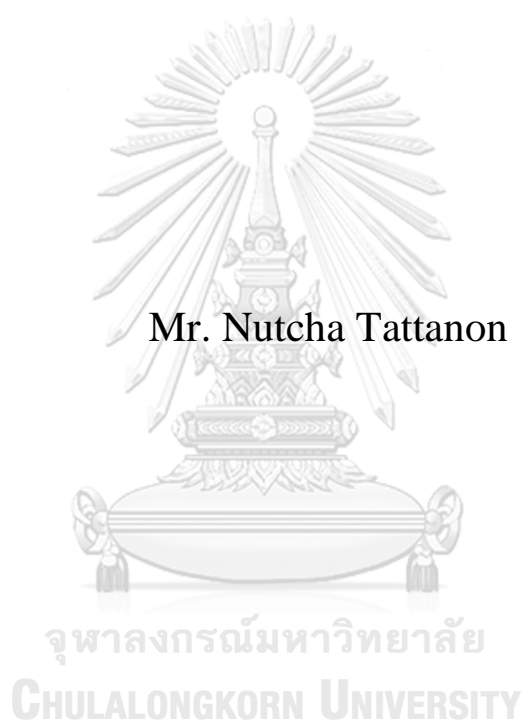


Factors associated with knowledge and awareness of syphilis  
among the youths visiting Family planning clinics, Bangkok,  
Thailand



A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Public Health in Public Health  
Common Course  
COLLEGE OF PUBLIC HEALTH SCIENCES  
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ปัจจัยที่มีความสัมพันธ์ต่อความรู้และความตระหนักต่อโรคซิฟิลิสในกลุ่มเยาวชนที่มารับบริการใน  
คลินิกวางแผนครอบครัว กรุงเทพมหานคร ประเทศไทย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต  
สาขาวิชาสาธารณสุขศาสตร์ ไม่สังกัดภาควิชา/เทียบเท่า  
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ปีการศึกษา 2563  
ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย



นัชชา ทัดตานนท์ : ปัจจัยที่มีความสัมพันธ์ต่อความรู้และความตระหนักต่อโรคซิฟิลิสในกลุ่มเยาวชนที่มาใช้บริการในคลินิกวางแผนครอบครัว กรุงเทพมหานคร ประเทศไทย. ( Factors associated with knowledge and awareness of syphilis among the youths visiting Family planning clinics, Bangkok, Thailand) อ.ที่ปรึกษาหลัก : อ. ดร.นุชนาฎ หวนนากลาง

การระบาดของโรคซิฟิลิสควบคุมได้ตั้งแต่ปี พ.ศ. 2503 อย่างไรก็ตามโรคซิฟิลิสได้กลับมาระบาดอีกครั้งในบางพื้นที่ของทวีปเอเชียตะวันออกเฉียงใต้ ในประเทศไทยนั้นอุบัติการณ์ของโรคซิฟิลิสเพิ่มขึ้นในทุกภูมิภาค จากข้อมูลของกรมควบคุมโรคพบว่าประชากรที่มีเสี่ยงสูงคือกลุ่มเยาวชนอายุ 15-24 ปี วัตถุประสงค์ของการวิจัยเพื่อศึกษาปัจจัยที่มีความสัมพันธ์กับความรู้และความตระหนักในการป้องกันโรคซิฟิลิสในกลุ่มเยาวชนที่มาใช้บริการที่คลินิกวางแผนครอบครัว กรุงเทพมหานคร ประเทศไทย วิธีการศึกษาเป็นการศึกษาแบบภาคตัดขวางโดยใช้แบบสอบถาม เลือกกลุ่มตัวอย่างแบบเจาะจงในเยาวชนอายุ 15-24 ปีที่มาใช้บริการที่คลินิกวางแผนครอบครัว กรุงเทพมหานคร ประเทศไทย ในช่วงเดือนเมษายน-มิถุนายน พ.ศ.2564 วิเคราะห์ข้อมูลโดยใช้สถิติการถดถอยโลจิสติกเพื่อศึกษาปัจจัยที่มีความสัมพันธ์กับระดับความรู้และความตระหนักในการป้องกันโรคซิฟิลิสของเยาวชน ผลการศึกษาเป็นดังนี้ ผู้เข้าร่วมวิจัยรวมทั้งสิ้น 207 คน ผลการวิเคราะห์การถดถอยโลจิสติกเพื่อหาความสัมพันธ์ระหว่างปัจจัยต่างๆ แสดงให้เห็นว่าผู้ที่มีสถานะว่างงานมีระดับความรู้ในการป้องกันซิฟิลิสน้อยกว่าผู้ที่มีงานประจำ [OR 0.29, 95% CI (0.11-0.75)], ผู้ที่อาศัยร่วมกับครอบครัวหรือญาติมีระดับความรู้ในการป้องกันซิฟิลิสน้อยกว่าผู้ที่พักอาศัยคนเดียว [OR 0.187, 95% CI (0.07-0.51)], ผู้ที่ใช้ถุงยางอนามัยเป็นประจำเมื่อมีเพศสัมพันธ์มีระดับความรู้ในการป้องกันซิฟิลิสมากกว่าผู้ที่ไม่เคยใช้ถุงยางอนามัย [OR 7.95, 95% CI (1.64-38.61)], ผู้ที่ไม่เคยได้รับการศึกษานามัยการเจริญพันธุ์มีระดับความรู้ในการป้องกันซิฟิลิสน้อยกว่าผู้ที่เคยได้รับการศึกษา [OR 0.29, 95% CI (0.11-0.77)], ผู้ที่เคยมีประวัติมารับบริการอนามัยการเจริญพันธุ์ที่คลินิกหรือโรงพยาบาลเอกชนมีระดับความรู้ในการป้องกันซิฟิลิสน้อยกว่าผู้ที่มาใช้บริการเป็นครั้งแรก [OR 0.27, 95% CI (0.07-0.99)] สำหรับการวิเคราะห์ระดับความตระหนักในการป้องกันซิฟิลิสพบว่าผู้ที่มีระดับความรู้ในการป้องกันซิฟิลิสอยู่ในเกณฑ์ดีมีระดับความตระหนักมากกว่าผู้ที่มีระดับความรู้ปานกลางหรือต่ำ [OR 1.19, 95% CI (1.06-1.33)]



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ปีการศึกษา        2563

ลายมือชื่อนิสิต .....  
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# # 6374016253 : MAJOR PUBLIC HEALTH

KEYWORD Syphilis, syphilis prevention, youth, knowledge, awareness, sexually transmitted infection

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Nutchra Tattanon : Factors associated with knowledge and awareness of syphilis among the youths visiting Family planning clinics, Bangkok, Thailand. Advisor: Nuchanad Hounnaklang, Ph.D.

Syphilis has been controlled since 1960. However, syphilis is now reappearing in some areas in Africa and South-east Asia including Thailand. In Thailand, syphilis is reappearing in all regions. The most high-risk population is the youth aged 15-24 year. Objective of this study aimed to determine factors associated with knowledge and awareness of syphilis prevention among youths visiting at family planning clinic, Bangkok, Thailand. Method of this study was a cross-sectional study conducted by purposive sampling among the youth aged 15-24 years old who visit at PPAT family planning clinic, Bangkok, Thailand during April-June 2021. Multivariable logistic regression analysis was used to determine the association between factors and the knowledge/awareness level of syphilis prevention. Total 207 participants were recruited in this study. The result from multivariable logistic regression analysis showed that unemployment associated with lower knowledge level compared with fulltime job [OR 0.29, 95% CI (0.11-0.75)], living with family or relative associated with lower knowledge level compared with living alone [OR 0.187, 95% CI (0.07—0.51)], always use of condom associate with higher knowledge level compared with never use condom [OR 7.95, 95% CI (1.64-38.61)], participant who never had a reproductive health education associated with lower knowledge level compared with participant who had a reproductive health education [OR 0.29, 95% CI (0.11-0.77)], and participant who had ever used a reproductive health service at private clinic/hospital associated with lower knowledge level compared with who use this service for the first time [OR 0.27, 95% CI (0.07-0.99)]. According to the awareness, participant who had a good knowledge level associated with higher awareness level of syphilis prevention compared with those who had fair or poor knowledge level [OR 1.19, 95% CI (1.06-1.33)]. We concluded that the youths were recognized as vulnerable group for syphilis. To prevent them, it was important for public health to emphasize on knowledge and awareness regarding syphilis prevention among the youths. Additionally, novel strategy to increased knowledge and awareness level of syphilis prevention need to be considered.

Field of Study: Public Health

Student's Signature

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Academic Year: 2020

Advisor's Signature

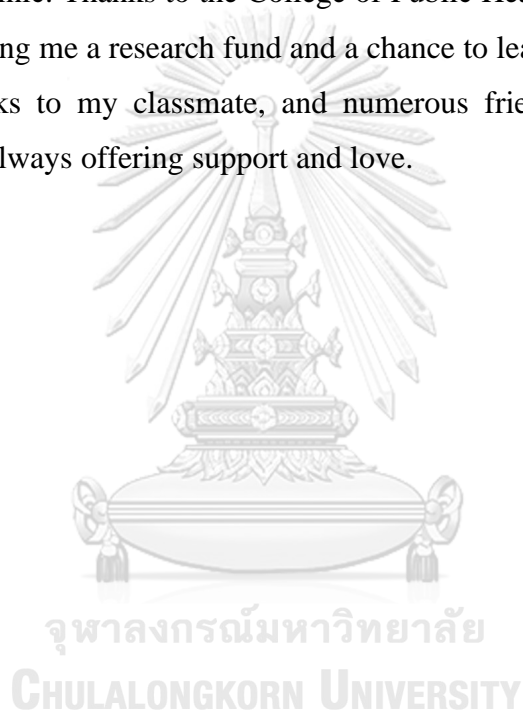
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# Chapter 1

## Introduction

### 1.1 Background and rationale

Sexual transmitted infections (STIs) are one of the most common communicable diseases and suffering to millions of citizens around the world. According to World Health Organization (WHO) report, more than 1 million citizens worldwide acquire sexual transmitted infections every day. Moreover, each year there are approximately 376 millions of new patients infected with 1 of 4 most common STIs that are chlamydia, gonorrhoea, syphilis and trichomoniasis respectively (1) (2). Sexual transmitted infections can cause acute uro-genital problems such as cervicitis, urethritis, vaginitis, vaginal discharge, and genital ulcer. Additionally, some can cause chronic diseases especially HIV and syphilis. Syphilis infection may enhance the transmission of HIV and the other STIs. HIV and syphilis are commonly co-infection. (3) patients presenting with syphilis should be offered HIV testing and all HIV-positive patients should be regularly screened for syphilis. A genital ulcer caused by syphilis make it easier to transmit and acquire of HIV. Therefore, detection and treatment of syphilis can help to reduce HIV transmission. In additional, some studies report that syphilis will increase the viral load of someone who is already infect with HIV (4).

Syphilis causes many health problems, if infected patients not receive a treatment and followed-up adequately. In 1960, WHO implemented a global strategy program to control over syphilis, this program represented one of the most successful health programs by the WHO. At that time, new cases of syphilis around the world decreased gradually. However, syphilis is now reappearing in some areas in Africa and South-east Asia including in Thailand. Later in 2016, the World Health Assembly announced the Global health sector strategy on sexually transmitted infections, 2016–2021. (5) This strategy included rapid scale up of evidence-based interventions and services to end sexually transmitted infections as public health concerns by 2030. The strategy set targets for reductions in gonorrhoea and syphilis incidence in adults and

recommended the establishment of global baseline incidences of sexually transmitted infections by 2018.

Thailand had a successful story for controlling HIV and other STIs since 1989, which called the 100 Percent Condom Program (6). This program was implemented by the Department of disease control of Thailand (DDC) focused on condom use among sex workers to ensure that clients could not purchase sexual services without using condom. When this program was implemented, the rates of sexually transmitted infection (STIs) dropped quickly and significantly (6). In 1991, the 100 percent condom program was declared to be a national health policy. Condom use was promoted through mass media, health education, and outreach programs aimed at specific groups throughout the country. The Ministry of Public Health began providing approximately 60 million condoms a year free of charge, mainly distributed to sex establishments (6).

However, the current situation of syphilis in Thailand has been increased dramatically over 5 times for the last 10 years. Data from the Department of Disease Control of Thailand (DDC) showed that in 2010, incidence of syphilis was 2.16 per 100,000 population and it increased to 11.52 per 100,000 population in 2020 (7). Syphilis cases are major in youths and young adults, its accountable for 20 to 41 percent of all syphilis cases in 2020 (7). DDC believed that this situation is due to decrease rate of condom use among youths and young adults, and some of them believe that syphilis and other STIs can be infected if only they have sexual intercourse with sex-workers. The incidence of syphilis when analyzed by region in 2017 showed that syphilis incidence rate in the central region is the highest, equal to 43.8 per 100,000 population. The northern region incidence rate was 24.7 per 100,000 people. The north-eastern region incidence rate was 22.1 per 100,000 population, and the south incidence rate was 13.4 per 100,000 population. However, this situation report of Thailand is likely to be inferior to real situation because it received data from passive surveillance system which documented only cases that visited in hospital. Its mean that people without sign and symptom or people who is in the latent stage will not be reported and not get an adequate treatment. So, they can transmit syphilis to their partners sexually.

Recent study showed that this reappearing of syphilis among youths and young adults was relative with sexual behavior change through advanced technology, especially internet and social media use (8). More than 90 percent of this populations access to the internet and usually use social media in their daily life (9). As we know, internet is very useful for many purposes, however some of them use internet and social media for nudies, premature sexual intercourse, seeking sexual partner and other sexual proposes (10). Therefore, the 100 Percent Condom Program which emphasizes on sex worker in the sex establishments may not as effective as in the past, because the program did not cover internet and social media used.

