

## **CHAPTER 4**

### **ANALYSIS AND RESULT**

The objective for this study is to answer the question for cost-benefit of screening HCV virus from the blood donor and to evaluate cost for HCV screening that has been established the screening test (Elisa) for blood donors, so it can build up the self-awareness for HCV for every hospital before receiving the blood from the donor.

#### **4.1 Component to evaluate cost-benefit**

1. Cost for screening test process (Elisa)
2. Benefit will be composed of two things: Cost avoided of HCV treatment and lost income of HCV infected patients.

#### **Cost**

Cost as an economist view means the value of all the resource that has been used to get the final product or out put or services. However, this study cost means the resource that had been use for the screening test process. Method by Elisa test (Enzyme Linked Immunosorbent) and will be composed of labor and other expenditure cost.

#### **Cost for the Screening test**

The donor's population from Thai Red Cross between years 1998, 1999, and 2000 will be used. The average figure was the representative for all donors.

Table 4.1 Number of donors: 2000

Year	Donors
1998	228,111
1999	224,483
2000	211,633
Average	221,409

Source: Division of statistic, Thai Red Cross

Table 4.2 Screening test cost per head: 2000

Program	Value (Baht/person)
1. Anti-HCV	102.00
2. Labour cost	1.55
3. Overhead cost	3.64
<b>Total</b>	<b>107.19</b>

Source: Division of Finance and Administration, Thai Red Cross.

Unit cost for screening test for each donor at Thai Red Cross was 102 Baht and the represented populations were 221,409 person.

$$\begin{aligned}
 \text{Cost of Screening test} &= 221,409 \times 102 \\
 &= 22,583,718 \text{ Baht}
 \end{aligned}$$

Beside cost for the screening process test, it also involved other cost in the process for the screening program.

1. Labor cost
2. Overhead cost

Table 4.3 Other cost: 2000

Cost	Unit cost ( Baht )
1. Labor	1.55
2 Overhead cost	3.64
Total	5.19

Source: Division of Finance and Administration, Thai Red Cross.

Unit cost for the screening process test for donors at Thai Red Cross per head was 5.19 Baht and represented population was 221,409 Baht.

$$\begin{aligned} \text{Other cost} &= 5.19 \times 221,409 \\ &= 1,149,113 \end{aligned}$$

Cost for screening test combined with other cost:

$$\begin{aligned} \text{Cost of Screening process test} &= 22,583,718 + 1,149,113 \\ &= 23,732,831 \text{ Baht} \end{aligned}$$

## 4.2 Benefit

### 4.2.1 Cost saving for treatment

To calculate the benefit for cost save for treatment will be by using the cost for HCV patient that is paid directly to Chulalongkon Memorial Hospital and combined with the prevented population from HCV.

