

Table 4 Causes of early neonatal deaths

Causes	Number (percent)	Details
<u>Principal causes</u>		
Congenital anomalies	6(42.9)	Anencephaly (4), ^a congenital heart disease (1), multiple anomalies (1)
Perinatal asphyxia	2(14.3)	
Meconium aspiration	2(14.3)	
Neonatal sepsis	2(14.3)	
Preterm	1(7.1)	
Hypothermia	1(7.1)	
<u>Precipitating causes</u>		
Obstetric problems	5(35.7)	Premature rupture of membrane (2), cord accident (1), pre-eclampsia (1), pregnancy induced hypertension (1)
Others	2(14.3)	Child neglect (2)
Perinatal asphyxia	1(7.1)	
Inconclusive	6(42.9)	

^aFigure in parenthesis is number of cases.

Table 5 Perinatal mortality rate by maternal characteristics

Maternal characteristics	Perinatal mortality rate (per 1,000 births)	Relative risk [95% confidence interval]
Age (y)		
< 20	4.3	0.39 [0.09,1.61]
≥ 20	11.11	1
Occupation		
Laborer	11.61	2.00 [0.83,4.80]
Farmer	12.36	2.12 [0.87,5.17]
Non-labor work	5.78	1
Education		
Primary or lower	12.00	2.06 [0.93,4.56]
Higher	5.78	1
Parity		
0	7.39	0.68 [0.30,1.52]
= > 1	10.89	1
Antenatal care visits		
No or once	17.09	1.78 [0.43,7.40]
Often or regular	9.5	1
Mode of delivery		
Abnormal	13.94	1.66 [0.81,3.41]
Normal	8.34	1

Table 6 Classification of degree of preventability

Classification	Stillbirth N (%)	Early neonatal death N (%)
Preventable	9 (39.1)	5 (35.7)
Probably preventable	6 (26.1)	4 (28.6)
Probably unpreventable	5 (21.7)	2 (14.3)
Unpreventable	3 (13.1)	3 (21.4)

Note: Information for this part was adequate in 37 cases (97.4%). Preventable = consensus among the three raters that death of this case can be prevented, probably preventable = two out of three rated as preventable, probably preventable = two out of three rated as unpreventable, unpreventable = consensus among all raters that death of this case can not be prevented.

Table 7 Births, stillbirths, early neonatal deaths, and perinatal death rates.

Classification of births and deaths	This study (2001-2002)	Previous reports
Live-birth (cases)	3,529	542,054 ^a
Stillbirth (per 1,000 births)	24 (6.75)	NA
Early neonatal death (per 1,000 live-births)	14 (3.97)	1,157 (11.15) ^b
Perinatal death (per 1000 births)	38 (10.69)	7,032 (10.01) ^a

^a From the Safe Motherhood Project for the year 1996, the rate was expressed per 1,000 live-births. Perinatal mortality rate was 9.8 for the year 1997; ^b For the year 1996 from Amornwichee P et al.⁸

**Family Life Events at the First Year of Life : A Prospective Cohort
Study of Thai Children**

By Dr.Jariya Wittayasooporn

Family Life Events at the First Year of Life : A Prospective Cohort Study of Thai Children.

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During the past decades, there has been a proliferation of research base on the hypothesis that stress, arising from an accumulation of family life events is associated with child health outcome. There was the three years prospective study in Newzeland shown clearly that family life events were associated with increased risks of the lower respiratory tract problems, gastroenteritis, accidents, burns and scalds, accidental poisoning and hospital admissions for suspect home related conditions (Beatrais, Fergusson and Shanon 1982). In addition, stressful family life events is correlated with the changes on the health of chronically ill child such as glycemic control in children with insulin independent diabetes mellitus (Worral-Davies, Holland, Berg and Goodyear 1999), pulmonary functioning of children with cystic fibrosis (Patterson and McCubbin 1983), medical contacts and school absences in asthmatic children (Gartland and Day 1999), somatic condition for example cardiovascular, gastrointestinal, pseudoneurologic symptoms and generalized pain and weakness (Meade, Lumley, Casey, 2001; Greene, Walker, Hickson and Thompson 1985). Furthermore, many studies have done with maternal report of child behavioral problems such as difficult to manage or control, temper tantrums, feeding problems, aggressive and tension, irritability or nervousness (Beatrais, Fergusson, and Shanon 1982; Fergusson, Horwood, and Shanon 1984), adaptive behaviors (adaptability, leadership, social skills and study skills), the externalizing behaviors (aggression, hyperactivity and conduct problems) (Jackson, Sifers, Warren and Velasquer 2003) as well as the adolescents' report of their internalizing behaviors including anxiety or depressive symptoms (Rueter, Scaramella, Wallace and Conger 1999).

The Prospective Cohort Study of Thai Children (PCTC) is the first in Asia and being a prospective birth cohort study conducted in 5 different regions of Thailand with its cultural diversity. One of the main purposes of this PCTC study is to link-selected child's family life events with future child growth development and health outcome. The aim of this report is to describe the family life event pattern, parents/guardian's perceive severity scoring, and examine priority order of the events by combining frequency and perceive severity.

Method

Sample and Data collection

The data was collected at the first year of life of a birth cohort of 4245 children born from 4215 families (30 twins) in different five areas in Thailand. The demographic data are shown in Table 1. The information has been collected by a structured interview with the child's mother or a primary caretaker including father, grandmother etc. The participants were asked to report the most upset stress and strain family life event during the last 12 months, then asked to report yes or no of the change happened of the family inventory life events in their family during the last 12 months. In addition the participants were asked to rate the impact of the events, which was happened to their family living.

Family Life Events Measurement

The measure was based on the selected items of family inventories life events which was developed by McCubbin and Patterson (cited in McCubbin and Thompson 1987; H I McCubbin, Thompson and A I McCubbin 1998). The selection of items was guided by those life changes appearing on other individual life change inventories (SRRS from Holmes & Rahe, 1967; PERI from Dorenwend, Krasnoff, Askerasy, and Dohrenwend, 1978). In addition, there were selected by the clinical and research experiences of the research team and the experts in an area of child-rearing and child health. The 23 selected items likely to be crisis experience by birth family are grouped into 5 categories including family member transition and marital status strains (4 items), finance and work-family strains (4 items), illness and family care strains (5 items), family legal violation and emotional strains (6 items), and Loss and death strains (4 items). It is a yes/ no scale items and each items have a 4-point Likert scale to report the degree of stress or strain range from none to high level. The score of none=0 (similar with the score of the event did not happened), low= 1, moderate=2, and high=3. The score were computed by summing separately the report of number of life events occurrence and the report of the degree of stress or strain appraisal since the child was born until 1 year of life. Both higher score of an occurrence and higher score of an appraisal are indicated the greater accumulation of family stress. The reliability of the modified family inventories life events has internal consistency alpha is 0.99.

Result

At the beginning of an interview the participants were asked to describe one of the most upset stress or strain family life event, their appraisals was found an additional family life events as shown in Table 2. The percentage of mothers or primary caretaker endorsing an occurrence of each family events and an appraisal of each items are presented in Table 3. Furthermore, the priority order of the events by combining frequency and perceive severity of the total family was demonstrated in Figure 1 and ...

Table 1. Demographic Data of Parents in the Sample

Personal Characteristic	Mothers	Fathers
Age (Year)		
- Min – max	14 – 48	15-70
- Mean	27.02	30.76
- SD	6.26	7.14
Family Income (Baht)		
- Min – max	0.0 – 18,120,000	
- Mean	183,444	
- SD	414,145	
Education level (n=4175)		
- None/ can't read	5.3	3.5
- Primary	47.5	48.3
- Secondary & high school	28.4	28.6
- Vocational	8.6	10.7
- Bachelor & higher	10.0	8.2
- Other	0.2	0.2
Occupation (n=4194)		
-High performance		
- Profession	5.74	8.5
- Business owner	0.04	7.9
- Skill-training (clerk, factory worker)	32.97	6.2
- Non-skill		
- Farm worker, labor	19.45	46.3
- Farmer	23.17	21.2
- Unemployed	17.81	2.9
Religion (n=4169)		
- Buddish	78.0	79.0
- Islam	17.9	17.6
- Christ	0.7	0.8
Risk Behaviors (n=3931)		
- Smoking	0.9	51.6
- Alcohol drinking	1.8	60.4
- Hx. of drug addict	0.2	13.4

Table 2. An Additional of The Most Upset Stress and Strain Family Life Events

Family life events	C N=286	S N=127	NE N= 366	N N=185	BKK N=169	Total N=1134
Difficulty in managing children	12	5	11	7	13	48
Husband have a lover affair	2	2	2	6	6	18
Husband's time away from family	1	2		2	1	6
A member play gambling			4			4
Mother have a new baby /pregnant					2	2

Table 3 An Occurrence and Appraisal of Family Life Events. (N=4056)

