเลือกปฏิบัติเกี่ยวกับวัณโรคไม่ก่อให้เกิดการเปลี่ยนแปลงทั้งภายในกลุ่มและระหว่างกลุ่ม (p-value >0.05, CI=-1.398, 0.810) ข้อเสนอแนะในการศึกษา คือ ควรนำโปรแกรมการสื่อสารไปประยุกต์ใช้ในโรงเรียนเพื่อการ รณรงค์ให้ความรู้ที่ถูกต้องเกี่ยวกับวัณโรค ทัศนคติเชิงบวกเกี่ยวกับวัณโรคปอด และการลดการตีตราเกี่ยวกับวัณโรคในนักเรียน มัธยมศึกษาตอนปลาย

สาขาวิชา	สาธารณสุขศาสตร์	ลายมือชื่อนิสิต ....
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KEYWORD: TUBERCULOSIS, TB STIGMA, TB DISCRIMINATION, COMMUNICATION, INTERVENTION, HIGH-SCHOOL STUDENTS

Saowaluk Moonsarn : EFFECTIVENESS OF COMMUNICATION PROGRAM ON REDUCTION OF TB STIGMA AND DISCRIMINATION AMONG HIGH-SCHOOL STUDENTS IN BANGKOK: A QUASI-EXPERIMENTAL STUDY . Advisor: Asst. Prof. ANUCHIT PHANUMARTWIWATH, Ph.D. Co-advisor: Prof. RATANA SOMRONGTHONG, Ph.D.

Tuberculosis (TB) is a contagious disease through airborne transmission, and it is still a major cause of illness in Thailand. In addition, some patients with TB infection suffer from stigma and discrimination while living in their community. However, the stigma of TB patients is also reported to be high among high school students. The study aimed to explore the effectiveness of communication program on reduction of TB stigma and discrimination among high-school students in Bangkok. A quasi-experimental study was implemented in two high schools with 212 high-school students (Experimental group =108; Control group=104). Purposive and systematic sampling techniques were adopted in the selection of schools and students. The experimental group received the communication program for a three-month study period, whereas the control group received no intervention. Data collection was conducted by the questionnaires at baseline, 3 months, and 5 months. Data were analyzed using the Chi-square test, Fisher's exact test, Paired t-test, Independent sample t-test, and Generalized Estimating Equations (GEE). The outcomes revealed that the communication program was found to be effective in reducing TB stigma (p-value <0.05,CI=4.962, -1.723) and increasing TB knowledge(p-value <0.05, CI=1.825, 2.537), TB attitudes (p-value <0.05, CI=4.493, 6.280), and self-efficacy on TB stigma and discrimination (p-value <0.05, CI=7.133, 9.483) as compared to the control group. However, there was no significant difference within and between both groups for TB discrimination (p-value >0.05, CI=-1.398, 0.810). The study suggests that the communication program should be adopted in school to make up for the TB knowledge and TB attitudes, and to reduce TB stigma among high-school students.

Field of Study:	Public Health	Student's Signature	....
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		Co-advisor's Signature	....

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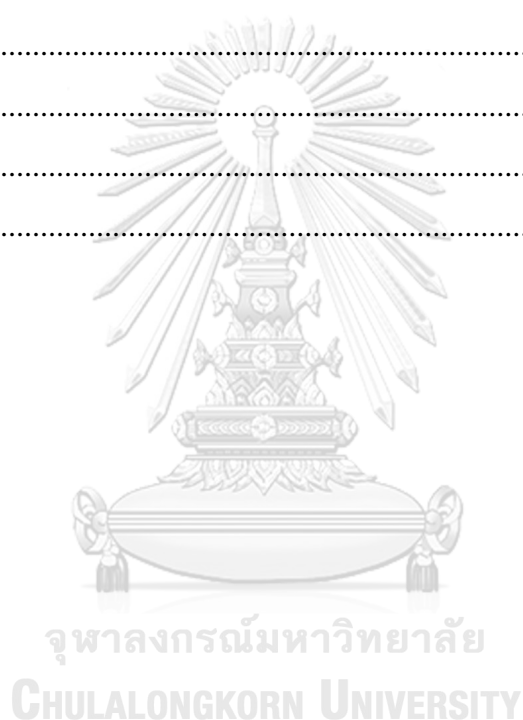
Saowaluk Moonsarn

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CHAPTER I

INTRODUCTION

1.1 Background and Rationale

Tuberculosis (TB) is a contagious disease caused by infection of mycobacteria, *mycobacterium tuberculosis* (MTB), the symptoms are shown as follows: 1. chronic cough for more than 2 weeks or coughing up sputum, coughing up blood, 2. low fever in the afternoon-evening, and 3. loss of weight and sweating a lot at night. TB is a disease that is transmitted from person to person through the air (airborne transmission) through coughing, sneezing, speaking, shouting or laughing, causing the droplets to spread. TB can occur in all organs of the body, mostly often found in the lungs (80%), which is easily transmitted. (Bureau of Tuberculosis, 2018). Most people (about 90%) who develop the disease are adults, with more cases among men than women. About a quarter of the world's population has been infected with M. tuberculosis (World Health Organization, 2021).

Worldwide, TB remains a major cause of ill health and is one of the leading causes of death, and the leading cause of death is from a single infectious agent, ranking above HIV/AIDS. In 2020, an estimated 9.9 million (range, 8.9–11 million) people got sick with TB, equivalent to 127 cases per 100,000 population, there were an estimated 1.3 million (range, 1.2–1.4 million) TB deaths among HIV- negative people, up from 1.2 million (range, 1.1–1.3 million) in 2019, and an additional 214, 000 (range, 187,000–242,000) deaths among HIV-positive people, a small increase from 209,000 (rage, 178,000–243,000) in 2019. Furthermore, the global number of deaths officially classified as caused by TB (1.3 million) in 2020 was almost double the number caused by HIV/AIDS (0.68 million), and TB mortality has been more severely impacted by the COVID-19 pandemic in 2020 than HIV/AIDS (World Health Organization, 2021).

At the same time in Thailand, TB continues to be an important public health problem. In 2020, the World Health Organization (WHO) reported that Thailand was one of the countries with a high number of TB and TB-HIV. TB situation in Thailand,

2020 was found that there were 105,000 (range, 79,000–134,000) of TB patients, and 11,000 (range, 8,900–14,000) deaths from TB. In addition, there were an estimation of 150 cases per 100,000 population of incidence rate of TB(World Health Organization, 2021). There were 19,163 TB patients who hadn't accessed to medical services and treatment, and there was a report of treatment coverage at 81.74 % of expected total number of cases (World Health Organization, 2021).

Similarly, TB situation in Bangkok,2020 showed that there were an estimated 11,134 cases of TB, and 1,500 people weren't on treatment (Bangkok Metropolitan Administration, 2021).This partly reflects a delay in or lack of access to treatment that leads to spreading in communities. However, some factors (e.g. lack of knowledge about TB, lack of awareness about TB, and perception of TB stigma) can mostly be influenced with the delay TB diagnosis, poor treatment adherence or the spread of TB.(Zhang, Li, Zhang, Fan, & Li, 2016). The perception of TB stigma is an important factor that affects to people, community, workplace of the others. In addition, many experts believe that it will make a difficulty to find the estimated 4 million missing TB cases without addressing TB stigma (Macintyre et al., 2017).

The stigma attached to many diseases, especially TB, is a major condition of public health important and quality of life in TB management (Eva M Moya, Biswas, Chavez Baray, Martinez, & Lomeli, 2014). Stigma, originally described by Goffman as defined an " undesirable or discrediting" ,attributes that an individual who is negatively regarded by the broader society and devalued, shunned or their experience. The stigma can occur in two forms: external and internal (Dodor, Neal, & Kelly, 2008). Mostly stigma leads to discrimination, and discrimination can occur in two forms: direct and indirect discrimination. Therefore, stigma is an important and leads to discrimination, and is also a cause of discrimination.

Many communicable diseases, for example TB, HIV/AIDS, and leprosy are associated with stigma and discrimination. (Baral, Karki, & Newell, 2007). TB stigma attributes one of the major social factors which is a cause of diagnosis delay and non-adherence treatment among TB patients(Yin et al., 2018). Also, TB stigma leads to increase transmission of infectious diseases (Suleiman, Sahal, Sodemann, El Sony, & Aro, 2013), and an increasing risk of disability, and drug resistance. (Eva M Moya et al., 2014). TB stigma and discrimination have been identified by multiple forces,

including a lack of understanding of TB infection, myth about transmission,prejudice, the link with HIV/AIDS, and a fear relating with the illness to disability and death (Eva M Moya et al., 2014).

TB stigma is closely associated with the perception by an individual that can be affected by people, place and others at the risk of infection (Dodor et al., 2008). It should focus on TB stigma because it attacks a person's self-worth, affects a person's right to dignity, and thus violates human rights (Asta Rau, 2018). Also, TB stigma can lead to self-isolation from home, friends and family (Jittimanee et al., 2009). In addition, TB patients may have difficult access to the treatment. It is possibly due to stigma and discrimination in many forms such as termination of employment, stigma from people in the community and many other formats. The only effective approach to control TB disease is to rapidly diagnose and treat TB patients, thereby breaking the chain of infection. But there are some issues about the stigma and discrimination that make TB patient difficult for sufferers to disguise the fact that they have TB. Once they are identified, sufferers experience considerable stigma and discrimination on account of their disease, leading to a delay of diagnosis and treatment and causing a major impact on TB control (Baral, Karki, & Newell, 2007).

TB stigma and discrimination have an impact on suffering at home, in the workplace, institutions and in the community (Baral et al., 2007).Several studies have showed that TB transmission or TB stigma can occur in nurseries, schools, hospitals, workplaces and other settings (Ngamvithayapong-Yanai, Luangjina, Thawthong, Bupachat, & Imsangaun, 2019). From the study of Jittimanee, it was found that TB stigma was high (65%) by showing that there was from the community (34%), and low TB knowledge was also found (23%) (Jittimanee et al., 2009). A similar study by Arininta showed that 81.9% of TB patients had experiences with stigma, and 54% of participants had experiences with self-stigma, and the effects of social stigma and self-stigma on patients in adolescent were high from family and community. For the recommendation in this study, the school should have the socialization programs and can provide the support for the healing process by explaining everyone who can get TB has a chance of cure (Arininta, 2019). A report linked to the study of Debulpaep, it showed that 13% of children were infected by TB in their classes at the school after contacting with a teacher who is a casual contact (Debulpaep et al., 2020).

A report linked with the study of Zhang, showed that the participants had a high pressure and a high worry about the interruption of studies more than the disease, and the participants had a high serious lack of awareness of disease, caused by the ignorance of schools, parents and students, and become to obstacle to the delay of diagnosis and treatment (Zhang et al., 2016). Although, TB patients are a high risk group associated with TB stigma and mostly can occur from community or family, but we should concern about high school students. Furthermore, the study reported by Osonwa and Eko, the outcomes revealed that 83.3% of the participants would stop buying food from a person infected by TB, while 36.0 % would avoid crowed areas and 31.5% would avoid eating, talking and sharing the same bed with a TB patient. Hence, a high rate of social stigma and discrimination against TB patients was reported among school adolescents in Ogoja urban in Ogoja Local government area of Cross River State, Nigeria (Osonwa & Eko, 2015). Similarly, the report conducted by BE Health Association in 2020 at four high schools in Bangkok, that 57.1% of the 630 interviewed high-school students acknowledge a high level of TB stigma and discrimination and 57.1% of the 630 interviewed revealed that male high-school students had mean score higher than female high-school students (BE Health Association, 2020).

A link with a report of Bangkok Metropolitan Administration, 2019 was found that it was nearly 5% of TB patients found in the schools (Bangkok Metropolitan Administration, 2019). All of TB patients were an estimated 459 new cases of TB in adolescent 15-19 years , and there were 57% of TB cases in men, while remainders were 33% of TB cases in women. (Bangkok Metropolitan Administration, 2021).

Therefore, TB stigma and discrimination are very close and important with high school students, and there is limited intervention to direct on the reduction TB stigma. However, it was only found that there is a recommendation in the future for TB intervention that should include stigma specific intervention or should adopt from any intervention such as HIV/AIDS stigma and discrimination intervention, leprosy, or mental illness intervention to reduce stigma and discrimination in public, school and workplace (Bond et al., 2017). Especially, the schools are located in the slum areas. It was found that nearly 20 % of TB patients were in the slum areas (Bangkok Metropolitan Administration, 2019) The slum area is one of high-risk areas with a

spread of TB infection (Division of Tuberculosis, 2018) because it was characterized by overcrowding, unsanitary, lack of ventilation, sanitation facility and poor housing.

Therefore, the school surrounding with the slum areas where is one place of high-risk areas with a spread of TB infection. But there is limited intervention on the reduction TB stigma in school. It only was found that the intervention in a field of TB-HIV or the communication program for the TB control among TB patients or general population. The communication is a social process based on dialogue using a broad range of tools and different levels, including listening, building trust, sharing knowledge and skill, building policies, debating and learning for sustained and meaningful change (Waisbord, 2010). Several studies have showed the intervention in a field of TB-HIV or the communication program for the TB such as, the study of Siegel, it was found that stigma is important, also stigma campaign must address on the community and structural levels divers of stigma, and should be concerned an individual level (Siegel et al., 2015).A report linked with the study of Gentili, it was found that meetings with healthcare staff can reduce perceived of TB outbreak after intervention among both groups, also meetings with healthcare staff are useful in clearly definition the situation that face-to-face meetings can play an important role in effective communication (Gentili et al., 2020).

Therefore, we consider a design of the communication program based on the self-efficacy theory and social support developed by Albert Bandura, 1977 and House, 1981, because Bandura trusted about those perceived must change their attitude, perception and behaviors, also can make them confident and lead to desirable health behavior. While social support is a starting point that will lead to health outcomes and support the perceiving of people in order to achieve sustainable health behavior (Ministry of Public Health, 2002).

In this study, we focused on the communication program based on the self-efficacy theory and social support for providing knowledge, enhancing self-confidence, and supporting information to the participants to reduce TB stigma and discrimination. As showed the three reports such as Bangkok Metropolitan Administration and BE Health Association as well as in addition studies such as Osonwa and Eko. Therefore, we decided to explore the effectiveness of communication program on reduction of TB stigma and discrimination among high-

school students in Bangkok, Thailand. Hopefully, this study may benefit the students infected by TB in school and help school areas to reduce TB stigma and discrimination.

1.2 Research Questions

1.1.1 Does the communication program affect to reduction of TB stigma and discrimination among high-school students in Bangkok?

1.1.2 Does the communication program affect to knowledge, attitude, self-efficacy of TB stigma and discrimination among high-school students in Bangkok?

1.3 Research Objectives

1.3.1 General Objectives

1.3.1.1. To explore the effectiveness of the communication program on reduction of TB stigma and discrimination among high-school students in Bangkok.

1.3.2 Specific Objectives

1.3.2.1. To compare mean score differences on the TB stigma and discrimination among experimental and control groups before, and after intervention within same groups and between groups.

1.3.2.2 To compare mean score differences on the knowledge of TB among experimental and control groups before, and after intervention within same groups and between groups.

1.3.2.3 To compare mean scores differences on the attitude of TB among experimental and control groups before, and after intervention within same groups and between groups.

1.3.3.4 To compare mean score differences on self-efficacy of TB stigma and discrimination among experimental and control groups before, and after intervention within same groups and between groups.

1.4 Research Hypothesis

<u>Null hypothesis</u>

1.4.1 The communication program has no difference of the effect on the reduction of TB stigma and discrimination before and after intervention among experimental and control groups.

1.4.2 The communication program has no difference of the effect on the knowledge, attitude, self-efficacy of TB stigma and discrimination before and after intervention among experimental and control groups.

<u>Alternative hypothesis</u>

1.4.3 The communication program has difference on the effect on the reduction of TB stigma and discrimination before and after intervention among experimental and control groups.

1.4.4 The communication program has difference on the effect on the knowledge, attitude, self-efficacy of TB stigma and discrimination before and after intervention among experimental and control groups.

1.5 Scope of the Study

This study is a quasi-experimental study with two groups of pretest-posttest design. The study aims to explore the effectiveness of reduction on TB stigma and discrimination among high-school students in Bangkok. The context of this study is comprised of TB stigma and discrimination, knowledge of TB, attitude of TB and self-efficacy of TB stigma and discrimination. The target population is high-school students, aging between 15-19 years, who are studying in public high-school, in Bangkok areas.

1.6 Conceptual Framework

| Independent Variables | Intervention | Dependent Variables |
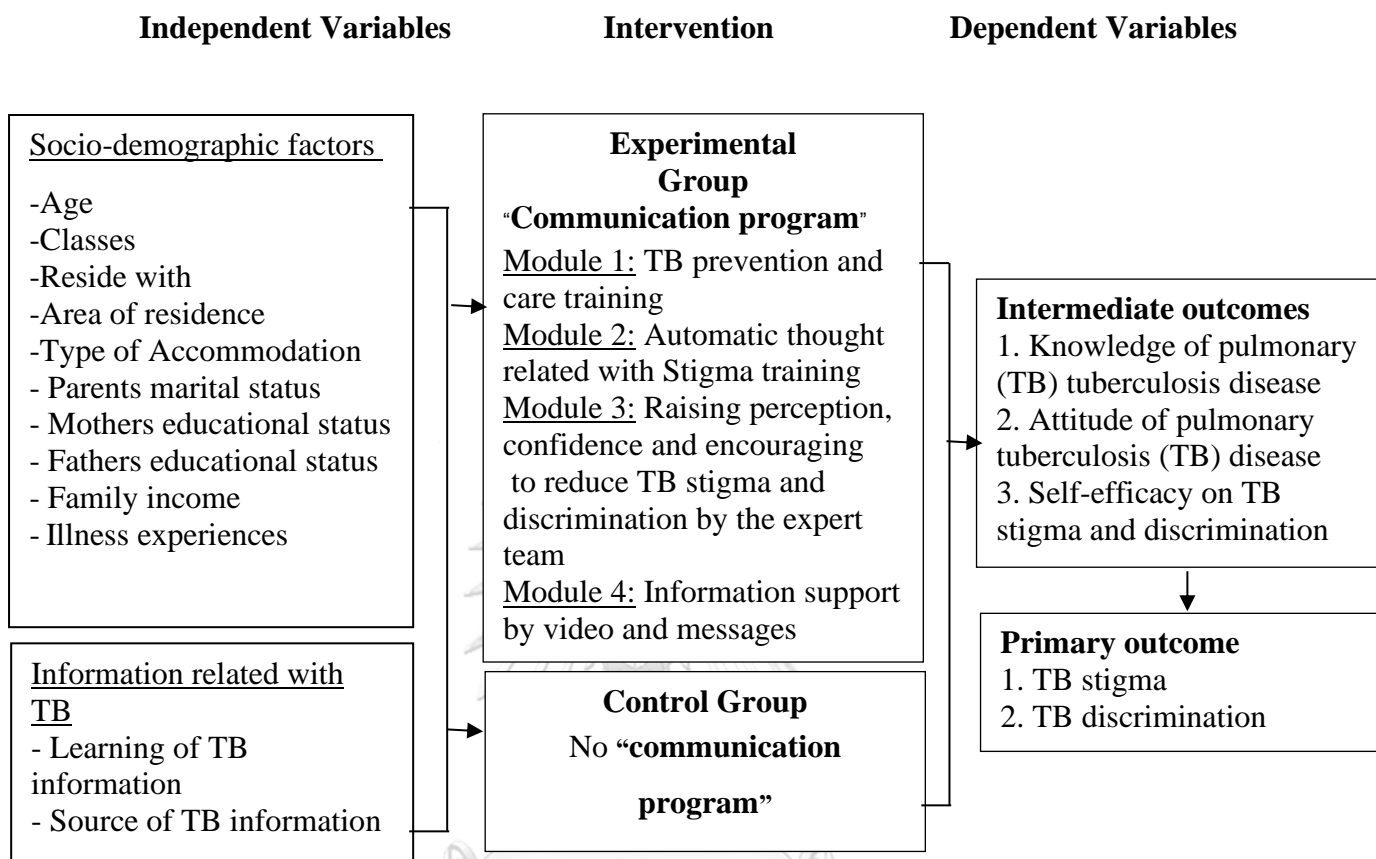
Figure 1: Conceptual framework

1.7 Operational Definitions

1.7.1 High-school students: who are studying in public high-school, under Bangkok areas are between the age of 15-19 years.

Socio-demographic factors: refer to socio-demographic factors, information related with TB.

- Socio-demographic factors refer to gender, age, religion, classes, reside with, area of residence, type of accommodation, parents marital status, mother's educational status, father's educational status, family income, illness experiences, know person with TB

- Information related with TB refer to the students have to hearing or learning of TB information and the source of TB information that students have to hearing or learning before starting the intervention.

1.7.2 Knowledge of the TB disease : refer to understanding of high-school students and ability to answer the knowledge of TB curability, knowledge of duration of infectiousness, beliefs about transmission, protection measures and knowledge of TB transmission (Craig et al., 2018).

1.7.3 Attitude of the TB disease: refer to rationale, beliefs, feelings, and values and effect on the actions or behaviors of high-school students for respondents towards the TB disease.

1.7.4 External TB stigma: refer to the perceptions, beliefs and negative attitudes of stigma are an attribute towards TB patients which was comprised of, disclosure issue, shame, blame and guilt, mistrust, fear, rejection and avoid (Eva Margarita Moya, 2010).

1.7.5 TB discrimination: is the result of stigma that refer to the expectation of the reactions or behaviors that affect to TB patients was comprised of exclusion, distinction or restrictions which violate human rights and fundamental freedoms such as elimination of all forms of discrimination against persons with disabilities (Eva Margarita Moya, 2010).

1.7.6 Communication program: based on the program which motivates, confidences and supports, the target group having knowledge, attitude and perceived TB stigma and discrimination the activities were included; TB prevention and care training, automatic thought related with stigma training, raising perception and encouraging the targeted population to reduce TB stigma and discrimination by role model and the expert team who had the experience in the field with TB, information support by happy ending with TB video, which video related with TB stigma and discrimination created by physicians, also TB messages to against TB stigma and discrimination by VDO clip, poster or leaflet, the duration of the program within 3 months and follow-up 2 month for program evaluation.

1.7.7 Self-efficacy of TB stigma and discrimination

Self-efficacy reduce TB stigma and discrimination: refer to assessing self-perceptions. Consisting of perceived self-efficacy, and outcome expectation related with TB stigma and discrimination

- perceived self-efficacy: refer to expectations of self-efficacy to reduce TB stigma and discrimination.

- outcome expectation: refer to able to assess behavior practices that will lead to reduce TB stigma and discrimination, and also haven't negative behaviors or actions that reflect to TB patients.

1.7.8 Social support: refer to provide information support by happy ending with TB video and TB messages to against TB stigma and discrimination by poster or leaflet and video.

1.7.9 Public high-school: refer to the schools, which are under Office the Basic Education Commission, and the size of schools are largest (total minimum of students at least 2,500)

CHAPTER II
LITERATURE REVIEW

In this chapter, we are describing general information about TB disease including TB infection, TB symptoms, TB treatment, prevention and control of TB disease. Also, TB stigma and discrimination are, also described in detail as well as theories related to self-efficacy and social support. Furthermore, some examples of the research studies including TB stigma and discrimination are shown and described.

2.1 TB knowledge

2.1.1 A history of TB originated from a disease with the first evidence of lesions found in the spine of a mummy in ancient Egypt, which was in the period of 2,400 BC from the literature of the ancient Greeks about 460 BC. Hipopocrates recorded that it was a period of widespread epidemic disease symptoms similar to the plague at that time. The disease is called "The White Plague". There are also other names "phthisis" or "consumption". The word "TB" has been used in the middle of the last century. TB knowledge and the pathology of TB begun to appear in the 17th century, with an evidence based on tuberculosis from Italian doctors. There was no medicine in those days. Therefore, a sanatorium has been established for the treatment of tuberculosis (Bureau of Tuberculosis, 2018).

2.1.1.1 Epidemiology and pathogenesis

Mycobacterium tuberculosis, causing TB disease, is classified as *M. tuberculosis* complex TB occurs in most organs of the body, in particular lungs, which is easily transmitted. Extrapulmonary TB may be found in other organs, including pleura, lymph nodes, spine, joints, abdomen, urinary system reproductive system, nervous system etc (Bureau of Tuberculosis, 2018).
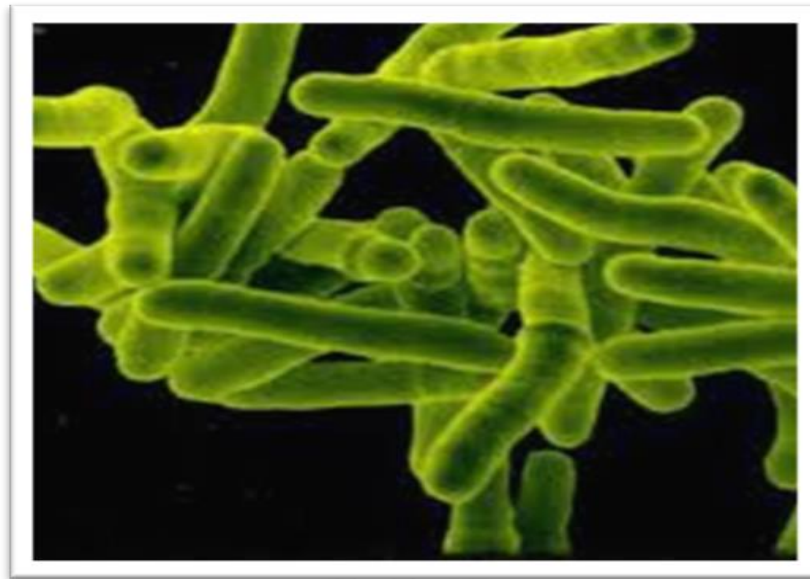
Figure 2: Morphology of mycobacterium tuberculosis
(Bureau of Tuberculosis, 2018).

M. tuberculosis is destroyed by many factors, including some
chemicals, heat, sunlight and ultraviolet light. The sunlight can destroy TB in the sputum in 20-30 hours. Dry sputum that is not exposed to sunlight can live for 6 months. Heat can destroy TB at the temperature of 60 degree Celsius for 20 minutes.

2.1.2 TB symptoms

(1) Chronic cough for more than 2 weeks

(2) Coughing up sputum, coughing up blood

(3) Low fever in the afternoon-evening

(4) Loss of weight

(5) Sweating a lot at night

2.1.3 Transmission of TB

Transmission of TB is occurred by a spread of the droplets
such as coughing, sneezing, speaking, shouting, laughing, etc. Large droplets will fall to the ground. Aerosols are small particles with a size of 1-5 micrometers which will float and spread in the air. The person inhales the aerosol, that has TB large particles attached to the nose or throat, which do not cause the disease. However, small particles will enter to alveoli pulmonary.
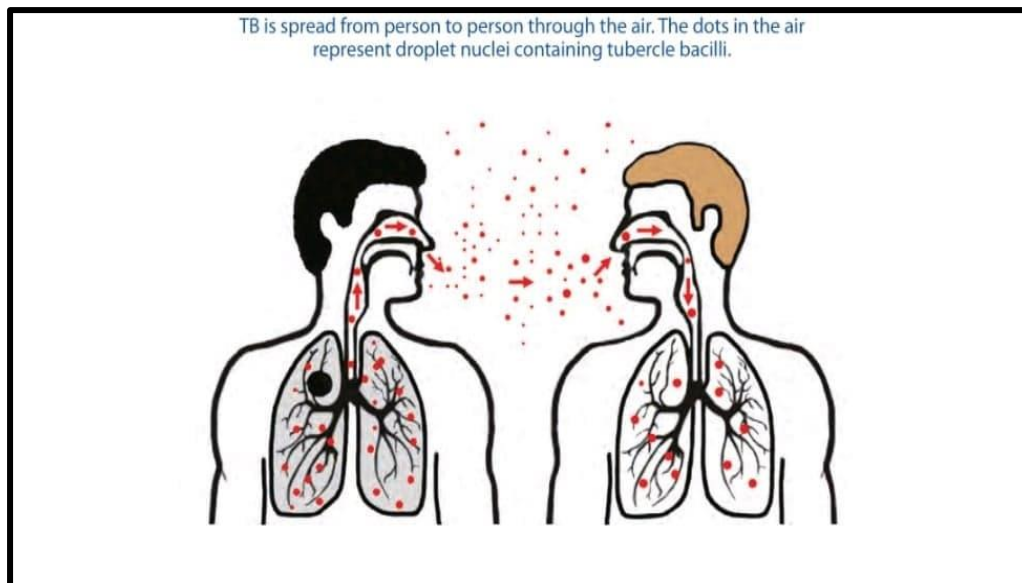
Figure 3: Transmission of TB

(Bureau of Tuberculosis, 2018).

