

CHAPTER 4

RESULTS

The blood of 2,328 asymptomatic participants were collected. All blood samples were tested for one tube osmotic fragility test and only 502 samples were positive. Only 502 samples were further investigated by the modified hemoglobin H inclusion test and the PCR test. The results were shown in table 4.1 and 4.2. The calculation of properties of the test was performed.

Table 4.1. Demographic data of 2,328 healthy people

	Number	Percent
<u>Age (year)</u>		
1-20	464	20.0
21-40	1,570	67.0
41-60	293	12.0
>61	1	0.04
<u>Sex</u>		
Male	2,067	88.8
Female	261	11.2
<u>Diagnosis</u>		
Normal	1,734	74.0
Hb E trait	450	19.0
Hb E homozygous	50	2.1
Hb E trait with α -thal trait	12	0.5
α -thal trait	43	1.8
β -thal trait	35	1.5
Hb H disease	2	0.1
Hb E homozygous with α -thal trait	1	.04
Hb CS	1	.04
Total	2,328	100.00

Table 4.2 The two by two tables of the modified hemoglobin H inclusion test and the PCR test.

		PCR test for α -thalassemia 1	
		Present	Absent
Modified Hb H inclusion test	Positive	47	8
	Negative	11	436

$$\text{Sensitivity} = 47 / (47 + 11) = 81\%$$

$$\text{Specificity} = 436 / (8 + 436) = 98\%$$

$$\text{PPV} = 47 / (47 + 8) = 85\%$$

$$\text{NPV} = 436 / (11 + 436) = 98\%$$

$$\begin{aligned} \text{Accuracy} &= (47 + 436) / (47 + 8 + 11 + 436) \\ &= 96\% \end{aligned}$$

$$\begin{aligned} \text{LR+} &= \frac{47}{(47 + 11)} \cdot \frac{8}{(8 + 436)} \\ &= 44.8 \end{aligned}$$

$$\begin{aligned} \text{LR-} &= \frac{11}{(47 + 11)} \cdot \frac{436}{(8 + 436)} \\ &= 0.2 \end{aligned}$$

$$\text{Prevalence} = (47 + 11) / (47 + 8 + 11 + 436) = 11.5\%$$

The economic evaluation was analyzed from the data in table 4.3 to 4.12. The results of the total cost of each program and cost effectiveness ratio was shown in table 4.13 and 4.14 respectively.

Table 4.3 Capital depreciation (C.C) of Osmotic fragility test and modified Hb H inclusion test

	Floor space (m2)	Unit cost (baht)	Equipment (baht)	Total (baht)
1.Laboratory	200	25,000	-	5,000,000
2.Centrifuge	-	-	20,000	20,000
3.Microscope	-	-	50,000	50,000
4.Incubator	-	-	20,000	20,000
				5,090,000

Table 4.4 Time used by technician during Osmotic fragility test and modified Hb H inclusion test

	Time (h)
1. registration and blood drawing for 100 tests	16.0
2. OFT 100 test	8.3
3. transfer and centrifuge for 20 positive tests	2.0
4. incubation for I.C. test	2.0
5. microscopic examination	7.2
6. total time for 100 tests (1+2+3+4+5)	35.5
7. total time for 2300 test (6 months period)	816.5
8. total time for 1 month	136.0
-during Monday-Friday 6.4h./day for 20 days	128.0
-during Saturday-Sunday(overtime)	8.0

Table 4.5 Salary and overtime of technician for Osmotic fragility test and modified Hb H inclusion test

	Baht/h	Time (h)	Baht (1 month)	Baht (6 months)
Salary* 8,450 Baht/month	70.4	128	9,011.00	54,066.00
Overtime 840/8h	105.0	8	840.00	5,040.00

*6 working hours(h) per day for 20 days

Table 4.6 Labour cost (L.C.) of Osmotic fragility test and modified Hb H inclusion test

