**DRAFT RESEARCH PROPOSAL:**

**"Assessing a societal value for a ceiling threshold in Thailand"**

**Proposed by**
**Health Intervention and Technology Assessment Program (HITAP)**

**Summary:**

Although health economic evaluation, particularly cost-effectiveness (CE) analysis, is recognized as an important criterion for resource allocation, the presentation of its results as cost per unit of health outcome e.g. Quality-Adjusted Life-Year (QALY) is still arbitrary for policy makers to decide whether the technology is cost-effective. By using the concept of "ceiling threshold", if the CE ratio of new health intervention is not greater than the "threshold", then the health technology is deemed to be cost-effective and is appropriate for adoption or reimbursement. On the other hand, if the CE ratio of the health technology is greater than the "threshold" the policy makers will limit access of that health technology. As, CE assessment is increasingly adopted, "ceiling threshold" of cost-effectiveness is expected to emerge in many countries to reflect the need for a more systematically, consistency and transparency decision making process. (Birch S 1993; Eichler Hans-Georg 2004)

Unfortunately, there is no scientific standard for CE threshold. Presently, threshold figures, presented as WTP per QALY values, proposed by individual authors or institutions vary widely (Eichler Hans-Georg 2004; Gyrd-Hansen 2005) with a figure of US$ 50,000 /QALY, frequently quoted since 1982 was being cost effective.(Weinstein 1995) As mentioned earlier, there is an inevitably need for CE threshold for guiding decision making process in several countries. In fact, it is stated that assessing societal value for ceiling threshold should be a research priority. (Johannesson M 1997; Johannesson M 1998)However, it appears reasonable to expect that "threshold" will not be identical in different countries depending on CE ratio of the intervention and ability to pay for a given intervention, which vary across countries. (Eichler Hans-Georg 2004)

To the current knowledge, this is the first study in Thailand aims to determine the willingness to pay of Thai general public for health care investment in several activities (i.e. health prevention, treatment). The result from this study will serve as one of the useful criteria for making health care resource allocation and priority setting in Thailand more consistency, systematically, and transparency.

## 1. Introduction:

In the situation of health care budget constraint worldwide, it is expected that health care resource allocation will increasingly rely on the result of health economic studies in particular cost-effectiveness (CE) analysis. At present, several countries, have recently introduced legislation or guidelines to mandate CE assessment, most often for the reimbursement of health technology mainly pharmaceuticals.(Pridchard 2002) As, CE assessment is increasingly adopted, "ceiling threshold" of cost-effectiveness is expected to emerge in many countries to reflect the need for a more consistency and transparency decision making process. (Eichler Hans-Georg 2004) By using the concept of "threshold", if the CE ratio of new health intervention is not greater than the "threshold", then the health technology is deemed to be cost-effective and is appropriate for adoption or reimbursement. On the other hand, if the CE ratio of the health technology is greater than the "threshold" the policy makers will limit its utilization.

Originally, the concept of "threshold" was proposed by Weinstein and Zeckhauser since 1973. (Weinstein M 1973)It was referred to a ratio between monetary cost and a measure of health gain that an intervention must achieve to be acceptable in a given health care system. (Weinstein M 1973)Thus, for making CE ratio of different health technology comparable, health gain must be measured in a same unit. Quality-Adjusted Life Year (QALY), which represents both quality of life and quantity of life is one of a widely accepted and recommended measures. Other common and widely used measures of health gain are Disability- Adjusted Life year (DALY), which was proposed by the World Health Organization (WHO), and Life – Year Gained (LYG).

***Current figure of CE threshold***

Unfortunately, there is no scientific standard for CE threshold. Presently, threshold figures, presented as WTP per QALY values, proposed by individual authors or institutions vary widely. (Eichler Hans-Georg 2004) The current figures for threshold were summarized in the review by Eichler Hans-Georg et.al (Eichler Hans-Georg 2004), as displayed in table 1.

