

Historical development of health technology assessment in Thailand

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Objectives: This study aims to review the development of health technology assessment (HTA), including the socioeconomic context, outputs, and policy utilization in the Thai setting.

Methods: This study was conducted through extensive document reviews including those published in both domestic and international literature.

Results: Evidence suggests that contextual elements of the health system, especially the country's economic status and health financing reforms, as well as their effects on government budgeting for medical and public health services, played an important role in the increasing needs and demands for HTA information among policy makers. In the midst of substantial economic growth during the years 1982 to 1996, several studies reported the rapid diffusion and poor distribution of health technologies, and inequitable access to high-cost technology in public and private hospitals. At the same time, economic analysis and its underpinning concept of efficiency were suggested by groups of scholars and health officials to guide national policy on the investment in health technology equipment. Related research and training programs were subsequently launched. However, none of these HTA units could be institutionalized into national bodies. From 1997 to 2005, an economic recession, followed by the introduction of a universal health coverage plan, triggered the demands for effective measures for cost containment and prioritization of health interventions. This made policy makers and researchers at the Ministry of Public Health (MOPH) pay increasing attention to economic appraisals, and several HTA programs were established in the Ministry. Despite the rising number of Thai health economic publications, a major problem at that period involved the poor quality of studies. Since 2006, economic recovery and demands from different interests to include expensive technologies in the public health benefit package have been crucial factors promoting the role of HTA in national policy decisions. Meanwhile, HTA capacity has been strengthened through the establishment of many health economic and HTA initiatives. An illustration of the work and contributions of the Health Intervention and Technology Assessment Program (HITAP) is provided. In this phase, HTA policy integration has been enhanced through different mechanisms and organizations.

Conclusion: Over the past two decades a notable progression has been made in relation to the capacity building of HTA research and its policy utility in Thailand. Such development has been shaped by multiple factors. It is anticipated that experience gained among academics, health officials, and civil society organizations will be helpful not only in sustaining the momentum but also in improving formal HTA systems in the future.

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Before the diffusion of Western-style medicine into Thailand in the late 1800s, the country's healthcare system was dominated by the practice of traditional healers who used simple methods, for example, observation, interrogation, auscultation, and olfaction, for diagnosis of illness; and traditional interventions, such as herbal drugs and physical massage, for treatment of diseases. Modern medical technology played no role in this era. In addition, linking health care with religions seemed to be common (5). Many Buddhist temples acted as health delivery facilities or even medical schools at the same time. Given that such a nonindustrialized system involved individual treatment, underpinned by philanthropic ideals of providing care to relieve sufferers of illness through the introduction of nature-based technologies, providers were largely unconcerned with the costs and efficiency of healthcare services.

However, significant changes in the Thai healthcare system took place during the reign of King Rama V (1853–1910): Thai society adopted modern instruments and knowledge as a means to survive colonization by greater powers. The introduction of Western medicines in Thai life was accelerated after World War II when medical sciences greatly benefited from research and development of technologies dealing with diseases and injuries generated by military operations, and also the invention of military machines and equipment (2). Since then, healthcare services have been increasingly reliant on complex technologies specifically created to serve medical and public health purposes. Although the development and adoption of these technologies has offered considerable advantages to the population's health, it was not without cost. For instance, it has caused and continues to cause large increases in healthcare costs; adverse effects, both preventable and unpreventable; and undesirable social consequences. In addition, access to health technology is one of the most distinct differences between the rich and the poor.

In Thailand, although health technology assessment (HTA) is a relatively new discipline, it has received great attention by stakeholders and has made significant strides in recent years. This study focuses on HTA as a form of "policy research" that measures short- and long-term consequences of the application or use of health technology (3). In Thailand, HTA can be traced back to the early 1980s when the first literature on this subject became available. This study begins with a narrative of the Thai background and its healthcare system. Then it describes the early development of HTA in this country, followed by the second phase and the recent progression. The study concludes with lessons learned during the past decades and future challenges that may be relevant to decision makers, healthcare planners, academics, and health personnel in other resource-poor countries.

OVERVIEW OF THAILAND AND ITS HEALTHCARE SYSTEM

Thailand is the 19th largest country of the world in terms of population with approximately 64 million people (17). Its economic structure has been transformed in the industrial and service sectors more than in the agricultural sector. Nevertheless, the country experienced a serious economic crisis in 1997, resulting in a sharp decline in the annual economic growth rate from 7 percent in 1996 to –1.7 percent in 1997 and –10.8 percent in 1998 (24). Poverty incidence increased from 17.0 percent in 1996 to 21.3 percent in 2000. In 2002, an economic recovery began and the proportion of people living under the poverty line dropped steadily to 11.2 percent in 2004 (19). In 2007, the overall gross domestic product (GDP) in Thailand was 519 billion International dollars, with the Thai GDP per capita standing at 7,900 International dollars (9).

