

## CHAPTER 3

### RESEARCH METHODOLOGY

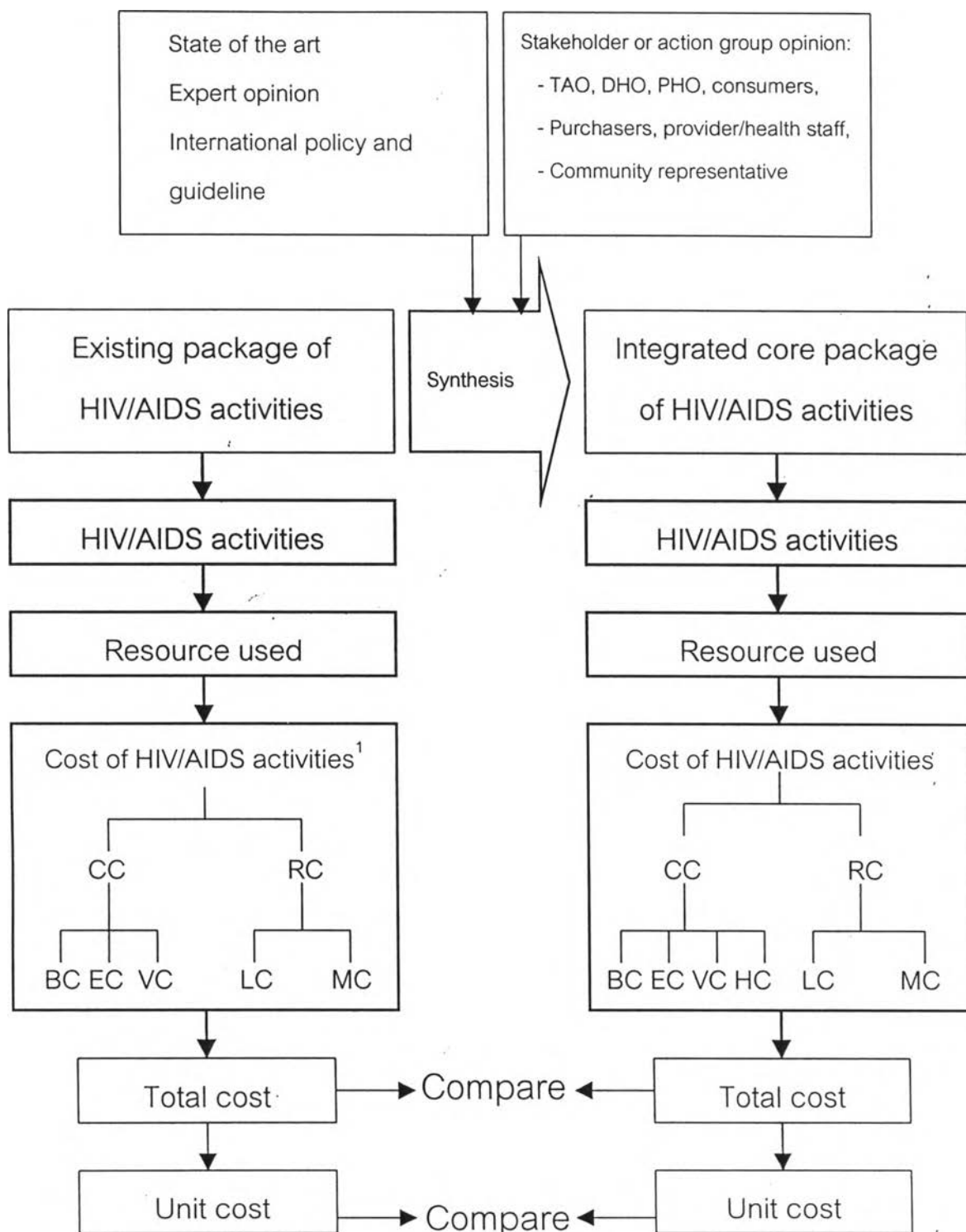
This is a cross-sectional descriptive study on incremental costs at the Tambon Lor Health Center of implementing an integrated core package of HIV/AIDS activities for PWA and people in the service area. The fiscal year 1998 is represented for situation of implementing the integrated core package of HIV/AIDS activities. The hypothetical situation compared the cost of the existing package of HIV/AIDS activities that are presently provided and the cost of an integrated core package of HIV/AIDS activities may be provided in the future.

#### 3.1 Conceptual Framework

The HIV/AIDS package is distilled from health package. An integrated core package is modified from the existing package of HIV/AIDS activities by eliminating some activities and adding completing new activities or transferring HIV activities from the hospital to the health center. The development of an integrated core package of HIV/AIDS activities was done by considering expert opinion, stakeholder or action groups opinion, state of the art, and national policy and guidelines.

The components of the existing packages and an integrated core package of HIV/AIDS activities are costs that are calculated from inputs as capital cost and recurrent cost. Capital cost includes cost of building, equipment, vehicle, and human capital. Recurrent cost or operating cost includes cost of labor, material or supply that associated with AIDS. Two methods are used to calculate total cost of HIV/AIDS package. One is the summation of capital cost and recurrent cost associated with AIDS. Another is the summation of the cost of HIV/AIDS activities. Unit cost is the total cost of each HIV/AIDS activity divided by quantity of that activity. The last step of this study, total cost of HIV/AIDS package, total cost of HIV/AIDS activities, unit cost of HIV/AIDS package, and unit cost of each HIV/AIDS activity are presented in Figure 3.1.