Presently, a figure of US$ 50,000 US Dollar has frequently been quoted since 1982 as being cost-effective. (Weinstein 1995) (Hirth Richard A. 2000) This number was originally based on the purported annual cost/QALY to the Medicare program for patients with chronic renal failure, which later has been widely debated that it might underestimate the program true cost. In addition, it has been unadjusted for inflation. Using the US CPI to adjust for inflation, this threshold is equivalent to $95,000 /QALY in 2003 US dollars.(Hirth Richard A. 2000) In addition, there is an argument that the "threshold" of US$ 50,000 /QALY, which currently used in economic evaluation is being too low while a higher threshold of US$200,000/ QALY is more consistent with societal willingness to pay for health intervention.(Ubel P 2002)

As shown in table 2, when comparing QALY weight to DALY weight, it is found that the threshold of "x3 GDP/DALY" recommended by WHO is also well excess of $US 50,000 /QALY in many high income countries.(Eichler Hans-Georg 2004)

Table 1: Summary of cost-effectiveness threshold proposed for or applied to resource allocation

| Reference | Country | Description/methodology | Threshold as quoted in reference |
|---|---|---|---|
| **Thresholds proposed by individuals or institution** | | | |
| (Weinstein 1995; Hirth Richard A. 2000) | US | "Rule of thumb" / "Dialysis standard" | US$ 50,000 / QALY (quoted repeatedly since 1982) |
| (Laupacis A 1992) | Canada | Proposed in context of Canadian health – care system | l.b. 1990 – CAN$ 20,000/ QALY<br>u.b. 1990 – CAN$ 100,000/ QALY |
| (Organization. 2002) | - | Proposed for low-income countries | Less than 3 times GDP per capita per DALY averted |
| **Thresholds inferred from past allocation decision** | | | |
| (George B 2001) | Australia | Retrospective analysis of series of reimbursement decisions | l.b. 1998/9 – AUS$ 42,000/ LYG<br>u.b. 1998/9 – AUS$ 76,000/ LYG |
| (Pridchard 2002) | New Zealand | Assumption based on past reimbursement decision | 2000 NZ$ 20,000/ QALY |
| (Towse A 2002) | UK | Retrospective analysis of past recommendation made by NICE | l.b.2002 – UK £ 20,000/ QALY<br>u.b. 2002 – UK £ 30,000/ QALY |
| **Thresholds estimated from willingness to pay or related studies** | | | |
| (Hirth Richard A. 2000) | NA+ WE | Human Capital | 1997- US$ 24,777 / QALY |
| | | Revealed preference/ non-occupational safety | 1997- US$ 93,402 / QALY |
| | | Contingent valuation | 1997- US$ 161,305 / QALY |
| | | Revealed preference/ job risk | 1997- US$ 428,286 / QALY |
| (Gyrd-Hansen 2003) | Denmark | Elicited preference for health states | ?- DKK 88,000 / QALY |
| (King Joseph T. Jr. 2005) | USA | Elicited preference for health states | $12,500 -$32,200 /QALY |
| (Byrne 2005) | USA | Elicited preference for health states | $1,221 – $ 5,690/ QALY |

* l.b. = lower bound, u.p. = upper bound, NA = North America, WE = Western Europe

Table 2: Threshold values in (US$/DALY) in several high-income countries based on WHO recommendation (Eichler Hans-Georg 2004)

| Country | " x3 GDP threshold" (US$ /DALY) |
|---|---|
| USA | 108,600 |
| Japan | 74,700 |
| Canada | 74,400 |
| France | 73,200 |
| Germany | 70,200 |
| Australia | 69,600 |
| UK | 68,400 |
| Italy | 66,300 |
| Spain | 54,000 |
| New Zealand | 53,100 |

In addition, it appears reasonable to expect that "threshold" will not be identical in different countries depending on CE ratio of the intervention and ability to pay for a given intervention, which vary across countries. (Eichler Hans-Georg 2004)

