

**THAILAND**
**Last Updated: 2006-12-05**

Level	Date	Region and sample descriptor	Sex	Age (years)	Sample size	Haemoglobin (g/L)						Mean	SD	Method	Reference	Notes	
						Proportion (%) of population with haemoglobin below:										General	Line
						70	100	110	115	120	130						
S	2002	Ubon Ratchathani province: SAC	B	6.00- 12.99	567								C	5227	*	1	
LR	1999	Songkhla Province: Hat Yai rural area: SAC: Total	B	6.00- 13.99	397								A	3507	*	2	
		Songkhla Province: Hat Yai rural area: SAC by inter	B	6.00- 13.99	140						121	10				3	
		Songkhla Province: Hat Yai rural area: SAC by inter	B	6.00- 13.99	134						121	9				4	
		Songkhla Province: Hat Yai rural area: SAC by inter	B	6.00- 13.99	123						122	10				5	
S	1997P	Northeast-Thailand: Women	F	15.00- 45.99	607					17.3			A	2933	*	6	
SR	1996 -1997	Sakon Nakhon Province: All	B	1.00- 90.99	837						132	14	A	3690	*	7	
		Sakon Nakhon Province: Adults: Total	B	15.00- 60.99	458						139	14				8	
		Sakon Nakhon Province: Elderly: Total	B	61.00- 90.99	35						113	11				9	
		Sakon Nakhon Province: Children: Total	B	1.00- 14.99	344						129	13				10	
		Sakon Nakhon Province: All by sex	F	1.00- 90.99	543											11	
		Sakon Nakhon Province: All by sex	M	1.00- 90.99	294											12	
		Sakon Nakhon Province: Adults by sex	F	15.00- 60.99	323											13	
		Sakon Nakhon Province: Adults by sex	M	15.00- 60.99	135											14	
		Sakon Nakhon Province: Children by sex	F	1.00- 14.99	194											15	
		Sakon Nakhon Province: Children by sex	M	1.00- 14.99	150											16	
L	1996P	Chiang Mai: Pre-SAC	B	0.50- 6.99	340			24.7					A	2936	*		
		Chiang Mai: SAC	B	7.00- 14.99	219					29.2							
N	1995	Adults: Total	B	15.00- 59.99	1389						124	15	A	3961	*	17	
		Elderly: Total	B	60.00-NS	426						129	12				18	
		NPNLW: Total	F	15.00- 44.99	1077					16.8							
		PW: Total	F	NS	242			22.3			118	12				19	
		LW: Total	F	NS	692					19.7	128	12					
		Pre-SAC: Total	B	0.00- 5.99	3260			25.2			117	11					
		SAC	B	6.00- 14.99	132					20.5	126	9				20	
		Adults by sex	F	15.00- 59.99	1184					17.6						21	
		Adults by sex	M	15.00- 59.99	205											22	
		Adults by area: Urban	B	15.00- 59.99	239											23	
		Adults by area: Rural	B	15.00- 59.99	1150											24	
		Adults by region: Central	B	15.00- 59.99	217											25	
		Adults by region: North	B	15.00- 59.99	268					15.6						26	