Figure 3.1 Conceptual Framework



<sup>1</sup>CC = Capital cost, RC = Recurrent cost, BC = Building cost, EC = Equipment cost, VC = Vehicle cost, HC = Human-capital cost, LC = Labor cost, MC = Material cost

### 3.2 Identification of the Components of HIV/AIDS Package by Activities

#### 3.2.1. The Existing Package of HIV/AIDS Activities

Tambon Lor Health Center provides the present package of HIV/AIDS activities that consist of five categories as follow.

1) Palliative care, which is provided for patients every day, is supportive treatment. For example, HIV/AIDS patients get fever and headache, so health personnel may treat symptomatic problem but do not treat HIV/AIDS disease. In the fiscal year 1998, there were 133 HIV/AIDS visits to palliative care.

2) Mother and child health includes antenatal care (ANC), family planning (FP), the well baby program, and the expanded program on immunization (EPI).

(1) ANC is provided to pregnant women every Tuesday. Health personnel provide ANC at least 4 ANC to each pregnant woman, 3 doses of tetanus toxoid, and postnatal care twice for each HIV-negative pregnant woman but not for HIV/AIDS pregnant woman. HIV-positive pregnant women receive ANC as part of the anti-retroviral (ARV) project at Chun Hospital. In the fiscal year 1998, there were thirty-three general pregnant women receiving ANC at Tambon Lor Health Center. There is only one HIV positive pregnant woman in the service area of Tambon Lor Health Center receiving ANC at Chun Hospital.

(2) Family planning (FP) is provided every Wednesday. There is a counselling clinic for general patients and HIV/AIDS patients and a premarital clinic but in the fiscal year 1998 there were only three cases of HIV/AIDS counselling. So, the main HIV/AIDS activity of family planning is contraceptive distribution and condom distribution. Condoms were distributed 100 – 300 pieces per time to the community primary care center for 4 times a year and distributed to a box in front of health center 21 times a year; hence, total condom distribution is 3,400 pieces per year. Total family planning in the fiscal year 1998 was 646 cases. There were 65 cases of family planning are symptomatic and asymptomatic-HIV.

(3) The well baby program and EPI are provided once per month for three hours and thirty minutes. HIV/AIDS children receive EPI the same as Non-HIV positive children. The records do not specify HIV status. Sometimes, there is only one

staff member at health center, so it is very busy. The personnel would record only in the baby log book and not the health center record. In the fiscal year 1998, the well baby program provided 196 cases to children that included 10 cases of HIV-positive children. The total for EPI was 280 cases including 14 cases of EPI for HIV-positive children.

3) Home health care service (HHC) or home visitation includes social support because total cost of social support is distributed to PWA at home. The time of each HHC that health personnel provide to HIV patient is half a day or three hours and thirty minutes. Health personnel provide twice HHC per month for symptomatic HIV but do not specify a day. There is no record of the AIDS cases strange record. In the fiscal year 1998, there were 22 AIDS deaths and 33 PWA divided to 12 explicit AIDS cases, and 21 implicit AIDS cases. Thus, health staff provided HHC for 34 PWA is 60% of total PWA in the service area.

Social support or funding for HIV/AIDS patients in this community is Japanese International Cooperation Agency (JICA), Tambon Administrative Organization (TAO), and the Department of Public Welfare in the Ministry of Interior in forms of money, medicine, supplies, and employment. The community saving fund in this area is a health volunteer saving fund. However, the aims are not specific to HIV/AIDS and the budget is not known.

4) Management information system (MIS) and paperwork are administrative, record, report, and planning of HIV/AIDS activities that got from observation time logging of health personnel for two weeks and projection estimate to one year.

5) Health education and health promotion conduct many community meetings and training sessions for health volunteers, health educate at the public health centers, schools and village community about seasonal disease, basic health needs, and HIV/AIDS. There are records of health activities with a rough estimation of time spent for each activity and no specific time estimate for HIV/AIDS activities. Health staff always teaches and suggests many things concentrated health to peoples at one time. For example, a health education session on three diseases at the health center may last thirty minutes to one hour, but time spent for each disease differs. So discussion with health personnel for the time spent on HIV at each health education session and health promotion is necessary. Times of health education at health center, school, and village

is fifteen to thirty minutes. Two hours to three hours and a half is spent at community meeting or training health volunteers. Times spent on each health education, session meeting, and training health volunteers for HIV/AIDS around five minutes to ten minutes although the total time of health education, session meeting, and training health volunteers dissimilar. In the fiscal year 1998, there are sixteen sessions of health education in the community, sixty sessions of health education at health center, sixty-two health volunteer sessions of training, and seven community meetings. There is one staff member responsible the health education and health volunteer training. Two staffs members are responsible the community meetings.

### **3.2.2. The Integrated Core Package of HIV/AIDS Activities**

#### **3.2.2.1 The Development of an Integrated Core Package of HIV/AIDS Activities**

In the development of an integrated core package of HIV/AIDS activities at the sub-district level, many new HIV/AIDS activities are added to health center and some HIV/AIDS activities are transferred from hospital to health center. It did not eliminate any activities of the existing HIV/AIDS package. The provincial, district, and sub-district managers are presently developing the core elements of a cost-effective package to respond to HIV at sub-district level. The development of this package is part of the process of developing "AIDS competent Tambons". Details of the package are described below. The development of this package is based on the following premises.