Family Life Events	Occurrence		Appraisal of stress or strain					
	(%)	Rank No.	None (%)	Low (%)	Mod. (%)	High (%)	Mean /SD	Rank No.
Family Transition and Marital status strains								
- A member adopted a child (n=54)	1.3	19	70.4	11.1	7.4	11.1	0.59 (1.3)	22
- A member move out / new person move into the house (n=773)	12.9	2	79.8	5.6	7.1	7.5	0.42 (0.91)	23
- Separate from spouse >3 months (n=335)	8.3	7	54.6	9.5	12.5	23.2	1.04 (1.26)	18
- Spouse was divorced (n=168)	5.7	12	37.5	6.5	11.3	44.6	1.63 (1.37)	10
Finance and work-family strains								
- A member changed to a new job / career (n=522)	12.9	4	67.2	11.3	12.3	9.2	0.64 (1.01)	21
- A member lost / quit a job (n=427)	12.0	6	32.1	16.1	16.6	35.1	1.55 (1.26)	13
- Took out a loan/ refined the loan (n=1689)	41.7	1	41.1	10.1	17.0	31.7	1.39 (1.30)	15
- Being robbed, loss of money etc. (n=141)	3.5	14	33.3	17.7	17.7	31.2	1.47 (1.25)	14
Illness and family care strains								
- A member became physically disability / chronically ill (n=239)	6.1	10	28.5	19.7	13.8	38.1	1.61 (1.25)	11
- Close relative became seriously ill / injured (n=315)	7.8	8	46.0	12.7	16.8	24.4	1.19 (1.25)	17
- Parent/spouse became seriously ill / injured (n=84)	2.3	17	19.1	3.6	15.5	61.9	2.20 (1.18)	3
- A child member became seriously ill / injured (n=122)	4.6	15	23.8	13.9	23.8	38.5	1.77 (1.12)	6
- A member appear to have a psychosis (n=36)	1.0	20	27.8	13.9	22.2	36.1	1.66 (1.24)	8
Family Legal Violations & Family Emotion Strains								
- A member have an argument (n=247)	6.8	9	18.2	23.1	17.4	41.3	1.81 (1.15)	5
- Physical abuse/ violence in home (n=149)	3.7	13	19.5	24.2	19.5	36.9	1.74 (1.15)	7
- A member was arrested by police/went to jail (n=115)	2.9	16	27.8	6.1	19.1	46.0	1.82 (1.30)	4
- A member appears to depend on alcohol / drugs (n=226)	5.6	11	33.6	12.4	14.2	39.8	1.60 (1.31)	12
- A member appears to have emotional problems (n=651)	16.1	3	47.2	22.8	16.5	13.5	0.97 (1.08)	20
- Being victim of a violence act (assault/ rape etc) (n=76)	1.9	18	36.8	22.4	13.2	27.6	1.32 (1.23)	16
Loss/ Death strains								
- Death of close relative (n=496)	12.2	5	56.9	10.1	9.3	23.8	1.00 (1.27)	19
- A child member died (n=14)	0.4	22	35.7	14.3	0.0	50.0	1.64 (1.44)	9
- A parent/spouse died (n=25)	1.8	21	8.0	8.0	4.0	80.0	2.56 (0.96)	1
- Suicide in home (n=8)	0.2	23	25.0	0.0	0.0	75	2.25 (1.38)	2

Figure 1. The priority order of the events by combining frequency and perceive severity of total family (N=4056).

Percentage of an occurrence (log scale)

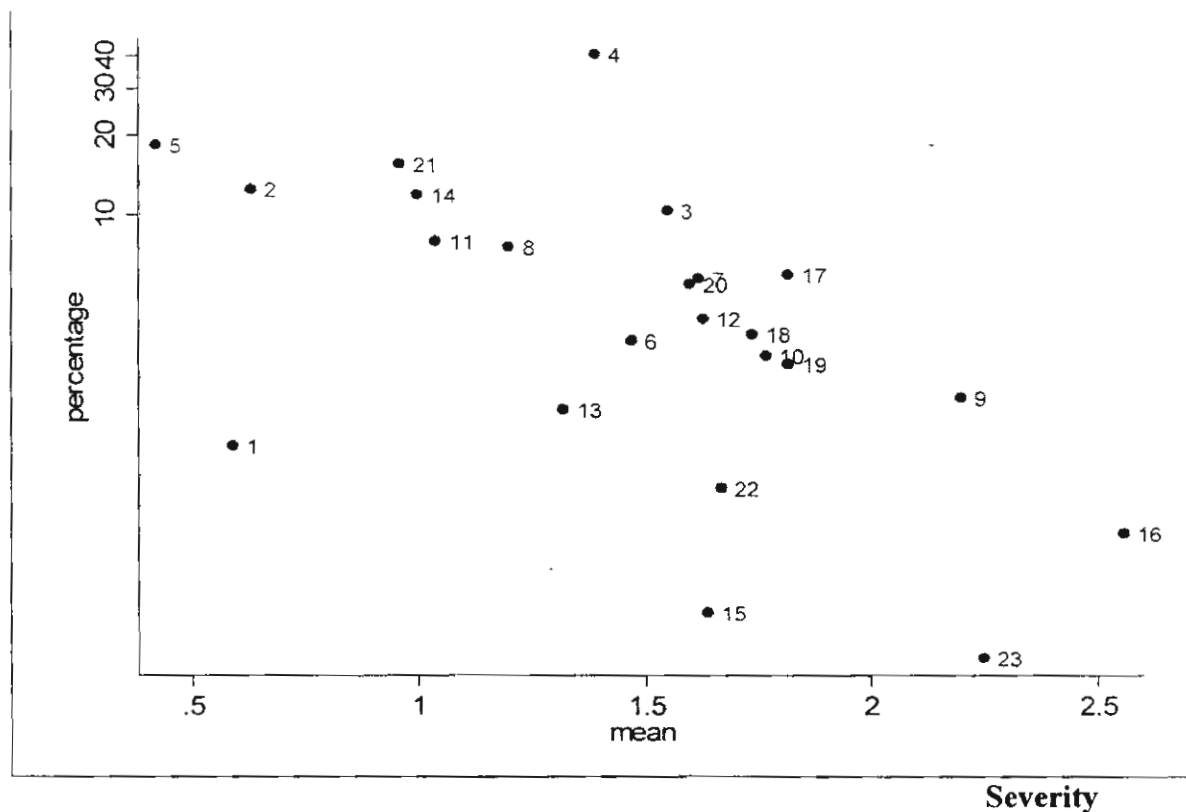


Figure 2 The priority order of the events by combining frequency and perceive severity in Pratumtaun (Central part of Thailand N=743)

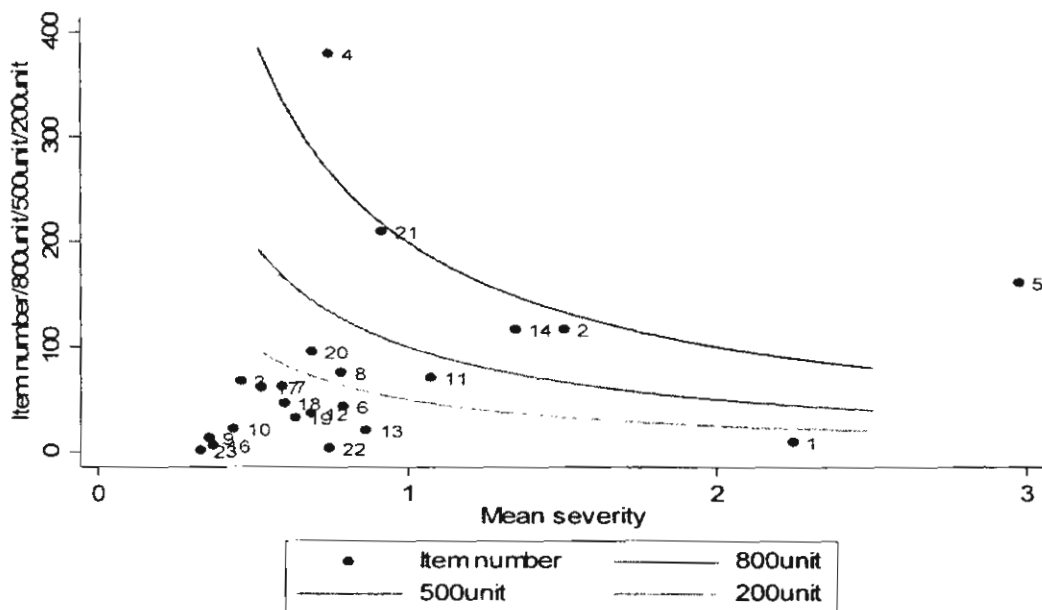


Figure 3 The priority order of the events by combining frequency and perceive severity in Tapa (Southern part of Thailand N=1047)

