

# MATERNAL AND CHILD HEALTH IN A MARGINALIZED COMMUNITY ALONG THE THAI-MYANMAR BORDER

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**Abstract.** The objective of this study was to conduct a cross-sectional evaluation of pregnancy indicators, child growth failure, and the effect of antenatal care on birth outcomes in a marginalized community under the care of a health center in Suan Phung District, Ratchaburi Province. Health and socioeconomic data about children born in 2007 and their parents were obtained from the sub-district health center and district hospital were collected and analyzed by univariate and multivariate methods. Most of the residents in the study were Karen ethnic origin. Data was available for 152 children, of which 136 met study inclusion criteria. Health outcomes of the study population significantly different from the general Thai population included higher average parity ( $2.53 \pm 1.99$  vs  $1.735$ ;  $p < 0.001$ ), lower average birth weight ( $2,876.05 \pm 399.48$  grams vs  $3,200$  grams,  $p < 0.001$ ), and lower average height-for-age and weight-for-age ( $p < 0.001$ ). The prevalences of stunting, underweight and wasting were higher than the general Thai population ( $p < 0.001$ ). Having fewer than 4 antenatal care (ANC) visits was associated with low birth weight (unadjusted OR 4.88, 95% CI 1.13-21.05; adjusted OR 5.77, 95% CI 1.27-26.30).

**Keywords:** maternal and child health, birth outcomes, marginalization, Karen people, Thailand

## INTRODUCTION

Maternal and child health (MCH) is a domain of public health which has implications for at least 3 of the 8 Millennium Development Goals (MDGs) of the United Nations, particularly after the 2005 revision

when additional targets were added.

Health outcomes and utilization of various MCH services are used as indicators of the achievement of these revised MDGs. The proportion of births attended by skilled health personnel is an indicator of Goal 5, Target 5.A (reduction in maternal mortality), while adolescent birth rate and antenatal care coverage (at least 4 visits) are indicators of the revised Goal 5, Target 5.B (achieve by 2015 universal access to reproductive health). The proportion of 1 year old children immunized against measles is used as an indicator of

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the revised Goal 4 (reduction in childhood mortality). The proportion of underweight children aged < 5 years is an indicator of Goal 1 (eradicate extreme poverty and hunger) (United Nations, 2008).

Despite Thailand's success in many MCH factors, such as infant mortality comparable to that of Western countries, 97% institutional deliveries, and 96% measles immunization rate by 1 year of age (UNICEF, 2009), MCH along the Thai-Myanmar border remains problematic (WCRWC, 2002), particularly in marginalized ethnic communities. No comprehensive research regarding MCH outcomes has been carried out among the ethnic, marginalized, non-refugee population along the Thai-Myanmar border in Ratchaburi Province, Thailand. Although the debate about the effects and benefits of antenatal care is still on-going among public health scholars, there has yet to be a study of the effect of antenatal care on birth outcomes in such a population.

We carried out a cross-sectional study of MCH pregnancy outcomes and birth outcomes (*ie*, parity, birth weight, gestational age, preterm birth, birth attendant, institutional delivery, 1-minute Apgar score, and referral or complications during delivery), the prevalence of growth failure in 2007-born children (stunting or very low height-for-age, underweight or very low weight-for-age, and wasting or very low weight-for-height), and the effect of antenatal care on birth outcomes, in an area under the care of the sub-district health center in Suan Phung District, Ratchaburi Province, located at the Thai-Myanmar border.

## MATERIALS AND METHODS

### Data collection and management

Data were extracted from the District

Health Office, the District Hospital, and the Provincial Public Health Office. Other data sources for MCH data were the sub-district health center and the district hospital.

Socioeconomic data at the sub-district health center are normally collected and maintained in recording system known as Family Folders and also in its electronic database called the Health Center Information System (HCIS).

Data regarding maternal health outcomes, number of antenatal care visits, and birth outcomes were collected from antenatal care records and birth certificates of the sub-district health center and the HCIS, and from obstetrics records and birth certificates of the district hospital.

Data regarding childhood immunization were collected from the sub-district health center's records and the HCIS. A considerable number of childhood immunization records in paper format were missing and data in the HCIS were incomplete; therefore, immunization information was not included in the analysis of this study. During each immunization visit, the community public health officers measured the weight and height of the children; thus data regarding childhood growth were also available from child immunization records. On average, each child received immunization more than once, thus their weight and height were recorded on more than one separate occasion.