Overall resources devoted to health care have increased dramatically in recent years. The total health expenditure has increased at a faster rate than that of national GDP, from 3.5 percent of GDP in 1979 to 6.09 percent of GDP in 2000 (28). In 2001, Thailand achieved universal healthcare coverage through general tax revenue resulting in public health expenditure making up the majority of total spending (~70 percent) compared with private expenditure. The Universal Coverage scheme (UC) managed by the National Health Security Office (NHSO) protects the 47 million people who are not eligible for the Civil Servant Medical Benefit Scheme (CSMBS), which covers 4 million government and state enterprise employees and their dependents, or Social Health Insurance (SHI), which is a mandatory health insurance for 10 million private sector employees in companies employing more than one employee (27). Table 1 describes key characteristics of these major insurance schemes.

The Ministry of Public Health (MOPH) is the principal agency responsible for promoting, supporting, controlling, and coordinating most health service activities offered at hospitals and health centers throughout the country (44). There are also, however, several other state agencies that play significant roles in medical and health development programs such as the Ministry of Education, the Ministry of the Interior, the Ministry of Defense, the Bangkok Metropolitan Administration, and state enterprises. These agencies operate health facilities, including hospitals, which provide primary, secondary, and tertiary medical services. During the past two decades, the private sector has expanded rapidly in Bangkok and other provincial cities. In 2004, there were 461 private hospitals (Bangkok 129, other provinces 332), 10,819 private clinics, 11,094 drugstores, and 2,011 traditional medicine drugstores (44).

Table 1. Public Health Insurance Schemes in Thailand

Public health schemes	Civil Servant Medical Benefit Scheme (CSMBS)	Social Health Insurance (SHI)	Universal Coverage Scheme (UC)
Year of introduction	1960	1990	2001
Responsible organization	The Comptroller General's Department, Ministry of Finance	Social Security Office	National Health Security Office
Beneficiaries	Government employees, dependents and pensioners	Private sector employees	The remaining population who are not covered by CSMBS and SHI
Population coverage (2007)	4 million, 6%	10 million, 16%	47 million, 75%
Sources of finance	Government budget (general tax revenue)	Tripartite payroll contributions by employee, employer and the government	Government budget (general tax revenue)
Payment to health facilities	Fee-for-service reimbursement	Capitation inclusive outpatient and inpatient services	Capitation for outpatient, disease prevention A global budget with the application of case base payment, i.e., diagnostic-related group for inpatient services
Inclusion of health services	Almost all treatment interventions but not preventive measures; No clear benefit package defined	A clearly defined benefit package for treatments; Pharmaceutical benefit based on the National List of Essential Medicines	A clearly defined benefit package for both treatments and disease prevention and screenings; Pharmaceutical benefit based on the National List of Essential Medicines

At the national level, the Thai Food and Drug Administration (FDA), under the MOPH, is responsible for the market authorization of drugs and medical devices. The market authorization requires evidence related to the safety, efficacy, and quality of the products from sponsoring companies. The Ministry of Commerce controls drug prices through mandatory price labeling of over-the-counter (OTC) drugs. The evidence used for price setting of OTC drugs includes information on cost structures and international prices submitted by pharmaceutical companies. Prices of non-OTC drugs are controlled by the Medicine Price Ceiling, which is a list of maximum price for each drug that sellers are allowed to charge from public hospitals (37). The ceiling price set by the Committee for Development of the Medicine Price List is based on collective information on purchasing prices of similar drugs from every public hospital (37). There is no price ceiling or reference set for medical devices. It is determined entirely by market demand and supply. The prices of drugs and medical devices, which are commonly used across settings, are also controlled by the mechanism of bulk purchasing at the national and provincial levels (36).

The National List of Essential Medicines (NLEM) is a list of drugs, vaccines, radioactive substances, and disinfection agents that are necessary for the prevention and control of all major health problems in the country. The regulations mandate the MOPH to develop the NLEM. Public facilities are then required to procure medicines from this list. The NLEM is also referred to by the three public health schemes as the pharmaceutical reimbursement list. Also, the NLEM aims to be used as a tool to encourage the rational

use of medicines (38). The cost of prescribed drugs outside the NLEM will be born by individuals under the SHI and UC schemes, but not the CSMBS. The CSMBS allows three medical doctors to co-endorse the use of drugs outside the NLEM (23). The first version of the NLEM was developed in 1972. The current version was issued in early 2008.

There is no reimbursement list for medical devices. They are controlled implicitly by their distribution by suppliers. The coverage of use of medical devices varies largely among the three public schemes. The CSMBS covers almost all medical devices using a fixed-rate fee-for-services payment, whereas the UC and SHI schemes include use of medical devices as part of their basic health packages and support based on prepaid capitation. As a result, unequal access to and utilization of expensive medical devices has been widely noticed, for example, computed tomography (CT) scans, magnetic resonance imaging (MRI), and mammography between CSMBS versus UC and SHI beneficiaries (10).

PHASE I (1982–96): THE INTRODUCTION OF THE CONCEPT AND PRACTICE OF HTA IN THAILAND

During this period, the average annual economic growth rate in Thailand was around 9 percent, which was the world's highest growth rate, and the GDP per capita increased 28-fold (17). The higher purchasing power of domestic patients in conjunction with a policy on 5-year corporate tax and import duties exemption from the Board of Investment prompted private hospitals to improve their facilities, employ more health professionals, and invest in advanced and

expensive medical equipment. Furthermore, it was not only the private health sector but also the public healthcare institutions that experienced unparalleled growth with considerable expansion of investment in health facilities including medical technology. These facts were well illustrated by Tangcharoensathien et al. (24) who reported a rapid expansion in private hospital beds and an immense increase in the diffusion of CT scanners, MRI technology, and renal dialysis units in both public and private sectors during the period 1990–96.