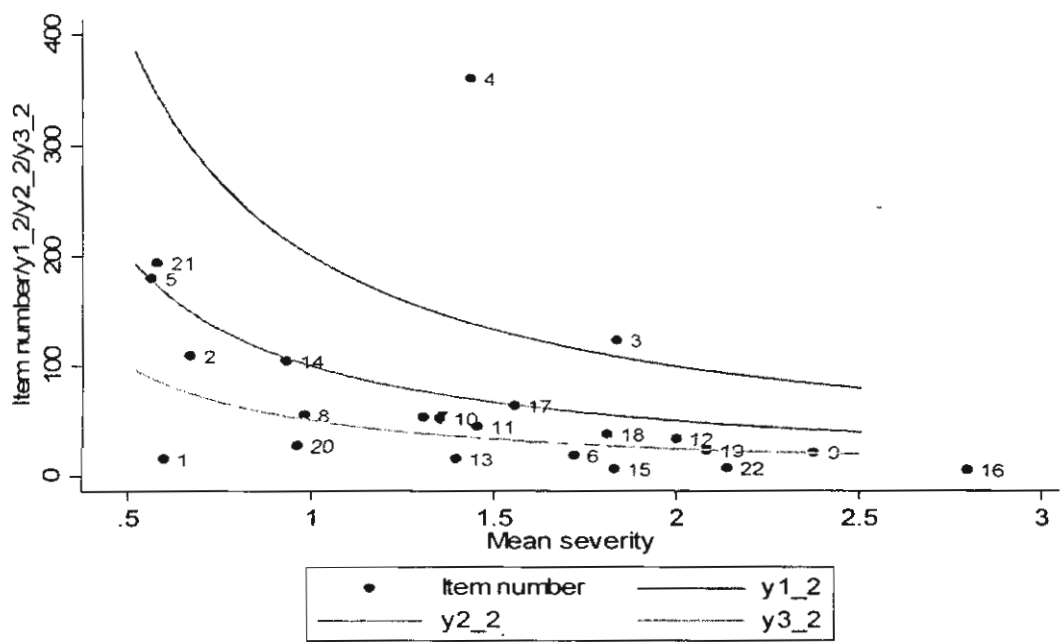


Figure 4 The priority order of the events by combining frequency and perceive severity in Kranuan (North East part of Thailand N=846)

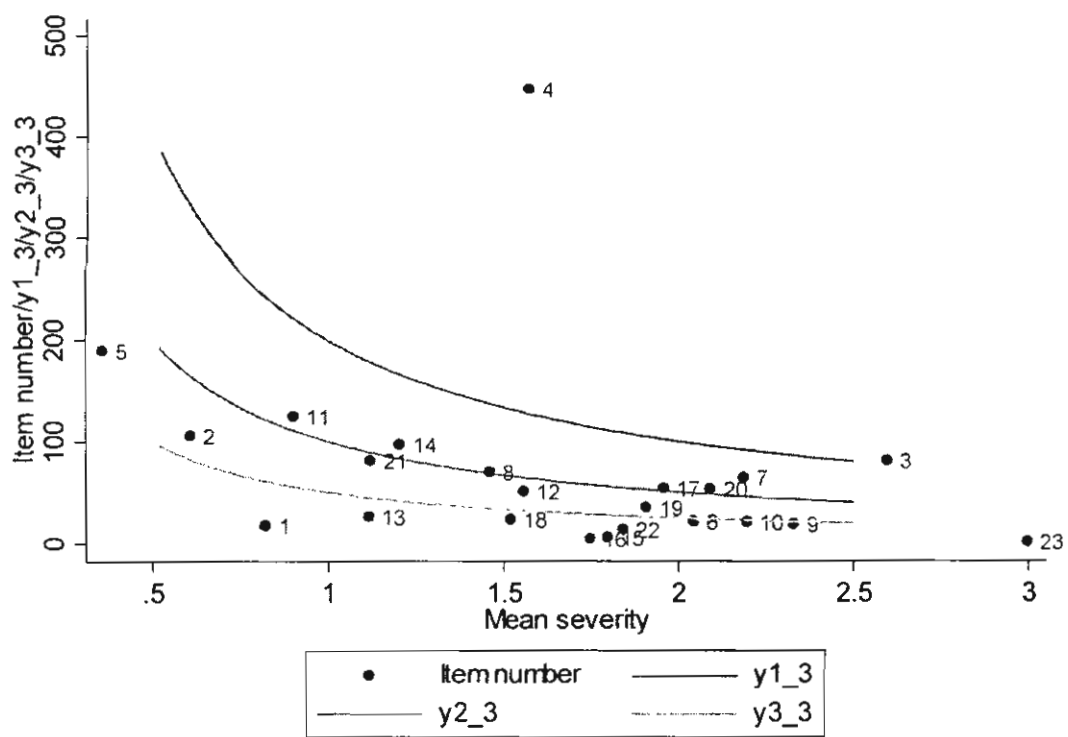


Figure 5 The priority order of the events by combining frequency and perceive severity in Nan (Northern part of Thailand N=757)

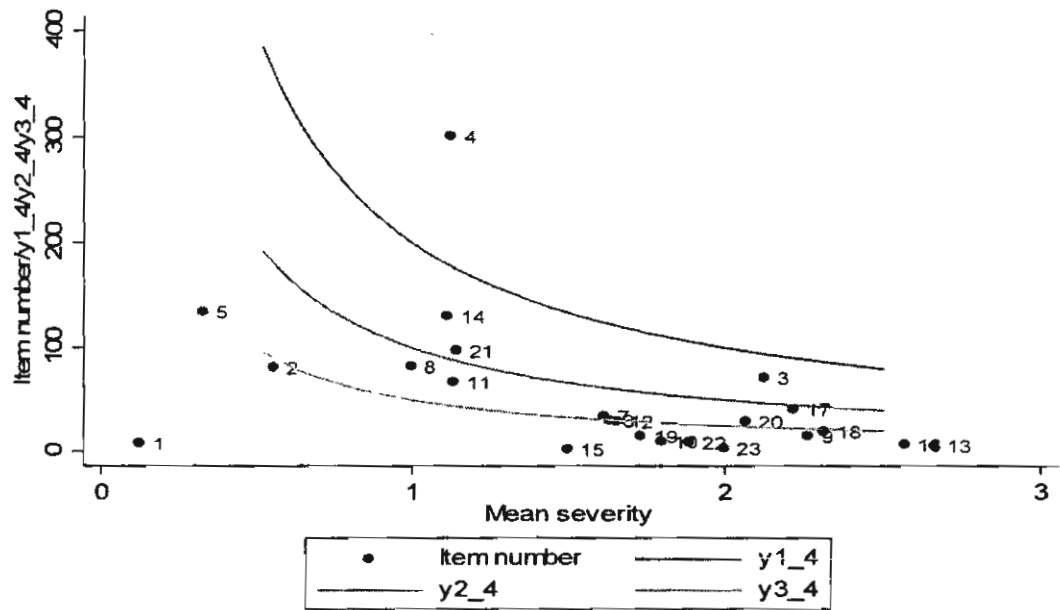
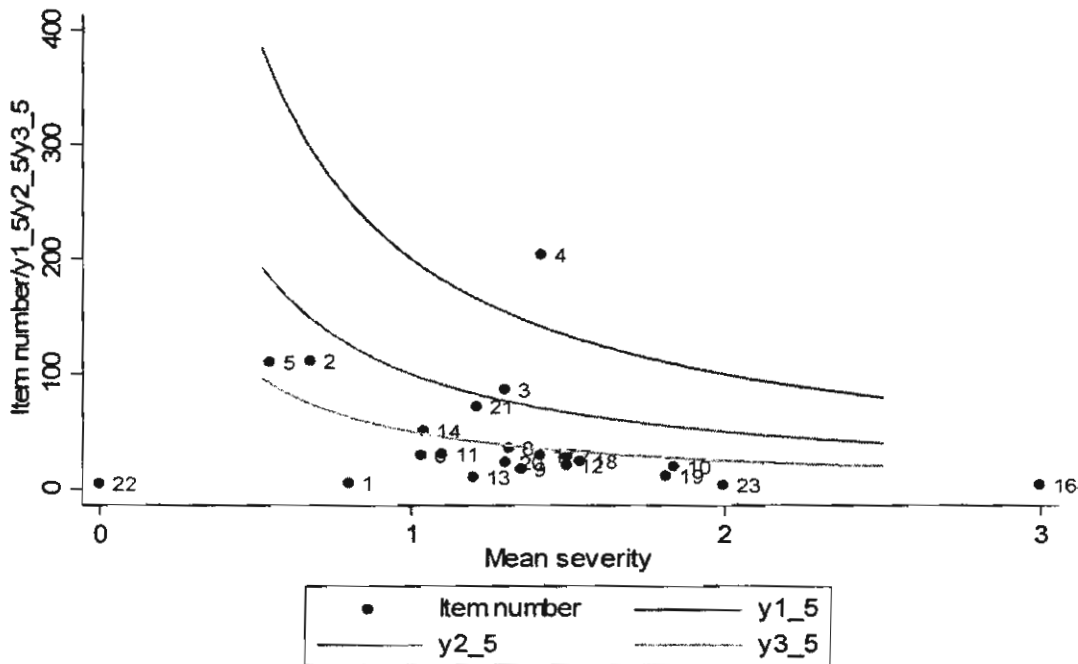


Figure 6 The priority order of the events by combining frequency and perceive severity in Bangkok N=663



Health Practices of pregnant women in five areas of Thailand : The Prospective Cohort Study of Thai Children (PCTC) Project

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Abstract

Good health practice is critical for pregnant women and their unborn children. This study aims to explore health practice of pregnant women and investigates its relationships to maternal age, education, pregnancy planning, and the number of living children in five areas of Thailand using data from the Prospective Cohort of Thai Children Project. A structured interview using 4-point Likert scale scoring of 14-items on appropriateness of behaviors during pregnancy was conducted. Subjects were 3,555 pregnant women from five selected areas of Thailand: A district from each of provinces comprising Kanjanaburi, Songkhla, Nan, Khonkaen, and Bangkok.