1) Cost-effective interventions to respond to HIV are well known in Thailand and throughout the world.

2) Northern Thailand has progressed dramatically on the HIV front, but local health managers do not call it success yet. In Phayao, after a decrease of the HIV prevalence among HIV positive pregnant women from 10% to 5% between 1992 and 1995, the HIV prevalence has reached a plateau, with little further reduction in the rate.

3) To progress further, the response needs to cover each household if not each individual. To achieve high coverage of these households, the development of the sub-district (Tambon) response is essential. Tambon administrative authorities, health

center staff, schoolteachers, and community organizations are key actors are supporting the households.

4) The local response should be developed as a coordinated effort of local actors. The response of the health sector, the other sectors, and the community organizations should not be separated. Linkages have to be cultivated and institutionalized.

5) District teams cannot ensure the direct support to each individual household. Their role is to support sub-districts and act as referral. The "AIDS competent sub-district" package includes the coordination activities and the specific activities of key "action groups".

(1) Coordination activities: The components of this activity indicate as follow.

Counselor training: Counselor training for HIV/AIDS of three staff members are one week (5 days) and one day per month every month for first year and one day per month every 6 months for the following year.

Vision building: The ongoing development of a common vision among the actors in community implies objective settings, strategic planning, and coordinating of activities. This is conducted through the establishment of regular meeting of the major actors (TAO, health center staff, PWA groups, schoolteacher, NGOs, community organizations, agriculture sector representatives, etc.) with occasional ad-hoc support of district actors (representatives of district team, of district hospital). There are two main meetings annually. There are two staff members, ten local facilitators, and one external facilitator spend about half a day or three hours and thirty minutes for each meeting.

Coordination meetings: These meetings are activities with the community at large, using Participatory Rural Appraisal (PRA) which are conducted by the action team (key actors). There are 20 key actors of each meeting. The two staff members spend about half a day or three hours and thirty minutes for each meeting. There are four meetings for one year.

Rolling planning process: Institutionalization of the dialogue between the actors in each "action groups" to 3 steps is divided into community assessment, planning, and monitoring. Community assessment, community risk assessment or assessment analysis action is conducted at regular time intervals by each action group,

integrating techniques such as PRA and Appreciation Influence Control (AIC) into the routine planning process. Community risk assessment is required for interviews, survey, and focus group of people in the responsibility area. It includes risk mapping, response mapping, and structure analysis. Risk mapping is the identification of vulnerable groups, risk areas, and behaviors that is conducted by the group of major actors. Response mapping is the identification of SWOTs (Strengths, Weaknesses, Opportunity, Threats) of the different sector and community groups and sub-groups, leaders and key volunteers, and identification of "action groups" within the map. Planning is the strategic of thinking carefully about problem solving or to do in the future by action group. The last step of rolling planning process is monitoring process. There are ten meetings of the rolling planning process, five meetings of risk mapping, three meetings of response mapping, and 2 meetings of planning and monitoring the rolling planning process.

Information sharing: There are three meetings per year every 4 months. The two staff members spend half a day for each meeting. This aspect includes HIV related data management, local analysis of information related to HIV in the community and feed back to other action groups, provision of information on HIV transmission and evolution to action groups, facilitation of the coordination between the various "action groups".

(2) Specific activities: The action groups identification include the TAO, the health center, the school, youth groups, women's groups, commercial sex works, PWA, elderly, and monks. The specific activities of the specific action group "health services" are presented here. The role of the health center staff (nurse and assistant nurses) is to develop AIDS competent health services". These activities are indicates below.

Care for HIV positive patient: It is the transferred HIV/AIDS activities from hospital to health center as clarified. First, tuberculosis (TB) activities includes TB case findings and sputum collecting, TB treatment follow up and adherence assurance with Directly Observed Treatment Short Course (DOTS). Second, treatment of simple opportunistic infection (OI) is treatment of diarrhea, acute respiratory infection (ARI), skin infections, candidiasis. Third, pneumocistic carinii pneumonia (PCP) prophylaxis and

adherence assurance with DOTS to symptomatic patients, potentially Isoniazid (INH) prophylactic therapy in a second phase when DOTS will be functional.

Retro-productive health continuum: This includes pretest posttest counselling for HIV, follow up counselling, premarital counselling for HIV, HIV counselling during family planning, ANC counselling, Anti-Retroviral (ARV) antenatal and postnatal prophylactic treatment for HIV positive pregnant woman and HIV positive post delivery woman, nutritional counselling and growth monitoring of children replacement fed (breast milk substitute).

Home health care service: It is palliative care that is provided by nurses of the health center, psychosocial support. Health facilities should provide two HHC per month for AIDS family and give the present kit to PWA at least 50% of total PWA.

### **3.2.2.2. The Component of an Integrated Core Package of HIV/AIDS Activities**

The coordination activities and specific activities of an integrated core package of HIV/AIDS activities are distributed to 5 categories liked the existing package of HIV/AIDS activities.

1) Palliative care: The service time is the same existing package of HIV/AIDS activities but an integrated core package has more activities than the old one. The additional activities of the integrated core package of HIV/AIDS activities as mentions: TB case finding and sputum collecting, PCP prophylaxis, TB treatment divided to DOST for active TB and INH prophylaxis.

2) Mother and child health: There includes ANC, FP, the well baby program and EPI that the service time is the same as the existing package of HIV/AIDS activities, but the integrated core package provides more activities than the old one. The differences are follows.