	Salary for 6 months (baht)	Overtime (baht)	Total (baht)
1.Technician	54,066	5,040	59,106
2.Assistant technician	18,000	1,000	19,000
3.Laboratory assistant	18,000	1,500	19,500
			97,606

Table 4.7 Material cost (M.C.) of Osmotic fragility test and modified Hb H inclusion test

	Quantity	Unit price (baht)	Total (baht)
1.Syringes 10 ml.	2,300	6	13,800
2.Needle No.21	2,300	1	2,300
3.Test tube (CBC)	2,300	2.5	5,750
4.Chemical for OF test	2,300	3	6,900
5.Chemical for IC test	500	3	1,500
			30,250

Table 4.8 Capital depreciation (C.C.) of Osmotic fragility test and PCR test

	Floor space (m2)	Unit cost (baht)	Equipment (baht)	Total (baht)
1.Laboratory	200	25,000	-	5,000,000
2.PCR machine	-	-	200,000	200,000
3.Electrophoresis	-	-	100,000	100,000
4.Polaloid camera	-	-	70,000	70,000
5.Microcentrifuge	-	-	50,000	50,000
6.Water bath	-	-	30,000	30,000
				5,450,000

Table 4.9 Time used by technician during Osmotic fragility test and PCR test

	Time (h)
1. registration and blood drawing for 100 tests	16.0
2. OFT 100 test	8.3
3. DNA extraction for 20 positive tests	6.0
4. PCR processing	3.0
5. electrophoresis and photography	1.3
6. total time for 100 tests (1+2+3+4+5)	34.6
7. total time for 2300 test (6 months period)	795.8
8. total time for 1 month	132.0
-during Monday-Friday 6.4h./day for 20 days	124.0
-during Saturday-Sunday(overtime)	8.0

Table 4.10 Salary and overtime of technician for Osmotic fragility test and PCR test

	Baht/h	Time (h)	Baht (1 month)	Baht (6 months)
Salary* 8,730 Baht/month	72.7	124	9,014.00	54,084.00
Overtime* 840/8h	105.0	8	840.00	5,040.00

*6 working hours(h) per day for 20 days

Table 4.11 Labour cost (L.C.) of Osmotic fragility test and PCR test

	Salary for 6 months (baht)	Overtime (baht)	Total (baht)
1.Technician	54,084	5,040	59,124
2.Assistant technician	18,000	1,000	19,000
3.Laboratory assistant	18,000	1,500	19,500
			97,624

Table 4.12 Material cost (M.C.) of Osmotic fragility test and PCR test

	Quantity	Unit price (baht)	Total (baht)
1.Syringes 10 ml.	2,300	6	13,800
2.Needle No.21	2,300	1	2,300
3.Test tube (CBC)	2,300	2.5	5,750
4.Chemical for OF test	2,300	3	6,900
5.Chemical for PCR test	500	300	150,000
			178,750

Table 4.13 Total cost calculation = CC + L.C + M.C

	Modified Hb H test	PCR test
Capital Cost	5,090,000	5,450,000
Labour Cost	97,606	97,624
Material Cost	30,250	178,750
Total cost	5,217,856	5,726,374

Table 4.14 Cost effectiveness ratio (C/E)

	Total cost	Case detected	C/E
Modified Hb H	5,217,856	55	94,870.36
PCR test	5,726,374	58	98,730.58

$$\text{Incremental cost} = (\text{Cost}_{\text{PCR}} - \text{Cost}_{\text{Hb H}}) / (\text{Case}_{\text{PCR}} - \text{Case}_{\text{Hb H}})$$

Cost_{PCR} = total cost of PCR test

$\text{Cost}_{\text{Hb H}}$ = total cost of modified Hb H test

Case_{PCR} = case detected by PCR test

$\text{Case}_{\text{Hb H}}$ = case detected by modified Hb H test

$$\begin{aligned} \text{Incremental cost} &= (5,726,374 - 5,217,856) / (58 - 55) \\ &= 169,506 \text{ baht/case} \end{aligned}$$