According to school-based reproductive health program of Thailand, recent research reported that there were many obstacles to the teaching of reproductive health education among adolescents and youths, for example; lack of skills in transferring knowledge about reproductive and sex education among teachers, not enough teaching time, lack of proper learning materials (11). The research also suggested that there should have a reproductive health education beginning earlier in a primary school level. Corresponding with the report from the Department of Disease Control of Thailand that there were a lot of misconceptions of syphilis among the youths, some of them believed that syphilis and other STIs can be infected if only they have sexual intercourse with sex-workers(7), and some believed that STIs can transmitted only when semen was secreted, so they used a condom only at a period of ejaculation. (12) Therefore, a sufficient knowledge and awareness are essential to correct those misconceptions about syphilis and other STIs, and also give a benefit to overall reproductive health among the youths. Another literature supports that knowledge about sexual risk behavior and its consequences are an important factor for prevention and control of STIs. (13) Knowledge is an important prevention factor for STIs. It has been suggested that knowledge about STI transmission might influence sexual behavior. (14)

Health belief model is a well-known behavioral change model that emphasizes on knowledge and perception of individual and aims to change the particular health-related behaviors (15). It consists of the key factors that influence health behaviors as an individual's perceived threat to sickness or disease (perceived susceptibility), belief of consequence (perceived severity), potential positive benefits of action (perceived

benefits), perceived barriers to action, exposure to factors that prompt action (cues to action), and confidence in ability to succeed (self-efficacy). Therefore, we applied this model in our study by conducted questionnaires to explore knowledge and perception of participants about syphilis' prevention.

Our study collaborated with the PPAT family planning clinic which is the first non-profit organization and a pioneer in family planning in Thailand. PPAT has a good partnership working with College of Public Health Sciences, Chulalongkorn university and Ministry of Public Health. The clinic provides family-life education, family planning and counselling services to married couples. It also provides services on sexually transmitted infectious, HIV/AIDS, health care for mothers and children, and reproductive health. There are 10 clinics located throughout Thailand, 3 clinics in Bangkok, 3 clinics in the north, 2 clinics in the northeast and 2 clinics in the south. Additionally, the Family planning clinic support a contraceptive service including oral contraceptive pill, contraceptive injection, implantation and condom.

This study aims to explore the factors that associate with level of knowledge and awareness of syphilis among youths focused on preventive measure of transmission. Additionally, this study will provide essential information to help us understand more about syphilis on youths' perspective, and this may give benefits to health care providers and policy maker to improve the syphilis prevention program.

### **1.2 Research question**

- 1) What are the characteristics of youths who visit at Family planning clinic?
- 2) What are the factors related to knowledge of syphilis among youths who visit at Family planning clinic, Bangkok, Thailand?
- 3) What are the factors related to awareness of syphilis among youths who visit at Family planning clinic, Bangkok, Thailand?

### **1.3 Research objective**

- 1) To determine factors related to knowledge level of syphilis prevention among youths visiting at PPAT family planning clinic, Bangkok, Thailand.
- 2) To determine factors related to awareness level of syphilis prevention among youths visiting at PPAT family planning clinic, Bangkok, Thailand.

#### 1.4 Research hypothesis

1) **Null hypothesis** - There is no association between characteristics of youths who visit at PPAT family planning clinic and the knowledge level of syphilis prevention.

**Alternative hypothesis** - There is an association between characteristics of youths who visit at PPAT family planning clinic and the knowledge level of syphilis prevention.

2) **Null hypothesis** - There is no association between characteristics of youths who visit at PPAT family planning clinic and the awareness level of syphilis prevention.

**Alternative hypothesis** - There is an association between characteristics of youths who visit at PPAT family planning clinic and the awareness level of syphilis prevention.

## 1.5 Conceptual framework

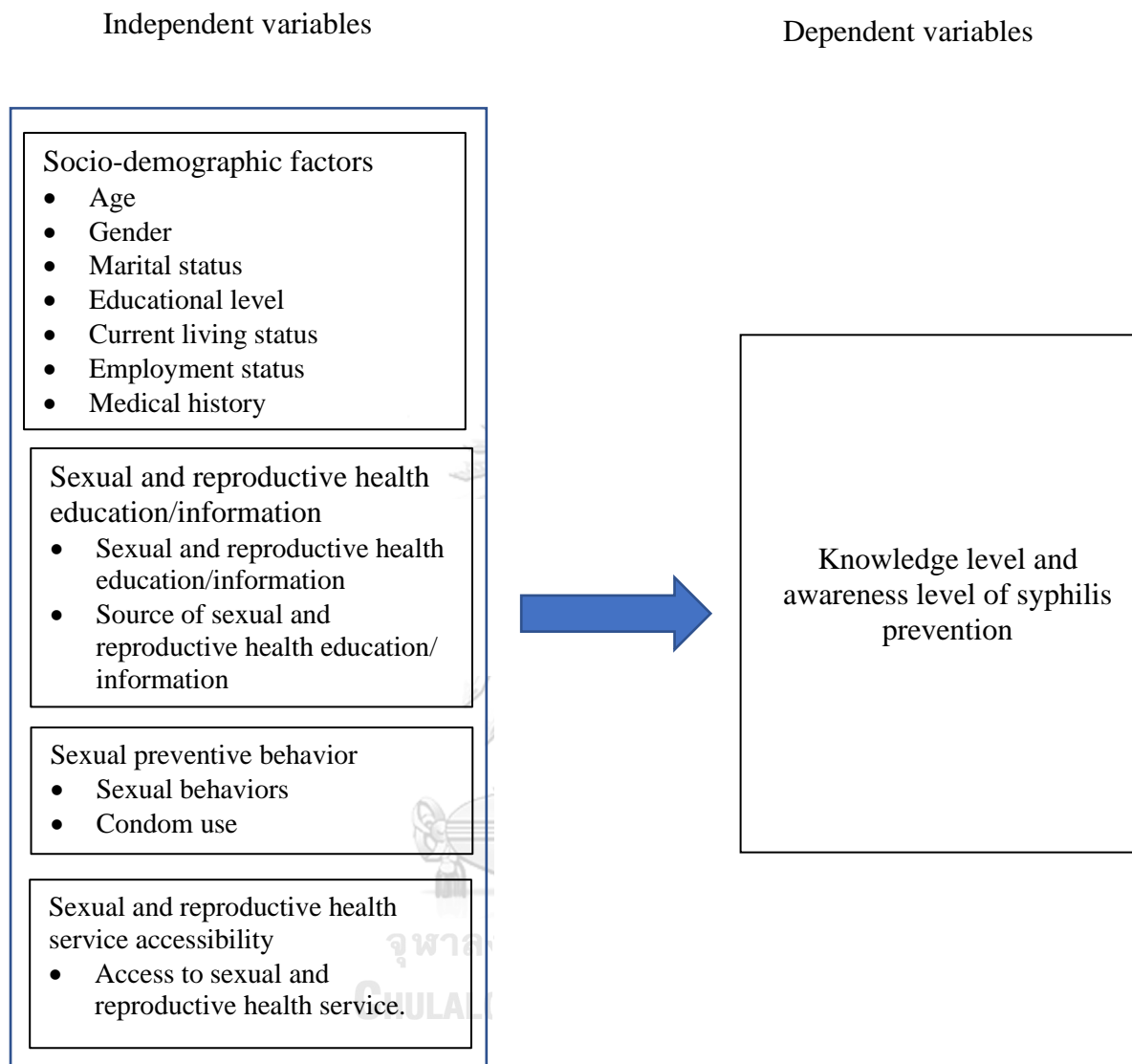


Figure 1: Conceptual framework

## 1.6 Operative definition

- 1) Youth: as individual in the 15-24 years old group (WHO)
- 2) Knowledge: Understanding an information of syphilis such as, what is syphilis, epidemiology, transmission route, sign and symptom, treatment and prevention. Evaluate by using “Knowledge of syphilis questionnaires” composed of 15 items.
- 3) Awareness: The state of being conscious of individuals’ behavior risk associated to syphilis in order to avoid the infection. Evaluate by using “Awareness of syphilis questionnaires” composed of 15 items.
- 4) Syphilis: Syphilis is a bacterial infection caused by *Treponema pallidum* that results in substantial morbidity and mortality. Syphilis is a sexually transmitted infection (STI) usually spread through contact with infectious sores on the genitals, anus, rectum, lips or mouth, via blood transfusion, or through mother-to-child transmission during pregnancy. (WHO)
- 5) Family Planning Clinic: A clinic that provides advice and treatment relating to contraception, sexual health and reproductive health.
- 6) Sexual and reproductive health: A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes. (WHO)

## Chapter 2

### Literature review

#### 2.1 Syphilis

##### 2.1.1 What is syphilis

Syphilis is a communicable disease. It can be transmitted from one to another by sexual intercourse, blood transfusion and from mother-to-child transmission. It is caused by the spirochaete called *Treponema pallidum* subspecies *pallidum*, an obligate human pathogen. This organism must infect a host to survive, in contrast with another organism that are capable to survive in environment or outside host body. The clinical presentations result from local inflammatory response by *Treponema pallidum* replicates itself within human organs (16) (17). Infected patients normally follow disease courses that divided into 4 stages, primary, secondary, latent and tertiary stages. There are different signs and symptoms present in each stage. Left untreated patients can progress to late stage of disease in approximately 15 percent (18). At late-stage syphilis can lead to develop an inflammatory process entire body (e.g., ascending aortitis, gummatous lesions, and osteitis), which can lead to serious cardiovascular dysfunction. Syphilis can also infect the central nervous system called neurosyphilis. Neurosyphilis can occur in any stage of diseases that can result in blindness, paresis and dementia (18).

In Thailand, syphilis is now reappearing in many regions of Thailand especially in the central region including Bangkok. Recent situation of the sexually transmitted infections (STIs) increased from 18.8 per 100,000 population in 2014 to 33.8 per 100,000 population in 2019 (19). The report from department of disease control of Thailand (DDC) showed that the performance of program implementation to control STIs was decrease along with the rate of condom use was lower, so that STIs infection rate in Thailand tended to increase continuously in a recent year (19). Most common STIs was gonorrhoea and follow by syphilis. The incidence of gonorrhoea increased from 10.5 to 14.5 per 100,000 population, which was 1.4 times. At the same time, incidence of syphilis in 2014 was 4.7 per 100,000 people, and there was a significantly rapid increase in 2019, which equal to 13.8 per 100,000 population, that



is 2.9 times more than 2014 (19). Another data from DDC showed that in 2010, incidence of syphilis was 2.16 per 100000 population and it increased to 11.52 per 100000 population in 2020. Syphilis cases are major in youths and young adults and its responsible for 20 to 41 percent of all syphilis cases in 2020, Thailand (7).

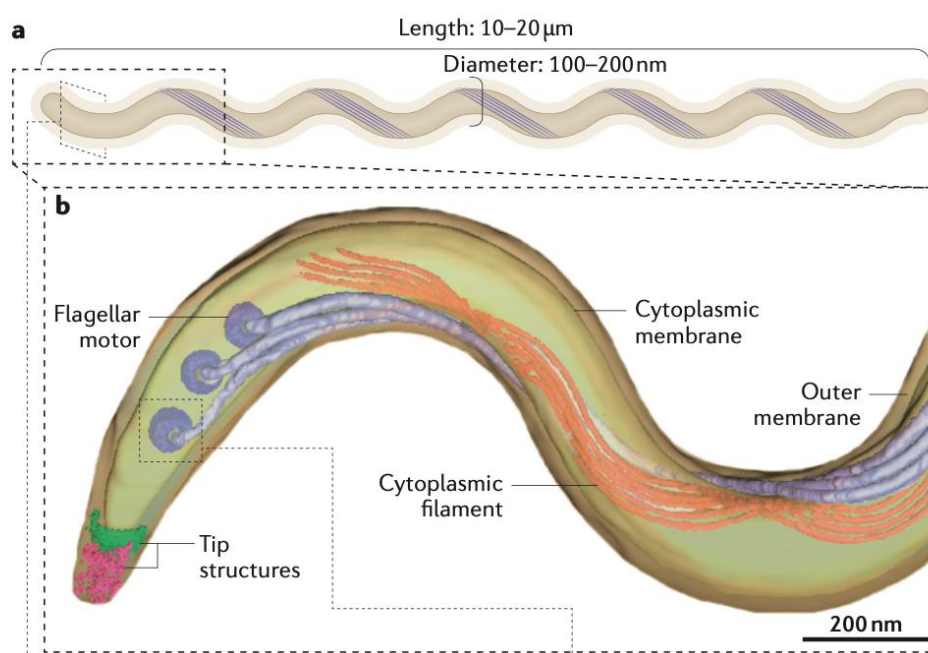


Figure 2: A. *Treponema pallidum* composes of a protoplasmic cylinder and cytoplasmic membrane bounded by a thin peptidoglycan sacculus and outer membrane. B. Periplasmic flagellar filaments, a defining morphological feature of spirochaetes(20).

### 2.1.2 Epidemiology of syphilis

Globally, more than 5 million new cases of syphilis are diagnosed every year, with most cases take place in low and middle income countries (LMICs) where infections are still endemic(21). By contrast, in higher-income countries, syphilis infection is less common and occurs disproportionately in specific population of society such as those in poverty, people with poor access to health care, or those in minor ethnic, sexually minority populations, especially among men who have sex with men (8) (22).

General population prevalence data about syphilis is limited in high-income countries. Most epidemiological data of syphilis come from LMICs. Even though, it likely underestimates the true burden of syphilis due to poor documentation and

underreporting. Most country representative data come from studies conducted among women at their first antenatal care visit and reported by the WHO (23). Since after the recognition of the HIV epidemic, syphilis has been epidemiologically associated with HIV infection. Syphilis usually causes genital ulcers which are densely infiltrated with lymphocytes and provide a portal of entry for HIV acquisition (24). In 2014 in the USA, about 40% of all people diagnosed with early syphilis were found co-infection with HIV at same time (8). Additionally, Syphilis continues to persist among men who have sex with men (MSM) and other groups who tend to have multiple sex partners (25). and could probably return in heterosexual populations without public health monitoring. Because syphilitic lesions increase risk for acquiring and transmission of HIV, syphilis infections among MSM are of particular concern (26). The recent introduction of pre-exposure prophylaxis (PrEP) for HIV is a new tool for HIV prevention, however PrEP cannot prevent from syphilis infection. So, with reports of high incidence of syphilis among PrEP users (27), clinicians and public health officers need to ensure that PrEP for HIV prevention does not lead to increase syphilis transmission.