The problems of overinvestment in, poor distribution of, and inequity of access to advanced medical technology were recognized by academics and health personnel in medical schools where the investment in high-cost technology was concentrated. As a result, the likes of the Centre for Health Economics, Chulalongkorn University (1990), and the Social Administration Pharmacy units at Chulalongkorn University (1991) and Mahidol University (1992) were established during the period (see Figure 1), aiming to use HTA to guide investment in the rational use of medical technology. However, with limited capacities and support in conducting research in this area, most activities of these units concentrated on the introduction of the general concept of HTA and providing basic training to their students. Although several HTAs were conducted, the studies adopted narrow viewpoints focusing mainly on the costs and short-term implications of big investments in tertiary hospitals. Some of these assessments were supported by international agencies, such as the United Nations' Children's Fund (UNICEF), the World Health Organization, the U.S. Agency for International Development and the International Development Research Centre of Canada, but without national policy linkage. This led to limited utilization of HTA studies during the time.

In 1993 the most notable attempt to establish a specialized HTA unit was done by the collaboration between the Health Systems Research Institute (HSRI) of Thailand and the Karolinska Institute of Sweden. The program, the so-called Technology Assessment and Social Security in Thailand (TASSIT), was introduced (40). This initiative focused on the use of HTA as an information tool for public health insurance plans (15). Unfortunately, at that juncture, it was a beginning phase of health insurance systems in Thailand. Only a small proportion of the Thai population (less than 30 percent) were covered by tax-based insurance plans, so the government budget spending on health was not significant. This resulted in an underestimation of the importance of HTA by policy makers. In addition, TASSIT operated in the form of a loose network among academics who were interested in HTA and only worked on a part-time basis for the program. Owing to a lack of critical mass, especially full-time staff, and a continuation in building up research capacity, there was no major output delivered and it was eventually terminated in the late 1990s.

PHASE II (1997–2005): AN INCREASING INTEREST IN HTA FROM DECISION MAKERS

An economic crisis in Thailand began in mid-1997 as a result of poor management of the financial sector, excessive investments by private companies, and inappropriate supervision of foreign currency exchange by the Bank of Thailand. This crisis resulted in huge foreign debts and currency deficits (24). It also prompted the Thai government to have to ask for a loan of 17.2 billion USD from the International Monetary Fund (IMF) and its alliances. The crisis had significant implications at both macro- and micro-levels, including sharp reductions in values of currencies and asset prices, a sudden increase in unemployment, and a severe household income contraction. Poverty incidence increased from 17 percent in 1996 to 21 percent after the crisis.

A decline in the ability to pay for health care caused by the crisis provoked pressure on the government to increase support to the public health system. A rise in public health spending, the expansion of coverage of public health insurance among Thais due to the increased number of the poor who are eligible for the coverage of the public health plan, and a growth in service utilization in public health facilities was evidenced (24). Decision makers at national and hospital levels were under pressure from a rapid increase in demand for health services with little improvement in financial support. At this time, healthcare managers, especially within the MOPH, paid increasing attention to cost containment, in part through the introduction of HTA. The "Health Technology Assessment" unit was established in 2002 under the MOPH's Department of Medical Services. However, this division, with a limited research capacity, has only delivered a few HTA studies (less than 12) so far. It also relies solely on limited support from the MOPH budget, and has never had a clear plan for building research capacity for HTA. This HTA unit has played a very limited role in informing decisions about investments in health technology in real policy and practice.

In 2001, when the country's economic status started to recover, the government declared its intention to implement universal coverage of health care with major financial reforms (41). The policy also aimed to harmonize the benefits, costs, and management of several existing insurance schemes that would lead to an equitable healthcare system. The public share of the total health expenditure rose from 45 percent in 1994 to 64 percent in 2005 (39). The NLEM as the pharmaceutical benefit package for all public health insurance plans became very crucial because it has had a significant impact on the prescribing and dispensing of medicines throughout the country. Although the first establishment of the NLEM was in 1972, with subsequent revisions in 1982 and 1996, the revision of the 2004 NLEM was the first to introduce economic aspects as a criterion for drug selection apart from the safety and clinical efficacy (4).