2.1.3.1 Factors affecting that the determination of TB transmission can be divided into 4 factors.

Table 1 : Factors affecting that the determination of TB transmission

Factors	Description
TB patient factors	Such as; TB, lungs, bronchi or larynx during the phlegm infection patients with pulmonary ulcers will have many infections. When there is a cough, sneezing or other symptoms that cause strong breathing
Medical service factors	Such as; late diagnosis and treatment incorrect medication or incomplete treatment
Environment	Such as; dense and cramped locations sunlight not reaching poor air flow
Exposure	Frequency of tubercle bacilli, and duration of exposure

2.1.4 TB Disease

TB patients will have signs and symptoms of TB, such as chronic cough for more than 2 weeks, chest pain, coughing up blood or sputum, weight loss, fever, abnormal sweating at night, fatigue, tiredness, and loss of appetite. The TB patient can transmit the infection to other people through the respiratory system by talking, sneezing or receiving fluids. TB infection can be confirmed in the

laboratory using an acid fast bacilli smear (AFB smear) or culture. If the result is positive, it will confirm the diagnosis of TB disease (Bureau of Tuberculosis, 2018).

Table 2: Comparative between TB infection and TB disease

Latent TB infection	TB disease: Active case
None of symptoms	TB patients will have signs and symptoms of TB, such as chronic cough for more than 2 weeks, chest pain, coughing up blood or sputum, weight loss, fever, abnormal sweating at night, fatigue, tiredness, and loss of appetite.
No spread of the infection to other people	Spread of the infection to other people
TB skin test (TST) or (IGRA) test positive	TB skin test (TST) or (IGRA) test positive
Chest X-ray and sputum examination give negative results	Chest X-ray and sputum examination, X pert MTB/RIF or culture give positive result
Provide treatment in for a latent TB infection to prevent active TB disease. (IPT)	On treatment regimens

TB can be found in any organ in our body, but the most common problem is pulmonary TB showing about 80 percent of all TB diseases. Pulmonary TB can spread the infection to other people, on the other hand, extrapulmonary TB can be found in approximately 20%, in particular HIV-infected patients. In addition, the proportion of extrapulmonary TB can be found on some common organs including lymph nodes (the most common), bone (spine) pleura, urinary system, intestines, meninges and skin.

2.2 Treatment of TB Disease

There are 2 phases of treatment regimens recommended for treating adults with TB disease. The treatment regimen was comprised of both the initial phase for 2 months and a continuation phase for 4 months (National Center for HIV/AIDS, TB Prevention, & Prevention, 2013).

(1) Initial Phase

During the first 2 months of intensive treatment, 4 parallel Isoniazid (INH), Rifampicin (RIF), Pyrazinamide (PZA), and Ethambutol (EMB) are used daily, and during the next 4 months is continuous treatment. Use 2 parallel drugs, Isoniazid (INH), and Rifampicin (RIF).

(2) Continuation Phase

The continuation phase of treatment is given for 4 months by using 2 parallel drugs, Isoniazid (INH), and Rifampicin (RIF). There may be a delay in treatment (delayed response) may extend the duration of continuous treatment. The treatment for a total of 9-12 months will be provided but the patients should consult a specialist for individual consideration.

The treatment duration of tuberculosis is at least six months, but some cases may be delayed in treatment. Therefore, the treatment should be for a total of 9-12 months, depending on the opinion of the medical doctor and confirmation of the laboratory test.

2.3 Prevention and Control of the Spread of TB Disease

TB patients can spread the infection to other people from the latent period until being diagnosed and the treatment with an effective drug formula and not found in the phlegm. Most TB patients will have to take on the treatment for at least 2 weeks until 2 months for intensive phase infection. Therefore, people who are close have a chance to get TB infected. Especially those who live in the same house or same area with TB patients (Bureau of Tuberculosis, 2016). Prevention of the spread of pulmonary TB was comprised of;(Keanchunbai, 2017)

2.3.1 Primary prevention is disease prevention before the disease occurs. It is the most efficient way, economical and the most effective activity, this phase comprised;

2.3.1.1 Promoting health behaviors ; such as providing education about knowledge of prevention and control of TB disease, changing attitudes and providing consulting services, etc.

2.3.1.2 Promoting environmental health; such as hygienic living arrangements, environmental sanitation improvement and providing health services for safety.

2.3.1.3 Promoting health on the body to be immune to various diseases such as; health examination and vaccination against from diseases.

2.3.2 Secondary protection is prevention during the disease period, including

2.3.2.1 Screening for disease as soon as possible before disease infected

2.3.2.2 Initial findings for the patients, especially the communicable diseases group or deadly contagious diseases, that can spread the infection to other people such as; cholera, diphtheria, whooping cough, polio, pulmonary TB.

2.3.2.3 Immediate diagnosis and treatment can help treat the disease accurately and effectively, making the disease disappear quickly, preventing complications and eliminating disease and can reduce the spread of disease infection.

2.3.2.4 prevention of the spread of infection to other people in the communities

2.3.3 Tertiary prevention is the prevention of disability by focusing on the treatment of disability and physical rehabilitation. TB can be detected as soon as possible and expect that the family members who live in the same house together with the patients have awareness of pulmonary TB. Do not show disgust to patients to reduce stigma,in the order to prevent TB in the future (Bureau of Tuberculosis, 2016).

In conclusion, TB is one cause of death, a disease that is transmitted from person to person through the air (airborne transmission) and can spread from person to person everywhere. The Ministry of Public Health and many organizations in Thailand have the strategies to control this disease, and they hope to end TB disease in the future. Stigma and discrimination are the one challenge of TB disease. Also stigma and discrimination are important to consider for health policy and clinical practice, because stigma and discrimination can lead people to suffer, increasing the transmission of TB disease and may delay diagnosis, care seeking and delay on

treatment. The details of TB stigma and discrimination will be described in section 2.4

2.4 TB stigma and discrimination

TB stigma is beginning to receive some well-deserved attention at the global level. Many experts believe that it will be difficult to find the estimated 4 million missing TB cases without addressing the TB stigma. Similarly, some studies found that TB patients suffering from TB disease, were stigmatized because TB stigma effects on the treatment delay and had an impact on the quality of life for people with TB. This section describes TB stigma and discrimination as follows.

2.4.1 TB stigma theory and measurement

There is increasing recognition of TB stigma and it continues to be a major barrier for some people (patients, families, caregivers, and communities).
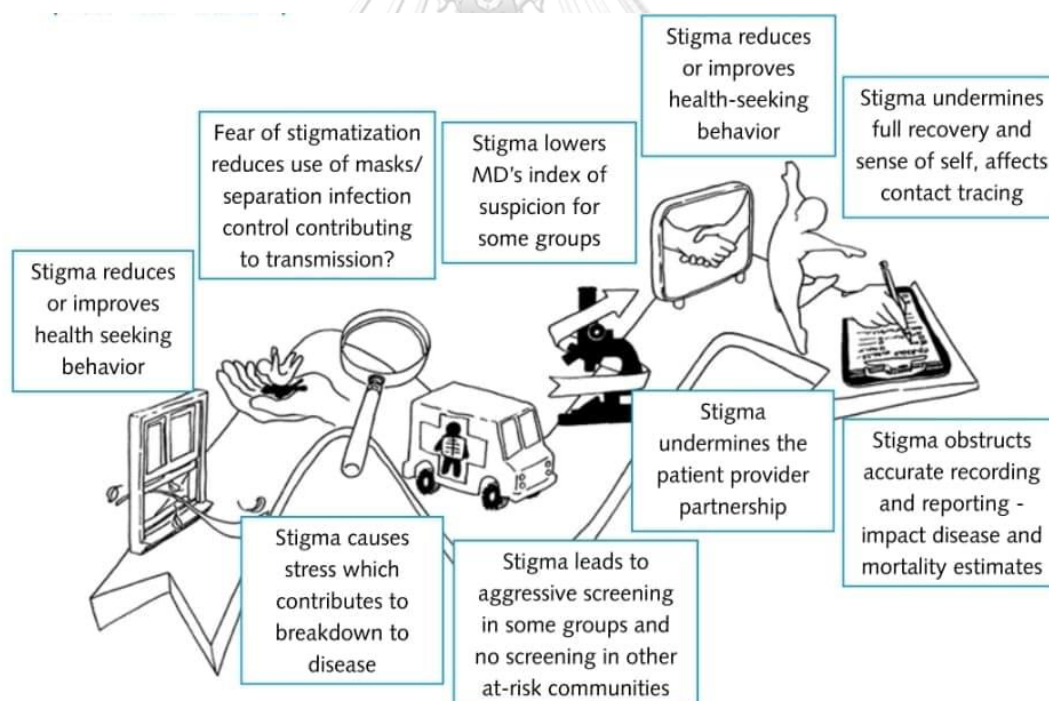
Figure 4 : Potential Impacts of Stigma along a Person's TB Care Itinerary

or Trajectory

(Craig et al., 2018).

Based on figure 4, it is considered as a matrix of types of TB stigma and populations that may produce them or be affected by stigma. The different forms of

stigma and the specific groups involved in producing them. Reduction of TB stigma can facilitate an early diagnosis and full recovery and is a priority of national TB programs. Patient groups and representing groups who suffer from the TB stigma, such as miners and healthcare workers, are also calling for concerted efforts to reduce the stigma (Craig et al., 2018)

2.4.1.1 How to measure TB stigma by participatory approaches

Participatory TB stigma research recognizes that the community has the expertise to identify drivers of stigma and create solutions. Therefore, knowledge of TB stigmatization should be made in conjunction with those most affected by TB. Cooperative research aims to democratize the research process and challenge traditional power relationships in a "smash and grab" research approach. It is described in table 3.

Table 3 : Ways to Engage People with TB in the Stigma Measurement Process

Participating in Research	Managing Research
• Setting the research agenda by deciding on topics for research. • Sitting on recruitment panels for the appointment of research staff. • Acting as researchers/peer researchers following training. • Conducting fieldwork and collecting data. • Assisting with the analysis and interpretation of data. • Devising recommendations. • Writing or coauthoring research reports. • Disseminating findings, and serving as interpreters or cultural ambassadors.	• Acting as co-applicants on research proposals. • Chairing or participating in project advisory groups/ steering committees. • Chairing or participating in research implementation groups and ethical review committees. • Monitoring the implementation of recommendations.

There are many different ways to conduct collaborative research with affected communities, in addition to interviews or focus groups. Some of them have been in the field of TB. We believe that there are many areas where stakeholders, disciplines and experiences will be fully integrated. Diversity can strengthen processes and outcomes because TB stigma measures are so advanced. Survivors, families, friends, carers, healthcare workers and other tuberculosis-related professions also testify and suffer from stigma, and stigmatization. Many perspectives are needed to develop a comprehensive tools (Craig et al., 2018)

2.4.1.2 Conceptualizing TB stigma and its measurement

The concept of stigmatization has become from studies reported in the literature, sociology, psychology and medicine. The original concept of stigma is based on social interaction in response to the sociological and social psychological developments that emerged since the 1960s by Goffman. The definition of stigma focused on the symbolic mark, which remains behind far usage, the stigma of physical traits has become archaic an idea (Weiss, Ramakrishna, & Somma, 2006).

TB stigma is not natural, understanding of stigma that way is important for both measurement and reduction. Once thought to be an evolutionary advantage, most theories view stigmas as an immutable social structure. TB stigma is not a natural or unavoidable part of having TB. TB stigma needs to be activated and nurtured to exist finding which ideas, legal, social and cultural norms, rhetoric and routines fuel and maintain a particular stigma requires a detailed inquiry. However, there are certain strengths of stigmatization that have been defined over the years. These include conscious and unconscious processes that cause bias. They can be seen as a series of progressive steps, respectively, and the conditions that society might allow to reclassify individuals as less valuable (Craig et al., 2018)

Link and Phelan (2001) provides a framework of defined components that make up the stigma process and show how people create categories around people with conditions or differences. These categories are linked to stereotypes that can lead to discrimination or other behavioral changes that affect to patient or family. The different types of stigma are described below. The group of sufferers (or patients) is stereotyped with a negative either to think they are going to be stigmatized or make to feel stigmatized. Link and Phelan (2001) are described that process in the following way, "In conceptualization, stigma arises when the following interrelated components converge. First, people distinguish and identify human differences. Second, dominant cultural beliefs link individuals who are identified as undesirable traits to negative stereotypes. Third, the labeled individuals are categorized in different categories in order to separate "we" from "them" to some extent. Fourth, labeled individuals experience loss of status and discrimination, leading to unequal outcomes (Link & Phelan, 2001).

2.4.1.3 Effective stigmatization requires power

Stigmatization is based on access to social, economic and political power that allows it to differentiate, create stereotypes, label people of different types, and complete implementation of rejection, exclusion, and discrimination. So, it applies the term stigma is used when labeling, stereotyping, separation, discrimination, loss of status, and discrimination arise in a power situation that allows unfolding. Stigmatization and discrimination that can result from it, are only possible when there are differences in power between the stigmatized and the so-called mainstream (the powerful).
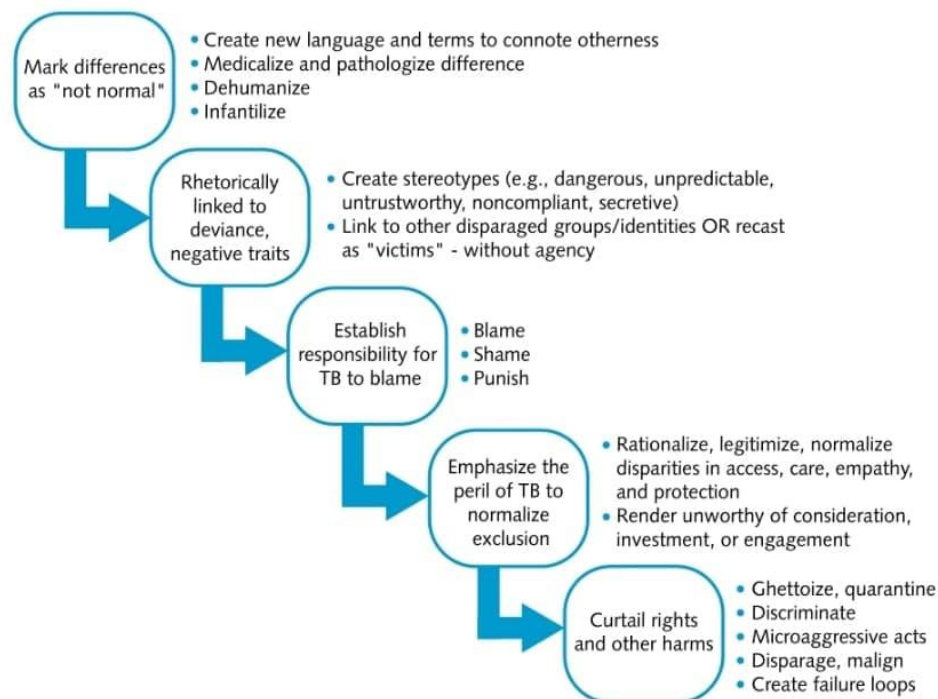
Figure 5: A typical stigma-building Cascade
(Link & Phelan, 2001).

2.4.1.4 Unpacking and Domains of Stigma

To understand TB stigma, one should separate stigma drivers, domains and consequences, It is described as follows,

(1) Drivers of TB stigma; drivers of TB stigma; depending on the types of stigma, setting, population and types of TB, structure stigma can be driven by power differential. Also, drivers may differ by epidemic characteristics (low

or high burden setting) or by the population impacted (age, sex and class) (Macintyre et al., 2017).

(2) Consequences of TB stigma; It should be recognized the TB stigma interacts on complex levels with psychological, social and political factors. The impact of TB stigma is therefore not indirectional and not always negative, such as, TB stigma can make some patients more adherent and some less adherent. Furthermore, TB stigma's consequences maybe impact to individual, family and community levels (Macintyre et al., 2017).

(3) Domain of TB Stigma

The stigmatization process can be broken into specific domains, the domains of stigma are comprised of drivers and facilitators.

(1) Divers are individual-level factors that show negative influence to stigma process, such as; lack of awareness of stigma and harmful consequences, fear of infection of TB disease, social breakdown from family and community, and prejudice and stereotypes towards TB patients.

(2) Facilitators are society-level factors that show negative or positive influences, including: protective or punitive law, awareness of rights, structure barriers to public policy level, also culture and gender norms (Stangl, Lloyd, Brady, Holland, & Baral, 2013).

Pescosolido and Martin (2015) identified seven domains of public stigma: social distance, traditional prejudice, exclusionary sentiments, negative affect, treatment carryover, disclosure carryover and perceptions of dangerousness (Pescosolido & Martin, 2015).

Figure 6 : Common domain of Public Stigma
(Craig et al., 2018).

There are seven domains which may be explained in terms of TB patients they become recognizable as commonly understood parts of stigmatization, and it is described as follows,

(1) Social distance refers to an individual trying to avoid a person with TB (PWTB).

(2) Traditional prejudice refers to people with stereotypes. People with tuberculosis believe that all people with TB are less valuable.

(3) Exclusionary sentiments refer to people who want to separate a person with TB (PWTB) from everyone, else or deny or deny their rights.

(4) The negative effect refers to emotional reactions such as disgust or hatred a person with TB (PWTB).

(5) Carrying out of treatment refers to when people are afraid of

someone knowing that they have received treatment for TB in the past. This is the need to recognize a secret that may remain after a person has recovered.

(6) Disclosure carryover refers to when people are afraid of the reaction when they know people with TB.

(7) Perception of danger refers to the idea that a person with TB (PWTB) represents a risk to the society (Craig et al., 2018).

2.5.1.5 TB Stereotypes in Universal and local

The description of TB stereotypes in Universal and local is mentioned in table 4.

Table 4 : TB Stereotypes in Universal and local

Universal/Local	Causes
Chicago	- Being selfish about sharing drugs - Being unprincipled
Rural Mozambique, Zambia	- Having HIV - Having an abortion
Urban, Nepal	- Drinking Alcohol - Visiting Sex Workers - Smoking Tobacco

Almost all stigmatization is caused by attaching negative thoughts and behaviors to a person, this can be a conscious process or an unconscious process, while negative labeling and associations are part of the world, labels, links and stereotypes vary by context (Craig et al., 2018).

2.4.2 Stigma and Discrimination definitions

2.4.2.1 Stigma definitions

Stigma was a Greek word that refers to a person with an abnormal Body, who was different from others and they hadn't morals, such as criminals and slaves. More recent literature emphasizes stigma as a process that involves differentiation, othering, and discrimination. Two main forms of stigma emerge as external and internal (Rau et al., 2018). External stigma manifests as negative attitudes, perceptions, beliefs and behavior that lead people to reject, avoid, or fear those who they think have an undesirable 'mark' towards those with HIV or TB. Internal stigma refers to negative beliefs that a person holds about himself or herself-

negative self-judgements based on that person's lived experience (Heijnders & Van Der Meij, 2006). Both types of stigma lead to poor treatment adherence, increase the spread of the disease, ultimately poor health, also a reduction in the quality of life (Siegel et al., 2015). Therefore, we focus on stigma because it attacks a person's self-worth, affects a person's right to dignity, and thus violates human rights.

Stigma originally defined by Goffman (1963), refers to a desirable or discrediting attribute that reduces an individual's status in the society. Goffman, 1963 defined stigmatization as a condition in which a person or group of society determines what differentiates us from them and what should be desirable and undesirable?. Characteristics that differ from most individuals were considered deviation, when an individual feels unworthy or guilty, leading to loss of self-worth. A person feels stigmatized which began linked to a difference and undesirable (Goffman, 1963). However, the stigma depends on the social and cultural context, and finally status loss and discrimination (Stangl et al., 2013).

In conclusion, stigma is a social process, experience or anticipated, characterized by exclusion, rejection, blame or devaluation that results from experience, perception or reasonable, the anticipation of social judgment a person or group (Weiss et al., 2006). Also, a link that sets the person apart to undesirable stereotypes, which an individual feels unworthy or guilty, leading to a lack of self-worth and depression and abnormal behavior, which results in unfair treatment and discrimination.

2.4.2.2 Discrimination definition

Discrimination is characterized by prejudice, action or treatment of people infected and affected and the risk for TB disease (Klein, Karchner, & O'Connell, 2002).

Discrimination occurred in two forms and is described as follows, (Baral et al., 2007).

(1) Direct discrimination occurs when a person is treated less favourably on their ground disease.

(2) Indirect discrimination occurs when a requirement or condition is applied which, although applied equally to all persons. It is such that a considerably smaller proportion of people with the disease and it cannot be shown to be justifiable

other than on health grounds. Some factors can lead to discrimination, including gender, race and disability.

In conclusion, the perception of stigma by other people or by the stigmatized person that leads to discrimination and stigma is important because, it causes discrimination. Therefore, TB stigma and discrimination produce social inequality.

2.4.2.3 Definitions of types of TB stigma

(1) Public stigma is the negative attitudes, beliefs, and behaviors held by the wider community or general public (Craig et al., 2018).

(2) Internalized or self-stigma captures the idea that individuals may come to endorse negative stereotypes, and therefore, they feel isolated from society, because of fear, disgust and avoidance of gossip. In addition, self-stigma can affect to decrease self-worth, also making them feel untreated as others. It has also affected people by disliking themselves; causing them to be ashamed, devalued and hopeless (UNOPS, 2019).

(3) Anticipated stigma (perceived stigma) is the worry that one will be devalued after a TB diagnosis. For the person with a TB diagnosis, this is the fear (often the result of observing others being stigmatized) that the stigma against the person will be so bad that will affect access to TB services. It may delay people from seeking and returning for care, or impact adherence to the prescribed medicines. Whether or not stigma actually occurs, anticipated stigma may interfere with care-seeking and treatment adherence (UNOPS, 2019).

(4) Enacted or experienced stigma reflects the range of stigmatizing behaviors, messages, and effects that are either directly experienced by the person with TB or by their families and/or that drive others to acts of discrimination, rejection, or isolation in different settings (family, community, health care, workplace, in particular). Enacted and experienced stigma are two sides of the same coin, either seen from the perspective of the stigmatizer(enacted) or the stigmatized (experienced) (UNOPS, 2019).

(5) Secondary stigma is a stigma against surrounding groups of people with TB such as family members, friends, and caregivers, who are not sick with TB. This stigmatization occurs, it may leave those involved with the patient and TB

patients haven't received social assistance or make their life too difficult and pressure. Furthermore, this may dictate their behaviors or beliefs, regardless of whether stigmatizing attitudes or reactions actually occur (UNOPS, 2019).

(6) Community/public stigma describes negative attitudes, beliefs and behaviors held by the wider community (neighbors in particular) or the general public. This is closely related to anticipated stigma (UNOPS, 2019).

(7) Structural stigma describes the laws, policies, media and institutional architecture that may be stigmatizing or alternatively protective against stigma. This includes societal level conditions, cultural norms and institutional practices that constrain the opportunities, resources and wellbeing of stigmatized populations (UNOPS, 2019).

2.4.3 Divers of Stigma at the Community Level

There are many potential drivers of TB stigma in the general population. Stigma in the general group can be influenced by social characteristics, such as knowledge, epidemiology context, structural drivers of TB stigma and invidual Characteristics. Some experts have believed that the spread of TB infection can increase TB stigma (Craig et al., 2018). However, TB knowledge is consistent with the relationship with TB stigma. Especially, TB stigma at a community level, furthermore, it can increase with education and social class levels.It is described as follows:
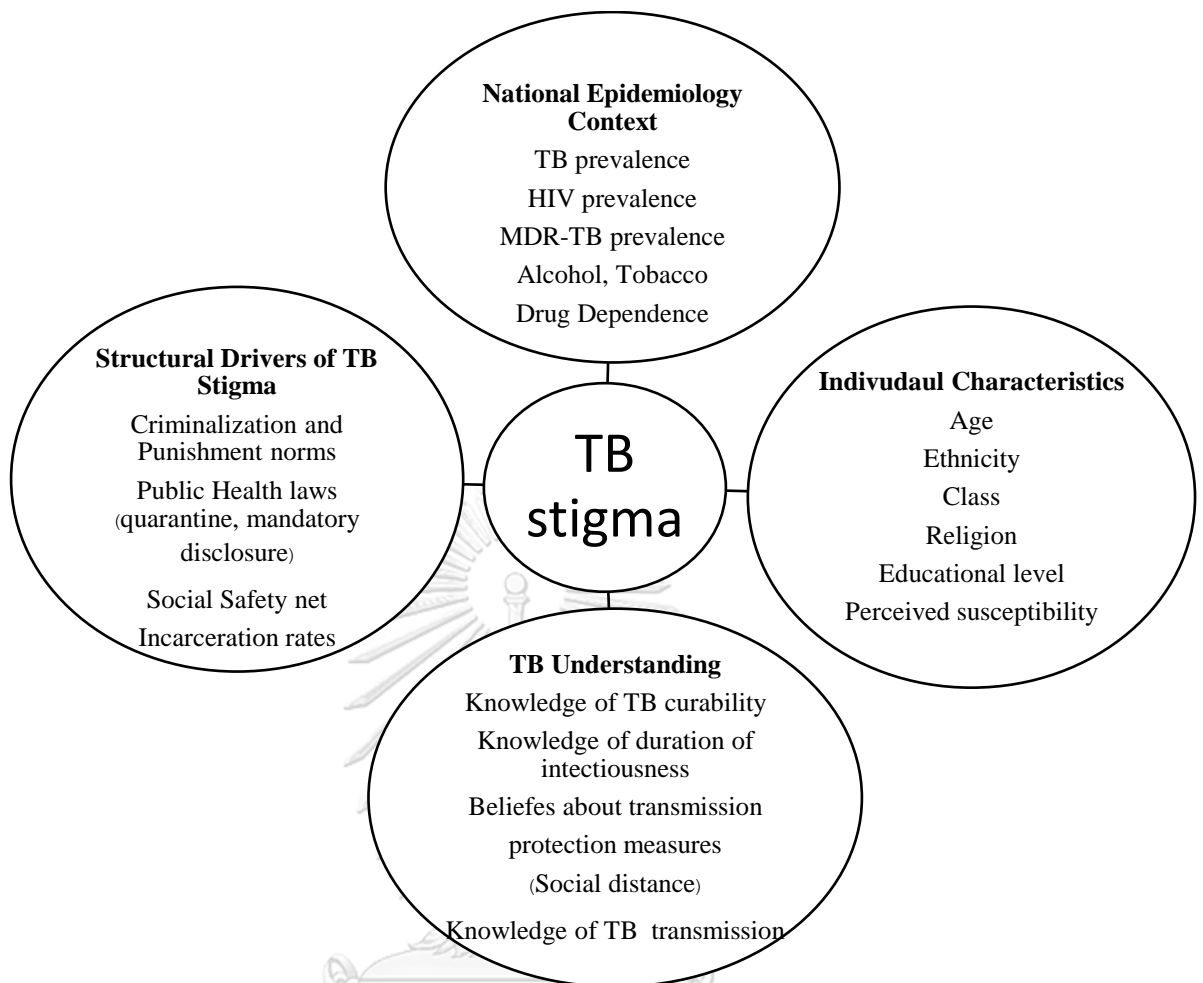
Figure 7 : Illustrative Influences upon societal TB stigma

(Craig et al., 2018)

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2.4.4 Strategies to reduce Stigma and Discrimination

There are many strategies to reduce stigma and discrimination as reported in many literature reviews. These strategies and interventions can be implemented at different levels: intrapersonal, interpersonal, organizational/ institutional, community and government/structural (Heijnders & Van Der Meij, 2006). In this section, it is described as follows;

Table 5: Strategies related to stigma and discrimination

Level	Strategies
Intrapersonal level	- Treatment - Counselling - Cognitive – behavioural therapy - Empowerment - Group counselling -Self-help, advocacy and support groups
Interpersonal level	- Care and support - Home care teams - Community-based rehabilitation
Organizations/Institutional level	- Training program - (New) policies, like patient-centered and integrated approaches
Community level	- Education - Contact - Advocacy - Protest
Government/Structural level	- Legal and policy interventions - Rights-based approaches

2.4.4.1 Intrapersonal level

The intervention at the intrapersonal level aimed to change characteristics of the individual such as knowledge, attitudes and behavior, self-perception, improving self-esteem, coping skills, empowerment and economic support (Heijnders & Van Der Meij, 2006). This strategy provides social reinforcement for positive attitudes, behavior change and maintenance of safe behavior. The intervention at the intrapersonal level has many strategies such as:

(1) Individual counselling and cognitive behavioral therapy within the field of HIV/AIDS, and TB are an important strategy to decrease stigma (Heijnders & Van Der Meij, 2006). Literature reviews of stigma-reduction intervention found, that counselling has been implemented at the group level, also cognitive behavioral therapy has been shown to be effective in helping to deal with the consequences of self-stigma, therefore, cognitive behavioral therapy (CBT) is a strategy in which patients are trained to identify and modify negative beliefs and negative interpretations.