Child anthropometry Z-scores (Height-for-Age Z-Score or HAZ, Weight-for-Age Z-Score or WAZ, and Weight-for-Height Z-Score) were calculated and compared to the national data (Nutritional Division, 1999). However, the average height-for-age Z-score (HAZ), weight-for-age Z-score (WAZ), and weight-for-height Z-score (WHZ) of each child were calculated and used instead of treating the z-score from each measurement as separate units, in

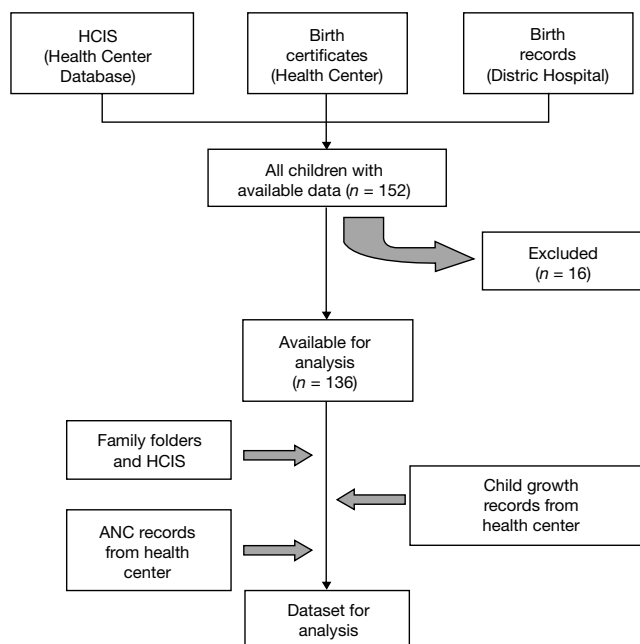


Fig 1—Flow of information in the study.

order to comply with the assumption of independence on the Student's *t*-test. Growth failure was defined as being either stunted, underweight, or wasted at any measurement session. Stunting was defined as a child having his or her HAZ below -2, being underweight was defined as a child having his or her WAZ below -2 and wasting was defined as a child having his or her WHZ below -2.

This study included all children who were born in 2007, according to information from birth certificates or a record of the child in the HCIS. Children who were identified as being "from outside the area" and children whose parents were not linkable were excluded from the study, as records of either parent of the child must be linkable (by the HCIS) in order to make adjustments in the determination of the effect of ANC on birth outcomes. The data used in this study consisted entirely of secondary data, which has several limitations,

to be elaborated further later.

### Statistical analyses

For comparison of health outcomes of the study population to the general Thai population, independent one-sample *t*-tests were applied to continuous data, while one-sample tests of proportion were used in order to compare the prevalence of health outcomes in the area with those of the general Thai population. The health outcome data of the general Thai population were from official sources and relevant international organizations (Nutritional Division, 1999; Health Information Group 2006 a, b; UNICEF, 2009). For comparison of the prevalence of preterm births, no national data were

available. The author used a figure reported by the Faculty of Nursing at Chiang Mai University (Faculty of Nursing, 2007) for comparison purposes only; the mentioned figure did not represent the national-level data in any way. For determination of the association between ANC usage and birth outcomes, logistic regression was performed.

### RESULTS

One hundred fifty-two records of children born in 2007 were available, of whom 136 met inclusion criteria. Socioeconomic status and demographic status of the mothers in the study are shown in Table 1. The education level of the study participants, particularly women, were lower than among the Thai population. Approximately 60% of mothers in the area lacked Thai citizenship based on birth certificates and the HCIS. Among children with birth certificates, 6.58% of the certificates were

Table 1  
Maternal and paternal socioeconomic and demographic indicator in the study population.