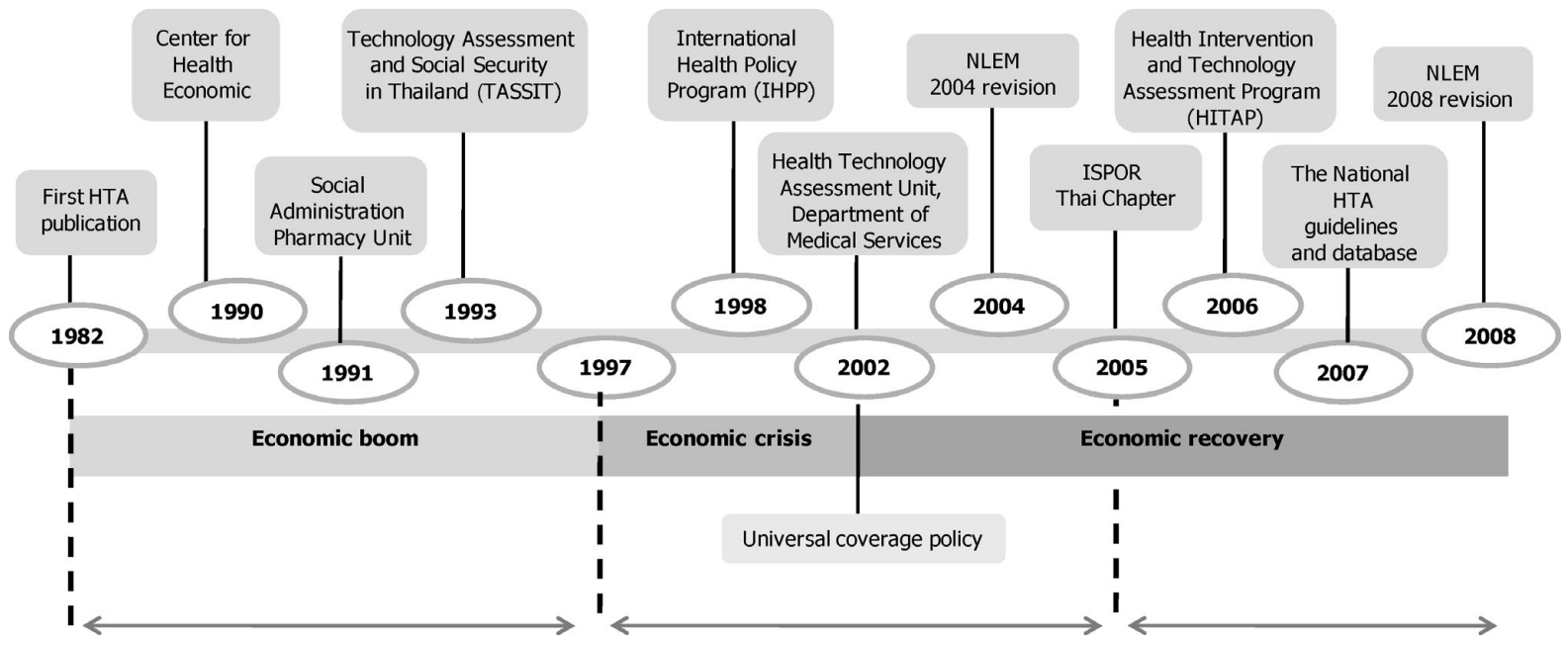


Figure 1. Milestones on health technology assessment (HTA) development in Thailand, 1982–2008. NLEM, National List of Essential Medicines; ISPOR, International Society for Pharmacoeconomics and Outcome Research.

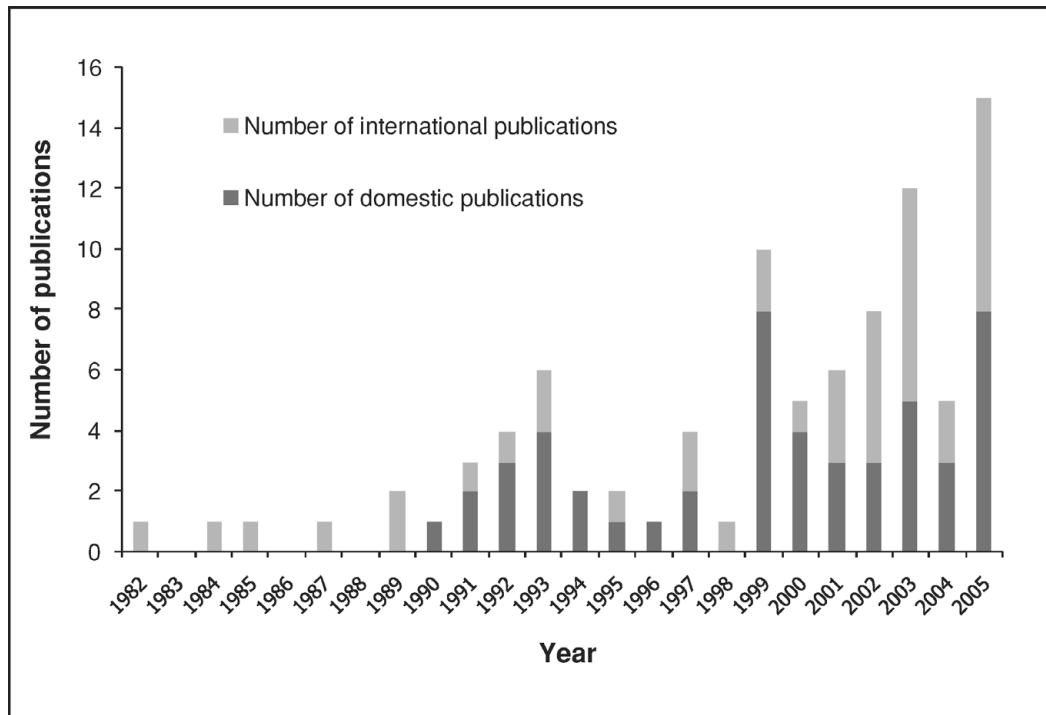


Figure 2. Numbers of Thai economic evaluation publications, international and domestic, 1982–2005.