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						Proportion (%) of population with haemoglobin below:										General	Line
						70	100	110	115	120	130						
N	1995	Adults by region: Northeast	B	15.00- 59.99	659									A	3961		27
		Adults by region: South	B	15.00- 59.99	245												28
		Adults by sex and area: Urban	F	15.00- 59.99	205					15.1							29
		Adults by sex and area: Urban	M	15.00- 59.99	34					14.7							30
		Adults by sex and area: Rural	F	15.00- 59.99	979					18.1							31
		Adults by sex and area: Rural	M	15.00- 59.99	171					15.8							32
		Adults by sex and region: Central	F	15.00- 59.99	181					12.7							33
		Adults by sex and region: Central	M	15.00- 59.99	36					13.9							34
		Adults by sex and region: North	F	15.00- 59.99	216					14.8							35
		Adults by sex and region: North	M	15.00- 59.99	52					9.6							36
		Adults by sex and region: Northeast	F	15.00- 59.99	590					21.7							37
		Adults by sex and region: Northeast	M	15.00- 59.99	69					24.6							38
		Adults by sex and region: South	F	15.00- 59.99	197					12.7							39
		Adults by sex and region: South	M	15.00- 59.99	48					10.1							40
		Elderly by sex	F	60.00-NS	212					45.8	120	14					41
		Elderly by sex	M	60.00-NS	214					51.9	129	16					42
		Elderly by area: Urban	B	60.00-NS	57												43
		Elderly by area: Rural	B	60.00-NS	369												44
		Elderly by region: Central	B	60.00-NS	39						129	17					45
		Elderly by region: North	B	60.00-NS	122						126	14					46
		Elderly by region: Northeast	B	60.00-NS	223						122	16					47
		Elderly by region: South	B	60.00-NS	42						130	14					48
		NPNLW by area: Urban	F	15.00- 44.99	193					15.5	129	11					
		NPNLW by area: Rural	F	15.00- 44.99	884					17.1	129	12					
		NPNLW by region: Central	F	15.00- 44.99	158					11.4	131	11				49	
		NPNLW by region: North	F	15.00- 44.99	192					14.6	131	11					
		NPNLW by region: Northeast	F	15.00- 44.99	539					20.8	127	12					
		NPNLW by region: South	F	15.00- 44.99	188					12.2	130	9					
		PW by area: Urban	F	NS	39			25.6			118	12					
		PW by area: Rural	F	NS	203			21.7			118	12					
		LW by area: Urban	F	NS	107					15.9	129	11					
		LW by area: Rural	F	NS	585					20.3	128	12					
		LW by region: Central	F	NS	56					17.9	130	10				50	
		LW by region: North	F	NS	117					16.2	130	11					
		LW by region: Northeast	F	NS	394					21.6	127	12					
		LW by region: South	F	NS	125					17.6	130	10					

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Level	Date	Region and sample descriptor	Sex	Age (years)	Sample size	Haemoglobin (g/L)						Mean	SD	Method	Reference	Notes	
						Proportion (%) of population with haemoglobin below:										General	Line
						70	100	110	115	120	130						
N	1995	Pre-SAC by sex	F	0.00- 5.99	1565			22.9				117	11	A	3961		
		Pre-SAC by sex	M	0.00- 5.99	1695			27.3				116	11				
		Pre-SAC by area: Urban	B	0.00- 5.99	517			24.6				117	11				
		Pre-SAC by area: Rural	B	0.00- 5.99	2743			25.3				117	11				
		Pre-SAC by region: Central	B	0.00- 5.99	613			19.6				118	11				
		Pre-SAC by region: North	B	0.00- 5.99	585			20.0				118	11				
		Pre-SAC by region: Northeast	B	0.00- 5.99	1487			29.2				116	12				
		Pre-SAC by region: South	B	0.00- 5.99	575			25.9				116	10				
		Pre-SAC by sex and area: Urban	F	0.00- 5.99	255			22.4				118	11				
		Pre-SAC by sex and area: Urban	M	0.00- 5.99	262			26.7				117	11				
		Pre-SAC by sex and area: Rural	F	0.00- 5.99	1310			23.0				117	11				
		Pre-SAC by sex and area: Rural	M	0.00- 5.99	1433			27.4				116	12				
		Pre-SAC by sex and region: Central	F	0.00- 5.99	281			17.1				119	10				
		Pre-SAC by sex and region: Central	M	0.00- 5.99	332			21.7				118	11				
		Pre-SAC by sex and region: North	F	0.00- 5.99	300			17.3				119	10				
		Pre-SAC by sex and region: North	M	0.00- 5.99	285			22.8				117	12				
		Pre-SAC by sex and region: Northeast	F	0.00- 5.99	728			27.7				116	12				
		Pre-SAC by sex and region: Northeast	M	0.00- 5.99	759			30.6				116	12				
		Pre-SAC by sex and region: South	F	0.00- 5.99	256			21.9				117	10				
		Pre-SAC by sex and region: South	M	0.00- 5.99	319			29.2				115	10				
L	1993P	Maha Sarakham: NPW	F	15.00- 39.99	352					21.6	129	13	A	1738	*		
S	1986 -1987	Maha Sarakham Province: NPW	F	NS	265					33.2			A	3811	*	54	
		Maha Sarakham Province: NPW	F	NS	317					13.2						55	
		Maha Sarakham Province: NPW	F	NS	269					14.5						56	
		Maha Sarakham Province: NPW	F	NS	304					23.4						57	
L	1986P	N-Thailand: NPW: Non-vegetarian	F	16.00- 45.99	159					5.0			A	1010	*		
		N-Thailand: NPW: Vegetarian	F	16.00- 45.99	232					49.1							
		N-Thailand: Pre-SAC: Non-vegetarian	B	2.00- 6.99	103			13.0									
		N-Thailand: Pre-SAC: Vegetarian	B	2.00- 6.99	123			25.0									
		N-Thailand: SAC: Non-vegetarian	B	7.00- 12.99	169					20.0							
		N-Thailand: SAC: Vegetarian	B	7.00- 12.99	212					23.5							
S	1985 -1986	Northeast-Thailand: Children by sex	F	1.00- 8.99	859						113	15	A	2934	*		