(1) ANC: The HIV-positive pregnant woman who receive ANC at Chun Hospital come back to receive ANC at Tambon Lor Health Center. Health center provides the additional activities as HIV-testing for pregnant woman and woman to get married, pretest and posttest counselling for HIV, follow-up counselling, ARV antenatal and postnatal for HIV, premarital counselling for HIV, and ANC counselling.



(2) Family planning: The additional HIV/AIDS activities of family planning are HIV-testing for family planning user, and HIV counselling during family planning that all health staff used to take the HIV-counselling training course.

(3) The well baby program and EPI: The additional activity is nutritional counselling and growth monitoring of children replacement fed or breast milk substitute for HIV positive children or children born to HIV positive mother.

3) HHC: Health facilities should provide two HHC per month for AIDS family and give the present kit to PWA at least 50% of total PWA.

4) MIS and paperwork: Assume that the activities and time are the same.

5) HE and health promotion: The integrated core package of HIV/AIDS activities concentrated community assessment so the action groups conducted many activities as health education, health promotion, community meeting, and training health volunteer. The new additional activities of the integrated core package of HIV/AIDS activities divide to counselling training health staff, vision building, coordination meeting, rolling planning process, and information sharing.

The difference of existing package and an integrated core package of HIV/AIDS activities are indicated in Table 3.1.

Table 3.1 Comparison between the Existing Package and an Integrated Core Package of HIV/AIDS Activities.

Activities	Existing package	Integrated core package
1. Palliative care	This package provides supportive care to PWA everyday.	This package provides supportive care to PWA everyday including the existing package and in addition to provide the transferred activities from hospital to health center as follow: <ul style="list-style-type: none"> <li>- TB case finding, sputum collecting,</li> <li>- TB treatment: DOST for active TB,</li> <li>- TB prophylaxis: INH prophylaxis,</li> <li>- PCP prophylaxis.</li> </ul>
2. MCH		
2.1 ANC	HIV positive pregnant woman receives ANC as part of the ARV project at Chun hospital.	HIV positive pregnant woman come back to receive ANC at Tambon Lor Health Center so these are the transferred activities from hospital to health center: <ul style="list-style-type: none"> <li>- HIV-testing for pregnant woman and woman to get married,</li> <li>- pretest and posttest counselling for HIV and follow up counselling,</li> <li>- ARV antenatal and postnatal for HIV,</li> <li>- premarital counselling for HIV,</li> <li>- ANC counselling.</li> </ul>
2.2 Family planning	This activity includes counselling during family planning, contraceptive distribution, and condom distribution provided every Wednesday.	This package provides family planning same the existing package but concentrates counselling during family planning more than the old one. Otherwise, there is the transferred activity from hospital to health center as HIV-testing for family planning user.
2.3 The well baby program and EPI	This package provides the well baby program for growth monitoring of children and EPI half a day per month.	This package provides the same activities of the existing package and focuses on nutritional counselling, growth monitoring of child replacement fed or breast milk substitute for HIV positive children or children born to HIV positive mother.

Table 3.1 (continued)

Activities	Existing package	Integrated core package
3. Home visitation or home health care service	This package provides two homes visitation per month for the explicit HIV/AIDS cases and gives the present kit to PWA at home is 60% of total PWA in the service area.	This package provides two HHC or homes visitation per month for explicit HIV/AIDS cases same the existing package but gives the present kit to PWA at home is 50% of total PWA in the service area.
4. MIS & paperwork	This is a job for administrative, record, report, and planning for HIV/AIDS activities that got from observation for two weeks and projection estimate to one year.	This package uses the same data from the existing package of HIV/AIDS activities.
5. Health education & health promotion	This activity includes meeting community, training sessions for health volunteer, health education at health center, school, and in community.	<p>This package provides the same activities of the existing package of HIV/AIDS activities and concentrates community assessment by adding the new activities as mentions:</p> <ul style="list-style-type: none"> <li>- training counselling for health staff,</li> <li>- vision building,</li> <li>- coordination meeting,</li> <li>- rolling planning process,</li> <li>- information sharing</li> </ul>

Source: Summary from sections 3.2.1 and 3.2.2

### 3.3 Population and Sample

Population in this study are primary health centers in Phayao province. Data of this research is obtained by the purposive sampling method because there are most pilot projects of HIV/AIDS activities concentrated Tambon Lor Health Center.

### 3.4 Data Collection

There are two types of data in this study, according to the source of data.

1) Primary data This data comes from survey and observation, for example, observe health personnel's time spent on HIV/AIDS activities and discuss with health staff about their working time, work characteristic, and services provided.

2) Secondary data This data is collected from health records or the hospital database. The data might be a draft or in detail depending on the purpose of particular program that collected them. The secondary data in this study includes health personnel income, number of patients, the components of existing – core package of HIV/AIDS activities, material usage and their cost, etc.

### 3.5 Data Analysis

According to the conceptual framework, the variable of this study is cost. Hence, there were many complications of the study concerning collected data and defined costs. Both primary and secondary data were entered into the equation as following. The analytical process is conducted to achieve the appropriate indicators intended to the study objectives.

#### 3.5.1. Cost Classification

##### 1) Classification by activities

In this study, the total cost of the existing package and an integrated core package of HIV/AIDS activities is the summation of the costs of palliative care, MCH, HHC or home visitation, MIS, paperwork, health education and health promotion associated with AIDS.