***Alternative to CE threshold***

Another way to apply result from CE analysis to decision process is league table. The advantage of league table approach is that it concerns both CE ratio criterion and affordability. However, it requires comprehensive information on the costs and effects of the complete range of programs, which is not usually available. Therefore, a combined threshold and budget impact approach still offer a more feasibility way for health care allocation. (Eichler Hans-Georg 2004)

***Flaws of using CE threshold***

The concept of using "threshold" accompanying with CE ratio for resource allocation is not without criticism. Firstly, using CE threshold might lead to problem of affordability or uncontrolled growth in health care expenditure. (Ubel P 2002) Since using CE threshold would lead to adoption of a range of health technology that would go beyond what health care system could afford. It might be more understandable to view this as that "a family can bankrupt if it purchases too many goods, even where those goods are available at bargain price". Then, to adopt the new technology, the decision maker must cancel the existing intervention in order to find enough resource to support the new technology. Continuing to add new intervention that meet the CE threshold in the long run would lead to continual increase in per capita heal care cost. However, the threshold approach assures, implicitly, that additional resource can be found to support the new program if the ICER is not greater than the threshold.

Secondly, using CE threshold criterion alone might fail to maximize the health gain from a given budget.(Birch S 1993)The use of ICER threshold to decide which program to purchase fails to maximize the health gains from a given budget, as shown in the following example(Birch S 1993);

Example: A health care organization has an additional US$20 Million to improve health of its clients. Detail of 4 potential candidate programs for implementation is described in term of ICER in table 3. Suppose the committee

decides to use the figure of US$50,000 per QALY as the threshold, the only program acceptable is A with the QALY gain of 285 and 6US$ M remains unused. However, if program A is accepted with 3 units of program D the QALY gain will be 336. On the other hand, by accepting program B, C, and D, the QALY gain will be 343.

Table 3: Detail of cost and QALY gain of candidate programs

| Program | QALY gain | Cost (US$ M) | ICER (US$/QALY) |
|---|---|---|---|
| A | 285 | 14 | 49,120 |
| B | 192 | 10 | 52,080 |
| C | 134 | 8 | 59,700 |
| D | 17 | 2 | 117,650 |

In addition, it has been argued that application of threshold concept is only valid under a number of assumptions, including constant return of scale, constant marginal opportunity cost, and perfect divisibility of health care program.(Birch S 1993)

***Methodology issue related to assessing WTP per QALY***

Different preference elicitation, visual analog, standard gamble, and EuroQol may result in different QALY. (Gold MR 1996; Volk RJ 1997; Badia Xavier 1999; Drummond M 2001) Utility also vary according to who is making the estimate.(Drummond M 2001) There is as yet no unanimity as to whose viewpoint should be used to when making societal policy decisions.(Gold MR 1996; Drummond M 2001)

WTP method itself is subject to the criticism. It can be assessed using several different methods that may yield different results, including open-ended questions, bidding games, payment cards, single “take-it-or-leave-it” questions, and “take-it-or-leave-it” questions with follow up. (Diener A 1998). However, considerable progress has been made in the WTP elicitation methodology and in WTP estimation techniques. As improvements occur in design of survey, stated WTP values will get closer to actual value.

WTP can be influenced by income and national standards of living. It was found that WTP per QALY gained increases with income and decreases with the size of the health gain. (Gyrd-Hansen 2005). Then, question assessing WTP/QALY should be posed to a random sample of the populations such that the income distribution in the respondent group equals that of the population. (Gyrd-Hansen 2005)

WTP/QALY may be dependent on the context such as on the number of people who benefit or on whether the intervention reduced mortality risk or solely improves health.(Gyrd-Hansen 2003; Byrne 2005) A health scenario that involves a risk of death may be viewed quite differently from one that does not.(Byrne 2005) As study and debate on appropriate thresholds for CE continue, the presence of risk of mortality in the health state being valued should be recognized as a potentially important when WTP/QALY values are elicited and calculated. (Byrne 2005)

