Revisiting the Choice
To involve hospitals in the partnership for tuberculosis control in Indonesia

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Dedicated to an incredible woman, who is also my mother, Margaretha Prihatin, for teaching me the meaning of love and life.

And to my husband, Krisnohasmoro Murti, and my son, Bumi Praba Murti, for bringing the miracle of love into my life.
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Abstract

Tuberculosis (TB) is a major public health problem in many low- and middle-income countries, including Indonesia. To accelerate TB case detection, and to improve the quality of diagnosis and treatment provided by all providers, the Public-Private Mix for implementing Directly Observed Treatment Short-course (PPM DOTS) was introduced in 2000. However, previous studies on PPM DOTS have focused on private practitioners and there has been a scarcity of research on PPM DOTS in the hospital setting. This dissertation aims to capture the potential of the PPM DOTS strategy, and identify the barriers to its implementation in hospitals in Indonesia.

This dissertation is based on four separate but interrelated studies: 1. A cost-effectiveness analysis, comparing incremental cost per additional number of TB cases successfully treated under three strategies of PPM DOTS in four provinces. 2. An evaluation of the access to TB services by a cross-sectional study among 62 hospitals, by estimating the proportion of TB cases receiving standardised diagnosis and treatment according to the DOTS strategy. The data were analysed using post-stratification analysis. 3. The quality aspect was explored in a multiple-case study, including eight selected hospitals. The data were analysed using cross-case analysis. 4. The process of partnership was explored through a qualitative study. In-depth interviews were conducted with 33 informants, who were actors involved in PPM DOTS in hospitals in Yogyakarta province. Content analysis was applied to the qualitative data.

PPM DOTS in hospitals was shown to be a cost-effective intervention in this particular context. However, the quality of the implementation was commonly suboptimal. In addition, a substantial number of TB cases did not get standardised diagnosis and treatment as per the DOTS strategy. The process of creating partnership among hospitals and National TB Programme was shown to be complex and dynamic. Process factors, such as commitment to collaboration and interaction and trust among the actors, were shown to be important. The rapid scaling-up of PPM DOTS in hospitals at the national level in Indonesia should be revisited. Indeed, considering the importance of hospitals in TB control, the implementation should be continued and expanded. However, more attention needs to be given to process, context and governance.

Keywords: tuberculosis, Public-Private Partnership, formative evaluation, health service research, health system research.
Abstract in Bahasa Indonesia


Original papers

The thesis is based on the following papers:


* The original article has been reprinted with permission from the publisher.
** The articles have been published in open-access journals.
The papers will be referred to by their Roman numerals.
Glossary and definitions

**Average cost-effectiveness ratio**: a ratio comparing total cost and total effectiveness of a health intervention (Drummond et al., 1997).

**Community health centre**: a government-owned health care facility located in a subdistrict, that delivers primary health services and basic promotive and preventive health programs (Ministry of Health Republic of Indonesia, 2004).

**Cost**: cost from an economic perspective is meant as an ‘opportunity cost’, which is ‘the value of a resource in its most favoured alternative use (Shiell et al., 2002, page 86).’ In the context of health intervention/programmes, ‘cost’ is equal to the value of resources that are used because of a certain sickness/disease or a certain health intervention. The concept of cost even includes productivity loss because of the sickness/disease or because of undergoing the health intervention (Drummond et al., 1997), for example a loss of income during the sickness or a loss of income due to going for treatment.

**Cost-effectiveness analysis**: cost-effectiveness analysis is an analysis that answers a particular question of technical efficiency, namely, how best to achieve the objective of maximising health gains within budget constraints. Cost-effectiveness analysis is a comparison of cost relative to the outcome of health interventions, the cost of which is measured in monetary units and the effectiveness is estimated in a single natural unit of the health intervention (Drummond et al., 1997; Shiell et al., 2002).

**Clinical audit**: ‘...a process to improve the quality of health care through systematic and critical examination of current clinical practices compared to agreed standards’ (Mancey-Jones & Brugha, 1997, page 183).

**Clinical pathway**: ‘...structured multidisciplinary care plans which detail essential steps in the care of patients with a specific clinical problem’ (Rotter et al., 2010, page 2).

**Content analysis**: a method of analysis in a qualitative study which is particularly interested in exploring the manifest and underlying meanings of the text (Graneheim & Lundman, 2004).

**Cure rate**: proportion of smear-positive TB cases cured (having negative result of sputum test after completing the short-course treatment) among all smear-positive TB cases registered for the treatment (WHO, 1999).

**Default rate**: proportion of smear-positive TB cases that defaulted in treatment among all smear-positive TB cases registered for treatment (WHO, 1999).

**Directly Observed Treatment Short-course (DOTS) strategy**: a strategy to control tuberculosis, launched by the World Health Organization in 1994. There are five components of the strategy: political commitment, diagnosis by quality-assured sputum microscopic tests, standardised short-course treatment with a combination of anti-TB drugs and direct observation of treatment, uninterrupted supply of anti-
TB drugs, and a recording and reporting system for the monitoring and evaluation of treatment outcome (WHO, 1994; WHO, 1999).

**Directly Observed Treatment (DOT):** a standardised treatment procedure, in which a tuberculosis patient is directly observed when swallowing anti-TB drugs (WHO, 1999). In the Indonesian context, the treatment observer can be a health worker, a member of the patient’s family, or a community leader (Ministry of Health Republic of Indonesia and Stop TB Partnership, 2007).

**DOTS team:** a hospital DOTS team consists of at least a medical doctor, a nurse and a laboratory staff, and is responsible for planning, conducting and evaluating the activities within the DOTS strategy in the hospital (Ministry of Health Republic of Indonesia, 2006a; Ministry of Health Republic of Indonesia, 2010a).

**DOTS unit:** a centre of TB service (diagnostic, treatment, recording/reporting) in the hospital. The DOTS unit is also supposed to be a centre for coordination with other units in the hospital and with other health facilities in the network of National Tuberculosis Programme (Ministry of Health Republic of Indonesia, 2006a; Ministry of Health Republic of Indonesia, 2010a).

**Effectiveness:** the outcome of a certain health program/intervention/service, measured in the wider population (Drummond et al., 1997), not just in the clinical trial study.

**General hospital:** a hospital that provides health services for all diseases (Ministry of Health Republic of Indonesia, 2010b).

**Hospital:** a health care facility that provides ambulatory, inpatient, and emergency health services. Based on Indonesian government criteria, each hospital should have a minimum of 50 beds (Ministry of Health Republic of Indonesia, 2010c).

**Incremental cost-effectiveness ratio:** cost of additional effectiveness of a certain health programme compared to other health programmes (Drummond et al., 1997).

**Lung clinic:** a health facility that provides only an ambulatory health service for lung diseases, and conducts promotive and preventive health programs in lung health (Ministry of Health Republic of Indonesia, 2007a). In Indonesia, the implementation of DOTS strategy in lung clinics is organised under the strategy of PPM DOTS in hospitals.

**Lung hospital:** a hospital that provides health services for particular lung diseases (Ministry of Health Republic of Indonesia, 2010b).

**Multi Drug Resistant-Tuberculosis:** a tuberculosis case that is resistant to at least Isoniazid and Rifampicin (Espinal, 2003; Shah et al., 2007).

**National Tuberculosis Programme:** a programme that conducts activities for controlling TB throughout the country. The National Tuberculosis Programme in many countries is commonly conducted by the government. In Indonesia, the NTP
is under the responsibility of the Communicable Disease Prevention Directorate of the Ministry of Health. Since the implementation of decentralisation policy, the basic unit of NTP is conducted at district level with support from the Provincial Health Office and Ministry of Health (Stop TB Partnership Indonesia, 2010).

**Post-stratification adjustment:** a specific calculation, which is used to adjust for expected or known discrepancies between sample and population, which occurred due to clustering and unequal stratification probability (Gelman & Carlin, 2000).

**Private practitioners:** health workers who have private practices, commonly physicians (in both solo and group practices). In the Indonesian context, private practitioners are commonly physicians/nurses/midwives who administer private care during the evening (Rokx et al., 2009).

**Public-Private Partnership:** a term to describe the collaboration between public and private sectors in public agendas, including health. The term is applicable at different levels (international, national and local) as well as in various fields (Reich, 2000; Buse et al., 2005).

**Public-Private Mix for DOTS strategy:** an approach to engage all providers of health services in the TB control programme. The WHO introduced the approach in the 2000s. By 2007, 16 out of 22 countries with high TB burdens conducted the PPM for TB control. The term is known by the acronym ‘PPM DOTS’. However, the term ‘Public-Private Mix for DOTS strategy’ has changed over time to ‘PPM for TB control’ and ‘PPM for TB care and control’. In some WHO publications, the PPM acronym stands for ‘Public-Private Mix’ and ‘Public-Public Mix’, in order to emphasise that PPM DOTS is a collaboration between the NTP and public and private health care providers which have not implemented the DOTS strategy (so-called non-NTP providers) (WHO, 2000a; WHO, 2001; WHO, 2005; WHO, 2007a; WHO, 2007b; WHO, 2008a).

**Quota sampling:** a non-random sampling method in which the investigator selects sample members to fulfil a specified ‘quota’ or number (Petrie & Sabin, 2005).

**Sanatorium:** a place for treating TB patients in which they are given certain exercises and nutritional diet (Daniel, 2006).

**Specialized hospital:** a hospital that provides health services for particular diseases, e.g. eye hospitals, lung hospitals, mother and child hospitals (Ministry of Health Republic of Indonesia, 2010b).

**Treatment success rate:** the proportion of new smear-positive TB cases registered under DOTS in a given year that successfully completed treatment, whether with or without bacteriological evidence of success (cured or treatment completed respectively). Cure is assessed as negative on sputum smear examination after the completion of treatment (WHO, 1999).
**Tuberculosis (TB):** tuberculosis is a disease from which both humans and animals can suffer. In 2008, about 1.3 million people (20 per 100,000 population) in the world died from TB. Tuberculosis in humans is caused by the bacteria *Mycobacterium tuberculosis*. Tuberculosis is diagnosed by clinical manifestation with complementary laboratory examinations (e.g. sputum smear test, biopsy) and X-ray. There are two types of tuberculosis: pulmonary (tuberculosis in lung), or extra-pulmonary forms (affecting other organs, such as the kidney, skin, and brain). A pulmonary TB case, with the appearance of *Mycobacterium tuberculosis* in the sputum test, can spread the infection through the air. Someone who is infected with *Mycobacterium tuberculosis* will not necessarily become sick. Only 5-10 percent of people with *Mycobacterium tuberculosis* infection (but who are not infected by HIV) will develop the disease (WHO, 2010a).

**TB-HIV case:** a case of co-infection between Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) in a patient (WHO, 2010b).

**XDR-TB case:** a case of Multi Drug Resistant-Tuberculosis with further resistance to three or more of the six classes of second-line drugs for TB: aminoglycosides other than streptomycin, cyclic polypeptides, fluoroquinolones, thioamides, serine analogs, and salicylic acid derivatives (Shah et al., 2007).
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<td>BCG</td>
<td><em>Bacille Calmette-Guerin</em></td>
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<td>CEA</td>
<td>Cost-effectiveness analysis</td>
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<td>CIDA</td>
<td>Canadian International Development Agency</td>
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<td>DFID-UK</td>
<td>Department for International Development – United Kingdom</td>
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<td>DOTS</td>
<td>Directly Observed Treatment Short-course</td>
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<td>HIV/AIDS</td>
<td>Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome</td>
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<td>Global Fund</td>
<td>Global Fund to Fight Tuberculosis, HIV/AIDS, and Malaria</td>
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<td>ISTC</td>
<td>International Standard for Tuberculosis Care</td>
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<td>ICER</td>
<td>Incremental cost-effectiveness ratio</td>
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<td>KNCV</td>
<td><em>Koninklijke Nederlandse Centrale Vereniging</em> (The Netherlands Tuberculosis Foundation)</td>
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<td>MDR-TB</td>
<td>Multi Drug Resistant-Tuberculosis</td>
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<td>NGO</td>
<td>Non-Governmental Organisation</td>
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<td>NTP</td>
<td>National Tuberculosis Programme</td>
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<td>PPM</td>
<td>Public-Private Mix</td>
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<td>PPP</td>
<td>Public-Private Partnership</td>
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<td>TB</td>
<td>Tuberculosis</td>
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<td>TBCTA</td>
<td>The Tuberculosis Coalition for Technical Assistance</td>
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<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>XDR-TB</td>
<td>Extensively Drug Resistant-Tuberculosis</td>
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Introduction

Tuberculosis: past and present

Tuberculosis (TB) is an ancient disease. The pathological sign of TB was discovered in an Egyptian mummy from about 3000 years BC. However, it was only in 1882 that Robert Koch succeeded in isolating *Mycobacterium Tuberculosis*, the cause of TB in humans. A vaccine for TB was found in 1921 by Albert Calmette and Camille Guerin, which was named *Bacille Calmette-Guerin*. Antibiotics to kill the *Mycobacterium Tuberculosis* were discovered during the period 1943-1957 (Daniel, 2006). Because of the discovery of anti-TB drugs and better socioeconomic conditions, TB was not considered a problem in wealthy countries in Europe and North America during the 1950s-1970s. Meanwhile, the TB epidemic continued in poor countries (World Health Organization [WHO], 1994; Ogden et al., 2003).