(2) Self-help, advocacy and support groups, within all health field studied and it has important to contribute to a person's identity and self-esteem, coping skills and social integration. There was the study by Dimissie et al. (2003) showed the effectiveness of support groups on stigma reduction, also TB clubs by Demissie enhance patient compliance and improve societal attitudes towards TB (Demissie, Getahun, & Lindtjørn, 2003).

2.4.4.2 Interpersonal level

Interventions at the interpersonal level aimed to modify the affected person's environment. These interventions deal with the impact of social support and social networks on health status and behaviors. This intervention has the target group are the patients and his or her family, work environment, and friendship networks (Heijnders & Van Der Meij, 2006). The intervention at the interpersonal level has many strategies such as:

(1) Care and support, Nyblade et al. (2003) argue that while people with HIV/AIDS are cared for by their family, community volunteers and health care providers, this care can come with a stigma. Therefore,it is important to educate and support HIV-affected persons about the disease, its symptoms and way of transmission, the language they use, available resources, and to mobilize communities to come into action (Nyblade et al., 2003).

(2) The home care team, in the field of HIV/AIDS, showed a positive result from the work of home care teams. In contrast, some reports on home-based care concluded that intervention found positive attitudes affected by HIV/AIDS, the effects of this strategy were not on stigma reduction (Heijnders & Van Der Meij, 2006).

(3) Community-based rehabilitation, this strategy showed that community-based rehabilitation (CBR) had positive effects on the reaction of leprosy patients and their families towards leprosy and had an even larger effect on people's occupational and economic status. But, it did not identify the specific factors that had relevance to these changes and how these changes relate to stigma reduction (Heijnders & Van Der Meij, 2006).

2.4.4.3 Organizations/Institutional level

This part of the interventions was aimed at change health and stigma-related aspects of an organization. This part of the intervention can be achieved through a training program, which increases knowledge on health issues and of the impact of stigma on the lives of individuals. The intervention at this level has many strategies such as:

(1) Training program, in the field of TB, from the study by Macq and et al. (2005) on the social stigma of TB in Nicaragua, found that health workers reported both feelings of affection and supportive behavior towards persons affected by TB, as well as fear of contagion and consequent behaviors of isolation. Also, many experts suggest that stigma reduction could be based on the professional's knowledge of how to practice could lead to less stigma and at the same time could lead to achieving stigma reduction (Macq & et al, 2005).

2.4.4.4 The community level

Interventions at the community level aimed to increase knowledge regarding specific health conditions and stigma within specific community groups, also aims to increase community development skills, develop support networks, and through these provide better access to services for people affected. The intervention at the community level has many strategies such as:

(1) Education is the first step in stigma reduction and is combined with other strategies. Education aims to inform the general public and community groups by increasing their knowledge about illness and provides facts on which stigma is thought to be based. Several experts conclude that the content of these messages or information is very important for the effects on stigma reduction.

(2) Contact refers to all interactions between the public and persons affected, with the specific objective to reduce stigma attitudes. Contact can be either direct and face-to-face, or indirect (such as, through the media). Contact in combination with an educational intervention is one of the most promising approaches. Within the field of mental illness, several studies

show that contact interventions are associated with improved attitude (Heijnders & Van Der Meij, 2006).

(3) Advocacy is a program towards enabling the environment to influence policies and discrimination laws, and improve access to treatment and care. No study was found that the effectiveness of advocacy as s stigma reduction strategy.

(4) Protest aims to suppress stigmatizing attitudes toward mental illness. The field of social psychology show that protest interventions can affect attitude change.

2.4.4.5 Government/Structural level

Interventions at the government/structural level aimed to enforce the protection of right of people affected with a stigma illness. Within the field of TB and cancer, as the study of Heijnders and Van Der Meij (2002) showed both TB and cancer became less stigma as knowledge and medical treatment improved (Heijnders & Van Der Meij, 2006)

Therefore, it is best to combine with the intervention at the interpersonal level and community level, as previous studies showed that a combination of counseling, education and contact is very promising.

In conclusion, TB stigma and discrimination is a major social factor that causes a delay in diagnosis and treatment non-adherence among TB patients, and also leads to increase transmission of infectious disease. But there was no any the intervention to direct the reduction TB stigma and discrimination, we only found that the recommendation in the future for TB stigma intervention should include stigma-specific intervention and should be to provide and enhance TB education programs in public, school and workplace. Especially, schools are particularly placed a high risk to increase the spread of TB transmission, due to overcrowding and longer periods of contact (Ngamvithayapong-Yanai et al., 2019). Therefore, we consider designing the communication program based on Self-efficacy theory and social support developed by Bandura (1977) and House (1981), because Bandura trusted about those perceived must change their attitudes, perceptions and behaviors, and also develop their confidence in knowing what to do and actually doing it, (Ngamvithayapong-Yanai et al., 2019), and leading to desirable health behavior. While social support is a starting

point that will lead to health outcomes and support the perceiving of people to achieve sustainable health behavior. The details of both theories will be described in sections 2.5 and 2.6.

2.5 The Self-efficacy theory

      2.5.1 The concept of self-efficacy

The original concept of self-efficacy was developed and tested by Bandura (1977).Self-efficacy is presumed to have a more powerful influence on behavior. The concept of "Self-Efficacy" was applied and based on social learning theory. This theory has been used extensively in psychology, social studies, and health education. Especially, health education in hospitals helps patients acquire knowledge and abilities themselves and increase skills, and ability to learn and practice for themselves. As mentioned Bandura said that people could learn a process that was complex, especially in the area of behavior. Bandura had suggested that individuals had faith in their abilities. Thus, they influenced to help people perform a particular task. This was an important behavior that links between knowing what to do and actually doing it (Bandura & Adams, 1977).

In basic concepts of self- efficacy, Bandura believed that behavior might analyze the conditions and the stimuli of behaviors, which emphasize the reinforcement by the condition to remain those behaviors. Bandura believed that human behavior should decrease the importance of the control of internal factors, but it continues to focus on the control of external factors. The various reinforcement behavioral interactions may be described as having a relationship between three components:

      (1) Behaviors, especially focus on the specific behavior

      (2) Person, such as a patient

      (3) Environmental

It can be seen that Bandura's concept of behavior and environment, wasn't separated, Bandura believed that people would use environmental conditions which influence behavior, also can influence people in part of decisions in the next action or behavior. A person 's behavior will change in any direction depending on the learning gained from society. The environment determines the behavior that will occur in a

person, such as thoughts, emotions, and expectations. The study of that person's behavior must analyze the conditions and stimuli that affect the person's behavior. Based on the concept of self-efficacy had the hypothesis that believed if a person can expect or believe in his or her abilities knew what to do and when will be done, it will get the results that he/she had wished for and will act accordingly. The main structure of the theory can be described as follow,

Person ⟶ Behavior ⟶ Outcome

Efficacy Expectations   Outcome Expectations
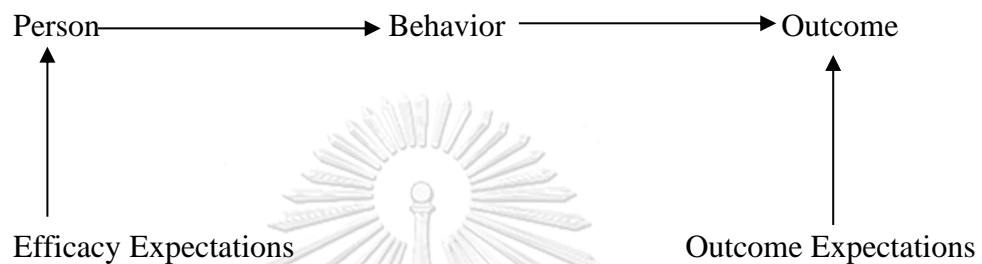
Figure 8 : The main structure of self-efficacy theory

(Ministry of Public Health,2002).

According to self-efficacy theory, the essential components of the theory are comprised of;

(1) Efficacy Expectations

Bandura expects that ability. It is the patient's belief that he or she is able to perform the behaviors that are defined to lead to the desired health behavior.

(2) Outcome Expectations

Refers to patients having an estimate of the specific behavior to perform and will lead to the expected results.

In conclusion, self-efficacy theory is based on the social learning theory. When a patient has the skills for appropriate action, then he/she will have enough encouragement. Therefore, the expectations are important to predict or decide whether the patient will change health behavior and continue to remain desirable health behavior.

2.5.2 Sources of self-efficacy information

Bandura found that the expectations of self-efficacy develop in four sources:

(1) Performance Accomplishment

Performance accomplishment depends on a person's learning or experiences. Success in doing a task alone is not enough because before a person can complete a task if forced to succeed would lead to difficulty. Therefore, success in doing a task is not enough to raise self-efficacy. In addition, each person will be successful through their abilities. Based on the efficacy expectations, most people who are successful at doing a task occurs from their experiences and perceived expectations. Therefore, successfully at the task can be develop skills or behavior whereas perceptions and raise self-efficacy. For example, a person who once tried to quit smoking for a day but failed probably will doubt his or her ability to quit for a day in the future. On the other hand, a person who is able to go a full day without smoking may hold strong self-efficacy expectations for abstaining for another day.

(2) Vicarious Experience

Vicarious experiences (observational learning, modeling, imitation) Vicarious Experience is learning that takes place by seeing an a role model, such as observational learning, modeling, imitation. The learning process is arising to see the patterns in a line with the ideas that a modeling technique to maintain a desirable health behavior. In addition, the patterns of healthy behavioral examples should be praised, which is more effective than unresponsive patterns. Demonstrating a good modeling or patterns that influences to people, also it is a stimulus them to help acceptation and desirable health behaviors change.

(3) Verbal persuasion

Verbal persuasion (or social persuasion) is the ways to educate people to take care their-self by health educators. It is familiar and is used regularly, because it is easy to use and can be used for any occasion available all the time. Persuasion to speak, or persuasion people to make an effort using their own abilities to change health behaviors by eliminating inappropriate behaviors, for example, community committee members can induce community residents to cooperate in cleaning.

(4) Emotion Arousal

Emotional or physiological arousal influences self-efficacy expectations when people associate aversive emotional states with poor behavioral performance, perceived incompetence, and perceived failure. Emotional arousal is a cause to develop person to be aware of what they are doing. The stimulus level can be an important indicator. It might be increase or decrease a person's abilities. Bandura said that if a person has over-stimulated, it could destroy his or her job, because a person may suffer a failure if their have too much pressure (Ministry of Public Health,2002)

2.5.2 Dimensions of self-efficacy

There are three dimensions of self-efficacy, it can be described as follow:

(1) Magnitude

Refers to the level or size of the difficulty of the task that must be performed. If a person believes him or herself have low expectations of their abilities or have limited capacity to do only simple the task. If it has assignment the activities that are too much difficult, they often will find failure. Therefore, when assignment the task must be considered the competency and the task on the hand is not to be too must difficult, it means that everything should be a moderation.

(2) Strength

Strength refers to the ability to determine possibilities. In the ability of a person to perform a task it is done by a two-step process: first, assigning a list of activities to perform, which reflects the degree of difficulty of each activity. The confidence to perform tasks successfully on time, the strength value is determined or evaluated at which level of confidence is in the range. The evaluation can be in the range of 1–10 or 10-100.

(3) Generality

Refers to some experiences will give to rise the abilities that lead to perform other tasks in a similar context, for example, the beliefs of cardiovascular patients about fitness endurance testing under the supervision of physicians and beliefs that the patients can be achieved when comeback to their houses.

In summary, perceived self‑efficacy is concerned with people's beliefs in their ability to influence events that affect their lives. Bandura trusted about those

perceived must change their attitudes, perceptions and behaviors, also can make their to confidence knowing what to do and actually doing it,(Ngamvithayapong-Yanai et al., 2019) and leading to desirable health behavior.

2.6 Social Support

Social support means a person receiving help from interaction with other people in society. There are many types of help such as news, money and labor etc. Social support consists of two parties, the giving party, such as parents and teachers and the receiving party, such as children or students receiving advice from such persons. (PublicHealth, 2002). The term social support has been defined and measured in numerous ways. According to seminal work by House (1981) social support is the functional content of relationships that can be categorized into four broad types of supportive behaviors or acts: (House, Umberson, & Landis, 1988)

(1) Emotional support is an exchange of life experiences by showing compassion, love, trust, caring and generosity.

(2) Instrumental support is provided directly assist to a person in need with physical goods or services. Maybe done by friends, colleagues or neighborhood.

(3) Information support is provided with advices, suggestions, and information that a person can to address problems.

(4) Appraisal support is the provision realistic of information, and is useful for an evaluation. Also, it maybe is the form of constructive feedback, affirmation, and social comparison.

Types of social support can lead to the result of the decision a person makes and depends on the influence of a person, it is always more important and dominating than ourselves. It represents a purpose of interaction between individuals that express mutual interest and help, such as instrumental support, information, or emotion. These supports are causing a bond believe that someone loves and cares and praised to see the value as a part of society. In addition, social support continues to play a crucial role in people to maintain desirable health behavior and mental health (House et al., 1988)

Table 6: Types of social supports

Emotional support	Expressions of empathy, love, trust, and caring
Instrumental support	Tangible aid and services
Informational support	Advice, suggestions, and information
Appraisal support	Information that is useful for self-evaluation

Sources of social support are included;

(1) Primary groups are social groups that are intimate and have a relationship with each other in a high gathering, such as family, relatives and neighbors

(2) Secondary groups are social group that has a patterned relationship and rules that have influenced the norms of people in society, including colleagues, professional groups and other social (Kaplan, Cassel, & Gore, 1977).

(3) Groups of people with natural attachments consisting of people in direct family groups are husband, wife, grandparents, parents, children, and persons with closed family relationships including neighbors, and workers working in the same place. Familiar acquaintances; (Heaney & Israel, 2008)

(1) Supporting organizations and associations are groups of people that come together as clubs, associations, and foundations that are not health professionals.

(2) Professional helper group means persons engaged in the promotion, prevention, treatment and rehabilitation by health staff.

In conclusion, social support refers to something that an advocate, which can be an individual or a group involves with instrumental support, information, emotion and appraisal support. This social support continues to lead individuals or a group to maintain desirable health behavior and mental health.

Therefore, we consider designing the communication program based on self-efficacy theory and social support developed by Bandura, 1977 and House, 1981, because Bandura trusted about those perceived must change their attitudes, perceptions and behaviors, and also their confidence in knowing what to do and actually doing it and leading to desirable health behavior. While social support is a starting point that will lead to health outcomes and support the perceiving of people to achieve sustainable health behavior. In addition, we have reviewed the term of the

communication program. The details of communication theory will be described in section 2.7.

2.7 The communication theory

Communication is a human behavior as a forwarding process to exchange information between sender and receiver through channels communication. We have reviewed the term communication theory which is described as follows. (Yaowares, 2006).

2.7.1 Communication definitions

Carl I Hovland et al. (1948) has to propose that communication is the process by which one person (sender) sends stimuli (usually spoken or written language) to change the behavior of another person (receiver) (Hovland, 1948).

Warren W. Waver refers to communication as encompassing every process that one person's mind may have affected other people. Communication doesn't only just happen in writing and speaking. It also includes music, pictures, ballet and all human behavior

Bermard Barelson and Gary A Steiner (1964) refers communication as behavior or the process of conveying information, thoughts, emotions, feelings, skills, etc. by using symbols such as words, pictures, numbers, etc. This implies that "messages" are diverse and also include emotions, feelings, knowledge and ability which a sender wants to convey to his or her audience (Berelson & Steiner, 1964).

Kitima Surasonthi (2021) refers to communication as similar to the objective between the sender and the receiver in which both parties must have a corresponding communication objective to be successful (Kanokprajak & Cheyjunya, 2021).

Therefore, communication is a social process based on dialogue using a broad range of tools and different levels, including listening, building trust, sharing knowledge and skill, building policies, debating and learning for sustained and meaningful change.(Waisbord, 2010).

In conclusion, communication is a process of transferring messages from sender to receiver through media that will achieve the purpose and objectives and behaviors of the people involved. It consists of a sender, receiver, message and channel. Therefore, the communication process is the transmission between the sender

and receiver, so the receiver can understand the meaning of the messages through appropriate media and respond to the same behavior (Yaowares, 2006).

2.7.2 The communication elements

David K. Berlo (1960) proposed a model of communication called in the name of the SMCR Model, which described the main elements of communication were comprised of; (Berlo, 1960)

(1) Source or sender means the source of a message, it can be a person, an organization, an institution or a group of people who defines the knowledge and ideas that will send to the receiver.

(2) Message means the message that will be sent to the receiver. Normally, it is knowledge and thoughts that cannot be sent directly. It is necessary to bring the substance in such a way that it can transmit, for example, make it speech, sign and body language.

(3) Communication channel refers to news, wording or the message from the sender will be broadcast by means of media or intermediate (media), which can be simple media such as meeting face to face, writing, acting to use of more complex media such as radio, television and computer.

(4) Receiver means the destination of communication which has to be perceived, understood or shown behavior as required by the sender.

Table 7 : Model of communication (SMCR Model)

Source or Sender	Message	Channel	Receiver
Communication	Code	Seeing	Communication
Skill	Content	Hearing	Skills
Attitude	Treatment	Touching	Attitude
Knowledge		Smelling	Knowledge
Social System		Tasting	Social System
Cultural system			Cultural system

Harold Lesswell (1948) proposed a model of communication. It can be described as follows,

| Who? | → | what would you like to say? | → | What's channel? | → | To whom, in what's situation? | → | Result/effect |
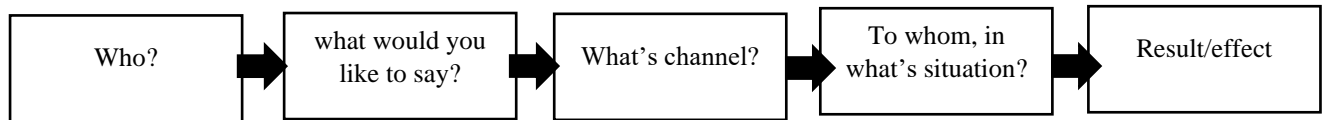
Figure 9 : Model of communication

(1) Who; referring to sender or source.

(2) What would you like to say?; referring to the message that the sender wants to say.

(3) What is a channel?; refers to news, wording or the message from the sender will send to the receiver by media or intermediate (media), which can be simple media such as meeting face to face, writing, acting to use more complex media such as radio, television and computer.

(4) To whom, in what situation?; refer to the destination of communication (sender) which has to be perceived, understood or shown behavior as required by the sender.

(5) Result/effect; refer to the sender and receiver can understand the meaning of the messages through an appropriate media and the receiver can respond to the same behavior.

In conclusion, there are four elements of communication namely; sender, channel, message and receiver, these elements are very important and influential in achieving the objective of the communication. Furthermore, it can make the people have knowledge, attitudes, and behavior in the way that the sender would like to do. In this study, we have used the SMCR model of David K. Berlo,(1960), because the SMCR model is appropriate for the communication of TB prevention. (Waisbord, 2010). Also, it is significant with risk perception of TB outbreak in parents and school staff groups (Gentili et al., 2020). Therefore, the SMCR model is an effective method of communicating health information. Hopefully, the participants who have joined the communication program can communicate their true knowledge of TB stigma and discrimination with their friends, family or community without TB stigma and discrimination against TB patients.

2.7.3 The objectives of the communication

There are 4 objectives of communication, it is described as follows, (Dumrongrith, 2011).

(1) To inform refers to the speech that a person or speaker is likely to use in communication for public relations or education. so that the sender could provide the receiver with clear and detailed information.

(2) To educate refers to the sender has a purpose to provide knowledge to the receiver such as, enhancing knowledge of the pulmonary TB for the household contacts group.

(3) To persuade refers to the sender wanting to convince the receiver to change their thoughts or have emotions and feelings following the messages that the sender wants to send.

(4) To entertain refers to the sender wanting to send the message through various channels to the receiver to make satisfaction or entertainment.

2.7.4 Types of the communication

There are two types of communication, with the first one depending on the communication channel and the other depending on the form and purpose. Communication channels are known as mediators, means, characteristics, and means used in interpersonal communication. The sender needs to make sure that they have chosen the appropriate communication channel so the information is sent satisfactorily to the person. Another form of communication depends on its form and purpose. Individuals implement various types of communication taking into account the nature of its form and its purpose. In addition, channel communication does not use words by words. It has verbal can be spoken and written, and oral communication can occur between people face to face or when away from it, while the type of communication that is based on style and purpose may be formal and informal. Other types of communication include grapevine communication, feedback, visual communication, and active listening (Kapur, 2020). Therefore, this part has only described the type of communication which relates to our intervention as follows, (Dumrongrith, 2011).

(1) Oral Communication (Distance)

Oral communication can take place among individuals in an appropriate manner when they are located at a distance. This communication is common and is an integral part of the lives of individuals. In communicating orally with individuals, who are located at a distance, there is a number of methods and technologies, are utilized. These include mobile phones, VOIP, video-conferencing, 2-way webinars, and so forth. These are regarded as modern and innovative methods, through which oral communication can be promoted among individuals when they are located at a distance. In the effective implementation of this type of communication, tone of voice and pace of delivery are regarded as crucial. The important factors that need to be taken into account in promoting oral communication at a distance are, listening, speaking slowly, reiterating the information that is understood, and keeping the tone of voice open and receptive. In some cases, when the individuals are unable to understand the concepts and other information clearly through oral communication, they may ask to send them through email.

(2) Written Communication

Written communication is the type of communication that takes place in a written form. The common forms of written communication are letters, notices, emails, messages, advertisements, and so forth. When the information is lengthy and comprises images, pictures, charts, graphs, statistical data, and so forth, then it cannot be imparted orally to the individuals. In such cases, written communication is regarded as one of the indispensable ways of imparting information. When the individuals are to send documents and reports, then they simply get them scanned and send them through email. When individuals are communicating with each other in a written form, they need to take into account various factors, these include, addressing appropriately, making use of decent words, stating the information in a clear and understandable manner, stating all the necessary concepts, and concluding well by saying thank you and putting the name and signatures. In order to implement written communication in an effective manner, it is vital for individuals to upgrade their skills in terms of various forms of technologies. When they are well-equipped in terms of the usage of computers, laptops, iPads, and mobile technologies, they will be able to carry out written communication satisfactorily.

(3) Feedback Communication

When the individuals, who are in leadership positions in educational institutions and various forms of organizations, such as instructors, supervisors, heads, directors, employers, and so forth, put into operation various types of assessment methods to evaluate the performance of the individuals. After evaluating the performance, they provide their feedback in terms of their performance. Hence, the communication that takes place is termed feedback communication. The main objective of feedback communication is to make provision of support and assistance to the individuals to overcome their limitations and bring about improvements. In the implementation of feedback communication in an efficient manner, these individuals need to take into account various factors, these include, inculcating the traits of morality and ethics, being honest and truthful, following the standards and principles, and giving constructive criticism. When individuals experience setbacks in their performance, then limitations need to be identified constructively. Furthermore, the individuals, in leadership positions need to make provision help, support, and assistance to their students and employees to identify the inconsistencies and bring about improvements. Therefore, within educational institutions at all levels and various types of organizations, this type of communication is regarded as crucial and beneficial.

(4) Active Listening

Active listening is regarded as one of the types of communication that is of utmost significance. It is regarded as a type of communication and it is also an important characteristic that needs to be put into operation to make the communication processes effective and meaningful. When individuals are implementing this form of communication, they can benefit in several ways. These include acquiring an efficient understanding of the concepts, providing solutions to problems that one experiences in the implementation of job duties, clarifying doubts, augmenting awareness, and being able to achieve the desired goals. In addition, when one actively listens to others, they can create amicable terms and relationships with them and generate feelings of pleasure and contentment. Within educational institutions, when the instructors are imparting information in terms of lesson plans

and academic concepts when the supervisors and managers are imparting information in terms of job duties when there is an organization of workshops, seminars, and conferences, and when the individuals are engaged in oral communication, whether face-to-face or distance, then it is vital for them to promote active listening. Therefore, it can be stated, that when one satisfactorily puts into operation this form of communication, they can benefit in several ways.

In summary, communication means the sender must have to set the objectives and the scope of the content before sending the messages, also the sender must have to know the target audience to select the channels for sending the message and select appropriate types of communication to make the receiver interested, to remember the message, able to show behavior according to the purpose of the sender, it will help to achieve the goals.

According to many kinds of literature, the studies show either program or intervention that can be applied with the theory in the study. In addition, there are lots of studies that are relevant to TB stigma and the program/intervention relevant in the field of TB, and HIV/AIDS to reduce stigmatization. Examples of research or studies are shown and described in section 2.8.

2.8 Relevant studies/research
2.8.1 Relevant studies/research with TB stigma and discrimination
2.8.1.1 A cluster randomized control trial (CRT) between two groups of TB patients and household members (aged ≥ 15 years) was conducted. The study aimed to 1) develop TB stigma items, and evaluate changes in them in response to a household intervention and 2) to improve patient outcomes and ultimately at reducing TB transmission and prevalence in the wider community, also succeeded in reducing TB stigma. The results showed that TB stigma was not significantly reduced by the household intervention, although confidence intervals for estimated intervention effects were wide, the recommendation in the future for TB intervention that should include stigma-specific intervention (Bond et al., 2017).

2.8.1.2 A qualitative study through in-depth interviews and focus groups relating to explore the social stigma of tuberculosis between stakeholders and prior to implementing an intervention to decrease the social stigma that affects people

who were affected by tuberculosis (PATB). The results showed that the feelings and attitudes were influenced stakeholders and people affected by tuberculosis (PATB). Finally, the feeling could influence the stakeholder's attitude toward PATBs and related to the issue of knowledge and information The next part in this study's recommendations could highlight more insights into the intervention's effectiveness and its congruence with social structural factors of the health care systems organization (Macq, Solis, Martinez, Martiny, & Dujardin, 2005).

2.8.1.3 An exposure investigation in a primary school and a private language school. The study aimed to describe outbreaks in one primary school and one language school, after exposure to a teacher with smear-positive pulmonary TB. The results showed that 13% of children were infected with TB in their classes at the school after contact with a teacher who is casual contact, and 40% of children under 5 years in contact with an adult smear-positive TB case were infected by TB (Debulpaep et al., 2020).