Studies across countries report syphilis infection associated with certain behavioral risks and other factors, including imprisonment, multiple or anonymous sex partners, sexual activity connected with illegal drug use, seeking sex partners on the Internet and other high-risk sexual network dynamics (28). Reports of unusual presentations and rapid progression of syphilis in patients with concurrent HIV infection have led to the hypothesis that infection with HIV or treatment for HIV might alters the natural history of syphilis (29).

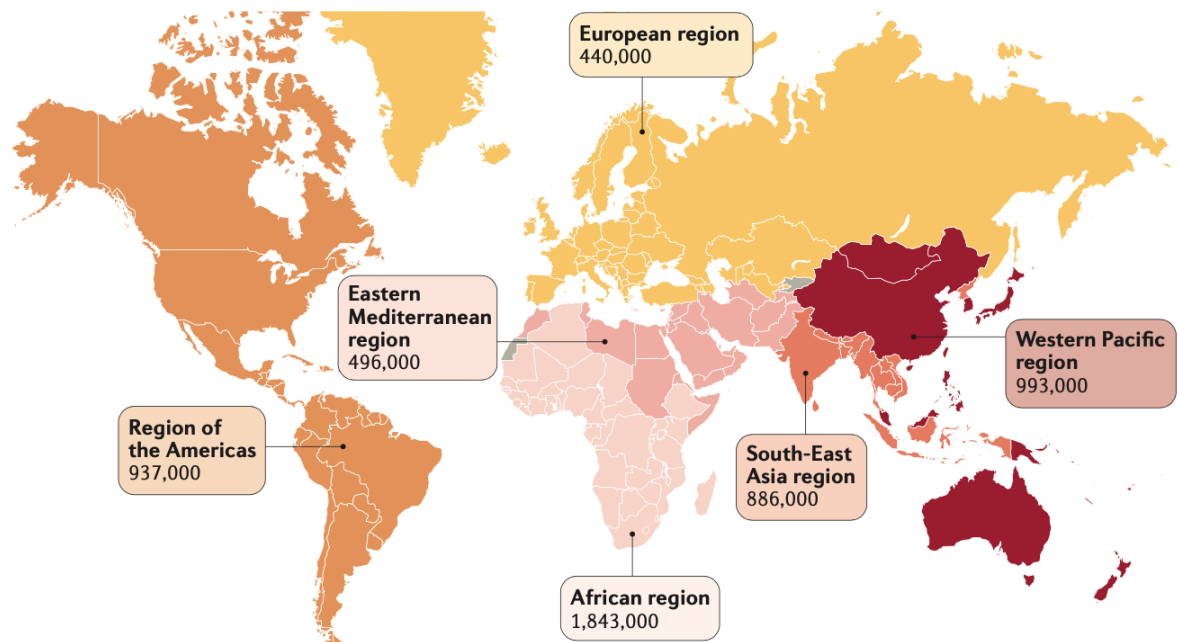


Figure 3: The WHO estimates of incident cases of syphilis by region in 2012, according to different geographical regions (21).

### Geographic distribution

Overall, the distribution of syphilis varies between low and middle income countries (LMICs) and high-income countries. LMICs generally have higher burdens of syphilis and the proportion of patient received adequate treatment is significantly lower than high-income countries (30). LMICs still have endemic of syphilis among their general populations (30). While high-income countries have low overall prevalence of syphilis. However, there are concentrated epidemics of syphilis in specific populations in high-income countries, for example, MSM, transgender women, sex workers and illegal drug use people (30). The proportion of neonate in LMICs that have over 100 syphilis cases per 100,000 births is higher than high-income countries, which is probably attributable to failure of syphilis screening at the first antenatal care visiting, endemic rates of syphilis, and failure to treat those who are diagnosed with syphilis. However, MSM, transgender women, and sex workers are disproportionately burdened with syphilis in every region (31). Those specific groups are not targeted for testing and treatment like pregnant women at their first antenatal care visit, and therefore they do not benefit from the screening and treatment

for syphilis. Additionally, those groups may suffer poor access to health care due to stigma and discrimination (32).

### **2.1.3 Transmission**

Syphilis is sexually acquired usually by direct skin-to-skin contact with someone who is active primary or secondary stage. Many studies have shown the attack rate of syphilis within 30 days of sexual exposure to someone with syphilis is 16- 30% (33). Additionally, oral sex, blood or solid organ transfusion can be the route of syphilis transmission (34) (35). The Sexual transmission of syphilis usually occurs during the first 1–2 years after infection (that is, during primary, secondary and early latent stages of infection) (17).

Syphilis can be transmitted congenitally from pregnant women to their fetus (16). Risk of mother-to-child transmission (MTCT) depends on the stage of maternal infection, the highest rate is in primary and secondary stages, followed by the early latent stage. However, transmission risk continues during the first 4 years after exposure, after which the risk of vertical transmission declines over time (36). MTCT of syphilis results in fetal death-in-utero, still-birth or death shortly after delivery (37). Infants born to infected mothers are often preterm, low birthweight or have clinical signs that mimic neonatal sepsis (that is, poor feeding, lethargy, rash, jaundice, hepatosplenomegaly and anemia).

### **2.1.4 Sign and symptoms of syphilis infection**

#### **Primary Stage**

At the primary stage of syphilis, it may present with a single painless ulcer or multiple ulcers located where syphilis entered patients' body such as genitalia, oral cavity. This ulcer is usually hard, round shape and painless. Because the ulcer is painless, it cannot be easy to be noticed by patients. For this reason, patients might not go to see a doctor for receiving any treatment. The ulcer usually lasts for 3 to 6 weeks and heals spontaneously regardless of receive or not receive treatment. Even after the ulcer disappear, patients still have syphilis in their body and need a treatment. Otherwise, primary syphilis can progress to the secondary stage (18).

### Secondary Stage

The secondary stage, patients might have skin rash or mucous membrane lesions. Mucous membrane lesions are ulcers located at oral cavity or genitalia. This stage usually starts with an erythematous rash on one or more areas, especially can be seen on the palms and feet. The rash is red or reddish-brown spots and typically not itchy. It sometimes fades out spontaneously so that patient or doctor might not notice it. Other symptoms are unspecific such as fever, enlargement of lymphatic nodes, sore throat, patchy hair loss, muscle pain and fatigue (18). The symptoms from this stage will recover whether or not patient receives a treatment. Without the adequate treatment, the infection will progress to the latent-stage and possibly tertiary stages of syphilis.

### Latent Stage

The latent stage of syphilis is a stage when there are no visible signs, or any symptoms of syphilis presented. If patients do not receive adequate treatment, patients will continue to have syphilis in their body for several years without any signs and symptoms. At this stage, syphilis cannot spread from person-to-person by sexual intercourse. However, it can transmit from pregnant women across placenta to their fetus. That is why the universal screening for syphilis among pregnant women at the first antenatal care is strongly recommended.

### Tertiary Stage

Without receiving any treatment, some patients will develop the tertiary stage which called tertiary syphilis. Data reports that only 10-25 percent of untreated patients will progress to the tertiary stage, but if it happens it can be harmful to many vital organ systems especially cardiovascular and central nervous system (17). Tertiary syphilis is very serious and might occur 10–30 years after get infected with syphilis. In tertiary syphilis, the disease damages seriously to internal organs and can result in severe disability or even death.

### Neurosyphilis and Ocular Syphilis

Syphilis can also spread to the central nervous system (neurosyphilis) or to the eye (ocular syphilis). This can happen during any of the stages of disease. Symptoms of neurosyphilis include severe headache, difficult to coordinate muscle movements, paralysis, muscle weakness, loss of sensation, dementia and visual impairment and even blindness.

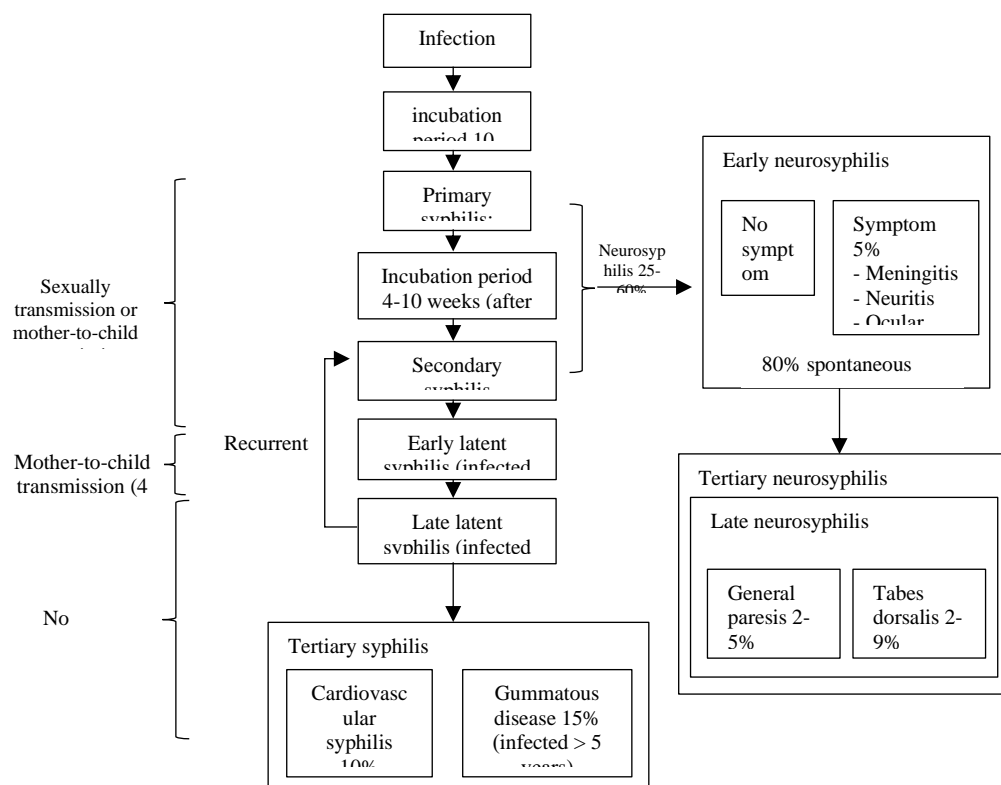


Figure 4: Clinical course and stages of syphilis (17).

### 2.1.5 Laboratory testing

At present, the diagnostic test for syphilis infection is performed by using two methods, the serological testing by detecting antibodies. The first method is called Non-Treponemal test which means the antibodies were not directly tested against *T. pallidum*, but it detects antibody produced by human body responding to the infection named is *Reagin*, these methods are called Rapid Plasma Reagin (RPR) and The Venereal Disease Research Laboratory (VDRL). Additionally, the Non-Treponemal test is not only used for diagnosis against syphilis infection, but it also uses for follow-up patients after initial treatment, decreasing of VDRL or RPR titer indicates

that patients will respond to the treatment. However, the Non-Treponemal test is not specific only for syphilis infection, it can be false positive to other diseases such as viral hepatitis, tuberculosis, leprosy and autoimmune diseases. Therefore, the Non-Treponemal test is preferable for being a screening test.<sup>34</sup>

The second method for testing is called Treponemal test. This method can directly detect antibodies against *T. pallidum*, the antibody that the body builds up specifically after infection. There are several techniques such as, Chemiluminescence Microparticle Immunoassay (CMIA), Enzyme Immunoassay (EIA), Treponemal Pallidum Hemagglutination (TPHA) Treponemal Pallidum Particle Agglutination (TPPA). This Treponemal test normally is particularly used for a confirming test (38). However, this method has limitations because it detects total antibodies against *T. pallidum*, both IgM and IgG. So, the titer will remain positive even if the patients receive a complete course of treatment. Therefore, the Treponemal Test is not suitable for follow-up patients (38).

### **2.1.6 Treatment**

A Penicillin, administered via intramuscular route, is the first-line drug for treatment patients in any stages of syphilis which is widely used in clinical practice around the world for several years and still shows an effective result. The dosages and durations of treatment depend on the stage and clinical presentations of the disease (18). Treatment for late latent syphilis and tertiary syphilis require a longer duration of treatment. The standard form of penicillin for treatment of syphilis is a Benzathine penicillin.

WHO guidelines for the treatment of syphilis (39).
<b>Early syphilis</b>
<ul style="list-style-type: none"> <li>• Intramuscular benzathine penicillin G (single dose)</li> <li>• Or intramuscular procaine penicillin (daily doses for 10–14 days)</li> <li>• If penicillin-based treatment cannot be used, oral doxycycline (two doses daily for 10–14 days) * or intramuscular ceftriaxone (daily doses for 10–14 days)</li> </ul>
<b>Late syphilis</b>
<ul style="list-style-type: none"> <li>• Intramuscular benzathine penicillin G (weekly doses for 3 weeks)</li> <li>• Or intramuscular procaine penicillin (daily doses for 20 days)</li> <li>• If penicillin-based treatment cannot be used, oral doxycycline (daily doses for 30 days) *</li> </ul>
<b>Congenital syphilis</b>
<ul style="list-style-type: none"> <li>• Intravenous aqueous benzyl penicillin (daily doses for 10–15 days) • Or intramuscular procaine penicillin (daily doses for 10–15 days)</li> </ul>
*Contraindicated during pregnancy.

### 2.1.7 Screening

The widely available and effective treatment with penicillin results in decreasing of syphilis prevalence and led to a low yield of screening in low-prevalence settings; thus, screening in low-risk adults (for example, premarital adults or those admitted to hospital) has been discarded in most countries. However, systematic reviews provide essential evidence in favor of syphilis screening for pregnant women, adults and adolescents at increased risk of infection and individuals donating blood or solid organs. Several countries also recommend syphilis testing in people with unexplained sudden visual loss, deafness or meningitis as these may be manifestations of early neurosyphilis (40).