The advent of HIV in the 1980s opened a new front in the war against TB globally bringing, as it did, TB and HIV co-infections (WHO, 1994; Espinal, 2003). Concurrently, outbreaks of Multi Drug Resistant-Tuberculosis (MDR-TB) were reported in a number of settings (Espinal, 2003). The rise of MDR-TB was related to the neglect of TB on the international agenda during the 1970s and 1980s (Ogden et al., 2003). The TB-HIV and MDR-TB problems triggered concerns over the return of TB in wealthy countries at the end of 1980s (WHO, 1994; Ogden et al., 2003). In 1993, the WHO announced a global emergency of TB (WHO, 1994).

The WHO (2009a) estimated that there were 8.9-9.9 million incident cases of TB in 2008, a figure that had been steadily increasing since 1990. Most of the TB cases were found in Asia (55 percent) and Africa (30 percent). The number of new TB-HIV cases in 2008 was estimated at 1.2-1.6 million, 13-16 percent of the total number of new TB cases globally (WHO, 2009a). The majority of TB-HIV cases were found in Africa (78 percent), with fewer in South-East Asia (13 percent) (WHO, 2009a). The number of MDR-TB cases was estimated at about 0.5 million in 2007, with the majority occurring in Europe (WHO, 2009b). A study by Shah et al. (2007) found that 9.9 percent of MDR-TB cases were Extensively Drug Resistant-TB (XDR-TB). The WHO (2009b) stated that, by the end of 2008, there were 55 countries that had reported at least one case of XDR-TB.

Global tuberculosis control: the metamorphosis

Before anti-TB drugs were discovered, efforts to control the TB epidemic consisted of ‘sanatorium care’ for TB patients, screening of TB with tuberculin test and X-ray, and the Bacille Calmette-Guerin (BCG) vaccination (Daniel, 2006). After the discovery of some anti-TB drugs in the 1940s, there began an era of chemotherapy to control TB, where TB patients were given 12-18 months of treatment (‘long-course treatment’) at ambulatory services (WHO, 1994; Ogden et al., 2003). In the 1970s, some research supported the feasibility of using improved anti-TB drugs, which reduced the duration of treatment to ‘short-course chemotherapy’, which lasted six months. However, the benefits of short-course chemotherapy were not widely known to policy makers at that
time (Ogden et al., 2003). The sputum test was recommended for the first time in 1974, while X-rays and tuberculin testing were not recommended as main diagnostic tests anymore (Daniel, 2006).

Concurrently with the statement of ‘the global emergency of TB’, the WHO proposed a strategy to fight the TB problem in 1994. The strategy was labelled ‘Directly Observed Treatment Short-course’ (DOTS), which consisted of five components (WHO, 1994):

- Political commitment.
- Quality-assured sputum microscopy.
- Uninterrupted supply of anti-TB drugs.
- Standardised short-course chemotherapy for all cases of TB under Directly Observed Treatment (DOT).
- Recording and reporting system.

The DOTS strategy was marketed successfully at international level but attracted some criticism, particularly of the DOT component. The success was due to the strategy of branding and marketing the DOTS strategy in national and international public health policy agendas (Ogden et al., 2003). In 1998, 119 countries had adopted DOTS into their national TB control strategies. Many of the countries implemented DOTS strategy in public health services, which were organized as National Tuberculosis Programmes (NTPs) (WHO, 2000a).

As a result of the WHO’s efforts, the DOTS strategy received much attention from international organisations, countries, and donors. The WHO had hosted the Stop TB Initiative since 1998. Later, the Stop TB Initiative developed into a large network called ‘The Stop TB Partnership’. The Stop TB Partnership continues to be an important agent driving the TB control programme and policy today, and has been developing a framework for global TB control, called ‘The Global Plan to Stop TB’. The Global Plan to Stop TB of 2000-2005 recommended all countries focus on the expansion of the DOTS strategy to reach at least 70 percent of detection of infectious TB cases. However, the plan was criticised as being too focused on DOTS strategy expansion and, as a result, it did not address the problems of TB-HIV and MDR-TB (Enarson & Billo, 2007).

In The Global Plan to Stop TB of 2006-2015, new strategies and approaches were introduced to address the complexities of the TB problem. The challenge of TB-HIV was addressed with TB-HIV collaboration — a joint activity between TB and HIV/AIDS control programs in reducing the burden of TB in people living with HIV/AIDS and vice-versa (WHO, 2010b). The ‘DOTS Plus’ initiative was designed to control the MDR-TB problem. DOTS Plus is a management strategy for MDR-TB cases, which implements the DOTS strategy and the use of second-line anti-TB drugs in the area with moderate-to-high prevalence of MDR-TB (WHO, 2010c). Case detection was also intensified by integrating TB control into the respiratory diseases detecting strategy in primary health care, through a programme called ‘Practical Approach to
Lung Health’ (WHO, 2006). To ensure the quality of DOTS strategy implementation, a strategy of ‘involving all health care providers with the Public-Private Mix approach’ was developed (WHO, 2006).

Even though global TB control strategies have been evolving to address the complex situation of the TB problem, DOTS strategy is still the core strategy in TB control programmes. Implementation of the DOTS strategy is believed to achieve a decrease in TB incidences among populations with a high level of HIV (Nunn et al., 2005). Implementation of the DOTS strategy is also believed to prevent the development of MDR-TB (Espinal, 2003).

**Public-Private Mix approach for DOTS strategy implementation**

The idea of Public-Private Mix (PPM) DOTS was developed in response to unsatisfactory NTP performance in TB case notification (WHO, 2001). In 2000, the NTP service could only capture 21 percent of new smear-positive TB cases globally, which decreased the optimism of reaching the global target of TB control as stated in the Millennium Development Goals (WHO, 2000a; WHO, 2003a). Meanwhile, some assessments revealed the potential of private health care providers in low-income countries to notify a large number of TB cases (WHO, 2001; Uplekar et al., 2001). However, numerous publications revealed poor TB diagnosis and treatment practices among various private health care providers. They tended to rely on X-ray and not utilise the sputum test for diagnosis (Marsh et al. 1996; Singla et al. 1998, Murthy et al. 2001; Chakaya et al. 2005), gave the wrong dosage, duration and regimen of treatment (Olle-Goig et al. 1999; Portero & Rubio, 2003), and did not stipulate treatment monitoring (Uplekar et al. 1998; Hong et al. 1999; Olle-Goig et al. 1999; Prasad et al. 2002; Portero & Rubio, 2003). Therefore, the original idea of PPM DOTS addressed poor TB-case management among private health care providers (WHO, 2001; Uplekar, 2003).

In the generic model of PPM DOTS, the public sector (the NTP at central/provincial/local levels) was supposed to be responsible for financing and stewardship aspects. Local PPM DOTS agencies (which can be public, private, or NGO) sign a Memorandum of Understanding with the national/provincial NTP. The local PPM DOTS agency has an agreement with private and public providers to provide TB care. The NTP is responsible for providing technical support such as training, supplies, and drugs (WHO, 2001).

The concept of PPM DOTS evolved from the collaboration between NTP and the private health sector (particularly private practitioners) into collaboration between NTP with all TB care providers (WHO, 2005; Ravligione and Uplekar, 2006). Some publications related to PPM DOTS have noted that the acronym ‘PPM’ stands for both ‘Public-Private Mix and Public-Public Mix’ (WHO, 2006 page 16). An example of Public-Public Mix is the collaboration between NTP and prisons or public medical colleges. Some publications have used the term ‘PPM for TB control’ (WHO, 2007a), to mean the same as PPM DOTS. Recent publications have used the term ‘PPM for TB care and control’ (WHO, 2007a; WHO, 2007b; WHO, 2008a).
Up to now, implementation of PPM has reached many types of providers, the nature of which varies between countries. Identified providers engaged in PPM comprise of:

- Private companies (Sinanovic & Kumaranayake, 2006; Ardian et al., 2007).
- Non-governmental organisations (Hurtig et al., 2002; Sinanovic & Kumaranayake, 2006; Ardian et al., 2007).
- Allopathic and non-allopathic private practitioners (Murthy et al., 2001; Quy et al. 2003; Ullah et al., 2004; Newell et al., 2004; Rangan et al., 2004; Maung et al. 2006; Mahendradhata et al., 2007; Xiong et al. 2007).
- Medical colleges (WHO, 2008b).
- Prisons (WHO, 2008b).
- Private laboratories (Masjedi et al., 2007).
- Hospitals (Mantala 2003; Irawati et al. 2007).

Among the various types of providers in PPM, the involvement of private practitioners, hospitals, medical colleges and prisons are the most common models implemented (WHO, 2008b).

Evaluations among various PPM DOTS pilot projects in many high-TB-burden countries showed that the PPM DOTS approach was feasible to scale-up (WHO 2003a; WHO, 2004a) because it gave high treatment success and case notification (Newell et al., 2004; Kumar et al., 2005; Dewan et al., 2006). Moreover, the PPM DOTS involving private practitioners has been shown to be cost-effective (WHO, 2004b, Floyd et al., 2006) and improve equity in access (Lönnroth et al., 2007).

**Tuberculosis and the National Tuberculosis Programme in Indonesia**

With total number of incident TB cases 0.34-0.52 million in 2008, Indonesia ranks fifth after China, India, South Africa and Nigeria. The number of prevalent TB cases in 2008 were estimated to 0.23-0.83 million, while the TB mortality was 26-124 thousand cases (WHO, 2009a). However, the national TB prevalence survey in 2004 showed different epidemiology patterns among Eastern Indonesia, Sumatra and Java-Bali. The highest incidence of TB was found in Eastern Indonesia (189 per 100,000) followed by Sumatra and Java-Bali (160 per 100,000 and 59 per 100,000 respectively) (Ministry of Health Republic of Indonesia, 2005). The total number of MDR TB cases (in 2007) was 12,209. The estimated proportion of all TB cases with MDR-TB cases was 2.3 percent. About 2.2-3.6 percent of TB cases were co-infected with HIV (WHO, 2009a).

Indonesia has been adopting the DOTS strategy into national policy since 1995 and has been implementing it particularly in community health centres (Puskesmas). It applies the sputum microscopy test for TB suspects in its diagnosis procedures and patients receive free anti-TB drugs. A treatment observer is selected for each patient; he/she can be the health worker, community leader, or family member who lives near the TB patient’s home (Ministry of Health Republic of Indonesia, 2007b; Ministry of Health Republic of Indonesia & Stop TB Partnership, 2007). The patient and the
treatment observer are commonly advised to visit the community health centre once a week during the intensive treatment (the first two months of treatment) and bi-weekly in the continuation phase of treatment.

At the national level, the TB control programme in Indonesia is organised by the NTP unit in the Directorate of Communicable Disease Control, of the Ministry of Health Republic of Indonesia. Responding to the decentralisation policy, the basic unit of operational NTP is the district health office, with assistance and monitoring from the provincial health office. An official, called a **Wasor (Wakil Supervisor)**, is responsible for the NTP programme at the district level. The tasks of a **Wasor** involve visiting the TB-control providers to get data on new cases, coordinating providers and ensuring sufficient supply of anti-tuberculosis drugs. Moreover, the provincial laboratory is responsible for providing quality assurance for sputum microscopy tests (Stop TB Partnership Indonesia, 2010).

Tuberculosis control programme activities in Indonesia also receive financial and technical assistance from international donors. The Dutch Government and **Koninklijke Nederlandse Centrale Vereniging (KNCV/The Netherlands Tuberculosis Foundation)** have a long history of involvement in financing the TB control programme since the 1980s (WHO, 2009c). Other donors such as the Asian Development Bank (ADB), the Australian Agency for International Development (AusAID), the Canadian International Development Agency (CIDA), the Japan International Cooperation Agency (JICA), and the United Kingdom, have contributed finance to the TB control programme in Indonesia since the 1990s.

Even though the operation of the NTP has been devolved to the district level, the financing of the NTP comes mainly from external donors and central government (WHO, 2009a; WHO, 2009b). During 2004-2008, the Global Fund was the largest donor to the TB control programme in Indonesia (WHO, 2009c). External donors have thus contributed greatly to the achievement of the targets of 70 percent case detection and 85 percent treatment success rate in 2006 (WHO, 2008b). However, high dependency on external funding is also a concern for the future of the TB control programme (WHO, 2009c); this concern seems relevant, because the case-detection rate in Indonesia decreased to 68 percent after the temporary cessation of Global Fund contributions in 2007 (WHO, 2009b).

**The choice: scaling-up PPM DOTS in hospitals in Indonesia**

In the Indonesian context, hospitals are not under the authority of the NTP. The overall national policy for hospitals (both public and private) is the responsibility of the Medical Service Directorate General of the Ministry of Health. Meanwhile, the operation of public hospitals is under several authorities, i.e., central, provincial and district governments (see Research Setting).

The PPM DOTS in public and private hospitals was the earliest model of PPM DOTS implemented in Indonesia. The pilot projects of PPM DOTS in hospitals were conducted in several provinces (Yogyakarta, South Sumatra, West Sumatra and Bali) in the 2000s. Among the pilot projects, the one in Yogyakarta involved the largest
participation of hospitals (29 hospitals and clinics) (WHO, 2003b). The result of the Yogyakarta project showed a tenfold increase in the absolute number of TB cases during five years of implementation (Irawati et al. 2007).

