TECHNICAL EFFICIENCY OF PRIVATE CLINICS UNDER UNIVERSAL COVERAGE SCHEME IN BANGKOK, THAILAND

Miss Pimpitcha Kangyang

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for the Degree of Master of Science Program in Health Economics and Health Care Management
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ประสิทธิภาพทางเทคนิคของคลินิกเอกชนภายใต้หลักประกันสุขภาพถ้วนหน้า ในเขตพื้นที่กรุงเทพมหานคร ประเทศไทย

นางสาวพิมพ์พิชชา ก้างยาง

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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By	Miss Pimpitcha Kangyang
Field of Study	Health Economics and Health Care Management
Thesis Advisor	Associate Professor Paitoon Kraipornsak, Ph.D.

Accepted by the Faculty of Economics, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

.....Dean of the Faculty of Economics

(Professor Worawet Suwanrada, Ph.D.)

THESIS COMMITTEE

.....Chairman

(Associate Professor Sothitorn Mallikamas, Ph.D.)

.....Thesis Advisor

(Associate Professor Paitoon Kraipornsak, Ph.D.)

.....External Examiner

(Professor Siripen Supakankunti, Ph.D.)

พิมพ์พิชชา ก้างยาง : ประสิทธิภาพทางเทคนิคของคลินิกเอกชนภายใต้หลักประกันสุขภาพถ้วนหน้าในเขตพื้นที่กรุงเทพมหานคร ประเทศไทย (TECHNICAL EFFICIENCY OF PRIVATE CLINICS UNDER UNIVERSAL COVERAGE SCHEME IN BANGKOK, THAILAND) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร. ไพฑูรย์ ไกรพรศักดิ์, 53 หน้า.

การศึกษาครั้งนี้มีจุดมุ่งหมายเพื่อวัดประสิทธิภาพทางเทคนิคของคลินิกเอกชนภายใต้หลักประกันสุขภาพถ้วนหน้า จำนวน 88 แห่ง พื้นที่กรุงเทพมหานคร ในปีงบประมาณ 2560 และเพื่อระบุปัจจัยมีผลต่อประสิทธิภาพทางเทคนิคของคลินิกเอกชนดังกล่าว โดยการศึกษาแบ่งออกเป็น 2 ส่วน ส่วนแรก คือ การวัดประสิทธิภาพทางเทคนิคด้วยแบบจำลอง DEA และส่วนที่สอง คือ การระบุปัจจัยที่มีผลต่อประสิทธิภาพทางเทคนิค โดยใช้แบบจำลอง Tobit ผลการการวัดประสิทธิภาพทางเทคนิคด้วยแบบจำลอง DEA ภายใต้ข้อสมมติฐาน variable return to scale แสดงให้เห็นว่าคลินิกเอกชนภายใต้หลักประกันสุขภาพถ้วนหน้า จำนวน 84 แห่ง (ร้อยละ 95.45 ของกลุ่มเป้าหมายในการศึกษา) ดำเนินงานอยู่บนเส้นประสิทธิภาพทางเทคนิคที่แท้จริง และมีคะแนนเฉลี่ยประสิทธิภาพทางเทคนิคที่แท้จริง เท่ากับ 0.98 นอกจากนี้ผลการวิเคราะห์ของแบบจำลอง Tobit พบว่าอัตราส่วนของบุคลากรที่สนับสนุนทางการแพทย์มีผลต่อประสิทธิภาพทางเทคนิคที่แท้จริง (TEVRS) อย่างมีนัยสำคัญทางสถิต ในขณะที่ตัวแปรอื่น ๆ ได้แก่ อัตราส่วนของแพทย์เวชศาสตร์ครอบครัว อัตราส่วนของพยาบาลเวชปฏิบัติ อัตราส่วนการให้บริการสร้างเสริมสุขภาพและการป้องกันโรค จำนวนสมาชิกในหลักประกันสุขภาพถ้วนหน้า ประเภทของคลินิกและสถานที่ตั้ง ไม่มีผลต่อประสิทธิภาพทางเทคนิคที่แท้จริง (TEVRS).

ผลการศึกษารูปแบบของความไร้ประสิทธิภาพด้วยแบบจำลอง DEA พบว่า เพื่อให้ได้ขนาดที่เหมาะสม คลินิกเอกชนที่มีการดำเนินการในระดับผลตอบแทนไปในทิศทางที่เพิ่มขึ้นนั้นควรขยายขนาดการให้บริการมากขึ้น ในขณะเดียวกันคลินิกเอกชนที่มีการดำเนินการอยู่ในระดับผลตอบแทนไปในทิศทางลดลงนั้นควรลดขนาดการให้บริการลง นอกจากนี้จากการวิเคราะห์ของแบบจำลอง Tobit ชี้ให้เห็นว่าควรเพิ่มอัตราส่วนบุคลากรสนับสนุนด้านสุขภาพเพื่อเพิ่มประสิทธิภาพในการทำงาน

สาขาวิชา เศรษฐศาสตร์สาธารณสุขและการจัดการบริการสุขภาพ ลายมือชื่อนิสิต .....

ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

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This study aimed to measure technical efficiency of 88 private clinics under Universal Coverage Scheme (UC) in Bangkok in fiscal year 2017 and to identify the factors affecting their technical efficiency. The study was divided to two parts. The first part was measuring of technical efficiency with data envelopment analysis (DEA) and the second part was identifying the factors affecting efficiency with regression analysis using Tobit model. The result of DEA under a variable return to scale assumption showed that 84 private clinics under UC (95.45 percent of the target of study) were operating on pure technical efficiency frontier (VRSTE), the mean pure technical efficiency score was equal to 0.98. Furthermore, the results of regression analysis revealed that only health supporting staff ratio was significantly affecting on pure technical efficiency (TEVRS) of private clinics under Universal Coverage Scheme (UC) while other explanatory variables such as family medical physician ratio, nurse practitioner ratio, health promotion and disease prevention service ratio, the number of Universal Coverage Scheme (UC) members, type of clinics and location were insignificant.

As a result of DEA; patterns of scale inefficiencies showed that in order to achieve appropriate scale of operation, private clinics under UC which operated increasing return to scale (IRS) should expand their scale of operation while private clinics under UC which operated decreasing return to scale (DRS) should reduce their scale of operation. Moreover, as a result of regression analysis, in order to increase in efficiency, it should increase in health supporting staff ratio.

Field of Study: Health Economics and Health Care Management Student's Signature .....
Advisor's Signature .....

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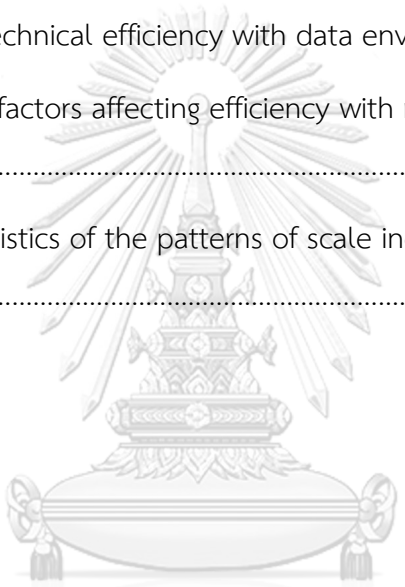


List of Abbreviations

CRS	Constant Return to Scale
DEA	Data Envelopment Analysis
DMUs	Decision Making Units
DRS	Decreasing Return to Scale
IRS	Increasing Return to Scale
MoPH	Ministry of Public Health
NHSO	National Health Security Office
PCC	Primary Care Cluster
PCUs	Primary Care Units
SE	Scale Efficiency
TECRS	Technical Efficiency Score under Constant Return to Scale
TEVRS	Technical Efficiency Score under Variable Return to Scale
UC	Universal Coverage Scheme
VRS	Variable Return to Scale

Chapter I
Introduction

1.1 Background & Rationale

In Thailand, health care services under Ministry of Public Health (MoPH) can be classified as 3 levels by Geographic Information System: GIS (THCC, 2011); primary care, secondary care and tertiary care.

Primary Care Units (PCUs) are classified as the lower level health care delivery such as sub-district health centers, community health centers, general hospitals, medical centers and other health care services that provided by government and private sectors. The mission of PCUs is providing holistic health services; diagnosis, health promotion and disease prevention, rehabilitation and treatment for outpatient. The PCUs are located in the central of sub-district or closest to people living in household in city and people can access convenience health services. Furthermore, they should employ full-time physicians such as general practitioner, family medicine, preventive medicine, occupational medicine and epidemiology.

The upper level health care delivery is secondary care that refers to community hospitals, general hospitals, medical centers and other health care services that provided by government and private sectors. There are beds for inpatient with non-complicated cases. They also should employ full-time physicians as PCUs.

The top level is tertiary care that divided into 2 levels; tertiary care level and excellence center level. Tertiary care level refers to some general hospitals, medical school, specialized hospitals and other health care services that provided by government and private sectors. This service is expanded the scope of medical care required by sub-special physicians such as the kidney disease, respiratory tract disease, digestive system diseases, blood diseases, gastrointestinal diseases, neurosurgery, vascular surgery, heart disease, anatomy, radiation therapy, diagnostic radiology Nuclear Medicine Cancer, etc. While the excellence center refers to the hospital center and specialized hospital prescribed as specialized disease center.

Recently, Thailand's health care system has been facing over-crowding problem in secondary care such as community hospitals and general hospitals. The amount of patient visits was increasing; there were 125.5 million patient visits in 2012 and the number was increase to 292.6 million patient visits in 2015. The increasing in amount of patient visits is cause of long waiting queue in hospitals and inaccessibility problems. The primary care units (PCUs) are important foundation in health system that expected to solve the over-crowding problem. In National Health Development Plans in 2017 to 2021 (MoPH, 2016), there was considered to develop PCUs by reforming the primary care to be Primary Cluster Care (PCC) that designed health teamwork in primary care unit with family-based and multidisciplinary teamwork in the care of pediatric patients.

Although there are several existing PCU facilities in Thailand such as health centers, community medicine centers, community and family clinics in general hospitals, etc., there is shortage in urban area especially in Bangkok. The number of government hospitals, private hospitals and referral hospitals participating Universal Coverage Scheme (UC) in Bangkok were equal to 21, 19 and 9 units respectively (MoPH, 2017) whereas the population in Bangkok was high number by those migrated from the other provinces, the current number of population was equal to 5.6 million people in 2016 (BMA, 2016). The ratio of hospitals participating Universal Coverage Scheme (UC) to population was not adequate and also affect to accessibility in primary care service. Hence, the National Health Security Office (NHSO) have developed primary care service model to solve over-crowding problems in hospitals, reduce the waiting queue of patients in hospitals and also provide PCUs to cover all population by recruiting the exiting private clinics in Bangkok to be their partnership to provide the primary care service under universal coverage scheme (UC).

Private clinics have become NHSO's partnership to provide the primary care service under universal coverage scheme (UC) (NHSO, 2017). They are supported the budgets from the National Health Security Office (NHSO) with the permission of the National Health Security Commission's Notification on Qualifications, Standards, Service Units and Network of Service Units, the Health Insurance Regulation dated 27th June 2001 (NHSO, 2016), the approval of the location of the National Health Insurance Sub-

Committee Bangkok. It is extremely challenging task for private health agencies to manage their own available resources to achieve minimum cost and maximum product of healthcare services under NHSO's qualifications and standards.

