CHAPTER 4

RESULTS AND DISCUSSION

4.1 Unit Cost of Krasung CH and Lampraimach CH

4.1.1 Result of Total Direct Cost (TDC)

Table 4.1 shows the values of LC, MC and CC of Krasung CH. From Table 4.1, the value of LC is 47% of TC, MC 30% and CC 23% of TC. Table 4.2 shows the values of LC, MC and CC of Lampraimach CH. The value of LC is 43.61%of TC, MC 29.27% and CC 27.12% of TC. It obviously shows that, approximately 70% of TC of two CHs comes from fix costs (FC) of the hospitals (FC = LC+CC). (See more details of total LC of two CHs in Appendix IV)

4.1.2 Result of Unit cost

After allocating costs from NRPCC and RPCC to PS by using step down allocation method (see more details of step down allocation in Appendix III), the results of unit costs are shown in the tables below.

Table 4.3: Results of unit costs of Krasung CH.

Code	Department	Full cost (Baht)	Unit of Measurement	Unit cost (Visit/day)
C01	OPD	2,504,461.50	24,714.00	101.34
C02	IPD	2,984,496.72	3,876.00	769.99
C03	Dental Department	560,450.48	2,458.00	228.01
C04	PCD	690,114.72	2,207.00	312.69
C05	SED	295,329.10		
	Total	7,034,852.51	33,255.00	

Table 4.1: Value of LC, MC and CC of Krasung CH (Baht/ three months)

CODE	DEPARTMENT	LC	MC	CC	TDC	%LC	%MC	%CC	Total
A01	Administration	740,887.90	568,862.72	948,710.58	2,258,461.20	10.53167638	8.08634892	13.48586312	32.10388842
A02	Nursing Department	233,016.00	490,259.63	0	723,275.63	3.312308249	6.969010783	0	10.28131903
A03	Medical Records	153,425.00	0	13,458.30	166,883.30	2.180927031	0	0.191308915	2.372235946
A04	Canteen	15,850.00	97,475.00	90,627.50	203,952.50	0.225306785	1.385601189	1.288264393	2.899172367
A05	Supply	165,680.00	13,739.90	29,938.60	209,358.50	2.35513111	0.195311842	0.425575376	2.976018327
B01	Pharmacy Department	167,210.00	841,204.51	109,076.84	1,117,491.35	2.376879967	11.95767088	1.550520638	15.88507148
B02	Laboratory	65,610.00	81,900.00	10,675.09	158,185.09	0.932642154	1.164203512	0.151745754	2.248591421
B03	X-ray	14,969.00	0	17,805.52	32,774.52	0.212783423	0	0.253104382	0.465887806
B04	LR-OR	308,335.50	0	0	308,335.50	4.382970355	0	0	4.382970355
B05	Thai's Traditional medicine	39,105.00	4,548.00	23,071.37	66,724.37	0.555875193	0.064649543	0.327958119	0.948482856
C01	OPD	408,986.50	0	38,370.49	447,356.99	5.81371819	0	0.545434179	6.359152368
C02	IPD	530,236.00	0	292,577.00	822,813.00	7.537272448	0	4.158964237	11.69623668
C03	Dental Department	195,319.00	35,055.00	16,067.56	246,441.56	2.77644769	0.49830469	0.228399387	3.503151767
C04	PCD	152,668.00	0	0	152,668.00	2.170166322	0	0	2.170166322
C05	SED	117,006.00	0	3,125.00	120,131.00	1.663233164	0	0.044421685	1.707654849
	Total	3,308,303.90	2,133,044.76	1,593,503.85	7,034,852.51	47.02733846	30.32110136	22.65156018	100

Table 4.2; Value of LC, MC and CC of Lampraimach CH (Baht/three months)