Because of the promising outcomes from the pilot projects, the Ministry of Health chose to scale-up the PPM DOTS at the national level in 2003 (WHO, 2003; Ministry of Health Republic of Indonesia, 2006). The findings from the national survey of TB prevalence, which was conducted during 2004, supported the NTP’s policy to scale-up the PPM DOTS in hospitals, particularly on Java, Bali and Sumatra. The survey revealed that about 50 percent of people with a history of TB in Java, Bali and Sumatra initiated the treatment in hospitals (Stop TB Partnership Indonesia, 2010).

The NTP initiates the involvement of hospitals in PPM DOTS by arranging training for hospital staff (commonly physicians, nurses and laboratory staff). As follow-up, the hospitals are asked to establish hospital DOTS teams and to provide DOTS units. The hospital DOTS team is responsible for organising activities under the DOTS strategy (called the ‘task mix’) at the hospital level. The hospitals are given the following options for the task mix:

- Diagnosis of TB cases in hospitals, followed by referral to a community health centre for DOT, with clinical follow-up at the hospital.
- Diagnosis of TB cases, followed by referral to a community health centre for DOT, without clinical follow-up at the hospital.
- Diagnosis of TB cases, followed by start of DOT at hospitals, followed by referral to a community health centre during the treatment.
- Diagnosis of TB cases and full DOT at hospitals.

The NTP provides free anti-TB drugs, supplies for laboratory diagnostic and standardised recording/reporting forms for the hospitals (Ministry of Health Republic of Indonesia, 2006a; Ministry of Health Republic of Indonesia, 2010a). The hospitals involved in PPM DOTS are supposed to follow diagnosis and treatment as per national guidelines (Ministry of Health Republic of Indonesia, 2007b).
Rationale of the study

The PPM DOTS strategy has become important on the agenda of many countries that are dealing with the TB problem. In 2007, 14 out of 22 high-burden countries have scaled-up the pilot projects of PPM DOTS into national policy (WHO, 2008b). The PPM DOTS in hospitals is an important model of PPM, which has created a lot of interest among many high-burden countries.

Experiences of PPM DOTS have been documented and discussed in the international TB-control arena. Various guidelines, tools and reports have been produced since the first PPM DOTS experiences a decade ago. Similarly, plenty of studies have been conducted to refine the PPM DOTS discourse. However, previous literature was dominated by issues of PPM DOTS in private practitioners, and was scarce in hospital settings. The generalisability of findings from PPM DOTS in private practices to hospital settings is limited; the characteristics of hospitals are more complex than those of individual private practices. A hospital is a more complex structure in its organization, and has more resources than individual private practices. Hospitals may also have more TB cases than individual private practices.

The Ministry of Health in Indonesia chose to scale-up PPM DOTS in hospitals as a national strategy of TB control in 2003, and formally included it in the NTP strategic plan of 2006-2010 (Ministry of Health Republic of Indonesia, 2006b; Ministry of Health Republic of Indonesia and Stop TB Partnership, 2007). In 2005, there were 370 out of 1226 hospitals (29 percent) engaged in PPM DOTS. The number increased to 563 out of 1478 (38 percent) in 2007 (Ministry of Health Republic of Indonesia, 2009). Limited research has been conducted to evaluate the implementation of PPM DOTS in hospitals in Indonesia. Two external monitoring missions evaluated the TB control programme in Indonesia in 2003 and 2007 (WHO, 2003a; Ministry of Health Republic of Indonesia and Stop TB Partnership, 2007), including preliminary descriptions about PPM DOTS in hospitals. Considering the choice made by the Ministry of Health to scale-up PPM DOTS in hospitals at the national level, further description and exploration about its implementation are still relevant and important.
Aim

Overall aim
The study aims to capture the potential of, and barriers to, the implementation of PPM DOTS strategy in hospitals, and thereby contribute to the improvement of the TB control programme in Indonesia.

Specific aims
- To evaluate the cost-effectiveness of PPM DOTS strategy in hospitals.
- To describe the access to standardised diagnosis and treatment in outpatient units of hospitals involved in PPM DOTS.
- To explore the quality of TB service at hospitals involved in PPM DOTS, and the essential factors to achieve quality outcomes.
- To explore the perceptions of actors involved in PPM DOTS in hospitals of the process of partnership.
Theoretical framework and research questions

First of all, this dissertation is based on the idea that the ‘old’ debate on the appropriateness of the DOTS strategy as the overall strategy for TB control is not relevant today. The direct observation of treatment component of DOTS strategy has been criticised as a controversial approach, problematic from both the operational and ethical points of view (Ogden et al., 2003). However, since the launch of the DOTS strategy, much effort has been made to contextualise and explain its approaches. Today, the DOTS strategy has been adopted in many countries. Therefore, attention should be given to the further improvement of its implementation. The overall ambition of this thesis is not only to add knowledge but also to contribute to the decision-making process. In evaluating the potential of, and barriers to, the implementation of PPM for TB control, this thesis uses a health system framework (Figure 1).

Figure 1. Health system building blocks, functions and objectives (The figure is modified from WHO, 2000b; Alliance for Health Policy and System Research, 2009).

Health system framework

The rationale behind using the health system framework is the similarity between concepts of PPM for TB control and concepts of health systems theory. A health system has been defined as ‘all the people and actions whose primary purpose is to promote, restore and maintain health’ (WHO, 2000b). Health systems are composed of the six following ‘health system building blocks’ (Figure 1): stewardship from government, financing, human resource management, pharmaceuticals management, service provision, and an information system (WHO, 2007c; WHO, 2009d). The interaction between the six components of health systems results in four functions: stewardship, creating resources, financing, and delivering services (WHO, 2000b). In the generic model of PPM for TB control (WHO, 2001), there are aspects of governance, delivery
of services, and provision of technical support (training, supplies and drugs). Those aspects are part of health system functions (WHO, 2000b). For example, in order to deliver TB services to a population, there should be health service facilities provided. In addition, an information system should be available in order to manage TB cases properly, particularly in evaluating results of diagnosis and treatment outcome. To be able to deliver good TB services for a population, trained physicians and nurses should be available, besides the provision of quality anti-TB drugs and other supplies. Obviously, sufficient funds should be provided to finance the activities of TB service delivery. Above all, the capacity of government to construct TB health service facilities, to train the human resources, to provide logistics for TB service, and to secure financing, is needed.

The four functions serve to achieve three fundamental goals/outcomes of health system, i.e., improved health and equity, responsiveness to public expectations, and protection against financial/social risks (WHO, 2000b, page 8). ‘Healthy’ health systems are able to provide resources and deliver services that are effective, cost-effective, and safe to those who need them. ‘Healthy’ health systems can provide adequate funds and financial protection for a population to access the health services. ‘Healthy’ health systems can ensure the sufficient “policy frameworks, effective oversight, coalition building, accountability, regulations, incentives and attention to system design” (WHO, 2009d).

Linking the study objectives with the health system theory, this dissertation proposes seven research questions (Table 1). Research questions 1 to 5 focus on the cost-effectiveness and quality of, and access to, PPM-DOTS implementation — these three aspects are linked to service delivery. Research questions 6 and 7 emphasise the process of partnership, which is a concern about the ‘governance’ aspect of PPM DOTS.
Table 1. Study objectives, research questions and the focuses within the health system framework.

<table>
<thead>
<tr>
<th>Study objectives</th>
<th>Research questions</th>
<th>Focus within the health system</th>
</tr>
</thead>
<tbody>
<tr>
<td>To evaluate the cost-effectiveness of PPM DOTS in hospitals.</td>
<td>1. How cost-effective is PPM DOTS in hospitals compared to other PPM DOTS strategies?  2. Which contexts and factors affect the cost-effectiveness ratio?</td>
<td>Cost-effectiveness/efficiency of health service delivery</td>
</tr>
<tr>
<td>To describe the access of standardised diagnosis and treatment in the outpatient units of hospitals involved in PPM DOTS.</td>
<td>3. Does the DOTS strategy in PPM hospitals serve all tuberculosis patients who visit the hospitals?</td>
<td>Degree of access to health service delivery</td>
</tr>
<tr>
<td>To explore the quality of TB service at hospitals involved in PPM DOTS and the essential factors to achieve quality outcomes.</td>
<td>4. How is the quality of DOTS strategy implementation in the hospitals involved in the PPM for TB control?  5. Which factors are important for the production of quality outcomes of TB services?</td>
<td>Quality of health service delivery</td>
</tr>
<tr>
<td>To explore the perceptions of actors, involved in PPM DOTS in hospitals, of the process of partnership.</td>
<td>6. How is the process of partnership between NTP and hospitals in implementing the PPM for TB control?  7. What is the level of mutuality in the partnership between NTP and hospitals?</td>
<td>Coalition-building and governance</td>
</tr>
</tbody>
</table>

Cost-effectiveness

Cost-effectiveness analysis is a comparison of the cost and consequences of certain health interventions (Walker, 2001, Shiell et al. 2002). Cost in economic theory is meant as opportunity cost which is defined as ‘the value of a resource in its most favoured alternative use’ (Shiell et al., 2002). Cost can be calculated both from a provider and a societal perspective. The societal perspective views the cost of a health intervention both from the provider and patient (and patient family’s) perspectives. Even the decrease in productivity of the patient and their family, due to their involvement in the programme, should be estimated as a part of the societal cost (Drummond et al., 1997). Effectiveness is a certain level of consequence of a health intervention, which is measured in a ‘real health care’ setting, instead of in a randomised clinical trial (Drummond et al., 1997).

Access

The research question on the accessibility of PPM-DOTS challenges one particular element of PPM-DOTS, namely that it is designed ‘to improve and to provide equitable access to TB care to all patients’ (WHO, 2010d). The literature reviews showed no commonly accepted definition of access (Goddard and Smith, 2001) and in fact the definition often overlapped with quality (Campbell et al, 2000). This thesis defines access as the ‘ability to secure a specified set of health care services, at a specified level of quality, subject to a specified maximum level of personal inconvenience and
cost, whilst in possession of a specified amount of information’ (Goddard and Smith, 2001, page 1151).

Quality
This thesis uses the Donabedian model of quality of care, which is widely recognised and has had a major impact on the way quality is seen and assessed (Frenk, 2000). The Donabedian model asserts that quality of health service can be assessed from three aspects: structure, process, and outcome (Donabedian, 2003). The structural aspects of health service consist of physical characteristics (e.g. resources and management) and staff characteristics (skill and team working). Process is defined as the way of providing clinical and interpersonal care to the patient. Outcome is the end product of interactions between structure and process, which can be measured by health status indicators and user evaluation.

Governance
The two last research questions touch on the process of governance and, more specifically, on the partnership within the PPM-DOTS arrangement in hospitals. The term ‘partnership’ has been used implicitly and explicitly in much of the literature about PPM-DOTS. For instance, in the WHO TB report in 2009 (WHO, 2009b page 57), the PPM for TB control in Pakistan was written as ‘Public-Private Partnership’. Some publications also noted that the PPM implied a spirit of partnership (Lönnroth and Uplekar, 2005). This thesis uses the definition of ‘partnership’ coined by Brinkerhoff (2002), which is:

‘a dynamic relationship among diverse actors, based on mutually agreed objectives, pursued through a shared understanding of the most rational division of labour based on the respective comparative advantages of each partner. Partnership encompasses mutual respect, equal participation in decision making, mutual accountability and transparency.’

Systems thinking
Systems thinking has been used in the discussion of each issue of the health system (WHO, 2009d) – that ‘blocks’ of the health system’s ‘building’ cannot be easily separated from the others. While each sub-study focuses on a specific aspect such as ‘quality’ or ‘governance’ the relationship between the various parts of the health system framework is explored (Figure 2). The analysis of cost-effectiveness, access, quality and governance of the implementation of PPM DOTS is set out in Paper I-IV (see page v). Paper I does not only discuss the level of cost-effectiveness, but also reflects on the context and process of implementation. Paper II particularly discusses the issue of access in delivering the DOTS strategy in relation to human resource management issues (e.g. collaboration among units in the hospitals in providing services and commitment from health professionals). Paper III explores the quality
of treatment from the perspectives of structure, process, and outcome, which touch on the function of ‘creating resources’ and ‘delivering services’. Paper IV focuses on the governance aspect of the overall system in implementing the DOTS strategy in hospitals, including the process of governing ‘financing’, ‘resource creating’ and ‘service delivery’ functions.

Figure 2. Health system framework in the context of PPM for TB control in hospitals, and the coverage of health system issues in the thesis.
Research process, setting and methodology

Research process

In 2005, the WHO office, Jakarta, asked Universitas Gadjah Mada to conduct research on DOTS strategy implementation on Java Island, Indonesia (the ‘DOTS hospital assessment study’). The research received funding from the Department for International Development in the United Kingdom (DFID-UK). The DOTS hospital assessment study took place during 2006-2007 (Figure 3) on Java Island. The assessment focused on Java Island due to its relatively long experience of PPM DOTS implementation. The PPM DOTS strategy in hospitals in Yogyakarta Province on Java Island was initiated in 2000, and was one of the first in the country. The author of this thesis (‘the author’) was the co-investigator of that study, and got involved in designing the study protocol, and data collection, as well as conducting analysis and reporting the results.

The WHO, Jakarta, also invited others from Universitas Gadjah Mada to collaborate on ‘The Cost-effectiveness Analysis (CEA) Study on PPM DOTS strategy in Indonesia’. The study also involved KNCV and the Ministry of Health Republic of Indonesia as collaborators. The core team consisted of two researchers from Universitas Gadjah Mada, the author, and a research consultant from the WHO office, Jakarta. The research was conducted during 2006-2008 (Figure 3).