##### 2) Classification by input

Creese and Parker (1994) explained classification of costs by input that divided to capital cost and recurrent cost. Capital cost includes costs of building, equipment,

vehicle, long-term training for health personnel that occurs only once or rarely, and cost of social mobilization. Recurrent cost is defined as the cost of personnel or labor cost, material supply, maintenance building as electricity and water usage, vehicle maintenance, short-term training, and operating cost.

(1) Capital cost is the cost of inputs that last for more than one year, and have value equal to or more than 1,000 Baht, which might be purchased in the year before a study and associated with the establishment of productive capacity and physical infrastructure. Otherwise, there is no expenditure on capital cost at all during the study period. Capital costs consist of two components. One is the opportunity to invest the sum in some other venture yielding positive benefit. It is usually valued by applying an interest rate to the amount of capital invested. The another component of a capital cost is the depreciation over time of the asset itself. Capital cost includes the cost of building, equipment, vehicle and human capital or long-term training.

Building The space for HIV/AIDS activities in Tambon Lor Health Center and the infrastructure furnishing also integrate in building. There are many approaches to calculate building cost i.e. record assesses, use the renting cost for the similar space or look for a similar building and assess for its cost. In this study, cost of building is an original cost that looked from the planning department records, Phayao Provincial Health Office (PHO), and projects to current cost or present cost.

Equipment The categories used in health center that last one year or more, and the unit price is more than 1,000 Baht. Some cost of equipment is the original cost as drawn from the record of health center and from the planning department of PHO. But for some equipment, the current cost for similar equipment from the standard cost of equipment account, and market price is used to calculate.

Vehicle The cost of two motorcycles is the original cost from planning department of PHO.

Human capital cost is the costs of investment in education due to moving to areas that have better job opportunity, and costs of investment in medical care to improve health or appearance (Ruffin and Gregory, 1997). In this study, human capital cost is costs of long-term training for health staff who still has useful life or life time (ten years) more than one working year.

(2) Recurrent costs are costs associated with the operation or maintenance of facilities or assets. The items mentioned below will be considered as the recurrent cost:

Labor costs are salaries, wages and other expenses associated with personnel directly involved in the HIV/AIDS activities.

Supply or material costs are for materials used up in the course of the year, as direct inputs to the principle activities performed by the program, and other small items purchased during the year. The unit cost of an item is less than 1,000 Baht. Supplies are defined to be two groups: 1) medical supplies: medicine, vaccines, needles, syringes, cotton wool, etc., and 2) non-medical supplies: office supply, office utility includes charges for electricity, water usage, building maintenance and vehicle maintenance.

In this study, all costs of data are grouped into capital cost or recurrent cost items. Capital cost items of the existing package of HIV/AIDS activities are building, equipment, and vehicle. Capital cost items of the integrated core package of HIV/AIDS activities are the same as the existing package except costs of long-term training counselling for health staff. Recurrent cost items of the existing package and an integrated core package of HIV/AIDS activities are labor cost and material cost.

### 3.5.2 Cost Calculation

#### 1) Cost calculation of HIV/AIDS package by activities

Total cost of the existing package and an integrated core package of HIV/AIDS activities is the summation of the cost of all activities associated with AIDS.

$$TCA = TCPC + TCMCH + TCHHC + TCMIS + TCHE \quad (3.1)$$

where

- TCA = Total cost of HIV/AIDS package
- TCPC = Total cost of palliative care for HIV/AIDS
- TCMCH = Total cost of MCH for HIV/AIDS
- TCHHC = Total cost of HHC for HIV/AIDS
- TCMIS = Total cost of MIS and paper work for HIV/AIDS

TCHE = Total cost of HE and health promotion for HIV/AIDS

## 2) Cost calculation of HIV/AIDS package by inputs

The research tried to analyze cost components of the health center by inputs, and classifies costs into capital cost and recurrent cost. All HIV/AIDS activities are calculated, by based on the use of inputs. Total provider cost can be calculated by summing up the total capital cost and the total recurrent cost that associate with HIV/AIDS activities.

$$TCA = CCA + RCA \quad (3.2)$$

where

TCA = Total cost of HIV/AIDS package

CCA = Total capital cost of HIV/AIDS package

RCA = Total recurrent cost of HIV/AIDS package

$$CCA_{(EP)} = BCA + ECA + VCA \quad (3.3)$$

where

$CCA_{(EP)}$  = Total capital cost of the existing package of HIV/AIDS activities

BCA = Building cost of HIV/AIDS package

ECA = Equipment cost of HIV/AIDS package

VCA = Vehicle cost of HIV/AIDS package

$$CCA_{(ICP)} = BCA + ECA + VCA + HCA \quad (3.4)$$

where

$CCA_{(ICP)}$  = Total capital cost of an integrated core package of HIV/AIDS activities

BCA = Building cost of HIV/AIDS package

ECA = Equipment cost of HIV/AIDS package

VCA = Vehicle cost of HIV/AIDS package

HCA = Cost of long-term training

The total recurrent costs of the existing package and an integrated core package of HIV/AIDS activities are same as indicated follow.

$$RCA = LCA + MCA \quad (3.5)$$

where RCA = Total recurrent cost of HIV/AIDS package  
 LCA = Labor cost of HIV/AIDS package  
 MCA = Material cost of HIV/AIDS package

### 3) Total cost of HIV/AIDS package

There are two methods to calculated total cost of HIV/AIDS package. One is summation the cost of HIV/AIDS activities as in equation 3.1. Another is the summation of capital cost and recurrent cost as in equation 3.2 or applying equation 3.6. Both primary and secondary data are entered in the equation as mentioned below.

