BARRIERS, ENABLERS AND CHALLENGES IN THE PRACTICE OF DIRECTLY OBSERVED TREATMENT FOR TUBERCULOSIS PATIENTS IN A LOCAL THAI COMMUNITY

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Abstract

Tuberculosis (TB) has presented a challenge to the public health community in Thailand, especially as regards patient adherence to TB treatment. Direct observed treatment (DOT) is recommended for promoting patient adherence to TB treatment. There is good evidence that DOT can significantly increase the patient adherence to TB treatment. However, the implementation of DOT has complex relationships to socioeconomic factors and Thai context issues.

The overall aim was (1) to obtain a deeper understanding of what happens when the DOT is practised in a local Thai community, and (2) to generate knowledge for improving the implementation of DOT, and thereby improve patient adherence to TB treatment.

The empirical data were collected in Trang province, in the southern region of Thailand, between 2013 and 2015. The sample of study I consisted of five District TB Coordinators and five TB clinic staff from the public health sectors in rural and urban areas. Phenomenographic analysis was used. Study II: Five focus group discussions were conducted with 25 village health volunteers and six family members; manifest and latent content analysis was used for the analysis. Study III: Twenty TB patients were interviewed, using grounded theory methodology. Study IV: A mixed-method systematic review was accessed through databases. Data from the selected studies were extracted and synthesized using thematic analysis.

The fear of stigma of TB patients was considered a significant barrier to the practice of DOT and adherence to TB treatment (studies I, II and III). Lack of TB knowledge and skills among DOT observers were revealed as barriers to the practice of DOT (studies I and II). At the same time, social facilitation and TB patients’ positive thinking and self-awareness were considered enablers of patient adherence to TB treatment (studies I and III). Another result is to provide an empowerment approach for DOT observers, who, in turn, will increase the empowerment of TB patients to achieve adherence to TB treatment (study IV).

This thesis contributes a deeper understanding of the perspective of healthcare providers, DOT observers and TB patients when DOT is practised in a local Thai community. A challenge from these results is to provide an empowerment approach towards DOT observers. The results of this thesis will be useful for policy-makers who will consider strategies for improving the implementation of DOT and enabling patient adherence to TB treatment in the Thai context.
Education is the most powerful weapon which you can use to change the world

-Nelson Mandela-

**Background:** Tuberculosis (TB) has presented a challenge to the public health community in Thailand, especially as regards patient adherence to TB treatment. Direct observed treatment (DOT) is recommended for promoting patient adherence to TB treatment. There is good evidence that DOT can significantly increase the patient adherence to TB treatment. However, the implementation of DOT has complex relationships to socioeconomic factors and Thai context issues. Thus, there was a need to conduct this thesis, which aimed (1) to obtain a deeper understanding of what happens when the DOT is practised in a local Thai community, and (2) to generate knowledge for improving the implementation of DOT, and thereby improve patient adherence to TB treatment.

**Methods:** The empirical data were collected in Trang province, in the southern region of Thailand, between 2013 and 2015. The sample of study I consisted of five District TB Coordinators and five TB clinic staff from the public health sectors in rural and urban areas. Phenomenographic analysis was used. Study II: Five focus group discussions were conducted with 25 village health volunteers and six family members; manifest and latent content analysis was used for the analysis. Study III: Twenty TB patients were interviewed, using grounded theory methodology. Study IV: A mixed-method systematic review was accessed through databases. Data from the selected studies were extracted and synthesized using thematic analysis.

**Results:** The fear of stigma of TB patients was considered a significant barrier to the practice of DOT and adherence to TB treatment (studies I, II and III). Lack of TB knowledge and skills among DOT observers were revealed as barriers to the practice of DOT (studies I and II). At the same time, social facilitation and TB patients’ positive thinking and self-awareness were considered enablers of patient adherence to TB treatment (studies I and III). Another result is to provide an empowerment approach for DOT observers,
who, in turn, will increase the empowerment of TB patients to achieve adherence to TB treatment (study IV).

Conclusion: This thesis contributes a deeper understanding of the perspective of healthcare providers, DOT observers and TB patients when DOT is practised in a local Thai community. Lack of TB knowledge and skills among DOT observers, and fear of stigma among TB patients are considered as significant barriers. Also social facilitation as well as TB patients’ positive thinking and self-awareness are considered as key enablers. A challenge from these results is to provide an empowerment approach towards DOT observers, who, in turn, will empower TB patients to achieve adherence to TB treatment. The results of this thesis will be useful for policy-makers who will consider strategies for improving the implementation of DOT and enabling patient adherence to TB treatment in the Thai context.

Keywords:
directly observed treatment, empowerment, facilitator, leadership, local community, Thailand, tuberculosis
LIST OF PAPERS

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.


II Choowong, J., Tillgren, P., & Söderbäck, M. (2017). Directly observed therapy providers’ practice when promoting tuberculosis treatment in a local Thai community. (Submitted).


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ABBREVIATIONS

DOT  Directly Observed Treatment
DOTS  Directly Observed Treatment, Short-Course
DTC  District TB Coordinator
FGD  Focus Group Discussion
FM  Family Member
NTP  National Tuberculosis Program
PARIHS  The Promoting Action on Research Implementation in Health Services
PCU  Primary Care Unit
TB  Tuberculosis
UHC  Universal Health Coverage
VHV  Village Health Volunteer
WHO  World Health Organization
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DEFINITIONS

The Directly Observed Treatment Short-course or DOTS was introduced by WHO as a global strategy for effective TB control (World Health Organization, 1999).

Short-course treatment refers to a treatment regimen that lasts 6-8 months and uses a combination of anti-TB drugs (World Health Organization, 1999).

DOTS’ five main components:
1. Government commitment to sustained TB control activities. This is essential for the other four components to be implemented and sustained. This commitment must first translate into policy formulation, and then into the financial and human resources and administrative support necessary to ensure that TB control is always part of health services.
2. Case detection. This is the use of sputum smear microscopy to identify people with pulmonary TB among those attending general health services.
3. Standardized treatment regimen of six to eight months for all confirmed sputum smear-positive cases, with directly observed treatment for at least the initial two months.
4. A regular, uninterrupted supply of all essential anti-TB drugs.
5. A standardized recording and reporting system. This is used to systematically evaluate patient progress and treatment outcome, as well as overall program performance.

The DOTS regimen consists of two phases: an initial phase and a continuation phase (World Health Organization, 1999):
1. Initial phase: 2-3 months of daily treatment with three or more drugs.
2. Continuation phase: 4-6 months of daily or intermittent treatment with two or more drugs.

Directly observed treatment or DOT means watching patients taking the TB medications for at least the first two months (intensive phase of treatment).

Patient under DOT means the patient has to take the daily dose of drugs under the direct observation of a health worker or other designated person, to ensure that the drugs are taken in the right combination and for the appropriate duration (World Health Organization, 1999).
**DOT observers** can be anyone who is willing, trained, responsible, acceptable to the patient and accountable to the TB control services (World Health Organization, 1999).

**Incidence of TB** is defined as the number of new TB cases in one year per 100,000 population (United Nations, 2010).

**Prevalence of TB** is defined as the number of TB cases in a population at a given point in time (sometimes referred to as "point prevalence") per 100,000 population (United Nations, 2010).

**Death rates** associated with TB are defined as the estimated number of deaths due to TB in one year per 100,000 population (United Nations, 2010).

**Treatment success rate** is the percentage of patients who are cured and those who have completed treatment (United Nations, 2010).

**Cure rate** is defined as the percentage of patients who completed treatment and had two negative sputum examinations during treatment, of which one was at the end of treatment (United Nations, 2010).
In 1993, I graduated with a Bachelor of Nursing Science from Boromarajonani College of Nursing Suratthani in Thailand. From 1993, I worked as a nurse instructor at Boromarajonani College of Nursing in Trang in Thailand. In 2002, I received a Master’s degree in Nursing Sciences (Adult Nursing) from Khon Khen University in Thailand. My thesis had a quantitative design. Since 2002, I have taught Nursing Science at Boromarajonani College of Nursing in Trang. My work experience included: lecturer, responsible for both theory and practice for nursing students in adult nursing and other major and technical nursing subjects. Also, I was responsible for encouraging students to participate in traditional culture activities with internal college, and external societies.

My interest in the TB project was fostered during 2008-2012, when I participated in public health activities in Trang province in Thailand including: being a part of committee which was responsible for supervising and inspecting the public health nurses’ tasks. I was part of the committee and secretary of the Ethic Club Network, which was responsible for organizing meetings about ethics and integrity at a local health level. Also, I was a part of a ‘Public Health Policy Team’ which created and developed health care policy for elderly people. I conducted research on quality management of people with chronic illnesses in primary healthcare as well as tuberculosis, which was sponsored by the National Health Security Office, Thailand.

In 2012, I applied to become a full-time doctoral student, my proposed research project being ‘Improving the outcome of the managerial system in TB epidemic prevention and control in Trang province, Thailand’ at Mälardalen University, Sweden. During 2012-2017, the project was developed and became more focused.

In my research process, I have been responsible for the study conception and design, performing the data collection and data analysis, and drafting of manuscripts I-IV with my supervisors.
1. INTRODUCTION

Tuberculosis (TB) is a major public health concern resulting in high rates of morbidity and mortality worldwide, particularly in low and middle income countries, despite treatment having been available for over 50 years. An estimated 1.8 million people died from TB in 2015, making it among the top ten causes of death worldwide (World Health Organization, 2015). The Millennium Development Goals (MDGs) are designed to meet the needs of the poorest in the world. These goals focus on, among others, ending hunger, reducing poverty and promoting education and gender equality. MDG 6c is focused on TB and is beginning to reverse the incidence of TB (United Nations, 2010). The MDGs and the Stop TB partnership goals are important in working towards containing TB because they can increase political attention to the TB epidemic.

The Stop TB goals by the World Health Organization (WHO) have been aligned with the MDGs. The initial global strategy and targets of the Stop TB program were launched in 2006, and were increased after revision for the 2011-2015 strategy. The goals for 2011-2015 were the global burden of TB to be halved by 2015 compared to levels in 1990; the incidence of active TB to be reduced to less than one case per one million population per year by 2050; and successful treatment of 90 percent of smear-positive cases by 2015 (World Health Organization, 2006a). Despite these goals, the MDG reports indicate that the global incidence is falling slowly (United Nations, 2010). In 2014, a new global strategy and targets for TB prevention, care and control were adopted to continue post 2015 with a bold vision of a world without TB. The targets of ending the global TB epidemic by 2035 will be met through a reduction of TB deaths by 95 percent, and of TB incidence by 90 percent, or less than 10 TB cases per 100 000 population (World Health Organization, 2014).

The treatment and control of TB is made more difficult by the magnitude of the problem and the complexity of the forces driving the epidemic. The need to control the TB epidemic was followed by the development and global implementation by the WHO of directly observed treatment short-course (DOTS) as the internationally recommend strategy for TB control (World Health Organization, 1999). The DOTS strategy in TB management has been highly successful in terms of national alignment (Frieden & Sbarbaro, 2007; Garner, Smith, Munro & Volmink, 2007). The technical, logistical,
operational and political aspects of DOTS work together to ensure its success and applicability in a wide variety of contexts through the existing primary health care (PHC) network.

Although the DOTS strategy in general has been found to be useful in managing the TB epidemic, the key part of the DOTS strategy and Stop TB program is the DOT. DOT implies that treatment is taken by a patient under supervision by another person, often a health professional or community health worker (World Health Organization, 1999). The practice of DOT varies considerably across contexts. Both providers and places of treatment provision may differ, given the differences in the ways that DOT is implemented in different settings, which makes it difficult to assess the impact that DOT has on treatment outcomes. Furthermore, the TB treatment program through the implementation of DOT continues to face challenges such as the increasing problem of drug resistance which is likely to be the result of poor adherence to TB treatment and wider health system related problems (Frieden & Sbarbaro, 2007).