Figure 3. Timeline of data collection of the four studies in the thesis.

The author used their previous involvement in ‘the DOTS hospital assessment study’ and ‘the CEA study on PPM DOTS in Indonesia’ to develop the plan for PhD training. Under the umbrella of the DOTS hospital assessment study, the two studies presented in Paper II and III were developed and conducted (Figure 4). Paper I originated from ‘the CEA study on PPM DOTS strategy in Indonesia’.
To complete the overall aim of the thesis, the author developed and conducted the study for exploring the process of partnership during 2008-2009 (Figure 3) in Yogyakarta province. The selection of Yogyakarta province was made because the PPM-DOTS in hospitals in Yogyakarta had been ongoing since 2000, so that rich information about the process of collaboration could be expected.

**Research setting**

Indonesia is an archipelago country in South-East Asia. With a total population of about 237 millions (in 2010), Indonesia is the fourth most populous country in the world. Fifty-eight percent of the total population live on Java Island. Meanwhile, the proportion that lives in Bali and Sumatra Island is two percent and 21 percent of the total population respectively. The annual growth rate of the population for the whole country is 1.49 percent. Bali is the province with the highest growth population rate, i.e. 2.15 percent (Central Bureau of Statistics Indonesia, 2010).

Currently, 13.3 percent of the total population of Indonesia are living under the poverty line. In Indonesia, the poverty line is defined as the minimum fulfilment of 2100 kcal of food per day and basic non-food goods that are essential to sustain life. The proportion of poor people in rural areas (17 percent) is higher than in urban areas (11 percent) (Central Bureau of Statistic Indonesia, 2010). About 75 percent of the population finance their visits to health care facilities out of their own pockets, and only 15-20 percent of the population have any form of health insurance (WHO, 2008c; World Bank, 2008). The government has provided a mandatory health insurance system for the poor since 2004 (Rokx et al., 2009), which accounted for 5.3 percent of total general government expenditure in 2006 (WHO, 2008c).

Public health service in Indonesia is organised on five levels: village, sub-district, district, provincial, and central. There is, at least, a community health centre located in
every sub-district (WHO SEARO, 2010). Many public health programmes, including
the TB control programme, are integrated in the health centres (WHO, 2009b).
Supporting the function of the health centre are sub-health-centres, village midwife
clinics, and integrated health posts at the village level (WHO SEARO, 2010).

Public health service facilities, including hospitals, are fragmented in terms of
ownership (central government, provincial and district governments). Most public
hospitals are owned by provincial and district government (World Bank, 2008).
Specialised hospitals (e.g. lung hospitals) and teaching hospitals are owned by the
central government, specifically the Ministry of Health. In addition, there are hospitals
and other health care facilities which are administered by the Ministry of Defence
(military and police hospitals) and the Ministry of Law (e.g. prison health clinics).

Based on the type of services provided, the hospitals are classified into general
hospitals and specialised hospitals. General hospitals provide various medical
services, while a specialised hospital focuses on a specific service (e.g. obstetrics
and gynaecologic, lung diseases). In 2008, general hospitals comprised 78 percent
(1,080 out of 1372) of all hospitals in the country (Ministry of Health Republic of
Indonesia, 2009).

Private health care providers commonly consist of private practitioners, such as
physicians, nurses, and midwives, who work part-time for private practices and private
hospitals. About 75 percent of health workers in public health service are also part-
time private practitioners. Private practitioner physicians (in both solo and group
practices) are commonly found in urban areas. Private midwives’ and nurses’ private
practices are popular among the rural population. Private hospitals comprise about
51 percent of total hospitals in Indonesia (World Bank, 2008).

Regulation of hospitals (both public and private) is the responsibility of the
Directorate of Medical Service, Ministry of Health. The NTP is organised through the
Directorate of Communicable Disease Control at the Ministry of Health (Ministry of
Health Republic of Indonesia, 2010a).

Figure 5. The study sites (The figure is modified from Wikimedia, 2010).
Research methods

The overall thesis consists of four study designs (Table 2): 1. A cost-effectiveness analysis was designed to compare particularly the incremental cost per additional successfully treated TB case, under three strategies of PPM DOTS in four provinces (Figure 5). 2. To evaluate the access to standardised TB diagnosis and treatment in hospitals, a cross-sectional study was conducted in 62 hospitals on Java Island. By post-stratification analysis, the study estimated the proportion of TB cases receiving standardised diagnosis and treatment according to the DOTS strategy. 3. Quality aspects of PPM DOTS in hospitals were explored in a multiple case study, including eight hospitals. Data were analysed using cross-case analysis. 4. The process of partnership was explored through a qualitative study. In-depth interviews were conducted with 33 respondents, who were actors involved in PPM DOTS in hospitals in Yogyakarta province. Content analysis was applied to the qualitative data.

Table 2. Summary of study methods.

<table>
<thead>
<tr>
<th>Papers</th>
<th>Sites</th>
<th>Design and analytical aspects</th>
<th>Sample</th>
<th>Data source</th>
</tr>
</thead>
</table>
| Paper I| Yogyakarta, Central Java, West Sumatra, Bali | Cost-effectiveness analysis was based mainly on retrospective data and modelling for comparing incremental cost-effectiveness ratio. A societal perspective was used in measuring cost. Costs were calculated for the value in 2005. Effectiveness of all TB control strategies were assessed based on patients diagnosed in 2005. | Community health centre only (4 provinces) Community health centre + hospital referral of TB patients (3 provinces) Community health centre + hospital treatment of TB patients (3 provinces) Community health centre + private practitioners (2 provinces) | • Documentation on effectiveness of TB program  
• Patient interviews  
• Documentation on data of cost (National government, district health office, province, NGO)  
• Site surveys (health centres, hospitals). |
| Paper II| Yogyakarta, Central Java, East Java, West Java, Banten, and Jakarta | Cross-sectional study to estimate proportion of TB cases accessed to standardised diagnosis and treatment. Post-stratification adjustment/analysis was conducted. | 31 public general hospitals, 29 private general hospitals, 2 pulmonary hospitals | • Medical-record reports  
• TB patient register  
• Laboratory registers |
| Paper III| Yogyakarta and Central Java | Multiple-case study to explore the quality of structure, process and outcome from PPM DOTS implementation. Cross-case analysis was applied to explore important structure and process factors regarding quality outcome. | 4 public general hospitals, 4 private general hospitals | • Documents, such as TB patient register at DOTS unit, hospital policy to DOTS strategy, list of hospital staffs trained for DOTS strategy  
• Focus Group Discussions  
• In-depth interviews |
| Paper IV| Yogyakarta | Qualitative study with content analysis to explore actor’s perceptions of the process of collaboration in PPM DOTS in hospitals during 2000-2008. | 4 physicians, 6 nurses, 8 hospital laboratory staff, 2 hospital medical-record staff, 6 district NTP staff, 3 provincial NTP staff, 1, central NTP staff, 1 personnel from the hospital association, 2 consultants for the pilot project | • In-depth interviews |
‘The Cost-Effectiveness Study’ (Paper I)

The Cost-Effectiveness Analysis (CEA) Study compared the three strategies of PPM DOTS as complements to the baseline DOTS strategy implementation in community health centres:

- Diagnosis by hospitals and referral to community health centres for treatment.
- Full diagnosis and treatment in hospitals.
- Diagnosis by private practitioners and referral to community health centres.

The CEA study also intended to address the comparison with the practise of TB case management, which did not follow the DOTS strategy (non-DOTS) but the required sample size of patients could not be obtained.

Four provinces (Yogyakarta, Central Java, Bali and West Sumatra) were selected purposively, based on discussions with the Ministry of Health. The model of PPM DOTS in private practices was studied in Yogyakarta and Bali provinces. The model of PPM DOTS in hospitals was evaluated in all selected provinces. For detailed descriptions about each strategy of PPM DOTS that was compared in the CEA study, see Table 3.

Table 3. Descriptions of strategies which were analysed in the cost-effectiveness study.

<table>
<thead>
<tr>
<th>Strategy/Combination</th>
<th>Description</th>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health centre DOTS (public)</td>
<td>Diagnosis and treatment of TB patients with DOTS at public health centres.</td>
<td>Yogyakarta, Central Java, Bali and West Sumatra</td>
</tr>
<tr>
<td>Health centre DOTS + Hospital referral of TB patients</td>
<td>Hospitals and lung clinics diagnose patients and then refer them to a local public health centre for treatment and follow-up.</td>
<td>Yogyakarta, Central Java and West Sumatra</td>
</tr>
<tr>
<td>Health centre DOTS + hospital treatment of TB patients</td>
<td>Diagnosis and treatment of TB patients using the DOTS method entirely at the hospital level, reporting to public health authorities.</td>
<td>Yogyakarta, Central Java, and Bali</td>
</tr>
<tr>
<td>Health centre DOTS + engagement of private practitioners</td>
<td>Private practitioners refer patients with TB symptoms for diagnosis and treatment in public health centres.</td>
<td>Yogyakarta and Bali</td>
</tr>
</tbody>
</table>

From each province, three districts were purposively selected to represent urban, semi-urban and rural settings. The districts were selected through discussions with the Provincial Health Offices of the study areas. In addition, the meetings between the research team and the personnel from the Provincial Health Offices were also used to get information about the research settings.

Costs from the provider perspective comprised: cost of diagnosis, cost of treatment, cost of drugs and the cost of programme arrangement. Data regarding the cost of diagnosis and treatment were collected through visits to public and private hospitals and community health centres. Secondary data were collected from district health
Cost-effectiveness is expressed as cost-effectiveness ratio, which is cost per unit of outcome of the health program/intervention/service. Cost was measured in monetary units and the effectiveness of the TB control programme was mainly measured by the number of cases successfully treated. Cost-effectiveness in this study was measured in the average cost-effectiveness ratio (ACER) and incremental cost-effectiveness ratio (ICER). The average cost-effectiveness ratio (ACER) was measured as a ratio comparing total cost needed for implementing DOTS strategy per total number of cases successfully treated. Incremental cost-effectiveness ratios (ICER) of the PPM DOTS strategies were calculated as the additional cost of conducting PPM DOTS strategy per additional effectiveness unit, compared to DOTS in community health centres only (as the baseline).

The difference between ACER and ICER is illustrated in Figure 6. For instance, if the total cost of DOTS strategy in community health centres was $200,000, and the total number of TB cases successfully treated was 200; this means ACER = $1,000/case successfully treated. The ACER of PPM DOTS in hospitals was, therefore, equal to 2,000$/case successfully treated (600,000 $ divided by 300 cases). The ICER of PPM DOTS in hospitals, compared to the baseline of DOTS in community health centres, was $600,000-200,000 per 300-200 cases, or $4,000 per case successfully treated.
‘The Access Study’ (Paper II)

The study on access to diagnostics and treatment case management used a cross-sectional design. The study population were drawn from hospitals on Java Island involved in the PPM-DOTS strategy, with two inclusion criteria: (1) hospitals should have been involved in PPM DOTS at least for two years, and (2) TB recording and reporting systems should be in place, and outpatient-morbidity reports available. This study selected 31 public general hospitals, 29 private general hospitals, and two public lung hospitals as the sample. The study aimed to estimate the proportion of TB patients that did not receive standardised diagnosis and treatment in the hospitals. This is the proportion that was lost to follow-up, but was assumed to have been treated in outpatient units under non-DOTS procedures.

Due to the incomplete recording of TB referrals from hospital to other DOTS facilities, the cross-sectional study used the referral rate identified in previous projects in Yogyakarta province. The median for the referral rate during 2003-2005 was 31.5 percent and 32.5 percent for all forms of TB cases and sputum smear-positive TB cases respectively (Irawati et al. 2007).

The analysis consisted of several steps: firstly, the number of TB cases from each data source was described and compared among types of hospitals using the Kruskall-Wallis statistical test. Secondly, the number of TB cases was extrapolated from the sample into the study population, by conducting post-stratification analysis. In post-stratification analysis, a weighted index was calculated by dividing the number of hospitals in the study population by the number of hospitals in the sample. The weighted index was used to calculate the weighted cumulative number of TB cases in the different groups. The weighted index was applied in order to extrapolate the proportion of TB patients that received a standardised diagnosis and treatment in the sample, to the study population. The proportion treated under non-DOTS was estimated by identifying the gap between the proportion of TB cases diagnosed and treated with DOTS strategy and the total of TB cases diagnosed by the hospitals, after adjustment for the median referral rate as mentioned previously.

‘The Quality Study’ (Paper III)

The study for exploring the quality of DOTS strategy implementation used a multiple case-study design. A case-study design was selected in order to enable exploration of phenomena (Zucker 2001; Yin, 2003), which was the intention of the study, using both qualitative and quantitative data.

The study focused on public and private general hospitals, as they were the most common hospitals involved in PPM. We identified two settings: Yogyakarta and Central Java. Yogyakarta represented an ‘intensive’ PPM conducted with a lot of external resources, while Central Java represented the national policy of scaling-up DOTS. In addition, we also considered the potential difference of TB control performance between the teaching and non-teaching hospitals.

Maximum variation sampling was conducted to select the hospitals that vary most in terms of how long they had been implementing the DOTS strategy, as well as in
terms of hospital capacity and patient volume. Finally, eight hospitals were selected as cases, comprising two public teaching hospitals, two public non-teaching hospitals and four hospitals within Yogyakarta and Central Java provinces.