The term "efficiency" refers to the best use of resources in production (Hollingsworth, 2008). Data envelopment analysis (DEA) is one of tools of efficient measurements which was original concept by Farrell (Farrell, 1957), is about the performance of organizations with more than one input. "Technical efficiency" is producing the maximum amount of output from a given amount of input, or alternatively producing a given output with minimum quantities of inputs (Hollingsworth, 2008).

Recently, Data envelopment analysis (DEA) has been wildly used applying in healthcare. It can evaluate the technical efficiency of health services by focusing on operation that on its production frontier. In Thailand, there are several previous studies about efficient measurement in hospitals and sub-district health centers under UC that provide by Ministry of Public Health (MoPH), but there is lack of study in private clinics.

This study aimed to measure technical efficiency of private clinics under UC in Bangkok, Thailand, fiscal year 2017 and also to identify the factors affecting their level of technical efficiency score. The result of this study was expected for mangers of private clinic participating Universal Coverage Scheme (UC) in Bangkok to understand their own efficient levels and decide how to allocate their own available resources to achieve efficiency.

1.2 Research Questions

1.2.1 Primary Question

What is the level of technical efficiency score of private clinics under universal coverage scheme in Bangkok, Thailand?

1.2.2 Secondary Question

How are the factors affecting their technical efficiency scores?

1.3 Objectives

1.3.1 General Objective

This study aimed to apply an accuracy tool of efficiency measurement for indicating the level of technical efficiency score of private clinics under universal coverage scheme in Bangkok, Thailand and also to investigate the factors that determine their technical efficiency scores.

1.3.2 Specific Objectives

1.3.2.1 To measure technical efficiency scores of private clinics under universal coverage scheme in Bangkok by using data envelopment analysis (DEA).

1.3.2.2 To explain the factors affecting the level of technical efficiency score of private clinics under universal coverage scheme by regression analysis.

1.4 Scope of Study

The study of technical efficiency of private clinics under universal coverage scheme (UC) in Bangkok, Thailand, focused on 88 private clinics participating Universal Coverage Scheme (UC) in Bangkok, used the private clinics under UC as decision making units (DMUs), collected cross-sectional data in fiscal year 2017 (October, 2016-November, 2017) by secondary data from National Health Security Office (NHSO).

1.5 Hypothesis

This study was divided to two parts. The first part was measuring of efficiency score of private clinics under universal coverage scheme (UC) in Bangkok and the second part was identifying of their factors affecting efficiency.

The private clinics were expected high performance due to the characteristic of private sector is competitive and flexible to reallocate their resources. Although the private clinics participating UC have to operate under the permission of the National Health Security Commission's Notification on Qualifications, Standards, Service Units

and Network of Service Units, they were allowed to organize in some activities base on organization. So the part of measuring efficiency score, it was expected that more than 90 percent of target of study were operating on pure technical efficiency frontier of input-oriented model.

The part of identifying the factors affecting efficiency that focused on pure technical efficiency score of input-oriented model, there were seven explanatory variables were expected affecting private clinics under UC's technical efficiency such as ratio of family medical physician to other staff, ratio of nurse practitioner to other staff, ratio of health supporting staff to other staff, ratio of health promotion and disease prevention services to other services, the number of UC members, type clinics and location.

The organizational characteristics as family medical physician ratio, nurse practitioner ratio and health supporting staff ratio were expected positive correlation with private clinics under UC's efficiency due to their skill were specially related to primary care activities such as home care visits and health promotion and disease prevention.

The next organizational characteristic as health promotion and disease prevention services ratio were expected affecting private clinics under UC's efficiency. As health promotion and disease prevention activities emphasis prevention of disease instead of treatment, it was expected to reduce cost of treatments and positive correlative to private clinics under UC's efficiency.

Moreover, the number of Universal Coverage Scheme (UC) members under NHSO's condition was expected as appropriated number for private clinics. As a large number of UC members can affect to private clinics with work overload and the private clinics have to expand the medical supplies to cover all members. So the number of UC members under NHSO's condition was expected positive correlative to private clinics under UC's efficiency.

The last organizational characteristic as type of non-united clinic was expected to have positive relation with efficiency score due to non-united clinic provided health services were less complicated than united clinic.

Furthermore, the external environment as urban fringe and suburb location of Bangkok was expected to have positive relation with private clinics under UC's efficiency due to that area was expected to be excellent support primary care activities such as health promotion and prevention activities.

1.6 Possible Benefits

The result of this study was expected for mangers of private clinic participating Universal Coverage Scheme (UC) in Bangkok to understand their own efficient levels and decide how to allocate their own available resources to achieve efficiency.

Chapter II

Literature Review

2.1 Theoretical of efficiency measurement

The term of “efficiency” refers to the best use of resources in production (Hollingsworth, 2008). The original efficiency measurement concept was begun by Farrell (Farrell, 1957) which the concept of performance measurement of organizations with more than one input. Production efficiency or economic efficiency can be divided into two types; technical efficiency and allocative efficiency. Technical efficiency refers to the efficiency of an organization that produces the highest output by given input level or performance of the organization using the least production inputs by given output level while allocative efficiency refers to the efficiency of an organization in term of choosing the lowest cost input for production at a given level of output and price of input. When the technical efficiency and allocation efficiency are combined, it can be called “overall efficiency” which refers to it operates its cost or revenue frontier (Hollingsworth, 2008).

These efficiency concepts can be explained by the example case of single output (y) with two inputs X_1 and X_2. The production frontier or production function shows the maximum output by given combined inputs; $y = f(X_1, X_2)$.

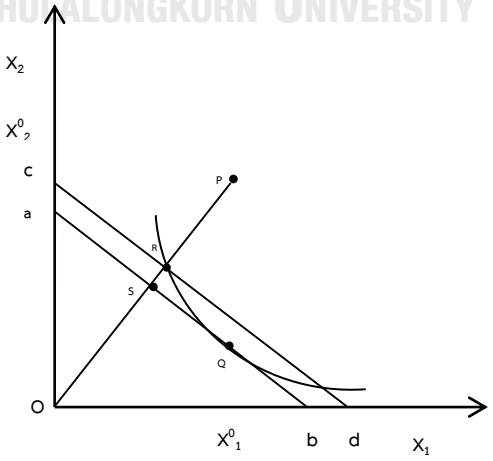


Figure 1 Farrell's measurement of efficiency

In figure 1 shows the technical efficiency that use combined inputs to produce a unit of output. Suppose that the production point is P with using combined inputs as X^0_1 and X^0_2, at point P is inefficiency because the efficient unit isoquant is y = 1 (output y = 1), so the production point could be R. The technical efficiency, TE at point P can be calculated as TE = OR/OP. Normally the value should be between 0 and 1 ($0<TE \leq 1$). If TE is equal to 1, it refers that the firm is technical efficiency and produce on the efficient unit isoquant. When the TE is less than 1, it refers to technical inefficiency. In figure 1, is also illustrating allocative efficiency, by iso-cost line as ab. At the optimal mix-inputs to produce y = 1 is Q, when the technical efficiency at point P, the quantity of using the mix-inputs is point R, its cost on iso-cost cd which higher that minimum cost (ab), it should move to point S which is on minimum cost. So that the allocative efficiency (AE) can be measured by AE = OS/OR which the value should be between 0 and 1($0<AE \leq 1$). The overall efficiency (OE) can be measure by considering the result of technical efficiency and allocative efficiency; OE = TE/ AE = OR/OP x OS/OR which the value should be between 0 and 1($0<OE \leq 1$).

The efficient measurement is about production or cost frontier, the frontier is formed by most efficiency among the firms which use the least input to produce given level of output or use given level of input to produce highest output. The firms which on the frontier of the most efficiency can be identified the best performers, there is different efficiency in each period, is related with changing in technology.

The efficient measurement can be divided by considering whether it is parametric or not and it is deterministic or stochastic. The parametric method assumes the efficient frontier by specific function while the non-parametric is not. The deterministic method assumes the inefficiency by distance of unit from its frontier whereas stochastic method by random error. The methods show in table 1.

Table 1 Summarized the methods of efficient measurement

Type	Parametric	Non-parametric
Deterministic	- Parametric mathematical programming - Deterministic (econometric) frontier analysis	- Data envelopment analysis (DEA)
stochastic	- Stochastic (econometric) frontier analysis (SFA)	- Stochastic data envelopment analysis

2.2 Data envelopment analysis

Data envelopment analysis (DEA) is efficient measurement method proposed by Charnes, Cooper and Rhodes (C. Charnes, Cooper, & Rhodes, 1978), is non-parametric mathematical method for estimating production or cost frontier and using linear programming to determine the efficiency index. This method can measure efficiency of unit which is called decision-making units (DMUs) that use multiple inputs and outputs. The inputs and outputs of each unit should be homogenous.

The efficiency index is calculated by ratio between weight outputs and weight inputs, the mix inputs and outputs should be weighted by assumed weight which is proper for linear programming. The DEA create the efficient frontier of DMUs, assume the value of DMUs which on the efficient frontier is equal to 100% or 1, other DMUs which are below the frontier that the efficiency index which less than 100% or 1 can calculated by the ration of distance of unit from its frontier. According to the concept, it is the relative efficiency measurement which comparing between the DMUs; it may not be a best performance value.

The advantages of this method; it can be used in mix inputs and outputs without the required the value of weight. In addition, the result of analysis is show the in poor performance values that is guideline for development in term of increasing operational efficiency and reducing costs. In contrast, the disadvantages are the unit which is best practice may not be a really best performer because it cannot identify

the relationship between outputs and inputs that indicates efficiency and it cannot solve the problem of random error.

2.2.1 Input-oriented measure

The input-oriented measure has been explained by Farrell's conceptual framework which considered in the simple case that producing production y with using two inputs (x1, x2); assume producing of output units under the Constant Returns to Scale (CRS). The calculation of efficiency index follows figure2 (Coelli, 1994).

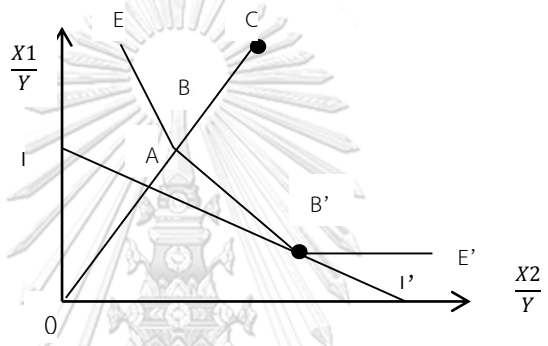


Figure 2 Calculating efficiency score by input-oriented measure

Since the assumption of the CRS, the output line is equal to 1 unit or the fully efficient firm is represented by the line EE' (Figure 1). If this unit uses the proportion of inputs at point C to produce one unit, the inefficiency of this unit can be measured by the BC, which is equal to the proportion of inputs (x1, x2) that can be reduced without impact on yield. If measured in percentages, it is equal to $\frac{BC}{0C}$. Therefore, the technical efficiency scores calculated on the factor of production. An input-oriented technical efficiency score (TE_I) is required in this case.

$$TE_I = \frac{BC}{0C} \qquad (1)$$

The TE_I value is in the range of 0-1, where the close score of 1 means the higher technical unit of production. For the proportion of inputs used at other points on the same line of output or unit isoquant, such as B 'or B, is $TE_I = 1$. In case of input-oriented allocative efficiency score (AEI) or comparison of price between inputs of production (II') in figure 1, it can be calculated by formula 2.

$$AE_I = \frac{0A}{0B} \qquad (2)$$

Therefore, the economic efficiency scores for the factor of production (Input-Oriented Economic Efficiency).

$$EE_I = TE_I \times AE_I = \frac{BC}{0C} \times \frac{0A}{0B} \qquad (3)$$

It is interesting to note that the performance scores calculated according to equations (1), (2) and (3) are in the range of 0 to 1.