2.8.1.4 A qualitative study (Ground theory) related to the causes of TB -related stigma and discrimination in Nepal. The objective of this study was to investigate the causes of TB-related discrimination among TB patients, their family members, and community members. The results showed that the major of TB patients on a cause of self-discrimination were self-isolation from family and friends, and especially from children, because they were a fear of TB transmission, avoid gossip and discrimination, and the causes of members include that; fear of the perceived risk of TB infection, and perceptions of links between TB and other causes of discrimination, especially poverty and low caste, recognize a link between TB and dishonest behavior, especially alcohol drinking, smoking and visiting sex-workers and the perception that TB was a divine curse is sent down to punish past unacceptable behavior. In addition, some patients felt discriminated against by healthcare professionals (Baral et al., 2007).

2.8.1.5 A randomized control trial related to testing interventions to decrease HIV and TB stigma among healthcare workers in South Africa. The objective of the study was to assess the extent and sources of HIV and TB-related stigma among healthcare workers and to develop and test evidence-based, stigma-reduction interventions in public hospitals in the Free State Province of South Africa.

In addition, this study must apply a qualitative study to explain some parts of the result. The results showed that the intervention was successfully tested in the cluster follow-up survey in 2018, and the intervention impact stigma levels in the workplace A randomized control trial related with testing interventions to decrease HIV and TB stigma among healthcare worker in South Africa. The objective of the study was to assess the extent and sources of HIV and TB-related stigma among healthcare workers and to developing and testing evidence based, stigma-reduction interventions in public hospitals in the Free State Province of South Africa. In addition, this study must to apply a qualitative study to explain some of part in the result. The results showed that the intervention was successfully tested in the cluster follow-up survey in 2018, and the intervention impacted on stigma levels in the workplace (Rau et al., 2018).

2.8.1.6 The expert meeting related to the research agenda to measure and reduce tuberculosis stigmas. The objectives were to define the main drivers and domains of TB stigma, the consequences of TB stigma, and what intervention can be done to reduce the extent and impact of TB stigma. The results showed that the fundamental cause of the stigma was the perceived contagiousness of TB, the domain of stigma was comprised of beliefs, attitudes and behaviors. The drivers of stigma consist of infectiousness of TB, power differentials, dangerousness, conscious attachment of blame, ignorance, increase stress, and discriminatory laws, therefore TB stigma-specific drivers may depend on the type of stigma, setting, population and type of TB. The consequences of stigma were comprised of nondisclosure, poor adherence, depression, stress, poor health-seeking behavior, self-isolation, reduced quality of life, social distancing, and forced isolation. The intervention to reduce TB stigma could be applied to other interventions such as leprosy, HIV or mental health in society, community, and individual attitudes, and behaviors to reduce stigma (Macintyre et al., 2017).

2.8.1.7 A cross-sectional study related to knowledge, attitude and TB-related social stigma among school adolescents of age 10-19 years in a semi-urban town in Nigeria. The study aimed to assess the knowledge, attitude and TB-related social stigma among school adolescent in Ogoja urban in Cross River State, Nigeria. The results showed that a high awareness and transmission of TB knowledge, but

knowledge of TB causes, treatment and prevention were reported low among school adolescents in Ogoja urban. The social stigma of TB patients was also reported high, age, sex and sources of information were significant to TB knowledge, and attitude and related to social stigma among adolescents. The recommendation was comprised of; 1) Teachers should also be trained on key diseases such as TB and HIV / AIDS and be provided updates on the prevention to impact the students, 2) In the future should be adopted in advocacy, sensitization and social mobilization in school (Osonwa Kalu & Eko Jimmy, 2015).

2.8.1.8 A cross-sectional study related to the measurement of the stigma associated with TB and HIV/AIDS in southern Thailand. The study aimed to develop scales that quantitatively measure stigma associated with TB and HIV/AIDS, and to determine the factors underlying such stigma, identify points of intervention, and evaluate the effects of stigma reduction programs. The results showed that the scales had the variation in stigma scores to assess stigma associated with TB and HIV/ AIDS. Survey and confirmation methods have been developed that are valid and reliable to quantify TB and HIV/AIDS-related to community and individual stigmatization. In the future, documents from this study should be used to guide and develop interventions and facilitate the monitoring and evaluation of TB stigma in the reduction program (Van Rie et al., 2008).

2.8.1.9 A prospective study related to social stigma and knowledge of TB and HIV among patients with both diseases in Thailand. The study aimed to assess TB stigma, TB knowledge, and HIV knowledge among HIV-infected TB patients in Thailand. The results showed that TB stigma was high (65%), about 34 % report having TB stigma from the community and 23 % reported from family. Low TB knowledge was found at 23%, also, low HIV knowledge was found at 49%. In the future, it is necessary to reduce stigma among patients and increase TB and HIV knowledge among the general community and patients to reduce diagnostic delays and improve patient outcomes (Jittimanee et al., 2009).

2.8.1.10 A case study report related to the effects of social and self-stigma on adolescent TB patients, the study aimed to determine the effects of social and self-stigma on adolescent TB patients. The results showed that 81.9% of TB patients had experienced stigma, also 54% of the participants had experienced self-

stigma in the form of uselessness, shame, fear, despair, guilt and ultimately lead to feelings of inferiority, feeling incomprehensible and decreasing self-efficacy. Effects of social stigma and self-stigma on patients in adolescence are high from family and community. For the recommendation in this study, the school should have socialization programs that can provide support for the healing process and explain that everyone can get TB, but there is a cure available (Arininta, 2019).

2.8.1.11 A cross-sectional study related to the status of TB- related stigma and associated factors: A cross-sectional study in central China. The study aimed to assess the status of TB-related stigmatization and factors among TB patients in China. The results showed that knowledge of TB, family work, and physician-patient communication was negatively associated with the stigmatization associated with TB. The participants who were married and with a previous history of tuberculosis treatment had high stigmatization of TB (Yin et al., 2018).

2.8.1.12 A qualitative study related to the experiences of high school students with pulmonary TB in China: a qualitative study. The study aimed to explore the overall illness experience of TB in Chinese high schools and to investigate in-depth the individual and social causes of TB. The results showed that the participants had high pressure and a high worry about the interruption of studies more than the disease. The participants had a high serious with a lack of TB awareness, caused by the ignorance of school, parents and the students, and become to obstacle to the delay of diagnosis and treatment. The participants didn't have the stigma, while patients' weak stigma can play a very positive role in the recovery of the condition and a high dependence on parents is conducive to disease recovery (Zhang et al., 2016).

2.8.1.13 A qualitative study (Grounded theory) related to Stigma against TB may hinder non-household contact investigation. The study aimed to explore experiences and perspectives on TB contact investigations in non-household contacts. The results showed that TB stigma is one of the barriers to global TB elimination, TB stigma leads to delay (Ngamvithayapong-Yanai et al., 2019)TB diagnosis and treatment. An annual health check-up, which included a mobile chest X-ray (CXR) available at the schools, contributed to the early detection of active TB. The Barriers and facilitators for the participants are associated with information, awareness and knowledge about TB; stigma; empathy; health system response. The

lack of knowledge about TB and misconceptions about TB transmission led to the experience of felt and enacted stigma. The suggestion should provide and enhance TB education programs in public, schools and the workplace (Ngamvithayapong-Yanai et al., 2019).

2.8.1.14 A cross-sectional study related to the assessment of stigma associated with TB in Mexico. The study aimed to assess TB stigma at the individual and community level. The study population was individuals of both sexes who had been affected by TB and were on treatment or who had completed treatment in the past 6 months ago. The result showed that there was no association between higher stigma scores by location, age, marital status, education (Eva M Moya et al., 2014).

2.8.1.15 A community-based cross-sectional survey related to knowledge, health-seeking behavior and perceived stigma towards TB among TB suspects in a rural community in southwest Ethiopia. The study aimed to describe the knowledge and TB stigma and to examine the knowledge and stigma affected health-seeking behavior among TB suspect cases in a rural community in southwest Ethiopia. The result showed that 83% of TB suspects had heard of the pulmonary TB, also 86% of the participants were aware of TB infection. Furthermore, it was found that marital status, and social and sexual relationships were significant with perceived of TB stigma, and the participants who had experience with previous TB treatment had appropriated health-seeking behavior (Abebe et al., 2010).

2.8.2 Relevant studies/research with intervention or strategies related with stigma and discrimination reduction

Intervention or Strategies related to stigma and discrimination reduction

2.8.2.1 An intervention study related to tacking TB patients' internalized social stigma through patient-centered care: An intervention study in rural Nicaragua. The study aimed to reduce internalized social stigma in a new AFB-positive TB patient diagnosis in rural Nicaragua. The results showed that after 2 months TB patients' internalized stigma is significantly reduced, similarly with interventions including TB clubs and home visits are successfully implemented (Macq, Solis, Martinez, & Martiny, 2008).

2.8.2.2 An intervention study related to the effectiveness of IEC interventions in reducing HIV/AIDS-related stigma among high school adolescents in

Hawassa, Southern Ethiopia. The study aimed to determine the effectiveness of IEC interventions. The results showed that after 2 months of follow-up, was a reduction in HIV related to misconceptions, stigma and discrimination attitudes, furthermore, campaigns using combined IEC interventions are associated with stigma and discrimination among school adolescents (Bekele & Ali, 2008).

2.8.2.3 A longitudinal study related to HIV prevention intervention to reduce HIV-related stigma evidence from china. The study aimed to examine the intervention effect on HIV-related stigmatizing attitudes. The results showed that HIV intervention reduced the level of HIV-related stigma attitude among the intervention arm participants during the 12 months and 24 months of follow-up (L. Li et al., 2010).

2.8.2.4 A mixed-methods study related to workplace interventions to reduce HIV and TB stigma among health care workers. The study aimed to inform the development of an evidence-based HIV and TB stigma campaign among HCWs. The results showed that stigma is important, also stigma campaign must address the community and structural levels divers of stigma, and should be a concern at the individual level (Siegel et al., 2015).

2.8.2.5 A randomized control trial (RCT) related to testing the efficacy of an HIV stigma reduction intervention with medical students in Puerto Rico: the SPACES project. The study aimed to assess the efficacy of the SPACES intervention to reduce HIV stigma attitudes among medical students in Puerto Rico. The results showed that the intervention group had lower HIV stigma than the control group, and reported that a 6 and 12 months follow-up was found to significantly lower HIV stigma(Varas‑Díaz et al., 2013).

Communication program related to the pulmonary TB

2.8.2.6 A population-based cross-sectional survey related to knowledge, attitudes, and practices about tuberculosis and the choice of communication channels among adults in a rural community in Vietnam. The main study aimed to describe the knowledge of TB, TB-associated stigma and suggested action in response to TB symptoms in relation to socio-demographic factors among men and women, and the study also analyzed community perceptions of community channels that should be used for health education at the community level. The results

showed that men had a significantly higher knowledge score than women. Linked with the source of information was associated with TB knowledge. The most reported source of information was television (64.4%) and friends or relatives (42.7%). However, women had to access mass media less than men. Interpersonal communication was an effective method of communicating health information. Furthermore, it was found that more than one-third of the participants were associated with TB stigma (Hoa, Chuc, & Thorson, 2009).

2.8.2.7 An intervention study related to the impact of communication measures implemented during a school TB outbreak on risk perception among parents and school staff, Italy. The study aimed to evaluate the impact of the communication strategy implemented during a school TB outbreak on risk perception by parents and school staff. The study also aimed to provide effective and useful communication with the public and media based on a transparent and open approach and included the arrangement of organized meetings and call centers on information risk and to identify factors related to changes in risk perception before and after the intervention. The results showed that risk perception of TB before and after the intervention showed a significant reduction in the perceived level of risk in parent and school staff groups. Meetings with LHA healthcare staff can reduce the perception of TB outbreak after intervention among both groups, also meetings with LHA are useful in clearly defining the situation that face-to-face meetings can play important role in effective communication. Furthermore, the factor related with decrease risk perception of TB outbreaks was a high level of education (Gentili et al., 2020).

2.8.2.8 A cross-sectional survey related to knowledge, attitudes, and practices about tuberculosis and the choice of communication channels among Thai, migrants and ethnic minorities with family members with TB in Thailand. The study aimed to assess TB knowledge, attitudes, and practices among Thai, migrants and ethnic minorities with family members with TB in Thailand. The results showed that sociodemographic factors such as high education, higher income, and having known people with TB in the community were associated with TB knowledge, it was also found that people who had experiences with TB patient was associated with TB knowledge. Furthermore, it was found that higher perceived community TB stigma was associated with health facility consultation if they had experiences with TB

symptoms. The study suggested for policymakers to increase knowledge and awareness of TB may use ACSM; advocacy community and social mobilization to fight TB (Pengpid et al., 2016).

   2.8.2.9 A randomized control trial (RCT) related to the effect of weekly text-message communication on treatment completion among patients with latent tuberculosis infection: study protocol for a randomized controlled trial (WelTelLTBI). The study aimed to determine whether the WelTel intervention can improve treatment completion among patients with LTBI, the study also aimed to evaluate the intervention's cost-effectiveness. The results showed that simple weekly text messages (the WelTel intervention) can improve treatment success among patients with LTBI, also cost-effective interventions that improve treatment success (van der Kop et al., 2014).

   2.8.2.10 A qualitative study related to participatory communication for tuberculosis control in prisoners in Bolivia, Ecuador, and Paraguay. The study aimed to assess the existing challenges to reduce TB in a prisoner, the study also aimed to propose ways to address them through communication interventions. The results showed that individual, social and structural system challenges were the appropriate communication with TB prevention and care in a prisoner (Waisbord, 2010).

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research design

This study was a quasi-experimental research with two groups by comparing between pre-experimental, post-experimental studies and after follow up intervention, post-experimental studies and after follow up intervention within 2 months. The experimental design is described in figure 10.
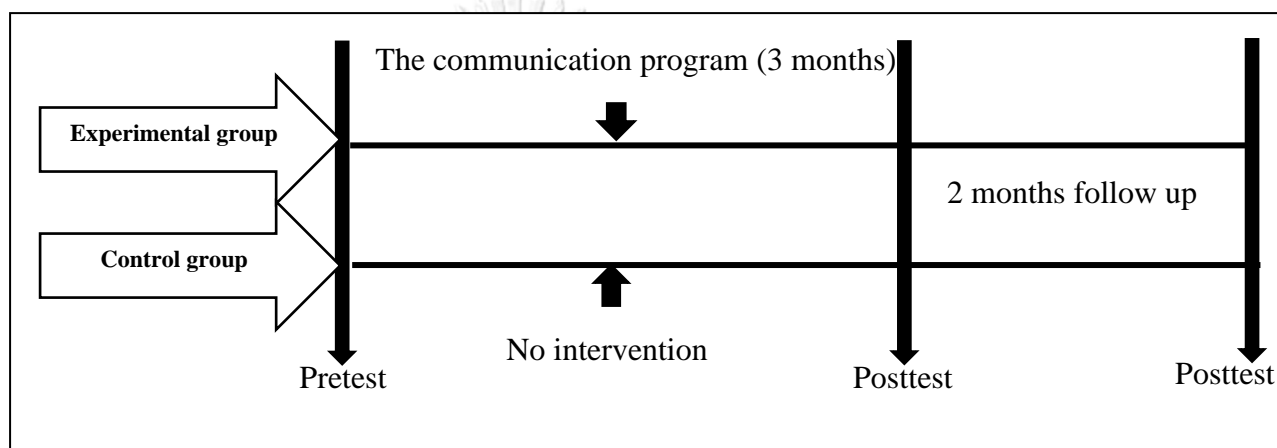
Figure 10 : The diagram of research design

3.2 Study period

This study was conduct from July to November 2021. The communication program was implemented for 3 months and follow up 2 months for program evaluation.

3.3 Study population and areas

There were 793 slum areas in Bangkok, and these slum areas were selected by following criteria set by Bangkok Metropolitan Administration. (Bangkok Metropolitan Administration, 2019). It was found that nearly 20 % of TB patients were in the slum areas. The slum area was one of high-risk areas with a spread of TB infection (Tuberculosis, 2018).

A link with a report of Bangkok Metropolitan Administration, 2019 was found that nearly 5% of TB patients were in the schools (Bangkok Metropolitan Administration, 2019). The TB cases reported in Bangkok, 2020 were an estimated 678 new cases of TB found in adolescent 15-24 years. Similarly, an estimated 459 new cases of TB in adolescent 15-19 years and there were 57% of TB cases in men, while for the remainder 33% of TB cases in women (Administration, 2021). There were the incidence of TB infection in school A and school D (Incidence of TB infection in school A=12.5% and school B=3.8%).(Bangkok Metropolitan Administration, 2019). Furthermore, the report of BE Health Association (2020), it was found that there were 57.1% of the 630 high school students with a high level of TB stigma and discrimination among high school students in Bangkok, also a high and mostly of male high-school students (25.6%) had perceived TB stigma and discrimination in a high more than female students (21.7%) (BE Health Association, 2020). Therefore, the implementation area in male public high-schools in Bangkok. The implementation areas in this study uses a purposive selection, with the following criteria:

(1) Area: The schools, where are under Office the Basic Education Commission.

(2) Target: Male public high-school where is the place surrounding by slum areas was defined by Bangkok Metropolitan Administration (Songpol, 2005).

(3) Selection criteria:
- The incidence of TB cases in the areas.
- A largest school size (total minimum of students at least 2,500)

- The school has the characteristics surrounding by the slum area set by Bangkok Metropolitan Administration. (Slum areas refer to overcrowding, unsanitary, lack of ventilation, sanitation facility and poor housing) (Songpol, 2005).

- Two schools were approximately more than 10 kilometers apart which prevented contamination between these schools (Shen, Hu, & Sun, 2015).

- The principal is willing to cooperate in this research.

3.3.1 Study areas

There were 137 high-schools in Bangkok areas, there were 125 high-schools under Office the Basic Education Commission, while for the remainder were the high-schools under Bangkok Metropolitan Administration and Public Private Organizations, and had 4 groups of school classified according to the number of students as follows,(Commission, 2020)

(1) Largest school size ≥2,500 students

(2) Large school size 1,500-2,499 students

(3) Medium school size 500-1,499 students

(4) Small school size ≤500 students

3.3.2 Study population

In this study, the researcher selected the study population were Thai male adolescent students who were studying in grades 10-12, in male public high-schools, Bangkok areas. It is described in section 3.4.

3.4 Research criteria

3.4.1 Inclusion criteria

(1) Thai male adolescent students, who were 15 to 19 years, must be able to read, write and communicate in Thai language (Osonwa Kalu & Eko Jimmy, 2015).

(2) The students were studying in grades 10-12, in male public high-schools, Bangkok areas.

(3) The students who used the Line program on social media devices such as smartphone, computer, iPad, tablet and laptop.

3.4.2 Exclusion criteria

(1) The students who missed the program at least 2 times from 12 totals.

(2) The students who plan to move to another school during the academic year 2021.

(3) The student whose parents were not allowed to participate in research.

3.5 Sampling and Sample size calculation

3.5.1 Sample size calculation

The sample size in this study was calculated according to the formula from (Lemeshow, Hosmer, Klar, Lwanga, & Organization, 1990).

$$n = \frac{2\sigma^2 \, (Z\alpha + Z\beta)^2}{(\mu_1 - \mu_2)^2}$$

n= Sample size estimate

$Z\alpha$= Standard scores for Type I error= 5%=1.96

$Z\beta$= Standard scores for Type II error= 10%=1.28

σ=Coefficient of variation the difference between the experimental and comparison groups after the intervention =9.34

μ_1=Mean of standard TB stigma score in the intervention group = 28.9 (Eva M Moya et al., 2014)

μ_2=Mean of standard TB stigma score in the control group = 24.4 (Eva Margarita Moya, 2010)

$$n = \frac{2(9.34)^2(1.96 + 1.28)^2}{(28.9 - 24.4)^2}$$

$$= \frac{1{,}831.52}{20.25}$$

$$= 90.44$$

$$\approx 108$$

The minimum sample size needed for each group of 90 subjects. However, in order to prevent cases lost to follow-up intervention studies and missing information, 20 % is added. The number of samples in each group was 108 high-school students.

3.5.2 Sampling Technique

(1) There were 125 public high-schools under Office of the Basic Education Commission.

(2) A purposive selection of 4 public high schools was chosen by the place of the schools in the slum areas defined by the Bangkok Metropolitan Administration. (Songpol, 2005).

(3) Purposive selection of 2 male public high-schools was chosen by the report of Bangkok Metropolitan Administration, 2019, there was the incidence of TB cases in the area, the high-school where was the place surrounding by slum areas were the large-sized school (school size $\geq$ 2,500 students) and had characterized by overcrowding. Therefore, the schools had environmental conditions which possibly correlate with the slum areas. Also, one public high-school area was randomly selected to be the experimental group, while the remainder was the control group, the distance between 2 public high-school areas was more than 10 kilometers.

(4) A random selection of the participants was defined by the inclusion criteria, then a systematic sampling technique was used for the selection of students at least 3 subjects per room in each class. The number of students per room was at least 40 subjects, and the participants were selected to use 13 range of ID students by Microsoft Excel. There were 12 rooms per grade, and the total of classes were 36 in grades between 10-12. Finally, the participants of each group were at least 108 subjects in each group.
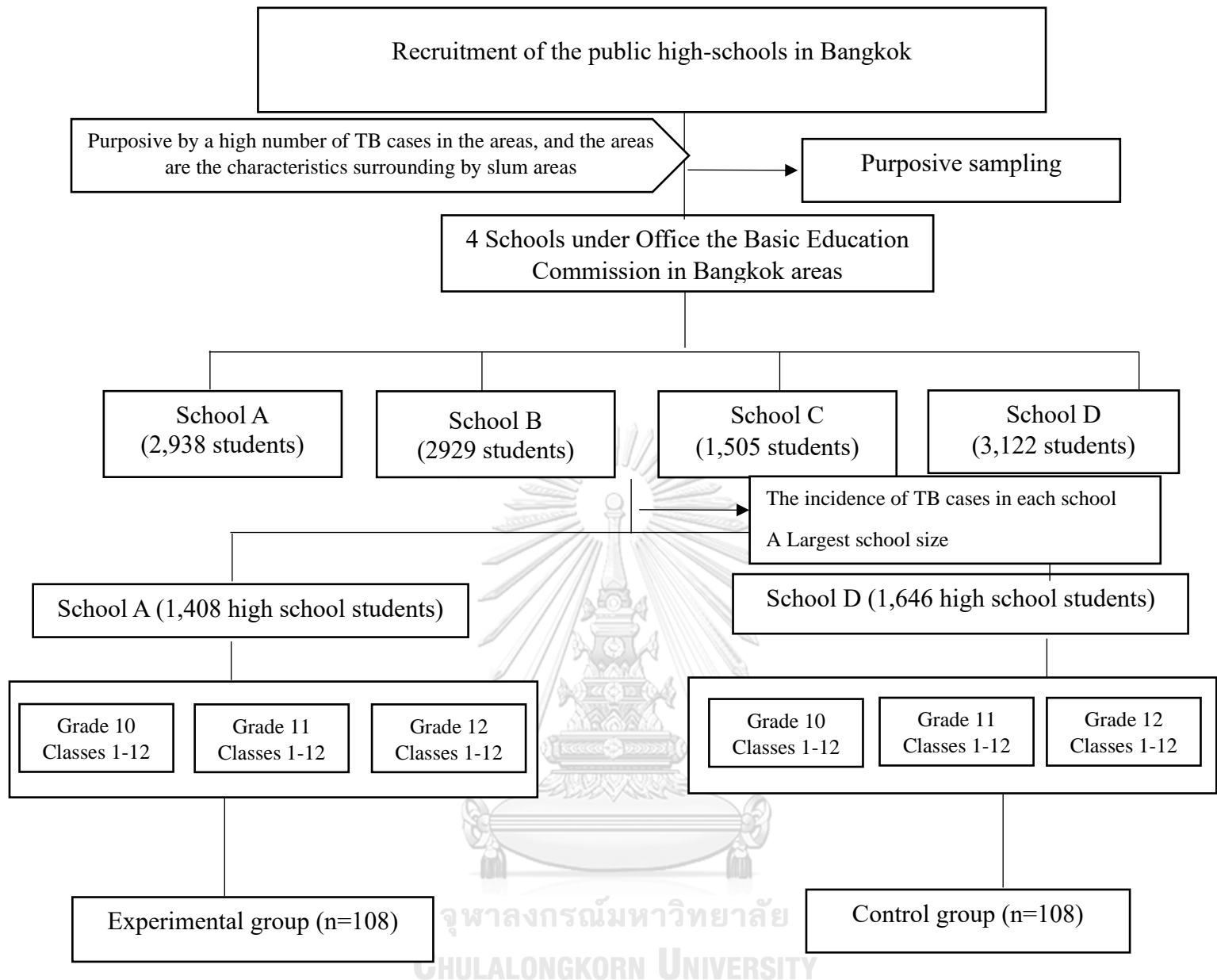
Figure 11: Flow diagram of sampling technique

The communication program was used for 5 months; the intervention was implemented within 3 months, and the 2 months follow-up for program evaluation was also monitored.

3.6 Study procedure

The investigation period was conducted for five months. The intervention was implemented within 3 months, and the 2 months follow-up for program evaluation was also monitored. The intervention tool was comprised of four modules for communication program. These included:

(1) TB prevention and care training was conducted by the researcher and three research assistants.

(2) Automatic thought related with stigma training was conducted by the one expert in the field HIV/AIDS stigma and discrimination under AIDS Right Foundation and the researcher team.

(3) Raising perceptions, confidences, and encouragements to reduce TB stigma and discrimination by the expert team (physician) was conducted by three experts in the field of TB, also the three experts were comprised of, advisory of Health office under Bangkok Metropolitan Administration, Director of AIDS, TB and STI control division under Bangkok Metropolitan Administration, and Director of Healthcare center 28 under Bangkok Metropolitan Administration. Furthermore, the researcher team helped all of experts during the implementation.

(4) Information supports by video and messages was conducted by the researcher and three research assistants.
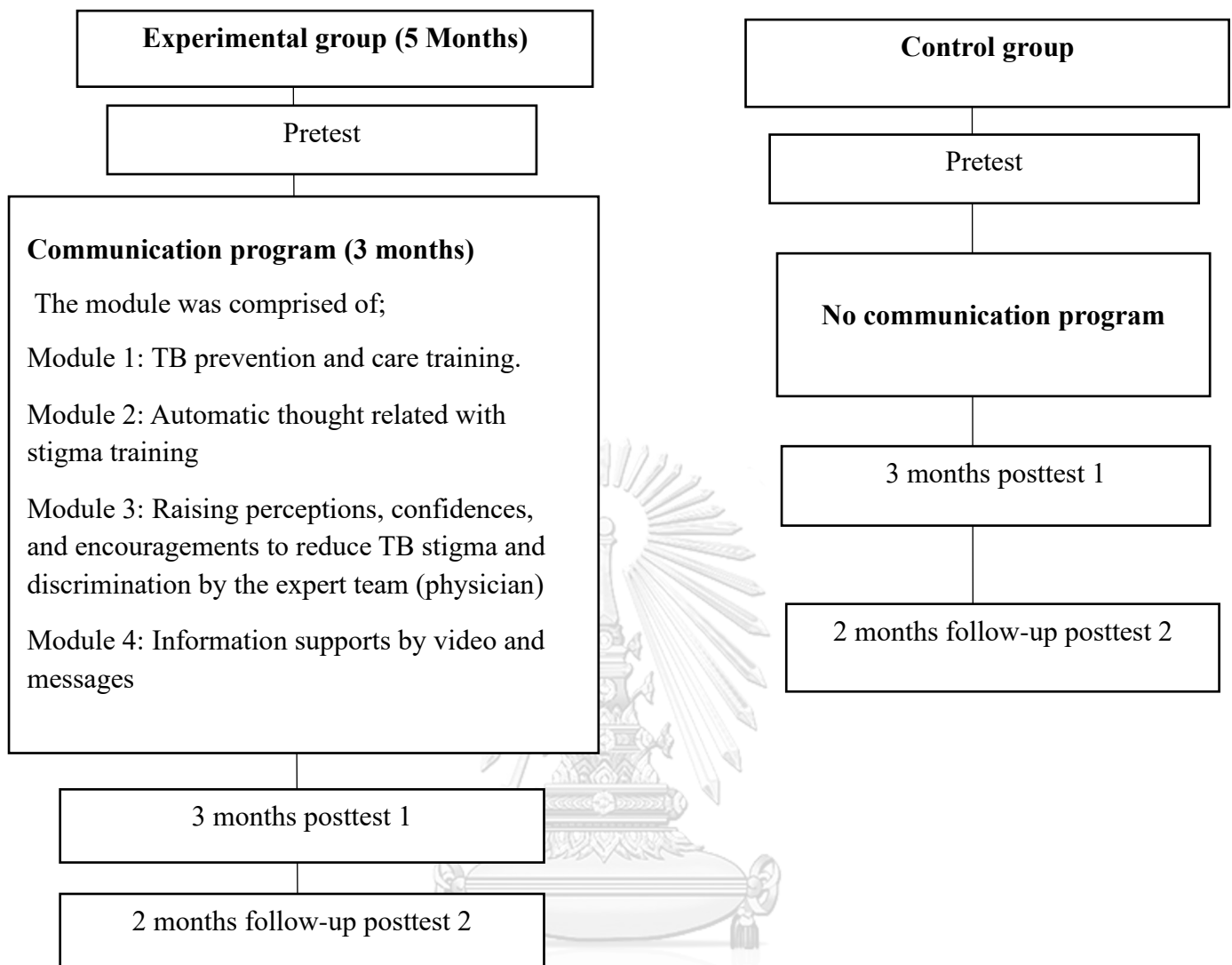
Figure 12: Flow diagram of study procedure

3.7 Measurement tools

3.7.1 The data collection was divided into 6 parts:

Part I: Socio-demographic characteristics factors (12 questions). There were 12 questions this part, consisting of age, classes, reside with, area of residence, type of accommodation, parents marital status, mothers educational status, fathers educational status, family income, illness experiences. Furthermore, in this part was comprised of information related with TB (2 questions).