In addition, it is proposed that to get a valid societal value for a QALY, the following 4 core issues must be addressed: (i) is social WTP simply the sum of individual WTP, (ii) will individual WTP map directly into social WTP, (iii) is personal income the appropriate budget constraint, and (iv) should we adjust WTP for ability to pay.(Smith Richard D. 2005)

### *Adoption of CE threshold in decision making*

The concept of threshold can be adopted for health care resource allocation in either explicit or implicit manner. (Eichler Hans-Georg 2004) Setting an explicit threshold for resource allocation (e.g. $ / QALY) might relief burden of policy makers who previously made implicitly rationing decision and also offer a more consistency and transparency of decision making process. (Coast 2001) However, such explicit threshold is politically sensitive ((Eichler Hans-Georg 2004) and can generate public debate about societal willingness to pay for health care, which might lead to an increase in the health care package as occurred in the "Oregon experiment" (Ham 1998)and the results from several public surveys.(Lees A; Coast 2001; Rosen P 2002) As a result, Eichler et al. (Eichler Hans-Georg 2004)found that no health-care system has implemented explicit CE ratio thresholds. The analysis of decision made for pharmaceutical reimbursements by Pharmaceutical Benefits Advisory Committee (PBAC) in Australia (George B 2001)and National Institute for Clinical Excellence (NICE) in UK offered examples of implicit threshold.(Towse A 2002) Result from Devlin et al (Devlin Nancy 2004) support the broad notion of an implicit threshold where the probability of rejection of NICE increases as the cost per QALY increases. The result also suggested a threshold higher than NICE stated range of acceptable cost effectiveness of £20,000 – £30,000 / QALY. The existence of an "explicit threshold" has been, later on denied by NICE officials. (Littlejohns 2002)

Consideration of CE threshold alone is insufficient to inform decision-makers. It is anticipated that CE threshold is not the sole decision criteria. In fact, budget allocation decision is driven by several factors such as political priorities, resource available, alternative, and other constraint considered by the decision maker. (Gold MR 1996) As found by Devlin et al cost effectiveness together with uncertainty and burden of disease, explain NICE decision maker better than CE alone.
In addition, it has been argued that using an estimate of society WTP per QALY as a decision criterion is inconsistent with the welfare economic goal of identifying an efficient use of health care resource. (Gold MR 1996)

Considering that CE assessment is increasingly adopted, "ceiling threshold" of cost-effectiveness is expected to emerge in many countries to reflect the need for a more systematically, consistency and transparency decision making process. (Birch S 1993; Eichler Hans-Georg 2004) However, it appears reasonable to expect that "threshold" will not be identical in different countries depending on CE ratio of the intervention and ability to pay for a given intervention, which vary across countries. (Eichler Hans-Georg 2004)

Instead of setting a single figure threshold (e.g. $/QALY), alternatively, a concept of threshold range with lower and upper boundaries ($X to $1.5X / QALY) was emerged. (Littlejohns 2002; Eichler Hans-Georg 2004) Using the threshold range, health intervention below the lower level will usually be accepted and made available, while those above the upper level will usually be rejected. The intervention falling between lower and upper level will be, however, judged predominantly by other additional criteria.(Eichler Hans-Georg 2004) It is indicated that the concept of CE threshold with upper and lower boundaries is more likely and more sensible than rigid single CE criterion. (Eichler Hans-Georg 2004)

Applying one unique WTP/QAlY as decision making tool, irrespective of whether health gain take the form of smaller health gains or life extension in perfect health created a potential problem (Gyrd-Hansen 2003). As health outcomes of interventions are so different, it is difficult to capture in the same measurement system

and directly compare of the QALY gain created by the two kinds of intervention. In general, society does not consider a unit of health gained by a severity ill individual to be of equal value to a unit of health gained by an individual who is less severely ill. For example, even though a study indicating that taking sildenafil 5 times per month would be US$11,230 per QALY ant that compares favorable with other medical condition, costing less than renal dialysis, cholesterol medication, and coronary artery bypass grafting (Smith KJ 2000), QALY gains from correction of erectile dysfunction by an otherwise healthy individual would probably not considered equivalent to a QALY gained through life-prolonging dialysis by an individual not to die from renal failure To ignore this and other differences in the societal value of the QALY could seriously mislead health policy decision. (McGregor 2003) In addition, concerns included preferential treatment given to specific disadvantaged group of patients (e.g those suffering form rare disease or from acute life threatening disease should be taken into account.