Code	Department	LC	MC	CC	TDC	%LC	%MC	%CC	Total
A01	Administration	3,584,580.50	1,326,253.43	2,115,145.35	7,025,979.28	15.40	5.69652593	9.084975813	30.18
A02	Canteen	132,090.00	502,377.00	186,583.90	821,050.90	0.57	2.157810523	0.801415476	3.53
A03	Nursing department	180,235.95	667,798.33	5,670.00	853,704.28	0.77	2.87	0.024353793	3.67
A04	Supply	194,565.00	76,380.00	105,785.90	376,730.90	0.84	0.328067503	0.454371773	1.62
A05	Medical Record	257,649.00	-	29,050.00	286,699.00	1.11	0	0.124775608	1.23
B01	Phamacy department	337,280.90	3,619,114.12	36,759.50	3,993,154.52	1.45	15.54482497	0.157889465	17.15
B02	Laboratory	263,918.80	487,802.78	104,128.00	855,849.58	1.13	2.095211309	0.447250758	3.68
B03	X-ray	132,494.75	-	7,732.35	140,227.10	0.57	0	0.033212003	0.60
B04	LR	363,967.50	-	576,513.75	940,481.25	1.56	0	2.476242814	4.04
B05	OR	315,575.75	-	529,876.25	845,452.00	1.36	0	2.275925347	3.63
B06	Thai's Traditional Medicine	62,325.90	84,132.00	98,262.50	244,720.40	0.27	0.361363906	0.422057253	1.05
B07	Discharge Center	102,060.00	-	-	102,060.00	0.44	0	0	0.44
C01	OPD (include ER)	1,075,870.35	-	42,347.50	1,118,217.85	4.62	0	0.181891052	4.80
C02	IPD I (Med)	684,626.36	-	37,167.65	721,794.01	2.94	0	0.159642552	3.10
C03	IPD II (PADIETRIC)	518,048.27	-	143,988.83	662,037.10	2.23	0	0.618461061	2.84
C04	IPD III (Surgeon-PP)	533,054.14	-	1,194,160.42	1,727,214.56	2.29	0	5.129159815	7.42
C05	IPD IV (Monk)	419,310.42	-	458,527.50	877,837.92	1.80	0	1.969468078	3.77
C06	ICU	470,742.41	-	320,294.50	791,036.91	2.02	0	1.375729467	3.40
C07	Dental department	213,600.00	51,221.40	113,169.50	377,990.90	0.92	0.220006242	0.486085824	1.62
C08	PCD	193,696.50	-	205,942.50	399,639.00	0.83	0	0.884564567	1.72
C09	SED	117,886.50	-	2,030.00	119,916.50	0.51	0	0.008719259	0.52
	Total	**10,153,579.00**	**6,815,079.06**	**6,313,135.90**	**23,281,793.96**	43.61	29.27213887	27.11619178	100.00

Table 4.4: Results of unit costs of Lampraimach CH.

Code	Department	Full cost (Baht)	Unit of measurement	Unit cost (Visit/ day)
C01	OPD (include ER)	6,668,659.25	27,820.00	239.71
C02	IPD I (Med)	2,674,702.81	4,228.00	632.62
C03	IPD II (PADIETRIC)	2,002,394.97	2,662.00	752.21
C04	IPD III (Surgeon-PP)	6,143,107.81	2,482.00	2,475.06
C05	IPD IV (Monk)	1,789,352.03	1,784.00	1,003.00
C06	ICU	1,481,896.22	456.00	3,249.77
C07	Dental department	1,169,509.73	2,989.00	391.27
C08	PCD	1,068,652.65	1,921.00	556.30
C09	SED	283,518.50		
	Total	23,281,793.96	44,342.00	

The unit of measurement for cost center OPD, Dental department and PCD is the number of visits of each cost center. For cost center IPD, the unit of measurement is the number of days.

In the case of the SED cost center, its operation is more on an active side than the others, for instance, it arranges insecticide sprays to protect the communities for protect Malaria and Dengue fever. Its unit cost, therefore, cannot be calculated from the number of visits in the hospital. However, AVO takes full cost of this cost center into account, because SED provides services for people in the communities as well.