#### 4.4 Treatment cost for HCV as net present value

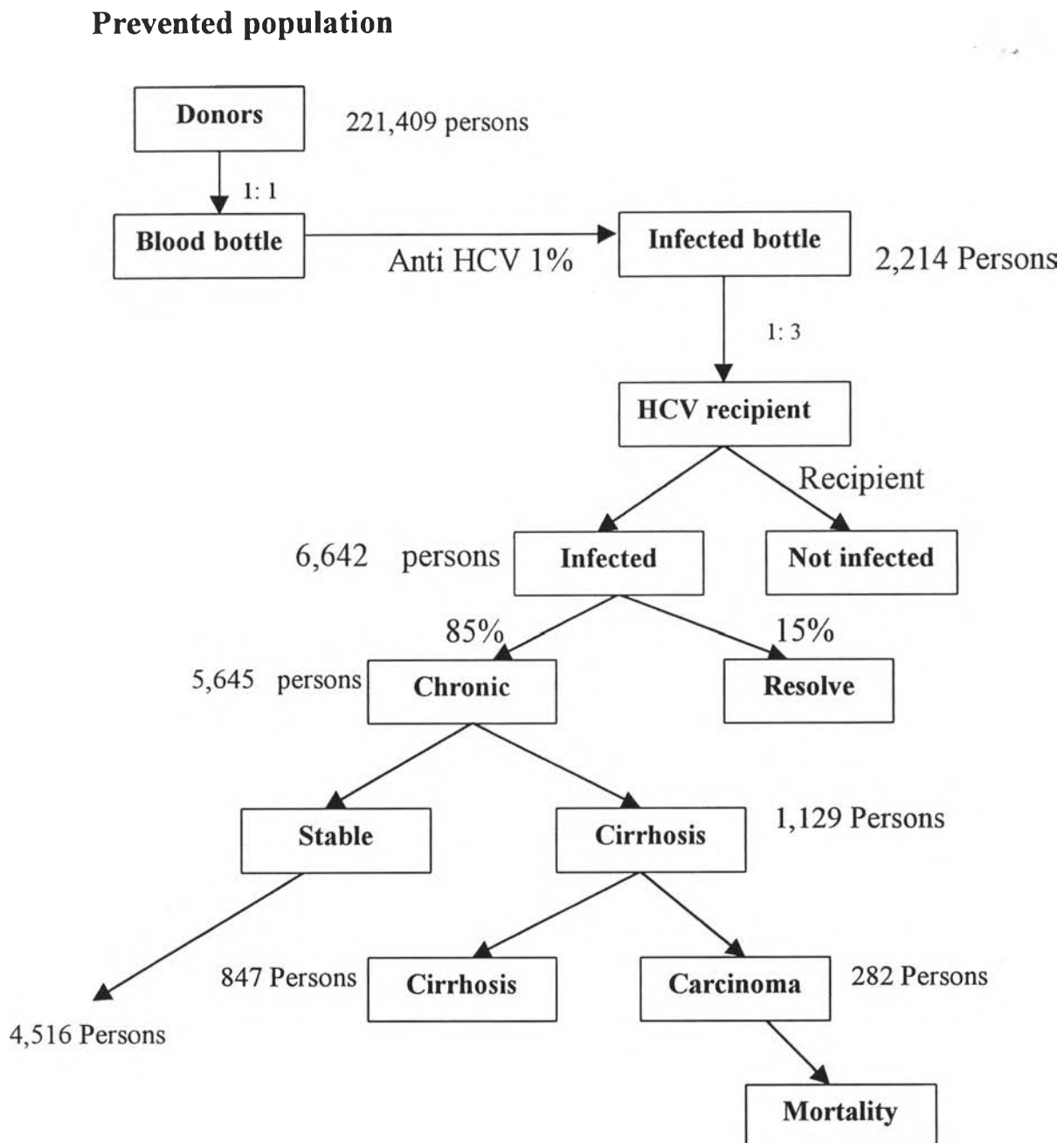
State	Expenditure (Baht)	Duration for Disease	Total Expenditure (3% discount)
1. Asymptomatic (Acute)	-	10	-
2. Chronic	4,990 (per/year)	10 years	42,565
3. Cirrhosis	41,844 (per/year)	5 years	138,386
4. Carcinoma	74,166 (per 5 mos)	5 months	46,217
Total			227,168

Source: Gastroenterology department at Chulalongkon Memorial Hospital.

In the acute state the symptom is asymptomatic; it is difficult to diagnosis. Treatment cost is undefined therefore, the assumption for this study was no treatment cost for acute state.

Treatment cost for hepatitis C that occurs at the second state was 4,990 baht per year for the duration of 10 years, equivalent to 42,565 baht at 3% annual discount rate. Cirrhosis state was 41,844 baht per year for duration of 5 years, equivalent to 138,386 baht at 3% annual discount rate. Carcinoma cost were collected from the patient recorded, that has been admitted and received the care for 16 cases at Medical recorded, Chulalongkorn Memorial Hospital. Treatment cost was 74,166 baht for 5 months, equivalent to 46,217 baht at 3% annual discount rate.

**Figure 4.1 Prevented population**



Presented population for blood donors 221,409 persons which were able to donate 221,409 bottles and will find blood infected by HCV 2,214 bottles (1%) and the blood that was infected by HCV will be transferred to other recipient at 6,642 cases (1:3) and 85% or 5,645 persons will develop to Chronic. The stable person will be 4,516 still and Cirrhosis state at 1,129 persons. At Cirrhosis state develop to Carcinoma at 282 persons and stable at 847 persons.