Variable	Study area (n, %)	National data <sup>a</sup>	p-value
Maternal education	65		
No formal education	40 (61.5%)	3.2%	<0.001 <sup>b</sup>
Primary school	13 (20.0%)	30.8%	0.0593
Lower secondary school	9 (13.9%)	22.1%	0.1088
Higher secondary school	2 (3.1%)	15.3%	0.006 <sup>b</sup>
Tertiary	1 (1.5%)	15.4%	0.002 <sup>b</sup>
Paternal education	56		
No formal education	26 (46.4%)	3.2%	<0.001 <sup>b</sup>
Primary school	16 (28.6%)	30.8%	0.7179
Lower secondary school	7 (12.5%)	22.1%	0.0834
Higher secondary school	6 (10.7%)	15.3%	0.3405
Tertiary	1 (1.8%)	15.4%	0.0048 <sup>b</sup>
Maternal occupation	47		
Housewife, student, no occupation	26 (55.3%)	Unknown	
Worker, farmer, trader	12 (25.5%)		
Civil servant, office worker	9 (19.2%)		
Paternal occupation	30		
Homemaker, student, no occupation	1 (3.3%)	Unknown	
Worker, farmer, trader	27 (90.0%)		
Civil servant, office worker	2 (6.7%)		
Mother's personal income	67		
No regular income	52 (77.6%)	Unknown	
Income below poverty line <sup>c</sup>	7 (10.5%)		
Income above poverty line	8 (11.9%)		
Father's personal income	56		
No regular income	32 (57.1%)	Unknown	
Income below poverty line	2 (3.6%)		
Income above poverty line	22 (39.3%)		
Citizenship information present	118		
Mother lacking Thai citizenship	71 (60.2%)	Unknown	
Birth certificate available	76		
Thumbprint used in birth certificate	5 (6.6%)	Unknown	

<sup>a</sup> Office of National Education Commission (2008) data source

<sup>b</sup> Statistically significant ( $p < 0.05$ )

<sup>c</sup> Poverty line is defined as the poverty line level in year 2007, as determined by the National Economic and Social Development Board (2008), as 1,475 Thai Baht/person/month.

not signed, but rather marked by thumbprints, indicating possible illiteracy.

Maternal health and birth outcomes are presented in Table 2. Adolescent pregnancy was more common than among the

general Thai population, and the percentage of grand multiparas and the average number of children born per mother (parity) were also significantly higher than among the general Thai population. The

Table 2  
Maternal health history, pregnancy outcomes and birth outcomes.

Variable	Study area				National data	p-value
	N	$\bar{x}$ (SD)	Range	Percentage		
Maternal age (year)	128	24.72 (6.42)	15-43		Unknown	
Adolescent Pregnancy	31			24.2%	14.49% <sup>c</sup>	0.002 <sup>a</sup>
Paternal (spouse's) age (years)	96	30.68 (8.32)	17-54		Unknown	
Adolescent fathers (Age ≤ 19)	5			5.2%	Unknown	
Parity	119	2.53	1-10	1-10	1.73 <sup>d</sup>	<0.001 <sup>a</sup>
Primipara (first child)	45			37.8%	50.8% <sup>d</sup>	0.0046 <sup>a</sup>
Multipara (2 <sup>nd</sup> - 4 <sup>th</sup> child)	58			48.7%	47.3% <sup>d</sup>	0.7531
Grand multipara (5 <sup>th</sup> child or more)	16			13.5%	1.9% <sup>d</sup>	<0.001 <sup>a</sup>
History of abortion (spontaneous or induced)	9			7.6%	Unknown	
Non-institutional delivery	26			27.4%	3% <sup>c</sup>	<0.001 <sup>a</sup>
Child with female gender	65			48.2%	48.4% <sup>c</sup>	0.9459
Birth weight (g)	104	2,876.05 (399.48)	1,700-3,950		3,200.00 <sup>f</sup>	<0.001 <sup>a</sup>
Low birth weight (BW < 2,500 g)	11			10.6%	11.0% <sup>g</sup>	0.8979
Gestational age (weeks)	96	38.32 (2.27)	30-43		Unknown	
Preterm births	13			13.5%	12.0% <sup>h,b</sup>	0.6421
Delivery by skilled BA	72			75.0%	97.0% <sup>c</sup>	<0.001 <sup>a</sup>
1-min Apgar ≤ 7	1			2.0%	Unknown	
Referred or had complication	8			14.0%	Unknown	

<sup>a</sup> statistically significant at  $\alpha = 0.05$ ; <sup>b</sup> Not national data (national data unavailable). Figure is cited only to serve as a comparative value.