The results showed that health practice score during pregnancy ranged from 14 to 55 with a mean of 39.3 (SD = 6.5), with 18% of poor score. Mean scores among regions were different with statistical significance. Southern woman had the poorest behaviors ($X = 34.3$, $SD =$). Independent significant predictors of poor practice from multiple regression include young mother, high parity, less than seven years of education, and unplanned pregnancy. Special program of health promotion should be provided to these risk groups.

Key words: health practice, pregnancy planning, pregnant women, number of living children

INTRODUCTION

Health practices during pregnancy are defined as actions of pregnant women that may have an impact on pregnancy outcomes (Lindgren, 2003). Good health practices such as having regular prenatal care, eating nutritious food, taking iron and vitamin supplement as prescribed have been found to associate with positive pregnancy outcomes. On the contrary, bad health practices such as drinking alcohol, smoking, and illegal drug use can cause low birth weight, prematurity, and congenital anomalies (Eustace, Kang, and Coombs, 2003). Healthy prenatal behavior can decrease low birth weight infants, reduce complications during pregnancy and postpartum. In turn, these conditions can lower the costs of care for the mothers and

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their infants. Therefore, exploring health practice of pregnant women and determining factors influencing their health practice can make health personnel understand the pregnant women's situation and prepare appropriate intervention.

The Prospective Cohort Study of Thai Children (PCTC) is a prospective birth cohort conducted in 5 different regions of Thailand with its cultural diversity started in 2000. One of the main purposes of this PCTC study is to link selected socio-economic and demographic factors, and health practices to the outcomes of the pregnancy. This PCTC study is an observational community-based designed to follow all fetus of 28th to 38th week pregnancy from 4 selected districts in different regions and Bangkok Metropolitan, the capital city, of Thailand. The pregnant women cohort was followed over one year period during 2000-2002 in each site. Time of recruitment had varied among sites.

LITERATURE REVIEW

Approximately 800,000 births take place each year in Thailand (Ministry of Public Health, 2002). The 9th National Socio-economic Development plan (2002-2006) set the goal that maternal death rate to be below 18/100,000 live births, low birth weight infants under 7/1000 live births in 2004. However, maternal death rate and low birth weight infants are still high in some area. For example, the Health Promotion Center 12th that covers population in 3 provinces in the South (<http://www.anamai.moph.go.th/hpc12/data/ana45.html>) reported maternal death rate of 37.6 per 100,000 live births in 2002.

Pregnant women are recommended to increase their caloric intake 200 kcal/day during the last 6 months of pregnancy. Protein intake should be increased to 60gm/day to cope with maternal and fetal requirement. Inadequate protein intake can cause maternal anemia and growth restriction (IOM, 1990; Fowles, 2002). Iron is needed for the growth of the fetus and placental development, prevention of iron deficiency anemia, low birth weight and preterm birth (IOM, 1990; Worthington-Roberts & Williams, 1993; Fowles, 2002). Low dose of iron supplement is recommended for the last 6 months of pregnancy. Folic acid and vitamin B6 are needed to "facilitate protein metabolism and to prevent maternal anemia and neural tube defects (Fowles, 2002). Calcium is needed for fetal bone and teeth formation and nervous system development (Worthington-Roberts & Williams, 1993; Fowles, 2002).

Factor affecting health practice

Health practice is influenced by the mother's characteristics such as maternal age, education, income, marital status, parity, knowledge, belief, cultural norm, health status and health care system. Adolescents usually enter prenatal care late more often than adults (Gortzak-Uzan, Hallak, Press, Katz, & Shoham-Vardi, 2001 and Montgomery 2003). Income significantly influences women's nutritional practices. Women with low income, unintended pregnancy, caring for more than one preschooler child tend to have negative birth outcome (Hickey et al., 1997 and Fowles, 2002). Hart (1996) found that gravidity had a negative effect on basic prenatal care actions and maternal hemoglobin levels. That is, with increasing number of pregnancies, the women had lower prenatal care action scores and lower hemoglobin. Women whose previous pregnancy had successful outcomes tend to believe that participation in prenatal care is unnecessary (Leatherman, and Hart, 1996).

Research Questions:

1. What are health practices during pregnancy of Thai mothers in five areas of Thailand? Are they consistency throughout five areas?
2. What are the relative contributions of maternal age, education, planning of the pregnancy, and number of living children on the mother's health practice during pregnancy?

Objectives of the Study

The objectives of this study are:

1. To describe health practice of pregnant women during the third trimester and to determine the consistency of health practice among five areas.
2. To compare health practice mean scores of pregnant women among five areas.
3. To determine the relative contribution of maternal age, education, pregnancy planning, and number of living children on the health practice of pregnant women.

Method

Population and Sampling

The 4215 pregnant women during 28-38 weeks of gestational age who were purposively recruited at home to be in the Prospective Cohort of Thai Children Project during October 2000 to 2002. They gave consent and ethical clearance

Instruments

Two instruments were used to collect data, the Personal Data Questionnaire (PDQ) and the Health Practice Questionnaire (HPQ). The PDQ was used to gather demographic data and information regarding pregnancy. The HPQ is a 17-item Likert scale developed by the investigators, base on health practice recommendation for pregnant women by the Health Division, Ministry of Public Health. Later, it was reviewed by the panel of experts. After improvement, this structure interview questionnaire was tried out on the pregnant women who had the same characteristics as the potential participants to see the clarity and understanding of the language, but not in the study population. After refinement, a group of assistant researchers was trained to use it. Then, they tried out the questionnaire before using it in collecting data with the researchers' observation. The assistant investigators were monitored intermittent to see their consistency in using the questionnaire. The HPQ addressed antenatal visit, seeking information related to pregnancy, observing abnormal sign, avoiding contagious disease, drinking alcohol, smoking, taking iron and calcium supplement as prescribed, exercise, and eating nutritious food including protein, egg, milk, soybean milk, liver, vegetable, fruit. Each item had four choices from never (0) to always (4). However, three items were taken off from the total score of health practice, drinking alcohol, smoking, and eating raw food, because they did not correlated to the total scores. They were separately presented. The Chronbach's alpha reliability for the remain 14 items was .70 for all five areas. They were .52, .58, .55, .79, and .48 for Panomtuan, Tapa, Kra-Nuan, Nan, and Bangkok respectively. The possible health practice score ranged from 14 to 56.

Statistical analysis

Frequency and percent were obtained for all variables. Each item of health practice was sum up to be the total health practice score. Means and standard deviation were calculated. ANOVA were used to compare mean scores among five regions. Scheffe Post Hoc Tests was used to explore significant difference between each pair of areas. Multiple Regression was employed to determine the relative contribution of maternal age, education, planning of pregnancy, and number of living children on health practice scores.

Results

Demographic Characteristics

Three thousand five hundred and fifty five (84.4%) of the 4215 pregnant women recruited for the Prospective Cohort of Thai Children were included in this study. Demographic characteristics of the sample are described in Table1. Maternal age ranged from 14 to 48 years with a mean of 27 years. Considering each area, mean age of the pregnant women in Kra-Nuan (North-East) was the lowest (24.9 years) while that in Bangkok was highest (29.3 years). Eighteen percent of the participants in Kra-Nuan was adolescents while about 16% of the participants in Thepa and Nan were 35 years or older (see Table1). More than half (56%) of the sample had six grades or less education. Approximately, 10% received bachelor degree or higher. The sample in two urban areas, Bangkok (31%) and Nan (15%), hold more of bachelor degree than the other three. Of all the participants, 80% was Buddhism, 17% Muslim, 2% respects Spirit, and less than 1% was Christian. For marital status, 97.5% had spouse. More than half of the participants (57%) planned for this pregnancy. Of all participants, 42% was pregnant their first child, 48 % already had 1-2 children, and about 8% had 3-12 children. Number of living children of the mothers ranged from 0 to 12 with a mean of 0.96. Approximately two third of the mothers (67.5%) planned their pregnancy while 24% was unplanned but wanted, 4.4% was unwanted, and 4.1% felt indifference. About 42% was pregnant their first child, 8.5% already had 3 children. It is interesting, 20% of pregnant women in Tepa already had 3-12 children.

Health Practice

Health practice score during pregnancy ranged from 14 to 55 with a mean of 39.3 (SD = 6.5). Median was 39.0. Approximately, 49% of the sample's health practice score was equal to or above mean. The results of ANOVA showed that mean scores among different regions were significantly different ($p < .001$). Post Hoc test revealed that health practice mean scores of the pregnant women in two regions of the urban were not significantly different (Bangkok = 43.9, and Nan = 43.6), but they were significantly higher than those in the rural areas (Panomtuan = 39.1, Kra-Nuan = 39.1, and Tepa = 34.3). Mean scores of health practice of the women in Panomtuan and Kra-Nuan were not significantly different, however, they were significantly higher than that in Tepa.

From multiple regression maternal age, education, planning of pregnancy, and number of living children were accounted for 24.2% of the variability in the health practice score. Pregnant women who were older, educated higher than six grades, had planned pregnancy and had less children were more likely to have better health practice than those who were younger, educated less than six grade, had unplanned pregnancy, and had more children.

However, considering for each region. There was different pattern in explained variance and order of the contribution to the variability of maternal health practice. Number of living children, age, education, and planning of pregnancy together could explain 6.3, 16.0, 8.5, 44.9, and 8.6% of the variance of maternal health practice in the sample of Panomtuan, Tepa, Kra-Nuan, Nan, and Bangkok respectively as shown in Table.