WTP for a QALY should not be seen as defining the theoretical link between CEA and CBA, but rather as an aid to decision makers. Previously, it has been proposed (Johannesson 1995)that if CEA incorporates all societal cost and using a cost/QALY threshold it can be interpreted as CBA. However, to translate QALYs into monetary units and thus translate CEA to CBA, it is necessary that one sole WTP per QALY value can be established irrespective of context-specific characteristics such as severity of illness, magnitude of health gain, patients characteristic, etc which is not true in the real situation. (Dolan R 2002; Gyrd-Hansen 2005)

As found that Willingness to Accept (WTA) is greater than WTP, the selling price of the QALY is greater than its buying price, then threshold should reflect this disparity. There may be the different for investments and disinvestment. (O Brien Bernie J. 2002) As the result, the calculated WTP/QALY should be used only in term of investment or adoption but not disinvestment or deprivation.

***Studies assessing CE threshold***

Hirth ea al(Hirth Richard A. 2000) used the results of their review on value of life studies to calculate the value of a QALY. Forty two values of life identified from literature review were based on several methods (e.g. human capital approach, contingent valuation, and revealed preference). QALYs were calculated based on age-specific quality of life, life expectancy, and age of the population in the study. By taking a following hypothetical study as an example, the population in the study has average age of 38 years and life expectancy is expected to be 78 years. The value of a statistical life in this population is found to be $ 3,000,000. With a 3% real discount rate, age-specific quality of life adjustments denoted by $q_{t+38}$, and simplifying assumption of a fixed duration of life, the value of 1 QALY can be approximately by the x that solves the following equation;

$$\$3{,}000{,}000 = \sum_{t=0}^{t=39} \frac{q_{t+38}x}{(1 + .03)^t}$$

Depending on the method used in the original study to calculate value of life, the study found estimated that values of QALY ranged from $31,000 (based on human capital approach) to $543,000 (revealed preference/job approach) with a median value of $336,000 in 2003 US dollars. With the exception of human capital

approach, these cost per QALY are far exceed “the rule of thumb” (i.e. $US 50,000 /QALY)

Byrne M. et al. (Byrne 2005) determined the WTP in a study of knee osteoarthritis in 2001. One hundred ninety three persons, located through a random digit dialing in Harris County, Texas were interviewed. Information on socioeconomic status, health preferences using visual analog scale (VAS), time tradeoff (TTO), and standard gamble (SG), and Willingness to pay (WTP) questions were collected. Two hypothetical scenarios, 1 with mild to moderate osteoarthritis and 1 with severe osteoarthritis, were described to participants. Scenarios were based on the domains of the EQ-5D as the following;

- Severe osteoarthritis:
  - Has some problems with walking about
  - Has some problems with self-care
  - Has some problems with performing usual activities
  - Has extreme pain or discomfort
  - Is moderately depressed
- Mild osteoarthritis
  - Has some problems with walking about
  - Has no problem with self-care
  - Has no problem with performing usual activities
  - Has moderate pain or discomfort
  - Is not anxious or depressed

WTP values for moving from each of the 2 scenarios and the participants own health to perfect health was collected using open-ended question. The WTP/QALY figure was calculated as follows,

$$WTP = QALY = \frac{WTP}{\sum_{t=1}^{T} \frac{1-Utility}{(1+r)^{t-1}}}$$

where, T indicates individual life expectancy which can be calculated from National Vital Statistics, and r is the discount rate.