To date, there has been little published about the practice of DOT at a local community level and little guidance on strategies for how to improve this practice in order to promote patient adherence to TB treatment. This thesis will concern barriers, enablers and challenges in the practice of DOT and patient adherence to TB treatment in a local Thai community. It belongs to the research field of Health and Welfare and Caring Sciences. The results may guide health practices and indicate effective and sustainable policies for improving the implementation of DOT in the Thai context in the future.
2. BACKGROUND

2.1 The Thai context

Thailand is located in Southeast Asia and is divided into four regions: Central, North, Northeast and South. It is further administratively divided into 77 provinces. The provinces are divided into 877 districts, 7,255 sub-districts and 74,944 villages. Some areas are also designated as municipalities, including all provincial capitals (Ministry of Public Health Thailand, 2015). The climate in Thailand is mainly tropical, with high levels of humidity. The country is located within a monsoon region and temperatures are relatively high all year round.

In 2015, the population of Thailand was 68 million people (World Health Organization, 2016). The capital Bangkok is home to more than 10 million people. Thailand has been facing dramatic change in ageing and family patterns over the last three decades, due to past population policies and economic decline. A new era of slow population growth occurred between 1970 and 1990, where the fertility rate declined from 5.5 to 2.2. Some impacts of the rapid fertility decline are the changing of population structure in terms of changes in age structure, educational and skill structure, state of health and geographical distribution as well as reduced family size (Kunphoommarl, 2012). There is a big difference in the proportions of higher-level education among people in the provinces compared to the capital city (World Health Organization, 2012).

The official national language, spoken and written, is Thai. Almost 100 percent of the Thai population have a high literacy rate (World Health Organization, 2012). Approximately 95 percent of the population have Thai ethnicity, with the 5 percent remainder comprising Chinese, Indians, and others. About 94.6 percent of the Thai people are Buddhist, and others are Muslim, Christian, Hindu and other religions (World Health Organization, 2012).

In 2011, the World Bank upgraded Thailand’s income categorization from a lower-middle income economy to an upper-middle income economy. Multiple dimensions of welfare were gained, for example, more children are now getting more years of education and everyone is now covered by health insurance while other forms of social security have expanded. Poverty in
Thailand is primarily a rural phenomenon. As of 2013, over 80 percent of the country's 7.3 million poor lived in rural areas. Significant and growing disparities in household income and consumption can be seen across and within the regions of Thailand, with pockets of poverty remaining in the Northeast, North, and Deep South (The World Bank Group, 2017).

Many Thai beliefs derive from the Buddhist philosophy. Buddhists believe that selfishness and craving can result in suffering, and that compassion and love bring happiness and well-being (Komin, 1991). Thai people place great emphasis and value on courtesy, politeness, respect, and self-control in order to maintain harmonious relations. Openly criticizing a person is a form of violence as it hurts a person and is viewed as a conscious attempt to offend a person. Loss of face means disgrace to Thais; thus to avoid confrontation and to look for compromise in difficult situations is important (Commisceo-Global, 2016; Komin, 1991).

The Thai people respect hierarchical relationships, which are defined as one person being superior to the other, such as parents being superior to their children, teachers to their students, and bosses to their subordinates. The family is the cornerstone of the Thai society and has the form of a hierarchy with the parents at the top (Commisceo-Global, 2016). The Thai context and beliefs are important to bear in mind in this thesis because they influence people’s way of thinking.

2.2 Health and welfare perspective

The right to health is a fundamental human right (Commission on Social Determinants of Health, 2008). Health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (World Health Organization, 1948). The welfare concept is closely interrelated and is sometimes even used synonymously with health and quality of life (Tengland, 2007). Having quality of life means to feel well and to have one’s desires fulfilled. A welfare measure is, consequently, any activity that aims at increasing the quality of life of an individual or of a population. Internal welfare is everything within the individual that typically contributes to quality of life, such as knowledge, skills, and abilities. External welfare is everything else that contributes to the quality of life of a population, such as laws and a social security system (Tengland, 2007).

Inequities in health care can be seen all around the world, related to socioeconomic and cultural factors, including income, gender, ethnicity, and rural/urban residency. Health equity through the TB treatment program is provided to all TB patients without any discrimination, and must be available, accessible, acceptable and of good quality (United Nations High Commissioner for Human Rights, 2008; World Health Organization, 2006b).
The Thai Government promoted a social welfare system in 1932, when Thailand moved from an absolute to a constitutional monarchy, by setting up a social insurance scheme. A social welfare policy was introduced in order to achieve the goal of ‘Welfare for all in the Year 2020’, to be applied in the Thai context (Kunphoommarl, 2012). Governmental and local initiative groups organized activities at individual, family and organizational levels in the rural areas, in the form of community welfare groups aiming to provide social protection (Kunphoommarl, 2012). Social protection has been addressed by the Thai Government since the 1997 constitution, referring to the Thai citizen’s right to a good standard of education as well as to a public health system. The national economic and social development plan has shown the importance of social protection improvement in terms of efficiency, equality and accessibility (Kamhom, 2011). The key elements of the strategy include a pro-poor, macro-economic environment, widening opportunities for the poor, improving social protection for the vulnerable and disadvantaged (Kamhom, 2011). In 2003 and 2007, the Social Welfare Promotion was developed and promoted of social security to satisfy the basic minimum needs of the people (Kamhom, 2011). The meaning of social welfare is to enable a good quality of life and self-reliance in terms of education, health, housing, occupation and income recreation, justice process and general social services.

The TB disease has a significant socioeconomic impact on patients and their families (Pongpirul, Starfield, Srivanichakorn & Pannarunothai, 2009). The cost of treatment and loss of livelihood due to TB could lead to catastrophic expenditure, while free treatment, the addition of socioeconomic support could make an enormous difference to poor patients’ lives and livelihoods. The economic support can address their nutritional and economic needs and indirectly help them adhere to treatment and achieve recovery (Pongpirul, et al., 2009). For external welfare, the Thai Government is considering its health care system and is planning to strengthen its PHC system to attain Universal Health Coverage (UHC) by improving geographic and financial accessibility (Primary Health Care Performance Initiative, 2015). Moreover, the national social welfare policy promoted access to high quality TB care for all people with TB by removing financial barriers and protecting Thai citizens from catastrophic health expenses. It did this by ensuring Thai citizens belong to one of the country’s social health protection schemes: the Civil Servant Medical Benefit Scheme for central government employees; the Social Security Scheme for private employees; and the Universal Coverage Scheme that targets uninsured people and low socioeconomic groups, or the voluntary health card project and low income health project (Damrongplasit & Melnick, 2015; Kunphoommarl, 2012; McManus, 2012; Primary Health Care Performance Initiative, 2015; Sakunphanit, 2008; Towse, Mills & Tangcharoensathien, 2004; Suraratdecha, Saithanu & Tangcharoensathien, 2005). This policy has supported the TB
patients by providing care, diagnostic services and anti-tuberculosis drugs free of charge (Kamolratanakuk et al., 1999; Tschirhart, Nosten & Foster, 2016).

Housing conditions are socioeconomic indicators of health and well-being (Shaw, 2004). Poor housing quality and overcrowding are associated with poverty, specific ethnic groups and increased susceptibility to disease. Both poor living conditions and overcrowding increase TB risk (Cantwell, McKenna, McCray & Onorato, 1998). Most TB patients in Thailand live in basic one-roomed homes in rural communities (Figure 1). It is possible for any family members (FMs) to get infected with TB whenever the patients cough or sneeze without covering their faces.

Figure 1: The basic one-roomed home (Source: Private)

2.3 Health care system

Health care systems are designed and financed to ensure equitable, universal coverage, with adequate human resources; therefore, health care systems are vital determinants of health (Commission on Social Determinants of Health, 2008). WHO recommends that the health care system should be based on the PHC model, combining locally organized action on the social determinants of health, as well as strengthening the primary level of care (Commission on Social Determinants of Health, 2008). This will provide integrated local relevant, high-quality programs and services promoting equitable health and well-being for all (Commission on Social Determinants of Health, 2008; United Nations High Commissioner for Human Rights, 2008).
The Thai health infrastructure includes facilities and programs provided by the public sector, nongovernmental organizations, as well as the private sector (Sakunphanit, 2008; World Health Organization, 2012). The majority of health care resources are concentrated in the urban areas. The health care facilities in the urban area have a higher number of beds and physicians than is the case in the rural areas. Private hospitals are provided for wealthy and middle class income people in urban areas (World Health Organization, 2012).

In urban areas, the largest agency that provides health care through the public sector is the Ministry of Public Health, with two-third of all hospitals and beds across the country. These are regional hospitals (501-1,000 beds) or general hospitals (120-500 beds) and a few special centre/hospitals at provincial level. The other public health services are medical school hospitals under the Ministry of Universities and general hospitals under other ministries (Sakunphanit, 2008).

In rural areas, the public health facilities are the district hospitals (10-120 beds), and primary care units in sub-districts. Primary care units focus mainly on PHC and are provided by local healthcare providers including public health nurses, midwives, and sanitarians. The lowest level of health care in the rural area is provided mainly by village health volunteers (VHVs) or people themselves (Sakunphanit, 2008; Pongpirul et al., 2009).

In local communities, the VHVs serve as the backbone of the health care delivery system, supporting the concept of community involvement as the heart and soul of PHC activities (Kauffman & Myers, 1997; Kowitt, Emmerling, Fisher & Tanasugarn, 2015). Currently, every village in Thailand has at least one VHV, who takes responsibility for five to 15 households (Kowitt et al., 2015). The VHVs are selected by their village members, which helps to ensure that they fully understand the cultural context of their community’s health care needs and can provide appropriate physical and emotional support to individuals and families. After being selected, the VHVs are trained by the healthcare providers in health education and promotion, disease prevention, and the fundamentals of providing basic care services to the local villages. The VHVs make home visits to provide follow-up care. At these home visits, VHVs might take a patient’s blood pressure, provide emotional and mental support through family counselling and informal conversations, and provide health information on matters such as a healthy diet. Other activities include helping with community projects and helping residents with traditional medicine resources (Kauffman & Myers, 1997; Kowitt et al., 2015). In 2010, there were more than 800,000 trained VHVs that served 12 million households throughout Thailand (Kowitt et al., 2015; Rohde et al., 2008).
Healthcare providers at different levels of the health system need to have knowledge, skills, and attitudes to successfully implement DOT (United Nations High Commissioner for Human Rights, 2008). Thus, the practice of DOT requires strong leadership and a lengthy commitment of human resources.

2.4 TB situation in Thailand

Thailand has the 18th largest burden of TB in the world, with an estimated incidence rate of newly diagnosed smear-positive TB cases of 140/100,000 in 2014 (World Health Organization, 2015). TB was 69 percent among men and 31 percent among women (World Health Organization, 2015). The Thai Ministry of Public Health has launched a STOP TB policy to reduce deaths from TB by 95 percent, cut new cases by 90 percent, and make Thailand free from TB by 2035 (Ministry of Public Health Thailand, 2015). The treatment success rate has decreased gradually from 83 percent in 2010 to 81 percent in 2012, still 81 percent in 2013 (Figure 2), falling below the national target of 85 percent (Ministry of Public Health Thailand, 2015).