Equation (3.6)

$$TCA = \sum_{i=1}^n ((\sum_{i=1}^n B_i \cdot S_1) + (\sum_{i=1}^n E_i \cdot S_2) + (\sum_{i=1}^n V_i \cdot S_3) + (\sum_{i=1}^n H_i \cdot S_4) + (\sum_{i=1}^n L_i \cdot S_5) + (\sum_{i=1}^n M_i \cdot S_6))$$

where  $B_i$  = Annual cost of building  
 $E_i$  = Annual cost of equipment  
 $V_i$  = Annual cost of vehicle  
 $H_i$  = Annual cost of human-capital  
 $L_i$  = Annual cost of health personnel  
 $M_i$  = Annual cost of material  
 $i$  = 1,2,3,4,5,...,n  
 $S_1$  = Proportion of space used for HIV/AIDS activities  
 $S_2$  = Proportion of equipment used for HIV/AIDS activities  
 $S_3$  = Proportion of vehicle used for HIV/AIDS activities  
 $S_4$  = Proportion of human-capital time for HIV/AIDS activities



$S_5$  = Proportion of labor time for HIV/AIDS activities

$S_6$  = Proportion of material used for HIV/AIDS activities

4) Unit cost is the average cost per unit of output or outcome. Calculation of a unit cost (often called average cost) is not difficult, if the total cost and the quantity of output have been found. Unit cost of each HIV/AIDS activity is total cost divided by quantity.

$$\text{Unit cost} = \frac{\text{Total cost of HIV/AIDS activity}}{\text{Quantity or outcome}} \quad (3.7)$$

#### 5) Calculation of capital cost for HIV/AIDS activities

This study clarifies cost by activity to 5 categories mentioned previously. Each HIV/AIDS activity is calculated from capital cost and recurrent cost. Another component is the opportunity cost of the funds tied up in the capital asset. This cost is the loss of opportunity of investment. It is usually valued by applying an interest rate to the amount of capital invested (Michael et al, 1997).

English (1984) described many methods for calculating depreciation as follows.

Straight-line depreciation This is the simplest method and widely used depreciation method. The asset value is divided by the number of years over which it is to be depreciated, in order to obtain the depreciation allowance for each year the depreciation expense that is charged to the expenses for that year.

Declining balance depreciation This method is computed as a negative exponential, but the calculation is done in discrete increments. For instance, it could be stated as a 20% declining balance. This would mean that the first year's depreciation allowance would be 20% of the original asset cost. For example, the book value at the beginning year is US\$ 10,000 so at the end of the first year the book value is US\$ 8,000, the first cost less the depreciation of US\$ 2,000. The second year's depreciation would now be 20% of the book value, and so the new book value would be US\$ 6,400. The procedure is repeated for subsequent years. Clearly, declining balance never reaches

a zero book value. To overcome this difficulty, the accountant uses straight line at some point.

Sum-of-the-digits depreciation This method has one distinct advantage over the declining balance method. The latter never reaches a zero value. Theoretically, it represents as infinite life. The sum-of-the-digits provide a declining allowance schedule that brings the value to zero at the end of the depreciable life. The sum-of-the-digits is found that by summing the years of depreciable life:

$$S = 1+2+3+4+5+\dots+n \quad (3.8)$$

The  $j^{\text{th}}$  year's allowance is then the ratio  $(n-j+1)/S$  times the original asset cost. For example, if the depreciable life is 5 years, then  $S=15$  and the first year's depreciation will be  $1/3$  of the asset value.

Sinking-fund depreciation This method is no longer in current use though it has important theoretical significance. The basis of the sinking-fund depreciation method is a hypothetical deposit into a sinking fund accumulated at a special interest rate and will amount to the original asset value at the depreciable asset life. Sinking-fund depreciation is the same as the proportion of an annuity payment that is allocated to the retirement of the principal.

Straight-line depreciation is constant and the value is linear. Sinking-fund depreciation has the effect of producing a slow decline of value in early and a faster decline in later years. The declining-balance and sum-of-the-digits methods both have the reverse effect that often tends to approximate the trend of resale values of assets.

Capital cost is calculated on an annualized basis so the following approaches are used (Creese and Parker, 1994).

Current value or current cost of capital items as the amount of money that would have to be paid to purchase a similar item now (the replacement value rather than the original price). According to Forest Woody Horton (1994), present value means taking today's cost as the norm and reducing the costs of future year by a "discount factor" based on an estimated time value of money.

Annual cost is the depreciation and opportunity costs expenses that are chargeable to the expenses for that year.

Useful life is lifetimes of an asset according to depreciation. Estimate total number of years of useful life the item can realistically be expected to have (from the time of purchase). Bluag (1972) employed fifty years of the useful life for concrete building, twenty-five years for integrated wood-concrete building, twenty years for wood building, ten years for vehicle, and five years for equipment in calculating capital cost. American Hospital Association (1988) applies five years for the useful life for equipment. Useful life in this study is twenty-five years for integrated wood-concrete building, five years for equipment, and ten years for vehicle. For useful life of human-capital is 10 year depend on HCR, UNAIDS, and Phayao PHO opinion.

Annualization factor or present worth of an annuity factor that means how much one received or paid annually for  $n$  years is worth today (Gittinger, 1984 same as Pindyck and Rubinfeld, 1998).