Result of the study found that the mean WTP/QALY for all methods was lower (range $1,221 - $5690/ QALY) than many estimates from several studies and lower than the most frequently cited of $50,000/ QALY. WTP/QALY was highest when participants were judging their personal health improvement as opposed to hypothetical scenarios. It was found that approximately 16% of the time, participants rated their own health as better on a utility measure than a given osteoarthritis scenario but were willing to pay more to improve their own health than to improve that scenario. Significant differences in WTP/QALY across elicitation methodologies for the same scenarios were also found. The authors indicated that the lower WTP/QALY found in this study may indicate that the presence of a mortality risk reduction substantially increases stated WTP/QALY.

King et.al. (King Joseph T. Jr. 2005) calculated WTP/QALY by measured preferences for current health in 3 patient populations using standard gamble, time-tradeoff, and visual analog. Closed ended bidding method was used to determine WTP. Subjects were asked to imagine that they could purchase a cure for all of their

health problems and symptoms with a single payment. The initial price was $1, the 2nd price offered was equivalent to 1 month of their household income, and the maximum price permitted was 10 times the subject's own annual household income. The WTP/QALY was then calculated as follows;

$$WTP / QALY = \frac{Willingness\,to\,pay\,amount}{\sum_{t=1}^{life\ expectancy} (1 - value\ of\ current\ health) * (1 + discount\ rate)^{-(t-1)}}.$$

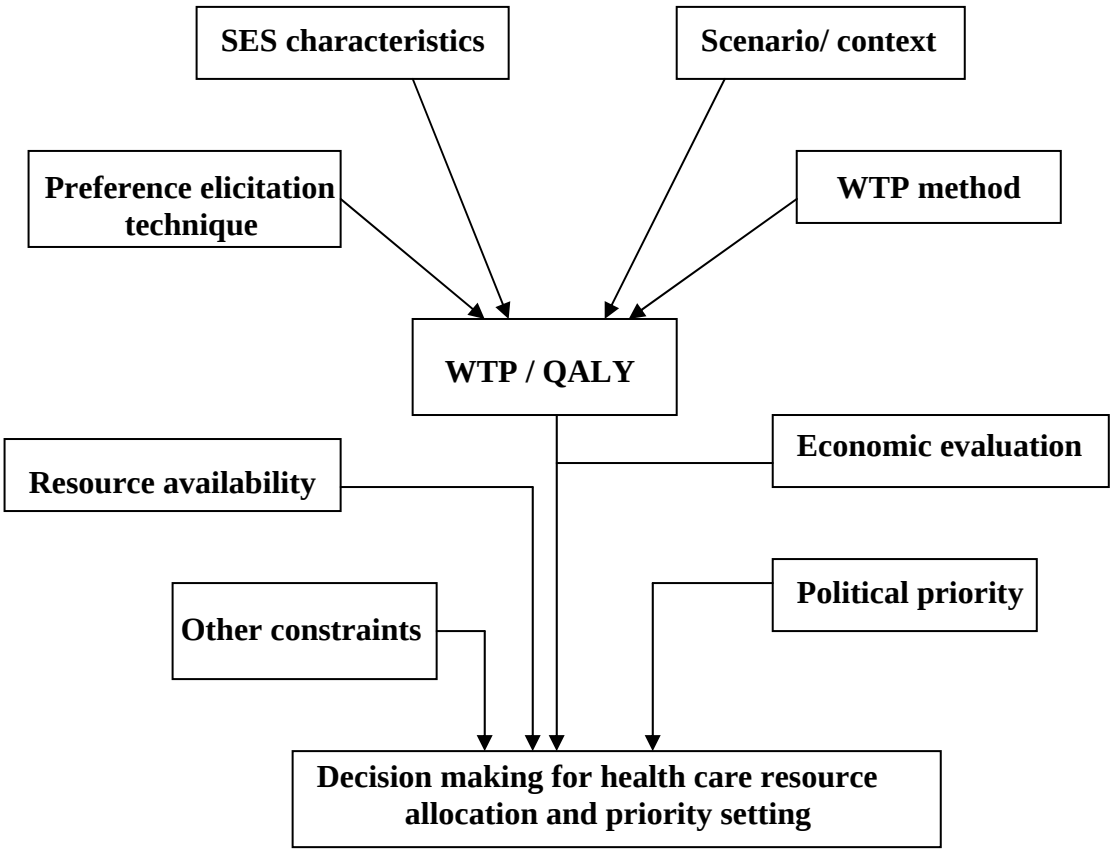
From this study, mean WTP/QALY ranged from $12,500 to $32,200 (2003 $US), which were below most frequently cited CE ratio of $50,000 / QALY.