![Figure 2: Treatment success rate in Thailand (Source: World Health Organization, 2015)](image)

This thesis was conducted in Trang province, in the southern part of Thailand. Trang province consists of ten districts, 87 sub-districts and 697 villages. The incidence of smear-positive TB was approximately 119 cases per 100,000 residents in 2012 (Trang Provincial Public Health Office, 2013). In 2011, the average treatment success rate achieved the national target (85 percent), but the treatment success rate ranged from 58 percent to 100 percent among the ten districts. This project was started in 2012, the average treatment success rate was 90 percent, and the treatment success rate ranged
from 74 percent to 100 percent among the ten districts. In addition, the average TB treatment success rate increased gradually from 2011 to 2013, but the TB treatment success rate dropped sharply from 95 percent in 2013 to 90 percent in 2014 (Figure 3). However, the target expectation of the treatment success rate under DOT is 100 percent (Trang Provincial Public Health Office, 2016).

Figure 3: Treatment success rate in 2011-2014 of Trang province (Source: Trang Provincial Public Health Office, 2016).

TB control within Thailand is organized according to the internationally recommended STOP TB policy. The implementation of DOT has been characterized by a top-down process, where the policy is formulated at the international level and then transferred down to the national and local levels (World Health Organization, 1999). The National TB Program (NTP) implementation is decentralized to the regions, provinces and districts, as the basic administrative units. There are national TB coordinators who monitor the NTP implementation in each region. Furthermore, the regional TB centre is responsible for monitoring, training, and supervising healthcare providers at the provincial levels. The provincial TB coordinator, district TB coordinator (DTCs) and TB clinic staffs are responsible for providing quality-controlled TB case detection and treatment through the practice of DOT in a local community (Open Society Institute, 2006). The section below will describe how the practice of DOT occurs in a local Thai community.
2.5 The practice of DOT in a local Thai community

In the local Thai community, the people with suspected TB in the village are screened by the VHV. After that, the suspected persons will be sent to the district hospitals for diagnosis and initiation of treatment through DOT. The TB clinic staff take responsibility for informing the TB patient about the disease and the DOT supervision. The DTCs take responsibility for organizing the community groups to have potential supervisors of the TB patient to ensure the completion of the treatment until cure. The TB clinic staff are coordinated with the public health nurses and refer the TB patient to primary care units near their home.

The supervision can be undertaken at a TB clinic or primary care unit or in the patient’s home, depending on the local community conditions. The patient is requested to return to the district hospital every month to assess their condition and receive a month’s supply of drugs (Open Society Institute, 2006). The supervision is provided by a DOT observer, who can be anyone willing, trained, responsible, and acceptable by the patient and accountable to the TB control services. A DOT observer can be a staff member at the primary care unit; a VHV; or a FM (Pungrassami, Johnsen, Chonguvivatwong & Olsen, 2002).

The public health nurses will select and train VHV to act as DOT observers. After training, the VHV will have the ability to perform the DOT by monitoring the medication administration, giving TB education to the patients, their families and communities as well as caring for the patient in the home (Open Society Institute, 2006). In addition, the VHV are also responsible for the cessation of TB transmission by exploring new and active cases, as well as participating as mediators between the hospital/local health centre and the patient’s family to sustain the medication process. The treatment outcome is evaluated and reported by the TB clinic staff to the DTCs, who further report to the provincial TB coordinator every four months (Ministry of Public Health Thailand, 2015).

2.6 Patient adherence to TB treatment

Adherence is a concept that arose in response to the negative connotations associated with compliance (Sumartojo, 1993). Adherence incorporates the self-management of treatment and the importance of cooperation between the healthcare provider and the TB patient. It is a more neutral term than compliance (Sumartojo, 1993). Compliance is viewed as incorporating a hierarchy and power differences between patients and medical professionals (Trostle, 1988). However, adherence to long-term therapies is complicated and difficult to achieve (World Health Organization, 2003). Non-adherence to TB treatment is one of the main obstacles to TB control as it contributes to
increasing the chance of transmitting the bacillus, resistance to medication, and leads to a greater chance of recurrence. Non-adherence can therefore have consequences for the individual, the family, and the community. It will also result in increased health service costs due to re-treatment (Yin, Yuan, Hu & Wei, 2016).

Situations associated with TB treatment adherence involve social, cultural and demographic barriers, in addition to those related to medication and also to the process of health care delivery (Lertmaharit, Kamol-Ratankul, Sawert, Jittimanee & Wangmanee, 2005; Mishra, Hansen, Sabroe & Kafle, 2006). Previous studies have indicated some of the multiple factors that may influence patient adherence to TB treatment. For example, structural factors, poverty and the financial impact of TB treatment have been found to be major influences on adherence (Munro, Lewin, Swart & Volmick, 2007; Shiotania & Henninka, 2014). The patient-related factors include motivation for staying on treatment and the psychological and physiological impacts of the adherence to TB treatment. Patients may hide their disease from employees for fear of dismissal, which may result in non-adherence. In addition, gender discrimination may influence treatment adherence, especially in some Asian settings, where females’ TB status is sometimes hidden because it may result in divorce or reduced prospects of marriage (Munro et al., 2007). The knowledge of, attitudes towards, and beliefs about TB and its treatment affect adherence (Munro et al., 2007). People encounter TB stigma in many settings, which may result in hiding the diagnosis (Courtwright & Turner, 2010). Factors related to the health service influence TB treatment adherence including the relationship between the healthcare provider and the patient (Munro et al., 2007).

2.7 Theoretical perspective

In this thesis, no particular theoretical standpoints were held prior to formulating the research questions in studies I and II. During the analyses, however, I came to understand the importance of theoretical understanding of implementing evidence-based knowledge in practice. After studying implementation sciences, I found the Promoting Action on Research Implementation in Health Services (PARIHS) framework to be appropriate to understand the results in the studies/thesis (Kitson, Harvey & McCormack, 1998; Rycroft-Malone et al., 2002; Rycroft-Malone, 2004; Rycroft-Malone, 2010).

The strength of the PARIHS framework is its emphasis on contextual understanding (Rycroft-Malone, 2008). The PARIHS framework states that successful implementation is a function of three core elements: the evidence, the context of the environment into which the evidence is to be used, and the mode of facilitation into practice (Rycroft-Malone, 2010). Kitson et al. (1998) stated that the most successful implementation occurs in the following
circumstances: when the evidence is scientifically robust and matches professional consensus and patient’s need; the context is receptive to change with sympathetic cultures, strong leadership, appropriate monitoring and a feedback system; and there is appropriate facilitation of change with input from skilled external and internal facilitators (Rycroft-Malone, 2010).

Evidence, one of three core elements of the PARIHS framework is composed of the sub-elements of research, clinical experience and patient preferences/experience (Kitson et al., 1998; Kitson et al., 2008; Rycroft-Malone, 2010). For the most successful implementation to occur, all three sub-elements should be rated highly. For example, even if the research evidence shows the DOT implementation is based on WHO’s recommendations, and is highly effective through a randomised controlled trial (World Health Organization, 1999), if it is rejected by clinicians and patients, it is unlikely to be successfully implemented despite its gold standard research evidence. The inclusion of patient experience and clinical experience as sub-elements of evidence is a unique aspect of the PARIHS framework. Thus, all three sub-elements of evidence should be considered for relevance (Kitson et al., 2008; Rycroft-Malone, 2010).

The second element of the PARIHS framework is the context. Context is defined as the environment or setting in which people receive healthcare service or the context putting research evidence into practice (Rycroft-Malone et al., 2002). Context in the PARIHS framework comprises three sub-elements: leadership, organizational culture and evaluation/measurement. A strong context is defined as follows: it has clear physical, social, structural and cultural boundaries; appropriate resources available; uses appropriate and transparent decision-making processes; power and authority are understood; information and feedback systems are in place; and is receptive to change (McCormack et al., 2002).

As regards leadership, Kitson et al. (1998) claimed that ‘high’ leadership includes: role clarity, effective teamwork, effective organizational structures and clear leaderships. In PARIHS, transformational leaders have the ability to transform cultures to create a context that is more conducive to the integration of evidence into practice, as opposed to transactional leaders who ‘command and control’ (McCormack et al., 2002).

By the organizational culture, Kitson et al. (1998) describe culture as the forces at work that give the physical environment a character and feel. The characteristics of strong culture include: the organization’s ability to define value and beliefs; valuing individual staff and clients; promotion of learning in organization; and consistency in relationships with others, including teamwork, power and authority as well as a rewards and recognition system (McCormack et al., 2002). However, organizational culture can be distinguished from organization climate. Organizational culture is defined as
the way things are done in the organization, but organizational climate is defined as the way people perceive their work environment (Glisson et al., 2008).

The evaluation as described by Kitson et al. (1998) refers to the presence or absence of routine monitoring systems in the organization. Rycroft-Malone et al. (2002) state that a strong evaluation includes: an audit and feedback on multiple levels (individual, team and system); an assessment of performance of multiple sources.

The implementation of DOT in Thailand is part of a policy process. The leaders who are directly responsible for managing and running the DOT program at the local level can inspire and challenge by creating a learning organization. Thus, this thesis also examines leadership as a sub-element of context.

Facilitation is the final element of the PARIHS framework, defined as a technique by which one person make things easier for others (Kitson et al., 1998). Furthermore, facilitators are described as individuals who help others to achieve particular goals, provide encouragement to others and promote action (Harvey et al., 2002). In this thesis, the DOT observers acted as facilitators in the practice of DOT in the local community. They helped the healthcare providers to apply DOT evidence into practice in a local community.

The thesis also discusses how the PARIHS framework will contribute to understanding of barriers and enablers in the practice of DOT, and how to improve the implementation of DOT into practice in the local Thai community.
3. RATIONALE

A global policy plan to manage TB epidemics has been constructed. Since 1993, the implementation of DOT in Thailand, goes from to the national level, which has political oversight and responsibility and provides a supporting function, to lower levels of health services. Along with the vertical structure, this approach has been criticized for focusing on target-oriented activities and control of transmission rather than contextual factors.

The implementation of DOT has complex relationships to socioeconomic factors and Thai context issues. Several factors in a local Thai community influence the practice of DOT and patient adherence to TB treatment, such as individual beliefs, perceptions, and knowledge of the healthcare providers, DOT observers and TB patients. The practice of DOT needs to be understood in local settings taking account of TB patients’ values and preferences regarding the treatment. Therefore, there is a need to acquire understanding of what happens when the DOT is practised in a local community to generate knowledge for improving the implementation of DOT, and thereby improve patient adherence to TB treatment.
4. AIMS

The overall aim of this thesis was (1) to obtain a deeper understanding of what happens when the DOT is practised in a local Thai community and (2) to generate knowledge for improving the implementation of DOT, and thereby improve patient adherence to TB treatment.

The specific aims of studies I-IV were:

Study I: To explore district leaders’ perceptions of the management of the DOT program in Trang province, Thailand.

Study II: To explore experiences among VHVs and FMs as DOT providers in a local Thai community.

Study III: To develop a conceptual framework of adherence to treatment among Thai people living with TB.

Study IV: To identify strategies for promoting the patient adherence to TB treatment in the local community.
5. METHODS

To accomplish the aims, the thesis included four studies which resulted in separate articles.