Table

Variables	Standardized Coefficients (β)					
	Panom -tuan	Tepa	Kra- Nuan	Nan	BKK	All regions
No. of living children	-.05	-.321**	-.144*	-.586**	-.134**	-.391*
Planned pregnancy	.134*	.087*	.054	.082*	.114**	.046*
Maternal age	.152*	.317**	.174**	.361**	.243**	.331*
Maternal education	.172*	.257**	.239**	.219**	.061*	.261*
R	.250	.399	.292	.670	.293	.492
R ²	.063	.160	.085	.449	.086	.242

* $p < .05$

** $p < .001$

Discussion

Health practice score during pregnancy ranged from 14 to 55 with a mean of 39.32 (SD = 6.55). Of all participants, 49% has health practice score equal to or above mean. Mean scores of health practice among five regions were significantly different ($p < .001$). Post Hoc test revealed that health practice mean scores of the pregnant women in two regions of the urban were not significantly different (Bangkok = 43.90, and Nan = 43.58), but they were significantly higher than those in the rural areas (Panomtuan = 39.10, Kra-Nuan = 39.07, and Tepa = 34.33). Mean scores of health

practice of the women in Panomtuan and Kra-Nuan were not significantly different, however, they were significantly higher than that in Tepa.

The results of Multiple Regression showed that maternal age, education, planning of pregnancy, and number of living children were accounted for 24.2% of the variability in the health practice score. In other words, pregnant women who were older, educated higher than six grades, had planned pregnancy and had less children were more likely to have better health practice than those who were younger, educated less than six grade, had unplanned pregnancy, and had more children. The relative contribution of each variables were number of living children ($\beta = -.39$, $p < .001$), age ($\beta = .33$, $p < .001$), education ($\beta = .26$, $p < .001$), and planning of pregnancy ($\beta = .05$, $p < .01$) respectively.

However, considering for each region. There was different pattern in explained variance and order of the contribution to the variability of maternal health practice. Number of living children, age, education, and planning of pregnancy together could explain 6.3, 16.0, 8.5, 44.9, and 8.6% of the variance of maternal health practice in the sample of Panomtuan, Tepa, Kra-Nuan, Nan, and Bangkok

The results revealed that pregnant women in urban areas had more positive health practice than those in the rural community. This may be the impact of socioeconomic status, feasibility to access to prenatal care and quality of care, information related to pregnancy, food resources, and transportation that tend to facilitate people in the city. However, the results were not congruent with other studies (Lindgren, 2003; Ganz, 2000) which found that pregnant women in inner-city were less likely to engaged in high-quality health practice than those in the other areas because of the stress generated by the environment. These incongruent results may come from the difference of the socio-economic structures and lifestyle between developed and developing countries.

The results reveal that pregnant women who were older, educated higher than six grades, had planned pregnancy and had less children were more likely to be good at health practice. This may be explained that younger pregnant women often have fewer life experiences than do adult mothers, making them less capable of self-care during pregnancy (Montgomery, 2003). Moreover, they start prenatal care late more often than adult groups (Gortzak-Uzan, Hallak, Press, Katz, & Shohamvardi, 2001). They may have at-risk behaviors such as tobacco use, alcohol and drug use, unhealthy dietary behavior, and physical inactivity (Christopherson & Jordan-Marsh, 2004).

However, less than 1% of the sample in this study had tobacco and alcohol use. This may be due to the cultural norm of Thai mothers that stresses on mothering role in which mothers were expected to do no harm on their babies. However, adolescent mothers may not be aware of eating nutritious diet during pregnancy because they often think that they are healthy and strong during this age.

Education is believed to help people in capable of seeking information to enhance their health, therefore, less educated person may have less opportunity to do that. Besides, less educated people usually obtain less salary that leads to have limited necessary facilities and feel more stress from economic pressure. Some pregnant women who had not planned to have a baby did not want the child but some wanted. However, unintended pregnancies may bring about reluctant feeling, anguish, guilt, and non-readiness. Thus, the pregnant women may not pay attention on their health. Unintended pregnancy was found to be associated with elective abortions, late prenatal care, and low birth-weight (Moos, 2003). On the contrary, if this pregnancy was planned, the mother usually expects the best outcome. This expectation encourages them to engage in more positive health practice during pregnancy than those who were not intend to have a baby. Mothers who expect their first child tend to be aware of their health behavior more than those who already have a baby, particularly who experienced normal delivery and had healthy newborn child in previous pregnancy. Approximately 56% of the sample already had at least a child. Therefore, they may have less time, energy, and resources to encourage them to engage in positive health practice because of their tasks in multiple roles.

Limitation of the Study

Among several items of behavior questions known from literature review to be strong predictors of pregnancy outcomes in developing countries, data reduction to obtain small number of domain could not be achieved by factor analysis (number of factor in final model with items needed to be removed). The Chronbach alpha's was .66. Due to their face validity, we keep all items in analysis?

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ตารางที่4. ร้อยละของสตรีตั้งครรภ์จำแนกตามความถี่ของการดื่มเหล้า/ยาสูบเหล้า ขณะตั้งครรภ์ และตามพื้นที่ (N=3578)

ดื่มเหล้า/ยาสูบเหล้า	พนมทวน	เทพา	กระนวน	น่าน	กทม.	รวม
ไม่ดื่มเลย	96.5	99.6	87.7	94.4	92.2	94.4
ดื่มนานๆ ครั้ง	3.1	0.4	11.8	5.5	7.6	5.3
ดื่มไม่ทุกวัน	0.1	0.0	0.4	0.0	0.2	0.1
ดื่มอย่างน้อย 1 แก้วทุกวัน	0.3	0.0	0.1	0.2	0.0	0.1

ตารางที่6. ร้อยละของสตรีตั้งครรภ์จำแนกตามความถี่ของการสูบบุหรี่ขณะตั้งครรภ์และตามพื้นที่ (N=3268)

สูบบุหรี่	พนมทวน	เทพา	กระนวน	น่าน	กทม.	รวม
ไม่สูบบุหรี่	98.2	97.3	99.4	99.2	97.1	98.3
สูบนานๆ ครั้ง	0.5	1.5	0.3	0.5	1.6	0.9
สูบบ่อยๆ	0.2	0.0	0.0	0.0	0.0	0.0
สูบทุกวัน	1.1	1.1	0.4	0.3	1.2	0.8
รวม	100	100	100	100	100	100
รับประทานทุกวัน	84.2	66.7	63.2	64.9	89.7	72.3
รวม	100	100	100	100	100	100

ตารางแสดง น้ำหนักที่ควรเพิ่มตลอดระยะการตั้งครรภ์ จำแนกตามดัชนีมวลกายก่อนการตั้งครรภ์

BMI ก่อนการตั้งครรภ์	weight gain ที่แนะนำ	
	ปอนด์	กิโลกรัม
น้ำหนักต่ำกว่าปกติ (BMI<19.8)	28-40	12.5-18
น้ำหนักปกติ (BMI=19.8- 26.0)	25-35	11.5-16
น้ำหนักเกิน (BMI= 26.1-29.0)	15-25	7.0-11.5
อ้วน (BMI> 29)	≥ 15	≥ 7

ที่มา Reifsnider & Gill. (2000). Nutrition for the childbearing years. JOGNN29(1), p.46

The pregnant women who were not plan for the pregnancy were less likely to have good health practice. Unplanned or unintended pregnancy is comprised of two groups: unwanted conceptions and mistimed conceptions. Unwanted conceptions are those that occur when the women did not want to have any more pregnancies at all (Petersen & Moos, 1997). The mistimed group indicated that she desired to become pregnant at sometime but not at this time.

The Center for Disease Control and Prevention (CDC) of the United States has identified six behaviors that place adolescents at risk including injuries and violence, tobacco use, alcohol and drug use, sexual behaviors, unhealthy dietary behavior, and *physical inactivity* (Kann, 1997).

Cultural influence on Temperament Questionnaire

By Dr.Benjaporn Panyayong

Cultural influence on Temperament Questionnaire.

Benjaporn Panyayong,M.D.

Introduction:

Temperament was widely accepted as a stable consistent organismic " behavioral dispositions(Bates,1989). Such disposition s appear to have some continuity, stability and generality for person , and to allow other people to feel a sense of knowing what a person is likely to do in a given situation, i.e. to be able to anticipate their reactions with some degree of confidence.(Prior,1992)

Temperament was defined in term of those behavioral styles that have strong biological basis; somewhat similarly Buss &Plomin (1986) defined as inherited personality traits present in early childhood. (Kagn,1987;Buss &Plomin,1986). Anyway, Bates (1980) suggested that much of temperament lay in parental perception rather than child behavior.(Bates,1980)

Thomas and Chess(1977) adopted nine intuitively derived dimensions in modeling the temperament of Thai infants and young children. They are: activity level, prevailing positive and negative Mood, Intensity of response, Threshold to respond, Persistence, Approach versus Withdrawal tendencies to new stimuli, Adaptability overtime to new experiences, Distractibility or ease of soothing, and Rhythmicity or regularity of biological function. According to studies based on structured observation or parent reports, there are three dimensions, pattern of activity, emotionality and attention. (These have much in common with other theoretical models. Finally, Bates(1989) has identified a number of temperament "concepts" for which he claims that there is considerable construct validity, and considerable commonality among workers in the area. Emotionality, is a primary one, although there are many who argue that this is too broad a concept. (Kohstamm,1989))

By consideration of conceptual overlap between dimensions, the clusters of related group of dimensions should not be overlooked.(Plomin&Dunn,1986) Furthermore, there are reasonably good cross-cultural data on the generality of clusters (Super & Harkness,1986)

Studies found that there are relationship between difficult temperament features and health outcomes later in life such as high rate of accidents, sleep difficulties and infantile colic.(Huttunden & Nyman,1982; Carey,1986) There are moderate relationships between children's temperament and their educational competence as measured by performance on standardized achievement test.(Keogh,1986) Children's temperament has been confirmed to have an extensive influence on scholastic performance, as measured by grades and standard achievement tests.() Temperament characteristics (activity, distractibility, persistence) had a much stronger impact on reading performance than did scholastic ability. (Martin,1994)

Measurement temperament in population are conducted in many places of the world such as.....