2.2.2 Output oriented measure

Output-oriented measure is aimed to calculate for defining the proportion of output that each DMU can produce with the same level of production. The concept can be explained in the following figure3.

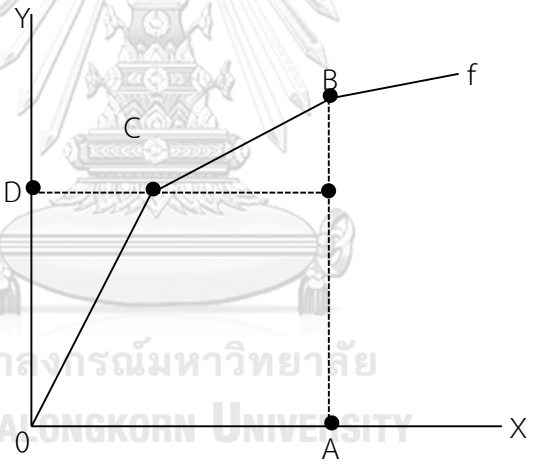


Figure 3 Calculating efficiency score by output-oriented measure

In figure3, the DMU produces the product y with using a single input (Masiye) and assigns function of production as f (Masiye). If the DMU is producing at the Z point which is lower than the efficiency level. The output efficiency can be calculated by $\frac{AZ}{AB}$ whereas the input efficiency can be calculated by $\frac{DC}{DZ}$.

In the case the DMU produces two types of goods (y1 and y2) with the only input (Masiye). Efficiency index is under the assumption of constant returns to scale (CRS) can be considered in figure 4.

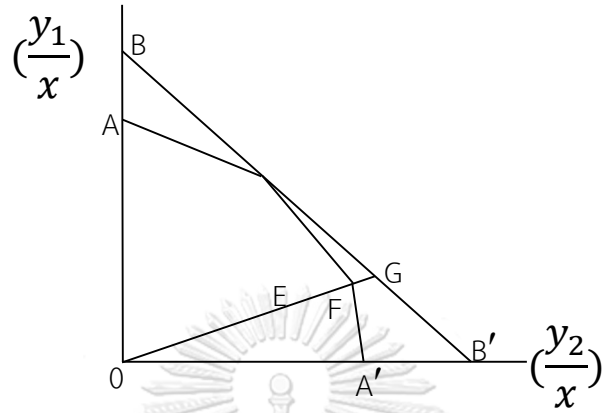


Figure 4 Calculating efficiency score by input-oriented measure (2 inputs)

In figure 4, the unit production possibility frontier id line AA' is. At point E is inefficient level that can measure by EF, therefore, yields of output-oriented technical efficiency score (TE_0) can be calculated by;

$$TE_0 = 1 - \frac{EF}{0F} = \frac{0E}{0F} \qquad (4)$$

For output-oriented allocative efficiency score (AE_0) can be calculated by;

$$AE_0 = \frac{0F}{0G} \qquad (5)$$

Output–oriented economic efficiency (EE_0) can be calculated by;

$$EE_0 = TE_0 \times AE_0 = \frac{0E}{0F} \times \frac{0F}{0G} = \frac{0E}{0G} \qquad (6)$$

It is observed that the performance scores calculated according to equations (4), (5) and (6) are in the range of 0 to 1.

2.3 Applications of DEA in healthcare

Recently, DEA has been wildly used in healthcare. DEA can evaluate the technical efficiency of health services by focusing on operation that on its production frontier. DEA can handle several inputs and outputs, most studies selected by data availability. There were several alternatives to define the output. Some studies used healthcare activities (e.g. visits performed, examinations provided) while some studies used quality indicators. There were three main categories for defining the input: labour, capital, and

consumable resources. These variables can be measured in physical unit or in monetary terms, as an overall aggregate measure or a set of disaggregated measures (Pelone et al., 2015).

In 2007, Masiye (Masiye, 2007) used the DEA technique to measure the performance of hospitals. The study of investigating health system performance: an application of data envelopment analysis to Zambian hospitals of Masiye focused on 30 hospitals, oriented-inputs consisted of total cost excluding personnel costs, the number of doctors, the number of other medical personnel (including pharmacists, nurses, medical technicians and radiologists), and the number of other personnel while oriented-outputs consisted of outpatient visits, the number of inpatient days, the number of mother and child care services, the number of surgical laboratory and radiation. The results of this study showed efficiency of hospitals operated at 67% level, only 40 hospitals on the efficiency frontier. In addition, the size of hospital and the number of factors were not appropriate, so that made these hospitals ineffective.

Zere and colleagues (Zere et al., 2006) used DEA techniques to measure technical performance of 30 district hospitals. The model consisted of three inputs as total cost, number of beds and the number of nurses whereas the outputs were the number of outpatient and the number of inpatient day. The results showed that the average technical efficiency was less than 75%, the number of hospital on the frontier was less than half of DMUs.

Matthew Forbes, Philip Harslett, Ilias Mastoris and Leonora Risse studied in measuring the technical efficiency of public and private hospitals in Australia (Matthew Forbes, 2010), it was concerned on 459 acute hospitals in three years since 2003 to 2006. The inputs of analysis consisted of staff (e.g. nurses, pathologists, radiologists, allied staff, domestic staff and administrative staff), medical and surgical supplies, pharmaceutical supplies, and number of bed. The outputs consisted of two parts; admitted patient services (e.g. acute separations, pregnancy and neonate separations, mental and alcohol separations and other separations) and non-admitted patient services (e.g. accident and emergency services, allied health, dental and other outpatient services, mental, alcohol and psychiatric services, dialysis and endoscopy, diagnostic (pathology and radiology) services and community services, district nursing

and other outreach services. The results showed that 90 % of the examples were operating at efficiency level.

In Thailand, most studies applied DEA in hospital. Puenpatom and Rosenman (Puenpatom & Rosenman, 2008) had studied provincial hospital of Thailand during the implementation of the Universal Coverage Scheme policy. The targets of this study were 92 provincial hospitals and general hospitals. The outputs consisted of the number of times inpatient, number of other cases, the number of surgical outpatient and number of non-surgical outpatient. The inputs consisted of the number of bed, the number of physician, the number of nurse, the number of dentist and pharmacist and the number of other personnel. The results showed that the hospitals have higher technical efficiency.

Valdmanis, Kumanarayake and Lertiendumrong (Valdmanis, Kumanarayake, & Lertiendumrong, 2004) conducted a study of service capabilities of public hospitals, for the poor and non-poor. There were 92 information centers (68 data centers) divided into groups by the level of technology in health services. The study was conducted in 1999 and DEA output-based analysis was used to calculate congestion index and plant capacity utilization. The variables were outpatient outcomes for poor, number of outcomes, the number of in-patient cases adjusted by the relative weight for the poor and number of in-patients adjusted for relative non-poor. The variables of inputs were the number of beds, the number of doctors, the number of nurses, the number of other staff, costs of compensation, drug costs and other operating expenses. The study found that increasing the number of services provided to poor patients did not reduce the number of services provided to patients. The hospital has almost fully provided services. The service can be increased about 5%.

Pattamsiriwat studied the efficacy and cost of the hospital office of the permanent secretary, Ministry of Public Health in the financial sector finance research program evaluating the impact of universal health care coverage on hospital finance (Pattamasiriwat, 2009). The study was based on the annual hospital financial report, the input variables were the number of patients, the number of outpatients and average relative weight while input variables were salaries and wages, compensation, service costs, number of beds, and number of personnel. The target of 23 center

hospitals, 58 general hospitals and 624 community hospitals, large community hospital (over 60 beds), medium-sized community hospitals (31-60 beds), and small community hospitals (30 beds). The average efficiency of center hospitals, general hospital and community hospitals were 0.94, 0.86, and 0.85, respectively.

In addition, there was study in health sub-district offices by Pattamsiriwat (Pattamasiriwat, 2008); the case study of cost efficiency among 246 health sub-district offices in 12 provinces, focus on health sub-district offices based on 246 units located in 12 provinces. The outputs consisted of 4 variables and the inputs consist of 3 variables inclusive of wages and salaries, compensation to officers, and operating expenses. It was found 45 units lied on the cost frontier represented 18 percent of total units; in most cases, efficiency scores (DEA, VRS assumption) range from 0.60 to 0.75 and averaged to 0.69.

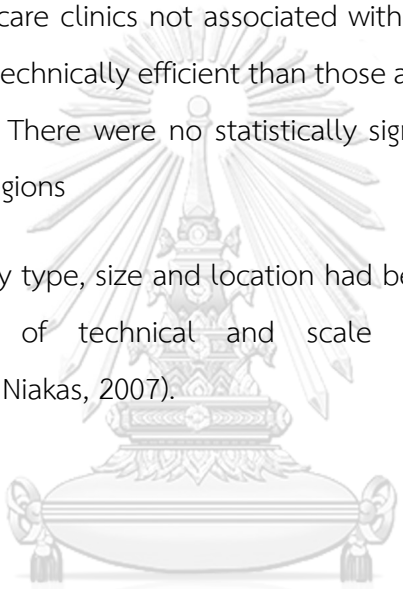
2.4 Factor affecting efficiency

Previous studies have used several factors to explanatory variables in primary healthcare such as location characteristics, the population growth, the mortality rate and the competition. In 2016, Panagiotis Mitropoulos (Panagiotis Mitropoulos, 2016) studied the factors to explanatory variables in health centers in Greek, the results of this study reveal the significant importance of different kind of variables that influence health center's scale of operation. Socio-demographic characteristics as population density and ageing rate of health centers are the main drivers of health center's scale efficiency exerting a positive and negative sign accordingly. Different variables such as competition, medium size and the proportion of inhabitants working on agricultural sector were responsible for the excessive use on inputs associated with operating at non optimal level of output. Variable is located in areas with significant percentage of population working in agriculture found to be more scale inefficient than their counterparts.