Owing to growing pressure on the government to include high-cost services in the new universal coverage scheme, with a limited budget available, explicit healthcare rationing became a prime concern among stakeholders (29;33). The need for independent units to carry out research for the prioritization of health interventions was raised by many decision makers and civil society groups. Unfortunately, the existing HTA unit at the MOPH was unable to meet the increasing demands. It appeared that universities and other research institutes could fill part of the gaps. Figure 2 shows a significant increase in the amount of economic evaluation carried out in the Thai setting and published in both domestic and international literature between 1997 and 2005. This increase was a result of better resource and infrastructure development during previous decades. At the same time, however, poor quality evidence and methodology used and missed-targeted research toward the determination of cost-effective interventions to deal with major health problems were identified (32).

During this period, a notable institute with HTA activities was the International Health Policy Program (IHPP). Established in 1998 with the objectives of strengthening health policy and system research capacity, IHPP was a semi-autonomous research arm of the MOPH's Bureau of Policy and Strategy. The program possessed expertise of analyzing healthcare costs, and later expanded to the fields of epidemiology, health outcome research, and qualitative policy analysis, all of which served well for HTA. During 2000 to 2005, several economic appraisals of health interven-

tions were completed by IHPP researchers. These included “designing policy on investing in proton radiation therapy” (22), “economic evaluation of the national program to prevent mother-to-child HIV transmission” (34), “assessing the potential demand and willingness to pay for an AIDS vaccine in Thailand” (26), and “assessing the feasibility and value for money of providing universal access to renal replacement therapy under the universal coverage scheme” (25). It is noteworthy that most HTA studies conducted by IHPP were actually used by policy makers at the national level. Pitayarangsarit and Tangcharoensathien (21) revealed the comparative advantages of IHPP over other research organizations; that it was exposed directly to relevant policy questions, and had physical proximity to policy circles, while it maintained political neutrality to deliver comprehensive and relevant answers to support policy decision making.

PHASE III (2006–08): A RAPID GROWTH OF DEMAND AND SUPPLY FOR HTA

The limitation of the government budget for health care generated by the introduction of the UC policy was well-recognized by decision makers at national and hospital levels. Meanwhile, different groups of people proclaimed that it was their right to get early access to new and/or expensive medical and public health interventions with support from strong civil society organizations and patients' representatives (30). They also demanded more transparent and participatory decision making. Dealing with such situations

required knowledge-based management of flourishing health technology—the policy strategy clearly stated in the 10th National Economic and Social Development Plan (2007–10) (18). A spotlight was shone on the need for a sound system for the assessment and management of health technology with the hope of finding a solution for the challenges ahead.

In July 2006, a group of IHPP researchers made a significant step by establishing the Health Intervention and Technology Assessment Program (HITAP) with financial support from the Thai Health Promotion Foundation, the HSRI, and the MOPH's Bureau of Policy and Strategy. One way in which this differed from the previous attempts to set up an HTA organization was that there was substantial support for HITAP to begin several activities necessary for setting up HTA systems in Thailand, where human resources, knowledge, and infrastructure were underdeveloped. HITAP proposes four main strategies, namely (i) research and development of fundamental knowledge and infrastructure for HTA, (ii) human capacity strengthening, (iii) assessment of health technology and interventions, and (iv) research and development of appropriate HTA management and social mobilization (29).

Under the first strategy, national standards and a body of knowledge to support HTA were developed, including the first version of methodological guidelines for economic evaluation in Thailand, a Thai HTA database, the societal value for a ceiling threshold (willingness to pay for a quality-adjusted life-year) and a decision framework for resource allocation. It was expected that the work under this strategy would foster methodological credibility and eventually, utilization of HTA results. At the end of 2007, a Web-based HTA database was launched (11) and the health economic guidelines were also endorsed as national protocols for studies required in the inclusion of new medicines in the NLEM (43).

HITAP also built up the competence and capacity of its researchers in both short- and long-term aspects through three approaches. First, it increased the number of mentorships by selecting highly equipped PhD graduates who committed themselves to participating in HITAP to increase their experience and to foster the transfer of knowledge to young researchers in an apprenticeship system. Second, HITAP recruited talented and committed young individuals to work with mentors on an on-the-job training basis. Third, HITAP supported apprentices who showed the capacity and commitment to study in PhD courses, both local and abroad, in relevant topics such as health economics, epidemiology, evidence synthesis, ethics, and resource allocation. As of August 2008, HITAP had six mentors and twenty-eight apprentices, five of whom were undertaking PhD studies.