Gyrd-Hansen D.(Gyrd-Hansen 2003) estimated WTP/ QALY by eliciting an individual WTP for a change in own health status using the existing EuroQol tariffs. The study was performed in Denmark 2001. Subjects were selected at random for interview. Only 42 health states, which were originally applied in deriving the current UK EuroQol tariff was used. These 42 health states were selected to represent a wide spread across the valuation space, including as many combinations of levels across the 5 dimensions as possible. The 42 health states were paired such that a total of 23 choice scenarios were established. During the interview, each respondent was presented with 2 health state description using the EuroQoL description system. Each respondent was presented with 1 choice scenario randomly selected amongst the total of 23 scenarios. Respondents were asked to imagine themselves in either of these health states, and to indicate which of the two health states they found to be the worse of the two. Then, they were posed a closed –ended WTP question. Discrete choice modeling was further used to analyze the data. The result from this study indicated that DKK88,000 / QALY. However, it should be noted that this WTP/ QALY figure is based on preference of QALY increments of maximum 0.32.

## 2. Research Objective

To determine the willingness to pay of Thai general public for health care investment in several activities including health prevention, and treatment

3. **Analytical Framework:** Determinant of WTP/QALY and its role in decision making process




4. **Research Design**

**4.1 Sample**

Random sampling of adult household members between 18 and 60 years of age will be selected to ensure representativeness of Thai population. The sample size and method of sampling will be specified after the pilot testing and instrument development was completed.

**4.2 Information to be collected**

The following information will be collected from the sample;

- Sociodemographic and clinical characteristics (i.e. age, sex, marital status, education, disease status)
- Preference of current health status and selected health status
- WTP for moving from one health state to another health state

**4.3 Data collection**

Data will be collected via face-to-face interview. Pilot testing will be performed to ensure the validity, reliability, appropriateness, and clarity of developed questionnaire and scenario. All interviewers will be trained and interviewer guideline will be developed in order to ensure the consistency of data collection. During the field work, supervision plan will be implemented.

5. **Timeline**

24 months. Tentative timeline of activities is described in Annex A.

6. **Ethical Clearance**

The proposal will be submitted to Ethical Review Committee for Research on Human Subjects for approval.

7. **Research Team**

| | | |
|---|---|---|
| Montarat | Thavorncharoensap, Ph.D. | Principle Investigator |
| Yot | Teerawattananon, M.D., Ph.D. | Co- Investigator |
| Sirin | Natanan, B.Sc.(Pharm) | Co-Investigator |
| Jomkwan | Yothasamut, MS. | Co-Investigator |
| Pissapun | Verrayingyong, M.S. | Co-Investigator |
| Richard | Smith, Ph.D. | Co- Investigator |
| Wantanee | Kulpeng, B.Sc. | Research Assistant |

The CVs of all of the researchers are attached in Annex B

8. **Budget**

3,250,000 Baht. The detail calculation of costs are presented in Annex B.