There were categorized as organizational (internal) or environmental (external). Organizational factors were internally determined such as staffing mix while

environmental factors were those over which the organization has little or no control such as facility type and region. In 2008, the study of Schmacker and McKay (Schmacker & McKay, 2008) showed that the proportion of total variance attributable to the inefficiency, the proportion of civilians on staff was negative and statistically significant, indicating a positive effect on productive efficiency while the coefficient for the proportion of physician-extenders on the provider staff was not statistically significant. Service type was no statistically significant differences in the levels of inefficiency. The coefficient for non-medical center facility type was statistically significant, but negative, indicating that primary care clinics not associated with medical centers (i.e. hospitals and clinics) were more technically efficient than those associated with medical centers (the omitted category). There were no statistically significant differences among the levels of efficiency in regions

Moreover, facility type, size and location had been found that were significant explanatory variables of technical and scale efficiency (Kontodimopoulos, Moschovakis, Aletras, & Niakas, 2007).



Chapter III
Research Methodology

3.1 Research design

This was descriptive study with mathematical techniques and econometric for analysis. It was divided to two parts, the first part was measuring of technical efficiency with data envelopment analysis (DEA) and the second part was identifying the factors affecting efficiency with Tobit regression analysis. It was cross-sectional study, using the secondary data for all analyses.

3.2 Target and population

This study focused on 88 private clinics which provide primary care under Universal Coverage Scheme (UC) in fiscal year 2017. In fact, the population or the total number of private clinics in Bangkok which registered in Universal Coverage Scheme (UC) system were equal to 165 units, but some private clinics are eliminated from this study due to their data are not completed especially the data of the number of staff which need to be used for DEA analysis. Decision making units (DMUs) of this study were 88 DMUs.

3.3 Conceptual framework

This study was divided to two parts.

The first part was measuring of technical efficiency of private clinics under Universal Coverage Scheme (UC) with data envelopment analysis (DEA) using input-orientated model. The inputs were considered three variables as staff, operating expenses and building and equipment expenses while outputs were considered two variables as the number of outpatient visits and the number of health promotion and disease prevention visits. The results of DEA would show the three associated efficiency scores consist of overall technical efficiency or technical efficiency under a constant return to scale assumption (TECRS) scores, pure technical efficiency or technical under

a variable return to scale assumption (TEVRS) and scale efficiency (SE) scores. DEA would also show the patterns of scale inefficiencies which are increasing return to scale (IRS) and decreasing return to scale (DRS).

The second part was identifying the factors affecting efficiency with regression analysis using Tobit model. Dependent variable was considered pure technical efficiency or technical efficiency under a variable return to scale assumption (TEVRS) which was the result of DEA analysis from the first part and independent variables were considered seven expected factors that relied on previous studies and characteristics of private clinic under UC. These independent variables were defined to organizational characteristics and external environments. The organizational characteristics were ratio of staff and health service, the number of UC members and type of clinics and the external environment as location.

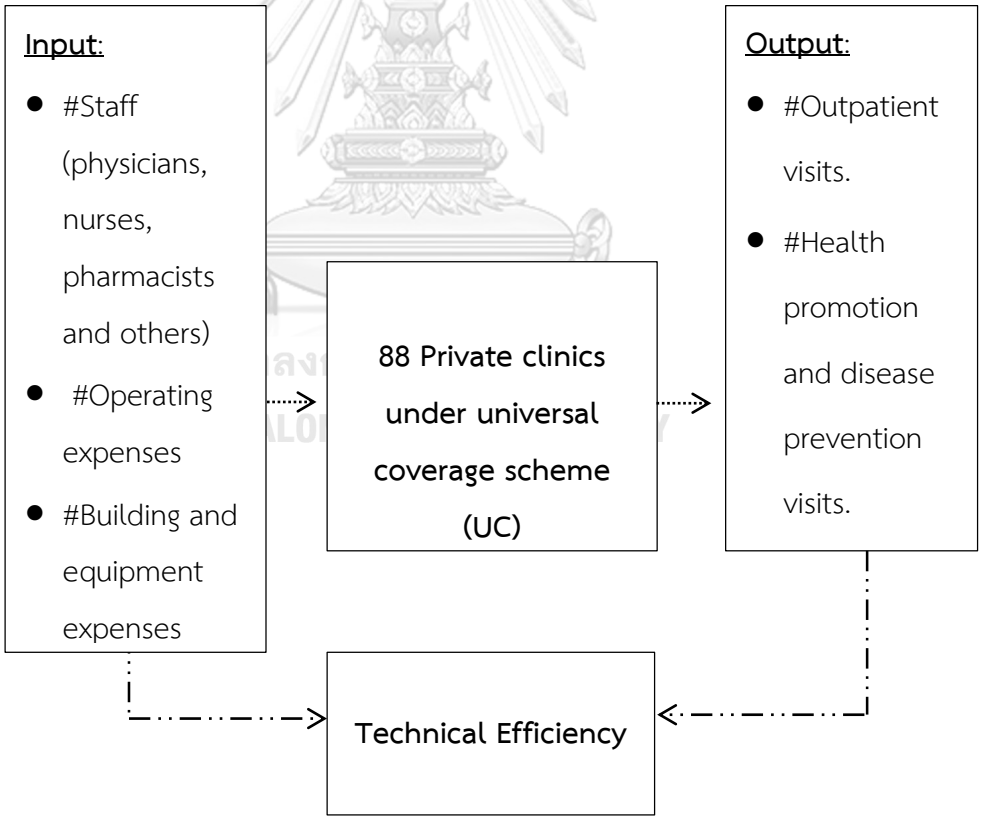


Figure 5 Measuring of technical efficiency with data envelopment analysis (DEA)

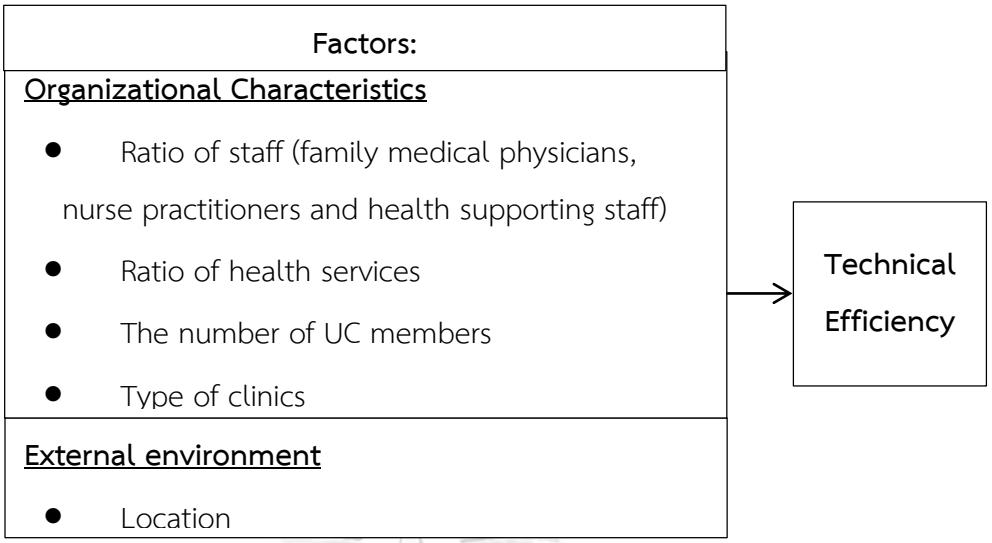


Figure 6 Identifying the factors affecting efficiency with regression analysis using Tobit model

3.4 Data and definition of variables

3.4.1 Data sources

The study used secondary data of cross sectional data of private clinics under universal coverage scheme (UC) in fiscal year 2017 (October, 2016- November, 2017) from National Health Security Office (NHSO). There were two sources; public online database and non-public online database of NHSO.

3.4.2 Data of measuring of technical efficiency with data envelopment analysis (DEA)

Measuring of technical efficiency with data envelopment analysis (DEA) consisted of input variables and output variables. These variables supported the theory of DEA analysis that described in the literature.

Input variables were considered three variables; staff, operating expenses and building and equipment expense. These input variables as proxy for three main input categories; labour, consumable resources and capital of private clinics following;

1. Number of staff as proxy for labour
2. Amount of operating expenses as proxy for consumable resources
3. Amount of building and equipment expenses as proxy for capital

Output variables are concerned on primary healthcare services including;

1. Outpatient visits
2. Health promotion and disease prevention visits.

Table 2 Defination of input variables

Variables	Categories	Operational definitions	Units	Sources
Input variable				
Number of staff as proxy for labour	Physicians	Number of doctors who graduate any faculty or school of medicine or dental and are licensed in the country as a medical doctor or dental doctors in private clinic (both specialists and general practitioners)	Full-Time Equivalents (FTEs)	Public online data base (NHSO, 2018)
	Nurses	The number of nurses who have completed the program of nursing and are licensed in the country as a nurse.	Full-Time Equivalents (FTEs)	Public online data base (NHSO, 2018)
	Pharma-ceutical staff	The number of pharmacist who have completed the program of pharmaceutical and are licensed in the country as a pharmacist and pharmaceutical staff who	Full-Time Equivalents (FTEs)	Public online data base (NHSO, 2018)

Variables	Categories	Operational definitions	Units	Sources
		work as pharmaceutical officer		
	Health supporting staff	The number of other medical staff of who graduate in bachelor's degree in health science or relative health care service	Full-Time Equivalents (FTEs)	Public online data base (NHSO, 2018)
Amount of operating expenses as proxy for consumable resources	Amount of operating expenses	The expenses on outpatient service and health promotion and disease prevention activities including consumable resources (e.g. medical and pharmaceutical supplies, administration and clerical services, housekeeping, and repairs and maintenance of private clinics.	Monetary (Bath)	Public online data base (NHSO, 2018)
Amount of building and equipment expenses as proxy for capital	Amount of depreciation of buildings and equipment expenses	The expenses on compensation of depreciation of buildings and equipment.	Monetary (Bath)	Public online data base (NHSO, 2018)

Variables	Categories	Operational definitions	Units	Sources
Output variables				
Primary healthcare services	Outpatient visits	The number of outpatient visits that private clinics report to NHSO	Visits	Non-public online data base (NHSO, 2018)
	Health promotion and disease prevention visits	The number of health promotion and disease prevention visits that medical clinics report to NHSO	Visits	Non-public online data base (NHSO, 2018)

* The unit of Full-Time Equivalents (FTEs); 2 part times were considered as 1 full-time.

* Operating expenses were excluded wage and salary of staff of private clinics.

3.4.3 Data of identifying the factors affecting efficiency with regression analysis

The part of identifying the factors affecting efficiency, Tobit regression analysis was used for defining correlation between private clinics under Universal Coverage Scheme (UC)'s efficiency score and factors affecting efficiency. Dependent variable was considered as pure technical efficiency or technical efficiency under a variable return to scale assumption (TEVRS) whereas independent variables were seven expected factors that relied on previous studies and characteristics of private clinic under UC.

The first explanatory variable was ratio of family medical physician to other staff. Recently, the Ministry of Public Health (MoPH) has reformed the Primary Care

Unit (PCU) to be Primary Cluster Care (PCC) that follow the National Health Development Plan for 2017 to 2021 (MoPH, 2016). The PCC has been designed health teamwork in primary care unit with family-based and multidisciplinary teamwork in the care of pediatric patients, so family medical physicians were expected to be the leader of PCC. According the National Health Development Plan, private clinics participating Universal Coverage Scheme (UC) in Bangkok have to enter this plan, so family medical physicians were expected to manage family-based and multidisciplinary team excellently and also expected to relate with efficiency of private clinics. Therefore, this proportion showed the combination of inputs between family medical physicians to other staff. This explanatory variable was expected to have positive relation with efficiency score as dependent variable.