One of HITAP's main activities was to appraise a wide range of health interventions, including drugs, medical devices, procedures, health promotion and prevention interventions, and public health policy. Unlike other formal HTA organizations in some industrialized countries, HITAP had

no legal authority to make policy decisions but served as a technical advisor for all public health authorities at the national level who were responsible for the planning and management of health technology. There were two channels for HTA topics to be assessed by HITAP (see Boxes 1 and 2). First, HTA topics were proposed annually and prioritized by key stakeholders in the public sector including the Health Ministry's departments, public health insurance plans, Royal Colleges, professional associations, and the Subcommittee for Development of the NLEM. Detailed information about the selection and prioritization of HTA topics were reported elsewhere (12). This process was to ensure that HTA studies were policy relevant and met the needs of those decision makers. Second, HITAP Scholars created the research topics that are of interest or considered to be important to the Thai society. These researcher-initiated topics were subsequently consulted with stakeholders and experts to ensure the transparency and policy relevance.

As of August 2008, twelve HTA studies had been completed and the majority of them were used by decision makers in several health authorities to determine the inclusion and exclusion of medicines or medical devices in public health benefit packages, designing new health initiatives, and informing current policy implementation (see Table 2).

The fourth strategy of HITAP is cross-cutting among the other three strategies including the improvement of HTA management within the organization and the integration of research findings into policy and practice. The past experience of HTA introduction in Thailand as well as HTA management in other settings were reviewed to draw lessons to support the development of a forthcoming national HTA institute, well equipped with necessary infrastructure and effective, transparent, and coherent management mechanisms. To enhance HTA utility, HITAP also developed mechanisms to disseminate research results and related recommendations to relevant audiences, including policy makers, health personnel, patients, the health industry, and the general public. HITAP communicated with stakeholders through policy dialogues, formal presentations and discussion at technical and policy forums, academic publications in domestic and international journals, and public media such as Web sites, newsletters, pocketbooks, newspapers, radio, and television.

During this phase, key stakeholders in the Thai health-care system were very active in producing and using HTA information. In 2005 academics, mainly from schools of pharmacy, multinational drug companies, and MOPH departments founded the Thai chapter of the International Society for Pharmacoeconomics and Outcome Research (ISPOR), aimed at promoting studies in the fields of health economics and outcome measures, and sharing knowledge and information among scholars, decision makers, and the health industry. Annual conferences hosted by this organization have been held since then, with an increasing number of participants. Furthermore, training courses on HTA-related

Box 1. A list of HTA topics prioritized by stakeholders, which have been completed or are being evaluated by HITAP, 2007–2008

- Economic evaluation of screening and treatment options for postmenopausal osteoporosis
- Economic evaluation of HMG-CoA reductase inhibitors (statin) for primary prevention of acute coronary syndrome among the Thai population
- The introduction of oral fluid based, rapid HIV antibody testing in Thailand's health service system: an analysis for policy development
- Evidence synthesis on the appropriate use of insulin analogue for diabetes patients
- Cost-utility analysis of recombinant human erythropoietin in anemic cancer patients induced by chemotherapy
- Assessing the feasibility and appropriateness of using PET-CT scans in Thailand
- Analysis of cost-utility on cochlear implantation for profoundly bilateral hearing loss patients in Thailand
- A cost-utility analysis of cholinesterase inhibitors for the treatment of mild- to moderate Alzheimer patients
- A cost-utility analysis of hematopoietic stem cell transplantation for the treatment of acute myeloid leukemia, severe aplastic anemia, and severe thalassemia
- Cost-effectiveness of treatment options for chronic hepatitis B and C
- Cost-effectiveness analysis of prenatal screening and diagnosis of Down syndrome in Thailand
- A household survey on attitudes and understanding toward the use of herbal medicines
- Evaluation of effects of advertisements on human papilloma virus vaccine in Thailand
- Economic evaluation alongside clinical study on providing rehabilitation services for stroke patients in Thailand
- Economic evaluation of oxaliplatin as the adjuvant therapy for colon cancer
- Rational use of high-cost antibiotics (i.e. carbapenem and the third generation of cephalosporins)
- Economic evaluation of rigid vs. foldable intraocular lenses for cataract extraction in Thailand
- Accessibility and appropriateness of using laparoscopic surgery among various groups of the Thai population with different health insurance schemes

HMG CoA, beta-hydroxy-beta-methylglutaryl-coenzyme A; PET-CT, positron emission tomography-computed tomography.

Note: In addition, some studies conducted by Health Intervention and Technology Assessment Program (HITAP) were identified by its staff based on the potential policy implications of the assessment results.

Box 2. List of Studies Initiated by HITAP Staff, 2006–2008

- An economic evaluation alongside a cluster randomized control trial of the routine offer of HIV counseling and testing at community hospitals in Thailand
- Assessing the implications of the compulsory licensing policy in Thailand
- Economic costs of alcohol consumption in Thailand
- Economic evaluation of oral fluid based, rapid HIV testing among patients visiting outpatient clinics in community hospitals in Thailand
- Analysis of measures for controlling drug prices in Thailand
- A systematic review and evidence synthesis on effectiveness and cost-effectiveness of policies and strategies for the prevention of HIV/AIDS
- Development of an optimal policy strategy for the prevention and control of cervical cancer in Thailand
- Economic burden of life-time treatment cost, and quality of life among invasive cervical cancer patients treated at university hospitals and regional cancer centers in Thailand
- Review of alcohol policies in Thailand and the roles of the Thai Health Promotion Foundation

HITAP, Health Intervention and Technology Assessment Program.

subjects such as evidence synthesis, economic evaluation, and decision analysis organized by universities and research institutes were found to be very popular. HTA and health economic units were set up by local offices of multinational pharmaceutical companies.