5.1 Research position

A paradigm refers to a systematic set of assumptions or beliefs about fundamental aspects of reality (Guba & Lincoln, 2005). It provides philosophical, theoretical, instrumental, and methodological foundations for conducting research, and provides researchers with a platform for interpretation of the world (Morgan, 1983). This thesis is based on the ontological assumption that the world is socially constructed. The epistemological assumption is based on a subjective approach to describe life experiences and give them meaning, to gain insight, explore the richness, and complexity inherent in the phenomena of interest in this thesis (Guba & Lincoln, 2005; Corbin & Strauss, 2008; Khankeh, Ranjbar, Khorasani-Zavareh, Zargham-Boroujeni & Johansson, 2015; Marshall, & Rossman, 2006). Subjective perspectives are important for health professionals who focus on caring, communication, and interaction with the patients (Holloway & Wheeler, 2013). Thus, these assumptions were appropriate and allowed the researcher to understand the healthcare providers’ perceptions, the DOT observers’ and the TB patients’ experiences. In addition, to improve the patient adherence to TB treatment through the DOT and develop an intervention in the future, a mixed-method, systematic review was conducted.

5.2 Study setting

The setting for this thesis was Trang province in southern Thailand. The health care administrations and TB facilities are provided by ten TB clinics and 125 primary care units. The DOT program is managed by the TB clinic staff in the district hospital in collaboration with DTCs and the provincial TB coordinator. There are usually one DTC and one TB clinic staff member in each district and more than a hundred public health nurses involved in the DOT services (Trang Provincial Public Health Office, 2013). Seven districts were included in studies I, II and III (marked with stars in Figure 4). In study I, the five districts with the highest numbers of new TB cases were chosen. In study II,
three districts with the highest numbers of new TB cases were chosen. In *study III*, seven districts with the highest numbers of new TB cases and distinct socio-economical levels were chosen.

**Figure 4** Geographical distribution of the districts in Trang province
(Source: http://www.mapsofworld.com/thailand/provinces/trang-map.html)
5.3 Study design

Studies I, II and III have applied qualitative methodologies. The combination of qualitative approaches made it possible to establish different views of the healthcare providers, DOT observers and the TB patients who are involved in the practice of DOT, and to develop their ideas through induction from the data as well as interpretation based on a combination of researcher perspective and the data collected. The first study explored the healthcare providers’ perceptions using phenomenographic analysis. The second study explored the DOT observers’ experiences using content analysis. The third study, with the TB patients, used grounded theory. The fourth study was a mixed-method systematic review. The four studies are summarized in Table 1 in relation to design, data collection, time of data collection, the number of participants and data analysis.

<table>
<thead>
<tr>
<th>Study</th>
<th>Study I</th>
<th>Study II</th>
<th>Study III</th>
<th>Study IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design</td>
<td>Explorative approach</td>
<td>Explorative approach</td>
<td>Grounded Theory</td>
<td>Systematic review</td>
</tr>
<tr>
<td>Data collection</td>
<td>Individual interviews</td>
<td>Focus groups</td>
<td>Individual interviews</td>
<td>Searching from databases</td>
</tr>
<tr>
<td>Time of data collection</td>
<td>April and July 2013</td>
<td>August and November 2013</td>
<td>July and November 2015</td>
<td>June and August 2016</td>
</tr>
<tr>
<td>The number of participants</td>
<td>5 DTCs and 5 TB clinic staff</td>
<td>25 VHVs and 6 FMs</td>
<td>20 TB patients</td>
<td>14 studies published between 1993 to 2015</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Phenomenographic analysis</td>
<td>Content analysis</td>
<td>Grounded Theory</td>
<td>Thematic analysis</td>
</tr>
</tbody>
</table>
5.4 Participant recruitment (studies I-III)

In studies I, II and III, purposive sampling was performed to include participants from the different districts with the highest rate of TB cases representing the variety of urban and rural households in Trang province, Thailand (Polit, Beck & Hungler, 2001).

In study I, the inclusion criteria for participants were that the healthcare providers should be from different areas, with different lengths of service, in order to study a variety of individual experiences. In each district, one TB clinic staff member from the district hospital and one DTC from the district public health office who was in charge of TB control was selected. Five men and five women, ranging from 37 to 56 years of age agreed to participate in the study. They all had at least 1.5 years of experience in a TB project. The number, sex, position, age, work experience and experience in a TB project of the participants are shown in Table 2.

Table 2 Background characteristics of the participants in study I

<table>
<thead>
<tr>
<th>No</th>
<th>Sex</th>
<th>Position</th>
<th>Age (years)</th>
<th>Work experience (years)</th>
<th>In charge of TB project (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female</td>
<td>TB clinic staff</td>
<td>56</td>
<td>40</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>TB clinic staff</td>
<td>55</td>
<td>34</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>DTC</td>
<td>42</td>
<td>22</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>TB clinic staff</td>
<td>45</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>DTC</td>
<td>37</td>
<td>17</td>
<td>1.5</td>
</tr>
<tr>
<td>6</td>
<td>Female</td>
<td>TB clinic staff</td>
<td>41</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>DTC</td>
<td>45</td>
<td>21</td>
<td>1.5</td>
</tr>
<tr>
<td>8</td>
<td>Male</td>
<td>DTC</td>
<td>45</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Male</td>
<td>DTC</td>
<td>47</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>Female</td>
<td>TB clinic staff</td>
<td>41</td>
<td>19</td>
<td>2</td>
</tr>
</tbody>
</table>

In study II, the inclusion criteria were VHVs without regard to gender, who worked in a community and had at least one year of experience as a DOT.
observer, and FMs who had experience as DOT observers in their own household. The sampling started with the researcher contacting the TB clinic staff for information about all identified DOT providers in the three districts. A letter of invitation was sent to 20 female VHV s, five male VHV s, and 10 female FMs. The 31 participants included 20 female VHV s, five male VHV s, and six female FMs. The participants were divided into five focus groups. The majority of the VHV s were female, aged between 22 and 59 years, with 1-26 years of work experience as VHV s and with 1-3 years of work experience as DOT observers (see Table 1 in Appendix B: paper II).

In study III, the inclusion criteria were men and women of different ages, diagnosis, and type of DOT observers. To recruit participants, the researcher called the patients, informed them about the aim of the study and asked for permission to conduct an interview. If the participant agreed to participate, written informed consent was obtained. The selection of participants continued until saturation was reached in the analysis. The initial aim was to recruit male and female TB patients equally from each district, but this proved to be difficult because the number of women with TB is less than the number of men with TB. The samples comprised 20 TB patients (14 males and six females) ranging in age from 23 to 85 years (see Table 1 in Appendix B: paper III).

5.5 Data collection (studies I-III)

In studies I and III, individual interviews were used to explore the participants’ perspectives. The interview guides were prepared beforehand using open-ended questions, follow-up questions and probing questions. Follow-up questions provide a chance to clarify and expand on what has been said and also indicate to the participants that the researcher is really listening (Dahlgren, Emmelin & Winkvist, 2007; Kvale & Brinkmann, 2009). The interview guides were developed from the researcher’s pilot interview, and were intended to gain greater richness of data by adding some questions to the previous interview guide (see Appendix A). In addition, the pilot interview was reviewed to ensure that the phenomenon under study had been communicated clearly to the participants. The pilot interviews also helped to improve interview techniques, especially for new researchers, so that the researcher could help participants explain their lived experiences without leading the conversation (Holloway & Wheeler, 2013).

Each participant was contacted before the interview. The details of the study were explained, verbal assent, and written consent to participate was requested. The interviews were conducted in the Thai Language and were carried out wherever was convenient for the interviewees: in district hospitals, the district public health offices, or the participants’ homes. The interviews were digitally audio-recorded, and transcribed verbatim in Thai. To
test the validity, the recorded interviews were sent to the interviewees for confirmation and adjustment. Five participants commented and confirmed the accuracy of the recorded information. To enhance self-awareness, reflective notes were made immediately after the interviews in order to document the events, actions/interactions, and processes of thinking (Holloway & Wheeler, 2013). Each interview lasted from 50 – 150 minutes. The data was continuously collected until saturation was achieved, meaning no new information was received and the number of interviewees was considered sufficient (Morse, 1995).

In study II, focus groups were chosen because the researchers wanted to understand how the VHVs and FMs as a group responded to being DOT observers. The researcher could decide to use a topic guide which presented the questions in detail (Barbour & Kitzinger, 1999). Furthermore, it was hoped that within the group setting individuals would be encouraged to share their experiences through reflecting on the experience of others in the group. The TB clinic staff were contacted and asked for information on all identified DOT observers. Each participant was contacted before the interview. Invitation letters were sent to 25 VHVs and ten FMs. The details of the study were explained, and both verbal and written consent to participate were requested. Five focus group discussions (FDGs) were performed; three groups consisted only of VHVs, and there were two mixed groups with VHVs and FMs.

The researcher acted as a moderator, listening, probing and making decisions on when to move into new topic areas (Holloway & Wheeler, 2013). During the data collection, to facilitate the group process, the participants including the researcher, sat in a circle, everyone being able to see and hear each other with as little distinction of hierarchy as possible. The session started with some opening questions to identify the characteristics of the participants. Then there were introductory questions and the participants spoke about their past experiences of VHV duty. After that the questions were supposed to move the participants into the focus of discussion about the practice of DOT. The researcher tried to lead the discussion without dominating it, and to allow each participant to share their experiences. The ending questions gave the participants the chance to make a final statement. The moderator gave a summary of the participants’ discussion and asked the participants for comments. A final question allowed the participants to add something that they had not considered during the discussion. An assisting moderator was responsible for the note-taking, audio-recording and focused on capturing reactions and feelings expressed during the discussion and also facilitated the transcription by writing down the sequence of input by the different participants (Krueger, 1994). The discussions were on average two hours long.
5.6 Data analysis (studies I-III)

In study I, data analysis was conducted using phenomenographic analysis to explore the management of the DOT program (Åkerlind, 2005; Marton & Booth, 1997). Phenomenography is the result of a participant thinking intentionally, interacting with the DOT management and striving to create meaning (Marton & Booth, 1997). The different ways of understanding have both ‘what’ and ‘how’ aspects. The ‘what’ aspect tells the researcher what is in the subject’s focus, the ‘how’ aspect describes how meaning is created. The categories of description are the researcher’s abstractions of the different ways of understanding that have been identified.

Data analysis commenced after all the interviews were completed. The texts were translated into English. The pilot interviews were not included when analysing the data. During the analytic process, the researcher met the supervisors several times to discuss and revise the identified perceptions into descriptive categories to ensure the quality of analysis and interpretation. The categories were based on ways of understanding expressed in more than one interview. The different categories in the outcome space were related to one another in a hierarchical way (Marton & Booth, 1997), and defining this structural relation between the categories could be a further step in a phenomenographic analysis. This hierarchical structure of the outcome space can be inferred from the data or it can be a result of a theoretical analysis of the categories.

In study II, the text was analysed by manifest and latent content analysis to find the sensitive characteristics of experiences of DOT observers (Graneheim & Lundman, 2004). The pilot FGD was not included when analysing the data. The analysis started with a naïve reading to obtain familiarity. The interview transcript was read out verbatim, line by line, and reread several times until it was fully understood and familiar. Then the researcher identified meaning units, as words, statements, and paragraphs that reflected experiences. The meaning units were condensed, checked for accuracy by rereading, and finally coded. The similarities and differences between codes were linked and grouped to form sub-categories, which in turn were organized into categories. Finally, relational information between the categories captured the understandings of VHVs’ and FMs’ experiences into themes. The researcher and supervisors were involved in the various stages of the analysis process.

In study III, the process of analysis and interpretation of the data was conducted according to Corbin and Strauss’s (2015) techniques and procedures for developing grounded theory. In the analysing process, the full transcripts of the interviews were translated into English and then the text was re-translated to the native language (Choi, Eastlick, Mill & Lai, 2012). The analysis started after the first interview. The researcher followed the
hierarchical coding process including the three steps of open, axial, and selective coding.