Expected treatment cost per case

$$\begin{aligned}
 &= 42,565 + [(1,129/5,645) \times 138,386] + [(282/5,645 \times 46,217)] \\
 &= 42,565 + 27,677 + 2,309 \\
 &= 72,551
 \end{aligned}$$

$$\begin{aligned}
 \text{Cost save for treatment} &= 72,551 \times 282 \\
 &= 20,459,382 \text{ Baht}
 \end{aligned}$$

### 4.3 lost income saved

Method to calculate for earning income foregone can be calculate from the population that death from HCV as frame work below as ( Net present value ).

Figure 4.2 Death population for HCV infected

Death population for HCV infected

Chronic 5,645 persons



Cirrhosis 1,129 persons



Carcinoma 282 persons



282 persons to mortality

From the figure 4.2, the population at 5,645 persons from the second state (Chronic) within 10 years will develop to the third state (Cirrhosis) at 1,129 persons and the other still in the second state. For the third state, which 1,129 persons will develop to the fourth state (Carcinoma) at 282 persons and the other, which are 1,129 persons still in the third state. The expected death population for the Carcinoma state will be 282 persons.

Table 4.5 Infected populations for HCV between the years 1998-2000

Age	1998			1999			2000		
	Donors	infected population	%	Donors	infected population	%	Donors	infected population	%
<20	37,735	143	0.38	40,356	99	0.25	34,451	81	0.24
21-25	55,890	436	0.78	53,827	374	0.69	48,642	292	0.60
26-30	44,276	245	0.55	41,683	200	0.48	40,304	197	0.49
21-35	31,775	202	0.64	30,799	141	0.46	30,712	129	0.42
36-40	25,404	166	0.65	24,815	159	0.64	24,282	96	0.40
41-45	16,578	114	0.69	16,533	89	0.54	16,866	99	0.59
46-50	9,668	56	0.58	9,824	31	0.32	9,632	49	0.51
51-55	4,633	28	0.60	4,620	23	0.50	4,802	18	0.37
56-60	1,972	13	0.66	1,879	6	0.32	1,814	6	0.03
>60	180	0	0.00	147	1	0.68	158	3	1.90
Total	228,111	1,403		224,483	1,123		228,023	970	

Source: Thai Red Cross

From the table 4.5 shows the amount of the population that had been donated the blood and found HCV infected was divided by the age from the year 1998, 1999, and 2000 found that the donor age between 21-25 year (average 23yrs) The proportion for HCV infected was 0.78, 0.69 and 0.60. The average age, which is 23 years old, will be the represented for the donor and HCV infected.

## **Lost income saved for HCV infected per capital**

### **4.4 Assumption to calculate lost income saved**

1. Average income per capital will be by using year 2000.
2. Set the benefit at 3% per year fixed.
3. Set the income increase every first five year at 20%.
4. HCV infected for the first state between the year 1-5 will be able to earn the income for NPV for 100% as normal person and no loss of income at all.
5. HCV infected for the second state between the years 6-15 are able to earn the income for NPV at 80% as normal person and will be loss the income for 20% as normal person.
6. HCV infected for the third state between years 16-20 be able to earn the income for NPV at 50% as normal person and will loss of the income at 50%as normal person.
7. HCV infected for the fourth state between year 21-40 and loss the income as 100% as normal person and no benefit for the NPV.