Capital recovery factor is the annual payment that will repay a US\$ 1 loan in  $n$  years with compound interest on the unpaid balance (Gittinger, 1984).

Discount rate. there are variations in the used of discount rate. However, in this study the real interest calculated by depositing money in the bank minus the rated of inflation (Ruffin and Gregory, 1997), or the discount rate from the economic planning office or Ministry of Finance will be employed. Pindyck and Rubinfeld (1998) explained that commercial banks sometime borrow money for short periods from the Federal Reserve, and the interest rate that the Federal Reserve charges on them is used as the discount rate. Another aspect of discount rate is obtained from the bank if the money was put into the bank instead of buying the capital inputs or it is the interest obtained from bond. Obviously, discount rates used by government assistance agencies, like commercial interest rates depend on many considerations, including general economic conditions. If the costs are more or less equal from month to month during the year, an average discount factor for each year may be better than a discount rate for each year (Forest Woody Horton, 1994).

Due to the changing interest and inflation rates in country, this study uses World Bank discount rate of 10% that is generally use to calculate the cost of building,

equipment, and vehicle. In addition, discount rate of long-term training health staff is 5% by considering expert opinion of HCR and Joint United Nations Programme on HIV/AIDS (UNAIDS).

English (1984) mentioned that there are two methods to calculate present value or current value of each year. One is the formula for a constant payment that calculated the future worth (F) of a present amount (P) at the end of the  $n^{\text{th}}$  period at the interest rate of  $i$ . The formula is:

$$F = P(1+i)^n \quad (3.9)$$

Another is the formula for a constant payment that calculated the present worth (P) of a future value (F) at the end of the  $n^{\text{th}}$  period at the interest rate of  $i$ . The formula is:

$$P = F/(1+i)^n \quad (3.10)$$

where

- P = The present worth or present value or current value
- F = The future worth or future value
- i = Interest rate at the specific period
- n = The difference of year between future worth and present worth

Gittinger (1984) explained the methodology to calculate annual cost of capital, using the following formula.

First, annual cost is current value or current cost divide by annualization factor that another name is present worth of an annuity factor. It is used to calculate the annual cost (A) of a sequence of level payments (the amount of each payment being P) to be made at the end of  $n^{\text{th}}$  periods at the interest rate of  $i$ . The formula is:

$$A = P \frac{[ (1+i)^n - 1 ]}{[ i(1+i)^n ]} \quad (3.11)$$

Second, annual cost is current cost multiply by capital recovery factor. The capital recovery factor is the reciprocal of the present worth of an annuity factor. It is used to calculate the amount of each level payment (P) to be made at the end of each of n periods to recover the present amount (A) at the end of the n<sup>th</sup> periods at the interest rate of i. The formula is:

$$P = A \frac{[i (1+i)^n]}{[(1+i)^n - 1]} \quad (3.12)$$

where

A = Annual cost

P = Present value or amount of each level payment

Annualization factor =  $\frac{[i (1+i)^n]}{[(1+i)^n - 1]}$

Capital recovery factor =  $\frac{[(1+i)^n - 1]}{[i (1+i)^n]}$

i = Discount rate

n = Useful life or life time of asset for depreciation

Calculation of capital cost for HIV/AIDS activities is total capital cost multiplied by the proportion used for HIV/AIDS activities.

#### (1) Building cost for HIV/AIDS activities

The annual cost of building is modified from the original cost taken from the records of planning department, Phayao PHO, and projected to present cost or current cost. The proportion space for health activities are known when the building space is clarified by measurement of building space for each activity. Then, annual cost for each health activity is known from annual cost of building multiplied by the proportion of space for each activity. Annual cost of building for HIV/AIDS activities is the proportion of building space used for HIV/AIDS multiplied by annual building cost of each activity. In reality, the proportion of building space for HIV/AIDS activities is space for HIV/AIDS activities divide by space for Non-HIV/AIDS activities. This study found that building space for health activity as curative care, MCH, HHC, MIS and paperwork, health education and health promotion did not clearly separate to HIV and Non-HIV. Tambon Lor Health Center provides curative care to general patients and PWAs at same room or

same space as provide MCH to general patients and PWAs at same area, work for MIS and paperwork concentrated HIV and Non-HIV at same room, and other activities too. Thus, the proportion of building space for HIV/AIDS activities should be the quantity of PWAs divided by quantity of general patients for each activity. For example, the proportion of building space for curative care is number of HIV-visits divide by number of Non-HIV visits, the proportion of building space for MCH is number of HIV MCH services divide by number of Non-HIV MCH services. The proportion of MIS and paperwork for HIV/AIDS activities is space for HIV divided by space for Non-HIV and other activities as well. In this study, the proportion of building space for curative care is the represent of all HIV/AIDS activities because there are more HIV visits and Non-HIV visits than other activities. The proportion building space for HIV is number of HIV visits divided by Non-HIV visits which is rough proportion.

#### (2) Equipment cost for HIV/AIDS activities

The annual cost of equipment is modified from the original cost taken from the records of planning department, Phayao PHO, Tambon Lor Health Center. The similar items are obtained from the standard cost of equipment account, and market price, then, projected to present cost or current cost. Annual equipment cost for health activities is known after clarifying equipment to health activities. Annual equipment cost for HIV/AIDS activities is annual equipment cost of each HIV/AIDS activity multiplied by the proportion used for HIV/AIDS. The proportion of equipment used for HIV/AIDS in this study is rough proportion because there is no record the frequency equipment used for HIV and Non-HIV. Hence, the rough proportion of equipment used for HIV/AIDS in this study is the same proportion of building space for HIV/AIDS.