With regard to HTA-policy integration, in 2007 the Subcommittee for development of the NLEM appointed the Health Economic Working Group, comprising academics and MOPH researchers, to support the use of pharmacoeconomics evidence for the selection of new and expensive medicines to the NLEM (14). The Working Group commissioned many domestic HTA units to conduct relevant studies. The latest revision of the NLEM in 2008 was the first time in Thai history that pharmacoeconomics evidence

played an official role in designing the reimbursement list of pharmaceuticals (43). As the national guidelines for health economic evaluations are adopted by the Subcommittee, it is expected that the use of HTA in decision making will be expanded, in part because it is a requirement that pharmaceutical companies submit pharmacoeconomics information for the next revision of the NLEM.

The NHSO, the Comptroller General's Department, the Social Security Office and the MOPH also implemented many policy recommendations drawn on HTA studies. Public health plans (see Table 2) increasingly demand the use of health economics and other evidence in devising their benefit packages, for example, new indications for use of positron

Table 2. HTA Studies Conducted by HITAP During 2006–2008 and Related Current Policies

Research projects	Findings	Issues taken by	Current policy
1. Economic evaluation on screening and treatment options for postmenopausal osteoporosis	Screening and treatment of osteoporosis among postmenopausal women were not cost-effective under the Thai context	The Subcommittee for development of the NLEM	Osteoporotic drugs were not included in the NLEM 2008 revision
2. Economic evaluation of HMG-CoA reductase inhibitors (statin) for primary prevention of acute coronary syndrome among the Thai population	Generic products of simvastatin were very cost-effective and should be administered to those with high risk of development of acute coronary syndrome	The Subcommittee for development of the NLEM	Only simvastatin was included in the NLEM 2008 revision
3. The introduction of oral fluid based, rapid HIV antibody testing in Thailand's health service system: an analysis for policy development	There were limitations of using oral fluid based HIV test in public health facilities	The Medical Device Control Division, MOPH	Not clear
4. Cost-utility analysis of recombinant human erythropoietin in anemic cancer patients induced by chemotherapy	Erythropoietin was cost-ineffective for treatment of anemia induced by chemotherapy among cancer patients	The Subcommittee for development of the NLEM	Erythropoietin was not recommended for treatment of anemia among cancer patients in Thailand
5. Assessing the feasibility and appropriateness of using PET-CT scans in Thailand	Evidence suggested that PET-CT scan may be appropriate for particular groups of cancer patients	The Comptroller General's Department, Ministry of Finance	CSMBS expands indications for use of PET-CT scan among cancer patients
6. Analysis of cost-utility on cochlear implantation for profoundly bilateral hearing loss patients in Thailand	Cochlear implantation was cost-effective in some particular groups	The Subcommittee for development of benefits and service system under the UC	The committee required more information on the budget implication before decision being made
7. A cluster randomized control trial on the routine offer of HIV counseling and testing at community hospitals in Thailand	Routine offer HIV counseling and testing was effective in detection of new HIV infected persons compared to the current practice—voluntary HIV counseling and testing	Health Department, Bangkok Metropolitan Administration and the NHSO	The nationwide implementation of the routine HIV counseling and testing was under consideration
8. Assessing the implications of the compulsory licensing policy in Thailand	The evidence supports the benefits of issuing the government use of patent on antiretroviral and anticancer drugs	The MOPH, the NHSO, and domestic and international NGOs	The government still supports the compulsory licensing policies issued between 2006 and 2008
9. Economic costs of alcohol consumption in Thailand	Alcohol exposed substantial costs to the society; the economic costs of alcohol consumption by far outweighed its government revenue	The House of Representatives, the Parliament of Thailand	The parliament passed the Alcohol Acts, B.E. 2551 (2008)
10. A systematic review and evidence synthesis on effectiveness and cost-effectiveness of policies and strategies for the prevention of HIV/AIDS	A number of proven effective and/or cost-effective HIV prevention options were identified for particular groups of Thais	The Disease Control Department, MOPH, the NHSO, and the World Bank	A study was used to identify policy gaps and applied for development of HIV prevention campaigns
11. Development of an optimal policy strategy for the prevention and control of cervical cancer in Thailand	Screening of cervical cancer was very cost-effective; nevertheless, the current screening coverage was very low; at current price, providing HPV vaccine was cost-ineffective under the Thai setting	The MOPH's departments, and the NHSO	Massive campaign on cervical cancer screening at public healthcare facilities, whereas HPV vaccine was left in the private market
12. Review of alcohol policies in Thailand and the roles of the Thai Health Promotion Foundation	A number of alcohol policies had been implemented without appropriate enforcement, monitoring, and evaluation for some particular policies; a number of recommendations were made to stakeholders including the Thai Health Promotion Foundation for reduction of alcohol consumption in Thailand	The Thailand Health Promotion Foundation	Not clear

NLEM, National List of Essential Medicines; MOPH, Ministry of Public Health; and NHSO, National Health Security Office; HMG CoA, beta-hydroxy-beta-methylglutaryl-coenzyme A; PET-CT, positron emission tomography-computed tomography.

emission tomography-CT scanners for cancer, and the introduction of provider-initiated counseling and HIV testing in community hospitals. Meanwhile, the MOPH used HTA information to improve its own vertical programs, for example, the national cervical cancer screening program as well as supporting national policy formulations, for example, the use of compulsory licensing on cancer drugs.