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						Proportion (%) of population with haemoglobin below:										General	Line
						70	100	110	115	120	130						
S	1985-1986	Northeast-Thailand: Children by sex	M	1.00- 8.99	839							113	15	A	2934		
L	1983 P	South Thailand: Newborns at delivery	B	0.00	21							153	14	C	2929	*	
		South Thailand: Infants	B	0.08- 0.99	366							103					58
L	1981 P	Northeast Thailand: Women	F	27.00- 42.99	461					34.3				A	2928	*	
		Northeast Thailand: Men	M	30.00- 44.99	182						23.6						
L	1979-1981	Northeast Thailand: NPNLW	F	15.00- 45.99	493							56.2		NS	2889	*	
L	1977-1979	Bangkok: PW	F	NS	9237			2.3						NS	2953	*	59
L	1976 P	Bangkok: PW	F	16.00- 42.99	216			44.4				112	12	A	4021	*	60
L	1973-1976	Bangkok: Newborns at delivery	B	0.00	206							159	10	A	2925	*	
		Bangkok: Newborns up to 48 hours	B	0.00	344							207					61
		Bangkok: Children	B	0.08- 4.99	977							114					62
L	1972 P	Bangkok: SAC	B	7.00- 10.99	184					17.4		124	9	A	4020	*	
		Khon-Kaen Province: SAC	B	7.00- 10.99	389					46.8		117	12				
L	1969-1972	Bangkok: PW	F	NS	154	0.0		31.2						A	1700	*	
		Ubol: PW	F	NS	241	0.4		39.0									
		Ubol: Children by age	B	0.08- 0.57	55			30.9									
		Ubol: Children by age	B	0.58- 1.99	273			15.8									
		Ubol: Children by age	B	2.00- 6.99	601			8.5									
L	1969-1970	Bangkok: PW: Total	F	16.00-NS	1853			5.9						NS	4065	*	
		Bangkok: PW by age	F	15.00- 19.99	NS			2.6									
		Bangkok: PW by age	F	20.00- 24.99	NS			4.8									
		Bangkok: PW by age	F	25.00- 29.99	NS			4.8									
		Bangkok: PW by age	F	30.00- 34.99	NS			5.1									
		Bangkok: PW by age	F	35.00-NS	NS			11.0									
		Bangkok: PW by pregnancy number: 1	F	16.00-NS	NS			4.4									
		Bangkok: PW by pregnancy number: 2	F	16.00-NS	NS			6.6									
		Bangkok: PW by pregnancy number: 3	F	16.00-NS	NS			5.8									