#### (3) Vehicle cost for HIV/AIDS activities

The annual cost of vehicle is modified from the original cost taken from the records of planning department, Phayao PHO, and projected to present cost or current cost. The proportion time used of vehicle for health activities are known by considering all health staff opinion but can not go into proportion time used for HIV/AIDS activities. Thus, the rough proportion of vehicle for HIV/AIDS in this study is the same proportion of building space for HIV/AIDS.

#### (4) Human-capital cost for HIV/AIDS activities

The annual cost of human-capital or cost of long-term training is modified from the original cost from local manager sessions, and projected to present cost or current cost. The proportion time of human-capital for HIV/AIDS activities is real proportion. The annual human-capital cost for HIV/AIDS activities is the annual human-capital cost of multiplied by the proportion of time for human-capital or the time of long-term training for HIV/AIDS activities.

#### 6) Calculation of recurrent cost for HIV/AIDS activities

Recurrent cost is those costs associated with the operation or maintenance of facilities or assets. The items mentioned below will be considered as the recurrent cost:

##### (1) Labor cost for HIV/AIDS activities

In this study, the office time of each health staff assumes to 50 weeks, or 250 office days, office time 8 hours per day, work time 7 hours per day or 420 minutes per day and total office time is 120,000 minutes per year. Health personnel work time is 87.5% of total time and 12.5% of total time is personal time, when personal time or relaxant time of health staff is only one hour of lunchtime everyday.

Personnel cost is a great importance, and the observation health staff time for each activity is also important. Health personnel have multiple intricate activities, so it is necessary to identify their time spent. Steps in clarification of health personnel time spent as follow.

First, the proportion of personal time and working time of three staffs calculated from time logging observation for two weeks, are obtained and then projected for one year.

Second, working time for HIV and Non-HIV are obtained from specified working time of three staffs. However, some activities cannot observe. Therefore, work time for HIV and Non-HIV activities are obtained by observation and discussion with health personnel.

Third, health personnel time for each activity is obtained from work time as time for curative care, MCH, HHC, and other activities. Working time for curative care includes curative care for HIV and palliative care for Non-HIV. Working time for other activities should be clarified further by using both time logging observation and discuss with staff concerned their working time and characteristic of work. Because health staff

do many activities throughout the year that can not be observed due to limited time; for example, HHC, health education, health promotion, community meeting and health volunteer training. After that, the final time for each activity such as time for HIV and Non-HIV activities are identified by integrating both observation and discussion.

Further, another important variable of labor costs is the expenditure on health personnel total income such as salary, wages, allowance, sales commission of health cards, and fringe benefit. Hence, health personnel's total income from the record and discussion with them are intended to collect.

Finally, calculation of labor cost associated with HIV/AIDS activities of each health personnel is estimated by multiplying the proportion time for HIV/AIDS activities to their total income in the fiscal year 1998.

## (2) Supplies and material cost for HIV/AIDS activities

Two categories of supplies and material cost are defined as medical supply and non-medical supply.

Medical supplies For example, medicine, vaccines, contraceptive, needle, syringe, cotton wool, etc. used for HIV/AIDS are collected from the Out-patient Department (OPD) card of HIV/AIDS patients, and all of medical supplies obtained from Tambon Lor Health Center records are actual usage. Some costs of medical supplies are original costs from health center record, Chun Hospital, Phayao Hospital, and PHO. Some costs of medical supplies are calculated using market price, medical supply industries or from the pharmacy organization accounting. Some costs of medicine are estimated from the cost of similar medicine, since its actual cost of it is not available. When the cost of medical supplies of general patients usage and HIV/AIDS usage are known, then total cost of medical supplies and medical cost for HIV are also determined.

Non-medical supplies Office supply and utilities includes charges for electricity, water usage, building maintenance, and vehicle maintenance. Office supply cost and office supply usage is obtained from health center record. Office utility cost is obtained from electricity bill, water supply bill and vehicle maintenance

The total cost of non-medical supplies is the summation of the costs of office supply and utilities. Non-medical supply cost for health activities is rough proportion that obtained from considering health staff. Non-medical supply cost for each HIV



activity is estimated from non-medical supply cost of that activity multiplied by the proportion used for HIV/AIDS activities. Thus, the proportion of office supply and utilities for HIV/AIDS in this study is the same rough proportion of building space for HIV/AIDS.

#### 7) Incremental cost

Drummond (1997), the term "incremental" is sometimes used to refer to such a charge but is more often used to refer to the difference in cost which effected or output between the two or more programmes being compared in the evaluation. Such analysis is performed to obtain the information on the additional cost in posed by use of one service over another, compared with the additional effects it deliver. The results tell that how much to pay for each extra output in adding the extra inputs.

Incremental cost is calculated by dividing the difference in total cost between existing package and integrated core package of HIV/AIDS activities at Tambon Lor Health Center and over the difference in their output.

### 3.5.3 Cost Comparison

This study compares cost of the existing package and an integrated core package of HIV/AIDS activities at sub-district level. Cost comparison will include: 1) total cost of HIV/AIDS package in terms of inputs, 2) total cost of HIV/AIDS in terms of activities, 3) unit cost of HIV/AIDS package i.e. total cost of HIV/AIDS package per HIV/AIDS patients, and 4) unit cost of HIV/AIDS per activity.