4.1.2.1 Unit cost of Krasung CH (Table 4.3)

The ACO of Krasung CH equals the summation of full costs of C01, C03, C04 and C05 divided by the summation of the number of hospital visits of C01, C03 and C04.

$$ACO_K = \frac{2,504,461.50 + 560,450.48 + 690,114.72 + 295,329.10}{24,714 + 2,458 + 2,207}$$

$$= 4.\underline{050.355.79} = 137.87 \text{ Baht/visit}$$
$$29,379$$

For ACI, because Krasung CH has only one ward, which is the general ward, then the ACI equals the unit cost of C02 (IPD) cost center.

$$\text{ACI}_K = 769.99 \text{ or approximately } 770 \text{ Baht/day}$$

Or $$= \underline{2,984,496.72} = 3,276 \text{ Baht/case}$$
$$911 \text{ cases}$$

4.1.2.2 Unit cost of Lampraimach CH (Table 4.4)

As same as ACO of Krasung CH, the ACO of Lampraimach CH equals the summation of full costs of C01, C07, C08 and C09 divided by the summation of the number of hospital visits of C01, C07 and C08.

$$\text{ACO}_L = \frac{6,668,659.25 + 1,169,509.73 + 1,068,652.65 + 283,518.50}{27,820 + 2,989 + 1,921}$$

$$= \frac{9,190,340.13}{32,730} = 280.79 \text{ Baht/visit}$$

The ACI of Lampraimach CH equals the summation of full costs of C02 through to C06 divided by the summation of the number of days of hospital stays of C02 through to C06.

$$\text{ACI}_L = \frac{2,674,702.81 + 2,002,394.97 + 6,143,107.81 + 1,789,352.03 + 1,481,896.22}{4,228 + 2,662 + 2,482 + 1,784 + 456}$$

$$= \underline{14,091,453.83} = 1,213.53 \text{ Baht/day}$$
$$11,612$$

Or

$$\text{ACI}_L = \underline{14,091,453.83} = 3,813.65 \text{ Baht/case}$$
$$3,695$$

4.2 Cost-Recovery of UC Scheme Analysis

As mentioned in Chapter 3, Cost of patient under UC Scheme in the first quarter of fiscal year 2002 is equal to (ACO * number of OPD visits from UC) + (ACI * number of IPD days from UC) + cost of refer UC cases +salaries of Health Center personnel + other expenditure of Health Center.

And Revenue from UC Scheme is equal to [1,052 * Number of people registered with UC in catchments area] / 4 + co-payment from patients + high cost care reimbursement + revenue from refer case of UC patients who are registered in other catchments areas.

Table 4.5: Information for analysis of cost recovery of UC scheme of two CHs.

	Unit of measurement	Krasung	Lampraimach
Number of population who are registered	Capitates	81,454.00	111,735.00
Number of OPD's UC	Total visit in three months	13,420.00	16.979.00
Number of IPD's UC	Total day stay in three months	2,562.00	8.432.00
Expenditure of Health center in district (include LC)	Baht of three months	3,810,359.67	6,968,140.00
ACO	Baht / visit	137.87	280.79
ACI	Baht / day	769.99	1,213.53
Refer case cost	Baht of three months	231,128.75	134.326.00
Revenue from high cost care +received refer case	Baht of three months	25,715.00	550.834.00
Revenue from co payment	Baht of three months	99,210.00	83.160.00

From the Table 4.3, TC of UC Scheme of Krasung CH (TCK) and TR of UC Scheme of Krasung CH (TRK) will be as follows,

TCK $= (13,420)*(137.87) + (2,562)*(769.99) + 3,810,359.67 + 231,128.75$

$= 1,850,215.42 + 1,972,724.61 + 4,041,488.42$

$= 7,864,370.45$ Baht

TRK $= (81,454)*(1,052) / 4 + 25,715 + 99,210$

$= 21,422,402 + 124,925$

$= 21,628,781$ Baht

Hence, TRK / TCK $= 21,628,781 / 7,864,370.45 = 2.75$, which indicates that the revenue of Krasung is 2.75 times its cost.