Part II: Knowledge of TB disease (15 questions)

There were 15 questions in this part. The questionnaire was modified and developed from TB and Care Prevention guidelines(RuksThaiFoundation, 2017)(Ruks Thai Foundation, 2017) and the study of Pengpid (Pengpid et al., 2016). The questionnaire included knowledge of TB curability, knowledge of the duration of infectiousness, beliefs about transmission, protection measures, and knowledge of TB transmission. The total score of knowledge was 15 points which means if the correct answer was scored 1 point, the incorrect answer and not sure was scored 0 points. The range of scores was 0-15 points.

Part III: Attitude of TB disease (11 questions)

There were 11 questions that were used to access attitudes towards the TB disease. The questions were modified from previous studies(Osonwa Kalu & Eko Jimmy, 2015) and TB Stigma Measurement Guidance.(Craig et al., 2018). The questions were comprised of both positive and negative statements. The score rated from 11 to 55, with five categories consisted of strongly agree, agree, don't know, disagree, and strongly disagree.

Table 8: Attitude scores for positive and negative statements

Positive Statement		Negative Statement	
Choice	Score	Choice	Score
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Neutral	3	Neutral	3
Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

Part IV: Self-efficacy on TB stigma and discrimination (14 questions)

There were 14 questions in this part. The questionnaire was modified from a previous study by Xianhong li, and et al.,(X. Li et al., 2011) and the study of Johnson et al., (Johnson et al., 2007) as well as the study of Prayogi, (Prayogi, 2017). The questionnaire included perceived self-efficacy and outcome expectation. The score rated from 14 to 70, with five categories consisted of strongly confident, very confident, partially confident, unsure, and unconfident.

Table 9: Self-efficacy on TB stigma and discrimination scores for positive and negative statements

Positive Statement		Negative Statement	
Choice	Score	Choice	Score
Strongly confident	5		1
Very confident	4		2
Partially confident	3		3
Unsure	2		4
Unconfident	1		5

Part V: TB stigma (11 questions)

There were 11 questions in this part. The questionnaire was modified from TB Stigma Measurement Guidance.(Craig et al., 2018). The questions were only comprised of negative statements. The questions were only comprised of negative statements. The score rated from 0 to 44 with five categories as follows,

Strongly agree = 4 points

Agree = 3 points

Don't know = 2 points

Disagree = 1 points

Strongly disagree = 0 point

Part VI: TB discrimination (10 questions)

There were 10 questions in this part. The questionnaire was modified from TB Stigma Measurement Guidance.(Craig et al., 2018). The questions were only comprised of negative statements. The questions were only comprised of negative statements. The score rated from 0 to 40 with five categories as follows,

Strongly agree =4 points

Agree = 3 points

Don't know= 2 points

Disagree = 1 points

Strongly disagree = 0 point

3.7.2 The Intervention tools

The communication program was used for five months (June-November, 2021)   and implementation in the school. The intervention was implemented within three months (June-September, 2021), and the two months (October-November,2021) follow-up for program evaluation was also monitored. Design the intervention based on the self-efficacy theory and social support developed by Albert Bandura, 1977 and House, 1981. The communication program was conducted by offline or online or both methods depended on the situation.

The communication program was conducted by offline training. There were two steps before implementing the intervention.

(1) The research team had to build relationships with target groups such as introducing the process of the research, providing participating information, and allowing the signing of consent forms to participate in the activities. This part was done one week before the intervention started in June 2021.

(2) Research Assistant Training Course

The five research assistants (RA) were comprised of, two experts in the field of the TB, and the field of HIV/AIDS stigma and discrimination, and were key speakers for the intervention on modules 2-3, while remainder three research assistants were community health volunteers who had the experience in the field of the TB at least five years were conducted the data collection such as the introduction of the process of the research, providing participating information and allowing the signing of the consent form to participate in the activities, and helping the researcher to encourage the participants during the intervention implementation. This part was done one week before the intervention started in June 2021.

The training course included the basic knowledge questions regarding important symptoms, the transmission of disease, diagnosis, treatment and prevention of TB disease, automatic thought related to stigma training, motivation, confidence, and social support techniques which related the issue. This course was done for one month before intervention implementation. The communication program was comprised of four modules. The program content is shown in table 10.

Table 10: The communication program

Module	Activities/Details
Module 1: TB prevention and care training. (Giving 2 hours for once a week within 3 weeks).Modified and developed from TB prevention and care curriculum.(RuksThaiFoundation, 2017). The objectives of module were comprised of; (1) To enhance knowledge, understanding and the attitude about the TB to the participants. (2) To identify and describe on the risk behavior, the prevention and care about the pulmonary TB by the participants.	- Activity I; Does tuberculosis real exist? - Activity II; Risk behaviors on the pulmonary TB infection. Activity III; Demonstration of the spread of the pulmonary TB infection and TB prevention through chemical test-kit and personal protective equipment (a mask). The detail of activities were comprised of, - The training course includes basic knowledge and prevention of tuberculosis (TB) disease. - Demonstration of the spread of the pulmonary TB infection and TB prevention through chemical test-kit. (Sodium hydroxide, phenolphthalein and vinegar juice) . - How to use the personal protective equipment (PPE).
Module 2: Automatic thought related with Stigma training (Giving 2 hours for once a week within 3 weeks). Modified and developed from HIV/AIDS stigma and discrimination in Healthcare center curriculum.(Bureau of AIDS, 2017) and Self-stigma Reduction Program. (AIDS Right Foundation, 2017). The objectives of module were comprised of; (1) To provide knowledge and understanding of negative automatic thoughts on themselves and others the	The training course includes basic knowledge of automatic thought related with Stigma by the HIV/AIDS experts related with stigma and discrimination. The activities were comprised of, - Activity I: Self-stigma evaluation. - Activity II: How to manage negative automatic thought on stigma? - Activity III: Sharing experience on TB stigma and discrimination in school.

Table 10.*Cont*.

Module	Activities/Details
participants. (2) To assess themselves about negative automatic thoughts of themselves and others. (3) To enhance the skills to change negative automatic thoughts on themselves and others.	
Module 3: Raising perception, confidence and encouraging to reduce TB stigma and discrimination by the expert team. (Giving 2 hours for once a week within 3 weeks). <u>The objective of module was comprised of;</u> (1) To enhance motivate and confidence the participants to reduce stigmatization and discrimination against tuberculosis patients.	The TB consulting are led by the research team and the expert team. The activities were comprised of, - Activity I: How to reduce TB stigma and discrimination? - Activity II; TB is not dangerous disease. - Activity III; Sharing experiences by the expert team who had experience in the field of the pulmonary TB disease.
Module 4: Information support by video and messages. <u>The objective of module was comprised of;</u> (1) To provide important messages to the target group to be able to take care of themselves and, can reduce TB stigma and discrimination with TB patients.	Information support by happy ending with TB video (modified and developed) and it was updated on social media, TB messages to against stigma and discrimination such as Care for yourself care for colleagues, Let's stop stigma, Zero stigma: new TB infections, and Save yourself save the world let's stop stigma. The activities were comprised of, - Activity I; Information support by happy ending with TB video (Hospital, 2020). - Activity II; Information support by messages.

Figure 13: Happy Ending with TB Video

(Hospital, 2020)

Figure 14: TB message to against stigma and discrimination.

The situation of COVID-19 in June 2021. Therefore, we changed the study design to be an online communication program and measurements with the teacher's assistance. The process of each activity online was described as follows,

(1) A researcher team conducted the questionnaires and information sheet by Google form, and social media channels (private group).

(2) A researcher team had to collect baseline data through online surveys such as Line groups or Facebook groups.

(3) The research assistant training course by social media (private group) such as Line group, Facebook group, or Zoom meeting group. This part was done one week before the intervention started. The program content by online training is shown in table 11.

Table 11 : Overview of communication program content by online training

Module	Descriptions/Details	Methods	Evaluation	Channels
Pretest by online		Google form	-	Line group
Module 1: TB prevention and care training.	- The training course included basic knowledge and prevention of TB disease. - Demonstration of the spread of the TB infection and TB prevention through chemical test-kit. (Sodium hydroxide, phenolphthalein and vinegar juice) - How to use the personal protective equipment (PPE).	Lecture/ group discussion/ Brain storming	-Observation by the reaction (face or voice of participants). - Respondents on the question	Line group/ Facebook group

Table 11.*Cont*.

Module	Descriptions/Details	Methods	Evaluation	Channels
Module 2: Automatic thought related with stigma training.	The training course included self-stigma evaluation, how to manage negative automatic thought on stigma?. and sharing experience on TB stigma and discrimination in school.	Lecture/ group discussion/ Brain storming	-Observation by the reaction (face or voice of participants). - Respondents on the question	
Module 3: Raising perception, confidence and encouraging to reduce TB stigma and discrimination	The training course included encourage, motivate the participants to increase confidences on the reduction of TB stigma and discrimination with TB patients in school, family or community.	Role model/ sharing experience/ focus group discussion	-Observation by the reaction (face or voice of participants). - Respondents on the question.	Line group/ Facebook group
Module 4: Information support by video and messages.	The training course included information support by happy ending with TB video (modified and developed)	Happy ending with TB video, Brainstorming, focus group discussion	-Observation by the reaction (face or voice of participants). - Respondents on the question	Line group/ Facebook group
3 months posttest 1 by online		Google form	-	Line group
5 months posttest 2 by online		Google form	-	Line group

Table 12 : Module period

Module	Week/Month	Tools	The target groups	
			Experimental group	Control group
Pretest			✓	✓
Module 1: TB prevention and care training.	1-3(June, 2021)	Lecture/ group discussion/ Brainstorming	✓	-
Module 2: Automatic thought related with stigma training.	4-6(July, 2021)	Lecture/ group discussion/ Brainstorming	✓	-
Module 3: Raising perception, confidence and encouraging to reduce TB stigma and discrimination	7-9(August, 2021)	Role model/ sharing experience/ focus group discussion	✓	-
Module 4: Information support by video and messages.	10-12 (September, 2021)	Happy ending with TB video, Brainstorming, focus group discussion	✓	-
3 months	**12 weeks**		**Posttest 1**	**Posttest 1**
2 months for follow-up	**8 weeks** (October-November, 2021)		**Posttest 2**	**Posttest 2**
Total	**16 weeks**			

3.8 Validity and Reliability

3.8.1 Validity test of the instrument

The validity of questionnaire was checked by three experts in the field of the pulmonary TB disease. After that the content of the questionnaire was adjusted according to their comments, and it was translated into Thai language.

3.8.2 The Reliability test of the instrument

After the questionnaire was revised, the pilot test was done in 30 study population from high-school students in other public high-school where was in the slum area for reliability test of the questionnaire. Cronbach's alpha coefficient was used to measure the reliability of the questionnaire, it must have a value of coefficient above 0.7 (DeVellis, 2016) that was considered as satisfactory.

The reliability test results of the questionnaires showed that the Kuder-Richardson 20 (KR-20) was 0.876 for TB knowledge. Cronbach's alpha coefficient was 0.875 for the TB attitudes, 0.744 for self-efficacy on TB stigma and discrimination, 0.907 for TB stigma and 0.825 for TB discrimination. Therefore, these results were considered acceptable.

3.8.3 Index of Congruence: (IOC)

Content validity testing on the data collection tools by using the data collection tools to check the content validity by the experts in the field of the TB disease, after passing the examination of the experts in the field of the TB disease, the content validity was evaluated by using the Index of Congruence: IOC, which was following scores;

Consistency that score is +1 point

Not sure score that score is 0 point

Inconsistency that score is -1 point

Then combine the points of the three experts in each item to find the consistency of the value from the formula with the following criteria;

Giving a score of +1 point means the experts were sure that the questions were consistent with the objectives.

Giving a score of 0 points means the experts were not sure that the questions were consistent with the objectives.

Giving a score of -1 point means the experts were sure that the questions were inconsistent with the objectives.

Therefore, it can be concluded that the standard value of the consistency index of congruence (IOC) of the question that had the value of the validity of the content must have an IOC of 0.50 - 1.00, but if the question had content validity with an IOC of less than 0.50, it means that the question was still unavailable and the question must be to improve.(Keanchunbai, 2017). The IOC index results of the questionnaires showed that TB knowledge was 0.72, TB attitudes was 0.75, self-efficacy on TB stigma and discrimination was 0.93, TB stigma was 0.93, and TB discrimination was 0.61.

3.9 Data Analysis

Relevant statistics included;

3.9.1 Descriptive statistics comprised of frequency, percentage, mean, and standard deviation were used for the analysis of socio-demographic factors and information related to TB, and all dependent variables (including knowledge of TB disease, the attitude of TB disease, self-efficacy on TB stigma and discrimination, TB stigma and discrimination.

3.9.2 Inferential statistics

(1) Testing difference of mean in a paired t-test was used for the analysis of knowledge of TB disease, attitude of TB disease, self-efficacy on TB stigma and discrimination, TB stigma and discrimination to compare pre and posttest within a group.

(2) Testing difference in independent sample t-test, Chi-square test and Fisher's exact test were used for the analysis of socio-demographic factors, information related with TB, environmental factor in school and dependent variables to compare between each group.

(3) Comparison in TB knowledge, TB attitudes, self-efficacy on TB stigma and discrimination, TB stigma, and TB discrimination between experimental group and control group at baseline, 3 months, and 2 months for follow-up. The normality was tested by Kolmogorov-Smirnov test. Generalized Estimating Equations

(GEE) was used for analyzing the overall program between experimental group and control group and comparison group because the GEE was used for analyzing repeated data and was used for irregularly-timed by used. A mean difference with 95% confidence interval (95% CI) to assess the effectiveness of the intervention.

(4) Statistical significance was considered at p-value < 0.05. The data analysis is shown in table 13.

Table 13 : Method of data analysis

Objectives	Main Variables	Statistic(s) used
To explore the effectiveness of the communication program on reduction of TB stigma and discrimination among high-school students in Bangkok.	- All of independent variables - All of dependent Variables	-Descriptive statistics (frequency, percentage, mean, standard deviation) - Chi-square test - Fisher's exact test - Independent sample t-test - Generalized Estimating Equations (GEE)
To compare mean score differences on the TB stigma and discrimination among both groups before, and after intervention within same groups and between groups.	- TB stigma - TB discrimination	Inferential statistics - Paired t-test - T-test for independent (Mean, Standard Deviation).
To compare mean score differences on the knowledge of TB among both groups before, and after intervention within same groups and between groups.	Knowledge of the pulmonary TB	Inferential statistics - Paired t-test - T-test for independent (Mean, Standard Deviation).
To compare mean scores differences on the attitude of TB among both groups before, and after intervention	Attitude of pulmonary TB	Inferential statistics - Paired t-test - T-test for independent

Table 13.*Cont*.

Objectives	Main Variables	Statistic(s) used
within same groups and between groups.		(Mean, Standard Deviation).
To compare mean score differences on self-efficacy of TB stigma and discrimination among both groups before, and after intervention within same groups and between groups.	Self-efficacy of TB stigma and discrimination	<u>Inferential statistics</u> - Paired t-test - T-test for independent (Mean, Standard Deviation).
To assesses the effectiveness of the over all program between the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up.	All of dependent variables	- Generalized Estimating Equations (GEE)

3.10 Ethical consideration

3.10.1 This research was approved by the research ethics review committee for research Involving Human group I, Chulalongkorn University.

3.10.2 The letters were written to the principal of high schools to obtain permission and cooperation for data collection.

3.10.3 The high school students were briefed about the confidentiality of their responses and the importance of providing the right information.

3.10.4 Informed consent and an information sheet, and were secured from the study.

3.10.5 The high school students who were ≥ 18 years provided a voluntary informed consent form.

3.10.6 The high school students who were <18 years provide informed consent with approval by a parent or guardian (assent form).

3.11 Expected Outcomes and Benefit

3.12.1 The students who passed the communication program can provide important messages against the TB stigma to their friends and the other groups.

3.12.2 The communication program should be adopted in school program to make up for the TB knowledge, TB attitudes, and self-efficacy on the TB stigma and discrimination to reduce TB stigma among high-school students.

3.12.3 The students had the positive confidence to study together with a friend who was infected with TB without mistrust, fear, rejection, and exclusion.

3.12.4 The communication program should be adopted in adequate advocacy, sensitization, and social mobilization in other institutions to provide TB knowledge, the positive TB attitudes, and reduce TB stigma among other groups.

3.12 The study schedule

The estimate duration of the study was about 15 months between August 2021 to December 2021. The details of the time estimate are shown in table 14.

Table 14 : The study schedule

Activities	2020					2021									
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct
Literature reviews	√	√													
Proposal writing		√	√												
Proposal exam and presentation				√											
Ethical approval					√	√	√								
Data Collecting and develop program								√							
Data Collecting (Program Implementation)									√	√	√	√	√		
Data Analysis														√	
Report writing and presentation															√

3.13 Budget

The total budget of this study was approximately 150,000 baht. The details of the budget are shown in table 15.

Table 15: Budget of the study

Topics	Estimated expenses (THB)
Documentation	20,000
Office equipment	10,000
Materials and supplies	30,000
Travel and service fares	5,000
Staff benefits for 5 months	50,000
Cash reward for subjects	30,000
Cash reward for experts who check validity	5,000
Total	**150,000**

CHAPTER IV
RESULTS

This study was a quasi-experimental design with two groups by comparing pre-experimental, and post-experimental studies. The purpose of the study was to explore the effectiveness of communication in the reduction of TB stigma and discrimination among high-school students in Bangkok. The study population was Thai male adolescent students who were studying in grades 10-12, in male public high schools, in Bangkok areas. The participants included 212 students, 108 students were randomly assigned to the experimental group, while the other 104 students were randomly assigned to the control group. The intervention was implemented within three months, and the two months follow-up for program evaluation was also monitored. There are three sections to this chapter. The results are shown in three parts as follows

4.1 The results of the participants at the baseline were comprised of, socio-demographic characteristics and information related with TB.

4.2 Comparison of Knowledge of TB, Attitude TB, Self-efficacy on TB stigma and discrimination, and TB stigma and TB discrimination among experimental and control groups before, and after the intervention within same groups and between groups.

4.3 Testing the effectiveness of the communication program on reduction of TB stigma and discrimination.

4.1 The results of the participants at the baseline

4.1.1 Socio-demographic characteristics factors

A total of 216 students (108 students in each school) were recruited for the study; however, 212 students from two schools were enrolled in the study. Four students from the control group did not meet the inclusion criteria and refused to participate this study. After singing the informed consent, the remaining 212 students were selected to the experimental (108 students) and the control groups (104 students). The mean age of the experimental group was 16.28± 0.91 years and the control group was 16.19± 1.03 years. All of students in the experimental group the

control group were studying in Grade 10-12, and most of students stayed with both parents in the experimental group (68.5%) and the control group (83.7%). Most of their area of residence in both groups were villages, in the experimental group (44.4%) and the control group (51.0%). Most of accommodation types in the experimental group were Flats/Apartment/Condo/ Commercial buildings (55.6%), while the control group was owner house (49.1%). Most of their parents' marital status in both groups were married/co-habited. Most of their mother's education status in the experimental group was secondary level (36.1%), while the control group was bachelor degree or higher (76.0%).Most of their father's education status in the experimental group was secondary level (36.1%), while the control group was bachelor degree (75.0%). Most of their family income in both groups were between 15,000 and 45,000 Baht (approximately USD 445.7-1,342.6). Most of their illness history in both groups were illness history. At baseline, except for mother's education status, father's education status, and family income were statistically significant difference between the experimental and control groups at p-value <0.05, whereas the other factors were no statistically significant difference between the experimental and control groups at p-value >0.05 (see Table 16).

Table 16: Baseline socio-demographic characteristics factors of the participants.

Socio-demographic characteristics	Experimental group (n=108)	Control group (n=104)	P-value
Age in years, mean(SD)	16.28 (0.91)	16.19 (1.03)	0.524[c]
Classes (n,%)			0.981[a]
Grade 10	36 (33.3)	36 (34.6)	
Grade 11	36 (33.3)	34 (32.7)	
Grade 12	36 (33.3)	34 (32.7)	
Residing with (n,%)			0.056[a]
Both parents	74(68.5)	87(83.7)	
Single parents	12(11.1)	8(7.7)	
Guardian	21(19.4)	9(8.7)	
Living alone	1(0.9)	0(0)	
Area of residence (n,%)			0.412[a]
Village	48(44.4)	53(51.0)	
Commercial buildings	47(43.5)	36(34.6)	
Others, specify (slum area or overcrowded area)	13(12.0)	15(14.4)	

Table 16.*Cont*.

Socio-demographic characteristics	Experimental group (n=108)	Control group (n=104)	P-value
Type of accommodation (n,%)			0.136[a]
Owner house	39(36.1)	51(49.0)	
Flats/Apartment/Condo/ Commercial buildings	60(55.6)	44(42.3)	
Others, specify (slum area or overcrowded area)	9(8.3)	9(8.7)	
Parents marital status (n,%)			0.053[a]
Married/co-habited	77(71.3)	88(84.6)	
Divorced/separated	27(25.0)	15(14.4)	
Widowed	4(3.7)	1(1.0)	
Mother's educational status (n,%)			<0.001[a] *
Primary level or lower	18(16.7)	6(5.8)	
Secondary level	39(36.1)	13(12.5)	
Diploma level	16(14.8)	6(5.8)	
Bachelor degree or higher	35(32.4)	79(76.0)	
Father's educational status (n,%)			<0.001[a]*
Primary level or lower	28(25.9)	5(5.8)	
Secondary level	39(36.1)	9(8.7)	
Diploma level	15(13.9)	11(10.6)	
Bachelor degree or higher	26(24.1)	78(75.0)	
Family income per month (n,%)			<0.001[a]*
<15,000 Baht (< USD 445.7)	38(35.2)	7(6.7)	
15,000-45,000 Baht (USD 445.7–1,342.6)	57(52.8)	49(47.1)	
> 45,000 Baht (> USD 1,342.6)	13(12.0)	48(46.2)	
Illness history (n,%)			0.328[b]
Yes	18(16.7)	12(11.5)	
No	90(83.3)	92(88.5)	

P-value < 0.05 by [a]Chi-square test, [b]Fisher's exact test, and [c]Independent sample t-test.

4.1.2 Information related with TB

The results showed that most of students ever heard/learned of TB information in both groups. Most of students in both groups had the source of TB information by social media. In conclusion, both factors were no statistically significant difference between the experimental and control groups at p-value >0.05 (see Table 17).

Table 17: Information related with TB

Information related with TB	Experimental group (n=108)	Control group (n=104)	P-value
Ever hear/learning of TB information			0.078[b]
Yes	103(95.4)	92(88.5)	
No	5(4.6)	12(11.5)	
Source of TB information			0.052[a]
TV/ Radio	23(21.3)	18(17.3)	
Social media (i.e. Facebook/Line/Internet/Instagram/Twitter)	41(38.0)	46(44.2)	
Healthcare staffs/ Teachers/ Community Health Volunteers/ Community leaders/ Friends/Family	33(30.6)	19(18.3)	
Others, specify (Newspaper/journals)	11(10.2)	21(20.2)	

P-value < 0.05 by [a]Chi-square test, [b]Fisher's exact test, and [c]Independent sample t-test.

4.2 Comparison of Knowledge of TB, Attitude to TB, Self-efficacy on TB stigma and discrimination, TB stigma, and TB discrimination among experimental and control groups at baseline, and 3-month intervention within same groups and between groups using paired samples t-test and independent sample t-test.

4.2.1 Between-group comparison results and mean score differences

Between-group comparison results and mean score differences of the knowledge of TB, attitude of TB, self-efficacy on TB stigma and discrimination and TB stigma and TB discrimination among the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up using independent samples t-test. Normality was tested for the knowledge of TB, attitude of TB, self-efficacy on TB stigma and discrimination, and TB stigma and TB discrimination by the Kolmogorov-Smirnov test. Independent sample t-test was used for comparing the score when the scores were normally distributed.

The results of comparisons between the group are shown in table 18. At baseline showed that there was no statistically significant difference in TB attitudes, self-efficacy on TB stigma and discrimination, TB stigma and TB discrimination (p-value >0.05), while there was a statistically significant difference in TB knowledge (p-value = 0.022). In contrast, after 3 months of implementing the intervention found that there were statistically significant differences in TB knowledge, TB attitudes,

self-efficacy on TB stigma and discrimination, and TB stigma (p-value <0.05), while there was no statistically significant difference in TB discrimination (p-value >0.05).In this regard, the 2 months for follow-up showed there were statistically significant differences in TB knowledge, TB attitudes, self-efficacy on TB stigma and discrimination, and TB stigma (p-value < 0.05), whereas there was no statistically significant difference in TB discrimination (p-value>0.05).

Table 18: Between-group comparisons of knowledge of TB, attitude of TB, self-efficacy on TB stigma and discrimination, TB stigma and TB discrimination at baseline, 3 months and 2 months for follow-up.

Variable	Baseline			3 months for intervention			2 months for follow-up		
	Exp.	Control	P-value	Exp.	Control	P-value	Exp.	Control	P-value
Knowledge of TB, mean (SD)	9.63 (1.46)	9.16 (1.54)	0.022*	12.83 (1.79)	7.59 (1.87)	<0.001*	13.77 (1.31)	9.43 (3.07)	<0.001*
Attitude of TB, mean (SD)	34.88 (4.11)	35.39 (5.72)	0.460	42.27 (5.75)	34.44 (4.61)	<0.001*	44.53 (4.17)	34.26 (4.12)	<0.001*
Self-efficacy on TB stigma and discrimination, mean (SD)	37.43 (7.22)	38.67 (8.37)	0.250	43.29 (6.43)	36.49 (7.94)	<0.001*	51.56 (4.10)	36.16 (5.66)	<0.001*
TB stigma, mean (SD)	22.43 (7.84)	21.65 (9.05)	0.502	17.52 (7.95)	22.50 (8.44)	<0.001*	21.36 (8.66)	25.97 (7.73)	<0.001*
TB discrimination, mean (SD)	28.39 (6.00)	29.15 (6.88)	0.395	27.25 (7.66)	29.04 (6.76)	0.072	26.79 (5.75)	28.15 (5.27)	0.075

Between-group comparisons were analyzed using independent sample t-test.