In the first step, the open coding, the transcript was read and reread several times in order to understand the meaning of the complete story of the participant. The analysis was then followed by the line by line coding. This process involves constantly comparing incidents with other incidents, back and forth, both within the individual interviews and across all interviews, to look for similarities and differences. Then conceptual labels were applied, and their properties and dimensions were identified. These concepts were grouped into categories. Then all transcripts were read again together with the field notes, making memos on concepts that emerged between the initial defining of categories and the first draft of the completed analysis. In the next step, similar concepts were grouped and re-conceptualized into a more abstract level, summarizing the content. This axial coding provided a holistic view of the findings, describing causal conditions, actions/reaction, intervention conditions, and consequences (Corbin & Strauss, 2015). The third step, selective coding, was performed to select a concept related to the core category. In the last step, a preliminary model was formed by relating categories to each other. Saturation was decided on when wordings and emerging concepts among participants tended to be repeated in the interviews (Corbin & Strauss, 2015).

Both memos and diagrams were useful in all stages of the analytical process. Memo writing was maintained during the data analysis. It is the pivotal intermediate step between defining categories and the first draft of completed analysis (Strauss & Corbin, 1990). Memo writing gave the researcher freedom to explore the ideas about the categories, from preliminary attempts to more sophisticated and abstractive conceptualizations. The diagrams gave visual representations of the categories and how to link those categories together. Investigation of a diagram could indicate where theory needed further development. Both memos and diagrams were useful for all stages of the analytic process.

Theoretical sensitivity referred to the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which was not (Strauss & Corbin, 1990, p. 42). In this study, the researcher built up theoretical sensitivity over time from reading and from professional and personal experiences, which guided the researcher when examining the data from all sides. The researcher and supervisors were involved in the various stages of the analysis process.
5.7 Systematic review (study IV)

Using a mixed methods systematic review is one way to answer a number of questions in the same systematic review (Harden & Thomas, 2005). In this study, the review question, “What are the facilitations of patient adherence to TB treatment?” was followed by the following three sub-questions: (1) What are the strategies for promoting patient adherence to TB treatment? (2) What are the perspectives and experiences of the DOT observers, TB patients, and healthcare providers on adherence to treatment? and (3) What are the implications of questions (1) and (2) for intervention development? A mixed methods approach was used to integrate the research results generated from different research methodologies into a single systematic review (Harden & Thomas, 2010).

The search strategy was developed and conducted with a librarian. The following databases were searched for eligible articles: Scopus, PubMed, Web of Science, and CINAHL Plus. The search terms used included Medical Subject Headings, and keywords relevant to the following terms: (1) ‘tuberculosis’ (tb), (2) ‘health personnel’ (3) ‘Family’ (FM), and (4) ‘Directly Observed Therapy’ (dot). These terms were chosen to best reflect on the DOT.

All primary empirical studies in peer-reviewed English language publications from 1993 to 2015 were included. Two reviewers independently screened titles and abstracts of potential articles, and studies that did not meet the inclusion criteria were excluded. Then the full-text of articles with relevant abstracts were reviewed. If the full-texts could not be obtained after using interlibrary loan services and contacting the author, the articles were excluded. The full-text articles were then screened by two reviewers and were included if the articles met the inclusion criteria. Any discrepancies arising during this process were resolved by discussion with members of the research team until consensus was achieved. The full-text articles were assessed independently for methodological validity, using the corresponding checklist from MMAT version 2011 (Pluye, Gagnon, Griffiths & Johnson-Lafleur, 2009; Pluye et al., 2011).

Thematic analysis was used to synthesize both qualitative and quantitative data. The qualitative and quantitative studies were analysed separately and a third synthesis combined the outputs (Pope, Mays & Popay, 2006). After a quality assessment of each study, the studies were closely read and the process of identifying descriptive themes occurred in three stages: line by line coding of the findings of the primary studies, organizing of codes into related areas to construct the descriptive themes, followed by constructing analytical themes. Codes were taken from the findings sections of the included studies. All data were manually coded by two independent reviewers.
The summary of the findings in the qualitative and quantitative studies was created by a matrix which facilitated constant comparative analysis and movement back and forth between the codes. Forty-three codes were identified and grouped into 13 descriptive themes, which stayed close to the data. The codes and descriptive themes were re-examined, compared and contrasted, refined and then grouped into a higher order of analytic themes (Thomas & Harden 2008). The analytical themes as synthesized from both qualitative and quantitative studies were discussed among the researcher and supervisors.
6. ETHICAL CONSIDERATIONS

Ethical permission for studies I, II and III was obtained from the research ethics committee of the Trang Provincial Health Office, Thailand (0027.001.3/1339) and the Regional Ethical Review Board in Uppsala, Sweden (Dnr. 2013/063). Permission was also obtained from the relevant health authorities. In study I, the data collections were conducted after receiving permission from the directors of Kantrang hospital, Muang hospital, Na Yong hospital, Palian hospital, Yan Ta Khao hospital.

In studies I, II and III, there was extra concern for the participants’ voluntary decision to take part in the research, and the ethical principles in research were strictly followed (Oliver, 2010). Each participant was contacted before the interview began. The details of the study were explained, and verbal and written consent to participate was requested. A written information sheet was provided, which included details about the study’s aim, procedure, confidentiality, voluntary consent, right to withdraw and contact information. The written information sheet and consent form were sent by hand. All participants signed consent forms.

During the data collection processes, no other ethical problems were identified, and no participants wanted to withdraw from the studies. The confidentiality of the data transcriptions was ensured by keeping them in a university computer that was accessed using a specific username and password. The data collected for each study were kept on the university’s server in separate folders. The transcriptions were altered to provide anonymity and no one could have identified the participants from the documents. Other documents were stored in a locked fireproof steel cabinet designed for the archiving of research materials, and only members of the research team could access the data. At the end of the study, the code lists and transcribed data will be destroyed.

In study IV, the systematic review did not contain any studies including human participants performed by any of the researchers.
7. RESULTS

7.1 Healthcare providers and DOT observers’ perspectives on barriers and enablers in the practice of DOT (studies I and II)

The healthcare providers in the local Thai community, perceived the importance of complying with the practice of DOT and following the NTP guidelines to reach the goal of stopping TB. However, they could not follow the guidelines in every instance. Moreover, the healthcare providers revealed that the barriers were related to practical dilemmas, and they also described some enablers in the management of the DOT program.

7.1.1 Barriers to the practice of DOT

In study I, the healthcare providers perceived that both the DOT observers and the TB patients were affected by the TB disease. The healthcare providers themselves did not like to deal with TB because it is a communicable disease. Also, the VHVs, who act as DOT observers and had gone through the TB educational program and learned how to protect themselves, were afraid of being infected with TB. Moreover, the healthcare providers perceived that TB patients were afraid of, and did not want anyone else and neighbours in the villages to know about the diagnosis because they feared being ostracized and stigmatized.

The healthcare providers stated that the TB patients mistrusted the VHVs as DOT observers because some of the VHVs violated their confidentiality by discussing their situation with villagers. The healthcare providers also perceived that the TB patients did not like having someone watching them while taking their medication, and wanted to take their medication by themselves, without an observer. In addition, the healthcare providers did not trust the patients’ family members to monitor the intake of TB medications. Furthermore, the healthcare providers perceived that although, the VHVs were trained to be individual observers, and manuals were available, they were not successful in performing their role as DOT observers. They perceived that knowledge about TB remained inadequate.
In *study II*, the DOT observers described the practical barriers including the lack of TB knowledge and skills to motivate the patients, their families, and communities, as well as lack of competence in documenting. The DOT observers found that the patients wanted to keep their illness secret, and to conceal their TB disease from others, as well as delay the treatment. The challenges in the VHV’s role started when they encountered the patients who did not know that TB can be cured, and who were afraid of facing discrimination. However, the VHV's demonstrated a wish to be more holistically-oriented towards the TB patients and develop skills to promote activities to improve the patients’ confidentiality, decrease the fear of stigma, and promote the patients’ adherence to TB treatment.

### 7.1.2 Enablers in the practice of DOT

In *study I*, the healthcare providers perceived that the enablers of success with a TB cure included the necessity of trusting and caring for the TB patients, as well as more community participation. They wanted to make changes to improve the DOT management including improving both the extrinsic and intrinsic motivations among the actors involved in the practice of DOT. Furthermore, they emphasized the need to organize a system to honour and boost the morale of VHV's, and a new method of practicing the TB guidelines. Finally, the healthcare providers needed to accept FMs as observers of the patient.

In *study II*, the VHV's said that they were able to be DOT observers because they had been trained through a specific TB education program by the public health nurses. Then, they could carry out their responsibilities by performing screening, watching patients take medications, and educating the TB patients and their families. The VHV's could conduct home visits once a week to cooperate with FMs in their villages, assess the patients’ medication, educate the patients and their families, as well as give them advice and motivate them to take the full course of medication. The FMs found themselves able to watch the patient take the medication in a proper way and care for them through family-based DOT, with support from the VHV's.

The VHV's as well as FMs indicated that their skill in building trust and caring made it easier for the patients to deal with the diagnosis and adherence to the TB treatment. They experienced it as important to understand the specific person with regard to his or her emotional characteristics and response to the personal situation. Other enablers of the practice of DOT were the VHV's working as a team when making home visits, and cooperating to give more attention when caring for the TB patients. Furthermore, the VHV's could provide counselling with the public health nurses when the patients did not accept the TB diagnosis or VHV's wanted them to educate or provide the TB patients with reliable information.
### 7.2 Patients’ perspective of adherence to TB treatment (study III)

When diagnosed with TB, the patients were referred to a TB clinic, where the clinic staff gave them TB medication and suggestions about how to take care of themselves. The struggle for social belonging was the core category for the TB patients because they wanted to feel they belonged to their community even though they were living with TB. They expressed how they struggled with personal barriers caused by physical changes, such as coughing up blood and weight loss, and by the social pressure, with fear of being socially rejected, and being called ‘Rung Kiat’ in Thai. The struggle for social belonging, made them conceal the illness.

However, the healthcare service, their choice of DOT observers, and support from family members, their relatives and community members supported them in adopting positive thinking and self-awareness by encouraging them to follow advice, change their behaviour, and continue to take the TB medication. Finally, they were able to adhere to the TB treatment until it was completed or they were cured. Furthermore, they were able to prevent TB transmission to their families and communities.

### 7.3 Strategies for promoting patient adherence to TB treatment (study IV)

The strategies for promoting patient adherence to TB treatment found in the systematic review. The themes were patients’ ability to control their own life; the role and skills of DOT observers; and the supporting environment.

The ability to control one’s own life was revealed as important from the insights of TB patients. It was found that the support of family, their relatives and community members was extremely important during the intensive phase of TB treatment. The TB patients were able to manage to continue treatment, mainly because their relatives or community members provided them food and dairy drinks, encouragement to continue their treatment, and sometimes money for transportation.

The communication skills of local healthcare providers was highlighted by TB patients and healthcare providers. Most studies suggested ways to support the patients during their treatment by improving communication and behaviour, respecting the individual patient’s autonomy and integrity, increasing knowledge of patients, their families and the community about the TB disease and its treatment, using flexibility in individual arrangements, and watching and supporting the patients’ discussing problems that arose during treatment.
Furthermore, a supporting environment in the local community was revealed as important from the experiences among TB patients. It was found that the community-based DOT option had better cure rates than clinic/self-administered TB treatment because it was convenient, reduced costs, saved time and enabled patients to stay with their families. The patients suggested ways to improve the community-based DOT, namely increasing community education, regular visits to all patients, incentives for treatment supervisors. Also the clinics should supply food to TB patients, nurses should teach communities about DOT and be more friendly. However, it was also found that an FM was the most convenient, acceptable and accessible DOT supervisor as well because the supervisor increased one’s ability to continue with daily activities during treatment and saved time and money.
8. DISCUSSION

This thesis was conducted in order to (1) to obtain a deeper understanding of what happens when the DOT is practised in a local Thai community and (2) to generate knowledge for improving the implementation of DOT in order to promote patient adherence to TB treatment. The results report the barriers and enablers potentially related to the practice of DOT in the local community. However, those results are limited by their focus on a local context with its specific conditions.