### Prenatal screening.

Syphilis screening is universally recommended for pregnant women, regardless of previous exposure, because of the high risk of mother-to-child transmission (MTCT) during pregnancy and the availability of a highly effective preventive intervention against adverse pregnancy outcomes (39). Global normative authorities and most national guidelines recommend syphilis screening at the first antenatal care visiting, ideally during the first trimester. Some countries recommend that women at high risk should repeat screening in the third trimester and again at delivery to identify new infections (28). Women should be tested during each pregnancy, even if they tested negative in a previous pregnancy (41). The importance of universal syphilis screening in pregnancy to prevent infant morbidity and mortality is emphasized in the current WHO global initiative to eliminate congenital syphilis (42). A systematic review of studies which report on antenatal care program initiating or expanding syphilis screening, compared with various local control conditions, found that enhanced screening reduced syphilis-associated adverse birth outcomes by >50% (43). Integration of syphilis testing with other prenatal interventions, including HIV testing, has been shown to be cost-effective across regions, even when syphilis prevalence is low (44).

### Screening in risk populations.

Increasing risk of syphilis infection relates to individual or partner's sexual behavior leading to syphilis infection or living in a community with a high syphilis prevalence (28). In many countries, syphilis testing is recommended for all patients visiting at STI or sexual health specialized center such as, HIV testing centers or drug treatment centres (40). The proper screening interval for individuals at an increased risk of infection is not well established; however, some guidelines suggest that MSM or people with HIV show a greater benefit from more frequent screening than others at risk of syphilis infection (for example, testing every 3 months rather than a single annual screening (45).)

### Blood-bank screening.

Although syphilis has been identified infectious risks for blood or solid organ donation, the reports of transfusion-transmitted syphilis have become extremely rare over the past 60 years as more countries adopt donor selection processes, universal serological screening of donors and the use of refrigerated products rather than fresh blood components (46). The survival of *T. pallidum* in different blood components has been shown to vary according to storage technique, with fresh blood or blood components stored for <5 days being more infectious than blood stored for longer periods (47). Screening of blood, blood components and solid organs for syphilis remains a recommendation in many countries(48).

#### **2.1.8 Prevention**

There is no vaccine against syphilis yet. Therefore, the most effective mode of prevention is being long-term mutually monogamous relationship with a partner who has been tested negative for syphilis or using appropriately latex condom every time of having sexual intercourse with partner. Prompt treatment is needed to avoid continued sexual transmission or MTCT. Additionally, treatment of all sex partners is important to avoid a re-infection (28).

#### **2.2 Knowledge and awareness of syphilis**

The survey from Department of Disease Control of Thailand reported a lot of misconceptions of syphilis among the youths(7), some of them believed that syphilis and other STIs can be infected if only they have sexual intercourse with sex-workers, and some believed that STIs can transmitted only when semen was secreted, so they used a condom only at a period of ejaculation (12). Therefore, a sufficient knowledge and awareness are essential to correct those misconceptions about syphilis and other STIs, and also give a benefit to overall reproductive health among the youths. Another literature supports that knowledge about sexual risk behavior and its consequences are an important factor for prevention and control of STIs (13). Knowledge is an important prevention factor for STIs. It has been suggested that knowledge about STI transmission might influence sexual behavior (14).

Although there are some literatures argued that accurate knowledge alone is insufficient to change attitude and behavior, but the knowledge along with awareness are still a fundamental conception towards a person's motivation to change his or her behavior (49). The challenge for public health on this issue is the way people change their knowledge-seeking behavior influenced by internet and technologies. In the past, youths got information about STIs and reproductive health mostly from friends, magazines, school and television. But now youths mostly get information from internet through computer and mobile phone. Some information on internet are rumors and incorrect leading to misconceptions towards developing positive behavior related to syphilis and STIs.

## **2.3 Factors related to knowledge and awareness of syphilis**

### **2.3.1 Socio-demographic factors**

According to the literature review, there were two studies from China explored about factors related to knowledge and awareness of syphilis in their populations. The first research was conducted in 2011, researcher investigated knowledge and awareness of syphilis in different populations in Guangzhou, the capital city of Guangdong Province, China. A questionnaire survey was conducted to 3,917 participants, and awareness rates of different groups were considered. Results from statistical analysis showed that different kind of population, age, education level, knowledge sources and birthplace were considered to be the significant factors affecting knowledge and awareness status. Author recommended that the knowledge and awareness rates of syphilis in the surveyed subjects were low, and targeted health education and health promotion should be strengthened (50). Another study from south China, they recruited 3,470 participants to survey knowledge and awareness of syphilis on prevention and treatment. Researcher found that age, gender, education level, and living area were significant associated with awareness of syphilis. Nevertheless, the percentages of awareness on syphilis knowledge were far from their national benchmark (51).

### **2.3.2 Reproductive health education/information**

In the past, most of Thai people received health education from the compulsory school program or mass media, such as newspaper, magazine and

television. But recently the Internet and social media were found that they had a great influence on sexual education, knowledge, awareness and sexual behavior. There was a research reported that the Internet provided an important information and unmet need for sexual health education, a range of uses of the Internet including searching for specific facts about HIV or STIs, attempting self-diagnoses of symptoms people might be experiencing, finding health care centers that offered HIV/STIs testing and affordable care, and learning about risk reduction techniques (52). Furthermore, the large national survey from Australia reported that the proportion of the population looking for potential sexual partners using Internet and smartphone apps was increased (53). There was 12.09% (2346/19,398) of their respondents reported ever searching for potential sexual partners on websites and smartphone apps, most common among people aged 16-29 years (53).

In Thailand there were several studies focus on HIV and overall STIs, but there was no study that emphasized on knowledge and awareness of syphilis among the youths which are the most vulnerable populations. Recent study in 2019 from Department of Disease Control of Thailand reported that youths have high sexual risk behaviors and misconceptions of sexually transmitted infections (12). From this survey of sexual behavior, it was also found that the rate of using a condom every time with different types of sexual partners was below 60 percent, so there is a room for researchers to explore the risk factors and the reasons behind this sexual risk behaviors among the youths.

### **2.3.3 Sexual preventive behavior**

Recent study from USA reported some sexual behaviors associated with syphilis infection, such as having 2 or more sexual partners in previous 12 months, casual partners, unprotected sex with casual partners, drug abuse, giving money for sex. Therefore, avoiding of these factors might prevent from syphilis infection and other STIs (54). The Centers for Disease Control and Prevention (CDC) recommends clinicians or health workers to advise their patients to adopt positive behavior changes, such as decline in sex without a condom, fewer sexual partners, and discussing how alcohol and/or drug use can impair judgment.

### **2.3.4 Access to sexual and reproductive health services**

Access to health care services is an important goal of health system in WHO framework. People with poor access to health services tend to have poor health outcomes. The same as access to sexual and reproductive health services which are an important service among adolescents, youths and sexually active adults. These services including sexual health education, couple counselling, sexual transmitted disease prevention, contraception, safe abortion and hospital referral system. There is a study reported that cost and prolong waiting time at hospital are the main barriers leading to poor access of reproductive health services (54).

### **2.4 The PPAT family planning clinic**

The PPAT family planning clinic is a part of the Planned Parenthood Association of Thailand under the Patronage of Her Royal Highness the Princess Mother (PPAT). PPAT is the first non-profit organization and a pioneer in family planning in Thailand. It was officially registered in 1980. PPAT is the only agency in Thailand that is a member of the International Planned Parenthood Federation (IPPF).

The organization works to inform the public about sexually transmitted and infectious diseases, HIV/AIDS, health care for mothers and children and reproductive health. PPAT also provides family life education, family planning and counselling services to married couples. Information is disseminated through the mass media, by training sessions, seminars and discussions, and by many projects designed to reach various target groups

Target population of Family planning clinic

1. Children and Youth groups
2. Women's groups
3. Vocational groups
4. Special target groups, such as Thai Muslims and refugees
5. Rural and Urban low-income people
6. General public the primary objective of PPAT is to develop the security, comfort and quality of life of Thai people on the basis of a planned family model.

### Mission of Family planning clinic

1. Increase access to the targeted population, particularly disadvantaged groups, providing comprehensive sexual and reproductive health information for them to be able to take care of their reproductive health, and make informed decisions to receive reproductive health services.
2. Promote and encourage the targeted population to be aware of their sexual and reproductive health and rights, which are entitled to be protected without any discrimination, as well as family planning for quality of life of members of the family, which is a broader meaning than family planning in the old days.
3. Prevent and resolve unplanned pregnancy and unsafe abortion activities, and promote the status and strengthen the capacity of women and youth in sexual and reproductive health and rights
4. Cooperate with government and private sectors to increase access to sexual and reproductive health services and sexual health commodities to promote sexual health that conforms to the needs, way of life and tradition of target group, as well as to promote the prevention and reduce the effect of sexually transmitted diseases and HIV infection.
5. Advance cooperation and connect with local and international network organizations, particularly in sub-regions, to implement and promote lifelong learning on sexual and reproductive health and rights, including Comprehensive Sexuality Education, family planning, maternal and child health, STIs and HIV
6. Strengthen relationships with women and youth organizations to encourage them to be strong advocates for championing and advocating the rights to sexual and reproductive health services without discrimination.
7. Develop and improve the organization of PPAT so that it can reach its maximum effectiveness

In Bangkok, there are 3 Family planning clinics which are Din-Daeng, Pin-Klao and Bang-Ken PPAT medical clinic. These clinics open on Monday to Friday, at 9 AM to 5 PM. They close on weekend and national holidays. There are specialty

medical doctors to provide reproductive health services including family planning consultant, ultrasound scanning, Pap smear, contraception, general medical examination with medical certificate and telephone consultation. Moreover, there are staffs that provides knowledge on sexually transmitted disease, prevention unplanned Pregnancy, fertility hygiene knowledge, LGBT understanding, and Activity based learning. The number of youths visiting at each Family Planning clinic is around 10-20 people per day.

## **Chapter 3**

### **Research Methodology**

#### **3.1 Study design**

This study design is a cross-sectional study.

#### **3.2 Study area**

This study will be conducted at 3 branches of Family planning clinics, Bangkok, Thailand. (Din Daeng PPAT Medical Clinic, Pin Klao PPAT Medical Clinic, Bang Khen PPAT Medical Clinic)

#### **3.3 Study period**

March to June 2021

#### **3.4 Study population**

The youths who visit at Family planning clinic, Bangkok, Thailand.

#### **3.5 Sample**

The youths who visit at Family planning clinic, Bangkok, Thailand.

#### Inclusion criteria

- The youth age between 15-24 years old both male and female.
- The youth who visit at Family Planning Clinic and members of Family Planning Clinic
- The youth who has willing to participate in research.
- The youth who has ability to read and write in Thai language.

#### Exclusion criteria

– none



### 3.6 Sample size

Sample size in this study was calculated by the Cochran formula (Cochran, 1963)

$$n = \frac{Z^2 p(1 - p)}{d^2}$$

$Z = 1.28$  : Critical value for 90% confidence level

$d = 0.05$  : Absolute precision required

$p = 0.50$  : Percentage picking a choice or response

$$n = \frac{(1.28)^2 0.50(1 - 0.50)}{(0.05)^2}$$

$$n = 164$$

From above formula, the minimal participants are 164 people. 20% additional participants (33 people) are added to avoid person who refuse or not complete answering the questionnaires. So, the total sample size is 200 people.

### 3.7 Sampling technique

Purposive sampling method from the youths visiting at 3 Family Planning Clinics, Bangkok, Thailand. (Din Daeng PPAT Medical Clinic, Pin Klao PPAT Medical Clinic, Bang Khen PPAT Medical Clinic), all participants who meet an inclusion criteria will be recruit in this study.

### 3.8 Research instruments

Research questionnaires are self-administrative questionnaires in Thai language that composed of 2 parts as following.

- Part 1:

1.1 General data & socio-demographic data.

1.2 Sexual preventive behavior

1.3 Sexual and reproductive health education/information

1.4 Sexual and reproductive health service accessibility

- Part 2:

2.1 Questionnaires about knowledge of syphilis.

2.2 Questionnaires about awareness of syphilis.

### Part 1

#### **1.1 General data & socio-demographic data**

This section consisted of socio-demographic data including age, gender, education status, employment status, internet, and social media use.

#### **1.2 Sexual preventive behavior**

#### **1.3 Sexual and reproductive health education/information**

educational level, source of reproductive health information

#### **1.4 Sexual and reproductive health service accessibility**

Sexual behavior including frequency of condom use, sexual transmission risk factors and testing for syphilis. Reproductive health education composes of source of education, preference of participant, and accessing to reproductive health service.

### Part 2

#### **2.1 Knowledge of syphilis**

This section measures knowledge of syphilis focused on prevention aspect. This questionnaire composes of 15 items. Each item has 3 choices (yes, no, don't know), there is only 1 correct answer. The cut-off points of knowledge score, we follow by Glass' Standard and criteria of assessment (55) which use percentile for classification, and we also consult with expert and advisor from College of Public health science, Chulalongkorn university. The score above 75<sup>th</sup> percentile was equal to "good knowledge level", and below 75<sup>th</sup> percentile was equal to "fair or poor knowledge score". This cut-off point is corresponding to the study about

knowledge and awareness of syphilis in China (51) which also uses 75<sup>th</sup> percentile to be a cut-off point for their study.

## 2.2 Awareness of syphilis

This section measure awareness of syphilis. This questionnaire composes of 15 items. Each item measure with 5 Likert's scales that are described below.

1 = Strongly disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly agree

- Measurement

Total scores of awareness are sum into total score. The cut-off points of awareness score, we follow by Glass' Standard and criteria of assessment (55) which use percentile for classification. Individual who got a score above 75<sup>th</sup> percentile equal to "good awareness level", and below 75<sup>th</sup> percentile equal to "fair or poor awareness level".

## 3.9 Development of questionnaires and reliability

- Review literature
- Validity
- Reliability

### 3.8.1 Review literatures

The researcher reviews literatures about syphilis, factor related to syphilis, knowledge and awareness related to syphilis, and combine with discussion with infectious disease doctor to establish the research questionnaires.

### 3.8.2 Validity

Content validity referred to the extent to which the items on a test are representative of the entire domain the test seeks to measure. This entry discusses

origins and definitions of content validation, methods of content validation, the role of content validity evidence in validity arguments, and unresolved issues in content validation. Content validity of the questionnaires were provided by three experts.