However, there has been known from developing countries majority of living variation of culture is high.

This study is an observational community-based designed to follow all fetus of 28th to 38th week pregnancy from 4 selected districts in different regions and Bangkok Metropolitan, the capital city, of Thailand. The birth cohort, born over one year period during 2000-2002 in each site, is observed and planned to follow up until the children reach the age of 24. Time of recruitment had varied among sites, usually 1-3 months different.

Samples : Expected number of children born from each site is 800-900 thus providing a total of 4300 children and 8600 parents. The first child was born in the Central District on October 15, 2000 and the last child born at Ramathibodi Hospital in Bangkok on September 14, 2002. It is worth noting that although the study will focus mainly on the children, their mothers, the identified subjects, are observed as early as 28th week of pregnancy and thus reliable data is collected, as well as the father and the primary care takers will be interviewed for important data regarding child rearing practices. In addition, community profile and changes over time would be included in the study protocol.

Variables and data collection : This study cover mainly factual in character. Different methods of data collection, appropriate to the variables, have been applied. Relatively

permanent characteristics, such as demographic data, are collected via interviews or extracted from existing records. High frequency data such as sleep and dietary patterns of children are collected using diary records. Medical and behavioral characteristics are measured by physicians and trained researchers. The list of variables collected in the first phase (fetus to first year of lives) of the project is shown in Table 1.

Data management and analysis : Due to huge quantity, data management system was changed from double data entry procedure to distributed data entry using scanner and Optimal Marked Recognition (OMR). Cleaning, editing and systemic verification and other data quality assurance is performed by both hand and a statistical package, using MySQL for the database server. The cleaned data are systematically sorted and saved in CD-rom format. Data integrity and logical check are performed before releasing for analysis. Three identical data sets are generated and kept in separate office for security. All data set for analysis will be

This study includes measurement using international accepted questionnaire tool for infants. Covering five different regions of Thailand was a good opportunity to understand the nature of temperament in this diversity of population. Moreover, it is possible to test the effects of culture and maternal characteristics in rating of the scales. Objectives of this study is to describe various 9 dimensions of temperament in PTCT subjects at the first year of life and to test the effects of the culture and maternal characteristics on these domains.

Method

PTCT is a birth cohort study in 5 regions of Thailand where the current reports will focus on measurement of temperament at 12 months old. The 5 study sites included urban, semi-urban in the North, rural district in central, Northeast and south and hospital – based birth cohort in Bangkok. In all regions excepted Bangkok, pregnant women in district were identified by districts' health volunteers and health personals at the third trimester of pregnancy where information background of families andwere collected after informed consents.

Information on birth was extracted from the obstetric records of hospital or from retrospective interview withindays after birth took place outside the hospital. The children and their families were follow up at 6,12 months and so on. Only those who survived and free from neurological deficits were used for temperament assessment at 12 months.

Instruments

Standard self reporting questionnaire for assessment of temperament were adopted and translated from the Australian Temperament Questionnaire into Thai and summated by experts from 5 institutes of child development centers of Thailand. After the approval questionnaire was field tested in 3 areas (Bangkok ,Central, and North).Since there are language dialect difference among region, the central questions were slightly modified to adopted to local settings. The list of questions was prepared as a standard questionnaire form as well as cards, each of which contains one specific item. From each study site, 2-5 research assistants who are full time employee at the project sites, graduated at least Bachelor degree level were trained and used as data collecting. On the day of data collection, the rating of questionnaire was carried out face- to- face . The subjects' mother was requested to read the question slowly . For every question read on the questionnaire, the card with corresponding item is dropped into score baskets, simultaneously. After the questionnaire was completed research assistant checked the same item from standard questionnaire against the card in the basket to ensure high quality of data. The questionnaire was manually checked by field supervisor on the spot before reply and sent to data management center. Computerization of the data was done with double data entry and subsequently statistical analyzed by using descriptive, statistic correlation matrix and analysis of co-variance.

Results

Out of 4,258 pregnant women recruited in the study, 43 withdrew before delivery leaving 4,215 study subjects who give 4,245 live births,60 twins. Among these, 37 infants died before the end of first year, one had neurological deficits, 9 lost to follow-up, two refused to participate at the first year, resulting in 4,174 subjects and 4,090

completed the questionnaire.. There was no significant different mortality rate and exclusive data among regions.

Absolute correlation between two items range from... to..... Chronbach's alpha of the questionnaire was 0.738. Correlation matrix of mean score of domain among regions are shown in table 2. At region level, correlation coefficient of mean score among domain range from -0.72 to 0.99, an average of 0.57. This indicate important inter-dimensional correlation.

Table 1 Demographic data of mothers of the samples

Personal Charectors	Mothers
Age (Years)	
Min-Max	14-48
Mean	27.02
S.D.	6.26
Educational Levels (n=4,175)	5.3
None can't read	47.5
Primary	28.4
Secondary& high school	8.6
Vocational	10.0
Bachelor & higher	0.2
Other	
Family Income(Baht)	
Min - Max	0 – 18,120,000
Mean	186,444
S.D.	414,145

Table 2 Correlation matrix of mean score domains among region.

	di1_ n	di 2_n	di 3_n	di 4_n	di 5_n	di 6_n	di 7_n	di 8_n	di 9_n
di 1_n	1.00								
di 2_n	-0.09	1.00							
di 3_n	0.27	0.77	1.00						
di 4_n	0.24	0.81	0.94	1.00					
di 5_n	0.56	-0.72	-0.24	-0.46	1.00				
di 6_n	0.54	0.71	0.94	0.93	-0.16	1.00			
di 7_n	0.60	0.59	0.93	0.83	0.06	0.96	1.00		
di 8_n	0.29	0.66	0.97	0.95	-0.22	0.92	0.89	1.00	
di 9_n	0.65	0.54	0.91	0.84	0.08	0.97	0.99	0.90	1.00

di 1 = Activity level , di 2 = Rhythmicity , di 3 = Approach versus Withdrawal , di 4 = Adaptability

di 5 = Intensity of response, di 6 = Mood , di 7 = Distractibility , di 8 = Threshold to respond, di 9 = Persistence

Table 3 Coefficients (SEs)of various factors predicting temperament score of different domains.

Domain	Education ,reference group=ไม่ได้รับ						Region ,reference group=BKK				p-value for test parameter of region
	ประถมศึกษา	มัธยมศึกษา	ปวช.- ปวส.	ป.ตรีและสูงกว่า	อื่นๆ	p-value for test parameter of education	South	NorthEast	North	Central	
new1	0.08 (0.05)*	0.14 (0.05)*	0.13 (0.06)	-0.06 (0.06)	0.46 (0.19)	p< 0.0001	-0.02 (0.03)	0.07(0.03)*	-0.01 (0.03)	-0.007 (0.04)	p= 0.0158
new2	0.02 (0.05)	-0.01 (0.05)	-0.09 (0.06)	-0.14 (0.07)*	-0.50 (0.22)*	p =0.0014	0.08 (0.03)*	-0.10 (0.03)**	-0.12 (0.03)**	-0.19 (0.04)**	p< 0.0001
new3	-0.09(0.05)*	-0.17 (0.05)**	-0.14 (0.06)*	-0.31 (0.06)**	-0.51 (0.20)**	p< 0.0001	-0.03 (0.03)	0.03 (0.03)	-0.07 (0.03)	-0.38 (0.04)**	p< 0.0001
new4	0.01 (0.04)	0.08 (0.04)	0.02 (0.05)	-0.03 (0.05)	-0.15 (0.16)	p = 0.0017	0.07(0.02)**	0.06 (0.02)	-0.006 (0.03)	-0.11 (0.03)**	p< 0.0001
new5	-0.001 (0.04)	0.02 (0.04)	0.04 (0.05)	0.08 (0.05)	0.15 (0.17)	P= 0.3131	-0.13 (0.03)**	0.04 (0.03)	-0.008 (0.03)	-0.03 (0.03)	p< 0.0001
new6	-0.09 (0.04)	-0.13 (0.05)*	-0.11 (0.06)**	-0.20 (0.06)**	-0.19 (0.19)**	P = 0.0154	-0.02 (0.03)	0.08 (0.03)**	-0.11 (0.03)**	-0.19 (0.03)**	p< 0.0001
new7	-0.07 (0.05)	-0.19 (0.05)**	-0.16 (0.06)**	-0.19 (0.06)**	-0.29 (0.19)**	p< 0.0001	-0.15 (0.03)**	0.03 (0.03)	-0.15 (0.03)**	-0.30 (0.03)**	p< 0.0001
new8	0.03 (0.04)	0.03 (0.037)	0.02 (0.04)	-0.05 (0.05)	-0.38 (0.15)	p=0.0129	0.01 (0.02)	0.02 (0.02)	0.009 (0.02)	-0.06 (0.03)*	p = 0.0695
new9	0.06 (0.05)	0.10 (0.054)	0.05 (0.06)	-0.12 (0.07)	0.07 (0.21)	p< 0.0001	-0.05 (0.03)	0.04 (0.03)	-0.04 (0.03)	-0.10 (0.04)**	p = 0.0018