Sources: <sup>c</sup> Health Information Group, 2006a; <sup>d</sup> Health Information Group, 2006b; <sup>e</sup> UNICEF, 2009; <sup>f</sup> Nutrition Division, 1999; <sup>g</sup> Bureau of Policy and Strategy, 2008b; <sup>h</sup> Faculty of Nursing, Chiang Mai University, 2007

birth outcomes are shown in Table 2. The proportion of non-institutional deliveries (home births and en-route deliveries) was higher than among the general Thai population. The proportion of deliveries by skilled attendants (medical personnel, such as doctors or nurses) was lower than among the general Thai population. The average birth weight was lower than among the general Thai population. The proportions of women having children with low birth weights and premature de-

liveries were not significantly different from the general Thai population.

Table 3 shows the prevalence of children with failure to thrive. Growth of the children in the area was significantly different from the general Thai population. The average Height-for-Age Z-score (HAZ) and Weight-for-Age Z-score (WAZ) of children in the area were significantly lower than among the general Thai population, while the proportions of children who were stunted and underweight (HAZ

Table 3  
Child growth and growth failure in the study area (boys and girls combined).

Variable	Study area				National data	p-value
	N	$\bar{x}$ (SD)	Range	Percentage		
Height for Age Z-Score (HAZ)	91	-1.81 (1.82)	-11.53 - 4.31		0.0 <sup>b</sup>	<0.001 <sup>a</sup>
%Stunted	58			63.7%	12.0% <sup>c</sup>	<0.001 <sup>a</sup>
Weight for Age Z-Score (WAZ)	91	-0.98 (1.31)	-3.7 - 3		0.0 <sup>b</sup>	<0.001 <sup>a</sup>
%Underweight	28			30.8%	7.0% <sup>c</sup>	<0.001 <sup>a</sup>
Weight for Height Z-Score (WHZ)	91	0.70 (2.29)	-5 - 20		0.0 <sup>b</sup>	0.0045
%Wasted	12			13.2%	4.0% <sup>c</sup>	<0.001 <sup>a</sup>
Number of types of growth failures combined						
None (healthy)	24			26.4%	Unknown	
1	41			45.1%		
2	21			23.1%		
3	5			5.5%		

<sup>a</sup> statistically significant at  $\alpha = 0.05$

Sources: <sup>b</sup> Department of Health, 1999; <sup>c</sup> UNICEF, 2009

Table 4  
Effect of ANC on pregnancy outcomes ( $n=117$ ).

Outcome	4 ANC visits or more ( $n=79$ )		Less than 4 visits ( $n=38$ )		Unadjusted OR (95% CI)	Adjusted OR (95% CI) <sup>a</sup>
	N	%	n	%		
Birth weight						
Normal ( $\geq 2,500$ g)	61	95.3%	25	80.7%	Reference	
Low ( $< 2,500$ g)	3	4.7%	6	19.4%	4.88 <sup>b</sup>	5.77 <sup>b</sup>
					(1.13-21.05)	(1.27-26.30)
Term birth						
Full term ( $\geq 37$ weeks)	59	89.4%	22	81.5%	Reference	
Preterm ( $< 37$ weeks)	7	10.6%	5	18.5%	1.92	1.7
					(0.55-6.67)	(0.48-6.12)
Place of birth						
At the hospital	40	66.7%	21	72.4%	Reference	
Outside the hospital	20	33.3%	8	27.6%	0.76	0.73
					(0.29-2.02)	(0.26-2.04)
Referral or complications						
No	30	81.1%	18	94.7%	Reference	
Yes	7	18.9%	1	5.3%	N/A	N/A

<sup>a</sup> Adjusted for adolescence pregnancy, grand multi-gravidity, and history of abortion (not shown)

<sup>b</sup> Statistically significant at  $\alpha = 0.05$

$<-2$  and WAZ  $<-2$ , respectively) were significantly higher than among the general Thai population (63.74% vs 12.00% and 30.7% vs 7.00%, respectively). The average Weight-for-Height Z-score, was higher than among the general Thai population, yet the proportion of children who were wasted was also significantly higher than among the general Thai population (13.19% vs 4.00%, respectively). Only 26.37% of the children in the study had no abnormalities in the weight and height measurements.

The effect of ANC on birth outcomes is presented in Table 4. Having fewer than 4 ANC visits was significantly associated with low birth weight (birth weight  $< 2,500$  grams). Mothers with fewer than 4 ANC visits were more likely to have preterm births, but mothers with fewer than 4 ANC visits were more likely to give birth in a hospital than those with 4 or more ANC visits, but neither one of the associations was statistically significant.