#### IOC (item-objective congruence)

The index of item-objective congruence was a procedure used in test development for evaluating content validity at the item development stage. This measure was limited to the assessment of unidimensional items or items that measure specified composites of skills.

Step one: The questionnaire was presented to the thesis committee for any suggestion for improvement.

Step two: The questionnaire was corrected and adjusted in accordance with comments and recommendations made by advisory committee.

Step three: After received feedback and recommendations from the advisory committee, the Index of Item-Objective Congruence (IOC) was used so as to find the content validity. In this process, the questionnaire was checked by three experts. (see in Appendix A).

The Item-Objective Congruence (IOC): the score ranged from -1 to +1.

- +1 : item clearly taps objective
- 0 : unsure/ unclear
- 1 : item clearly does not tap objective

If the value of the result less than 0.5, adjusted the questions till all three experts accepted. This questionnaire was already validated by the above three experts and all those three experts accepted my questionnaire.

#### 3.8.3 Reliability

Reliability involved the quality of measurement. To get the reliability of measurements, it was the degree to which a measurement measures the same way each time, it is used under the same conditions with the same participants. Reliability mainly reflects the consistency and stability of the test results. Cronbach's coefficient alpha ranged from 0 to 1, and the values closer to 0 imply that the items do not measure the same construct and values closer to 1 provides an opposite insinuation. The reliability coefficient of more than or equal 0.9 was excellent, between 0.8-0.9 was good, between 0.8 and 0.7 was acceptable, between 0.6 and 0.7 was questionable, between 0.5 and 0.6 was poor and less than 0.5 was unacceptable. In this research, the reliability was measured by Cronbach's alpha. Cronbach's alpha was calculated by SPSS version 22.0

To establish of the reliability of the questionnaire, pilot study was conducted among 30 youths by online questionnaires before doing the valid data collection. After that, internal consistency of the rating scales was done by Cronbach's alpha coefficient to measure the reliability. Cronbach's alpha coefficient for knowledge of syphilis questionnaire was 0.896; Cronbach's alpha coefficient for awareness of syphilis questionnaire was 0.867.

### **3.10 Data collection**

Researcher contacts and send a letter to the director of Family Planning Clinic, Bangkok for permission and then explains the details of research to staffs at clinic. Knowledge and awareness on syphilis questionnaires are constructed with Google Form and collected by self-administrative method. All eligible participants are informed consent by researcher before participating in the research. Additionally, researcher trains staff at clinic to assist a data collection process.

Then, researcher visits at 3 Family Planning Clinics (Din Daeng PPAT Medical Clinic, Pin Klao PPAT Medical Clinic, Bang Khen PPAT Medical Clinic). At waiting area, researcher explain an instruction to all eligible participants. All participants who meet an inclusion criteria will receive a questionnaire. All questionnaires are in Thai language. There are 2 options of answering the

questionnaires depend on participants' preference, answer sheet method, and google form method by using QR code scanning via mobile phone.

### **3.11 Data analysis**

Descriptive statistics: socio-demographic data, education, sexual behavior, and access to reproductive health service were reported by frequency and percentage.

Inferential statistics: The association between socio-demographic data, education, sexual behavior, access to reproductive health service, and the level of knowledge and awareness of syphilis prevention was analyzed by logistic regression statistics.

Additionally, bivariable logistic regression analysis was applied to all variables with a P-value less than 0.2 and then were consider for inclusion in a multivariable logistic regression model.

Multivariable logistic regression analysis was conducted to investigate he association which were statistically significant with P-value less than 0.05 and adjusted odds ratio (AOR) with 95% confidence interval (CI) was calculated.

### **3.12 Ethical approval**

Ethical approval was obtained from “The Research Ethics Review Committee for Research Involving Human Research Participants” Chulalongkorn University (COA number 126/2021). The Privacy of participant needs to be concerned because this research's issue is delicate. To protect the privacy of participant, researcher asked “The Research Ethics Review Committee for Research Involving Human Research Participants” to allow participants not to address or sign their name in this research, and underage participants did not need a parental consent.

## Chapter 4

### Results

This study aimed to determine the relationship between independent variables (which were, socio-demographic factors, educational level, reproductive health education, sexual behavior and access to reproductive health service) and dependent variables (which were level of knowledge and awareness among youths who visited at PPAT family planning clinic, Bangkok, Thailand).

This result composed of descriptive statistical results of these independent variables and dependent variables which were mentioned above. Additionally, inferential statistics was analyzed with logistic regression analysis. In the bivariable analysis, all variables which p-value less than 0.2 were considered for multivariable logistic regression model. The multivariate analysis was done by multiple logistic regression among independent variables with each of dependent variables.

#### 4.1 Socio-demographic characteristics

The results of the descriptive statistics and tests of association between factors of interest and knowledge of syphilis prevention are shown in Table 1.

Total number of participants was 207 people. Average age of participant was 22-year-old (SD 1.74), 93.6 percent of them are age between 20-25 year. Most of participants were female (59.4%) more than male (40.6%). 46.9 percent of them were single and 41.1 percent were married. 2 of 3 of them were employed with full-time job (61.4%).

#### 4.2 Education

More than half of participants' education level was university level or higher (57.0%) follow by high school (20.8%), vocational school (12.1%), and junior high school (10.1%) respectively. According to reproductive health education, 79.2 percent of participants had ever learned a reproductive health education in school-based program. Source of reproductive health education, 21 percent of them were educated

from school-base program, 21 percent learned from Internet, and 20 percent learned from hospital or clinic.

### 4.3 Sexual behavior

Almost participants in this study ever had sexual intercourse (98.1%), only 2.9 percent had an experience of sexually transmitted infection. However, the rate of “always use” of condom in participants is only 9.2 percent while “never use” of condom is 12.6 percent. In accordance with the sexual risk behavior issue, the highest risk behavior for syphilis infection is condomless sex, follow by multiple partners and having sex with person who has history of syphilis infection. Regarding the history of syphilis testing, only 20.8 percent of participants had ever done the screening test for syphilis.

### 4.4 Access to reproductive health service

64.7 percent of participants replied that there is no reproductive health service available in their living area. Among the participants who had ever visited some the kind of reproductive health services, 50.4 percent of them visited at public, 28.2 percent visited at primary care unit, and 21.4 percent visited at private clinic/hospital.

**Table 4. 1:** Frequency and percentage of participants classified by socio-demographic and related factors (n=207)

<b>Socio-demographic and related factors</b>	<b>n (%)</b>
Age group	
15-19 year	13 (6.3)
20-24 year	194 (93.7)
Gender	
Male	84 (40.6)
Female	123 (59.4)
Marital status	
Single	97 (46.9)
Married, live together	85 (41.1)
Married, separation	11 (5.3)
Divorce	14 (6.7)



<b>Socio-demographic and related factors</b>	<b>n (%)</b>
Employment status	
Fulltime job	127 (61.3)
Parttime job	36 (17.4)
Unemployment	44 (21.3)
Living status	
Living alone	39 (18.8)
Living with couple	76 (36.7)
Living with friend or colleague	14 (6.8)
Living with family or relative	78 (37.7)
Education level	
Junior high school	21 (10.1)
High school	43 (20.8)
Vocational school	25 (12.1)
University or higher	118 (57.0)
Reproductive health education	
Yes	164 (79.2)
No	43 (20.8)
Sexual intercourse	
Yes	203 (98.1)
No	4 1.9
Medical history of STIs	
Yes	6 2.9
No	201 97.1
Frequency of condom use	
Always	19 9.2
Usually	55 26.6
Sometimes	76 36.7
Rarely	31 15.0
Never use	26 12.6
Syphilis testing	
Yes	43 20.8
No	164 79.2

<b>Socio-demographic and related factors</b>	<b>n</b>	<b>(%)</b>
<b>Sexual risk behavior</b>		
Multiple partners	2	1.0
Condomless sex	43	20.8
Having sex with person who has history of syphilis infection	2	1.0
Having experience with sex-workers	1	0.5
No sexual risk behavior	155	74.9
Never had sexual intercourse	4	1.9
<b>Access to reproductive health service</b>		
yes	73	35.3
no	134	64.7
<b>History of reproductive health service use</b>		
Public hospital	52	25.1
Primary care hospital	29	14.0
Private clinic/hospital	22	10.6
Never use service	104	50.2
<b>Source of reproductive and sexual health knowledge</b>		
School		21%
Hospital/clinic		20%
Radio		2%
Television		11%
Publication		7%
Internet		21%
Social media		15%
Mobile phone message		3%

**Table 4.2: Level of knowledge and awareness of syphilis prevention**

Characteristic	Level of knowledge		Level of awareness	
	Fair or poor (n=98) *	High (n=66) *	Fair or poor (n=154) *	Good (n=53) *
<b>Age</b>				
15-19 year	10(76.9)	3(23.1)	11(84.6)	2(15.4)
20-24 year	131(67.5)	63(32.5)	143(73.7)	51(26.3)
<b>Gender</b>				
Male	56(66.7)	28(33.3)	59(70.2)	25(29.8)
Female	85(69.1)	38(30.9)	95(77.2)	28(22.8)
<b>Marital status</b>				
Single	59(60.8)	38(39.2)	69(71.1)	28(28.9)
Married, live together	63(74.1)	22(25.9)	65(76.5)	20(23.5)
Married, separation	8(72.7)	3(27.3)	9(81.8)	2(18.2)
Divorce	11(78.6)	3(21.4)	11(78.6)	3(21.4)
<b>Employment status</b>				
Fulltime job	80(63.0)	47(37.0)	95(74.8)	32(25.2)
Parttime job	27(75.0)	9(25.0)	24(66.7)	12(33.3)
Unemployment	34(77.3)	10(22.7)	35(79.5)	9(20.5)
<b>Living status</b>				
Living alone	16(41.0)	23(59.0)	28(71.8)	11(28.2)
Living with couple	53(69.7)	23(30.3)	52(68.4)	24(31.6)
Living with friend or colleague	7(50.0)	7(50.0)	11(78.6)	3(21.4)
Living with family or relative	65(83.3)	13(16.7)	63(80.8)	15(19.2)
<b>Education level</b>				
Junior high school	18(85.7)	3(14.3)	16(76.2)	5(23.8)
High school	31(72.1)	12(27.9)	33(76.7)	10(23.3)
University or higher	70(59.3)	48(40.7)	87(73.7)	31(26.3)
Vocational school	22(88.0)	3(12.0)	18(72.0)	7(28.0)
<b>Reproductive health education</b>				
Yes	105(64.0)	59(36.0)	122(74.4)	42(25.6)
No	36(83.7)	7(16.3)	32(74.4)	11(25.6)

Characteristic	Level of knowledge		Level of awareness	
	Fair or poor (n=98) *	High (n=66) *	Fair or poor (n=154) *	Good (n=53) *
Sexual intercourse				
Yes	139(68.5)	64(31.5)	151(74.4)	52(25.6)
No	2(50.0)	2(50.0)	3(75.0)	1(25.0)
Medical history of STIs				
Yes	4(66.7)	2(33.3)	5(83.3)	1(16.7)
No	137(68.2)	64(31.8)	149(74.1)	52(25.9)
Frequency of condom use				
Always	5(26.3)	14(73.7)	10(52.6)	9(47.4)
Usually	33(60.0)	22(40.0)	42(76.4)	13(23.6)
Sometimes	57(75.0)	19(25.0)	56(73.7)	20(26.3)
Rarely	27(87.1)	4(12.9)	26(83.9)	5(16.1)
Never use	19(73.1)	7(26.9)	20(76.9)	6(23.1)
Syphilis testing				
Yes	25(58.1)	18(41.9)	33(76.7)	10(23.3)
No	116(70.7)	48(29.3)	121(73.8)	43(26.2)
Sexual risk behavior				
Multiple partners	2(100.0)	0(0)	2(100.0)	0(0.0)
Condomless sex	32(74.4)	11(25.6)	33(76.7)	10(23.3)
Having sex with person who has history of syphilis infection	1(50.0)	1(50.0)	1(50.0)	1(50.0)
Having experience with sex-workers	1(100.0)	0(0)	0(0.0)	1(100.0)
No sexual risk behavior	103(66.5)	52(33.5)	115(74.2)	40(25.8)
Never had sexual intercourse	2(50.0)	2(50.0)	3(75.0)	1(25.0)
Available of reproduction health service				
yes	55(75.3)	18(24.7)	53(72.6)	20(27.4)
no	86(64.2)	48(35.8)	101(75.4)	33(24.6)
History of reproductive health service use				
Public hospital	39(75.0)	13(25.0)	41(78.8)	11(21.2)
Primary care hospital	19(65.5)	10(34.5)	17(58.6)	12(41.4)
Private clinic/hospital	18(81.8)	4(18.2)	18(81.8)	4(18.2)

Characteristic	Level of knowledge		Level of awareness	
	Fair or poor (n=98) *	High (n=66) *	Fair or poor (n=154) *	Good (n=53) *
Never use service	65(62.5)	39(37.5)	78(75.0)	26(25.0)

\* Frequency (percentage by row)

### Bivariate analysis

In the bivariate analysis, all variables with a p-value of less than 0.2 in a bivariable logistic regression analysis were considered for inclusion in a multivariable logistic regression model.