Domain	Mother/Age	BirthOrder	Income quantile reference=1 quantile				p-value for test parameter of Income Quantile
			Income_q_2	Income_q_3	Income_q_4	Income_q_5	
new1	0.005 (0.002)**	-0.03 (0.008)**	0.003 (0.03)	-0.01 (0.03)	-0.02(0.03)	-0.04 (0.03)	p = 0.6913
new2	-0.005(0.002)*	-0.004(0.010)*	0.004 (0.03)*	-0.05 (0.03)	-0.03(0.03)	-0.05 (0.04)	p = 0.3397
new3	-0.001(0.002)	0.02 (0.009)	-0.014 (0.03)	-0.021 (0.03)	-0.07(0.03)*	-0.04 (0.03)	p = 0.2417
new4	-0.001(0.002)	0.004 (0.007)	-0.03 (0.02)	-0.030 (0.02)	-0.04(0.03)	-0.02 (0.03)	p = 0.5875
new5	0.008(0.002)**	-0.02 (0.008)**	0.03 (0.03)	0.017 (0.03)	0.02(0.03)	0.02 (0.03)	p = 0.9034
new6	-0.006(0.002)**	0.01 (0.008)**	-0.004 (0.028)	-0.03 (0.03)	0.002(0.029)	-0.06 (0.03)*	p = 0.2096
new7	-0.01 (0.002)	0.01(0.008)	-0.004 (0.029)	-0.004 (0.03)	-0.009 (0.030)	-0.03 (0.03)	p = 0.9058
new8	0.003(0.001)	-0.005 (0.006)	0.020 (0.022)	-0.02 (0.02)	-0.007 (0.023)	-0.03 (0.02)	p = 0.2835
new9	-0.003 (0.002)	-0.004(0.009)	-0.003 (0.031)	-0.008 (0.03)	-0.005(0.033)	-0.05(0.04)	p = 0.6000

*<0.05, **<0.01

Discussion

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**Health-related settings and behaviours among Thai young pregnant
women : A community survey in 5 regions**

By Dr.Chaichana Nimnuan

Health-related settings and behaviours among Thai young pregnant women: A community survey in 5 regions.

Chaichana Nimnuan, MD. PhD.

Executive summary

Young pregnant women especially pregnancy at the age less than 20 are at risk of various social and health problems. Teenage pregnant women are generally ill-prepared for their maternal role. Although their sexual and physical state is well developed, their socioeconomic status and emotional development are far behind the adult counterpart. This poses risks of maladjustment among teenage mothers and also their children. Despite that, the problems have largely been ignored in developing countries.

Systematic and comprehensive study of teenage pregnancy has received relatively little attention in Thailand. Existing studies have been conducted at hospital-based and employed different methods leaving results un-comparable. Living and marital conditions, health outcomes, as well as health behaviours during pregnancy were hardly included in single study. As a result, the use of previous knowledge is limited. We, therefore, employed a systematic and comprehensive study of characteristics of teenage pregnancy using longitudinal observation research design. We recruited all 28th to 38th week pregnant women, 4177 in total, for a period of one year from 5 different sites distributed to each part of the country and followed them until their children were born. The whole samples were originally from the Prospective Cohort Study of Thai Children.

Data on demographic, physical health, psychosocial factors, marital-related variables, health behaviors related to pregnancy variables, and newborn's physical health were collected and analyzed. The results showed that the incidence of teenage pregnancy in some area such as Krannuan, the Northeastern representatives, is still high (18%).

Teenage pregnant women in all sites are less likely to live independently and more likely to be in unpaid job compared to adult counterpart. Our findings also support that teenage pregnant women at Bangkok site are more likely to be dissatisfied with their marriage. At Panomtuan (Central) and Nan (North) site, teenage pregnancy poses some

risk of having poor health care behaviours related to pregnancy. We do not find teenage pregnancy increases risk of birth complication, death of newborn, or low Apgar score. However, teenage pregnancy seems to be associated with low birth weight in some area, that is, Thepa (South) and Kranuan (Northeastern).

Regarding health behaviour during pregnancy, we found having higher income, being in higher level of occupation, and having higher score on supportive relationship with relatives are significant among other factors in increasing health care behaviours during pregnancy. Apart from health issues, policy makers should therefore pay more attention to living and working condition among teenage mothers as our study suggests. Being dependent and in unpaid job are likely to negatively affect teenage pregnant women on both psychosocial and health care conditions.

Marked differences in incidence of teenage pregnancy across sites pose some concerns when using the results for public policy. Likewise, associated factors with teenage pregnancy and also effects of teenage pregnancy on other health outcomes vary. Social and health policy intent to implement globally should be taken with some cautions. Our study indicates that different areas have different socioeconomic background. Thus their socioeconomic and health needs may significantly differ. Social and health promotion policy therefore has to be guided by knowledge specific to local areas and be tailored to suit local needs.

This study is far from complete. More exploration and confirmation are needed to improve understanding of the teenage pregnancy and its association. As a part of the Prospective Cohort Study of Thai Children project, the results of this study will be used as a starting point to understand possible effects of teenage pregnancy on long-term outcomes of Thai children in the future.

Health-related settings and behaviours among Thai young pregnant women: A community survey in 5 regions.

Chaichana Nimnuan, MD. PhD.

BACKGROUND

Teenage is a transitional period in which the child changes into later adulthood. Changes occur in all areas of development- physical, sexual, emotional, moral, and social. Sexual behaviours among Thai teenagers has dramatically changed. In 1998, approximately 30% of male and 15% of female aged 15-18 years have had sexual intercourse (Isaranurug & et al, 2000). Together with inadequate birth control method used among this group, teenage pregnancy becomes a public concern. Thailand National health plan has set the target to reduce the prevalence of teenage pregnancy down to 10% since 1997.

Young people generally are already at risk of various health problems. Among those, maternal mortality and morbidity, mental disorders, and substance and alcohol use disorders are disease and unhealthy behaviours which affect young people disproportionately (WHO 1995). Young age especially is a risk factor for maternal mortality, where the risk of death at childbirth may be as high as 100 times that in industrialized countries. Maternal mortality makes a considerable contribution to the overall number of deaths in young people (Abouzahr & Royston, 1991).

Apart from that, babies of adolescent mothers are also more likely to be of low birth weight (Phoungpaka et al, 1998; Jarutrakulchai P., Lowtaweesawad S., 1992) and their perinatal mortality rate is higher than those of older mothers. Adolescent pregnancy (pregnancies that occur among females below 19 years of age) can result in many health and social problems for both mother and child, especially when the mother is ill-prepared for her maternal role. Despite that, the problems have largely been ignored in developing countries.

Although overall results were not in favour of pregnancy among young pregnant women, some studies did otherwise. Piyasil (Piyasil, 1998) found there was no significant difference in short-term biological effect such as birthweight, perinatal morbidity and mortality between young and mature pregnant women. Similar results were also evident in Bungachart (Bungachart and Pincharoen, 1998) and Panprapa's studies (Panprapa and Duangmanee, 1998).

Despite the high prevalence of adolescent pregnancy, that is, approximately 6% (preliminary report; PCTC, 2001), the systemic and comprehensive study of adolescent pregnancy has still received relatively little attention in Thailand. Existing studies have been usually conducted at hospital-based and employed different methodologies (Piyasil V, 1998; Bungachart R, Pinchareon S., 1998; Jitphaitoon S, Smanchart B, 1981; Kotchasene T, 1998; Panprapa A, Duangmanee S, 1998). The results therefore are inconsistent and difficult to compare, and the use of the results is also limited.

Data on lifestyle and health-related setting and behaviors such as tobacco and alcohol use, living conditions, family structure, dietary pattern, exercise and also coping style are also essential for understanding the health needs of young pregnant women in Thailand. Because young people absorb national and international ideologies, values and norms and pass on what they inherit from their predecessors and what they themselves created to those of the younger generations and also as they are an important group of producers, any ill-health or premature mortality in young pregnant women has major cultural and economic implications. It is necessary then to have a systematic study of their living conditions and health-related behaviors in order to promote healthy setting and behaviors for them.

OBJECTIVES

The principal purpose of this project is to: 1) determine incidence of teenage pregnancy and also pregnancy-related health behaviors profiles among teenage pregnant women; 2) examine associations between teenage pregnancy and pregnancy-related health behaviours.