The results of this thesis are understandable from the perspective of implementation of DOT evidence into practice at a community level. According to the PARIHS framework, the most successful implementation occurs when all sub-elements are rated on a high range of the continuum or when the evidence is scientifically robust and matches professional consensus and patient need; when there is a strong leadership; and when there is appropriate facilitation of change with input from skilled external and internal facilitators (Rycroft-Malone, 2010).

Overall, in this thesis both leaders and facilitators who were responsible for the practice of DOT reported the enablers of and barriers to the practice of DOT in their areas. The TB patients revealed the barriers and enablers of their adherence to TB treatment. A lack of TB knowledge and skills among DOT observers and the fear of stigma of TB patients were considered significant barriers to the practice of DOT. At the same time, the social facilitation and TB patients’ positive thinking and self-awareness were considered important enablers of of patient adherence to TB treatment.

In the thesis, the main subjects discussed are as follows: the barriers and the enablers in the practice of DOT; and the challenges for improving the implementation of DOT in order to improve patient adherence to TB treatment.

8.1 The barriers to the practice of DOT

The research evidence, through a randomised controlled trial, shows that the implementation of DOT, based on WHO’s recommendations, has improved treatment adherence and is highly effective (World Health Organization,
1999). In this thesis, several barriers were found related to the practice of DOT in a local Thai community.

The fear of stigma among the TB patients was found to be the main barrier to the practice of DOT (*studies I, II and III*). By the fact that the TB symptoms are similar to those of HIV/AIDS (Ngamvithayapong-Yanai, Winkvist, Luangjina & Diwan, 2005). When the TB patient received the diagnosis ‘TB’, they suffered and experienced a barrier in relation to their social belonging in the community. Then, the TB patients would conceal their illness and struggle for belonging (*study III*). However, not only the individuals but also the whole family may suffer from social stigma and its negative consequences (Diwan & Thorson, 1999; Johansson, Long, Diwan & Winkvist, 2000). The fear of stigma is a universal concept and would be similar in Thai and other cultural perspectives. Previous studies found that TB is considered a shameful disease, an attitude that may lead people to hide their disease and change their social interaction after being diagnosed with the disease (Chang & Cataldo, 2014; Courtwright & Turner, 2010; Jurčev-Savičević, 2011; Konradsen, Lillebaek, Wilcke & Lomborg, 2014; Okanurak, Kitayapor, Wanarangsikul & Koompong, 2007).

The social and economic status of the TB patients will influence their adherence to TB treatment (Hurtig, Porter & Ogden, 1999; Munro et al., 2007). There are considerable differences with regard to stigma and its social consequences (Munro et al., 2007; Pungrassami et al., 2010). Nowadays, due to the social structure of many societies in developing countries, the women have a large workload, such as taking care of the family and doing waged work. Thus, the impact of TB in women is influencing not only their families but also the development of society through loss of workforce, ruined families, and orphaned children (Johansson, et al., 2000). In contrast, Soonthorndhada et al. (2004) found the Thai men were more vulnerable to TB than Thai women, because they are more likely to drink and smoke, and are likely to be doing paid work and to be working hard. The stigma may lead to delays for both sexes in seeking adequate care. Several studies reported stigmatisation of TB diagnosis as influencing the initiation of treatment and adherence to it (Chang & Cataldo, 2014; Courtwright & Turner, 2010; Konradsen et al., 2014; Munro et al., 2007; Okanurak et al., 2007; Pungrassami et al., 2010; Sengupta et al., 2006).

Moreover, the fear of being infected was found among the healthcare providers as well as DOT observers. This could be related to lack of knowledge and skills of DOT observers even though the DOT observers are trained through a specific TB education program according to the DOT guidelines, which in turn are based on WHO recommendations for community-based DOT (World Health Organization, 1999). However, there is no exact way of translating NTP policy and the DOT guidelines to match the actual conditions in the local Thai community (*studies I and II*). Thus, the
DOT observers could not meet the TB patients’ needs, especially when the patients did not know that TB can be cured, and were afraid of facing discrimination. These factors cause the TB patients to feel stigmatised and frustrated by an unwelcoming attitude and poor communication from healthcare providers and the DOT observers (Lewis & Newel, 2009). The high level of stigma due to a lack of TB knowledge led patients to conceal their TB status and struggle for social belonging (study III).

As the PARIHS framework emphasize the facilitator’s role (Harvey et al., 2002), the DOT observers as facilitators need to support and provide encouragement to the TB patients to help them achieve adherence to treatment. They need strong interpersonal and communication skills and must be able to earn the trust and respect of the TB patients (Thompson, Estabrooks & Degner, 2006). Thus, from the results of this thesis, it might be considered that there is an inadequate effort to meet the individual TB patients’ needs, which implies difficulties in a successful implementation of DOT in the local Thai community. As the PARIHS framework stated, even if the research evidence shows an implementation is highly effective through a randomised controlled trial, it can be rejected by clinicians and patients, and is unlikely to be successfully implemented (Kitson et al., 1998; Kitson et al., 2008; Rycroft-Malone, 2010).

8.2 The enablers in the practice of DOT

In studies I and III, it was found that the enablers of the practice of DOT in a local Thai community, and of patient adherence to TB treatment included: easy access to health services; continuity in the health service’s ability to choose the DOT observer; getting social support; and the patients’ positive thinking and self-awareness.

Being DOT observers, the VHVs are trained through a specific TB education program according to the DOT guidelines (Kowitt et al., 2015). Furthermore, the VHVs have to be selected by their village members, so they fully understand the cultural context. This acceptance allows them to better provide TB care and monitor the medication administration in the patients’ homes, as well as provide appropriate physical and emotional support (Open Society Institute, 2006). Also, the DOT observers can manage their role through support and cooperation with the public health nurses. Like the PARIHS framework, it is emphasized that the leaders, who are transformational leaders, need to have the ability to transform cultures to create a context that is more conducive to the transformation of evidence into practice (McCormack et al., 2002). Thus, in this thesis, a strong leadership is considered to be an enabler of the practice of DOT in the local community.

In this thesis, no patients were concerned about financial problems. Probably, a national concern in Thailand is to strengthen its primary health care system.
by improving geographic and financial accessibility using the UHC (Pongpirul et al., 2009; Primary Health Care Performance Initiative, 2015). This scheme is provided for uninsured people in low socioeconomic groups, and offers TB care free of charge (Kamolratanakuk et al., 1999). This concern will increase equitability by removing financial barriers and protecting people living with TB from catastrophic health expenses (Suraratdecha et al., 2005).

There is strong evidence in this thesis that Buddhism influences people’s thoughts regarding their adherence to the TB treatment. They were strongly grounded in their belief that the success of their cure would entail a further process of performing positive thinking, self-awareness, and positive health behaviours. This helped them acquire a positive attitude, and a feeling of belonging to their community and of not being stigmatised. Furthermore, this gave them self-discipline to achieve adherence to the TB treatment. Then, receiving support from the health service, DOT observers, families, relatives, community members, and the Buddhist religion were enablers. This result is also consistent with previous studies in Thailand which found that the individual’s beliefs and religion were associated with both stigmatising behaviours/attitudes as well as social support and the adherence to TB treatment (Sengupta et al., 2006). It is shown in other studies that people who receive social and emotional support from family members, friends and healthcare providers are more likely to comply with treatment (Courtwright & Turner, 2010; Jin, Sklar, Sen-Oh & Li, 2008; Macq, Torfoss & Getahun, 2007; Sengupta et al., 2006).

### 8.3 Challenges to improving the implementation of DOT

Inequities in the implementation of DOT were found in this thesis, related to inappropriate efforts to meet the individual TB patients’ needs, which implies difficulties in a successful implementation of DOT in the local Thai community. Also, the results revealed a lack of TB knowledge and skills of DOT observers as facilitators. The PARIHS framework emphasized that successful implementation needs strong leadership and facilitators who have appropriate knowledge and skills (Rycroft-Malone, 2010).

To provide health equity to all TB patients, the challenges of the substantive results of the first, second and the third studies suggest that introducing an empowerment approach will support the practice of DOT. In addition, the results of the systematic review indicated three strategies that offer an empowerment approach to promoting patient adherence to TB treatment. Thus, there is a challenge to provide the empowerment approach to DOT observers, who, in turn, can empower the TB patients to achieve adherence to TB treatment.
The concept of empowerment has been used frequently in the fields of health promotion and health education, social work, nursing, and education (Tengland, 2007; Tengland, 2008). Empowerment is the experience of feeling powerful (Laverack, 2004). Empowerment refers to a process of reaching a goal and involves the individual’s ability to control his/her own health and life (Tengland, 2008). There are similarities in that empowerment helps people to gain control over their own lives (Laverack, 2004; Tengland, 2007; Tengland, 2008).

The results of the fourth study suggest that an empowerment approach can assist the TB patients to gain the ability to control the factors that might affect their health or their own lives (Feste & Anderson, 1995; Rappaport, 1987; Roberts, 1999; Tengland, 2008; Wallerstein, 1992). The TB patients will have the ability to reflect critically on and to choose what preferences, desires and wishes to hold and to pursue, leading them to being cured of the TB disease. When people perceive that their lives are going well, they will get a better quality of life (World Health Organization, 2006b; Tengland, 2007; Tengland, 2008). In previous studies, it was found that the healthcare providers can empower the patients to change their behaviours in a positive way via their interactions with the healthcare providers or health education programs (Feste & Anderson, 1995; Roberts, 1999; Segbakken, Bjune & Frich, 2011; Sukumani, Lebese, Khoza & Risenga, 2012).

Empowering TB patients will be done by empowering the DOT observers through providing health education, giving them skills training, providing resources such as the actual TB guidelines to facilitate the role and skills development of DOT observers (Yasin & Karabey, 2016). These activities will encourage the DOT observers and support their self-reliance, self-confidence and self-esteem. Health education is a key way of transferring information, knowledge and skills and of helping people adapt to changing circumstances and conditions and encouraging them to solve problems in their communities (Haglund, Pettersson, Finer & Tillgren, 1996). Thus, by giving more TB health education to the DOT observers, they will improve their knowledge and skills, and they will be ready to teach the TB patients, leading to improvement in patient adherence to TB treatment (Escott & Walley, 2005; Hane et al., 2007; Lewis & Newel, 2009).

The knowledge and skills’ development of DOT observers will be possible when a well-designed health education program is used (Grol & Grimshaw, 2003). The public health nurses as leaders who are responsible for training VHV to act as DOT observers, need to understand the DOT observers’ view and create a climate for their knowledge and skills development (Laverack, 2007). According to the PARIHS framework, healthcare providers who are transformational leaders need the ability to transform cultures to create a context that is more conducive to the integration of evidence into practice.
(McCormack et al., 2002). Then, the relationship between the DOT observers and the leadership has to be mutual and non-hierarchical. It is a matter of trusting that DOT observers have the capacity to solve their own problems.