Table 4.6 shows net present value of the income for HCV patients

years	at		patient's age	average income yearly	Normal Income at NPV	Income on assumption	Lost income at NPV
2001	1	state 1	23	73,771.00	71,622.33	71,622.33	-
2002	2		24	73,771.00	69,536.24	69,536.24	-
2003	3		25	73,771.00	67,510.92	67,510.92	-
2004	4		26	73,771.00	65,544.58	65,544.58	-
2005	5		27	73,771.00	63,635.51	63,635.51	-
2006	6	state 2	28	76,721.84	64,253.33	51,402.67	12,850.67
2007	7		29	79,672.68	64,781.18	51,824.94	12,956.24
2008	8		30	2,623.52	65,223.77	52,179.02	13,044.75
2009	9		31	85,574.36	65,585.62	52,468.50	13,117.12
2010	10		32	88,525.20	65,871.06	52,696.85	13,174.21
2011	11	state 3	33	92,066.21	66,510.59	53,208.47	13,302.12
2012	12		34	95,607.22	67,056.98	53,645.58	13,411.40
2013	13		35	99,148.22	67,515.12	54,012.09	13,503.02
2014	14		36	102,689.23	67,889.68	54,311.74	13,577.94
2015	15		37	106,230.24	68,185.15	54,548.12	13,637.03
2016	16	state 4	38	110,479.45	68,847.14	34,423.57	34,423.57
2017	17		39	114,728.66	69,412.73	34,706.36	34,706.36
2018	18		40	118,977.87	69,886.96	34,943.48	34,943.48
2019	19		41	123,227.08	70,274.68	35,137.34	35,137.34
2020	20		42	127,476.29	70,580.53	35,290.26	35,290.26
2021	21	state 4	43	132,575.34	71,265.78	-	71,265.78
2022	22		44	137,674.39	71,851.23	-	71,851.23
2023	23		45	142,773.44	72,342.13	-	72,342.13
2024	24		46	147,872.49	72,743.47	-	72,743.47
2025	25		47	152,971.55	73,060.06	-	73,060.06
2026	26	state 4	48	159,090.41	73,769.38	-	73,769.38
2027	27		49	165,209.27	74,375.40	-	74,375.40
2028	28		50	171,328.13	74,883.54	-	74,883.54
2029	29		51	177,446.99	75,298.99	-	75,298.99
2030	30		52	183,565.85	75,626.70	-	75,626.70
2031	31	state 4	53	190,908.49	76,360.94	-	76,360.94
2032	32		54	198,251.12	76,988.25	-	76,988.25
2033	33		55	205,593.76	77,514.24	-	77,514.24
2034	34		56	212,936.39	77,944.28	-	77,944.28
2035	35		57	220,279.03	78,283.51	-	78,283.51
2036	36	state 4	58	229,090.19	79,043.54	-	79,043.54
2037	37		59	237,901.35	79,692.89	-	79,692.89
2038	38		60	246,712.51	80,237.36	-	80,237.36
2039	39		61	255,523.67	80,682.50	-	80,682.50
2040	40		62	264,334.83	81,033.65	-	81,033.65
				NPV =	2,872,721.95	1,042,648.58	1,830,073.37

Lost income saved from HCV infected per capital will be 1,830,073 baht and the expected population to die from HCV will be 43 persons.

$$\begin{aligned} \text{Lost income saved} &= 1,830,073 \times 282 \\ &= 516,080,586 \text{ Baht} \end{aligned}$$

### 1. Screening test ( Cost-Benefit Analysis )

$$\begin{aligned} \text{TF} &= \text{Total benefit} - \text{Total Cost} \\ \\ \text{Total benefit} &= \text{Lost income saved} + \text{treatments cost saved} \\ &= 516,080,586 + 20,459,382 \\ &= 2,148,062,496 \\ \text{Total cost} &= \text{Cost of Screening process} \\ &= \text{Cost of screening test} + \text{other cost} \\ &= 22,583,718 + 1,149,113 \\ &= 23,732,831 \text{ Baht} \\ \\ \text{TF} &= 536,539,968 - 23,732,831 \\ &= 512,807,137 \end{aligned}$$

When analyses for cost-benefit for screening test for screening for HCV was 2,124,329,665 Baht.

### 2. Screening test ( Benefit - Cost Ratio )

$$\begin{aligned} \text{Ratio} &= \text{Sum of benefit} / \text{Sum of cost} \\ \text{Sum of benefit} &= 536,539,968 \\ \text{Sum of cost} &= 23,732,831 \\ \text{Ratio} &= 536,539,968 / 23,732,831 \\ &= 22.60 > 1 \text{ (Benefit)} \end{aligned}$$

When analyses for the cost-benefit of the screening test and the result from calculation yield out as positive. It shows the benefit for performing the screening test to screen HCV infected in every donor.

Both method for calculation for Cost – Benefit Analysis and Benefit - Cost Ratio shows the benefit for performing Screening test for calculation as Cost – Benefit Analysis yield out positive as 512,807,137 Baht and Benefit - Cost Ratio yield out as 22.60.