In this thesis, the Donabedian concept of quality of health service was adapted to the setting of DOTS strategy implementation in hospitals. Criteria for input, process and outcome were devised. Trained staff, an available DOTS team, DOTS unit and NTP guidelines are prerequisites for starting the PPM for TB control in a health facility according to the national TB programme. Quality of process was assessed by the following indicators: (1) adherence to the correct standard of sputum-test administration to TB suspects and cases, and (2) conversion rate as an indicator of the quality of treatment process. The practical commitment from the hospital, as well as the adherence of hospital staff to guidelines and communication with the district NTP staff to secure the completion of treatment, were also explored as part of the ‘quality process’. Finally, the outcome of the service was measured, using the indicators from the TB control programme, i.e., treatment success rate and default rate.

Cross-case analysis, a special type of pattern matching technique (Yin, 2003), was used in the analysis with the intention to explore any relationship between variables of structure, process, and outcome. An inductive analysis was used to compare the findings from one case to another. Description of structure, process and outcome was made for each case. The hospitals with satisfactory quality outcome (the ‘good’ cases) and unsatisfactory quality outcome (the ‘bad’ cases) were identified. Patterns were also identified, by comparing the similarities and differences between the descriptions of each structure and process aspects within the ‘good’ cases and the ‘bad’ cases.

**‘The Governance Study’ (Paper IV)**

A qualitative study design was used to explore the process of collaboration between the NTP and hospitals in PPM DOTS. ‘Actors of partnership’ were selected, who purposively consisted of NTP staff, hospital staff, hospital association managers, and consultants for the pilot project of PPM DOTS in hospitals in Yogyakarta. Respondents were selected from four public hospitals and three private hospitals with a variation of performance in DOTS strategy based on a previous study (Utarini et al., 2007). Utarini et al. (2007) also identified that nurses, medical doctors and laboratory staff were the core personnel involved at the operational level, therefore six nurses, four medical doctors and eight laboratory staff were selected. Two personnel from the medical records unit of a hospital, who had frequent interactions with NTP staff at the district level, were also included. In addition to that, three staff from the Yogyakarta provincial health office, six staff from five district health offices, and a staff member from the National Tuberculosis Programme Unit at the Ministry of Health also took part. An individual from the hospital association, and two international consultants for the pilot project of the PPM for TB control were also selected as respondents for the study.
In-depth interviews were conducted in order to get the personal perceptions of the respondents. The interview topics focused on:

- The process of partnership initiation.
- The implementation of principles of mutual partnership, particularly: maximum benefit for each party, equality in decision making, shared objectives, processes, outcome and evaluation, agreed purpose and values, mutual trust, and respect (Brinkerhoff, 2002).
- The common problems faced and ways to maintain collaboration.

The audio-based interview records and the field notes were transposed into verbatim transcripts. A content analysis technique was used (Graneheim and Lundman, 2004), particularly applying the ‘directed content analysis’ approach (Hsieh and Shannon, 2005) by taking advantage of the early theory of partnership by Brinkerhoff (2002). The analysis was conducted in several steps: first, units of meaning were extracted from the verbatim transcripts, and manifest meanings were labelled as codes. The codes with common meanings were then grouped into sub-categories and categories, and relations of latent meanings among categories were identified as a theme.

**Ethical considerations**

All studies received ethical approval from the Faculty of Medicine, Gadjah Mada University. In addition to that, administrative permission was obtained from the local government in the study areas as required.

The research team obtained informed consent from the hospital directors, and representatives of the district and provincial NTP. The aim of the research and its benefits to the overall TB control programme, were explained to all participants. Before the interview or focus group discussion, we informed participants about the purpose of the interview/focus group discussion and their right to participate or to leave the study at any time. They were asked to have their granting of permission to record in audio format, and were informed of their right to refuse the recording if they so wished. When assessing the data from the patient register, no personal data was assessed, only the information about diagnosis and treatment. Confidentiality of patients’ identity during the data collection, analysis and presentation was maintained throughout.

The result of the study was fed back to hospitals, districts, provinces and national NTP staff in phases. The result of the CEA study was presented at two national meetings and provincial seminars, inviting relevant stakeholders at each level. The results of ‘the access study’ and ‘the quality study’ were disseminated together as part of the ‘hospital assessment DOTS study’ at a national meeting attended by the MoH (the Communicable Disease Control Directorate and the Medical Service Directorate), provincial and district NTP staff, and the hospitals. In addition, the results were also presented to the national TB expert committee (*Komite Ahli*). Findings from ‘the governance study’ were presented at the provincial-level meeting in Yogyakarta attended by provincial and district NTP staff, hospital staff, TB researchers, and NGOs concerned in TB issues.
Main findings

Cost-effectiveness of PPM DOTS in hospitals (Paper I)

The results of the CEA study are described in four aspects: effectiveness, cost, average cost-effectiveness ratio, and incremental cost-effectiveness ratio.

Effectiveness

In total, 10,577 sputum smear-positive TB cases were successfully treated, of which 4,241 (41 percent) can be attributed to PPM strategies (the numbers represent the three districts sampled in each province, not the entire province). The effectiveness of PPM hospital referral was 87-95 percent, which was larger than that of PPM hospital treatment (59-72 percent). In addition, the effectiveness of PPM private practitioners was 89-92 percent.

Cost

The cost per individual visit, for both diagnostic and pre-diagnostic visits in hospitals, tended to be higher than those at community health centres. However, the cost per visit for DOTS treatment was higher in community health centres than in hospitals, because of higher staff costs for DOT treatment in the community health centres. Service costs (including drugs and supplies) contributed about half of the total cost, while the programme cost represented 14 percent of the total cost, and about 36 percent of costs to patients. The proportion of patient cost, out of the total cost of the PPM strategies in hospitals or private practitioners, was larger than in health centres.

Average cost-effectiveness ratio

In general, the total cost per sputum smear in successfully treated TB cases in PPM hospitals, was higher than the DOTS strategy in community health centres. As seen in Table 4, the cost was $169-$511 per patient in the hospitals, but only $195-$420 per patient in the community health centres. In two provinces (Central Java and West Sumatra), the average cost per successfully treated case in PPM hospital referral was less than in the community health centres. The average cost per successfully treated patient was slightly less in the PPM hospitals ($169-551) compared to the PPM private practices ($298-$442). Comparison of ACER between PPM in hospitals and PPM in private practitioners, resulted in different findings. In Bali, the average cost per successfully treated patient in private practitioner was lower than in hospital. The results from Yogyakarta, however, revealed the opposite.
Table 4. Results of the cost-effectiveness analysis.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Province</th>
<th>Average cost-effectiveness ($)</th>
<th>Incremental cost-effectiveness* ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOTS at community health centre only (0)</td>
<td>Yogyakarta</td>
<td>268</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Central Java</td>
<td>206</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Bali</td>
<td>420</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>West Sumatra</td>
<td>195</td>
<td>-</td>
</tr>
<tr>
<td>DOTS at community health centre+ PPM hospital referral (1)</td>
<td>Yogyakarta</td>
<td>317</td>
<td>347</td>
</tr>
<tr>
<td></td>
<td>Central Java</td>
<td>199</td>
<td>183</td>
</tr>
<tr>
<td></td>
<td>West Sumatra</td>
<td>169</td>
<td>152</td>
</tr>
<tr>
<td>DOTS at community health centre + PPM hospital treatment (2)</td>
<td>Yogyakarta</td>
<td>283</td>
<td>294</td>
</tr>
<tr>
<td></td>
<td>Central Java</td>
<td>231</td>
<td>328</td>
</tr>
<tr>
<td></td>
<td>Bali</td>
<td>511</td>
<td>739</td>
</tr>
<tr>
<td>DOTS at community health centre + PPM private practitioners (3)</td>
<td>Yogyakarta</td>
<td>298</td>
<td>430</td>
</tr>
<tr>
<td></td>
<td>Bali</td>
<td>442</td>
<td>637</td>
</tr>
<tr>
<td>DOTS at community health centre + hospital referral + hospital treatment (1 and 2)</td>
<td>Yogyakarta</td>
<td>285</td>
<td>298</td>
</tr>
<tr>
<td></td>
<td>Central Java</td>
<td>216</td>
<td>247</td>
</tr>
<tr>
<td>DOTS at community health centre + hospital referral + private practitioners (1 and 3)</td>
<td>Yogyakarta</td>
<td>316</td>
<td>342</td>
</tr>
<tr>
<td></td>
<td>Central Java</td>
<td>316</td>
<td>342</td>
</tr>
<tr>
<td>DOTS at community health centre + hospital treatment + private practitioners (2 and 3)</td>
<td>Yogyakarta</td>
<td>293</td>
<td>309</td>
</tr>
<tr>
<td></td>
<td>Bali</td>
<td>567</td>
<td>982</td>
</tr>
<tr>
<td>DOTS at community health centre + hospital referral + hospital treatment + private practitioners (1,2 and 3)</td>
<td>Yogyakarta</td>
<td>305</td>
<td>327</td>
</tr>
</tbody>
</table>

* Incremental cost-effectiveness ratios in this study are incremental to the baseline case of implementing DOTS at the community health centre only.

Incremental cost-effectiveness ratio

The results showed different figures of incremental cost-effectiveness ratio (ICER) in each province (Table 4). In Yogyakarta province, the ICER for PPM hospital treatment under DOTS in community health centres ($294) was the lowest. Similarly, the ICER of PPM hospital treatment was not lower than PPM hospital referral and private practitioners combined ($342). In Central Java, the implementation of PPM hospital referral had the lowest ICER ($183) of all PPM strategies. Results from West Sumatra revealed that the PPM hospital referrals with a high volume of patients had one of the best ICERs ($152). In Bali province, the ICER of PPM private practitioners ($637) was lower than the ICER of PPM hospital treatment ($739).

Access to standardised diagnosis and treatment among TB cases in hospitals involved in PPM DOTS (Paper II)

The cross-sectional study showed that lung hospitals had a higher number of TB cases, compared to the general hospitals based on all three data sources used in the study. Private general hospitals had fewer TB cases compared to public general hospitals. The difference in the number of TB cases (all types including smear-positive cases) among the three categories of hospitals was statistically significant.
Moreover, the cross-sectional study revealed that DOTS units were not accessed by 20-53 percent of the patients in the hospitals with a diagnosis of TB. The proportion of TB cases (for all types), that missed the opportunity for standardised diagnosis and treatment in the hospitals, was larger in public general hospitals (53.3 percent) and private general hospitals (51.8 percent) than in lung hospitals (19.5 percent). In addition, 4-18 percent of infectious adult TB outpatients missed the opportunity for standardised treatment in a hospital DOTS unit. The proportion of smear-positive TB cases, that had no follow-up in a public general hospital was greater (18.2 percent) compared to those in private general hospital (4.2 percent) and lung hospitals (8.1 percent).

**Quality of DOTS strategy implementation in hospitals (Paper III)**

Quality of structure, process and outcome among the hospitals was shown to vary and be suboptimal. The standard infrastructure of DOTS strategy implementation, as mentioned in the national guidelines for PPM for TB control (Ministry of Health Republic of Indonesia, 2006; Ministry of Health Republic of Indonesia, 2010c), was not available in all hospitals. Hospitals also varied in terms of the actors who delivered the necessary commitment. The hospitals commonly did not conform to the recommended standard of diagnosis by sputum examination. The standard of 80 percent conversion rate was not achieved by all hospital in the case study, and all had differing approaches to the case-holding process. In terms of quality of outcome, the majority of hospitals could not achieve the standard of either the treatment success rate or the default rate.

Details of the quality of structure, process and outcome among the hospitals in the case study are given below:

**Quality of structure and process**

The obligatory structure (DOTS unit, DOTS team, TB national guidelines, financial incentives, free anti-TB drugs) was not fully available in some hospitals in the case study (Table 5). The number of new TB cases at outpatient units per trained staff member in hospitals, was in a range of 2-220 cases in 2005. The practical commitment from hospitals differed. Six variations of hospital commitment were discovered:

- Less support from the nurses and the medical specialist to the implementation of the DOTS strategy. No specific hospital policy from the hospital director existed (hospital 7 and 8).
- There were committed nurses with support from the hospital director, but the medical specialist was reluctant to implement DOTS strategy (hospital 4).
- There was much support from the hospital director and medical specialist, but less willingness from nurses to perform the recording routines (hospital 2).
- Only the medical specialist played an active role, but there was no TB-specific policy in the hospitals regarding DOTS strategy implementation (hospital 1 and 5).
• There existed an active medical specialist and dedicated nurses, as well as hospital policies for TB service. However, not all of the policies were perceived as supportive of DOTS strategy implementation (hospital 6).
• There were committed nurses and a medical specialist with support from the hospital director and the medical committee in the hospital (hospital 3).

The hospitals in the case study commonly showed low quality in diagnostic procedures. Only hospital 6 (a public non-teaching hospital) administered the required standard of sputum tests to all TB suspects in diagnosis, and to all TB cases after two months of intensive treatment (Table 5). In hospital 8, none of TB patients was even examined for sputum microscopy after the intensive treatment.

Similarly, three hospitals in the case study did not reach the 80 percent conversion rate. Four hospitals (hospitals 1, 3, 5, and 6) achieved the 80 percent conversion rate. The zero percent conversion rate in hospital 8 should be interpreted carefully, since this was mainly because no sputum smear-positive TB patients were sent to sputum smear evaluation (Table 5).