It was found in this thesis that the patients stated that the option to choose the DOT observers themselves was important for encouraging them to continue the treatment until cure. Community participation is considered an important aspect of PHC development (Preston, Waugh, Larkins & Taylor, 2010; Taylor, Wilkinson & Cheers, 2008). Previous studies have also shown that the community-based DOT is convenient, reduces costs, saves time, and improves daily living conditions as some patients are too weak to come to the TB clinic, and enabled patients to stay with their families, and community (Adatu et al., 2003; Wandwalo, Makundi, Hasler & Morkve, 2006). This result supports previous studies whose evidence shows the positive health outcomes achieved by applying community participation in the practice of DOT (Kironde & Bajunirwe, 2002; Sukumani et al., 2012). Other studies showed that involving community participation and providing community empowerment in primary health clinics may reduce stigma and achieve good adherence outcomes (Atkins, Lewin, Ringsberg & Thorson, 2012; Segbakken et al., 2011). Thus, involving community participation to empower the TB patients may also be worth considering as TB patients are afraid of stigma.

However, in this thesis, the healthcare providers declared that they mistrusted the FMs as DOT observers. Also, the Thai regional policy states that an FM or relative should only be an observer as a last option, because a previous study reported that family observation yields lower cure rates and much higher default rates than observation by someone outside the family (Frieden & Sbarbaro, 2007). Probably, FMs might not understand the treatment, and in places where power differentials exist within the home, that may result in an imbalance of power in accordance with the Thai context of hierarchical relationships, as the Thai people place great emphasis and value on courtesy, such as politeness, respect, and self-control, in order to maintain harmonious relations. Openly criticizing a person is a form of violence as it hurts the person and is viewed as a conscious attempt to offend the person being rebuked (Commisceo-Global, 2016; Komin, 1991). Previous studies found that using a family member was convenient, acceptable and accessible because it could increase the ability to continue with one’s daily activities during treatment and save time and money (Okanurak et al., 2007; Wandwalo et al., 2006; Zvavamwe & Ehlers, 2009). Another study found that there was no significant difference in cure rate among the TB patients who received DOT from a community member or a family member (Newell, Baral, Bam, Pande & Malla, 2006; Tian, Lu, Bachmann & Song, 2014). The results of this thesis suggest that FMs may empower TB patients by reminding, motivating and supporting the TB patient to continuously take their medication instead of directly observing the TB patients.
Finally, the health care providers want to get more financial support but do not have knowledge of other approaches to solve the difficulties in the practice of DOT.

### 8.4 Pre-understanding

The researcher is the major research instrument in qualitative studies and is involved throughout the research process (Rew, Bechtel & Sapp, 1993). The relevant literature regarding TB and my own experiences of TB, may have given me preconceptions about what is likely to be found in the data collection. To ensure the credibility of the data, I laid aside my preconceived ideas by writing down my opinions on the implementation of DOT by healthcare providers and patient adherence to TB treatment. To enhance self-awareness and minimise bias, a reflective journal was used throughout the data collection process and analysis to remind me about the bias and to enhance the study’s rigour (Charmaz, 2006).

Being a woman, interviewing male participants could imply difficulties in taking the other’s perspective. I have previous experience within the area of primary health care and have experience of individual interviews with local healthcare providers and VHVs, involving both men and women. These experiences were beneficial for improving my ability to listen to and talk with male participants.

Moreover, the supervisors’ meetings confronted my pre-understandings. These experiences have led to an awareness of the importance of an open mind when analysing the empirically generated data (Backman & Kyngäs, 1999).

### 8.5 Methodological strengths

Three qualitative data collections in this thesis are based on the constructivist paradigm. The importance of qualitative data was to describe the participant perspectives and gain insight to explore the richness, and complexity inherent in the interest in the implementation of DOT. To ensure trustworthiness of this thesis, the criteria of creditability, dependability, confirmability, and transferability will be discussed (Graneheim & Lundman, 2004; Guba & Lincoln, 1989; Polit et al., 2001).

**Credibility**

Credibility refers to the confidence in how well data and processes of analysis address the intended focus (Polit et al., 2001). One concern was the selection of the context, participants and approach to gathering data. Choosing
participants with various types of experience increased the possibility of shedding light on the research question from a variety of aspects. The purposive sampling was suitable for studies I and II, to reach the participants who had real knowledge about the implementation of DOT. The inclusion criteria and the recruitment processes were established to gain enriched data and knowledge. The number of participants was considered adequate to allow for the emergence of variations in perceptions and experiences.

Selecting the most appropriate method for data collection and for the amount of data, are also important for establishing credibility. In study I, the strength of the phenomenography approach was to explore how the healthcare providers perceived or understood the DOT program (Marton, 1981). This approach has subsequently been used frequently in health services research (Marton & Booth, 1997). The strength of the phenomenography methodology is to achieve variation in people’s ways of understanding the phenomenon. In the open-ended interviews, the participants were encouraged to speak freely about their experiences, giving concrete examples to avoid superficial descriptions about how things should be.

In study II, by using FGD, how the DOT observers experienced the implementation of DOT were captured (Krueger, 1994). The number of participants in each group, made it possible for everyone to make their voice heard and this provided both depth and range to the discussion and captured the diversity of their views (Barbour & Kitzinger, 1999; Krueger, 1994). The FGDs were conducted with heterogeneous groups, inviting the DOT observers who had experience of the implementation of DOT in a local community.

In study III, a grounded theory was used to gather the Thai TB patients’ experiences of adherence to TB treatment. The strength of grounded theory is that it is ‘grounded’ in the data from which it has emerged rather than being based on analytical constructs, categories or variables from pre-existing theories. Therefore, this approach deepened the understanding of experiences of patient adherence to TB treatment. To identify, refine and integrate categories, and ultimately to develop a conceptual framework, the researcher used a number of key strategies, including constant comparative analysis, theoretical sampling and theoretical coding (Corbin & Strauss, 2015). Throughout the entire process, the data collection and coding were carried out simultaneously, as is characteristic of grounded theory (Strauss & Corbin, 1998).

In study IV, the strength of the mixed-method systematic review was that it allowed a number of questions to be answered in the same systematic review (Harden & Thomas, 2005). Conducting a systematic review requires following specific steps to minimise bias, the introduction of errors, and the possibility of drawing the wrong conclusion. To minimise bias, the quality of each study was assessed (Harden & Thomas, 2010).
Another critical issue for achieving credibility was to select the most suitable data analysis, as there is a risk of losing the meaning of the text during the condensation and abstraction process. The credibility of the findings also concerns how well the categories covered the data. That means that no relevant data have been inadvertently or systematically excluded, nor have any irrelevant data been included (Graneheim & Lundman, 2004). The credibility of the data analysis process of studies I, II, III and IV was also enhanced by having more researchers involved in the analysis processes. The research team was composed of one Thai and two Swedish researchers. In addition, the peer checks were conducted in regularly meetings to discuss and review emerging data and the data analysis.

**Dependability**

Dependability refers to the stability of data over time and in different conditions (Polit et al., 2001). A dependable study should be accurate and consistent. When data are extensive and the collection extends over time, there is a risk of inconsistency during data collection (Guba & Lincoln, 1989). In studies I, II and III, the methods of assessing the dependability of data and conclusions were addressed by an open dialogue within the research supervisors. Also, the data and relevant supporting documents were presented to internal and external reviewers in PhD seminars and international conferences. In addition, the process of study was established, agreed and presented in detail as far as possible.

**Confirmability**

Confirmability refers to the neutrality or objectivity of data (Polit et al., 2001). It concerns ensuring data, interpretations, and outcomes of inquiries are rooted in context and persons apart from the researcher, and are not an expression of researcher imagination or the researcher’s assumptions and preconceptions. (Guba & Lincoln, 1989). Confirmability focuses on the characteristic of data being dependable. To enhance the confirmability and accuracy of the process, in studies I, II and III, the confirmability of the data was ensured by asking interviewees to double check the transcribed data, thus, the face validity of the study was confirmed. Also, the researcher audited the research process under the supervision of the supervisors, and three researchers interpreted the data independently.

**Transferability**

Transferability refers to how well the findings of the research project can be applied to similar situations or participants (Holloway & Wheeler, 2013).
In this thesis, to facilitate transferability, the researcher provided a thick description about the setting, the Thai context, the participants as well as the method of data collection, selection and characteristics of the participants, data collection and process of analysis. Thus, the knowledge in this thesis will be applicable in another, and researchers who undertake research in another context will be able to apply certain concepts that were originally developed here.

8.6 Methodological limitations

Using triangulation in this thesis was a strength, allowing the researcher to gain in-depth information from other research, and from the perspectives of the participants. It possibly links up a group of elements, thus producing a relatively exhaustive study on the given subject.

However, there are some limitations, the variety of participants was limited in terms of sex. In study II, more women than men were interviewed but more men than women were interviewed in study III. Moreover, the study is limited by its focus on a small number of communities from one province in Thailand. Consequently, it is not clear whether data from other communities and contexts would present similar perceptions and experiences to those found in this thesis.

Another concern is the similarity of the participants’ religious background. Most of them were Buddhists and some had strong beliefs, which may have influenced the results of this thesis. However, this aspect can be considered as both a strength and a limitation because Buddhism is the main religion in Thailand, as nearly 95 percent of Thailand’s population is Buddhist.

Another challenge was to translate the participants’ communicated meanings in Thai into understandable forms of English. The translation is the transfer of meaning from a native or mother tongue to the English language (Esposito, 2001). In studies I, II and III, to save time, 60 percent of the fully transcribed data from the interviews were translated into English for the common understanding of the all authors (Poss, 1999). The limitations of translation led to possible mistakes, the distortion of key messages, and a risk of losing key information from sources as translation involves the risk of misrepresentation of the contextual meaning (Birbili, 2000). During the translation process, the translator considered the individual situation and the cultural context of both societies to develop a translation that was understandable on several different levels and that reduced potential threats to the validity of the data (Choi et al., 2012; Regmi, Naidoo & Pilkington, 2010; Squires, 2009). Then the researcher and supervisors adjusted and re-checked the text, step by step and then forward until consensus was reached. Other interviews were analysed in Thai and then translated into the English language. For syntactical accuracy, the transliteration was checked by an
expert English-writing person (Brislin, 1970). However, there were some ideas, concepts, and feelings that might not always have been translated exactly from Thai to English language, for example the Thai term ‘Rung Kiat’, which is used in studies II and III.
9. CONCLUSIONS, IMPLICATIONS FOR PRACTICE, AND FUTURE RESEARCH

9.1 Conclusions

This thesis contributes a deeper understanding of the perspective of healthcare providers, DOT observers and TB patients when the DOT is practised in a local Thai community. Lack of TB knowledge and skills among DOT observers, and fear of stigma among TB patients are considered significant barriers to patient adherence to TB treatment. Also social facilitation as well as TB patients’ positive thinking and self-awareness are considered as key enablers. A challenge revealed in these results is to provide an empowerment approach towards DOT observers, who, in turn, will empower TB patients to achieve adherence to TB treatment. For understanding the implementation of DOT in the local Thai community, the PARIHS framework is useful. The results from this thesis also provide knowledge derived from contextual and facilitation elements. These elements are important for overcoming the barriers to implementing evidence-based practice.

9.2 Implications for practice

The Thai health care considers and provides internal and external welfare to promote equitable health and well-being for all TB patients (Commission on Social Determinants of Health, 2008).

According to the results of the first study, there is no exact way of translating NTP policy guidelines to match the actual conditions in local Thai communities. Thus, the DOT practice guidelines require modification for improving DOT observers’ understanding in different local communities.