Also, TC of UC Scheme of Lampraimach CH (TCL) and TR of UC Scheme of Lampraimach CH (TRL) will equal to

TCL $= (16,979)*(280.79) + (8,432)*(1,213.53) + 6,968,140 + 134,326$

$= 4,767,576.69 + 10,232,443.91 + 7,102,466$

$= 22,102,486.60$ Baht

TRL $= (1,052)*(111,735)/4 + 83,160 + 550,834$

$= 29,386,305 + 633,994$

$= 30,020,299$ Baht

Therefore, TRL divided by TCL will be 1.36. It means TRL 1.36 times TCL.

4.3 ARR Calculation

As mentioned in Chapter 3, DV = TR – TC and

DV per capita = $\dfrac{DV}{\text{Number of people registered with UC}}$

Therefore, **ARR = UC reimbursement Rate (UCR) +/- DV   per capita**

4.3.1 ARR of Krasung CH

From TCK = 7,864,370.45 Baht and TRK = 21,628,781 Baht

Then,   TRK – TCK = 21,628,781 – 7,864,370.45
                        = 13,764,410.55 Baht

Therefore, DV per capita = $\dfrac{13,764,410.55}{81,454}$ = 168.98 Baht /person

Finally, ARR of Krasung CH = 1,052 – 168.98 = 883.02 Baht / person

It means that the ARR of Krasung CH should equal to 884 Baht/capita/year at 81,454-registered capita.

4.3.2 ARR of Lampraimach CH

From TRL = 30,020,299 Baht and TCL = 22,102,486.60 Baht

Then,   TRL – TCL = 30,020299 – 22,102,486.60
                        = 7,917,812.40 Baht

Hence, DV per capita = $\frac{7,917,812.40}{111,735}$ = 70.86 Baht/person

Therefore, APP of Lampraimach CH = 1,052 − 70.86 = 981.14 Baht/person. The ARR of Lampraimach CH should equal 982 Baht/capita/year at 111,735-registered capita.

4.4 ANP Calculation

From DV = 0, TR − TC = 0, then TR = TC

4.4.1 ANP of Krasung CH (thirty-bed CH)

$$TRK = TCK$$

Then; $(X)*(1,052) / 4 + 25,715 + 99,210 = 7,864,370.45$

Hence; $X = \frac{(7,864,370.45 - 124,925) * 4}{1,052}$

$$X = \frac{7,739,445.45 * 4}{1,052}$$

$$X = 29,427.55 \text{ persons}$$

In conclusion, at 1,052 UCR, Krasung CH should cover approximately 29,428 people registered under UC.

4.4.2 ANP of Lampraimach CH (ninety-bed CH)

From   TCL = TRL

Then, **(X)***(1,052) / 4 +550,834 + 83,160 = 22,102,486.06

Hence; $$X = \frac{(22,102,486.06 - 633,994) * 4}{1,052}$$

$$X = \frac{21,468,492.60 * 4}{1,052}$$

$$X = 81,629.25 \text{ persons}$$

It means that if Lampraimach CH receives UCR at 1,052 Baht/person/year, Lampraimach CH should cover approximately 81,630 people registered under UC.

4.5 Graphic description of appropriate reimbursement rate (ARR) and appropriate number of people registered with UC (ANP)

From equation (3.11) in Chapter 3,

$$ARR = \frac{3UCR}{4} + \frac{[ACO_i - (PO_i)*(30)]*OP \text{ Utilization}_i + [ACI_i - (PO_i)*(30)]*IP \text{ Utilization}_i + OF_i}{ANP}$$

Where; i   = Size of CH

UCR = Current UC reimbursement rate (1,052 Baht/person/year)

PO   = Probability of co-payment of OP

PI   = Probability of co-payment of IP

OF   = Other figures (=costs of refer UC cases + other costs of Health

Center - High cost care reimbursement - revenue from refer

cases of UC patients who are registered in other catchments area

*Note: IP utilization calculate in term of visit (person) = Number of day stay of UC's patients / Length of Stay (LOS) of overall IP)

Table 4.6: Information for describes ARR and ANP in term of graph.