The case study explored two different settings with a different standard of case-holding process. When the case study was conducted (early 2006) in Yogyakarta setting, quarterly monitoring and evaluation meetings at district level were still in place. The network between hospital staff, district NTP staff, and the community health centres was available for exchanging information on referred cases from the hospitals, and the default cases in the hospitals. In Central Java, except in hospital 6, no systematic linkage between hospitals and the local health centres was in place. Communication between the hospital staff and the district NTP staff happened if there were default cases in the hospitals. The quarterly monitoring evaluation meetings were held, but not utilised to confirm the follow-up of referred cases or default cases.
Table 5. Quality of structure and process.

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pu/T*</td>
<td>Pu/NT**</td>
<td>Pr/NT***</td>
<td>Pu/T</td>
<td>Pu/NT</td>
<td>Pr/NT</td>
<td>Pu/NT</td>
<td>Pr/NT</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ownership</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
</tr>
<tr>
<td>Accreditation/certification</td>
<td>√#</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>NA##</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Number of new TB cases in outpatient unit (2005)</td>
<td>144</td>
<td>29</td>
<td>146</td>
<td>509</td>
<td>178</td>
<td>220</td>
<td>141</td>
</tr>
<tr>
<td>Number of new TB cases per trained physician</td>
<td>6</td>
<td>3</td>
<td>24</td>
<td>63</td>
<td>178</td>
<td>220</td>
<td>141</td>
</tr>
<tr>
<td>Number of new TB cases per trained nurse</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>18</td>
<td>178</td>
<td>220</td>
<td>70</td>
</tr>
<tr>
<td>Number of new TB cases per trained member of lab staff and pathologist</td>
<td>14</td>
<td>7</td>
<td>49</td>
<td>46</td>
<td>89</td>
<td>220</td>
<td>70</td>
</tr>
<tr>
<td>DOTS unit</td>
<td>√#</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>NA</td>
<td>√</td>
</tr>
<tr>
<td>DOTS team</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>NA</td>
</tr>
<tr>
<td>NTP guideline</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Financial incentives</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>NA</td>
<td>√</td>
<td>√</td>
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<tr>
<td>Free anti-TB drugs</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of suspects having at least two sputum examinations for diagnosis (%)</td>
<td>72.2</td>
<td>89.7</td>
<td>86.1</td>
<td>83.2</td>
<td>93.1</td>
<td>100</td>
<td>79.1</td>
</tr>
<tr>
<td>Proportion of TB cases with follow-up sputum examination after two months of treatment among all registered TB cases (%)</td>
<td>77.4</td>
<td>39.5</td>
<td>77.4</td>
<td>66.2</td>
<td>79.6</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Conversion rate (%)</td>
<td>94.6</td>
<td>66.7</td>
<td>88.2</td>
<td>71.4</td>
<td>100</td>
<td>90</td>
<td>14.3</td>
</tr>
</tbody>
</table>

* Public-teaching hospital; **Public-non teaching hospital; *** Private-non teaching hospital; #Available; ## Not Available.

Quality of outcome

The target of an 85 percent treatment success rate was achieved only in two hospitals (hospital cases 3 and 6). Only three hospitals had a completion rate of about 80 percent or more. Regardless of any problems of incomplete treatment outcome recording, half of the hospitals had default rates of more than five percent.

The treatment success rate, and the default rate, in hospitals 1 and 5 were close to meeting the targets (Table 6). The low treatment success rate in hospital 2 (46 percent) might not have been because of the problem of default cases, but because of a high proportion of referred cases during the treatment (35 percent of all cases and 53 percent of sputum smear-positive TB cases). Hospitals 3 and 6 presented obvious quality treatment outcomes. In contrast, hospital 4 revealed obvious suboptimal treatment outcomes (60 percent treatment success rate, 14 percent default rate, and 51 percent completion rate). Similarly, hospitals 7 and 8 showed low treatment success rates (14 percent and zero percent respectively), low completion rates (30 percent and three percent respectively) and high default rate (43 percent and ten percent respectively).
Table 6. Results of treatment outcome among eight hospitals in the multiple-case study.

<table>
<thead>
<tr>
<th></th>
<th>Yogyakarta Case 1</th>
<th>Yogyakarta Case 2</th>
<th>Yogyakarta Case 3</th>
<th>Yogyakarta Case 4</th>
<th>Yogyakarta Case 5</th>
<th>Yogyakarta Case 6</th>
<th>Yogyakarta Case 7</th>
<th>Yogyakarta Case 8</th>
<th>Central Java Case 1</th>
<th>Central Java Case 2</th>
<th>Central Java Case 3</th>
<th>Central Java Case 4</th>
<th>Central Java Case 5</th>
<th>Central Java Case 6</th>
<th>Central Java Case 7</th>
<th>Central Java Case 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default rate (SS+)*, (%)</td>
<td>7.1</td>
<td>0</td>
<td>5.9</td>
<td>14.3</td>
<td>0</td>
<td>0</td>
<td>42.8</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default rate (SS+)**, (%)</td>
<td>7.1</td>
<td>0</td>
<td>7.3</td>
<td>28.6</td>
<td>18.9</td>
<td>10</td>
<td>85.7</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment success rate (SS+), (%)</td>
<td>82.1</td>
<td>46.7</td>
<td>88.2</td>
<td>60</td>
<td>74</td>
<td>90</td>
<td>14.3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referred cases during treatment (SS+), (%)</td>
<td>8.9</td>
<td>53.3</td>
<td>0</td>
<td>0</td>
<td>1.7</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment completion rate (all cases), (%)</td>
<td>79.2</td>
<td>52</td>
<td>89.6</td>
<td>51.4</td>
<td>71.6</td>
<td>90.9</td>
<td>30</td>
<td>2.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referred cases during treatment (all cases), (%)</td>
<td>8.5</td>
<td>34.9</td>
<td>0</td>
<td>5.4</td>
<td>1.8</td>
<td>0</td>
<td>5</td>
<td>17.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SS+ = sputum smear-positive TB cases; * TB cases without information of treatment outcome are defined as missing values; ** TB cases without information of treatment outcome are defined as default cases.

Only cases 1 and 5 (public teaching hospitals), as well as case 3 (a private non-teaching hospital) managed to implement the DOTS strategy beyond the internal medicine or lung departments.

Important factors for the quality outcome of the DOTS strategy in hospitals (Paper III)

In hospitals with all the DOTS requirements (DOTS team, DOTS unit, TB guidelines and financial incentives) in place, the treatment outcomes varied (Table 5). The hospitals with satisfactory treatment outcomes (cases 3 and 6), enjoyed good commitment from the medical specialist, nurses and the hospital directors.

The following sections discuss patterns indicating the relationship between structure, process, and quality of outcome:

**Structural factors**

The case study revealed no consistent pattern between the status of ownership (public/private) and the status as a teaching/non-teaching hospital with regard to quality of outcome. Cases 3 and 6, which were a public non-teaching hospital and a private non-teaching hospital, had satisfactory treatment outcomes. The performance of case 3 and 6 were even better than cases 1 and 5, which were public-teaching hospitals.

Hospitals with a lower TB caseload per trained member of staff, did not have better treatment outcomes or a higher level of DOTS coverage within the hospital. The number of new TB cases in outpatient units per trained physician in case 3, was similar to that of case 8, but the outcome was better in case 3. The TB-load per trained nurse or per trained member of lab staff was lower in case 1 than in case 3, but the outcome was better in case 3 than case 1. Hospitals with a DOTS team, a DOTS unit, TB guidelines, free TB drugs, and financial incentives did not produce better outcomes.

**Process factors**

Among the eight hospitals in the case study, a lack of commitment from the medical specialist was found in three hospitals (cases 4, 7 and 8) with poor outcome. In
hospitals with better outcome (cases 1, 3 and 6), strong support from the medical specialist was available.

The case-holding process was also shown as an important contributing aspect for quality outcomes. However, the availability of a case-holding system for the area (e.g. quarterly monitoring meetings, an agreed mechanism among hospital actors and the district NTP for handling the referred and default cases) was not sufficient to ensure a good case-holding process. If the hospital actors were not willing to use the system, the case-holding process did not function as it should have. It was shown in case 4, which was the hospital with an adequate system for a case-holding process, that the hospital staff did not utilise the system well. By contrast, hospital 6 worked with no district case-holding process established, but the medical specialist created the hospital case-holding system with the health centres in the surrounding area.

**The process of PPM DOTS partnership in hospitals (Paper IV)**

The collaboration between NTP and hospitals was a dynamic process, as in the life of an organism, with phases of initiation (birth), growth and decline. During the initial phase (2000-2002), the actors perceived some hidden obstacles. The medical specialists commonly hesitated to implement the DOTS strategy. They tended to believe in their own clinical experience more than the diagnostic and treatment procedures of the DOTS strategy. At the same time, the NTP staff lacked the confidence to approach the medical specialists about it.

The formation of a Provincial DOTS Committee (PDC) in 2002 was a milestone for the phase of growth of 2002-2005. The PDC was perceived as ‘the door opener’ for the partnership between the NTP and hospitals.

‘... Dr. A and Dr. B, sometimes with Dr C, came to the hospitals to approach the key actors in the hospital DOTS team. After reaching agreements [about procedures of the DOTS strategy], then it was my turn to approach the nurse responsible for the TB programme in the hospital. When I faced any reluctance from doctors regarding the DOTS procedure, I reported to Dr A [the coordinator of PDC]. Dr A then looked for the rival ['the rival' means somebody who can negotiate at the same level and influence the physician].’

(A district NTP staff)

The intensive interaction among the PDC personnel, hospital staff and NTP officers facilitated the growth of mutuality. Some hospital staff perceived that initially recording and reporting was an additional burden of work for them, but later that was seen as an acceptable task. The hospital staff reached an understanding about the importance of recording and reporting tasks for the district NTP staff’s job.

‘...When we notify cases [TB cases], we contact her [the district NTP staff]. We need each others [help].’ (A nurse at a public hospital)
The majority of respondents perceived very collegial interactions among the hospital staff, the district NTP personnel, and the PDC in problem solving.

‘I felt comfortable [during the supervision]. They [the PDC member] guide me; they do not push me...’ (A laboratory staff at public hospital)

The district NTP staff perceived a gradual acceptance from the hospital staff — a transition from apathy to respect. The hospital actors also perceived a change of communication style from the district NTP staff, moving from a formal, instructive style, to a more collaborative style. In this period, there was a growth of initiative from the hospital personnel, who began to provide resources independently, e.g. the forms of recording and reporting, when stock had run out.

However, such values seem not to have grown perfectly. A lack of trust was still to be found among some hospital staff, manifesting as deliberate hindering and hiding of information from the NTP or PDC on a number of TB patients who had defaulted on the treatment. A general reluctance to cooperate on the part of the medical specialists, and fear of blame during supervision were still found. In addition, there was still a widely held view by NTP staff that they should have a senior role in the partnership between the NTP and hospitals.

‘It [the partnership between NTP and hospitals] is not an equal relationship. It is an instructional relationship...’ (A member of provincial NTP staff)

The period 2006-2008 was a time of decline for the partnership due to of scarcity of resources and change of personnel. Under the new leadership of the Provincial Health Office, the PDC did not function properly. No coordinating meetings of PDC were arranged during that time. The frequency of supervision visits to hospitals also dropped dramatically. Visits from district NTP staff to hospitals were mainly for the collection of routine data. Hospital actors perceived a lack of problem analysis and feedback from the district NTP staff. The motivation of hospital staff was perceived to be decreasing and some informants perceived decreasing trust amongst hospital staff for the NTP, as expressed in the following statement:

‘The volume of supervision is decreasing... currently, supervision is financed by Global Fund – only one provincial NTP staff does the supervision to district and health facilities [community health centres or hospitals] in each round of supervision...The supervision is not well prepared, so that it is not optimal. It is different from before when we had a team from provincial level [mix of provincial NTP staff and PDC] and a TB program officer at district level. In this current situation, I perceive that the hospitals trust us less than previously.’ (A member of provincial NTP staff)
Some respondents perceived a lower quality of recording and reporting, and some indicators of performance ceased to be evaluated altogether. There were still informal interactions among the hospital staff, the district NTP staff, and PDC members. But, overall, the governance of the partnership during this phase was weak.
Discussion

Reflections on the main findings

The discussion focuses on the four issues in the health systems, which are derived from the aims and research questions of this thesis, i.e., cost-effectiveness, access, quality and governance.

Cost-effectiveness

This study did not estimate the cost-effectiveness of TB care in hospitals without the DOTS program (non-DOTS strategy). Studies from Vietnam and India have shown a treatment success rate of about 50 percent (Uplekar et al., 1998; Lönnroth et al., 2003). If this rate is assumed to be valid also in Indonesia, it would indicate that implementing DOTS in hospitals improves the rate of treatment success. It is also likely that non-DOTS treatment has a higher cost than DOTS treatment. Thus, it is likely that DOTS treatment is more cost-effective than non-DOTS treatment. However, this cannot be firmly concluded without having observed non-DOTS strategies.

This study found that PPM DOTS in hospitals was as cost-effective as DOTS in community health centres in only two out of four provinces, namely Central Java and West Sumatra. Results from CEA studies in India (Floyd et al., 2006) and South Africa (Sinanovic and Kumaranayake, 2006) revealed that PPM DOTS involving private practitioners was as cost-effective as DOTS in the public sector.