**Table 3: Association between related factors and the knowledge level of syphilis prevention.**

Characteristics	Unadjusted OR (95% CI)	P-value
Age		
15-19 year	Ref	
20-24 year	1.176(0.160-8.662)	0.873
sex		
Male	Ref	
Female	0.77(0.32-1.87)	0.56
Marital status		
Single	Ref	
Married, live together	1.15(0.42-3.21)	0.78
Married, separation	0.62(0.08-4.99)	0.65
Divorce	0.84(0.15-4.71)	0.85
Employment status		
Fulltime job	Ref	
Parttime job	0.32(0.10-1.01)	0.05
Unemployment	0.24(0.08-0.70)	0.01*
Living status		
Living alone	Ref	
Living with couple	0.12(0.03-0.42)	<0.001**
Living with friend or colleague	0.50(0.09-2.70)	0.42
Living with family or relative	0.27(0.08-0.90)	0.03*
Medical history of STIs		
Yes	Ref	

Characteristics	Unadjusted OR (95% CI)	P-value
No	0.25 (0.02-3.29)	0.30
Education level		
Junior high school	Ref	
High school	1.30(0.25-6.89)	0.76
University or higher	2.21(0.45-10.86)	0.33
Vocational school	0.56(0.08-4.12)	0.57
Sexual intercourse		
Yes	Ref	
No	0.33(0.02-6.69)	0.47
Frequency of condom use		
Always	Ref	
Usually	0.16(0.04-0.73)	0.02*
Sometimes	0.07(0.01-0.32)	<0.001**
Rarely	0.04(0.01-0.26)	<0.001**
Never use	0.24(0.03-1.74)	0.16
Syphilis testing		
Yes	Ref	
No	1.48(0.54-4.03)	0.45
Sexual risk behavior		
No sexual risk behavior	Ref	
Unsafe sex (Multiple partners, Sex with sex-worker, condomless sex)	0.33(0.25-1.99)	0.51
Sex with person who has syphilis infection previously	17.647(0.46-671.66)	0.12
Reproductive health education		
Yes	Ref	
No	0.39 (0.13-1.18)	0.10
Available of reproduction health service		
Yes	Ref	
No	1.36(0.45-4.09)	0.59
History of reproductive health service use		
Never use service	Ref	
Public hospital	0.56(0.26-1.17))	0.12
Primary care hospital	0.88(0.37-2.08)	0.77
Private clinic/hospital	0.37(0.12-1.17)	0.10

\* (P-value &lt;0.05), \*\* (P-value &lt;0.01)

**Table 4: Association between related factors and the awareness level of syphilis prevention.**

Characteristics	Unadjusted OR (95% CI)	P-value
Age		
15-19 year	Ref	
20-24 year	3.44 (0.51-22.98)	0.20
Sex		
Male	Ref	
Female	0.72 (0.32-1.61)	0.42
Marital status		
Single	Ref	
Married, live together	0.59 (0.23-1.50)	0.26
Married, separation	0.56 (0.09-3.53)	0.54
Divorce	0.51 (0.11-2.41)	0.39
Employment status		
Fulltime job	Ref	
Parttime job	1.77 (0.70-4.50)	0.23
Unemployment	0.80 (0.29-2.22)	0.67
Living status		
Living alone	Ref	
Living with couple	1.28 (0.37-4.38)	0.69
Living with friend or colleague	0.72 (0.13-4.02)	0.71
Living with family or relative	3.10 (0.91-10.54)	0.07
Medical history of STIs		
Yes	Ref	
No	1.01 (0.08-13.18)	0.99
Education level		
Junior high school	Ref	
High school	0.52 (0.13-2.13)	0.36
Vocational school	0.83 (0.17-3.96)	0.81
University or higher	0.56 (0.15-2.10)	0.39
Sexual intercourse		
Yes		
No	1.84 (0.11-31.01)	0.67
Frequency of condom use		
Always	Ref	
Usually	0.21 (0.05-0.79)	0.02*
Sometimes	0.27 (0.07-0.99)	0.05*
Rarely	0.11 (0.02-0.58)	0.01*

Characteristics	Unadjusted OR (95% CI)	P-value
Never use	0.24 (0.04-1.38)	0.11
Syphilis testing		
Yes	Ref	
No	1.35 (0.53-3.46)	0.54
Sexual risk behavior		
Never had sexual intercourse	Ref	
Multiple partners	0.00(0.0-0.0)	1.00
Unsafe sex	1.34 (0.51-3.50)	0.55
Sex with person who has syphilis infection previously	1.21 (0.05-30.25)	0.91
Sex with sex-worker	0.00(0.0-0.0)	1.00
Reproductive health education		
Yes	Ref	
No	0.65 (0.25-1.71)	0.39
Available of reproduction health service		
Yes	Ref	
No	0.80 (0.29-2.24)	0.68
History of reproductive health service use		
Never use service	Ref	
Public hospital	0.70 (0.22-2.20)	0.54
Primary care hospital	2.49 (0.71-8.71)	0.15
Private clinic/hospital	0.70 (0.17-2.97)	0.63

\* (P-value <0.05)

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#### **4.5 Association of socio-demographic data, education sexual behavior, and access to reproductive health service with the knowledge and awareness level of syphilis prevention.**

The logistic regression statistics was applied to determine the association between socio-demographic characteristics, education, sexual behavior, and access to reproductive health service, with the level of knowledge and awareness of syphilis prevention.

Table 3 showed the association between related factors and knowledge. Crude logistic regression analysis found that employment status, living status, and frequency of condom use statistically significant associated with knowledge level of syphilis



prevention among the youths who visited at the Family Planning Clinic, Bangkok, Thailand. For more detail in each factor, employment status; participants with unemployment status had a statistically significant association with knowledge level of syphilis prevention compared to those who were fulltime job [OR 0.239, 95%CI (0.082-0.702)]. Living status; participants living with couple [OR 0.115, 95%CI (0.032-0.419)] and living with family or relative [OR 0.270 95%CI (0.081-0.895)] had a statistically significant association with knowledge level of syphilis prevention compared to those who living alone. Frequency of condom use; participants with usually use [OR 0.163, 95%CI (0.036-0.731)], sometimes use [OR 0.067, 95%CI (0.014-0.321)], and rarely use [OR 0.040, 95%CI (0.006-0.255)] had a statistically significant association with knowledge level of syphilis prevention compared to those who always use of condom.

Also, this study reported that the frequency of condom use associated with awareness level of syphilis prevention (table 4). Participants with usually use [OR 0.205, 95%CI (0.053-0.790)], sometimes use [OR 0.268, 95%CI (0.072-0.991)], and rarely use [OR 0.107, 95%CI (0.020-0.584)] had a statistically significant association with awareness level of syphilis prevention compared to those who always use of condom.

#### **4.6 Multivariable logistic regression analysis**

Multivariate analysis was applied to determine association between related factors and level of knowledge and awareness of syphilis prevention. All statistically significant variables associated with level of knowledge and awareness of syphilis prevention in bivariable logistic regression analysis which had a p-value of less than 0.2 were considered in a multivariable logistic regression model 1. Then, all significant different variables associated with knowledge and awareness of syphilis prevention in multivariable logistic regression model 1 which had a p-value of less than 0.05 were considered in a multivariable logistic regression model 2.

According to the knowledge level of syphilis prevention, employment status, living status, frequency of condom use, reproductive health education, and history of reproductive health service use had a p-value less than 0.05 for all variables after

analyzed with multivariable logistic regression model 1, so it was unnecessary to further analyzed with model 2. (Table 5)

According to the awareness of syphilis prevention, living status, frequency of condom use, and history of reproductive health service use were considered in a multivariable logistic regression model 1. As a result of model 1, frequency of condom use and knowledge of syphilis prevention were considered for multivariable logistic regression model 2. (Table 6)

Table 5: Adjusted Odds ratio (OR) and 95% Confidence Interval (CI) for knowledge level

Factors	Adjusted OR (95% CI)**
Employment status	
Fulltime job	Ref
Parttime job	0.38 (0.13-1.11)
Unemployment	0.29 (0.11-0.75) *
Living status	
Living alone	Ref
Living with family or relative	0.19 (0.07-0.51) *
Living with friend or colleague	0.67 (0.16-2.77)
Living with couple	0.46 (0.18-1.16)
Frequency of condom use	
Never use	Ref
Always	7.95 (1.64-38.61) *
Usually	1.49 (0.46-4.83)
Sometimes	0.58 (0.18-1.86)
Rarely	0.30 (0.07-1.37)
Reproductive health education	
Yes	Ref
No	0.29 (0.11-0.77) *
History of reproductive health service use	
Never use service	Ref
Public hospital	0.60 (0.25-1.43)
Primary care hospital	0.81 (0.28-2.36)
Private clinic/hospital	0.27 (0.07-0.99) *

\*(P-value < 0.05)

\*\* Adjusted OR for employment status, living status, frequency of condom use, reproductive health education, history of reproductive health service use.

Table 6: Adjusted Odds ratio (OR) and 95% Confidence Interval (CI) for awareness level

Factors	Model 1**	Model 2***
	Adjusted OR (95% CI)	Adjusted OR (95% CI)
Living status		
Living alone	Ref	
Living with family or relative	1.28 (0.44-3.74)	
Living with friend or colleague	0.68 (0.14-3.38)	
Living with couple	2.40 (0.87-6.59)	
Frequency of condom use		
Never use	Ref	
Always	2.84 (0.71-11.37)	
Usually	0.85 (0.26-2.74)	
Sometimes	1.24 (0.41-3.70)	
Rarely	0.64 (0.16-2.58)	
History of reproductive health service use		
Never use service	Ref	
Public hospital	0.78 (0.33-1.86)	
Primary care hospital	2.62 (1.02-6.75) *	
Private clinic/hospital	0.98 (0.28-3.43)	
Knowledge of syphilis prevention		
Fair or poor	Ref	Ref
Good	1.21 (1.06-1.37) *	1.19 (1.06-1.33) *

\*(P-value < 0.05)

\*\*Adjusted OR for living status, frequency of condom use, history of reproductive health service use, knowledge of syphilis prevention.

\*\*\*Adjusted OR for history of reproductive health service use, knowledge of syphilis prevention.

Regarding the multivariate analysis of knowledge level of syphilis prevention, employment status; participants with unemployment status had a statistically significant association with knowledge level of syphilis prevention compared to those who were fulltime job [OR 0.287, 95% CI (0.111-0.746)]. Living status; participant who lived with family or relative had a statistically significant association with knowledge level of syphilis prevention compared to those who lived alone [OR 0.187,

95% (0.069-0.510)]. Frequency of condom use, participant who always used condom had a statistically significant association with knowledge level of syphilis prevention compared to those who never used condom [OR 7.952, 95% CI (1.638-38.606)]. Reproductive health education, participant who had no Reproductive health education had a statistically significant association with knowledge level of syphilis prevention compared to those who had a Reproductive health education [OR 0.287, 95% CI (0.107-0.769)]. History of reproductive health service use, participant who had ever used a reproductive health service at private clinic/hospital had a statistically significant association with knowledge level of syphilis prevention compared to those who never used any reproductive health service [OR 0.267, 95% CI (0.072-0.996)].

Regarding the multivariate analysis of awareness level of syphilis prevention, only knowledge level of syphilis prevention had a statistically significant association with awareness level of syphilis prevention. Participant who had a “good” knowledge level had more awareness compared to those who had “fair or poor” knowledge level [OR 1.191, 95% CI (1.064-1.332)].

## **Chapter 5**

### **Discussion**

In consequence of reappearing syphilis infection among youths in Thailand, our study attempted to understand a reason behind this problem by exploring knowledge and awareness of syphilis prevention among youths which were the most high-risk group for infection. A cross-sectional study was conducted among 207 participants aged between 15–24-year-old who visited a the PPAT family planning clinic, Bangkok, Thailand. Aim of this study was to determine an association between related factors and the knowledge and awareness of syphilis prevention.

The result showed that 63 percent of participant were classified as “fair or poor knowledge level”. Along with awareness level, 74 percent of participant classified as “fair or poor awareness level”. This result reflexed to a school-based reproductive health education in Thailand need to be improved urgently, otherwise it might influence to preventive measure for controlling syphilis and other STI.

#### **5.1 Knowledge of syphilis prevention**

Employment status had been reported for a risk factor of sexually transmitted infection and syphilis. Because of individuals who were employed often met a lot of people in their workplace and everyday life, some job required frequent travel outside the place of residence. So, it was a chance for unprotected sex or multiple partners' sex. (56). Result from our study indicated that unemployment associated with lower knowledge of syphilis prevention compared with individual who had fulltime job. There was supportive data from a study of occupational related sexually transmitted infection from India reported that occupational status not only act as a risk factor for acquiring STIs, but also as a risk factor for spreading STIs. (56). Though there were several studies had been conducted to explore a relationship between occupational status and STI, only few studies specifically mentioned about knowledge of syphilis prevention and occupational status. A cross-sectional study from Brazil had been carried out to analyze knowledge, attitudes and practices of university adolescents about syphilis. They attempted to find the association between employment status to

level of knowledge, attitude, and practice about syphilis, however, the result was non statistically significant. (57) Therefore, further studies are required to support this finding.

Living status associates with level of knowledge in our study. From the literature review, there were no studies directly demonstrated a living status of youth to the knowledge of syphilis prevention. But there had been some qualitative studies on sexual health literacy in Thailand that mentioned the living status of adolescents could affect the level of knowledge to prevent of sexual risk behaviors (58). This study said that living with parents or relatives provided essential information to avoid sexual risk behaviors as well as they would contribute a trustful counselling when the youths had some sexual issues(58)

In general, sexual risk behaviors are considered to be a determinant of STDs (59). Our study found that unsafe sex without condom was the highest problem among sexual risk behaviors. Recently, Thai health-related organizations had explored this problem by conducting a survey among adolescents and youths. In year 2019, the Thai Health Promotion Foundation did a survey about attitude of condom use among adolescents and youths. Results from this survey was quite interesting, the top 3rd reasons why they avoid using condom were; price of condom was too expensive compared with meal, afraid to buy condoms especially buying from convenience stores because he was embarrassed by the cashier or afraid of being teased by others, prefer a contraceptive pill instead of condom. (60) Corresponding with the survey from DDC that reported a lot of misconceptions of syphilis and condom use. (12) Additionally, our study found a statistically significant association between frequency of condom use and level of knowledge. This finding was consistent with previous publication which studied about the relationship between level of health literacy and sexually transmitted infections among students, they mentioned that an adequate level of health literacy could help young people or students made better decisions about their sexual behavior. Furthermore, they found an incidence of STDs was associated with a low level of health literacy and low levels of condom use.(61)

Reproductive health education plays an important role to enable the youths understood and perceived their own risk of syphilis to avoid sexual risk behaviors. As

we mentioned previously that the Thai youths had a lot of misconceptions about syphilis and condom use. To correct this misconception, we need to reform a school-based reproductive health education program in accordance with the current situation, more accessible and broader. This finding was consistent with previous studies from China(50, 51), they found that educational level and reproductive health education associated with both level of knowledge and awareness of syphilis. Therefore, a sufficient knowledge and awareness were essential to correct those misconceptions as well as induce preferable sexual behaviors.