Information	Krasung CH	Lampraimach CH
Probability of co-payment of OP (PO)	0.23	0.14
PO * 30 Baht	6.90	4.08
Probability of co-payment of IP (PI)	0.26	0.20
PI * 30 Baht	7.80	5.91
ACO (per visit)	137.87	280.79
ACI (per person)	3,276.07	3,813.65
Utilization of UC's patients		
OP (visit)	13,420.00	16,979.00
IP (day)	2,562.00	8,432.00
Total utilization	15,982.00	25,411.00
People registered with UC	81,454.00	111,735.00
OF		
Expenditures from health center	3,810,359.67	6,968,140.00
Costs of refer cases	231,128.75	134,326.00
Revenue of refer case and high cost	25,715.00	550,834.00

The results of equation (3.11) are shown in Table 4.7.

Table 4.7: Data for graphic description of ARR and ANP.

ANP	ARR of Krasung CH	ARR of Lampraimach CH
10,000.00	1,563.27	2,936.50
20,000.00	1,176.13	1,862.75
29,428.00	**1,052.11**	1,518.75
40,000.00	982.57	1,325.87
50,000.00	943.85	1,218.50
60,000.00	918.04	1,146.92
70,000.00	899.61	1,095.79
80,000.00	885.78	1,057.44
81,454.00	**884.06**	1,052.65
81,629.00		**1,052.08**
90,000.00		1,027.61
100,000.00		1,003.75
110,000.00		984.23
111,735.00		**981.20**

Figure 4.1: Graphic description of ARR and ANP
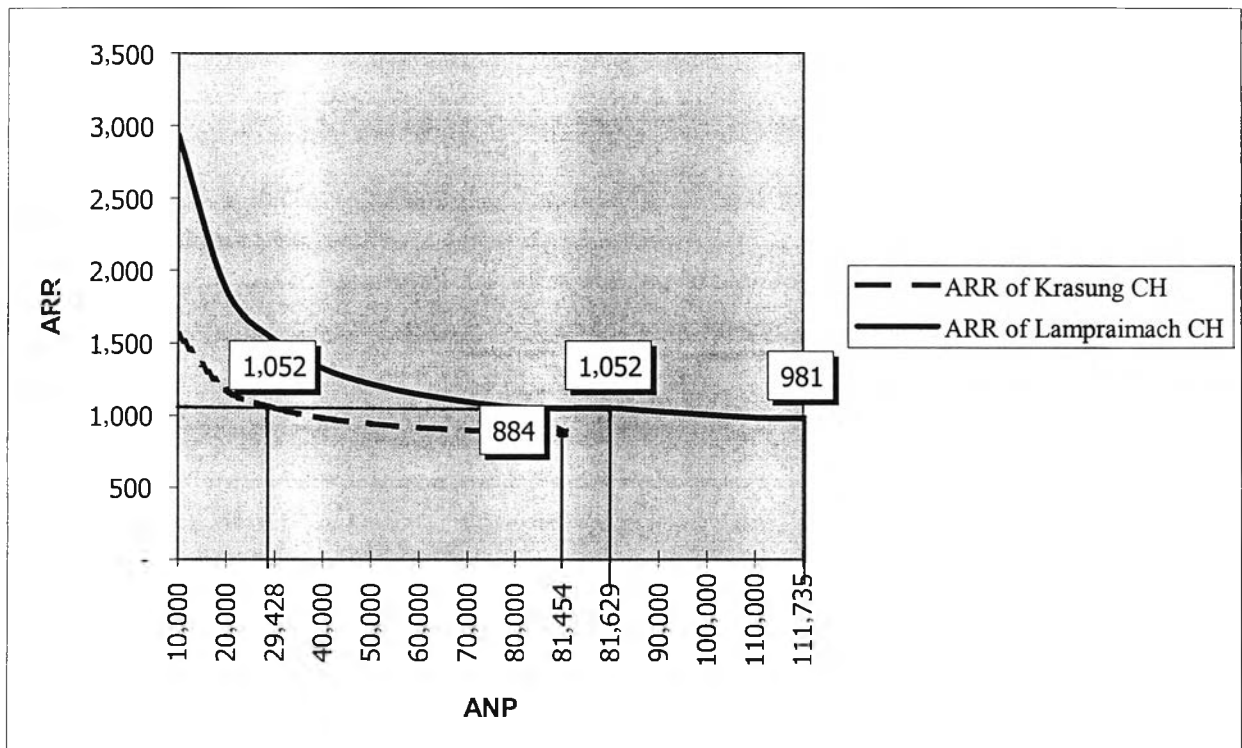
In Figure 4.1, the horizontal axis is ANP and vertical axis is ARR. Figure 4.1 show that at 1,052 Baht (present UCR), Krasung CH should have approximately 29,428 people registered with UC and Lampraimach CH 81,629 people registered with UC. Otherwise, at present number of people registered with UC of two CHs, the reimbursement rate of Krasung CH and Lampraimach CH should equal approximately 884 Baht and 981 Baht.