The second explanatory variable was ratio of nurse practitioner to other staff. Nurse practitioners can provide fundamental treatments, some treatments they can provide as physician, so they were expected to be important staff in private clinics. Therefore, this proportion showed the combination of inputs between nurse practitioners to other staff. This explanatory variable was expected to have positive relation with efficiency score as dependent variable

The third explanatory variable was ratio of health supporting staff to other staff. National Health Security Scheme defined Primary Care Unit (PCU) as health service provided holistic health services such as health promotion and prevention, diagnosis, nursing, and rehabilitation (NHSO, 2016), so private clinic under Universal Coverage Scheme (UC)' missions were not only providing treatments, but also providing health promotion and prevention activities. Health supporting staff were expected to be important staff to provide health promotion and prevention activities. Therefore, this proportion showed the combination of inputs between health supporting staff to other staff. This explanatory variable was expected to have positive relation with efficiency score as dependent variable.

The forth explanatory variable was ratio of health promotion and disease prevention service to other services. Health promotion and disease prevention services were expected important health service that emphasis prevention of disease instead of treatment, it expected reduces cost by requiring less health supplies. Therefore, this

proportion showed the combination of inputs between health promotion and disease prevention service to other services. This explanatory variable was expected to have positive relation with efficiency score as dependent variable.

The fifth explanatory variable was the number of Universal Coverage (UC) member. The number of Universal Coverage (UC) members that set by National Health Security Office (NHSO) was expected appropriate number for private clinics. The private clinics under Universal Coverage (UC) which have a large number of UC members, their number of patients per day tends to high, so they have to expand medical supplies to cover all patients. Therefore, the number of UC member under NHSO's condition was expected to have positive relation with efficiency score as dependent variable.

The sixth explanatory variable was type of clinics. There were two types of clinics; united clinic and non-united clinic. United clinic was healthcare service that can provide at least two treatments of dentistry, midwifery, physical therapy, medical laboratorial technology and Thai traditional medicine. It was expected more implicate health service than non-united clinic. Therefore, type of non-united clinic was expected to have positive relation with efficiency score as dependent variable.

The last explanatory variable was location. Bangkok area was divined to three parts; inner part, urban fringe part and suburb part (MU, 2006). According to private clinic under Universal Coverage Scheme (UC)' missions including providing health promotion and prevention activities; they have to work with community. The context of outer area that identified as urban fringe part and suburb part of Bangkok was seemed to excellent support for health promotion and prevention activities more that urban area. Therefore, this explanatory variable was expected to have positive relation with efficiency score as dependent variable.

Table 3 Explanatory variables for Tobit regression analysis

Variables	Types	Sources	Descriptions
Ratio of family medical physician	Quantitative	Public online data base (NHSO, 2018)	Ratio of family medical physician to other staff.

Variables	Types	Sources	Descriptions
Ratio of nurse practitioner	Quantitative	Public online data base (NHSO, 2018)	Ratio of nurse practitioner to other staff.
Ratio of health supporting staff	Quantitative	Public online data base (NHSO, 2018)	Ratio of health supporting staff other staff.
Ratio of health promotion and disease prevention service	Quantitative	Non-public online data base (NHSO, 2018)	Ratio of health promotion and prevention visits to other visits.
The number of Universal Coverage (UC) member	Dummy	Non-public online data base (NHSO, 2018)	The number of Universal Coverage (UC) member; 1= it is under NHSO's condition 0= it is not under NHSO's condition
Type of clinics	Dummy	Public online data base (NHSO, 2018)	Type of clinics; 1= non-united clinic 0= united clinic
Location	Dummy	Public online data base (NHSO, 2018)	Location in Bangkok; 1=Outer area (urban fringe part and suburb part) 0=Inner area

Thus, the empirical model by regression model following;

$$TEVRS = \beta_0 + \beta_1 RFM + \beta_2 RPN + \beta_3 RHS + \beta_4 RPP + \beta_5 UC + \beta_6 TC + \beta_7 LOC + \varepsilon$$

Where;

TEVRS= Technical efficiency under a variable return to scale assumption

RFM = Ratio of family medical physician

RPN = Ratio of nurse practitioner

RHS = Ratio of health supporting staff

RPP = Ratio of health promotion and disease prevention service

UC = Number of Universal Coverage Scheme (UC) members

TC = Type of clinics

LOC= Outer area (urban fringe part and suburb part)

ε= Error term that captures other possible factors no specified

It was expected that the organizational characteristics such as ratio of family medical physician to other staff, ratio of nurse practitioner to other staff, ratio of health supporting staff to other staff, ratio of health promotion and disease prevention services to other services, the number of UC members under NHSO's condition and type of non-united private clinic were the factors affecting the efficiency of private clinics under Universal Coverage Scheme (UC) or DUMs. Moreover, externally environmental characteristic as location in outer part of Bangkok was also the factor affecting efficiency.

Chapter IV
Results and Discussion

This chapter presented results of measuring of technical efficiency of 88 private clinics under Universal Coverage Scheme (UC) in Bangkok, in fiscal year 2017 by data envelopment analysis (DEA) using input-oriented model and identifying the factors affecting efficiency using Tobit regression analysis. The results were divided into three parts as follows;

1. General description of the input and output variables
2. Descriptive statistics of technical and scale efficiency scores
3. The result of regression

4.1 General description of the input and output variables

The average of inputs of staff[1]; physician, nurse, pharmaceutical staff and health supporting staff was equal to 1.64, 1.18, 2.72 and 5.82 full-time equivalents (FTEs) respectively with standard deviation (S.D.) of 0.54, 0.31, 0.56 and 1.53 respectively. It implied that basically the number of physician and nurse of the private clinics were less than 2 FTEs while the pharmaceutical staff which consist of pharmacist and pharmaceutical staff were less than 3 FTEs and supporting staff (other staff) was less than 6 FTEs.

The average of operating expenses[2] was equal to 5,327,782.17 baht with standard deviation (S.D.) of 2,556,578.33 while depreciation of buildings and equipment expenses was equal to 827,416.75 with standard deviation (S.D.) of 125,492.42.

The average of outpatient visits was equal to 21,627.41 visits with standard deviation (S.D.) of 6,698.95 while the average of health promotion and disease prevention visit was equal to 9,100.18 visits with standard deviation (S.D.) of 4,010.33.

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[1] The unit of Full-Time Equivalent (FTE); 2 part times were considered as 1 full-time.

[2] Operating expenses were excluded wage and salary of staff of private clinics

It showed that the number of outpatient visits was more than health promotion and disease prevention visits.

Table 4 Descriptive statistics of input and output variables

	Mean	Median	Max.	Min.	S.D.
Inputs					
Physician	1.64	1.50	4.00	1.00	0.54
Nurse	1.18	1.00	3.00	1.00	0.31
Pharmaceutical Staff	2.72	2.50	4.50	1.50	0.56
Health Supporting Staff	5.82	6.00	13.00	1.00	1.53
Operating expenses	5,327,782.17	4,792,471.94	27,859,422.40	120,615.50	2,556,578.33
Depreciation of buildings and equipment expenses	827,416.75	802,568.39	1,597,902.99	408,441.83	125,492.42
Outputs					
Outpatient visits	21,627.41	21,529.00	48,345.00	3,993.00	6,698.95
Health promotion and disease prevention visits	9,100.18	7,432.00	26,948.00	2,177.00	4,010.33

Table 5 Descriptrive statistics of type of clinics

Type of clinic	Count (unit)	Percentage
Non-united clinics	73	82.95
United clinics	15	17.05
Total	88	100.00

Table 5 showed the statistics of type of clinics, the total of 88 private clinics under Universal Coverage Scheme (UC) can be divided by two types; united clinic and non-united clinic. The number of non-united clinics was higher than united clinic. There were united clinics as 15 units; it can be calculated as 17.05 percent of total of target study while non-united clinics as 73 units; it can be calculated as 82.95 percent of total of target study.

Table 6 Descriptrive statistics of location of clinics

Location	Count (unit)	Percentage
Inner part	17	19.32
Urban fringe part	44	50.00
Suburb part	27	30.68
Total	**88**	**100.00**

Table 6 showed the statistics of location of clinics, according to the area of Bangkok can be divided by 3 parts inner part, urban fringe part, suburb part. Most of private clinics were in urban fringe part as 44 units; it can be calculated as 50.00 percent of total of target study. In suburb part, there were 27 units; it can be calculated as 30.68 percent of total of target study. The least number was in suburb part as 17 units; it can be calculated as 19.32 percent of total of target study.

As the results, it can be observed that the number of staff in private clinics under Universal Coverage Scheme (UC) was quite similar, those were less deviation. The minimum number of physicians as 1 full-time equivalent (FTE) was consistent with NHSO's commission on qualifications and standards in healthcare services (NHSO, 2017a); the private clinics which have 10,000 UC members have to employ physician at least 1 full-time. In contrast, the minimum number of nurses was against to NHSO's

commission, they have hire nurse at least 1 full time per 2,500 UC members; it found that there was nurse as 1 full-time equivalent (FTE) per 10,000 UC members. Moreover, it found that most budgets were spent on operating activities.

Furthermore, most private clinics participating Universal Coverage Scheme (UC) in Bangkok in fiscal year 2017 were non-united clinics that provide general treatment, in case of other treatments such as dentistry, midwifery, physical therapy, medical laboratorial technology and Thai traditional medicine, patients were referred to contracted referral hospital or other contracted health organizations. Most of them operated in urban fringe and suburb area in Bangkok; it can imply that there was high demand in primary care services under Universal Coverage Scheme (UC) in outer area, so this area was expected appropriate for operating primary care services under Universal Coverage Scheme (UC) while in inner area was expected low demand due to there were several alternative health care services and people can afford to pay by themselves.

4.2 Descriptive statistics of technical and scale efficiency scores

The measuring of technical efficiency by data envelopment analysis (DEA) of 88 private clinics under Universal Coverage Scheme (UC) using DEAP version 2.1 software package developed by T.Coelli (1996). The results of DEA with input oriented assumption showed overall technical efficiency or technical efficiency under a constant return to scale assumption (TECRS) scores, pure technical efficiency or technical efficiency under a variable return to scale assumption (TEVRS) scores and scale efficiency (SE) scores as Table 7 follow;

Table 7 Descriptive statistics for CRSTE, VRSTE and SE

TE	Mean	Median	Maximum	Minimum	S.D.
CRSTE*	0.82	0.86	1.00	0.35	0.15
VRSTE**	0.98	1.00	1.00	0.56	0.03
SE***	0.84	0.87	1.00	0.35	0.13

***** Technical efficiency score under a constant return to scale assumption

** Pure technical efficiency score or technical efficiency score under a variable return to scale assumption

*** Scale efficiency score

From the table 7 showed the result of DEA analysis with input oriented assumption, the average of technical efficiency score under a constant return to scale assumption (CRSTE) was equal to 0.82 (SD = 0.15), for pure technical efficiency score or technical efficiency score under a variable return to scale assumption (TEVRS) was equal to 0.98 (SD=0.03) and scale efficiency score (SE) was equal to 0.84 (SD=0.13). It can be observed that the result of TEVRS, the minimum number of efficient score was equal to 0.56 (the highest score=1) while TECRS was equal to 0.35 (the highest score=1).