Significant at p-value <0.05.

4.2.2 Within-group comparison results and mean score differences

Within-group comparison results and mean score differences of the knowledge of TB, attitude of TB, self-efficacy on TB stigma and discrimination and TB stigma and TB discrimination among the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up using pared samples t-test. Normality was tested for the knowledge of TB, attitude of TB, self-efficacy on TB stigma and discrimination, and TB stigma and TB discrimination by the Kolmogorov-Smirnov test. Paired t-test was used for comparing the score when the scores were normally distributed.

The results of the comparison within the groups of TB knowledge are shown in table 19. The comparison of mean score differences by TB knowledge in the experimental group showed that at baseline, the mean score was 9.63. After 3 months of intervention, the mean score improved to 12.83 as well as the 2 months for follow-up, the mean score improved to 13.77. The baseline of mean score in the control group was 9.16. After 3 months of intervention, the mean score decreased to 7.59, while the 2 months for follow-up, the mean score increased to 9.43.

Therefore, in the experimental group the results showed that there was a statistically significant difference in TB knowledge at baseline to the 3 months of intervention (mean difference= -3.19, p-value <0.05). In addition, there were statistically significant differences at 3 months for intervention to the 2 months for follow-up (mean difference= -0.94, p-value <0.05) as well as from the baseline to the 2 months for follow-up (mean difference= -4.13, p-value <0.05). While, the control group, the results showed that there was a statistically significant difference in TB knowledge at baseline to the 3 months of intervention (mean difference= 1.56, p-value <0.05). In addition, there was a statistically significant difference at 3 months of intervention to the 2 months for follow-up (mean difference= -1.83, p-value <0.05). However, there was no statistically significant difference from the baseline to the 2 months for follow-up (mean difference= -0.26, p-value>0.05). The mean scores of TB knowledge versus each time-points in the study among the experimental and control groups are shown in Figure 15.

Table 19: Comparison within groups of the TB knowledge among the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up.

Time	Experimental Group (n=108)		Control Group (n=104)	
	Mean	SD	Mean	SD
Baseline	9.63	1.46	9.16	1.54
3 months for intervention	12.83	1.79	7.59	1.87
2 months for follow-up	13.77	1.31	9.43	3.07
Mean Difference(P-value) Baseline-3 months for intervention	-3.19 (<0.001*)		1.56(<0.001*)	
Mean Difference(P-value) 3 months for intervention- 2 months for follow-up	-0.94(<0.001*)		-1.83(<0.001*)	
Mean Difference(P-value) Baseline - 2 months for follow-up	-4.13 (<0.001*)		-0.26(1.000)	

Within-group comparisons were analyzed using paired t-test.

Significant at p-value <0.05.

Figure 15: The mean scores of TB knowledge versus each time-points in the study among the experimental and control groups.

The results of the comparison within the groups of TB attitudes are shown in table 20. The comparison of mean score differences by TB attitudes in the experimental group showed that at baseline, the mean score was 34.88. After 3 months of intervention, the mean score improved to 42.27 as well as 2 months for follow-up, the mean score improved to 44.53. The baseline of mean score in the control group was 35.39. After 3 of months intervention, the mean score decreased to 34.44, and also the 2 months for follow-up, the mean score decreased to 34.26.

Therefore, in the experimental group the results showed that there was a statistically significant difference in TB attitudes at baseline to the 3 months of intervention (mean difference=-7.38, p-value <0.05). In addition, there were statistically significant differences at 3 months for intervention to the 2 months for follow-up (mean difference=-2.25, p-value <0.05) as well as from the baseline to the 2 months for follow-up (mean difference= -9.64, p-value <0.05). While, the control group, the results showed that there was no statistically significant difference in TB attitudes at baseline to the 3 months of intervention (mean difference= 0.95, p-value>0.05). In addition, there was no statistically significant difference at 3 months for intervention to the 2 months for follow-up (mean difference= 0.17, p-value>0.05) as well as from the baseline to the 2 months for follow-up (mean difference= 1.12, p-value>0.05). The mean scores of TB attitudes versus each time-points in the study among the experimental and control groups are shown in Figure 16.

Table 20: Comparison within groups of TB attitudes among the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up.

Time	Experimental Group (n=108)		Control Group (n=104)	
	Mean	SD	Mean	SD
Baseline	34.88	4.11	35.39	5.72
3 months for intervention	42.27	5.75	34.44	4.61
2 months for follow-up	44.53	4.17	34.26	4.12
Mean Difference(P-value)	-7.38(<0.001*)		0.95(0.146)	
Baseline-3 months for intervention				

Table 20.*Cont*.

Time	Experimental Group (n=108)		Control Group (n=104)	
	Mean	SD	Mean	SD
Mean Difference(P-value)	-2.25(<0.001*)		0.17(0.781)	
3 months for intervention- 2 months				
for follow-up				
Mean Difference(P-value)	-9.64(<0.001*)		1.12(0.337)	
Baseline - 2 months for follow-up				

Within-group comparisons were analyzed using paired t-test.

Significant at p-value <0.05.

Figure 16 : The mean scores of TB attitudes versus each time-points in the study among the experimental and control groups.
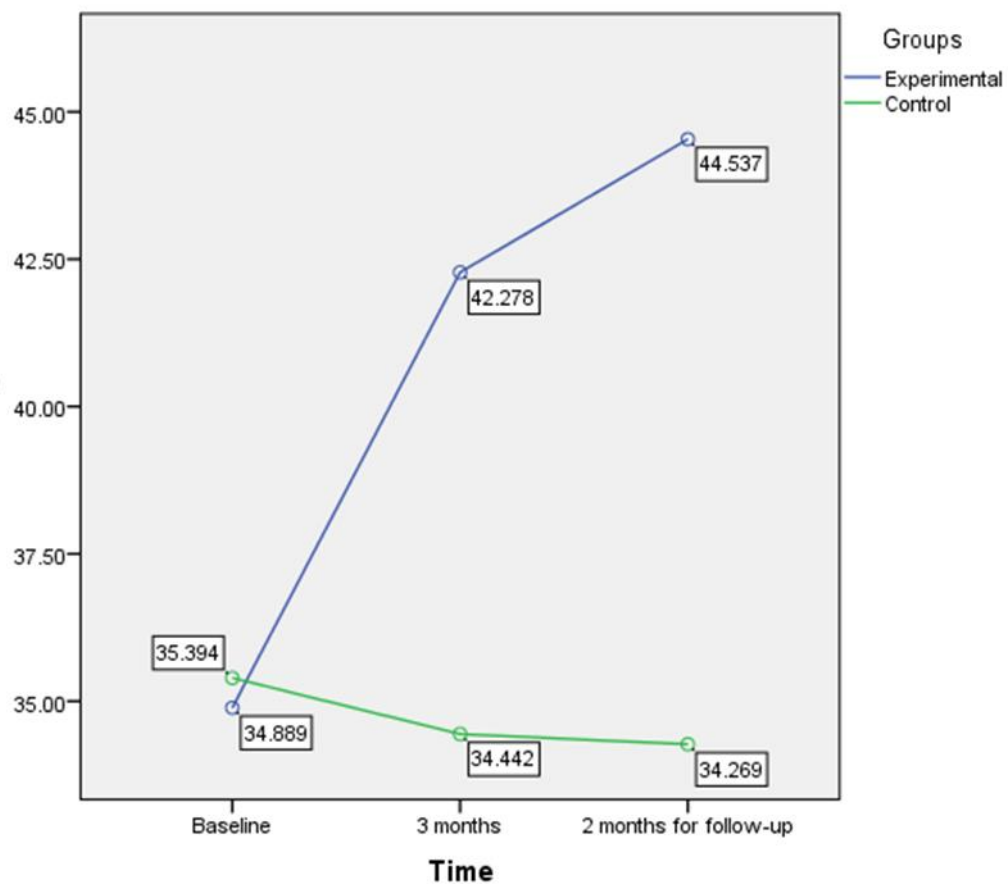
The results of the comparison within the groups of self-efficacy on TB stigma and discrimination are shown in table 21. The comparison of mean score differences by self-efficacy on TB stigma and discrimination in the experimental group showed that at baseline, the mean score was 37.43. After 3 months of intervention, the mean score increased to 43.29 as well as 2 months for follow-up, the mean score increased to 51.56. The baseline means score in the control group was 38.67. After 3 months of intervention, the mean score decreased to 36.49, and also the 2 months for follow-up, the mean score was 36.16.

Therefore, in the experimental group the results showed that there was a statistically significant difference in TB attitudes at baseline to the 3 months of intervention (mean difference=-5.86, p-value <0.05). In addition, there were statistically significant differences at 3 months for intervention to the 2 months for follow-up (mean difference=-8.26, p-value <0.05) as well as from the baseline to the 2 months for follow-up (mean difference=-14.13, p-value <0.05). While, the control group, the results showed that there was a statistically significant difference in self-efficacy on TB stigma and discrimination at baseline to the 3 months of intervention (mean difference= 2.18, p-value <0.05). In addition, there was no statistically significant difference at 3 months for intervention to the 2 months for follow-up (mean difference= 0.32, p-value>0.05). However, there was a statistically significant difference in self-efficacy on TB stigma and discrimination at baseline to the 2 months for follow-up (mean difference= 2.51, p-value<0.05). The mean scores of self-efficacy on TB stigma and discrimination versus each time-points in the study among the experimental and control groups are shown in Figure 17.

Table 21: Comparison within groups of the self-efficacy on TB stigma and discrimination among the experimental group and the control group at baseline, 3-month intervention, and 2-month follow-up.

Time	Experimental Group (n=108)		Control Group (n=104)	
	Mean	SD	Mean	SD
Baseline	37.43	7.22	38.67	8.37
3 months for intervention	43.29	6.43	36.49	7.94
2 months for follow-up	51.56	4.10	36.16	5.66
Mean Difference(P-value) Baseline-3 months for intervention	-5.86 (<0.001*)		2.18(0.035*)	
Mean Difference(P-value) 3 months for intervention- 2 months for follow-up	-8.26(<0.001*)		0.32(0.735)	
Mean Difference(P-value) Baseline - 2 months for follow-up	-14.13(<0.001*)		2.51(0.024*)	

Within-group comparisons were analyzed using paired t-test.

Significant at p-value <0.05.

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Figure 17: The mean scores of self-efficacy on TB stigma and discrimination versus each time-points in the study among the experimental and control groups.

The results of the comparison within the groups of TB stigma are shown in table 22. The comparison of mean score differences by TB stigma in the experimental group showed that at baseline, the mean score was 22.43. After 3 months of intervention, the mean score decreased to 17.52, while the 2 months for follow-up, the mean score increased to 21.36. The baseline of mean score in the control group was 21.65. After 3 months of intervention, the mean score increased to 22.50, and also the 2 months for follow-up, the mean score was 25.97.

Therefore, in the experimental group the results showed that there was a statistically significant difference in TB stigma at baseline to the 3 months of intervention (mean difference=4.90, p-value <0.05). In addition, there were statistically significant differences at 3 months for intervention to the 2 months for follow-up (mean difference=-3.83, p-value <0.05); however, there was no statistically

significant difference in TB stigma at baseline to the 2 months for follow-up (mean difference=1.07, p-value >0.05). While, the control group, the results showed that there was no statistically significant difference in TB stigma at baseline to the 3 months for intervention (mean difference = -0.08, p-value >0.05). In addition, there were statistically significant differences at 3 months of intervention to the 2 months for follow-up (mean difference=-3.46, p-value>0.05) as well as from the baseline to the 2 months for follow-up (mean difference=-4.31, p-value>0.05). The mean scores of TB stigma versus each time-points in the study among the experimental and control groups are shown in Figure 18.

Table 22: Comparison within groups of TB stigma among the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up.

Time	Experimental Group (n=108)		Control Group (n=104)	
	Mean	SD	Mean	SD
Baseline	22.43	7.84	21.65	9.05
3 months for intervention	17.52	7.95	22.50	8.44
2 months for intervention	21.36	8.66	25.97	7.73
Mean Difference(P-value) Baseline-3 months for intervention	4.90 (<0.001*)		-0.08(0.142)	
Mean Difference(P-value) 3 months for intervention- 2 months for follow-up	-3.83(0.003*)		-3.46(0.003*)	
Mean Difference(P-value) Baseline - 2 months for follow-up	1.07(1.000)		-4.31(0.002*)	

Within-group comparisons were analyzed using paired t-test.

Significant at p-value <0.05.

Figure 18: The mean scores of TB stigma versus each time-points in the study among the experimental and control groups.
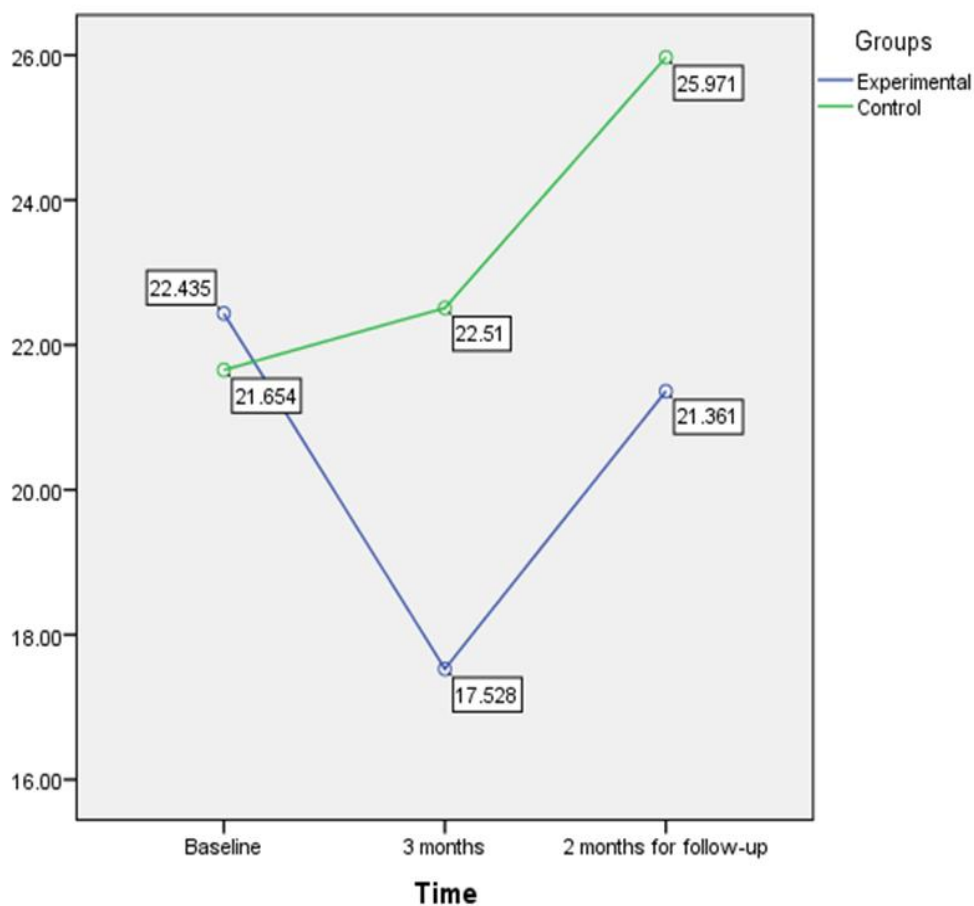
The results of the comparison within the groups of TB discrimination are shown in Table 23. The comparison of mean score differences by TB discrimination in the experimental group showed that at baseline, the mean score was 28.39. After 3 months of intervention, the mean score decreased to 27.25, and also the 2 months for follow-up, the mean score decreased to 26.79. The baseline of mean score in the control group was 29.15 as well as after 3 months of intervention, the mean score was 29.04, while the 2 months for follow-up, the mean score decreased to 28.15.

Therefore, in the experimental group, the results showed that there were no statistically significant differences in TB discrimination at baseline to the 3 months of intervention (mean difference=1.14, p-value >0.05) as well as the 3 months of intervention to the 2 months for follow-up (mean difference=0.45, p-value >0.05). In addition, there was no statistically significant differences in TB discrimination at the

baseline to the 2 months for follow-up (mean difference=1.60, p-value >0.05). Similarly, in the control group, the results showed that there were no statistically significant differences in TB discrimination at baseline to the 3 months of intervention (mean difference=1.10, p-value >0.05) as well as the 3 months of intervention to the 2 months for follow-up (mean difference=0.89, p-value >0.05). In addition, there was no statistically significant differences in TB discrimination at the baseline to the 2 months for follow-up (mean difference=1.00, p-value >0.05).The mean scores of TB discrimination versus each time-points in the study among the experimental and control groups are shown in Figure 19.

Table 23: Comparison within groups of TB discrimination among the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up.

Time	Experimental Group (n=108)		Control Group (n=104)	
	Mean	SD	Mean	SD
Baseline	28.39	6.00	29.15	6.88
3 months for intervention	27.25	7.66	29.04	6.76
2 months for follow-up	26.79	5.75	28.15	5.27
Mean Difference(P-value) Baseline-3 months for intervention	1.14(0.176)		1.10(0.911)	
Mean Difference(P-value) 3 months for intervention- 2 months for follow-up	0.45(0.603)		0.89(0.248)	
Mean Difference(P-value) Baseline - 2 months for follow-up	1.60(0.113)		1.00(0.710)	

Within-group comparisons were analyzed using paired t-test.

Significant at p-value <0.05.

Figure 19: The mean scores of TB discrimination versus each time-points in the study among the experimental and control groups.
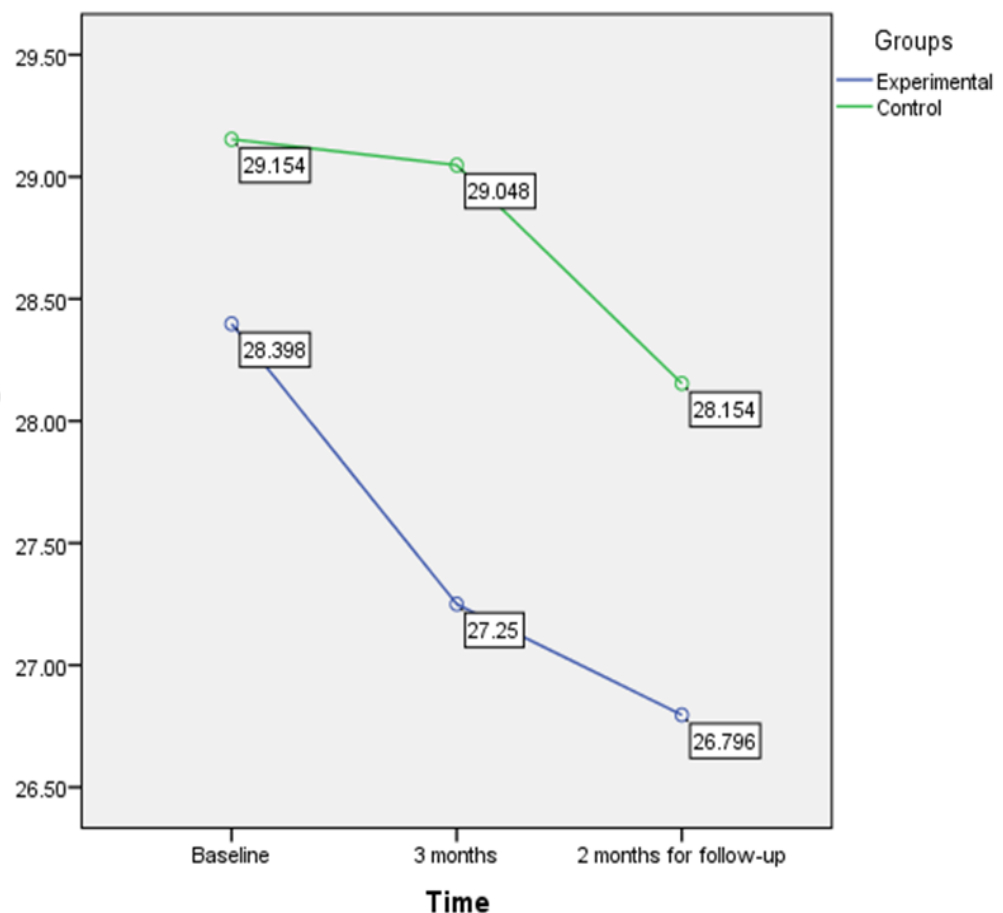
4.3 Testing the effectiveness of the communication program on reduction of TB stigma and TB discrimination.

4.3.1 Comparison of mean score differences of the TB knowledge, TB attitudes, Self-efficacy on TB stigma and discrimination and TB stigma and TB discrimination, and the over all program between the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up using Generalized Estimating Equations (GEE). Normality was tested for the knowledge TB, TB attitudes, self-efficacy on TB stigma and discrimination, and TB stigma and TB discrimination by the Kolmogorov-Smirnov test. The comparisons of the over all program in TB knowledge between the groups are shown in table 24. After adjusting

mother's education status, father's education status, and family income, the over all program results showed a significant difference between the experimental and the control groups (p-value <0.05, 95% CI =1.825, 2.537). In the experimental group and the control group at baseline, the results showed mean score differences in the experimental group higher than the control group (difference in mean =0.47). After 3 months of intervention, the results showed mean score differences in the experimental group higher than the control group (difference in mean =5.23) as well as the 2 months for follow-up, showed mean score differences in the experimental group higher than the control group (difference in mean =4.34).

Therefore, the measure of mean score differences at 3 time periods in the experimental group showed that TB knowledge was improved over time, while the control group had increasing and decreasing mean score differences over 3 time periods on TB knowledge.

Table 24: Comparison of the TB knowledge among 3 time-points between experimental and control groups.

Time	Experimental Group (n=108)		Control Group (n=104)		Difference in mean (Exp.-Control)	Group×Time P-value (95% CI)
	Mean	SD	Mean	SD		
Baseline	9.63	1.46	9.16	1.54	0.47	<0.001*
3 months for intervention	12.83	1.79	7.59	1.87	5.23	(1.825, 2.537)
2 months for follow-up	13.77	1.31	9.43	3.07	4.34	

The covariate variables such as mother's education status, father's education status, and family income were adjusted by Generalized Estimating Equations (GEE)
Comparisons were analyzed using Generalized Estimating Equations (GEE)
Significant at p-value <0.05.

The comparisons of the over all program in TB attitudes between the groups are shown in Table 25. After adjusting mother's education status, father's education status, and family income, the over all program results showed a significant difference between the experimental and the control groups (p-value <0.05, 95% CI

=4.493, 6.280). In the experimental group and the control group at baseline, the results showed mean score differences in the experimental group lower than the control group (difference in mean =-0.50). After 3 months of intervention, the results showed mean score differences in the experimental group higher than the control group (difference in mean =7.83) as well as the 2 months for follow-up, showed mean score differences in the experimental group higher than the control group (difference in mean =10.26). Therefore, the measure of mean score differences at 3 time periods in the experimental group showed that TB attitudes increased over time. In contrast, the control group did not change mean score differences over three time periods on the TB attitudes.

Table 25: Comparison of TB attitudes among 3 time-points between experimental and control groups.

Time	Experimental Group (n=108)		Control Group (n=104)		Difference in mean (Exp.-Control)	Group×Time P-value (95% CI)
	Mean	SD	Mean	SD		
Baseline	34.88	4.11	35.39	5.72	-0.50	<0.001*
3 months for intervention	42.27	5.75	34.44	4.61	7.83	(4.493,
2 months for follow-up	44.53	4.17	34.26	4.12	10.26	6.280)

The covariate variables such as mother's education status, father's education status, and family income were adjusted by Generalized Estimating Equations (GEE)
Comparisons were analyzed using Generalized Estimating Equations (GEE)
Significant at p-value <0.05.

The comparisons of the over all program in self-efficacy on TB stigma and discrimination between the groups are shown in Table 26. After adjusting mother's education status, father's education status, and family income, the over all program results showed a significant difference between the experimental and the control groups (p-value <0.05, 95% CI =7.133, 9.483). In the experimental group and the control group at baseline, the results showed mean score differences in the

experimental group lower than the control group (difference in mean =-1.23). After 3 months of intervention, the results showed mean score differences in the experimental group higher than the control group (difference in mean =6.80) as well as the 2 months for follow-up, showed mean score differences in the experimental group higher than the control group (difference in mean =15.40).

Therefore, the measure of mean score differences at 3 time periods in the experimental group showed that self-efficacy on TB stigma and discrimination was increased over three time periods. In contrast, the control group had increasing and decreasing mean score differences over three time periods on self-efficacy on TB stigma and discrimination.

Table 26: Comparison of self-efficacy on TB stigma and discrimination among 3 time-points between experimental and control groups.

Time	Experimental Group (n=108)		Control Group (n=104)		Difference in mean	Group×Time P-value
	Mean	SD	Mean	SD	(Exp.-Control)	(95% CI)
Baseline	37.43	7.22	38.67	8.37	-1.23	<0.001*
3 months for intervention	43.29	6.43	36.49	7.94	6.80	(7.133, 9.483)
2 months for follow-up	51.56	4.10	36.16	5.66	15.40	

The covariate variables such as mother's education status, father's education status, and family income were adjusted by Generalized Estimating Equations (GEE)
Comparisons were analyzed using Generalized Estimating Equations (GEE)
Significant at p-value <0.05.

The comparisons of the over all program in TB stigma between the groups are shown in Table 27. After adjusting mother's education status, father's education status, and family income, the over all program results showed a significant difference between the experimental and the control groups (p-value <0.05, 95% CI =4.962, -1.723). In the experimental group and the control group at baseline, the results

showed mean score differences in the experimental group higher than the control group (difference in mean =0.78). After 3 months of intervention, the results showed mean score differences in the experimental group lower than the control group (difference in mean =-4.98) as well as the 2 months for follow-up, showed mean score differences in the experimental group lower than the control group (difference in mean =-4.61).

Therefore, the measure of mean score differences at 3 time periods in the experimental group showed that TB stigma decreased over time. In contrast, the measure of mean score differences within the control group at 3 time periods showed that TB stigma had increased mean score differences during the same period.

Table 27: Comparison of TB stigma among 3 time-points between experimental and control groups.

Time	Experimental Group (n=108)		Control Group (n=104)		Difference in mean (Exp.-Control)	Group×Time P-value (95% CI)
	Mean	SD	Mean	SD		
Baseline	22.43	7.84	21.65	9.05	0.78	<0.001*
3 months for intervention	17.52	7.95	22.50	8.44	-4.98	(-4.962, -1.723)
2 months for follow-up	21.36	8.66	25.97	7.73	-4.61	

The covariate variables such as mother's education status, father's education status, and family income were adjusted by Generalized Estimating Equations (GEE)
Comparisons were analyzed using Generalized Estimating Equations (GEE)
Significant at p-value <0.05.

The comparisons of the over all program in TB discrimination between the groups are shown in Table 28. After adjusting mother's education status, father's education status, and family income, the over all program results showed that the there was no significant difference between the experimental and the control groups (p-value >0.05, 95% CI =-1.398, 0.810). In the experimental group and the control

group at baseline, the results showed mean score differences in the experimental group higher than the control group (difference in mean =-0.75). After 3 months of intervention, the results showed mean score differences in the experimental group lower than the control group (difference in mean =-1.79) as well as the 2 months for follow-up, showed mean score differences in the experimental group lower than the control group (difference in mean =-1.35).   The measure of mean score differences at 3 time periods in the experimental group showed that TB discrimination did not change over time (p-value >0.05). Similarly, the measure of mean score differences within the control group at 3 time periods showed that TB discrimination did not change mean score differences during the same period (p-value >0.05).

Table 28: Comparison of TB discrimination among 3 time-points between experimental and control groups.

Time	Experimental Group (n=108)		Control Group (n=104)		Difference in mean (Exp.-Control)	Group✕Time P-value (95% CI)
	Mean	SD	Mean	SD		
Baseline	28.39	6.00	29.15	6.88	-0.75	0.602 (-1.398, 0.810)
3 months for intervention	27.25	7.66	29.04	6.76	-1.79	
2 months for follow-up	26.79	5.75	28.15	5.27	-1.35	

The covariate variables such as mother's education status, father's education status, and family income were adjusted by Generalized Estimating Equations (GEE)
Comparisons were analyzed using Generalized Estimating Equations (GEE)
Significant at p-value <0.05.