Reproductive health service use associated with knowledge level of syphilis prevention in our study, however majority of the youths in our study did not have a reproductive health service available in their local area. This problem needs to be solved. The online reproductive health services might fill this gap of accessibility, because currently everyone can access to internet easily through mobile phone, tablet, and laptop. The youths can use internet to access online services for reproductive health education, develop skill for prevent STIs and prevent unplanned pregnancy, online counseling for family planning, etc.

## **5.2 Awareness of syphilis prevention**

From multivariable logistic regression analysis model 2, we found that the knowledge of syphilis prevention was statistically significant associated with the awareness level of syphilis prevention. Awareness is more complex than knowledge. it is the result of cognitive processes, that refers to the situation in which a person experiences, feelings, thinks or realizes from a particular event. It is a condition that a person understands and assessing one's own situation based on wisdom and mental state to choose the behavior or action for dealing with problems that has been encountered. (62) Thus, to increase the awareness level of youths we need to put more effort rather than providing only health education. It has been studied that applying a behavioral change model to increase the level of health awareness. For example, the Health belief model is a well-known behavioral change model that focus on individual beliefs about health conditions, which predict individual health-related behaviors. (15) The model consists of the key factors that influence health behaviors as an individual's perceived threat to sickness or disease (perceived susceptibility), belief of

consequence (perceived severity), potential positive benefits of action (perceived benefits), perceived barriers to action, exposure to factors that prompt action (cues to action), and confidence in ability to succeed (self-efficacy). This finding corresponds with a process of awareness formation. There was a research that review definition and process of awareness from several literatures, all of them mention that perception and knowledge were an essential element also fundamental of awareness. Starting with people experienced or perceived in a particular matter. Subsequently, concepts were formed through a cognitive process. After that there will be learning and developing as a body of knowledge. Finally, if that knowledge is meaningful to their core value, it will raise awareness. (63)

These results raise a big challenge to the current syphilis control programs of Thailand, because knowledge and awareness are the fundamental of self-protective behavior to prevention of syphilis and other STIs as well as overcomes misconceptions about susceptibility to infection. Therefore, its necessary to reorientate a reproductive health program in Thailand to keep up with the changing of perception, preference, and sexual behavior of the youths. Additionally, it might assist the healthcare provider, public health workforce, Department of disease control, and policy maker to focus more on these factors and establish a suitable strategy for controlling syphilis among the youths and vulnerable population.

### 5.3 Conclusion

The youths are generally recognized as sexually active and vulnerable for syphilis infection. Almost 1 of 4 youths in this study has sexual risk behavior susceptible to syphilis. In order to reduce these sexual risk behaviors, it is important to emphasize the knowledge and increase awareness regarding syphilis prevention among the youths. Also, many health behavioral change models are useful to increase the knowledge and awareness level.

The result of this study demonstrates that employment status, living status, frequency of condom use, reproductive health education, and history of reproductive health service use associated with knowledge level of syphilis prevention among the youths who visited at the Family Planning Clinic, Bangkok, Thailand. Additionally,



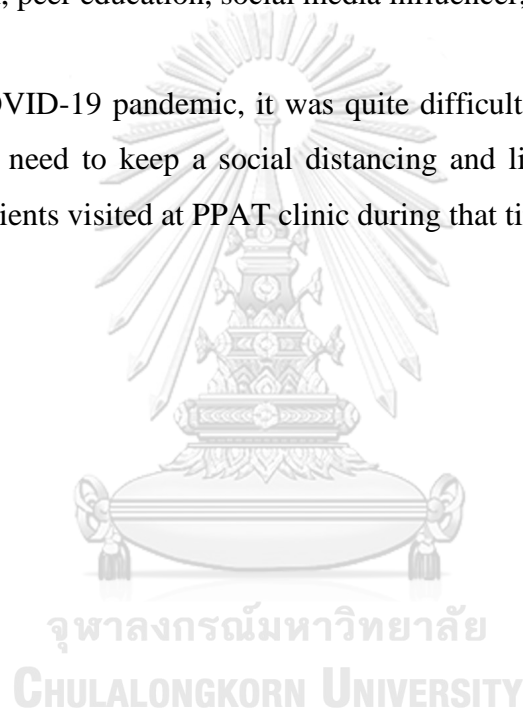
our study found that only knowledge level of syphilis prevention had an association with awareness level of syphilis prevention.

#### **5.4 Recommendation**

For future and further study, it is suggested that the researcher should focus on syphilis knowledge implementation by looking into the participative groups' socio-demography, sexual behavior, and access to reproductive health service aspects. Additionally, novel strategy to increase knowledge and awareness level of syphilis prevention need to be considered. For example, reproductive health education via mobile application, peer education, social media influencer, etc.

#### **5.5 Limitation**

Due to COVID-19 pandemic, it was quite difficult to access youths at PPAT clinic because we need to keep a social distancing and limit time to contact. Also, there were less patients visited at PPAT clinic during that time.



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## **Appendix**

### **Questionnaire (English version)**

#### Knowledge & awareness of syphilis infection questionnaires

#### **Instruction**

This questionnaire evaluates on knowledge and awareness of syphilis infection based on participant's perspective. It is divided into 2 parts as following. All answers will be kept confidentially and anonymously.

– **Part 1:**

- 1.1 General data & socio-demographic data.
- 1.2 Sexual preventive behavior
- 1.3 Sexual and reproductive health education/information
- 1.4 Sexual and reproductive health service accessibility

– **Part 2:**

- 2.1 Questionnaires about knowledge of syphilis.
- 2.2 Questionnaires about awareness of syphilis.

#### **PART 1**

##### **1.1 General data & socio-demographic data**

- 1.Age: ..... year
- 2.Gender
  - Male
  - Female
- 3.Marital status
  - Single
  - Married, live together
  - Married, separation
  - Divorce
  - Other, please specify.....

- 4. Employment status
  - Employed, part time
  - Employed, full time
  - Unemployed
- 5. Current living status
  - Living alone
  - Living with family or relative
  - Living with friend or colleague
  - Living with couple
  - Other, please specify.....
- 6. Medical history
  - Have one or more sexually transmitted infection in previous 6 months
  - None
  - Other, please specify.....
- 7. Education level
  - Primary school or lower
  - Junior high school
  - High school
  - University or higher
  - Vocational school
  - Uneducated
  - Other, please specify.....

### 1.2 Sexual preventive behavior

1. Have you ever had sexual intercourse?
  - yes
  - no
- 2. How often do you use condom when you have sexual activity?
  - Always
  - Usually
  - Sometimes
  - Rarely
  - Never use

- 3. Have you ever got a test for syphilis?
  - Yes
  - No
- 4. Do you have any risk factors of syphilis transmission?
  - Multiple partners
  - Condomless sex
  - Having sex with person who has history of syphilis infection
  - Having experience with sex-workers
  - I don't have any sexual risk behavior
  - I never had sexual intercourse.

### 1.3 Sexual and reproductive health education/information

- 1. Do you ever have reproductive health education or sexual health education?
  - Yes, when.....
  - No
- 2. What source of reproductive health education or sexual health education that you get from? (Can answer more than 1 choice)
  - School program
  - Friend
  - Family
  - Internet
  - Social media
  - Print media (e.g., book, magazine)
  - Hospital or clinic
  - Radio
  - Other, please specify.....
- 3. What source of reproductive health education or sexual health education that you prefer? (Can answer more than 1 choice)
  - School program
  - Hospital or clinic
  - Radio or Podcast
  - Television or advertising



- Print media (e.g., book, magazine)
- Internet and website
- Social media
- Mobile messenger application
- Other, please specify.....

#### **1.4 Sexual and reproductive health service accessibility**

- 1. Is there any family planning service in your area of living?
  - Yes
  - No
- 2. If yes, what kind of family planning service that you know or ever visit?
  - Hospital 's youth friendly clinic
  - Primary healthcare service
  - The Family planning clinic
  - Other, please specify.....
- 3. How difficult of accessing to family planning service in your area?
  - Easy
  - Moderate
  - Difficult
- 4. If difficult, what are the barriers? (Can answer more than 1 choice)
  - Time
  - Money
  - Transportation and place
  - Mode of access
  - Feel uncomfortable
  - Other, please specify.....

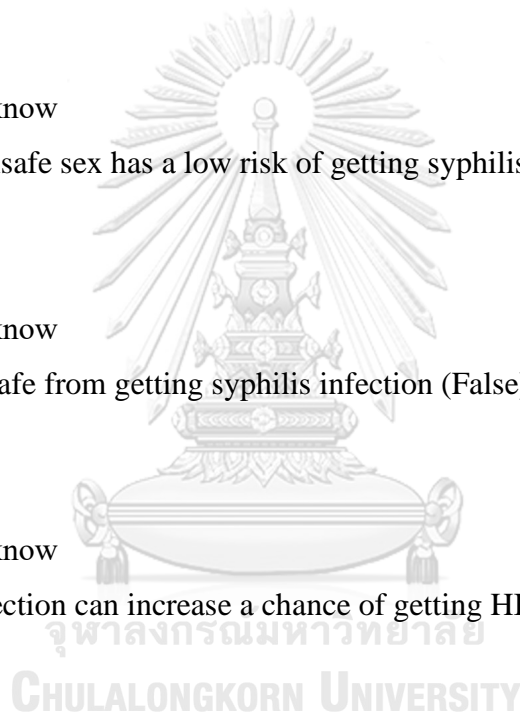
### **PART 2**

#### **2.1 Questionnaires about knowledge of syphilis**

**Instruction:** This part evaluate about knowledge of syphilis composed of 15 items. Please choose only one answer in each item that meet your understanding the most.

- 1. Syphilis is mainly transmitted through sexual contact (True)

- True
  - False
  - Don't know
- 2. Primary syphilis will show up with painless ulcer at genitalia (True)
    - True
    - False
    - Don't know
  - 3. A person looks healthy may has syphilis (True)
    - True
    - False
    - Don't know
  - 4. One-time unsafe sex has a low risk of getting syphilis infection (False)
    - True
    - False
    - Don't know
  - 5. Oral sex is safe from getting syphilis infection (False)
    - True
    - False
    - Don't know
  - 6. Syphilis infection can increase a chance of getting HIV (True)
    - True
    - False
    - Don't know
  - 7. Syphilis infection associate with increasing HIV viral load in HIV patients (True)
    - True
    - False
    - Don't know
  - 8. Pregnant woman can transmit syphilis to their baby (True)
    - True
    - False
    - Don't know



- 9. Having dinner or shaking hands with syphilis patients can infect syphilis (False)
  - True
  - False
  - Don't know
- 10. Using condoms correctly in sexual contact can prevent syphilis transmission (True)
  - True
  - False
  - Don't know
- 11. Antiretroviral drug for treatment of HIV or PrEP (Pre-Exposure Prophylaxis) can prevent syphilis transmission (False)
  - True
  - False
  - Don't know
- 12. Syphilis is not curable (False)
  - True
  - False
  - Don't know
- 13. Sex partners of syphilis patients need to attend a hospital for serological examination even they have no symptom (True)
  - True
  - False
  - Don't know
- 14. If the treatment of syphilis is not complete or not follow the schedule, patient has to re-start the treatment (True)
  - True
  - False
  - Don't know
- 15. People infected with syphilis and then receive complete treatment can develop immunity that can prevent them from syphilis re-infection (False)
  - True
  - False

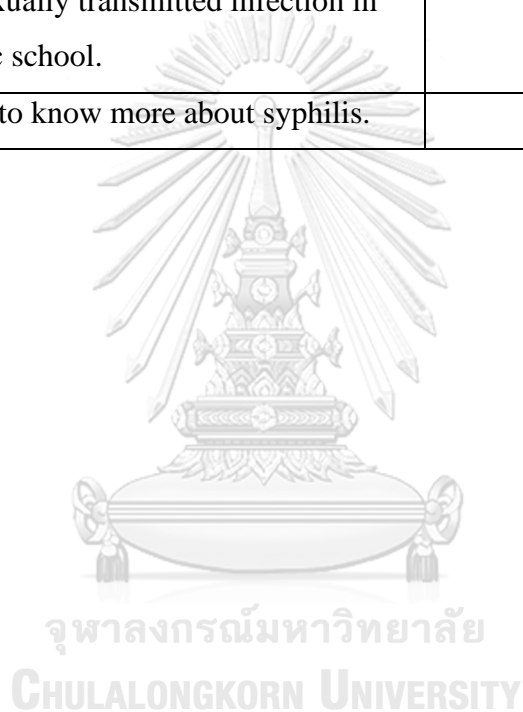
- Don't know

## 2.2 Questionnaires about awareness of syphilis

**Instruction:** This part evaluate about awareness of syphilis composed of 15 items. Each item has 5 level of rating scale; 1 is strongly disagree, 2 is disagree, 3 is neutral, 4 is agree and 5 is strongly agree. Please choose only one answer in each item that meet your opinion the most.

No.		Rating scale				
		1	2	3	4	5
		Strongly disagree <-----> Strongly agree				
1	I have heard about syphilis					
2	I know how to prevent myself from syphilis infection.					
3	I prefer to use condom with my partner when I have sexual intercourse					
4	I know how to use condom correctly					
5	I am confident that the use of condom can prevent form syphilis infection					
6	I should know my current syphilis infection					
7	I think I should know that your sexual partner has syphilis and other STIs or not?					
8	If I am in high-risk group that susceptible for syphilis infection, I should test for syphilis at least 1-2 time/year					
9	I think long-term monogamy relationship is a good way to prevent syphilis and other STIs					
10	If I have something wrong that possible a sign (e.g., wound at genitalia) of syphilis infection, I do not hesitate to see a doctor.					