The result from Central Java suggests that PPM DOTS hospital referral has the best ICER. However, results from Yogyakarta show a similar cost-effectiveness between PPM DOTS hospital referral and hospital treatment. That said, combining PPM DOTS hospital referral and hospital treatment does not appear to be a cost-effective option, compared to choosing between them. The combined option also requires a good referral network, as well as the capacity and commitment from hospitals in delivering DOTS strategy (which were shown as lacking in the access and quality studies). Studies by Utarini et al. (2007) have shown that both PPM DOTS hospital referral and treatment are commonly implemented in hospitals. Practically, it was found that the choice of being referred to a community health centre, or being treated in the hospital, was made by patients and/or physicians, and not by the hospital (Utarini et al., 2007).

This study showed variations of ICER results among provinces, which points to the importance of context and management matters as determinants of cost-effectiveness. The findings from Central Java were estimated in the context of local staff implementing the programme with a high patient-volume. The results from Yogyakarta occurred in the context of significant technical and financial assistance from donors, with a committed PPM manager. A study in India has also highlighted the importance of committed PPM managers (with sufficient leadership), to a cost-effective PPM strategy (WHO, 2004b). Factors influencing the retention of patients during treatment need to be considered, i.e., patients lost during the referral (for hospital referral strategy) and weak default tracing (for hospital treatment strategy).
In rural areas, referral of TB patients from hospitals to local community health centres can help to decrease the burden of patient travel cost, while the community health centres are able to absorb the added patient load without additional staff.

In summary, from a cost-effectiveness perspective, there is no clear winner between the strategies. However, when hospitals are involved, it is likely that referring patients to health centres is preferable in many situations rather than having treatment in hospital.

**Access and quality**

**The magnitude of the problem**

This study estimated that between 19-53 percent of TB cases (all forms) and 4-18 percent of SS (+) TB cases in hospitals involved in the PPM for TB control, missed the opportunity to provide standardised diagnosis and treatment as in the DOTS strategy. These findings run contrary to the aim of PPM DOTS, which is ‘to improve and to provide equitable access to TB care to all patients’ (WHO, 2010d). The study also showed that this inconsistent access to DOTS strategy is more prominent in public general hospitals. The general hospitals, and the medical college hospitals, are the most common types of hospital in the PPM DOTS strategy (WHO, 2008b). However, the identity of those who accessed, and who did not access, was unknown; therefore the equity aspect of access could not be explored in this study. The findings from the CEA study showed that the patient cost in the PPM DOTS hospitals was higher than in health centres. Is this evidence that PPM DOTS in hospitals puts an additional financial burden on patients, and potentially introduces inequity problems? It should be borne in mind that there is only limited evidence from which to draw conclusions about the issue of equity in access and quality of PPM DOTS (Malmborg et al., 2006; Travis and Cassels, 2006).

The findings of this study showed that quality of DOTS strategy implementation in public and private hospitals varies. Not all of the standard structure for DOTS strategy was available in the hospitals. In addition, standard diagnosis and treatment were only partially carried out. Studies with larger numbers of hospitals in Indonesia by Utarini et al. (2007, 2009a & 2009b) found that only between 10-37 percent of hospitals in Indonesia had all of the necessary standard structure for DOTS implementation as specified in the national guidelines. Another study by the Ministry of Health in Indonesia among 18 hospitals, revealed that only 60 percent of the hospitals involved in PPM DOTS had a hospital DOTS team (Ministry of Health Republic of Indonesia, 2010a).

‘The quality study’ revealed differing practices among the hospitals in performing the sputum smear examination for diagnosis and follow-up. By clinical audit, Utarini et al. (2007) found that between 20-80 percent of TB suspects in 7 out of 8 hospitals on Java did not undergo the standardised procedure of sputum test for diagnosis. A study by Loveday et al. (2008) showed only 22 percent of pulmonary TB cases in a public hospital in South Africa, were diagnosed using sputum smear examination.
A study by Chiang et al. (2007) revealed different findings in large cities in North Africa and Asia, when the diagnostic practice was investigated through face-to-face interviews with hospital staff. It showed that the hospital staff in almost all hospitals that linked to the NTP (98 out of 99 hospitals) stated that they always administered sputum smear examinations for TB suspects. The contradictory findings from Loveday et al. (2008) and Chiang et al. (2007), and also the findings of this study, on the varying levels of commitment from hospitals, may raise the possibility of a ‘silent reluctance’ of hospitals involved in PPM DOTS to implement standardised diagnostic procedure.

In this study, most hospitals did not achieve the targets of treatment outcome indicators. Other studies at national and international levels found low treatment outcomes in the hospitals involved in PPM DOTS. Utarini et al. (2007; 2009a and 2009b) revealed that 21-88 percent of all sputum smear-positive TB cases in public and private hospitals in Indonesia were successfully treated. These studies have also shown a wide range of treatment-default rates among smear-positive TB cases, of between 0-30 percent. The findings were consistent with the results from a few other studies in other countries in Asia and Africa. A study by Chiang et al. (2007) revealed that half of the hospitals, which functioned as the basic management unit of NTP (48 out of 89 hospitals), had treatment success rates of less than 70 percent. In a district hospital in South Africa, which implemented NTP service, only 18 percent (40 out of 225 smear-positive TB cases) completed the treatment (Loveday et al., 2008). On the other hand, two recent studies from India and Nepal showed that the implementation of DOTS resulted in a 97 percent cure rate (Chokani et al., 2006) and an 80 percent treatment success rate (Sharma et al., 2004). However, those two studies were conducted in tertiary teaching hospitals.

Possible explanatory factors

There are many factors contributing to the suboptimal quality of, and poor access to, PPM DOTS. Ogden et al. (1999), who argued that poor access and quality of TB care were not patient failures, are persuasive. Therefore, this thesis concentrates particularly on the provider and policy factors which contribute to the problem.

It is relevant to describe the complexity of services in the hospital when exploring the possible factors contributing to problems of access and quality (USAID and TBCTA, 2010). Patients with symptoms of TB should have different entrances when using the outpatient or inpatient services of the hospitals. An adult patient who has had a cough for more than three weeks should visit the internal medicine unit or lung unit. Another patient with symptoms of extra pulmonary TB should be able to visit a surgeon or dermatologist. When arranging TB services in hospitals, collaboration from various staff is essential, such as: physicians, nurses, laboratory staff, pharmacists, and staff in medical recording. It is a complex task to engage all relevant hospital actors in TB services when implementing the DOTS strategy (USAID & TBCTA, 2010). This study showed that the DOTS strategy was commonly implemented only partly in certain units in the hospitals. In the hospitals implementing DOTS strategy beyond
the internal medicine and lung departments, there were systems of collaboration between units, and support from the hospital authorities. An argument by Nelson et al. (2002) supported the findings of our study, that ‘supportiveness of the larger organisation’ is associated with high quality of health service.

The problem of quality in health service is closely linked to the quality of human resources. Loveday et al. (2008) revealed poor knowledge among the physicians in hospitals in South Africa about TB diagnostic procedure. Moreover, this study has pointed out the importance of commitment from hospital actors, particularly medical specialists and nurses. As also seen in this study, commitment from hospital actors was commonly weak. Loveday et al. (2008) also revealed that both physicians and nurses commonly lacked willingness to educate patients about duration of treatment, which negatively influenced the treatment outcome.

The problems of access and quality can be related to the problem of coordination among the hospital units providing TB services. Nelson et al. (2002) explained that teamwork among the personnel in providing the health service was essential to the quality of health service. A study by Utarini et al. (2007) revealed that only about one-third of hospitals in Indonesia conducted routine meetings of the DOTS team. Other studies by the Ministry of Health Republic of Indonesia have revealed similar findings, for example that only 28 percent of DOTS teams in hospitals worked optimally (Ministry of Health Republic of Indonesia, 2010a). Even though support from the hospital director is related to the performance of DOTS strategy in the hospitals (Ministry of Health Republic of Indonesia, 2010a), it is commonly neglected.

Nowadays, the standardised TB treatment in DOTS strategy applies ‘short-course therapy’ of six months, which is shorter than the treatment procedure before the era of DOTS. Yet, TB patients who get symptomatic improvement after several months of taking treatment, tend to interrupt or discontinue the treatment (Barennes et al., 2010). Moreover, TB patients can be referred for treatment to other health facilities, which increases the risk of loss of follow-up during the referral. Therefore, the case-holding process is a crucial issue in TB care delivery. Communication between hospitals and the NTP during the case-holding process was shown to be an important factor in the quality treatment outcome in this study. Some studies (Chiang et al., 2007; Loveday et al, 2008) have also discussed the significance of weak systems of patient tracing as a contributing factor to poor treatment outcomes in hospitals. Irawati et al. (2007) found that the treatment outcome improved after a network between the hospitals and the community health centres was established. However, this study showed that availability of a system for the case-holding process is not enough. Because even when such a system existed, if the hospital actors were not willing to use it, the case-holding system would not function, thus harming treatment outcome.

The poor access to, and suboptimal implementation quality of, PPM-DOTS hospitals are certainly not because of the non-availability of systems and tools for quality assurance and improvement. It is rather a problem of making all the systems
and tools works together properly. The concept of PPM DOTS contains aspects of quality improvement (WHO, 2006) such as:

- Increasing resources (training, supplies, anti TB drugs, incentives)
- Supervision
- Quality indicator comparison (monitoring evaluation meetings, laboratory cross-checks)

There are tools that have been developed for quality improvement purposes, such as ISTC and guidelines on TB care (TBCTA, 2009; USAID and TBCTA, 2010). Some studies have pointed out low quality of supervision in TB control programme implementation (Kelly, 2001; Meijnen, 2002). Kelly (2001) found that supervision did not get to the cause of the problem, as it should have. Meijnen (2002) found practices of supervision, which commonly did not check pathways of diagnosis and treatment for each TB patient. Moreover, this study revealed the hospital staff’s wish for supervision conducted supportively. Thus, supervision could certainly improve TB control programme indicators in health facilities, such as case detection and cure rates, when it is conducted supportively (Murthy et al. 2001; Kelly, 2001).

**Governance of partnership**

This study suggests that the process of partnership is like a life, which consist of phases of birth (initiation), growth, and decline. In the phase of initiation, actors perceived barriers of mistrust and inequality of status. The values of mutuality (respect, trust, equality of status) grew through intensive interactions. However, the mutuality level declined when there were weak governance and lack of resources.

Formal agreement has been commonly recommended for initiating partnership in PPM DOTS (Lönnroth et al., 2004; TBCTA and USAID, 2010). This study revealed that, beyond the formal agreement, antagonisms existed between NTP staff and hospital actors. Previous studies have explored these barriers to collaboration between NTP and private practitioners, particularly prejudices among the actors (Hurtig et al. 2002; De Costa et al., 2008). Physicians’ mistrust of the diagnostic procedure in DOTS strategy was observed in this study and others (Uplekar et al., 2001; Uplekar, 2003; Loveday et al., 2008; Siddiqi et al., 2008). The mistrust of DOTS strategy can depend on differences of paradigm and interest between clinicians and TB control programmes (Uplekar, 2003; Siddiqi et al., 2008). Thus, the key problem is how to get NTP and hospitals together in partnership.

The qualitative study explored the role of the PDC (which was formed by the hospital association) as ‘the door opener’ for partnership between the NTP and hospitals. Hurtig et al. (2002), Rangan et al. (2004) and Lönnroth et al. (2004) have suggested that NGOs and medical associations can be important actors for linking NTPs and private practitioners. Why are PDC/hospital associations, NGOs and medical associations powerful enough to raise enthusiasm and commitment from the hospitals and private practitioners? In this study, the hospital association was
accountable because of being ‘the umbrella organisation’ for hospitals. Later, PDC actors were trusted because of their sufficient commitment and capacity for problem solving.

Hudson et al. (1999) have argued for the importance of having wide organisational ownership in order to have successful collaborative arrangements. Wide organisational ownership implies that commitment from the organisation level should be translated into commitment at the operational level. This argument supports our findings on the importance of commitment from hospital physicians and staff as well as from the hospital organisation level.

Lönnroth et al. (2004) and Newell et al. (2005) highlighted dialogue and flexibility in PPM DOTS as important strategies. Dialogue and flexibility are useful to articulate each partner’s expectation, and to define shared objectives of partnership. Hudson et al. (1999) added the importance of personal relationships as a strategy of creating trust. Theoretical reviews and empirical evidence show that trust is essential for effective and sustainable partnership (Shortell et al., 2002; Hardy et al., 2003; Dhillon, 2009). In addition to dialogue and trust, recognition and anticipation of threats to collaborative works is another ingredient for successful partnerships (Hudson, et al. 1999). The findings of this study about phases of growth and decline also reflect these aspects.

In summary, this study agrees with Buse and Harmer (2007) who argued that governance is essential but commonly weak in collaboration between public and private sectors. This study supports the worries of some authors (Newell et al., 2005; Uplekar, 2008) that without good governance, PPM in hospitals might damage of TB control because of low access and quality of TB care provided by the hospitals. So who should take the responsibility of governing the partnership in PPM DOTS? Referring back to the concept of PPP in general, and PPM DOTS in particular, the governance function should be the responsibility of government, particularly the NTP (Lönnroth et al., 2004; WHO, 2006; Ghanashyam, 2008).