When testing the hypothesis in each variable. It can be described as follows,

(1) TB stigma showed that our findings accepted the alternative hypothesis that the communication program has a different effect on the reduction of TB stigma before and after intervention among experimental and control groups.

(2) TB discrimination showed that our findings accepted the null hypothesis that the communication program has no difference in the effect on the reduction of TB discrimination before and after intervention among experimental and control groups.

(3) TB knowledge showed that our findings accepted the alternative hypothesis that the communication program has a different effect on TB knowledge before and after intervention among experimental and control groups.

(4) TB attitudes showed that our findings accepted the alternative hypothesis that the communication program has a different effect on TB attitudes before and after intervention among experimental and control groups.

(5) Self-efficacy on TB stigma and discrimination showed that our findings accepted the alternative hypothesis that the communication program has a difference in the effect on self-efficacy of TB stigma and discrimination before and after intervention among experimental and control groups.

Hence, a summary of findings indicated that these interventions demonstrated significant effectiveness in communication programs based on self-efficacy and social support theories in reducing TB stigma and increasing TB knowledge, TB attitudes, and self-efficacy on TB stigma and discrimination compared with the control group. However, TB discrimination encountered no significant difference within and between both groups. Please see the discussions in chapter 5.

CHAPTER V

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

The purpose of the study was to explore the effectiveness of communication in the reduction of TB stigma and discrimination among high-school students in Bangkok. This section will be presented the discussion of findings, conclusion, limitations, recommendations, and further study. Moreover, the discussion of findings will be supported by comparing and contrasting with previous relevant studies.

This study was a quasi-experimental study with two groups of pretest-posttest design. The investigation lasted for five months from July to November 2021. The study population was Thai male adolescent students who were studying in grades 10-12, in male public high schools, in Bangkok areas. A total of 216 students were recruited for the study, 212 students from two schools were enrolled in the study. The dropout rate was expected to be < 20% addition recruitment which was done. Therefore, the participants included 212 students, 108 students were randomly assigned to the experimental group, while the other 104 students were randomly assigned to the control group. The intervention was implemented within three months, and the two months follow-up for program evaluation was also monitored. The experimental group received the communication intervention that included TB prevention and care training, automatic thought related to stigma training, raising perceptions, confidence, encouragement, and information supports for three months, whereas the control group did not receive that intervention. The communication program was designed based on the self-efficacy theory and social support developed by Albert Bandura, 1977 and House, 1981. Data were collected by the questionnaires that included socio-demographic characteristics factors, information related to TB, TB knowledge, TB attitudes, and self-efficacy on TB stigma and discrimination were intermediate outcome variables, while TB stigma and TB discrimination were main outcome variables. Data analysis included descriptive and inferential statistics. Descriptive statistics comprised of frequency and percentage were adopted to analyze the participants' socio-demographic characteristics. Chi-square test, Independent sample t- test, and Fisher's exact test were used to determine whether there is a statistical difference between the participants' socio-demographic characteristics

between-group at baseline. Inferential statistics comprised of a paired t-test was used to compare results and mean score differences within the same group, while independent sample t-test was used to compare results and mean score differences between groups. In addition, Generalized Estimating Equations (GEE) was used to test the over all program between the experimental group and the control group at baseline, 3-month intervention and 2-month follow-up.

There are five sections of this chapter are as follows,

5.1 Discussion

5.2 Conclusion

5.3 Limitations

5.4 Recommendations

5.5 Further Study

5.1 Discussion

5.1.1 Socio-demographic characteristics

Results of the study showed that a total of 216 students (108 students in each school) were recruited for the study; however, the dropout rate was expected to be < 20% addition recruitment which was done. The mean age of the experimental group was 16.28 ± 0.91 years and the control group was 16.19 ± 1.03 years. All of students in the experimental group the control group were studying in Grade 10-12, and most of students stayed with both parents in the experimental group (68.5%) and the control group (83.7%). Most of their area of residence in both groups were villages, in the experimental group (44.4%) and the control group (51.0%). Most of accommodation types in the experimental group were Flats/Apartment/Condo/ Commercial buildings (55.6%), while the control group was owner house (49.1%). Most of their parents' marital status in both groups were married/co-habited. Most of their mother's education status in the experimental group was secondary level (36.1%), while the control group was bachelor degree or higher (76.0%).Most of their father's education status in the experimental group was secondary level (36.1%), while the control group was bachelor degree (75.0%). Most of their family income in both groups were between 15,000 and 45,000 Baht (approximately USD 445.7-1,342.6). Most of their illness history in both groups were illness history. Information related with TB

showed that most of students ever heard/learned of TB information in both groups. Most of students in both groups had the source of TB information by social media. In conclusion, both factors were no statistically significant difference between the experimental and control groups at p-value >0.05. At baseline, except for mother's education status, father's education status, and family income were statistically significant differences between the experimental and control groups at p-value <0.05, whereas the other factors were no statistically significant difference between the experimental and control groups at p-value >0.05. After mother's education status, father's education status, and family income were adjusted to test the effectiveness of communication on TB knowledge, TB attitudes, and self-efficacy on TB stigma and discrimination, and the reduction of TB stigma and discrimination. The findings revealed that there were no differences between adjusting. It can be concluded that the three baseline characteristics had no significant impact on the findings of the study. The experimental group was assigned to complete the communication program within 3 months of intervention (within 12 totals), whereas the control group did not receive that intervention. The communication program was monitored according to an interview schedule at three time points namely, at baseline, 3-month intervention and 2-month follow-up. Three significant findings were obtained:

  1. TB knowledge

  After adjusting mother's education status, father's education status, and family income, TB knowledge score from baseline, 3-month intervention and 2-month follow-up showed a significant difference between both groups (p-value <0.05, 95% CI =1.825, 2.537). However, within-group comparison showed that TB knowledge improved mean score differences at 3 time periods in the experimental (p-value <0.05), while the control group had increasing and decreasing mean score differences over 3 time periods on TB knowledge.

  2. TB attitudes

  After adjusting mother's education status, father's education status, and family income, TB attitudes score from baseline, 3-month intervention and 2-month follow-up showed a significant difference between both groups (p-value <0.05, 95% CI =4.493, 6.280). However, within-group comparison showed that TB attitudes improved mean score differences at 3 time periods in the experimental (p-value

<0.05), while the control group did not change mean score differences over three time periods on the TB attitudes (p-value >0.05).

3. Self-efficacy on TB stigma and discrimination

After adjusting mother's education status, father's education status, and family income, self-efficacy on TB stigma and discrimination score from baseline, 3-month intervention and 2-month follow-up showed a significant difference between both groups (p-value <0.05, 95% CI =7.133, 9.483). However, within-group comparison showed that self-efficacy on TB stigma and discrimination increased mean score differences over three time periods in the experimental (p-value <0.05). In contrast, the control group had increasing and decreasing mean score differences over three time periods on self-efficacy on TB stigma and discrimination.

4. TB stigma

After adjusting mother's education status, father's education status, and family income, the over all program results showed a significant difference between the experimental and the control groups (p-value <0.05, 95% CI =4.962, -1.723). However, within-group comparison showed that TB stigma decreased over three time periods in the experimental (p-value <0.05), while the control group had increased mean score differences during the same period.

5. TB discrimination

After adjusting mother's education status, father's education status, and family income, the over all program results showed that the there was no significant difference between the experimental and the control groups (p-value >0.05, 95% CI =-1.398, 0.810). However, within-group comparison showed that TB discrimination did not change over three time periods in the experimental (p-value >0.05); similarly, the control group did not change mean score differences during the same period (p-value >0.05).

5.1.2 TB stigma

The mean score differences on the TB stigma among experimental and control groups at baseline, 3-month intervention and 2-month follow-up after the communication program were significant.Our findings were similar to the study reported by (Macq et al., 2008) and the results showed that after 2 months TB patients' internalized stigma was significantly reduced; similarly, the interventions including TB clubs and home visits were successfully implemented. Similarly, the study reported by (Bekele & Ali., 2008) showed that the results after 2 months of follow-up, was a reduction in HIV related to misconceptions, stigma, and discrimination attitudes, furthermore, campaigns using combined information, education, and communication (IEC) interventions were associated with stigma and discrimination among school adolescents as well as the study reported by (Varas‑Díaz et al., 2013) the results showed that after 2 months of HIV stigma intervention, the intervention group had lower HIV stigma than the control group, and reported that a 6 and 12 months follow-up was found to significantly lower HIV stigma. The experimental group can decrease TB stigma over all three time periods. This may be caused each activity of the communication program was conducted by TB experts, which add to its trustworthiness and provided pertinent messages to against TB stigma. Although, the TB stigma mean score difference was not significantly decreased from baseline to 2 months for follow-up (p-value >0.05). This may have been because after 3-month intervention, it did not have any intervention booster. A booster during 2 months for follow-up may be implemented using social media and online communication to support participants in maintaining their perceptions, beliefs, and positive attitudes to reduce TB stigma towards TB patients. Similarly, the study reported by (Varas‑Díaz et al., 2013) the results showed that after 6 and 12 months follow-up HIV stigma intervention was found to significantly lower HIV stigma. In addition, a booster was contacted by phone and via email in order to complete the 6 and 12-month follow-up over the web. Therefore, TB stigma did not improve from baseline to 2 months for follow-up. In contrast, the control group had increased mean score differences at 3 time periods. This may have been because the control group did not receive the intervention.

5.1.3 TB discrimination

The mean score differences on the TB discrimination among experimental and control groups at baseline, 3-month intervention and 2-month follow-up after the communication program did not change over time. Our findings were similar to the study led by (Chen et al., 2021)showed that discriminatory attitudes and isolated behaviors towards TB have not changed significantly in southeastern China. However, unlike a study reported by (Bekele & Ali., 2008) showed that the information, education and communication (IEC) interventions after 2 months of follow-up, was lowered HIV related misconceptions, stigma and discrimination attitudes. Another study led by (Ugarte, Högberg, Valladares, & Essén, 2013) showed that stigma and discrimination were reported high in the general population, especially sub-groups:therefore, this study suggests community-based strategies, including the monitoring of stigma and discrimination, and designing and implementing stigma reduction interventions, are greatly needed to reduce inequities and increase acceptance of persons with HIV.In addition, the study conducted by (Nayar, Stangl, De Zalduondo, & Brady, 2014) showed that the the authors suggest applying a framwork, adapted from the HIV stigma field, to direct further research and the adaptation of existing strageties to reduce HIV-related stigma and discrimination to address socail and health-related stigmas affecting children and their families. Furthermore, most of the participants had never met someone infected with TB, meaning they had no opportunity to personally experience with TB discrimination. Therefore, the communication program did not affect on TB discrimination within the same groups and between groups. It could be concluded that the participants did have an experience or get sick with TB. Hence, TB discrimination could be found more in other groups than among high-school students such as TB patients, persons affected by TB and no treatment is recommended. (Arininta, 2019).

5.1.4 TB knowledge

There was an overall significant difference in the TB knowledge scores between the two groups and a significant interaction between time and group and 3-time points, meaning the effect of time was significantly different for the experimental group and control group. Therefore, these measures showed that a communication program can have positive results on improving participants' TB knowledge within the experimental group and between groups. Our findings were similar to the study reported by (Bisallah et al.,2018) and showed that health education intervention after 3, 6 and 9 months resulted in significant improvement in TB knowledge and TB attitudes within the intervention group compared to the control group. Similarly, a study conducted by (Van der Westhuizen et.al.,2015) which designed the intervention included six components of the model as well as self-efficacy theory were adapted, showed that the TB infection control was improved through TB knowledge and TB attitudes after the intervention. Another study led by (Gentili et al., 2020) the study related to the impact of communication measures implemented during a school TB outbreak on risk perception among parents and school staff, Italy. The study reported that after 4 months intervention showed a significant reduction in the perceived level of risk in parent and school staff groups. Meetings with LHA healthcare staff can reduce the perception of TB outbreak after intervention among both groups, also meetings with LHA are useful in clearly defining the situation that face-to-face meetings can play important role in effective communication. The results therefore indicate that the communication program was effective in improving TB knowledge at three time points, because the intervention was delivered by a TB expert, which add to its trustworthiness and provided pertinent messages to improve participants' knowledge (Gentili et al., 2020).While, the control group, mean score differences related to tuberculosis knowledge increased and decreased over three periods. This may be because the control group did not receive any intervention.

5.1.5 TB attitudes

The mean score differences on the TB stigma among experimental and control groups at baseline, 3-month intervention and 2-month follow-up after the communication program were significant. Therefore, these measures showed that a communication program can have positive results on improving participants' TB attitudes within the experimental group and between groups. Our findings were similar to the study reported by (Bisallah et al.,2018) and showed that health education intervention after 3, 6, and 9 months resulted in significant improvement in TB knowledge and TB attitudes within the intervention group compared to the control group. Similarly, the study conducted by (Van der Westhuizen et.al.,2015) which designed the intervention included six components of the model as well as self-efficacy theory were adapted, showed that the TB infection control was improved through TB knowledge and TB attitudes after the intervention. Another study conducted by (Ahmad et al.,2018) reported that the photovoice intervention after 2 and 4 months was improved in TB knowledge, TB attitudes, self-efficacy and successful treatment compared with the control group. Therefore, these measures showed that a communication program can have positive results on improving participants' TB attitudes within the experimental group and between groups. This may have been because the intervention was delivered by a TB expert, which add to its trustworthiness and provided pertinent messages to improve positive participants' attitudes. However, the control group did not change mean score differences over three time periods on the TB attitudes. This may have been because the control group did not receive the intervention.

5.1.6 Self- efficacy on TB stigma and discrimination

The self-efficacy on TB stigma and discrimination score from baseline, 3-month intervention and 2-month follow-up showed a significant difference between both groups. Our findings were similar to the study reported by (Ahmad et al.,2018) reported that the photovoice intervention after 2 and 4 months was improved in TB knowledge, TB attitudes, self-efficacy and successful treatment compared with the control group. Similarly, the study conducted by (Van der Westhuizen et.al.,2015) which designed the intervention included six components of the model as well as self-

efficacy theory were adapted, showed that the TB infection control was improved through TB knowledge and TB attitudes after the intervention. Another study led by (Umar et al., 2019) reported that self-efficacy mediated the effects of depression and stigma on ART adherence. Furthermore, it should be considered to design effective interventions to reduce the impact of depression and stigma on ART adherence as well as medication self-efficacy should be considered. Therefore, these measures showed that a communication program can have positive results on enhancing participants' self-efficacy to reduce TB stigma and discrimination within the experimental group and between groups. Hence, this result showed that self-efficacy on TB stigma and discrimination increased mean score differences over three time periods in the experimental. In contrast, the control group had increasing and decreasing mean score differences over three time periods on self-efficacy on TB stigma and discrimination. This may have been because the control group did not receive the intervention. In addition, the communication program should be adopted for the control group in the future is recommended.

In conclusion, these results indicated that the communication program based on self-efficacy and social support theories were effective in reducing TB stigma, and improving TB knowledge, TB attitudes, and self-efficacy on TB stigma and discrimination compared with the control group. During COVID-19 pandemic, the communication program was conducted by online training. The communication program could convince the participants to participate the entire activity for a 3-month study period. Moreover, we were surprised that the participants' attention was outstanding in each weekly activity.

Participants did not logout from online training prior to its end and also activated their camera during the entire intervention. They furthermore actively participated during the training by responding and providing their feedback verbally or by chat box. Hence, we believe that our intervention was successfully conducted during the COVID-19 pandemic, also thanks to the school principal's commitment and all participants' voluntary consent to play an active part in our study. In addition, each activity of the communication program was conducted by TB experts, which add to its trustworthiness and provided pertinent messages to endorse anti-TB stigma,

while improving participants' knowledge, attitudes, and self-efficacy on the TB disease.

5.2 Conclusion

The communication program based on the self-efficacy theory and social support showed that TB stigma can be effectively reduced while TB knowledge and attitudes as well as self-efficacy on TB stigma and discrimination were improved all three 3 time periods among high-school students can be increased. However, TB discrimination did not show a significant change within and between both groups.

5.3 Limitations

This study has several limitations. Firstly, it was possible that TB stigma and discrimination could be found more in other groups than among high-school students, such as TB patients, persons affected by TB and no treatment. Secondly, the study population could not be randomly selected, because the area and sample size were limited, narrowing at the same time the generalization of the study. Thirdly, this study was conducted by an online training due to COVID-19 restrictions. Therefore, the intervention may have been perceived as incomplete for participants with only access to social media. In addition, the same COVID-19 restrictions prevented us from monitoring the participants' feelings (emotions during the 5-month study period).

5.4 Recommendations

Our findings suggested that the participants who fully completed this intervention felt confident to convey anti-TB stigma message. They also felt self-assured in communicating what they learned in their immediate surroundings, were aware of social effects TB can exert in their community while they gained prevention behavior in regard to TB pulmonary infection. Furthermore, we therefore recommended that the communication program should be adopted in school program to make up for the TB knowledge, provide the positive TB attitudes, enhance self-efficacy on TB stigma and discrimination, and reduce TB stigma among adolescent students.

5.5 Further Study

5.5.1 Promoting the communication program on the reduction of TB stigma and discrimination in school areas and other institutions to get consolidated evidence.

5.5.2 A booster during 2 months for follow-up should be implemented using social media and online communication to support participants in maintaining their perceptions, beliefs, and positive attitudes to reduce TB stigma towards TB patients.

5.5.3 Testing the study onsite, because this study was conducted via online during COVID-19 pandemic and the intervention as well as the participants were limited.

5.5.4 Focusing on another study such as a randomized controlled trial or qualitative study for understanding the participants' feelings or experience of TB stigma and discrimination among high-school students.

5.5.5 Applying the communication program on the reduction of TB stigma and discrimination for increasing TB knowledge, TB attitudes, self-efficacy on TB stigma and discrimination, and reducing TB stigma through an online educational program in schools.

5.5.6 Integrating the activities in the communication program on the reduction of TB stigma and discrimination combine with health programs for providing TB knowledge, TB attitudes, self-efficacy on TB stigma and discrimination, and reducing TB stigma in other groups such as TB patients, persons affected by TB and no treatment.

Appendix A
The Questionnaires (English)

The questionnaire was prepared as part of data collection in the dissertation of the effectiveness of communication program on reduction of TB stigma and discrimination among high-school students in Bangkok. We kindly ask you to give your valuable time to answer this questionnaire. Every item is the most truthful. Your response will not have any effect on your life and well-being. The organizer takes this opportunity to thank you for your cooperation in answering the question sincerely. This questionnaire is divided into 6 parts as follows,

Part I: Socio-demographic characteristics factors (12 questions)

Part II: Knowledge of pulmonary (TB) tuberculosis disease (15 questions)

Part III: Attitude of pulmonary tuberculosis (TB) disease (11 questions)

Part IV: Self-efficacy on TB stigma and Discrimination (14 questions)

Part V: TB stigma (11 questions)

Part VI: TB discrimination (10 questions)

Part I: Socio-demographic characteristics factors (12 questions)

Instructions; Please fill in the answer that best describe the student's characteristics

1. Age……………………..years

2. Classes, ☐ 1) Grade 10   ☐ 2) Grade 11   ☐ 3) Grade 12

3. Residing with
   ☐ 1) Both parents
   ☐ 2) Single parents
   ☐ 3) Guardian
   ☐ 4) Living alone

4. Area of residence
   ☐ 1) Village
   ☐ 2) Slum area, (refer to overcrowding, unsanitary, lack of ventilation, sanitation facility and poor housing).
   ☐ 3) Commercial buildings

☐ 4) Others, specify…………………………………………………..

5. Type of accommodation

   ☐ 1) Monthly rental room (i.e. flats/apartment/condo)

   ☐ 2) Owner house

   ☐ 3) Relative's house

   ☐ 4) Others, specify……………………………………………………

6. Parents marital status

   ☐ 1) Married/co-habited

   ☐ 2) Divorced/separated

   ☐ 3) Widowed

7. Mother's educational status

   ☐ 1) Illiterate

   ☐ 2) Primary level

   ☐ 3) Secondary level

   ☐ 4) Diploma level

   ☐ 5) Bachelor degree

   ☐ 6) Master degree or higher

8. Father's educational status

   ☐ 1) Illiterate

   ☐ 2) Primary level

   ☐ 3) Secondary level

   ☐ 4) Diploma level

   ☐ 5) Bachelor degree

   ☐ 6) Master degree or higher

9. Family income per month

   ☐ 1) <15,000 bath

   ☐ 2) 15,000-45,000 bath

   ☐ 3) > 45,000 bath

10. Illness history

   ☐ 1) Pneumonia

   ☐ 2) Kidney disease (taking immunosuppressant medications)

   ☐ 3) Asthma

☐ 4) Others, specify…………………………………….

Part I-A: Information related with TB

11. Ever hear/learning of TB information

☐ 1) Yes

☐ 2) No

12. Source of TB information

☐ 1) Newspaper/journals

☐ 2) Teachers

☐ 3) TV

☐ 4) Radio

☐ 5) Social media (i.e. Facebook/Line/Internet/Instagram/Twitter)

☐ 6) Friends/Family

☐ 7) Healthcare staffs

☐ 8) Community Health Volunteers

☐ 9) Community leaders

☐ 10) Others, specify………………………………….

Part II: Knowledge of pulmonary (TB) tuberculosis disease (15 questions)

Instructions; Please put an ✓ under on a category of the knowledge of pulmonary (TB) tuberculosis disease that provides on the right on each item in this evaluation form.

No	Questionnaires	Answer	
		False	True
1.	The tuberculosis is caused by virus.		
2.	The suspicious symptoms of pulmonary tuberculosis are sneezing and runny nose.		
3.	TB patients can spread the disease to others by coughing and sneezing.		
4.	If a person is living with a TB patient in musty and non-ventilating area over 8 hrs, she/he is risk to be infected by tuberculosis.		
5.	All TB patients must be infected with HIV.		
6.	Anybody can get TB infection.		
7.	TB transmission is occurred by airborne		
8.	If TB patients take medication for more than 2 weeks, it will no longer spread.		
9.	TB patients started on drugs treatment at a certain period. If the sputum is detected and shows no TB, they can stop on drugs treatment by themselves.		
10	TB treatment duration is at least 6 months.		
11	TB prevention is respiratory and cough hygiene		
12	Wearing a face mask is the best way to prevent a spread of tuberculosis.		
13	The ultraviolet from sunlight cannot kill tuberculosis.		
14	Vaccine BCG can prevent TB infection		
15	TB prevention is achieved by exercising, taking enough rest and eating a variety of foods.		

Part III: Attitude of pulmonary tuberculosis (TB) disease (11 questions)

Instructions; Please put an ✓ under on a category of the attitude of pulmonary (TB) tuberculosis disease that provides on each item in this evaluation form.

No.	Questionnaires	Scales for measuring TB Attitude				
		Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
1	Tuberculosis is a disease that can cause a death.					
2	A status of tuberculosis can be shared.					
3	Tuberculosis is curable.					
4	Tuberculosis is a disease found in only the elderly and poverty people.					
5	Treatment of tuberculosis is free.					
6	Tuberculosis is a terrible disease because it is highly contagious.					
7	People who have TB are cursed.					
8	People who have TB are dirty and disgusting.					
9	Tuberculosis patients do not need treatment because they can recover by themselves.					
10	People with TB should be kept in a separate environment.					
11	TB infection must occur in slum areas more than other settings.					

Part IV: Self-efficacy on TB stigma and Discrimination (14 questions)

Instructions; Please put an ✓ under on a category of self-efficacy on TB stigma and discrimination that provides on each item in this evaluation form.

No.	Questionnaires	Scales for measuring on self-efficacy on TB stigma and Discrimination				
		Strongly confident	Very confident	Partially confident	Unsure	Unconfident
	In the past month, how confident have you been that you can:					
1	You can eat or drink with friends who have TB.					
2	You feel uncomfortable about being near those with TB patient.					
3	If some people have TB, you will behave the same behavior towards that person for the rest of their life.					
4	You can play with friend who is sick with TB.					
5	You will not keep their distance from people with TB.					
6	You can talk with TB patient.					
7	You don't feel afraid of those with TB.					
8	You don't try to touch others with TB.					
9	You prefer to have those with TB living in their school rather					

No.	Questionnaires	Scales for measuring on self-efficacy on TB stigma and Discrimination				
		Strongly confident	Very confident	Partially confident	Unsure	Unconfident
	than our school.					
10	You don't think that those with TB are disgusting.					
11	You don't want to be a friend with someone who has TB.					
12	You don't want to eat or drink with relatives who have TB.					
13	You cannot study with friend who have TB.					
14	You cannot live with TB patient.					

Part V: TB stigma (11 questions)

Instructions; Please put an ✓ under on a category of the TB stigma that provides on each item in this evaluation form.

No.	Questionnaires	Scales for measuring TB Stigma				
		Strongly agree	Agree	Don't know	Disagree	Strongly disagree
1	Some people may not want to eat or drink with friends who have TB.					
2	Some people feel uncomfortable about being near those with TB.					
3	If a person has TB, some school members will behave differently towards that person for the rest of					

No.	Questionnaires	Scales for measuring TB Stigma				
		Strongly agree	Agree	Don't know	Disagree	Strongly disagree
	their life.					
4	You don't want playing with friend who is sick with TB.					
5	Some people keep their distance from people with TB.					
6	Some people think that those with TB are disgusting.					
7	Some people do not want to talk to others with TB.					
8	Some people are afraid of those with TB.					
9	Some people try not to touch others with TB.					
10	Some people may not want to eat or drink with relatives who have TB.					
11	Some people prefer not to have those with TB living in their community.					

Part VI: TB Discrimination (10 questions)

Instructions; Please put an ✓ under on a category of the TB discrimination that provides on each item in this evaluation form.

No.	Questionnaires	Scales for measuring TB Discrimination				
		Strongly agree	Agree	Don't know	Disagree	Strongly disagree
1	People with TB must expect some restrictions on their freedom.					
2	A person with TB must have done					

No.	Questionnaires	Scales for measuring TB Discrimination				
		Strongly agree	Agree	Don't know	Disagree	Strongly disagree
	something wrong and deserves to be punished.					
3	People who have TB should be isolated.					
4	You don't want to be friends with someone who has TB.					
5	People have physically backed away from TB patients.					
6	Some people with TB should keep their distance away from others to prevent transmitting germs of the disease.					
7	Some people with TB should lose friendship when they share their illness.					
8	People who have TB should not be allowed to work or study.					
9	Most of people are uncomfortable about being near those with TB disease.					
10	We shouldn't play or do any activities together with TB patients.					