It was implied that most of private clinics under UC can manage their own resources to provide healthcare service efficiently. The average pure technical efficiency score (TEVRS) was reach at 0.98, it was consistent with previous study of Pattamsiriwat that studied the efficacy and cost of the hospital office of the permanent secretary, Ministry of Public Health in the financial sector finance research program evaluating the impact of universal health care coverage on hospital finance (Pattamasiriwat, 2009), the result showed that average efficiency of center hospitals, general hospital and community hospitals were 0.94, 0.86, and 0.85, respectively. However, the result was different from the study in health sub-district offices in 2008, efficiency scores (DEA, VRS assumption) range from 0.60 to 0.75 and averaged to 0.69.

As a result of descriptive statistics of input variables that can be observed the number of staff in private clinics under Universal Coverage Scheme (UC) was quite similar; those were less deviation, it might be the result of the national health security commission on qualifications and standards in healthcare services that private clinics have to operate, so the performance of private clinics under Universal Coverage Scheme (UC) in Bangkok were slightly different.

Table 8 Descriptive statistics of TE scores from Input oriented DEA model

TE	Private clinics on frontier (units)	Percentage (Total =88 units)
CRSTE*	23	26.14
VRSTE**	84	95.45
SE***	23	26.14

***** Technical efficiency score under a constant return to scale assumption

****** Pure technical efficiency score or technical efficiency score under a variable return to scale assumption

******* Scale efficiency score

Table 8 showed statistics of TE scores from input oriented DEA model, from the total of 88 private clinics, there were 84 private clinics were on technical efficiency under a constant return to scale assumption (CRSTE) frontier while others were inefficiency; it was 95.45 percent of the total units. There were 23 private clinics were on pure technical efficiency or technical efficiency under a variable return to scale assumption (VRSTE) and scale efficiency frontier; it was 26.14 percent of the total units. It can be implied that the private clinics under UC can manage the healthcare service efficiently.

There were 95.45 percent of the total units operating at technical efficiency (VRSTE) frontier which higher than hypothesis as 90 percent. It was consistent with Matthew Forbes, Philip Harslett, Ilias Mastoris and Leonora Risse studied in measuring the technical efficiency of public and private hospitals in Australia (Matthew Forbes, 2010) that found 90 percent of the examples were operating at efficiency level. In contrast, the result was different from the study of Pattamsiriwat that studied in health sub-district offices in Thailand, 2008 that found 45 units laid on the cost frontier represented only 18 percent of total units.

Table 9 Descriptive statistics of the patterns of scale inefficiencies

	CRS*	DRS**	IRS***
Private Clinics under UC	23	1	64

*Constant return to scale (CRS)

**Decreasing return to scale (DRS)

***Increasing return to scale (IRS)

Table 9 showed that from the 88 private clinics under Universal Coverage Scheme (UC), the private clinics under UC which CRS (constant return to scale) was equal to 23 units and IRS (increasing return to scale) was equal to 64 units while DRS (decreasing return to scale) was equal to 1 unit. Therefore, the result proved that increasing return to scale was higher than decreasing return to scale. It means that the percentage increases in outputs was more than percentage change in all inputs.

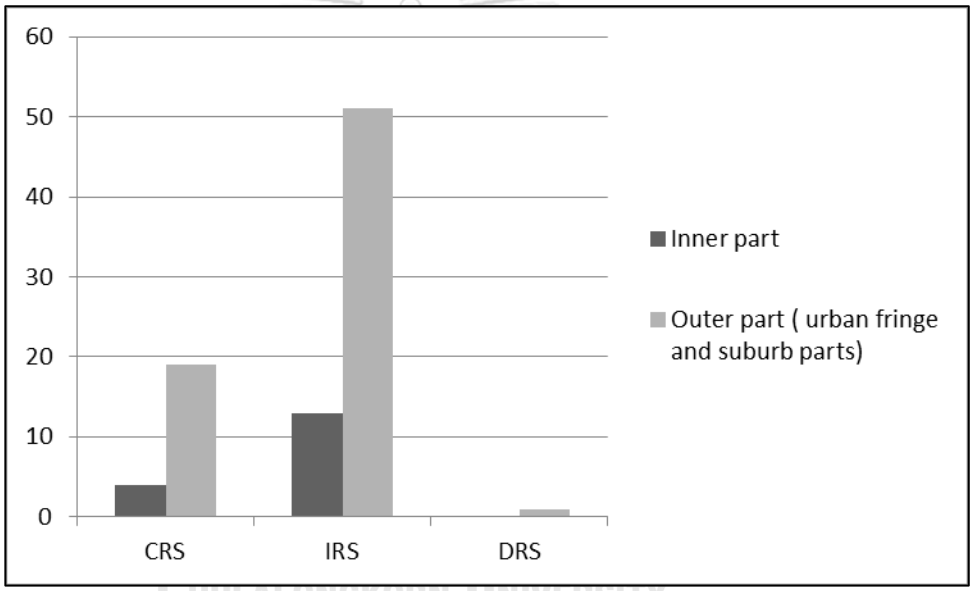

Figure 7 Descriptive statistics of the patterns of scale inefficiencies in different locations

Figure 7 depicted statistics of the patterns of scale inefficiencies in different locations. The private clinics under Universal Coverage Scheme (UC) which operated at constant return to scale (CRS); it found that most of them were in outer part of Bangkok (urban fringe and suburb parts) as 19 units while inner part were found as only 4 units. Increasing return to scale (IRS) were also found most of private clinics under UC were outer part (urban fringe and suburb parts) as 51 units while inner part were 13 units. And only one private clinic under UC in outer part (urban fringe and suburb parts) operated on decreasing return to scale (DRS).

As a result, most private clinics under UC were increasing return to scale (IRS), it means the output increases by a larger proportion than the increase in inputs during the operating process. For example, if input is increased by 1 time, but output increases by 1.5 times, then this group should expand their scale of operation for achieving efficiency. In contrast, some private clinics under UC were decreasing return to scale (DRS), it means the output increases by less than that proportional change in inputs. For example, if input is increased by 1 time, but output increases by 0.5 times, then this group should reduce their scale of operation for achieving efficiency.

Table 10 Descriptive statistics of the ratio of outputs to population in different locations

Locations	Outputs (visit)	Population (person)	Outputs/Population
Inner part	519,477	1,105,743	0.4698
Outer part (urban fringe and suburb parts)	2,184,551	4,590,666	0.4759
Total	**2,704,028**	**5,696,409**	**0.4747**

Table 10 depicted statistics of the ratio of outputs to population in different locations, the ratio of outputs to population of private clinics under Universal Coverage Scheme (UC) was seem to be low, the overall proportion was equal to 0.47 while proportion in inner part and outer part (urban fringe and suburb parts) was a slightly different. As a result, there was opportunity to increase outputs to cover all population, so it was confirmed that private clinics under UC which operated increasing return to scale (IRS) should expand their scale of operation to adjust the scale of operation appropriately for achieving efficiency.

4.3 The result of regression

The second part of this study was identifying the factors affecting efficiency of private clinics under Universal Coverage Scheme (UC) with Tobit regression analysis using EViews version 9. This was defending correlation between private clinics under

Universal Coverage Scheme (UC)'s efficiency score and factors affecting efficiency. A dependent variable was considered as pure technical efficiency or technical efficiency under a variable return to scale assumption (TEVRS) whereas independent variables were seven explanatory variables; ratio of family medical physician, ratio of nurse practitioner, ratio of health supporting staff, ratio of health promotion and disease prevention service, the number of Universal Coverage Scheme (UC) members, type of clinics and location.

Table 11 Descriptive statistics of explanatory variable

Variables	**Mean**	**Median**	**Max.**	**Min.**	**Std. Dev.**
Family Medical Physician Ratio	0.0528	0.0656	0.1935	0.0000	0.0550
Nurse Practitioner Ratio	0.0212	0.0000	0.2353	0.0000	0.0456
Health Supporting Staff Ratio	1.0701	1.0769	1.8571	0.2500	0.3487
Health Promotion and Disease Prevention Service Ratio	0.4405	0.3928	1.6677	0.1452	0.2168
The Number of Universal Coverage (UC) Members (dummy)	0.3977	0.0000	1.0000	0.0000	0.4922
Type of Clinics (dummy)	0.8295	1.0000	1.0000	0.0000	0.3782
Location (dummy)	0.8068	1.0000	1.0000	0.0000	0.3971

As the results, it can be observed that ratio of family medical physician and ratio of nurse practitioner variables were considered similar; it was less deviation (Std. Dev. = 0.0550 and 0.0456 respectively) while other variables such as health supporting staff ratio, health promotion and disease prevention service ratio, type of clinics and location were higher deviations (Std. Dev > 0.2.)

After running the Tobit regression using EViews version 9, the results revealed coefficient standard (Std. Error), z-Statistic and probability (Prob.) of seven explanatory variables; family medical physician ratio, nurse practitioner ratio, health supporting staff ratio, health promotion and disease prevention service ratio, the number of Universal Coverage Scheme (UC) members, type of clinics and location. The results showed that

only health supporting staff ratio was significant effect on technical efficiency (TEVRS) of private clinics under UC by P-value (Prob.) was less than 0.05 while other explanatory variables were insignificant effect on technical efficiency (TEVRS) of private clinics under UC by P-value (Prob.) was higher than 0.05.

Table 12 Tobit Regression results

Variables	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
Family Medical Physician Ratio	-0.0908383	0.1409311	-0.6445582	0.5192136
Nurse Practitioner Ratio	-0.1084353	0.1755673	-0.6176282	0.5368205
Health Supporting Staff Ratio	0.0564399	0.0218972	2.5774926	0.009952
Health Promotion and Disease Prevention Service Ratio	-0.0565734	0.0340754	-1.6602421	0.0968657
The Number of Universal Coverage (UC) Members (dummy)	0.0191022	0.0158423	1.2057768	0.2279036
Type of Clinics (dummy)	0.0041576	0.0196654	0.2114179	0.8325612
Location (dummy)	0.005992	0.0189911	0.3155185	0.752368

Number of observation = 88, Confidence Interval 95%, Sum squared reside =0.405149

The table 11 shows the Tobit regression results that depicted correlation between seven explanatory variables and technical efficiency (TEVRS) of private clinics under UC. The number of observation was equal to 88, confidence interval at 95 percent. The sum squared reside was equal to 0.405149.

The ratio of health supporting staff to other staff was explanatory variable that expected to have positive relation with efficiency score as dependent variable because health supporting staff were expected to be important staff to provide health promotion and prevention activities. According to the results, coefficient was equal to

0.0564399 and it was significant by P-value was less than 0.05. It was proved that health supporting staff ratio was positive relation with efficiency score.