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						Proportion (%) of population with haemoglobin below:							Mean	SD	Method	General	Line
						70	100	110	115	120	130						
L	1969 -1970	Bangkok: PW by pregnancy number: 4 Bangkok: PW by pregnancy number: 5 Bangkok: PW by pregnancy number: >=6	F F F	16.00-NS 16.00-NS 16.00-NS	NS NS NS		9.4 10.0 23.0					NS	4065				
L	1965 -1966	Bangkok: PW gestational age 1-7 months Bangkok: PW at delivery	F F	NS NS	624 150			63.6 44.0				NS	1732	*			

## NOTES

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**Reference No:** 5227

**General Notes:** *Sampling: facility based study (10 primary schools) in 10 poor rural subdistricts in Ubon Ratchathani province; children from each school were stratified by age and sex, and equal numbers of children randomly selected from each strata.*

**Line note 1** Prevalence of anaemia 31% (Hb <115 g/L both sexes 6-11 yrs, Hb <120 g/L both sexes 12 yrs).

**Reference No:** 3507

**General Notes:** *Facility based study (2 public schools) in a socioeconomically disadvantaged community in Songkhla Province, Southern Thailand (this area was free from malaria and no large iron supplementation program had been implemented); same study as reference No. 4906; baseline values of intervention study (daily iron, weekly iron, placebo); sampling: these schools were selected because they had >150 pupils and high prevalence of underweight children, were accessible by automobile and had willing teachers to participate, all primary school pupils were invited to participate; exclusion of subjects with severe malnutrition, chronic illness (thalassemia, haemolytic diseases), high iron storage (serum ferritin >100 µg/L), physical handicaps; Hb determination only for subsample (397 of 757 consented subjects).*

**Line note 2** Prevalence value calculated; prevalence of anaemia 27.0% (Hb <115 g/L 5-11 yrs, Hb <120 g/L 12-13 yrs); prevalence of iron deficiency anaemia in anaemic subjects 21.5% (Hb <115 g/L+serum ferritin <=20 µg/L <12 yrs, Hb <120 g/L+serum ferritin <=20 µg/L >=12 yrs); 185 boys+212 girls.

**Line note 3** Prevalence of anaemia 27.9% (Hb <115 g/L 5-11 yrs, Hb <120 g/L 12-13 yrs); prevalence of iron deficiency anaemia in anaemic subjects 28.2% (Hb <115 g/L+serum ferritin <=20 µg/L <12 yrs, Hb <120 g/L+serum ferritin <=20 µg/L >=12 yrs); 69 boys+71 girls; mean (SD) age 9.6 (1.7) yrs.

**Line note 4** Prevalence of anaemia 29.9% (Hb <115 g/L 5-11 yrs, Hb <120 g/L 12-13 yrs); prevalence of iron deficiency anaemia in anaemic subjects 15.0% (Hb <115 g/L+serum ferritin <=20 µg/L <12 yrs, Hb <120 g/L+serum ferritin <=20 µg/L >=12 yrs); 64 boys+70 girls; mean (SD) age 9.7 (1.9) yrs.

**Line note 5** Prevalence of anaemia 22.8% (Hb <115 g/L 5-11 yrs, Hb <120 g/L 12-13 yrs); prevalence of iron deficiency anaemia in anaemic subjects 21.4% (Hb <115 g/L+serum ferritin <=20 µg/L <12 yrs, Hb <120 g/L+serum ferritin <=20 µg/L >=12 yrs); 52 boys+71 girls; mean (SD) 9.7 (1.7) yrs.

**Reference No:** 2933

**General Notes:** *Study in 12 villages in Khon Kae Province.*

**Line note 6** Median Hb: 129 g/L.

**Reference No:** 3690

**General Notes:** *Study in 10 rural villages in Sakon Nakhon (prevalent for thalassemia and haemoglobinopathy); sampling: multistage random; Hb mean values, prevalence reported using Hct values.*

**Line note 7** Prevalence of anaemia 15.3% (Hct <33% both sexes 3 months-4 yrs, PW, Hct <36% both sexes 5-14 yrs, females >=15 yrs, Hct <39% males >=15 yrs); mean (SD) Hct 39.3% (4.6%); mean age 27.8 yrs.