**Strengths and limitations of the studies**

This study contributes to the ongoing reviews and discussions on the implementation of PPM DOTS, particularly the hospital model at national and international levels. The results of our CEA study enrich the findings of previous CEA studies in the PPM DOTS in private practitioners (WHO, 2004b; Floyd et al., 2006; Sinanovic and Kumaranyake, 2006). Similarly, the ‘quality’ and ‘access studies’ add to previous concerns about the quality of DOTS strategy implementation in hospitals from two joint external monitoring missions in 2005 and 2007 (WHO SEARO, 2006; Ministry of Health Republic of Indonesia and Stop TB Partnership, 2007). Moreover, the findings from the ‘quality’ and ‘governance studies’ add knowledge about the quality and process of collaboration of PPM-DOTS implementation in hospitals.

This thesis used a comprehensive health system framework. The research questions touched on several health system elements and functions. Still, some aspects on the health system theory have not been sufficiently explored. For example, the aspects
of equity in access, financing, and information systems did not form part of the research questions.

Plenty of CEA studies have been conducted based on randomised clinical trials, which were more about cost-efficacy analysis. This CEA study mostly used the data generated from the health system, so that it represented ‘real’ cost-effectiveness analysis. Still, some methodological aspects make it necessary to generalise the results of the CEA with caution, such as context and procedures in PPM DOTS arrangements.

The ‘quality’ study and the ‘access study’ also took advantage of routine data from hospitals, district and provincial health authorities. Our studies tried to support the idea of ‘using and benefiting from routine data’ in the health care system (Atun et al., 2010). However, this approach meant certain issues could not be explored by the data. For example, the ‘access study’ described the issue of poor access to standardised diagnosis and treatment but could not describe who could and could not access them. Another technical problem was incomplete recording, e.g. in the outcome status in the patient registers. However, an effort was made to improve the validity of secondary data by discussing unclear records with the staff in charge of the hospital medical record units.

On one hand, the case study and qualitative study are strong study designs for exploring phenomena (Pope and Mays, 1995; Yin, 2003). On the other hand, the generalisability of the case study and qualitative study are limited to other settings, and add mainly to the refining of the underlying theory (Yin, 2003). In the case study, a multiple case study design was used, which can increase the generalisability of finding from a case study (Yin, 2003). For the qualitative study, a description of the context of the study was provided, enabling the reader to judge to what extent the results can be generalised.

The author’s involvement in previous projects on hospital PPM in Indonesia since 2005 has produced some pre-existing understanding of the relationship between NTP and hospitals. Considering the role of researcher as the tool of research (Britten, 1995), the author’s tacit knowledge on PPM in hospitals has helped to explore the process of partnership. On the other hand, it was also a challenge to overcome potential biases, feelings and thoughts — something very important to the trustworthiness of the research (Creswell, 1994). Therefore peer-debriefing and referent checking was used for assessing the trustworthiness of the findings. Even though this study used the concept of mutuality in partnership (Brinckerhoff, 2002), in developing the explorative questions about the process of partnership, it was important to ‘keep a distance’ from the theory during the data collection and analysis. The sub-categories, categories and theme of this study went beyond from issues in Brinckerhoff’s concept. The specific limitations of Papers I-IV are given in Table 7.
### Table 7: Summary of main limitations of Paper I-IV

| Paper I | • Used assumption that DOTS strategy is more cost-effective than non-DOTS practice.  
• Estimated the cost with one treatment cycle and did not consider the cost of re-treatment after dropping out of treatment.  
• Estimation of cost and effectiveness for the PPM DOTS in hospitals (hospital referral and hospital treatment) were not observed in isolation which likely suffers from bias, because the TB patients could choose which treatment option preferred. If the patients were not given this option, the treatment effectiveness would likely be different.  
• Generalisability of findings should consider contexts and procedures. |
|---|---|
| Paper II | • There was a problem with quality of secondary data, which could not be totally eliminated even though the researchers had checked with the hospital staff.  
• The proportion of cases not administered under the DOTS strategy may have been underestimated. It was because the study used estimation of referral rates among hospital TB patients from an intensive pilot project.  
• Could not answer the equity aspect of the access to standardised diagnosis and treatment in hospitals involved in PPM. |
| Paper III | • The case study was conducted over a short period, so that only ‘snapshot’ pictures of the implementation of PPM DOTS in hospitals were obtained.  
• The study did not include the perceived quality of TB services from patients’ perspectives.  
• The generalisability of findings is limited to other different settings. |
| Paper IV | • The study explored mainly the process of partnership at the practice-level and while it was limited at the policy level.  
• Generalisability of the findings into other settings should be bound by context and time. |

### Lessons learnt from the research process

In health system research, it is highly recommended to have collaborations between the ‘researcher communities’ and ‘policy-maker communities’ during the research process. This research made such collaborative efforts. However, there were challenges both in conducting the research and delivering the research findings.

The study plans were presented to the policy makers to make them aware of the work and invite their input regarding the practicalities of data collection. However, the policy makers’ interests may have challenged the methodological aspects of the studies. For example, when planning the sampling method used for the CEA study, the policy makers had some preferences about which districts should be studied. Similarly, we could not select the hospitals in the ‘access’ study by randomised stratified sampling, because each provincial health office demanded that assessment took place in hospitals with a large number of TB cases.

Results on quality and access issues were presented for the first time in 2007. Some staff working in hospitals with unsatisfactory findings felt unhappy and were worried that the findings would affect their careers in the hospitals. Similarly, some NTP staff could not accept some findings and criticised the trustworthiness of the research. Dialogue between researchers and policy makers took place on many occasions to clarify the findings. The Medical Service Directorate in the Ministry of Health responded to the findings by conducting a study for assessing DOTS strategy implementation, the results of which captured some similar findings to this study.
As a follow-up, the Medical Service Directorate collaborated with the NTP unit in the CDC directorate of the Ministry of Health to produce guidelines for TB management in hospitals, which was published in 2009.

In 2008, the results of the CEA study were presented. It was a challenge to present the findings for the policy actors in NTP, as they demanded simple information instead of the complicated findings as seen in the CEA study. There was also some tension when presenting ‘the life of partnership’ of PPM DOTS in hospitals in Yogyakarta province; this was because that part of the findings showed ‘a declining partnership’ a view which may have not been well-received, because PPM DOTS in Yogyakarta province is held by many to be a pioneer at national and international levels. From the pilot project in Yogyakarta, models of PPM DOTS in hospitals were generated and widely promoted at national and international levels. Surprisingly, however, most of the participants in the seminar accepted the findings and acknowledged the need for further improvement. Step by step, the presentation of the results became more constructive and acceptable to the audience, which prevented the message being lost.

In summary, these studies agree with others’ arguments that substantial efforts are required to have the results of research acknowledged by policy makers (Nunn et al., 2002; WHO, 2007d; Eddama et al., 2008).
Conclusions and recommendations

Conclusions

Overall, this thesis has revealed potential, barriers and even complexities in conducting PPM in a hospital setting from the perspective of cost-effectiveness, access, quality, coalition building and governance. Implementation of PPM for TB control in hospitals (as an additional strategy to DOTS in community health centres) can be a cost-effective intervention, but it requires a specific process and context. Substantial proportions of TB patients in the hospitals that ‘agreed’ to implement DOTS strategy were not managed under standardised diagnosis and treatment procedure. Hospitals generally implemented a suboptimal quality of DOTS strategy implementation. The process of partnership building was shown to be dynamic. Process-related factors, such as commitment to collaboration, and interactions and trust between actors, were found to be important.

Recommendations

Considering the potential, barriers and complexities in conducting PPM DOTS in hospitals, several thoughts arise on policy recommendations for Indonesia and other high burden countries of TB:

Firstly, should PPM DOTS be stopped in hospital settings? In Indonesia, and many other low-to-middle-income countries where the user fee is a major source for financing health services, patients have great autonomy in choosing their health service provider. Previous evidence has shown that hospitals have large numbers of TB patients under their care (Singh et al., 2004; Ministry of Health Republic of Indonesia, 2005; Utarini et al., 2007). Stopping PPM DOTS is tantamount to letting those TB patients be managed without knowing the quality of service they receive.

Secondly, should the NTP policy continue to stick with the implementation of PPM DOTS as it is now? Indonesia has scaled-up PPM DOTS to almost 38 percent (563 out of 1478 hospitals in Indonesia) during seven years of implementation, which amounts to about 70 hospitals per year (Ministry of Health Republic of Indonesia, 2009). This study showed that this rapid implementation has resulted in low quality and poor access to DOTS strategy in hospitals involved in the PPM approach. If no remedial action is taken, the TB control programme may suffer — an observation that has been made by others (Uplekar, 2008; Loveday et al., 2008).

Therefore, this thesis recommends that policy makers in TB control programmes ‘revisit the choice’ of rapid scaling-up of PPM DOTS in hospitals at the national level. The approach of PPM DOTS in hospitals should not be ‘one policy fits all’, as seen in the current PPM DOTS policy. The NTP should devote more attention to process and context, while maintaining sufficient resources for PPM DOTS in hospitals. Details of the recommendations are:

For international initiatives on global TB control:

- Encourage the national government to increase its commitment to the TB control programme by securing the resources for proper PPM DOTS implementation in hospitals.
• Give more attention to strengthening the governance aspects of the TB control programme, particularly for PPM DOTS during technical assistance.

For NTP/Ministry of Health:
• Strengthen the collaboration between the NTP and the authorities of hospitals.
• Adapt the framework of situational assessment (WHO, 2007b; USAID and TBCTA, 2010) in provincial and district contexts, in order to determine right areas for PPM DOTS in hospitals.
• Target the hospitals with a large volume of TB patients, so that the resources used will be cost-effective.
• Strengthen the collaboration with organisations with power to influence hospital actors, such as hospital- and medical associations. Collaboration between NTPs and professional organisations exists in many countries. However, it should be evaluated for its effectiveness and strategies for continuous improvement should be planned.
• Train NTP staff at provincial and district levels in leadership skills, including negotiation, interpersonal communication, and anticipating contingency, particularly skills in planning.
• Collaborate with hospital authorities (if the hospitals are not under NTP authority) to encourage hospitals to have policies supporting DOTS strategy implementation.
• Interaction should take place frequently between NTP and hospitals to discuss and share visions, objectives and evaluate the partnership with the mindset of ‘being a partner’.
• Strengthen the communication between NTP and hospitals for case-holding process.

For hospitals:
• Take advantage of the available tools and systems for quality and access improvement, and adapt them into the context. Innovative quality improvement strategies for TB care, such as clinical audit (Siddiqi et al., 2008; Utarini et al. 2007) and clinical pathway (Hauck et al., 2004; Rotter et al., 2010). Multiple approaches should be taken to improve the quality of health services, particularly for changing physicians’ behaviour (Brugha and Zwi, 1998; Overtveit, 2003). Moreover, all the interventions should be constantly under review, put into context and fed back to health care personnel (Overveit, 2003).
• Strengthen and facilitate the hospital DOTS team’s work by putting committed actors with sufficient power to coordinate, review and improve DOTS strategy implementation.
Moreover, it is necessary to conduct further research on:

- Influence of context and process on the cost-effectiveness of PPM DOTS in hospitals.
- TB patients’ perspectives on the TB care delivery in hospitals involved in PPM DOTS.
- Other elements of health system in the PPM DOTS in hospitals that have not been touched by this thesis, such as equity, financing, practical use of health information systems of DOTS strategy in the hospital setting.
- Innovations that can improve access and quality of PPM DOTS in hospitals.
- How to improve and sustain trust among the partners.
The researcher

My interest in issues of health service and systems began in 2000 when I was working at a district hospital (2000-2001) and a community health centre (2001-2003) in North Sulawesi Province, Indonesia. The experience made me realise that health problems are complex, and frequently cannot be resolved only by medical interventions. This realisation influenced me a lot, and made me decide to leave my clinical career and focus on public health sciences. In 2003-2004, I got an opportunity to study for a Master in Public Health at Umeå International School of Public Health, Sweden. This course deeply influenced my thinking on many public health problems, particularly in low- and middle-income countries.

My work experience with the Centre of Health Service Management, and Postgraduate Program on Hospital Management, Universitas Gadjah Mada gave me the possibility to get involved in my first health service and system research. I got offers from colleagues there to join some studies, which I then used for my PhD research. My involvement with the primary health care group at the Umeå Centre for Global Health Research, has introduced me to various issues of health systems and policy.

I currently work at Universitas Sebelas Maret, and I am keen to involve myself deeper in the area of health systems. I hope very much to keep introducing public health issues from the health system perspective to my students, conducting more health system research, and advocating the research findings to the policy makers.
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When I am writing the cover story of this thesis, I am fulfilled with a firm thankful feeling. I could not reach the end stage of the PhD training only by my capability. I believe that God has been working through unique mechanisms and the hands of many people during the process. Therefore, I would like to give my sincere gratitude to everyone who has played an important role throughout the journey.

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‘Ngelmu iku kelakone kanthi laku. Lekase lawan khas, tegese khas nyantosani. Setya buda pangengkere durangkara.’ (Science will only be useful if it is applied. Application of science should start from the motivation to improve welfare of human life. To do so, it needs to be faithful in conquering challenges (texts from Serat Wedhatama, which were written by His Majesty KGPA Mangkunegoro IV/King of Mangkunegaran Surakarta in 1738).

May God help me.
References