Both of ratio of family medical physician to other staff and nurse practitioner to other staff explanatory variables were assumed to have positive relation with efficiency score because family medical physicians were expected to be the leader of Primary Cluster Care (PCC) in the National Health Development Plan and the private clinics also enter this plan, so family medical physician are assumed to be excellent in private clinics under UC management while nurse practitioners can provide some treatments as physician, so they were expected to be important staff in private clinics. According to the result showed that family medical physician and nurse practitioner ratio were negative relation with efficiency score but this regression analysis was insignificant due to P-value was higher than 0.05. It means these variables would not affect to technical efficiency (TEVRS) of private clinics under UC. As the results of descriptive statistics of explanatory variable, it can be observed that ratio of family medical physician and ratio of nurse practitioner variables were considered quite similar; those were less deviation (Std. Dev. = 0.0550 and 0.0456 respectively), so this might be cause of insignificant in regression analysis.

The ratio of health promotion and disease prevention service to other services was explanatory variable that expected to have positive relation with efficiency score as dependent variable because it emphasis prevention of disease instead of treatment, it was expected requiring less health supplies and reducing cost of treatment. According to the result showed that health promotion and disease prevention services ratio was negative relation with efficiency score but this regression analysis was insignificant due to P-value was higher than 0.05. It means that ratio of health promotion and disease prevention service to other services would not affect the efficiency of private clinics under UC. As a result of descriptive statistics of input and output variables, the number of outpatient visits was higher than the number of health promotion and disease preventions visits. It was implied that the capacity in providing treatments of private clinic in Bangkok was higher than health promotion and disease prevention services, so this might affect to insignificant in regression analysis.

The number of Universal Coverage (UC) members that set by National Health Security Office (NHSO) was expected appropriate number for private clinics. Therefore, the number of UC member under NHSO's condition was expected to have positive relation with efficiency score as dependent variable. According to the result proved that the number of Universal Coverage (UC) members was positive relation with efficiency score. However, this regression analysis was insignificant due to P-value was higher than 0.05. As this result, it was expected that the number of UC member under might not be related to the number of patients of private clinics, so the number of Universal Coverage (UC) member would not affect to increase in the efficiency of private clinics under UC.

There were two types of clinics; united clinic and non-united clinic. United clinic was healthcare service that can provide at least two treatments of dentistry, midwifery, physical therapy, medical laboratorial technology or Thai traditional medicine. It was expected more implicate health service than non-united clinic, so type of non-united clinic was expected to have positive relation with efficiency score as dependent variable. According to the result showed that non-united clinic positive relation with efficiency score, however this regression result was insignificant due to P-value was higher than 0.05. It means the non-united clinic was not associated to increasing in the efficiency of private clinics under UC. It was consistent with the study of Schmacker and McKay (Schmacker & McKay, 2008) that the service type was no statistically significant differences in the levels of inefficiency.

The last explanatory variable was location. This explanatory variable was expected to have positive relation with efficiency score as dependent variable because Bangkok area was divined to three parts; inner part, urban fringe part and suburb part (MU, 2006). According to private clinic under Universal Coverage Scheme (UC)' missions including providing health promotion and prevention activities; they have to work with community. The context of outer area that identified as urban fringe part and suburb part of Bangkok was seemed to excellent support for health promotion and prevention activities more that urban area. According to the result shows that outer part (urban fringe part and suburb part) of Bangkok clinic positive relation with efficiency score. However, this regression result was insignificant due to P-value was higher than 0.05. It

means that outer part of Bangkok was not associated to increasing in the efficiency of private clinics under UC.

Chapter V
Conclusion and Recommendations

5.1 Conclusion

This study aimed to apply an accuracy tool of efficiency measurement for indicating the level of technical efficiency score of private clinics under universal coverage scheme (UC) in Bangkok, Thailand and also to investigate the factors that determine their technical efficiency scores.

The first part was measuring of technical efficiency of private clinics under Universal Coverage Scheme (UC) by data envelopment analysis (DEA) using input-orientated model. The results showed that the private clinics under UC can manage their own resources to provide healthcare services efficiently. The average pure technical efficiency score (TEVRS) was reach at 0.98 and there were 84 private clinics under UC, calculated as 95.45 percent of the total number of target study operating at pure technical efficiency (VRSTE) frontier, it was higher than hypothesis as 90 percent. However, as a result of descriptive statistics of input variables that can be observed the number of staff in private clinics under Universal Coverage Scheme (UC) were quite similar; those were less deviation, it might be the result of the national health security commission on qualifications and standards in healthcare services that private clinics have to operate, so the performance of private clinics under Universal Coverage Scheme (UC) in Bangkok were slightly different.

Furthermore, as a result of inefficient patterns, most private clinics under UC were increasing return to scale (IRS), it means the output increases by a larger proportion than the increase in inputs during the operating process, so this group should expand their scale of operation for achieving efficiency. Moreover, the ratio of outputs to population showed that there was opportunity to increase healthcare services to cover all population, it was confirmed that private clinics under UC were increasing return to scale (IRS) should increase their healthcare services. In contrast, some private clinics under UC which operated decreasing return to scale (DRS), it means the output increases by less than proportional change in inputs, so this group

should reduce their scale of operation for adjusting the scale of operation appropriately.

The second part was identifying the factors affecting efficiency of private clinics under Universal Coverage Scheme (UC) with Tobit regression analysis. The number of observation was equal to 88, confidence interval at 95 percent, the sum squared reside was equal to 0.40. The results revealed that only health supporting staff ratio was significantly affect to technical efficiency (TEVRS) of private clinics under UC. The coefficient was equal to 0.06. It was proved that health supporting staff ratio was positive relation with private clinics under UC's pure technical efficiency score.

In contrast, other explanatory variables such as family medical physician ratio, nurse practitioner ratio, health promotion and disease prevention service ratio, the number of Universal Coverage Scheme (UC) members, type of clinics and location were insignificantly effect on technical efficiency (TEVRS) of private clinics under UC. It means these explanatory variables were not associated to increasing in pure technical efficiency of private clinics under UC.

According to the results, in order to achieving appropriate scale of operation, private clinics under UC which operated increasing return to scale (IRS) should expand their scale of operation while some private clinics under UC which operated decreasing return to scale (DRS) should reduce their scale of operation. Furthermore, health supporting staff ratio should be considered to increase in operation in private clinics under UC in Bangkok. Private clinic mangers can use these as evidence base for allocating healthcare resources efficiently and designing operation suitable for private clinics under in Bangkok.

5.2 Limitations

1. This study aimed to measure technical efficiency of private clinics (UC) which registered in Universal Coverage Scheme (UC) system in Bangkok, in fiscal year 2017, the total number as 165 units, but some data were not completed especially the data of the number of staff which need to be

used for DEA analysis so some private clinics were eliminated from this study.

2. Some data of input variables are assumed for calculation because the data were not available such as number of staff, salary of personnel, operating expenses and building and equipment expenses.

5.3 Recommendations

As a result of DEA; patterns of scale inefficiencies showed that private clinics under Universal Coverage Scheme (UC) which operated increasing return to scale (IRS), it means the output increases by a larger proportion than the increase in inputs during the operation process, so this group should expand their scale of operation for achieving efficiency. Moreover, a result of the ratio of outputs to population, there was opportunity to increase health services to cover all population, it was confirmed that private clinics under UC which operated increasing return to scale (IRS) should expand their scale of operation. However, some private clinics under UC which operated decreasing return to scale (DRS), it means the output increases by less than the proportional change in inputs, so this group should reduce their scale of operation for adjusting the scale of operation appropriately.

As a result of regression analysis, health supporting staff ratio was positive relation with private clinics under UC's pure technical efficiency score, in order to increasing to efficiency, it should increase in health supporting staff ratio.

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%E0%B8%81%E0%B8%AD%E0%B8%87%E0%B8%97%E0%B8%B8%E0%B8%99%20%E0%B9%80%E0%B8%A5%E0%B9%88%E0%B8%A1%204%20%E0%B9%82%E0%B8%A3%E0%B8%84%E0%B9%80%E0%B8%A3%E0%B8%B7%E0%B9%89%E0%B8%AD%E0%B8%A3%E0%B8%B1%E0%B8%87.pdf.

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APPENDIX

APPENDIX A: Results from DEAP Version 2.1

Input orientated DEA

Scale assumption: VRS

Slacks calculated using multi-stage method

EFFICIENCY SUMMARY:

firm	crste	vrste	scale	
1	1.000	1.000	1.000	-
2	0.692	1.000	0.692	irs
3	0.384	0.561	0.685	irs
4	0.986	1.000	0.986	irs
5	0.640	1.000	0.640	irs
6	0.946	1.000	0.946	irs
7	0.924	1.000	0.924	irs
8	0.984	1.000	0.984	irs
9	0.909	1.000	0.909	irs
10	1.000	1.000	1.000	-
11	0.683	1.000	0.683	irs
12	1.000	1.000	1.000	-
13	1.000	1.000	1.000	-
14	0.868	1.000	0.868	irs
15	0.793	1.000	0.793	irs
16	0.538	1.000	0.538	irs
17	0.725	1.000	0.725	irs
18	1.000	1.000	1.000	-
19	0.935	1.000	0.935	irs
20	0.717	1.000	0.717	irs
21	0.788	1.000	0.788	irs
22	0.960	1.000	0.960	irs
23	0.738	1.000	0.738	irs
24	0.725	1.000	0.725	irs
25	0.539	0.667	0.808	irs
26	0.915	1.000	0.915	irs
27	1.000	1.000	1.000	-
28	1.000	1.000	1.000	-
29	0.997	1.000	0.997	irs
30	0.893	1.000	0.893	irs
31	0.909	1.000	0.909	irs
32	0.716	0.742	0.965	drs
33	0.810	1.000	0.810	irs
34	0.751	1.000	0.751	irs
35	1.000	1.000	1.000	-
36	1.000	1.000	1.000	-
37	0.930	1.000	0.930	irs
38	0.774	1.000	0.774	irs
39	1.000	1.000	1.000	-
40	1.000	1.000	1.000	-
41	0.774	1.000	0.774	irs
42	1.000	1.000	1.000	-
43	0.351	1.000	0.351	irs
44	0.655	1.000	0.655	irs
45	0.872	1.000	0.872	irs