**Line note 8** Prevalence of anaemia 14.4% (Hct <36% females, Hct <33% PW, Hct <39% males); mean (SD) Hct 40.9% (4.3%).

**Line note 9** Prevalence of anaemia 34.3% (Hct <36% females, Hct <39% males); mean (SD) Hct 34.4% (3.8%); disaggregated data by sex.

**Line note 10** Prevalence of anaemia 14.5% (Hct <33% both sexes 3 months-4 yrs, Hct <36% both sexes 5-14 yrs); mean (SD) Hct 38.7% (4.2%).

**Line note 11** Prevalence of anaemia 14.4% (Hct <33% 3 months-4 yrs, PW, Hct <36% 5-14 yrs, >=15 yrs).

**Line note 12** Prevalence of anaemia 17.0% (Hct <33% 3 months-4 yrs, Hct <36% 5-14 yrs, Hct <39% >=15 yrs).

**Line note 13** Prevalence of anaemia 15.5% (Hct <33% PW, Hct <36% NPW).

**Line note 14** Prevalence of anaemia 11.9% (Hct <39%).

**Line note 15** Prevalence of anaemia 14.4% (Hct <33% 3 months-4 yrs, Hct <36% 5-14 yrs).

**Line note 16** Prevalence of anaemia 14.7% (Hct <33% 3 months-4 yrs, Hct <36% 5-14 yrs).

**Reference No:** 2936

**General Notes:** *Urban and rural Chiang Mai; facility based study (hospital) for urban children.*

**Reference No:** 3961

**General Notes:** *Sampling: stratified multistage cluster sampling based on households with 0-5 yrs of age children (1. regions; 2. provinces; 3. districts; 4. subdistricts/villages/blocks; 5. households), 20 879 household members were interviewed; Hb determination for subsample only (n=7218).*

**Line note 17** Prevalence of anaemia 17.3% (Hb <120 g/L females, Hb <130 g/L males); working population.

**Line note 18** Prevalence of anaemia 48.9% (Hb <120 g/L females, Hb <130 g/L males).

**Line note 19** Disaggregated data by region.

**Line note 20** Disaggregated data by sex, area, region.

**Line note 21** Working population.

**Line note 22** Working population.

**Line note 23** Prevalence of anaemia 15.0% (Hb <120 g/L females, Hb <130 g/L males); working population.

**Line note 24** Prevalence of anaemia 17.8% (Hb <120 g/L females, Hb <130 g/L males); working population.

**Line note 25** Prevalence of anaemia 12.9% (Hb <120 g/L females, Hb <130 g/L males); excluding Bangkok metropolitan; working population.