4.5 Conclusions and Discussion

This study has intended to estimate the unit costs of two CHs, analyze cost-recovery from UC scheme and calculate the ARR and ANP of two CHs. As mentioned in Chapter 1, this study has two hypotheses that the cost of community hospital cannot be covered under the UC Scheme and that

reimbursement rate of hospitals of different sizes should be different (i.e., the larger hospital should get higher reimbursement rate).

From Table 4.3 and 4.4, the unit costs per visit of PCD of two CHs are highest comparing with other OP services. The PCD provides services in hospital (i.e., mother and child counseling) and out of hospital (i.e., community volunteers' training, community health education). Anyhow, this study calculates unit cost per visit of PCD in term of visit in hospital. So the unit cost per visit of PCD will be high.

Table 4.8: Comparing value of ARR.

** At present people registered	ARR (Direct calculation)	ARR (Graphical method)
Krasung CH	883.02	884.06
Lampraimach CH	981.14	981.20

Table 4.8 shows the value of ARR, which come from different calculation method [Graphical method (equation 3.11) and direct calculation (equation 3.9, 3.10)]. The values of ARR of two CHs are not absolutely equal. Because the length of stay (LOS) of overall inpatient, Krasung CH 4.25, Lampraimach CH 3.14, are different from the LOS of UC's inpatient, Krasung CH 3.5, Lampraimach CH 3.59. The probability of co-payment of IP under UC calculates from the length of stay (LOS) of UC's IP. On the contrary, the IP utilization (visit or person) calculates from the LOS of overall IP. Therefore, the values of ARR, which come from different method, will be different.

Table 4.9: Conclusion of results of two CHs.

Results	Unit of measurement	Krasung CH	Lampraimach CH
ACO	Baht per visit	137.87	280.79
ACI	Baht per day	769.99	1,213.53
ACI	Baht per case	3,276.00	3,813.65
TR/TC		2.75	1.36
ARR	Baht per person per	884.00	982.00
ANP	Capita	29,428.00	81,630.00

Table 4.9 summarizes the results of this study. ACO and ACI of two CHs of different sizes are different. Not only ACO of Lampraimach CH (ninety-bed CH) is higher than that of Krasung CH (thirty-bed CH) but also ACI of Lampraimach CH is higher than that of Krasung CH. At the same UCR (1,052 Baht/person) and almost the same of number of people registered with UC of two CHs, since the main proportion of TR comes from the number of registered people multiplied by 1,052, the ratio of TR: TC of Lampraimach CH will be less than that of Krasung CH.

However, these two CHs have higher TR than TC because the numbers of people registered with UC are large enough. So the ARR of two hospitals will be less than the present UCR. The results indicate that the ARR of Krasung CH should equal 884 Baht per person per year and the ARR of Lampraimach CH should equal 982 Baht per person per year (at TR=TC or profit = 0).

At 1,052 UCR, Krasung CH should have 29,428 people registered with UC whereas Lampraimach CH should have 81,630 people registered with UC in order to make TR equal to TC or profit equal to zero.