11	If I have syphilis infection, I am not afraid about letting my partner know.					
12	You can give some basic advice to your friend or someone that ask you about syphilis disease.					
13	If my friends or relatives suspect syphilis infection, I will advise them to see a doctor.					
14	I think there should be education on syphilis and other sexually transmitted infection in the academic school.					
15	I would like to know more about syphilis.					



## Questionnaire (Thai version)

แบบสอบถาม

แบบสอบถามในหัวข้อความรู้และความตระหนักต่อโรคซิฟิลิสในกลุ่มเยาวชนอายุ 15-24 ปี

### คำชี้แจง

แบบสอบถามนี้เป็นการสอบถามความรู้และความตระหนักต่อโรคซิฟิลิสตามมุมมองและประสบการณ์ของผู้เข้าร่วมวิจัย ข้อมูลทั้งหมดจะถูกเก็บไว้เป็นความลับและไม่ระบุตัวตนของผู้ตอบแบบสอบถามซึ่งประกอบด้วยคำถาม 2 ตอนดังนี้

#### – ตอนที่ 1:

- 1.1 ข้อมูลทั่วไปและข้อมูลเชิงประชากร
- 1.2 พฤติกรรมทางเพศ
- 1.3 การได้รับการศึกษาและข้อมูลด้านอนามัยการเจริญพันธุ์
- 1.4 การเข้าถึงบริการด้านอนามัยการเจริญพันธุ์

#### – ตอนที่ 2:

- 2.1 คำถามเรื่องความรู้ต่อโรคซิฟิลิส
- 2.2 คำถามเรื่องความตระหนักต่อโรคซิฟิลิส

### ตอนที่ 1

#### 1.1 ข้อมูลทั่วไปและข้อมูลเชิงประชากร

- 1.อายุ: ..... ปี
- 2.เพศ

- 1.ชาย
- 2.หญิง
- 3.สถานะสมรส
  - 1.โสด
  - 2. คู่อยู่ด้วยกัน
  - 3. คู่แยกกันอยู่
  - 4. หย่า/หม้าย
  - 5.อื่น ๆ, โปรดระบุ.....
- 4.สถานะการทำงาน
  - 1.ทำงานเต็มเวลา (full-time)
  - 2.ทำงานบางเวลา (part-time)
  - 3.ว่างงาน
- 5.ปัจจุบันท่านพักอาศัยกับ
  - 1.พักอาศัยคนเดียว
  - 2.พักอาศัยอยู่กับครอบครัวหรือญาติ
  - 3.พักอาศัยกับเพื่อนหรือเพื่อนร่วมงาน
  - 4.พักอาศัยกับคู่ครอง
  - 5.อื่น ๆ, โปรดระบุ.....
- 6.ประวัติทางการแพทย์
  - 1.ท่านเคยมีประวัติโรคติดต่อทางเพศสัมพันธ์ชนิดใดชนิดหนึ่งในช่วง 6 เดือนที่ผ่านมา
  - 2.ไม่เคยมีประวัติ



3.อื่น ๆ, โปรดระบุ.....

■ 7.ระดับการศึกษาสูงสุด

1.ประถมศึกษาหรือต่ำกว่า

2.มัธยมต้น

3.มัธยมปลาย

4.มหาวิทยาลัยหรือสูงกว่า

5.อาชีวศึกษาหรือสายอาชีพ

6.ไม่ได้ศึกษา

7.อื่น ๆ, โปรดระบุ.....



1.2 พฤติกรรมทางเพศ

■ 1.ท่านเคยมีเพศสัมพันธ์หรือไม่

เคยมี

ไม่มีเคยมี

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

■ 2.หากเคยมี ท่านใช้ถุงยางอนามัยเมื่อมีเพศสัมพันธ์บ่อยแค่ไหน

1.ทุกครั้ง

2.ใช้เป็นส่วนใหญ่

3.บางครั้ง

4.นาน ๆ ครั้ง

5.ไม่เคยใช้



- 3. ท่านเคยตรวจเลือดเพื่อทดสอบหาการติดเชื้อฟิลิสหรือไม่
  - 1. เคยตรวจ
  - 2. ไม่เคยตรวจ
- 4. ท่านมีปัจจัยเหล่านี้ที่อาจเสี่ยงต่อการติดเชื้อฟิลิสหรือไม่
  - 1. การมีเพศสัมพันธ์กับคู่นอนหลายคน
  - 2. การมีเพศสัมพันธ์กับผู้อื่น โดยไม่สวมถุงยางอนามัย
  - 3. การมีเพศสัมพันธ์กับผู้ที่เคยมีประวัติการติดเชื้อฟิลิส
  - 4. การมีเพศสัมพันธ์กับหญิงหรือชายขายบริการ
  - 5. ไม่เคยมีพฤติกรรมดังกล่าวข้างต้น
  - 6. ไม่เคยมีเพศสัมพันธ์

### 1.3 การได้รับการศึกษาและข้อมูลด้านอนามัยการเจริญพันธุ์

- 1. ท่านเคยได้รับการเรียนการสอนเรื่องอนามัยการเจริญพันธุ์หรือเพศศึกษาก่อนหน้านี้หรือไม่
  - 1. เคยเรียน, เมื่อ.....
  - 2. ไม่เคยเรียน
- 2. ท่านได้รับข้อมูลเรื่องอนามัยการเจริญพันธุ์หรือเพศศึกษามาจากแหล่งใด (ตอบได้มากกว่า 1 ข้อ)
  - 1. โรงเรียนหรือมหาวิทยาลัย
  - 2. เพื่อน
  - 3. ครอบครัว

- 4.อินเทอร์เน็ต
  - 5.สื่อสังคมออนไลน์ (social media)
  - 6.สื่อสิ่งพิมพ์ (เช่น หนังสือ นิตยสาร แผ่นพับ)
  - 7.โรงพยาบาลหรือคลินิก
  - 8.วิทยุ
  - 9.อื่น ๆ, โปรดระบุ.....
  - 10.ไม่เคยได้รับข้อมูล
- 3.แหล่งข้อมูลใดที่ท่านคิดว่ามีความยินดีและเหมาะสมที่ท่านจะรับข้อมูลเรื่องอนามัยการเจริญพันธุ์หรือเพศศึกษา (ตอบได้มากกว่า 1 ข้อ)
- 1.การเรียนการสอนในโรงเรียน
  - 2.โรงพยาบาลหรือคลินิก
  - 3.วิทยุ
  - 4.สื่อโทรทัศน์หรือโฆษณา
  - 5.สื่อสิ่งพิมพ์ (เช่น หนังสือ นิตยสาร แผ่นพับ)
  - 6.อินเทอร์เน็ต
  - 7.สื่อสังคมออนไลน์ (social media)
  - 8.แอปพลิเคชันส่งข้อความ (Mobile messenger application)
  - 9.อื่น ๆ, โปรดระบุ.....

#### 1.4 การเข้าถึงบริการด้านอนามัยการเจริญพันธุ์

1. ในบริเวณใกล้กับที่ท่านอาศัยอยู่มีคลินิกอนามัยการเจริญพันธุ์/คลินิกวางแผนครอบครัวหรือไม่

- 1.มี
- 2.ไม่มี

2.หากมี ท่านเคยไปรับบริการคลินิกอนามัยการเจริญพันธุ์/คลินิกวางแผนครอบครัวจากที่ใด

- 1.คลินิกวางแผนครอบครัวในโรงพยาบาลรัฐ
- 2.สถานอนามัยหรือโรงพยาบาลส่งเสริมสุขภาพตำบล
- 3.คลินิกวางแผนครอบครัวของภาคเอกชนหรือโรงพยาบาลเอกชน
- 4.อื่น ๆ, โปรดระบุ....

3.ความยากง่ายในการเข้าถึงบริการอนามัยการเจริญพันธุ์/วางแผนครอบครัวในพื้นที่ที่ท่านอาศัยอยู่เป็นอย่างไร

- 1.เข้าถึงได้ง่าย
- 2.เข้าถึงได้ปกติปานกลาง
- 3.เข้าถึงได้ยาก

4.หากเข้าถึงได้ยาก อะไรที่เป็นอุปสรรคของการเข้าถึงบริการอนามัยการเจริญพันธุ์/วางแผนครอบครัว ในพื้นที่ของท่าน (ตอบได้มากกว่า 1 ข้อ)

- 1.ข้อจำกัดด้านเวลา
- 2.ข้อจำกัดด้านค่าใช้จ่าย
- 3.ข้อจำกัดด้านสถานที่หรือการเดินทาง
- 4.ข้อจำกัดด้านช่องทางการเข้าถึง
- 5.ข้อจำกัดด้านความรู้สึกรู้สึกหรือความสบายใจ

- 5.อื่น ๆ, โปรดระบุ.....

## ตอนที่ 2

### 2.1 คำถามเรื่องความรู้ต่อโรคซิฟิลิส

- 1. โรคซิฟิลิสเป็นโรคที่ติดต่อทางเพศสัมพันธ์
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 2. การมีแผลที่อวัยวะเพศอาจเป็นอาการแสดงเบื้องต้นของการติดเชื้อซิฟิลิสได้
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 3. คนที่ภายนอกดูแข็งแรงก็อาจมีเชื้อซิฟิลิสในร่างกายได้
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 4. การมีเพศสัมพันธ์แบบไม่ป้องกันแค่เพียงครั้งเดียวมีความเสี่ยงต่ำในการติดเชื้อซิฟิลิส
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 5. การมี oral sex นั้นปลอดภัยจากการติดเชื้อซิฟิลิส
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 6. การติดเชื้อซิฟิลิสเพิ่มความเสี่ยงของการติดเชื้อ HIV
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ

- 7. การติดเชื้อซิฟิลิสสามารถทำให้ผู้ติดเชื้อ HIV มีระดับของเชื้อ HIV ในเลือดที่สูงขึ้นได้
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 8. หญิงตั้งครรภ์ที่ติดเชื้อซิฟิลิสสามารถส่งผ่านเชื้อไปยังลูกในท้องได้
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 9. การจับมือหรือรับประทานอาหารร่วมกันกับผู้ป่วยซิฟิลิสสามารถทำให้ติดเชื้อได้
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 10. การใช้ถุงยางอนามัยแบบถูกรีวิเวระหว่างมีเพศสัมพันธ์สามารถป้องกันการติดเชื้อซิฟิลิสได้
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 11. การได้รับยาต้านไวรัส HIV หรือกินยา PrEP สามารถป้องกันการติดเชื้อซิฟิลิสได้
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 12. ซิฟิลิสเป็นโรคที่รักษาไม่หายขาด
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 13. คู่นอนของผู้ป่วยที่ติดเชื้อซิฟิลิสจำเป็นต้องมาตรวจหาการติดเชื้อซิฟิลิสที่โรงพยาบาลหรือคลินิกแม้ว่าไม่มีอาการผิดปกติ
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ



- 14. ผู้ป่วยที่ติดเชื้อซิฟิลิสที่ได้รับการรักษาไม่ครบหรือไม่มาฉีดยาครบจำนวนตามนัดของแพทย์ จำเป็นต้องเริ่มการรักษาใหม่ตั้งแต่ต้น (True)
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ
- 15. คนไข้ที่เคยติดเชื้อซิฟิลิสและได้รับการรักษาครบถ้วนแล้ว จะมีภูมิคุ้มกันไปตลอดชีวิตและไม่ติดเชื้อซ้ำอีก
  - ใช่
  - ไม่ใช่
  - ไม่ทราบ

## 2.2 คำถามเรื่องความตระหนักต่อโรคซิฟิลิส

ข้อ		คะแนน				
		1	2	3	4	5
		ไม่เห็นด้วยมากที่สุด <-----> เห็นด้วยมากที่สุด				
1	ฉันเคยได้ยินเกี่ยวกับโรคซิฟิลิส					
2	ฉันรู้วิธีการป้องกันตนเองจากการติดเชื้อซิฟิลิส					
3	ฉันรู้สึกสบายใจที่จะใช้ถุงยางอนามัยเมื่อมีเพศสัมพันธ์					
4	ฉันรู้วิธีการใช้ถุงยางอนามัยที่ถูกต้อง					
5	ฉันคิดว่าการใช้ถุงยางอนามัยสามารถป้องกันการติดเชื้อซิฟิลิสได้					
6	ฉันควรได้รับการตรวจและรู้สถานะการติดเชื้อซิฟิลิสของตัวเอง					
7	ฉันควรรู้ว่าคู่นอนของฉันมีการติดเชื้อซิฟิลิสหรือโรคติดต่อทางเพศสัมพันธ์อื่นหรือไม่					
8	ถ้าหากฉันมีพฤติกรรมเสี่ยงต่อการติดเชื้อซิฟิลิส ฉันควรได้รับการตรวจคัดกรองเพื่อหาการติดเชื้อซิฟิลิส					

	อย่างน้อยปีละ 1-2 ครั้ง					
9	ฉันเลือกที่จะมีคู่นอนเพียงคนเดียวเพราะเป็นวิธีการที่ดีในการป้องกันการติดเชื้อฟิลิสและโรคติดต่อทางเพศสัมพันธ์อื่น ๆ					
10	หากฉันพบว่ามีอาการผิดปกติที่อาจสงสัยว่าเป็นการติดเชื้อฟิลิส (เช่น การมีแผลที่อวัยวะเพศ) ฉันไม่ลังเลที่จะเข้าไปปรึกษาแพทย์					
11	ถ้าหากฉันติดเชื้อฟิลิสฉันยินดีที่จะบอกให้คู่นอนของฉันทราบ					
12	ฉันสามารถให้คำแนะนำเบื้องต้นกับเพื่อนหรือคนอื่น ๆ เกี่ยวกับโรคฟิลิสได้					
13	หากเพื่อนหรือญาติของฉันสงสัยว่าติดเชื้อฟิลิส ฉันจะแนะนำให้เขาไปพบแพทย์					
14	ฉันคิดว่าควรมีการเรียนการสอนเกี่ยวกับโรคฟิลิส และโรคติดต่อทางเพศสัมพันธ์อื่น ๆ ในสถานศึกษา					
15	ฉันอยากมีความรู้เกี่ยวกับโรคฟิลิสมากขึ้น					

## VITA

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