**Annexs**

**A. Time Frame and Project Activities**

**B. Detailed Budget**

**C. CVs of Research Team**

**A. Time Frame and Project Activities**

| Activities | 2007 | | | | | | | | | | | | 2008 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1. Proposal Development | √ | √ | √ | √ | √ | √ | | | | | | | | | | | | | | | | | | |
| 2. Expert panel meeting/ consulting | | | | | | | √ | √ | | | | | | | | | | | | | | | | |
| 3. Final Proposal | | | | | | | | | √ | | | | | | | | | | | | | | | |
| 4. Pilot study for questionnaire development | | | | | | | | | | √ | √ | | | | | | | | | | | | | |
| 5.Questionnaire development | | | | | | | | | | | √ | √ | | | | | | | | | | | | |
| 6. Field Testing of questionnaire and method | | | | | | | | | | | | | √ | | | | | | | | | | | |
| 7. Discussion on questionnaire amendment | | | | | | | | | | | | | | √ | | | | | | | | | | |
| 8. Logistic arrangement to field test | | | | | | | | | | | | | √ | √ | √ | √ | √ | | | | | | | |
| 8. Draft manual for interviewer | | | | | | | | | | | | | | √ | √ | | | | | | | | | |
| 9. Final questionnaire and manual production | | | | | | | | | | | | | | | √ | | | | | | | | | |
| 10. Training of interviewers and supervisors | | | | | | | | | | | | | | | | √ | | | | | | | | |
| 11. Design of data entry program | | | | | | | | | | | | | | | | √ | | | | | | | | |
| 12. Supervision plan | | | | | | | | | | | | | | | | √ | | | | | | | | |
| 13. Field work | | | | | | | | | | | | | | | | | √ | √ | √ | | | | | |
| 14. Questionnaire coding verification | | | | | | | | | | | | | | | | | | | √ | √ | | | | |
| 15. Data entry | | | | | | | | | | | | | | | | | | | √ | √ | | | | |
| 16. Data cleaning | | | | | | | | | | | | | | | | | | | √ | √ | | | | |
| 17. Data analysis | | | | | | | | | | | | | | | | | | | | √ | √ | √ | | |
| 18. First draft of preliminary report | | | | | | | | | | | | | | | | | | | | | | | √ | |
| 19. Internal discussion on the prelim report | | | | | | | | | | | | | | | | | | | | | | | √ | |
| 20. Final report | | | | | | | | | | | | | | | | | | | | | | | | √ |

## B. Detailed Budget

| | Transaction | Details | Baht |
|---|---|---|---|
| 1 | Honorarium for domestic expert | 4 persons*1,500 Baht *3 times | 18000 |
| 2 | Travel cost for domestic expert | 4 persons *5,000 Baht *3 times | 60000 |
| 3 | Accommodation for domestic expert | 4 persons *3,500 Baht *6 nights | 84000 |
| 4 | Honorarium for foreign expert | 1 person * 30,000 Baht * 12 days | 360000 |
| 5 | Travel cost for foreign expert | 1 person *150,000 Baht * 3 times | 450000 |
| 6 | Accommodation for foreign expert | 1 person * 3,500 Baht * 12 days | 42000 |
| 7 | Expert meeting | 35,000 Baht*3 times | 105000 |
| 8 | Questionnaire printing | 65 Baht * 2500 questionnaire | 162500 |
| 9 | Manual printing and instrument developing | 500 Baht * 30 manual | 15000 |
| 10 | Training interviewers and site staff | 2 times * 30000 Baht | 60,000 |
| 11 | Travel cost for field data collection | 60 days * 2,500 Baht | 150,000 |
| 12 | Accommodation for data collection | 60 days * 1,500 Baht * 8 rooms | 720,000 |
| 13 | Interviewer | 150 Baht * 2500 questionnaire | 375,000 |
| 14 | Site Staff | 3500 Baht * 24 persons | 84,000 |
| 15 | Interviewee | 120 Baht * 2500 questionnaire | 300,000 |
| 16 | Office supplies and facilities | | 119,700 |
| 17 | Travel cost for field supervisions | 2 persons* 5,000 Baht*4 times | 40000 |
| 18 | Accommodation for field supervisors | 2 persons * 2,000 Baht* 8 days | 32000 |
| 19 | Field supervisors | 2 persons * 800 Baht * 8 days | 12800 |
| 20 | Final report printing and manuscript submission | | 60,000 |
| | Total Project costs | | 3,250,000 |

## A. CVs of Research Team

## Reference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