46	1.000	1.000	1.000	-
47	1.000	1.000	1.000	-
48	0.842	1.000	0.842	irs
49	0.805	1.000	0.805	irs
50	1.000	1.000	1.000	-
51	1.000	1.000	1.000	-
52	0.630	1.000	0.630	irs
53	0.451	1.000	0.451	irs
54	0.575	1.000	0.575	irs
55	0.691	1.000	0.691	irs
56	0.796	1.000	0.796	irs
57	0.871	1.000	0.871	irs
58	0.924	1.000	0.924	irs
59	1.000	1.000	1.000	-
60	0.793	1.000	0.793	irs
61	0.745	1.000	0.745	irs
62	0.636	1.000	0.636	irs
63	0.838	1.000	0.838	irs
64	0.969	1.000	0.969	irs
65	0.660	1.000	0.660	irs
66	0.544	0.667	0.816	irs
67	0.913	1.000	0.913	irs
68	0.763	1.000	0.763	irs
69	0.860	1.000	0.860	irs
70	1.000	1.000	1.000	-
71	0.568	1.000	0.568	irs
72	1.000	1.000	1.000	-
73	0.678	1.000	0.678	irs
74	0.472	1.000	0.472	irs
75	1.000	1.000	1.000	-
76	0.971	1.000	0.971	irs
77	0.858	1.000	0.858	irs
78	1.000	1.000	1.000	-
79	0.903	1.000	0.903	irs
80	0.786	1.000	0.786	irs
81	0.647	1.000	0.647	irs
82	0.729	1.000	0.729	irs
83	0.762	1.000	0.762	irs
84	0.568	1.000	0.568	irs
85	1.000	1.000	1.000	-
86	0.941	1.000	0.941	irs
87	1.000	1.000	1.000	-
88	0.438	1.000	0.438	irs

mean 0.823 0.985 0.836

Note: crste = technical efficiency from CRS DEA

vrste = technical efficiency from VRS DEA

scale = scale efficiency = crste/vrste

Note also that all subsequent tables refer to VRS results

APPENDIX B: Results from Tobit regression

Dependent Variable: VRSTE

Method: ML - Censored Normal (TOBIT) (Newton-Raphson / Marquardt steps)

Date: 07/04/18 Time: 21:59

Sample: 1 88

Included observations: 88

Left censoring (value) at zero

Convergence achieved after 4 iterations

Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
RFM	-0.090838	0.140931	-0.644558	0.5192
RPN	-0.108435	0.175567	-0.617628	0.5368
RHS	0.056440	0.021897	2.577493	0.0100
RPP	-0.056573	0.034075	-1.660242	0.0969
UC	0.019102	0.015842	1.205777	0.2279
TC	0.004158	0.019665	0.211418	0.8326
LOC	0.005992	0.018991	0.315518	0.7524
C	0.940245	0.034818	27.00482	0.0000

Error Distribution

SCALE:C(9)	0.067853	0.005115	13.26650	0.0000

Mean dependent var	0.984511	S.D. dependent var	0.072710
S.E. of regression	0.071613	Akaike info criterion	-2.338416
Sum squared resid	0.405149	Schwarz criterion	-2.085052
Log likelihood	111.8903	Hannan-Quinn criter.	-2.236342
Avg. log likelihood	1.271480		

Left censored obs	0	Right censored obs	0
Uncensored obs	88	Total obs	88

APPENDIX C: Thai document about requiting private clinics to participate universal coverage scheme

สปสช.เพิ่มมาตรการให้คนกทม.เข้าถึงการรักษาพยาบาล ลดการรอคิวและแออัดในรพ.ขนาดใหญ่ หลังพบผู้ป่วยส่วนใหญ่เป็นโรคเรื้อรังที่ต้องตรวจติดตามอาการต่อเนื่องหรือโรคพื้นฐาน สามารถรักษาหน่วยบริการปฐมภูมิใกล้บ้านได้ หากเกินศักยภาพก็มีระบบส่งต่อรักษาได้ทันท่วงที แจงประสานงานร่วมทุกฝ่ายเพื่อการพัฒนาคุณภาพมาตรฐานคลินิกอบอุ่นให้ดูแลคนกทม.ได้ทั่วถึง

นพ.รัฐพล เตรียมวิชานนท์ ประธานกลุ่มภารกิจสำนักงานสาขาและการมีส่วนร่วม สำนักงานหลักประกันสุขภาพแห่งชาติ(สปสช.) กล่าวว่า แนวทางการดำเนินงานเพื่อให้ประชาชนในพื้นที่กรุงเทพมหานคร ซึ่งเป็นเมืองใหญ่ มีประชากรจำนวนมาก และมีหน่วยบริการสาธารณสุขระดับตติยภูมิอยู่จำนวนมาก ได้เข้าถึงบริการสาธารณสุขนั้น แนวทางสำคัญคือ การต้องลดความแออัดในแผนกผู้ป่วยนอก เพื่อลดการรอคิวของผู้ป่วย โดยดำเนินการดังนี้

1. โรงพยาบาลซึ่งเป็นหน่วยบริการระดับทุติยภูมิ-ตติยภูมิ เป็นหน่วยบริการที่รองรับผู้ป่วยที่มีอาการหนัก หรือเป็นโรคซับซ้อน เช่น มะเร็ง โรคหลอดเลือดสมอง โรคหัวใจ ฯลฯ หรืออาการแทรกซ้อนจากโรคเรื้อรัง เช่น แผลที่เกิดจากโรคเบาหวาน ฯลฯ นโยบายระบบหลักประกันสุขภาพแห่งชาติเน้นให้ประชาชนที่เจ็บป่วยด้วยโรคพื้นฐาน หรือโรคเรื้อรังที่มีอาการคงที่ ไม่มีภาวะแทรกซ้อน ไปใช้บริการที่หน่วยบริการปฐมภูมิก่อน หากหน่วยบริการปฐมภูมิรักษาไม่ได้ หรือจำเป็นต้องใช้เครื่องมือหรือหัตถการพิเศษ จะส่งต่อมารักษาที่โรงพยาบาลตามสิทธิทั้งนี้ เพื่อความสะดวกของประชาชน โรงพยาบาลในระบบหลักประกันสุขภาพในกรุงเทพมหานคร ประกอบด้วยโรงพยาบาลรัฐบาล จำนวน 21 แห่ง โรงพยาบาลเอกชนจำนวน 28 แห่ง แบ่งเป็น รพ.เอกชนที่รับดูแลประชากรผู้มีสิทธิจำนวน 19 แห่ง และโรงพยาบาลที่รับส่งต่อเฉพาะทางจำนวน 9 แห่ง หากเทียบสัดส่วนกับจำนวนประชากรในกรุงเทพมหานคร จัดว่ายังมีโรงพยาบาลไม่เพียงพอ จึงเป็นที่มาของโครงการลดความแออัดผู้ป่วยนอกโรงพยาบาลขนาดใหญ่ โดยเพิ่มคลินิกในพื้นที่มารองรับประชาชนแทนโรงพยาบาลที่ดำเนินการ เพื่อเพิ่มการเข้าถึงบริการ ประชาชนไม่ต้องรอนาน เดินทางสะดวก ปัจจุบันมีคลินิกชุมชนอบอุ่นในเขตกทม. 150 แห่ง

2. โครงการลดความแออัดผู้ป่วยนอกในโรงพยาบาลขนาดใหญ่ มีการดำเนินงานมาหลายพื้นที่ ตั้งแต่ รพ.ภูมิพลอดุลยเดช รพ.สมเด็จพระปิ่นเกล้า รพ.นพรัตนราชธานี รพ.ตากสิน รพ.ราชวิถี รพ.พระมงกุฎเกล้า มีการดำเนินงานเป็นขั้นตอน มีการจัดตั้งคณะทำงานจากหลายภาคส่วน อาทิ รพ.เลิดสิน สำนักอนามัย ศูนย์บริการสาธารณสุขในพื้นที่ องค์กรปกครองส่วนท้องถิ่น (สมาชิกสภา

กรุงเทพมหานคร, ประธานสภาเขต) ศูนย์ประสานงานหลักประกันสุขภาพในพื้นที่ สปสช. เขต 13 กรุงเทพมหานคร ทั้งนี้ได้มีการตั้งคณะทำงานที่มีภาคส่วนที่เกี่ยวข้องเข้ามาดำเนินการเป็นขั้นตอน ตั้งแต่การประชุมหารือ ประชาสัมพันธ์ในพื้นที่ จัดทำประกาศรับสมัคร ออกสำรวจพื้นที่ตั้งคลินิก ประชุมพิจารณาคัดเลือก ติดตามความคืบหน้า ตรวจประเมินตามเกณฑ์ พิจารณาผลการตรวจประเมินคลินิก การจัดสรรประชากร และการประชาสัมพันธ์หน่วยบริการ หลังจากกระจายประชากรผู้มีสิทธิไปยังหน่วยบริการปฐมภูมิแล้ว หากประชาชนไม่ทราบข่าวการเปลี่ยนแปลงดังกล่าว อนุโลมให้ประชาชนสามารถใช้บริการได้ที่โรงพยาบาล 1 ครั้ง จากนั้น เจ้าหน้าที่โรงพยาบาลจะแจ้งสิทธิใหม่ให้ทราบ เพื่อไปใช้บริการที่หน่วยบริการปฐมภูมิในครั้งต่อไป

3. การประชาสัมพันธ์ ใช้วิธีประชาสัมพันธ์เฉพาะกลุ่มในพื้นที่ ไม่ได้ออกข่าวสาธารณะเนื่องจากประชาชนในเขตพื้นที่อื่น อาจเกิดความสับสน การประชาสัมพันธ์ ดำเนินการ 2 ช่องทาง คือ การประชาสัมพันธ์ ในโรงพยาบาล เช่น ติดป้ายผ้า โปสเตอร์ แจกแผ่นปลิว รวมทั้งบุคลากรของโรงพยาบาลจะให้ข้อมูลข่าวสารแก่ผู้รับบริการ ผู้ป่วยที่มาใช้บริการการประชาสัมพันธ์นอกโรงพยาบาล เช่น ติดโปสเตอร์ แผ่นปลิวที่สำนักงานเขตและผ่านช่องทางประชาชนที่เป็นคณะทำงาน ได้แก่ สมาชิกสภากรุงเทพมหานคร, ประธานสภาเขตและศูนย์ประสาน งานหลักประกันสุขภาพ รวมทั้งการเข้าประชุมประจำเดือนของสำนักงานเขต เพื่อแจ้งข่าวให้ผู้นำชุมชนทราบ,การประชาสัมพันธ์ผ่านอาสาสมัครสาธารณสุข กรุงเทพมหานคร และช่องทางวิทยุชุมชน

4. การพัฒนาคลินิกชุมชนอบอุ่นให้มีคุณภาพมาตรฐาน เป็นนโยบายเร่งด่วนของ สปสช.กทม. ที่ต้องดำเนินการ มีการพัฒนาระบบการจ่ายเงินตามผลงานคุณภาพ รวมถึงการให้คณะสาธารณสุขศาสตร์ มหาวิทยาลัยธรรมศาสตร์ ตรวจประเมินประจำปี, การตรวจคลินิกโดยไม่แจ้งให้ทราบล่วงหน้าโดยทีม สปสช.กทม., การให้ภาคประชาชนมีส่วนร่วมในการบริหารและร่วมให้ความเห็นในดำเนินการของคลินิก

5. การพัฒนาระบบส่งต่อ สปสช. มีการเพิ่มงบประมาณให้คลินิกที่ดูแลผู้ป่วยโรคเรื้อรัง ทำให้ลดปัญหาการไม่ส่งต่อคนไข้ กรณีเตียงเต็มเป็นปัญหาที่สปสช.กทม.ไม่ได้นิ่งนอนใจ กำลังเร่งพัฒนาระบบและประสานงานผู้เกี่ยวข้อง เพื่อคลี่คลายปัญหาดังกล่าว

VITA

Name Miss Pimpitcha Kangyang

Date of birth 24 Oct. 1992

Place of birth Thailand, Chiang Rai

Nationality Thai

Education B.Sc in Public Health

at Thammasat University, Thailand

Work Project Coordinator

at Faculty of Public Health, Thammasat University, Thailand