Appendix B
The Questionnaires (Thai)

แบบสอบถาม

วิจัยเรื่อง: ประสิทธิผลโปรแกรมการสื่อสารเพื่อการลดการตีตราและการเลือกปฏิบัติเกี่ยวกับวัณโรคในกลุ่มเด็กนักเรียนระดับมัธยมศึกษาตอนปลายในเขตพื้นที่กรุงเทพมหานคร: (การศึกษาแบบกึ่งทดลอง)

    แบบสอบถามนี้จัดทำขึ้นเพื่อเป็นส่วนหนึ่งของการรวบรวมข้อมูลในวิทยานิพนธ์เรื่อง ประสิทธิผลของโปรแกรมการสื่อสารเพื่อลดการตีตราและการเลือกปฏิบัติเกี่ยวกับวัณโรคในกลุ่มเด็กนักเรียนระดับมัธยมศึกษาตอนปลายในเขตพื้นที่กรุงเทพมหานคร ทางผู้วิจัยจึงขอความกรุณาท่านในการเสียสละเวลาอันมีค่าของท่านในการตอบแบบสอบถามฉบับนี้ตามเป็นจริงของท่าน ซึ่งการตอบแบบสอบถามฉบับนี้จะไม่มีผลใด ๆ ต่อชีวิตและความเป็นอยู่ของท่าน ทั้งนี้ทางผู้วิจัยขอขอบพระคุณสำหรับความร่วมมือในการตอบแบบสอบถามด้วยความจริงใจ แบบสอบถามนี้แบ่งออกเป็น 6 ส่วนดังนี้

    ส่วนที่ 1: ปัจจัยลักษณะทางสังคมและประชากร (12 ข้อ)

    ส่วนที่ 2: ความรู้เกี่ยวกับวัณโรคปอด (15 ข้อ)

    ส่วนที่ 3: ทัศนคติเกี่ยวกับวัณโรคปอด (11 ข้อ)

    ส่วนที่ 4: การรับรู้ความสามารถของตนเองต่อการตีตราและการเลือกปฏิบัติเกี่ยวกับวัณโรค (14 ข้อ)

    ส่วนที่ 5: การตีตราเกี่ยวกับวัณโรค (11 ข้อ)

    ส่วนที่ 6: การเลือกปฏิบัติเกี่ยวกับวัณโรค (10 ข้อ)

    ขอขอบพระคุณที่ท่านได้สละเวลาในการตอบแบบสอบถามครั้งนี้

เสาวลักษณ์ มูลสาร

นักศึกษาระดับปริญญาเอก วิทยาลัยวิทยาศาสตร์สาธารณสุข

จุฬาลงกรณ์มหาวิทยาลัย

ส่วนที่ 1: ปัจจัยลักษณะทางสังคมและประชากร (12 ข้อ)

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ใน ☐ ข้อความตามลักษณะความเป็นจริงของตัวท่าน ในกล่องข้อความที่กำหนด

1. อายุ........................ปี

2. ชั้นเรียน

   ☐ 1) ระดับมัธยมศึกษาชั้นปีที่ 4

   ☐ 2) ระดับมัธยมศึกษาชั้นปีที่ 5

   ☐ 3) ระดับมัธยมศึกษาชั้นปีที่ 6

3. พักอาศัยอยู่กับ

   ☐1) พ่อและแม่

   ☐2) พ่อหรือแม่ เลี้ยงเดี่ยว

   ☐3) ผู้ปกครอง

   ☐4) อยู่คนเดียว

4. บริเวณรอบๆที่พักอาศัย

   ☐1) หมู่บ้าน

   ☐2) สลัม

   ☐3) ตึกแถว

   ☐4) อื่นๆ โปรดระบุ...

5. ประเภทของที่พักอาศัย

   ☐1) บ้านเดี่ยว

   ☐2) แฟลต/อพาร์ทเม้น/คอนโดมิเนียม

☐3) ตึกแถว

☐4) อื่นๆ โปรดระบุ………………………………………………………………….

6. สถานภาพการสมรสของผู้ปกครอง

☐ 1) แต่งงาน / อยู่ร่วมกัน

☐ 2) หย่าร้าง/แยกกันอยู่

☐ 3) หม้าย

7. การศึกษาของมารดา

☐1) ไม่รู้หนังสือ

☐2) ระดับประถมศึกษา

☐3) ระดับมัธยมศึกษา

☐4) ระดับอนุปริญญา

☐5) ระดับปริญญาตรี

☐6) ระดับปริญญาโท หรือสูงกว่า

8. การศึกษาของบิดา

☐1) ไม่รู้หนังสือ

☐2) ระดับประถมศึกษา

☐3) ระดับมัธยมศึกษา

☐4) ระดับอนุปริญญา

☐5) ระดับปริญญาตรี

☐6) ระดับปริญญาโท หรือสูงกว่า

9. รายได้ของครอบครัวต่อเดือน

☐1) น้อยกว่า 15,000 บาทต่อเดือน

☐2) 15,000- 45,000 บาทต่อเดือน

☐3) มากกว่า 45,000 บาทต่อเดือน

10. ประวัติการเจ็บป่วย

☐1) โรคปอดบวม

☐2) โรคไต(กำลังกินยากดภูมิคุ้มกัน)

☐3) โรคหอบหืด

☐4) อื่นๆ โปรดระบุ ……………………………………………………….

☐5) ไม่เคยมีประวัติการเจ็บป่วยด้วยโรคที่ต้องเข้ารับการรักษาที่โรงพยาบาลหรือ

สถานพยาบาล

ส่วนที่ 1-A: ข้อมูลข่าวสารที่เกี่ยวข้องกับวัณโรค

11. เคยได้ยิน/ เรียนรู้ข้อมูลเกี่ยวกับวัณโรค

☐1) เคยได้ยิน

☐2) ไม่เคยได้ยิน

12. แหล่งข้อมูลข่าวสารวัณโรค

☐1) หนังสือพิมพ์/ บทความวิชาการ

☐2) ครู

☐3) โทรทัศน์

☐4) วิทยุ

☐5) สื่อสังคมออนไลน์ เช่น เฟสบุ๊ค/ไลน์/อินเตอร์เน็ต/อินสตาแกรม/ทวิตเตอร์

☐6) เพื่อน/ครอบครัว

☐7) บุคลากรทางด้านสุขภาพ

☐8) อาสาสมัครสาธารณสุข

☐9) ผู้นำชุมชน

☐10) อื่นๆ โปรดระบุ …………………………………………………………..

ส่วนที่ 2: แบบสอบถามเกี่ยวกับความรู้วัณโรคปอด (15 ข้อ)

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ในช่องตอบคำถามที่เกี่ยวข้องกับความรู้วัณโรคปอดที่ให้ไว้ทาง
ด้านขวาในแบบสอบถาม

ข้อที่	ข้อคำถาม	คำตอบ	
		ผิด	ถูก
1	วัณโรคเกิดจากเชื้อไวรัส	✘	
2	อาการน่าสงสัยว่าเป็นวัณโรคปอด คือ อาการจาม น้ำมูกไหล	✘	
3	ผู้ป่วยวัณโรคแพร่เชื้อให้ผู้อื่นได้โดย การไอ และจาม		✘
4	หากเราอยู่ร่วมกับผู้ป่วยวัณโรคในที่อับ ไม่มีการระบายอากาศ เป็นเวลานาน จะเสี่ยงต่อการติดเชื้อวัณโรค		✘
5	ผู้ป่วยวัณโรคทุกรายต้องติดเชื้อเอชไอวี	✘	
6	ใครๆก็สามารถติดเชื้อวัณโรคได้		✘
7	วัณโรคแพร่กระจายเชื้อได้โดยผ่านทางเดินหายใจ		✘
8	หากผู้ป่วยวัณโรครับประทานยามากกว่า 2 สัปดาห์ โอกาสการแพร่กระจาย เชื้อจะลดลงมาก		✘
9	ผู้ป่วยวัณโรคที่เริ่มการรักษาไประยะหนึ่งแล้ว หากผลตรวจเสมหะ ไม่พบเชื้อ สามารถหยุดการรักษาได้เอง	✘	
10	ในปัจจุบันการรักษาวัณโรคต้องใช้เวลาอย่างน้อย 6 เดือน		✘
11	การป้องกันวัณโรค คือการดูแลสุขอนามัยของทางเดินหายใจ	✘	

ข้อที่	ข้อคำถาม	คำตอบ	
		ผิด	ถูก
12	การสวมหน้ากากอนามัยเป็นวิธีการป้องกันการแพร่กระจายเชื้อวัณโรคที่ดีที่สุด	✘	
13	แสงอุลตร้าไวโอเลตในแสงแดด ไม่สามารถฆ่าเชื้อวัณโรคได้	✘	
14	วัคซีน BCG สามารถป้องกันการติดเชื้อวัณโรคปอดได้ *(วัคซีนบีซีจีเป็นวัคซีนป้องกันเชื้อแบคทีเรียที่เป็นสาเหตุของวัณโรค โดยวัคซีนบีซีจีจะทำหน้าที่สร้างภูมิคุ้มกันต่อการเจริญเติบโตของเชื้อวัณโรคในร่างกายของมนุษย์)*	✘	
15	การป้องกันวัณโรคสามารถทำได้ โดยการออกกำลังกาย พักผ่อนให้พอ กินอาหารให้หลากหลาย		✘

ส่วนที่ 3: แบบสอบถามทัศนคติเกี่ยวกับวัณโรคปอด (11 ข้อ)

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ในช่องตอบคำถามของทัศนคติเกี่ยวกับวัณโรคปอดที่ให้ไว้ทางด้านขวาในแบบสอบถาม

ข้อที่	คำถาม	ระดับการวัด				
		เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1	วัณโรคเป็นโรคที่เป็นสาเหตุของการเสียชีวิตได้					
2	สถานะการป่วยเป็นวัณโรคสามารถบอกต่อคนอื่นได้					
3	วัณโรคสามารถรักษาให้หายขาดได้					
4	วัณโรคเป็นโรคที่มักเกิดกับผู้สูงอายุและคนยากจนเท่านั้น					
5	วัณโรคเป็นโรคที่รักษาฟรี					

ข้อที่	คำถาม	ระดับการวัด				
		เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
6	วัณโรคเป็นโรคที่น่ากลัวเพราะติดต่อกันได้ง่าย					
7	ผู้ป่วยวัณโรคสมควรได้รับการประณามว่าไม่ดูแลตนเอง					
8	ผู้ป่วยวัณโรคเป็นบุคคลที่สกปรก และน่าขยะแขยง					
9	วัณโรคส่วนใหญ่สามารถป่วยได้เองและหายเองได้					
10	ผู้ป่วยวัณโรคควรจะอยู่ในสภาพแวดล้อมที่แยกจากผู้อื่น					
11	การติดเชื้อวัณโรคมักเกิดขึ้นในชุมชนแออัดมากกว่าพื้นที่อื่น ๆ					

ส่วนที่ 4: แบบสอบถามการรับรู้ความสามารถของตนเองต่อการตีตราและการเลือกปฏิบัติเกี่ยวกับวัณโรค (14 ข้อ)

คำชี้แจง:โปรดทำเครื่องหมาย ✓ ในช่องตอบคำถามการรับรู้ความสามารถของตนเองต่อการตีตราและการเลือกปฏิบัติเกี่ยวกับวัณโรค ที่ให้ไว้ทางด้านขวาในแบบสอบถาม

ข้อที่	คำถาม	ระดับการวัด				
		มั่นใจมากที่สุด	มั่นใจมาก	มั่นใจบ้าง	ไม่แน่ใจ	ไม่มั่นใจเลย
ท่านมั่นใจเพียงใดว่าท่านสามารถทำดังข้อต่อไปนี้ได้ (ระยะเวลาในเดือนที่ผ่านมา-ปัจจุบัน)						
1	คุณสามารถรับประทานอาหารร่วมกับเพื่อนที่ป่วยเป็นวัณโรค					
2	คุณรู้สึกไม่สบายใจหากต้องอยู่ใกล้ผู้ป่วยวัณโรค					
3	หากเพื่อนหรือคนรู้จักของคุณป่วยเป็นวัณโรค คุณจะมีพฤติกรรม หรือการปฏิบัติตนแบบเดียวกันกับบุคคลนั้นไปตลอดชีวิต					
4	คุณสามารถเล่น หรือทำกิจกรรมใดๆ ร่วมกับเพื่อนที่ป่วยวัณโรค					
5	คุณไม่จำเป็นต้องเว้นระยะห่างจากผู้ป่วยวัณโรค					
6	คุณสามารถพูดคุยกับผู้ป่วยวัณโรคได้					
7	คุณไม่รู้สึกกลัวผู้ป่วยวัณโรค					
8	คุณไม่ควรแตะ หรือสัมผัสผู้ป่วยวัณโรค					

ข้อที่	คำถาม	ระดับการวัด				
		มั่นใจมากที่สุด	มั่นใจมาก	มั่นใจบ้าง	ไม่แน่ใจ	ไม่มั่นใจเลย
9	คุณต้องการให้ผู้ป่วยวัณโรคอาศัยอยู่แต่ในโรงเรียนของพวกเขามากกว่าที่จะอาศัยอยู่โรงเรียนเดียวกับคุณ					
10	คุณไม่คิดว่าผู้ป่วยวัณโรคเป็นบุคลที่น่ารังเกียจ					
11	คุณไม่ต้องการเป็นเพื่อนกับคนที่ป่วยเป็นวัณโรค					
12	คุณไม่ต้องการเป็นกินหรือดื่มกับคนที่ป่วยเป็นวัณโรค					
13	คุณไม่สามารถเรียนร่วมชั้นเรียนกับเพื่อนที่ป่วยเป็นวัณโรค					
14	คุณไม่สามารถอาศัยอยู่กับผู้ป่วยวัณโรค					

ส่วนที่ 5: แบบสอบถามการตีตราเกี่ยวกับวัณโรค (11 ข้อ)

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ในช่องตอบคำถามของการตีตราเกี่ยวกับวัณโรคที่ให้ไว้ทาง
ด้านขวาในแบบสอบถาม

ข้อที่	คำถาม	ระดับการวัด				
		เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่ทราบ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1	บางคนอาจไม่อยากดื่มหรือกินอาหารร่วมกับเพื่อนที่เป็นวัณโรค					
2	บางคนรู้สึกไม่สบายใจที่จะต้องอยู่ใกล้ผู้ป่วยวัณโรค					
3	หากมีผู้ป่วยวัณโรคในโรงเรียนของคุณ คุณคิดว่าเพื่อนในโรงเรียนของคุณบางคนจะต้องมีพฤติกรรมหรือการปฏิบัติตนที่แตกต่างกับบุคคลนั้นไปตลอดชีวิต					
4	คุณไม่อยากเล่น หรือทำกิจกรรมใดๆ ร่วมกับเพื่อนที่ป่วยเป็นวัณโรค					
5	บางคนต้องรักษาระยะห่างให้ไกลจากผู้ป่วยวัณโรค					
6	บางคนคิดว่าผู้ป่วยวัณโรคน่ารังเกียจและขยะแขยง					
7	บางคนไม่ต้องการพูดคุยกับผู้ป่วยวัณโรค					
8	บางคนกลัวผู้ป่วยวัณโรค					
9	บางคนพยายามที่จะไม่สัมผัสหรือแตะต้องผู้ที่เป็นวัณโรค					
10	บางคนอาจไม่อยากดื่มหรือรับประทานอาหารร่วมกับญาติวของผู้ป่วยวัณโรค					
11	บางคนไม่ต้องการให้ผู้ป่วยวัณโรคอาศัยอยู่ในชุมชนของตน					

ส่วนที่ 6: แบบสอบถามการเลือกปฏิบัติเกี่ยวกับวัณโรค (10 ข้อ)

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ในช่องตอบคำถามของการตีตราเกี่ยวกับวัณโรคที่ให้ไว้ทาง
ด้านขวาในแบบสอบถาม

ข้อที่	คำถาม	ระดับการวัด				
		เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่ทราบ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1	ผู้ป่วยวัณโรคจะต้องได้รับการกำจัดสิทธิและเสรีภาพ เช่น การเดินทาง การเข้าบริการทางด้านต่างๆที่รัฐหรือเอกชนจัดให้ การทำงาน หรือ การเรียน เป็นต้น					
2	ผู้ป่วยวัณโรคคือบุคคลที่กระทำผิด และจะต้องได้รับการลงโทษ					
3	ผู้ป่วยวัณโรคจะต้องแยกตัวออกจากบุคคลอื่น					
4	คุณไม่ต้องการเป็นเพื่อนกับคนที่ป่วยเป็นวัณโรค					
5	โดยทั่วไปผู้คนมักจะหลบหลีก หรือ ถอยห่างจากผู้ป่วยวัณโรค					
6	ผู้ป่วยวัณโรคที่อยู่ในระยะแพร่เชื้อควรจะอยู่ห่างจากผู้อื่น เพื่อป้องกันการแพร่กระจายเชื้อวัณโรค					
7	ผู้ป่วยวัณโรคต้องสูญเสียมิตรภาพระหว่างเพื่อนเมื่อพวกเขาบอกสถานะการเจ็บป่วยให้ทราบ					
8	ผู้ป่วยวัณโรคไม่ควรได้รับอนุญาตให้เรียนหรือทำงาน					
9	คนส่วนใหญ่มักไม่สบายใจที่จะต้องอยู่ใกล้ชิดผู้ป่วยวัณโรค					
10	พวกเราไม่ควรเล่น หรือมีกิจกรรมใดๆร่วมกับผู้ป่วยวัณโรค					

Appendix C

The instrument evaluation

The Kuder-Richardson 20 (KR-20) was 0.876 for knowledge of pulmonary (TB) tuberculosis disease.

Cronbach's alpha coefficient was 0.875 for the attitude of pulmonary tuberculosis (TB) disease, 0.744 for Self-efficacy on TB stigma and discrimination, 0.907 for TB stigma and 0.825 for TB discrimination

Part II: Knowledge of pulmonary (TB) tuberculosis disease (15 questions)

ข้อที่	ข้อคำถาม	Cronbach's alpha coefficient
1.	วัณโรคเกิดจากเชื้อไวรัส	0.876
2.	อาการน่าสงสัยว่าเป็นวัณโรคปอด คือ อาการจาม น้ำมูกไหล	0.876
3.	ผู้ป่วยวัณโรคแพร่เชื้อให้ผู้อื่นได้โดย การไอ และจาม	0.876
4.	หากเราอยู่ร่วมกับผู้ป่วยวัณโรคในที่อับ ไม่มีการระบายอากาศ เป็นเวลานานจะเสี่ยงต่อการติดเชื้อวัณโรค	0.876
5.	ผู้ป่วยวัณโรคทุกรายต้องติดเชื้อเอชไอวี	0.876
6.	ใครๆก็สามารถติดเชื้อวัณโรคได้	0.876
7.	วัณโรคแพร่กระจายเชื้อได้โดยผ่านทางเดินหายใจ	0.877
8.	หากผู้ป่วยวัณโรครับประทานยามากกว่า 2 สัปดาห์ โอกาสการแพร่กระจายเชื้อจะลดลงมาก	0.876
9.	ผู้ป่วยวัณโรคที่เริ่มการรักษาไปประยะหนึ่งแล้ว หากผลตรวจเสมหะ ไม่พบเชื้อ สามารถหยุดการรักษาได้เอง	0.876
10.	ในปัจจุบันการรักษาวัณโรคต้องใช้เวลาอย่างน้อย 6 เดือน	0.877
11.	การป้องกันวัณโรค คือการดูแลสุขอนามัยของทางเดินหายใจ	0.876
12.	การสวมหน้ากากอนามัยเป็นวิธีการป้องกันการแพร่กระจายเชื้อวัณโรคที่ดีที่สุด	0.876
13.	แสงอุลตร้าไวโอเลตในแสงแดด ไม่สามารถฆ่าเชื้อวัณโรคได้	0.877
14.	วัคซีน BCG สามารถป้องกันการติดเชื้อวัณโรคปอดได้ *(วัคซีนบีซีจี*	0.876

ข้อที่	ข้อคำถาม	Cronbach's alpha coefficient
	เป็นวัคซีนป้องกันเชื้อแบคทีเรียที่เป็นสาเหตุของวัณโรค โดยวัคซีนบี ซีจีจะทำหน้าที่สร้างภูมิคุ้มกันต่อการเจริญเติบโตของเชื้อวัณโรคใน ร่างกายของมนุษย์)	
15.	การป้องกันวัณโรคสามารถทำได้ โดยการออกกำลังกาย พักผ่อนให้ พอ กินอาหารให้หลากหลาย	0.877

Part III: Attitude of pulmonary tuberculosis (TB) disease (11 questions)

ข้อที่	ข้อคำถาม	Cronbach's alpha coefficient
1.	วัณโรคเป็นโรคที่เป็นสาเหตุของการเสียชีวิตได้	0.873
2.	สถานะการป่วยเป็นวัณโรคสามารถบอกต่อคนอื่นได้	0.875
3.	วัณโรคสามารถรักษาให้หายขาดได้	0.876
4.	วัณโรคเป็นโรคที่มักเกิดกับผู้สูงอายุ และคนยากจนเท่านั้น	0.876
5.	วัณโรคเป็นโรคที่รักษาฟรี	0.878
6.	วัณโรคเป็นโรคที่น่ากลัวเพราะติดต่อกันได้ง่าย	0.873
7.	ผู้ป่วยวัณโรคสมควรได้รับการประนามว่าไม่ดูแลตนเอง	0.878
8.	ผู้ป่วยวัณโรคเป็นบุคคลที่สกปรก และน่าขยะแขยง	0.876
9.	วัณโรคส่วนใหญ่สามารถป่วยได้เองและหายเองได้	0.878
10.	ผู้ป่วยวัณโรคควรจะอยู่ในสภาพแวดล้อมที่แยกจากผู้อื่น	0.873
11.	การติดเชื้อวัณโรคมักเกิดขึ้นในชุมชนแออัดมากกว่าพื้นที่ อื่น ๆ	0.873

Part IV: Self-efficacy on TB stigma and Discrimination (14 questions)

ข้อที่	ข้อคำถาม	Cronbach's alpha coefficient
1.	คุณสามารถรับประทานอาหารร่วมกับเพื่อนที่ป่วยเป็นวัณโรค	.733
2.	คุณรู้สึกไม่สบายใจหากต้องอยู่ใกล้ผู้ป่วยวัณโรค	.724
3.	หากเพื่อนหรือคนรู้จักของคุณป่วยเป็นวัณโรค คุณจะมีพฤติกรรม หรือการปฏิบัติตนแบบเดียวกันกับบุคคลนั้นไปตลอดชีวิต	.721
4.	คุณสามารถเล่น หรือทำกิจกรรมใดๆร่วมกับเพื่อนที่ป่วยวัณโรค	.725
5.	คุณไม่จำเป็นต้องเว้นระยะห่างจากผู้ป่วยวัณโรค	.744
6.	คุณสามารถพูดคุยกับผู้ป่วยวัณโรคได้	.727
7.	คุณไม่รู้สึกกลัวผู้ป่วยวัณโรค	.730
8.	คุณไม่ควรแตะ หรือสัมผัสผู้ป่วยวัณโรค	.721
9.	คุณต้องการให้ผู้ป่วยวัณโรคอาศัยอยู่แต่ในโรงเรียนของพวกเขามากกว่าที่จะอาศัยอยู่โรงเรียนเดียวกับคุณ	.716
10.	คุณไม่คิดว่าผู้ป่วยวัณโรคเป็นบุคคลที่น่ารังเกียจ	.729
11.	คุณไม่ต้องการเป็นเพื่อนกับคนที่ป่วยเป็นวัณโรค	.738
12.	คุณไม่ต้องการเป็นกินหรือดื่มกับคนที่ป่วยเป็นวัณโรค	.731
13.	คุณไม่สามารถเรียนร่วมชั้นเรียนกับเพื่อนที่ป่วยเป็นวัณโรค	.733
14.	คุณไม่สามารถอาศัยอยู่กับผู้ป่วยวัณโรค	.733

Part V: TB stigma (11 questions)

ข้อที่	ข้อคำถาม	Cronbach's alpha coefficient
1.	บางคนอาจไม่อยากดื่มหรือกินอาหารร่วมกับเพื่อนที่เป็นวัณโรค	.898
2.	บางคนรู้สึกไม่สบายใจที่จะต้องอยู่ใกล้ผู้ป่วยวัณโรค	.897
3.	หากมีผู้ป่วยวัณโรคในโรงเรียนของคุณ คุณคิดว่าเพื่อนในโรงเรียนของคุณบางคนจะต้องมีพฤติกรรม หรือการปฏิบัติตนที่แตกต่างกับบุคคลนั้นไปตลอดชีวิต	.897
4.	คุณไม่อยากเล่น หรือทำกิจกรรมใดๆ ร่วมกับเพื่อนที่ป่วยเป็นวัณโรค	.909
5.	บางคนต้องรักษาระยะห่างให้ไกลจากผู้ป่วยวัณโรค	.905
6.	บางคนคิดว่าผู้ป่วยวัณโรคน่ารังเกียจและขยะแขยง	.904
7.	บางคนไม่ต้องการพูดคุยกับผู้ป่วยวัณโรค	.894
8.	บางคนกลัวผู้ป่วยวัณโรค	.893
9.	บางคนพยายามที่จะไม่สัมผัสหรือแตะต้องผู้ที่เป็นวัณโรค	.897
10.	บางคนอาจไม่อยากดื่มหรือรับประทานอาหารร่วมกับญาติวของผู้ป่วยวัณโรค	.897
11.	บางคนไม่ต้องการให้ผู้ป่วยวัณโรคอาศัยอยู่ในชุมชนของตน	.893

Part VI: TB discrimination (10 questions)

ข้อที่	ข้อคำถาม	Cronbach's alpha coefficient
1.	ผู้ป่วยวัณโรคจะต้องได้รับการกำจัดสิทธิและเสรีภาพ เช่น การเดินทาง การเข้าบริการทางด้านต่างๆที่รัฐหรือเอกชนจัดให้ การทำงาน หรือ การเรียน เป็นต้น	.832
2.	ผู้ป่วยวัณโรคคือบุคคลที่กระทำผิด และจะต้องได้รับการลงโทษ	.822
3.	ผู้ป่วยวัณโรคจะต้องแยกตัวออกจากบุคคลอื่น	.793
4.	คุณไม่ต้องการเป็นเพื่อนกับคนที่ป่วยเป็นวัณโรค	.805
5.	โดยทั่วไปผู้คนมักจะหลบหลีก หรือ ถอยห่างจากผู้ป่วยวัณโรค	.799
6.	ผู้ป่วยวัณโรคที่อยู่ในระยะแพร่เชื้อควรจะอยู่ห่างจากผู้อื่น เพื่อป้องกันการแพร่กระจายเชื้อวัณโรค	.828
7.	ผู้ป่วยวัณโรคต้องสูญเสียมิตรภาพระหว่างเพื่อนเมื่อพวกเขาบอกสถานะการเจ็บป่วยให้ทราบ	.801
8.	ผู้ป่วยวัณโรคไม่ควรได้รับอนุญาตให้เรียนหรือทำงาน	.805
9.	คนส่วนใหญ่มักไม่สบายใจที่จะต้องอยู่ใกล้ชิดผู้ป่วยวัณโรค	.815
10.	พวกเราไม่ควรเล่น หรือมีกิจกรรมใดๆร่วมกับผู้ป่วยวัณโรค	.786

Appendix E
List of Abbreviations

AFB	Acid- fast bacilli
AIDS	Acquired Immunodeficiency Syndrome
ANOVA	A statistical analysis (Analysis of Variance)
BCG	Bacille Calmette-Guerin
CBR	Community-Based Rehabilitation
COVID-19	Coronavirus disease starting in 2019
CXR	Chest X-ray
E, EMB	Ethambutol
H, INH	Isoniazid
HIV	Human Immunodeficiency Virus
IGRA	Interferon-gamma release assay
IPT	Isoniazid Preventive Therapy
IOC	Item Objective Congruence Index
MDR-TB	Multiple Drug-Resistant Tuberculosis
MTB	*Mycobacterium Tuberculosis*
P, PZA	Pyrazinamide
PPE	Personal Protective Equipment
PWTB	Person with Tuberculosis
R, RIF	Rifampicin
School A	The experimental group
School B	The control group
SD	Standard Deviation
SPSS	A tool/program for analysing statistics
TB/HIV	HIV-infected TB
TB	Tuberculosis
TST	Tuberculin Skin Test
UNOPS	The United Nations Office for Project Services

WHO	World Health Organization
n	Sample size estimation
$\mu 1$	Mean of standard TB stigma score in the intervention group
$\mu 2$	Mean of standard TB stigma score in the control group
$\bar{x}$	Mean
$Z\alpha$	Standard scores for Type I error
$Z\beta$	Standard scores for Type II error
σ	Coefficient of variation the difference between the experimental and comparison groups after the intervention

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among Pre-hypertensive Patients
2. An exploration of Knowledge, Attitude, and TB stigma
among high-school students in Bangkok, Thailand
3. TB prevention and care guidelines among Migrants

AWARD RECEIVED   Certificate of Achievement for Outstanding Award 1
Poster Presentation Entitled "Exploring and Reducing
Tuberculosis Stigmatisation and Discrimination in Thai
High-Schools" on The 13th International Graduate
Students Conference on Population and Public Health
Sciences (IGSCPP) on July 8, 2022.

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