To achieve adherence to TB treatment requires the courage of public health nurses to minimise their control and their power and to trust in TB patients by focusing on creating trust and supporting the demands of VHVs, TB patients and FMs. The results of the first and the second studies suggest that the DOT observers need to become empowered through improved training. Then they, in turn, will empower patients to achieve adherence to TB treatment. In local Thai communities, the public health nurses have the responsibility to train the DOT observers, using their knowledge and skill, to care for TB patients in
their community equally, regardless of their individual economic and social status. Therefore, the public health nurses require ability and skills to support the DOT observers and other people with knowledge and dignity (American Nurses Association, 2013; Williams & Stanhope, 2008). Thus, if an empowerment approach is to be used, firstly, the researcher suggests focusing on the Thai public health nurses, who will work on TB issues and cooperate with the DOT observers and community members in the southern region of Thailand. Nursing education requires adjustment of the curriculum of education for public health nurses, or other areas where this approach is applicable, as well as training of postgraduate students in health sciences to obtain competent personnel for the empowerment approach.

The results of the fourth study indicate that to empower the DOT observers, by increasing knowledge, skill, and abilities will be achieved by inviting the VHV's and community members to be partners in TB health education because the VHV's and community members are important for designing an intervention to prevent and treat TB disease in Thailand. Health education can help people develop a critical understanding of the social conditions in which they live and of what they can do to change those conditions. If people become more knowledgeable about the effects of social conditions on TB, they may discover and solve the problems in their communities.

The results of this thesis have particular relevance when policy-makers consider how strategies can improve the implementation of DOT and enable the patient’s adherence to TB treatment. However, the results of this thesis may not be sufficient to change policies, in which case interaction between the directors of nursing colleges, provincial TB coordinators, regional TB coordinators, national TB coordinators and researchers is necessary to translate this knowledge into new policy initiatives.

9.3 Further research

In further research, others studies design would be recommended to fully understanding the barriers and enablers in the practice of DOT in local Thai communities. There is a strong need for transferring knowledge into the local contexts. Studying when to implement and apply an empowerment approach in a local community will be of interest.

An observation made during the data collection process concerned the housing conditions for TB patients who live in basic one-roomed homes, facing overcrowding and poor conditions. A supportive environment, including the physical environment and housing, is essential for the health of local communities, and this issue needs to be addressed in future studies.


strategier baserade på principer för empowerment kan främja implementeringen av DOT. Detta förhållningssätt skulle på lokal nivå i Thailand bidra till att stärka DOT-observatörerna i sin roll och sina förmågor att ge ett relevant stöd som främjar TB-patienter att genomföra hela behandlingen. Resultaten av denna avhandling kommer att vara användbar för politiska beslutsfattare och vårdgivare för att utveckla strategier som kan förbättra implementeringen av DOT i det thailändska lokalsamhället och stärka patienterna att genomföra sin behandling.
บทนำ: วัณโรคถือเป็นปัญหาสุขภาพที่ท้าทายในระบบสุขภาพในประเทศไทย โดยเฉพาะการมี "วินัยในการกินยาตามแผนการรักษาวัณโรค" (Adherence to TB treatment) วิธีการกำกับการกินยาแบบมีพีเลี:ยง (Direct Observed Treatment, DOT) เป็นวิธีการที่มีหลักฐานยืนยันว่าเป็นวิธีการที่ส่งเสริมให้ผู้ป่วยวัณโรคมีวินัยในการกินยาตามแผนการรักษาวัณโรคอย่างต่อเนื่อง และครอบคลุมระยะเวลาที่กำหนด อย่างไรก็ตามการนำวิธีการกำกับการกินยาไปใช้ในการปฏิบัติปฏิบัติก่อนอาจขับเคลื่อนในบริบทของสังคมไทย ยังเน้นมาจากปัจจัยทางด้านสังคมเศรษฐกิจ ดังนั้นจึงมีความจำเป็นต้องมีการศึกษาดูดปัญหาข้อมูลนี้ โดยมีวัตถุประสงค์หลักเพื่อให้เกิดความรู้ความเข้าใจมากขึ้น ที่สำคัญการดำเนินการกำกับการกินยาแบบมีพีเลี:ยงในผู้ป่วยวัณโรคในระดับบุคคล ครอบครัว และชุมชน และเพื่อส่งเสริมการรักษาโรคอย่างต่อเนื่องตามแผนการรักษาในผู้ป่วยวัณโรค การวิจัยครั้งนี้แบ่งออกเป็น 4 การศึกษา ได้แก่ การวิจัยเชิงคุณภาพ และการศึกษาเพื่อสรุปเนื้อหาวิเคราะห์การดำเนินการกำกับการกินยาแบบมีพีเลี:ยงในผู้ป่วยวัณโรค ซึ่งจะนำไปสู่การวิเคราะห์ในแผนการกำกับการกินยาในผู้ป่วยวัณโรคนี้ การวิจัยครั้งนี้แบ่งออกเป็น 4 การศึกษา ได้แก่ การวิจัยเชิงคุณภาพ โดยการศึกษาที่ 1: การศึกษาเชิงคุณภาพ เก็บรวบรวมข้อมูลจากการสัมภาษณ์ระดับบุคคลจากผู้รับผิดชอบงานวัณโรคระดับอําเภอ (District TB Coordinator) 5 คนและเจ้าหน้าที่คลินิกวัณโรค 5 คน วิเคราะห์ข้อมูลโดยวิธี Phenomenographic analysis การศึกษาที่ 2: เป็นการวิจัยเชิงคุณภาพเก็บรวบรวมข้อมูลจากการสัมภาษณ์กลุ่ม (Focus group discussions) ผู้มีประสบการณ์การทําหน้าที่เป็นพีเลี:ยงการกินยาให้แก่ผู้ป่วยวัณโรคในชุมชน ได้แก่ อาสาสมัครสาธารณสุขประจำหมู่บ้าน จำนวน 25 คน และสมาชิกครอบครัว จำนวน 6 คน วิเคราะห์ข้อมูลโดยวิธีวิเคราะห์เนื้อหา (Content analysis) การศึกษาที่ 3: เป็นการวิจัยเชิงคุณภาพ เก็บรวบรวมข้อมูลจากผู้ป่วยได้รับการวินิจฉัยว่าเป็นผู้ป่วยวัณโรค จำนวน 20 คน วิเคราะห์ข้อมูลเชิงลึกผู้ป่วยจากข้อมูลพื้นฐาน (Grounded theory) การศึกษาที่ 4: เป็นการวิจัยเชิงคุณภาพเก็บรวบรวมข้อมูลจากการสัมภาษณ์จากผู้ป่วยวัณโรคนี้จากการศึกษาเพื่อสรุปเนื้อหาข้อมูลในฐานข้อมูลอย่างเป็นระบบ วิเคราะห์ข้อมูลโดยใช้แก่นสาระ (Thematic analysis)
ผลการวิจัย: อุปสรรคที่สำคัญที่มีผลต่อการใช้ DOT และการมีวินัยในการกินยาได้แก่ กลัวการถูกรังเกียจจากสังคม (การศึกษาข้อมูลที่ 1, 2, และ 3) และการขาดความรู้และทักษะของผู้ป่วยเกี่ยวกับการรักษา (การศึกษาข้อมูลที่ 1 และ 2) และการศึกษานั้นพบว่าแรงเสริมในการมีวินัยในการกินยาได้แก่การอื่น ๆ จากอินเทอร์เน็ต การมีความคิดเชิงบวกต่อโรค และการมีความเข้าใจเกี่ยวกับผู้ป่วยวัณโรค (การศึกษาข้อมูลที่ 1 และ 3) นอกจากนี้ผลการสังเคราะห์งานวิจัยอย่างมีระบบพบว่ากลยุทธ์ที่ช่วยให้ผู้ป่วยวัณโรครักษาหายได้แก่การส่งเสริมกลวิธีการเสริมสร้างพลังอ่อนแอในผู้ป่วย (การศึกษาข้อมูลที่ 4)

สรุปผลการศึกษา: ผลการศึกษาในครั้งนี้มีประโยชน์ทั้งต่อนักวิจัยและวางแผนนโยบายในการดำเนินงานด้านสุขภาพที่สามารถนำผลการศึกษาไปใช้ในการพัฒนากลยุทธ์ในการนำ DOT ไปใช้ในทางปฏิบัติ และการส่งเสริมให้ผู้ป่วยวัณโรคมีวินัยในการกินยาตามแผนการรักษาในบริบทของสังคมไทย

คำสำคัญ: วัณโรค, การกินยาแบบมีผู้ดูแล (DOT), อาสาสมัครสาธารณสุขประจัญบาน, ชุมชน, การเสริมสร้างพลังอ่อนแอ, การวิจัยเชิงคุณภาพ, การตอบแบบมีระบบ
This thesis is the culmination of my PhD journey which was just like climbing a high peak, step by step accompanied with encouragement, hardship, trust, and frustration. When I found myself at the top experiencing the feeling of achievement, I realized that although only my name appears on the cover of this dissertation, a great many people including my FMs, well-wishers, my friends, colleagues and various institutions have contributed to accomplishing this huge task.

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13. REFERENCES


14. APPENDICES
Appendix A: Interview guides
Interview guide (study I)

Interviewee no……………Sex……………………Age……………years
Year of work experience ……………….years………months

Questions to the individual interview

(a) Tell me about how you manage the DOT program for TB patients?
(b) Tell me about how you support the VHVs in their work with TB patients and their families?
(c) Tell me about when the procedure and administration is well done? Can you give examples?
(d) Tell me about when the procedure and administration is less well done? Can you give examples?
(e) Is there anything else important you would like to talk about?

Supportive questions

What does that mean to you?
Could you describe more about that?
Could you give me an example?
Do you want to tell us more?
Interview guide (study II)

Interviewee no……………Sex……………………Age………..years
Year of work experience ……………….years…….months

Background of FMs

Age ........... years; Gender ............
Family members: .......... .... adults and children .....age ........ to ........years
The period of living with the patient in your family.................................
Previously had TB patient in the family ..................................................

Questions to the focus groups

(a) Tell me about your experiences when you carried out the implementation of DOT?
(b) Tell me about your experiences of motivating the TB patients and family members to engage in the DOT?
(c) Tell me about your experiences of involving patients in the DOT?
(d) Tell me about your support of TB patients and their families?
(e) Tell me about how the district leaders support you (VHVs)?
(f) Is there anything else important you would like to talk about?

Supportive questions

Can you explain more about this?
Are there other experiences?
Would you tell us more?
Would you give examples?
Interview guide (study III)

Interviewee no……………Sex……………………Age………..years
The period that you has had TB get TB…………….years…….months
Who is your DOT observer………………………………………………..

<table>
<thead>
<tr>
<th>Concept</th>
<th>Interview questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TB patients’ experiences and reflections when receiving the TB diagnosis.</td>
<td>(a) Could you please tell me the story about how you got your diagnosis? (b) What was the worst aspect of being diagnosed with TB? (c) How do you deal with these problem in your life?</td>
</tr>
<tr>
<td>2. TB patients’ experiences and reflections when receiving treatment until completing the treatment regime or they were cured.</td>
<td>(a) Could you please tell me the story about your TB treatment? (b) How was your treatment process? What was easy? What was difficult? (c) How did the TB clinic staff support you before, during and after your treatment? (d) How was your DOT observer chosen? (e) How did the observer support you during your treatment? (f) Who assisted you to manage your medicine regularly? (h) How do you feel when you are taking medicine? (g) Who has been helpful to you during your treatment? (i) Who has been the most support to you during your treatment?</td>
</tr>
</tbody>
</table>

Supportive questions

Can you describe more about that?
Would you tell me more?
Would you give me an example of that?