**Line note 26** Prevalence of anaemia 13.8% (Hb <120 g/L females, Hb 130 g/L males); working population.

**Line note 27** Prevalence of anaemia 22.0% (Hb <120 g/L females, Hb <130 g/L males); working population.

**Line note 28** Prevalence of anaemia 12.2% (Hb <120 g/L females, Hb <130 g/L males); working population.

**Line note 29** Working population.

**Line note 30** Working population.

**Line note 31** Working population.

**Line note 32** Working population.

**Line note 33** Working population; excluding Bangkok metropolitan.

**Line note 34** Working population; excluding Bangkok metropolitan.

**Line note 35** Working population.

**Line note 36** Working population.

**Line note 37** Working population.

**Line note 38** Working population.

**Line note 39** Working population.

**Line note 40** Working population; excluding Bangkok metropolitan.

**Line note 41** Disaggregated data by area, region.

**Line note 42** Disaggregated data by area, region.

**Line note 43** Prevalence of anaemia 40.3% (Hb <120 g/L females, Hb <130 g/L males).

**Line note 44** Prevalence of anaemia 50.1% (Hb <120 g/L females, Hb <130 g/L males).

**Line note 45** Prevalence of anaemia 30.8% (Hb <120 g/L females, Hb <130 g/L males); excluding Bangkok metropolitan.

**Line note 46** Prevalence of anaemia 51.7% (Hb <120 g/L females, Hb 130 g/L males).

**Line note 47** Prevalence of anaemia 53.3% (Hb <120 g/L females, Hb <130 g/L males).

**Line note 48** Prevalence of anaemia 33.3% (Hb <120 g/L females, Hb <130 g/L males).

**Line note 49** Excluding Bangkok metropolitan.

**Line note 50** Excluding Bangkok metropolitan.

**Line note 51** Excluding Bangkok metropolitan.

**Line note 52** Excluding Bangkok metropolitan.  
**Line note 53** Excluding Bangkok metropolitan.

**Reference No:** 1738  
**General Notes:** *Study in 20 villages in Maha Sarakham Province, Northeast Thailand.*

**Reference No:** 3811  
**General Notes:** *Study in 21 villages in the Maha Sarakham Province of Northeast Thailand; sampling: the province and the villages in the region were selected because they are typical for the area, all the women who fulfilled the inclusion criteria were invited to participate; inclusion only of healthy non-pregnant adolescent and young single women, wherever possible the same individuals were investigated at each measuring point; Hb determination only for subsample (March 1986: 265 out of 683; September 1986: 317 out of 605; January 1987: 269 out of 549; April 1987: 304 out of 542).*

**Line note 54** Dry, hot season, March 1986; median age 19.0 yrs.  
**Line note 55** Rainy season, September 1986; median age 19.0 yrs.  
**Line note 56** Dry, cold season, January 1987; median age 20.0 yrs.  
**Line note 57** Dry, hot season, April 1987; median age 20.0 yrs.

**Reference No:** 1010  
**General Notes:** *Study in 3 villages in Northern Thailand; inclusion only of subjects with low socioeconomic status; exclusion of subjects with malaria or thalassaemia HbE type.*

**Reference No:** 2934  
**General Notes:** *Study in 16 rural villages and urban area in Sakorn Nakhon Province; only mean Hb values.*

**Reference No:** 2929  
**General Notes:** *Facility based study (2 hospitals) in Songkhla Province; only mean Hb values.*  
**Line note 58** Disaggregated data by age.

**Reference No:** 2928  
**General Notes:** *Village in Si Sa Ket Province.*

**Reference No:** 2889  
**General Notes:** *Study in 6 villages in Si Sa Ket Province; partly same data as in reference No. 2928.*

**Reference No:** 2953  
**General Notes:** *Facility based study (hospital); Hb determination at first antenatal visit.*  
**Line note 59** Hb cut-off levels not according to WHO recommendations (please see 'Key to the data tables').

**Reference No:** 4021  
**General Notes:** *Facility based study (antenatal clinic at the Department of Obstetrics and Gynaecology, Faculty of Medicine, Siriraj Hospital); sampling: design not explained; Hb determination at first antenatal visit; values for other Hb cut-off levels.*  
**Line note 60** Disaggregated data by gestational age, parity.

**Reference No:** 2925

**General Notes:** *Facility based study (hospital); only mean Hb values.*

**Line note 61** Heel prick.

**Line note 62** Disaggregated data by age.

**Reference No:** 4020

**General Notes:** *Facility based study (elementary school in Bangkok and 6 schools in a rural area of Khon-Kaen Province); sampling: design not explained; values for other Hb cut-off levels.*

**Reference No:** 1700

**General Notes:** *Facility based study (hospitals) for PW; 1971 for PW; 1969-1972 for children.*

**Reference No:** 4065

**General Notes:** *Facility based study (Obstetric unit of the Ramathibodi Hospital, Mahidol University); sampling: design not explained; Hb cut-off level not according to WHO recommendations (please see 'Key to the data tables').*

**Reference No:** 1732

**General Notes:** *Facility based study (hospital).*

## REFERENCES

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