## DISCUSSION

This was a study of various maternal and child health indicators in a marginalized population with limited ability to communicate in the Thai language, or unwillingness to report personal information due to sensitive legal/social/political circumstances. This explains the reason for the missing data in our study.

Despite the extension school in the local area to provide education to students up to the ninth year of formal education), educational level in the study population was very low. The low education level might be associated with the unique socio-cultural context of the study population, the Karen people. According to HCIS, more than 60% of mothers did not have Thai citizenship; such status affects

healthcare seeking behavior and education. The use of thumbprints on birth certificates instead of signatures suggests at least 6.58% of parents in this study were possibly illiterate, although this number could be even higher.

Data regarding occupation and income may not be reliable and thus needs careful interpretation. A health center official stated there were inadequate health volunteers able to speak the Karen language. They may not want to reveal their income. These limitations may be a cause of missing data regarding socioeconomic status. There were numerous errors regarding occupation and income in the HCIS results. The data were obviously in error, such as listing a child's occupation as "employee". These data were not used in our study.

The proportion of adolescent mothers was significantly higher than the general Thai population. This is probably due to a lower level of education and the unique socio-cultural context of the study population. The higher proportion of adolescent pregnancies was a cause of concern, since adolescent pregnancies are high-risk. Promoting education can help keep girls in school and reduce the proportion of adolescent pregnancies (Lloyd, 2006).

Reproductive health indicators and birth outcomes were at a lower level than those of the normal Thai population, but the proportion of births attended by skilled birth attendants and the proportion of institutional deliveries were higher than in Myanmar (UNICEF, 2009). This is probably due to the fact that the local health center had been providing ambulance service to the district hospital for all residents in the study area free of charge but with an optional donation. According to a health center officer, the local police were willing to let potentially stateless individuals

attend hospitals in cases of medical emergency. The district hospital accepts all patients, regardless of citizenship status, or the ability to pay for treatment. Economic condition and ability to afford treatment probably did not play a major role in the outcomes regarding place of delivery and delivery assistant. Sixty percent of mothers in this study did not have Thai citizenship, it is likely that the cultural, legal, and political factors explain the poorer reproductive health indicators compared to the normal Thai population. The average number of children born to a mother (parity) and the proportion of mothers with 5 children or more (grand multipara) were also higher than in the general Thai population, which is typical of a population with low socioeconomic status and in a more traditional way of life.

The child anthropometry in this study supported a statement by Abubakar *et al* (2008) that children living in resource-limited settings have poor developmental outcomes, which include poor physical growth. Child anthropometry and prevalence of child growth failure in the study area were significantly different from the general Thai population. Children in the study area grew significantly slower than children in the general Thai population. Interestingly, they were not significantly thinner than the general Thai population. In fact they weighed significantly more than average compared to height. The results regarding child growth in this study suggest a genetic pre-disposition may have played a role. Human error in measuring weights and heights might have also played a role. These measurements were taken at the same time as vaccines were given; the children may not have held still for accurate reading to be taken. The study was an ethnic minority with low education; these factors might have influ-

enced feeding practices which should be investigated further.

The effect of ANC on birth weight in this study appeared to reflect the findings of Krueger and Scholl (2000). ANC provided an opportunity for pregnant women to receive thorough health examinations and monitor the progress of pregnancy, as well as provide health education, which can result in better healthcare seeking behavior and better birth outcomes. Despite marginalization of the study population, ANC still had an effect on birth weight, arguing for the benefits of ANC. Having at least 4 ANC visits should be promoted nonetheless due to the higher risk of low birth weight among women with fewer than 4 ANC visits.

This study is one of the first cross-sectional studies of socioeconomic status, pregnancy indicators, child growth failure, and the effect of ANC on low birth weight, preterm birth, place of births, and complications during birth, in a non-refugee marginalized population along the Thai-Myanmar border area of Ratchaburi Province. This study provides important data to help with public health planning and provision of maternal care to a marginalized migrant population. This study had certain limitations: the study only used secondary data and the ANC records and birth records were obtained from only 1 health center and 1 hospital. In mothers who reported hospital deliveries, 89.2% sought obstetric care at the local district hospital. Data obtained from these local sources reflect the health seeking behavior of the study population.

Future studies could include cross-sectional studies in other areas with marginalized populations. Qualitative studies may also be conducted in the study area regarding obstetric healthcare seeking behavior and child feeding practices.



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