In addition, according to the revised Medical Device Act B.E.2551 (2008), the assessment of the social, economic, and ethical impact of medical devices with a cost higher than 100 million Baht (US\$ 3.3 million) is mandatory before market authorization. According to the Act, the MOPH designates HTA units in and outside the country to conduct the assessments, the costs of which are shouldered by the industry. The next challenge is that a draft of the revised Drug Act, including use of economic evidence for medicine registration, will undoubtedly provoke serious debate among stakeholders. The center of discussion focuses on two major issues: whether it is appropriate to consider value for money of medicines in the process of market approval and whether Thailand has sufficient capacity to do so.

DISCUSSION

Every healthcare system in both industrialized and developing nations shares similar problems that arise from the advancement of medical technology while health resources are constraints. During previous decades, many healthcare systems in Europe, North America, and Australia developed formal systems for the assessment and management of health technology (1;3); however, this was hardly to be seen in developing nations. This study described how the consequences of the financial crisis in 1997 and, subsequently, the introduction of the universal health coverage policy in 2001 prompted action among decision makers to demand HTA evidence in resource allocation.

Because of the relationship between HTA and the social and economic circumstances, HTA needs to be on a national agenda. It is expected that locally funded and developed HTA will have a greater influence on national policy than HTA that depends heavily on external sources. Teerawattananon et al. (32) demonstrated that HTA studies funded by international organizations in the past failed to address national priority and national health system needs. It can be observed that HTA in Thailand has developed significantly over the past three years because national authorities have placed evidence-based decision making high on their health research agendas.

Not only the availability of financial resources, but also absorptive capacity including appropriate strategies to effectively manage its organization, are crucial for HTA development. Human capacity and infrastructure for HTA is a vital factor in the success or failure in development of HTA systems. Building up research capacity requires collective efforts and time before its impact can be clearly visible. Nev-

ertheless, the funding for capacity development is usually ignored by funding agencies (6). It can be seen in this case study that Thailand spent more than two decades strengthening human resources and infrastructure to get momentum. It also continues to require support to maintain and improve HTA capacity not only among scholars who produce HTA evidence but also decision makers, health personnel, and importantly, the general public whom decision makers and health professionals are sensitive as to what is of their best interest.

The literature suggested that research policy nexus is encouraged by several factors. In addition to research quality, strong relationships and trust between decision makers and researchers are indispensable (13). Apart from financial, human capacity, and infrastructure, participation from stakeholders and transparency will help increase the impact of HTA. However, information regarding management of HTA organizations in Thailand in phases I and II was lacking, whereas detailed descriptions of examples of good practice for HTA processes at HITAP were documented elsewhere (29).

HTA in Thailand and other societies emphasizes assessing value for money of health interventions (8;16;32); whereas, theoretically, HTA considers measuring health, social, economic, and ethical consequences of applications of health technology. This may be partly explained by the fact that its current main users, policy makers, are concerned with increasing health expenditures, and the ineffective and inappropriate use of health technology (7;20), and wish to improve the efficiency of the healthcare system (31). The use of HTA evidence by policy makers at the present time is of a voluntary nature. It is challenging to expand HTA focuses beyond the efficiency aspect. This would, however, result in an increasing interest in HTA among other groups, for example, health professionals and the general public. Ultimately, HTA would be demanded by the society.

The major application of HTA is in the areas of pharmaceuticals and medical devices because it is easier to integrate the assessment into the regulatory and policy frameworks in which the three public health insurance programs and the Subcommittee for Development of the NLEM legally exist. These bodies are responsible for the regulation of these products. In contrast, HTA was less developed and applied to the fields of health prevention and promotion, and social/public health initiatives because no responsible legal authority exists and thus, these areas have not been rigorously regulated in Thailand (35). Owing to an increasing demand for cost containment and efficiency of insurance programs, assessment of these initiatives tends to be favorable in the near future. An example can be drawn on the case of the National Institute for Health and Clinical Excellence of England and Wales, which has recently extended its mission to appraising public health interventions, after focusing only the assessment of pharmaceuticals, medical equipment, and interventional procedures since its establishment in 1999 (42).

In conclusion, the historical development of HTA in Thailand suggests that this form of policy research is associated with needs, demand, and supply. The success of HTA requires a balance between these three factors. During the early phase of development when only the need existed but the demand was neither recognized by decision makers nor promptly offered by scholars, the progression was obstructed. In the second phase when the needs were presented and the demand recognized by decision makers, a slow development could be visible. The rapid expansion in recent years was facilitated by the presence of considerable supply to address the existing needs and demands. However, good planning, sound management, and long-term investment in capacity building are still the main ingredients to the future success. Over 20 years of Thai experience, lessons can be learned and used as guidance to pave the way for the future of the formal foundation of HTA systems in Thailand.

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