RESEARCH DESIGN

We employ prospective design and follow 28th to 38th week of pregnancy selected from five different regions in Thailand. The pregnant women were observed and followed up until the pregnancy ended. This is an observational study and does not involve intervention. The overall design consists of both descriptive and analytic elements.

METHODS

Subjects will be recruited from those enrolled in the Prospective Cohort Study of Thai Children (PCTC). PCTC is the first prospective cohort, community-based, multi-level research on the biological, psychosocial and moral development outcomes of Thai children, which also covers most variables potentially determining child development such as physical environment, family structure and functions, and community profiles. The PCTC is an observational study, consisting of both quantitative and qualitative elements, and does not involve intervention. The PCTC employs prospective design and follows subjects, selected from five regions. The birth cohorts are observed and followed up until they reach the age of 24. The PCTC was launched in July 2000 and is targeted for completion in 27 years.

For this project, pregnant women were primary subjects. All 28th to 38th week pregnant women were identified, within a period of one year, and followed up until their offsprings were born. Although 4177 pregnant women were identified and recruited in this project, the total number of children in the PCTC is 4245 because 30 women gave birth to twins.

Investigation sites are located in 5 different regions of the country (Table 1). The sites were selected purposefully with an attempt to cover socio-geographic and cultural variation of the country. The study was not designed to serve generalization of the results to the whole country. Purposive sampling on sites was chosen to assure long-term follow-up of cohort subjects. Conditions underpinning the selection of investigation sites are where approximately 800-900 births annually are estimated; hospital directors agree to participate and commit to long-term cooperation and are willing to take on the role of local team leaders; and weather conditions allow all year accessibility.

Table 1. Description of investigation sites.

	Central region: Pantomuan District, Khanchanaburi Province	Southern region: Thepa District, Songkhla Province	Northeastern region: Kranuan District, Khonkhaen Province	Northern region: Mueng District, Nan Province	Bangkok metropolis*
Geography	The district locates in the northwest of Bangkok covering around 536 sq kms. Most are high and low plains intermixed with some mountainous area. A canal and local ponds serve as natural water supplies. Some big communities have municipal water-works. Despite a period of rainy season, the dry weather persists almost all year round.	The district locates in the far south of Bangkok covering around 978 square kilometers. Most are low plains intermixed with some mountainous area. This is the only site locating next to the sea. There are only two seasons in this part of the country, namely, summer and rainy season.	The district locates in the northeast of Bangkok covering around 433 sq kms. Most areas are plains suitable for farming purposes. A canal and local ponds serve as natural water supplies. Some big communities have municipal water-works. This site is quite dry compared to other part of the country.	The district locates in the far north of Bangkok covering around 919 square kilometers of town center. Most are high plains intermixed with some mountainous area. There is also flat alluvial plain next to Nan river. Water-works are provided by municipality for most communities. Hill tribe people use natural water resources. The winter season lasts much longer than the other four.	It represents metropolitan areas, the neighborhood of Ramadhibodi hospital, covering around 95.2 sq kms. Most are commercial sites with lots of traffic and pollution. There are also 146 slum areas located. Natural water resources are never for household use. There are water-works provided by the city.
Governance	The district consists of 8 sub-districts. Local affairs are managed by sub-district administrative offices.	The district consists of 7 sub-districts. Local affairs are managed by a municipality and 6 sub-district administrative offices.	he district consists of 9 sub-districts. Local affairs are managed by a municipality and by 9 sub-district administrative offices.	The district consists of 11 sub-districts. Local affairs are managed by a municipality and by sub-district administrative offices.	The study site consists of 7 metropolitans which cover 198 communities. They are all governed by city of Bangkok.
Population and people	Approximately 52,700 people inhabit. 99% are Buddhist. Migration out of the region is higher than other sites.	Approximately 55,300 people inhabit. This is the only site where most people are Muslim (about 60%).	Approximately 66,600 people inhabit. Most are Buddhist.	Approximately 57,500 people inhabit. About 13% are hill tribe people who believe mainly in spirits and animism. The rest are mostly Buddhist.	Approximately 788,900 people inhabit. Most of them live in flat and townhouse. This site has the highest rate of migration into the region. Marked differences in living conditions are evident.
Economy	Agriculture accounts for the most of the work-force. Most people work in the farm as farmers or non-skill manual workers. Main crops are rice and sugar cane. Some also have cattle such as cows and buffaloes.	Agriculture accounts for the most of the work-force. Most people work in the farm and fishery. Main crops are rubber, rice, and orchards. Some also have cattle such as cows and buffaloes.	Agriculture accounts for the most of the work-force. Most people are farmers and some are non-skill manual workers. Main crops are sugar cane and potatoes. Some also have cattle such as cows and buffaloes.	Agriculture accounts for the most of the work-force. Most people work in the farm as farmers or non-skill manual workers. Main crops are rice and fruit orchards. Some also have cattle such as cows.	Most are employees in various kinds of work such as government service, skill and non-skill manual workers.
Health care services	Pantomuan Hospital is a 60-bed community hospital. There are also 12 local health stations.	The main health care service is Thepa hospital which is a 30-bed hospital. Additionally, there are 11 local health stations but no private clinic	Kranuan hospital is a 90-bed community hospital. There are also 12 local health stations and 4 private clinic run by part-time physicians.	Nan hospital is a 300-bed community hospital. Additionally, there are 17 local health stations and also 19 private clinics run by part-time physicians.	Ramadhibodi hospital is a university hospital and acts as the main hospital responsible for recruiting subjects. As a center of Bangkok, many hospitals and clinics both government-run and private service available.

MEASURES

Many different variables were included in order to cover both sociodemographic, physical, behavioural, and psychosocial aspects of teenage pregnant women.

Outcome measures are mainly factual in character. Relatively permanent characteristics such as baseline demographic data are collected via interviews or extracted from existing records. Medical and physical characteristics such as birth outcomes, and physical status during pregnancy, are measured by physicians and by trained researchers. List of variables collected was shown in Table 2.

Demographic variables

Age: This study focused on teenage pregnancy, age variable was therefore divided into 2 groups, namely- 19 and younger and 20 and older.

Education: Education was judged by the highest level of education subjects had achieved. Originally, 5 levels were proposed, namely: illiterate; literate and up to grade 6; from grade 7 to 12; college level; and bachelor degree or higher. For the purpose of meaningful analysis, this variable would take either dichotomous (illiterate or literate) or ordinal (grade 6 or lower, grade 7 -12, college, or bachelor degree) whichever was more appropriate.

Housing: This categorical variable takes 3 values; living with others (0), renting or government-support (1), and self-own (2).

Annual income: Annual income was difficult to be determined directly because most subjects are farmers and regular income could not be guaranteed. In addition to salary for some, annual income was calculated based on agricultural products valued monetary by subjects. The total sum was then computed. To avoid an effect of extreme value, this variable was categorized based on its distribution into 4 level using quartiles.

Occupation: Occupation was more complex than other demographic variables due to marked variation within population. We transformed the variable into different classes using the Registrar General's Classification of Occupations (HMSO, 1970) with some modifications. For this study, group 0 represented unpaid job (e.g. housewife, student), group 1 for unskilled-manual (e.g. general workers), group 2 for skilled-manual (e.g. trained worker in factories, service givers, clerks), group 3 for self-employed farmers,

Table 2. List of variables.

Measures	Mode of Data Collection	Informants
Demographic	Records and questionnaires	pregnant women
-age		
-religions		
-education		
-housing		
-annual income		
-occupation		
Physical health	Hospital records (ANC, physical examination forms)	Physicians
-history of pregnancy complication		
-term time		
-height & weight gain		
-anemia		
-presence of disease during pregnancy		
Psychosocial variables	Questionnaires	pregnant women
-mental health (GHQ-12)		
-planned pregnancy		
-wanted pregnancy		
-supportive relationship with relatives		
-coping style		
Marital-related variables	Questionnaire	pregnant women
-courtship period before marriage		
-marital choice		
-marital times		
-time together spending each month		
-marital status		
-marital satisfaction		
Health behaviours related to pregnancy	Questionnaires and Birth records	pregnant women and Physicians
-pregnancy-related health behaviour (PRHB)		
-smoking & drinking		
-preparation for the new born		
-Birth complication	Physical examination forms	Physicians
New born's physical health		
-birth weight		
-apgar at 5 minutes		
-mortality		

and group 4 for self-employed professionals (managerial, lower or high-level professional) or shop-owners.

Physical health variables

We extracted this group of variables from physicians' records. *Weight gain* was classified by cut-off value at 10 kg, *Height* at 145 cm, and *Preterm* at 37 weeks. *Anemia* was determined by either haematocrit lower than 33 or haemoglobin level lower than 11.

Psychosocial variables

General Health Questionnaire 12 (GHQ-12): The GHQ-12 was used as a measurement of potentially psychiatric morbidity. It is a 12-item scale designed to be used both in clinical and community settings. Its reliability and validity have been extensively studied. It was translated to Thai and already validated with good psychometric properties results (Nilchaikovit, et al. 1996). For this study, little modification was done to suit the interview format (rather than self-rating format as it was originally intended). The psychometric properties for this group of sample were good. All items had item-total correlation higher than 0.25. The scale Cronbach alpha-value was 0.79. Responses to each question were scored from 0-0-1-1, giving a maximum score of 12. A high score indicated potentially mental morbidity.

Relatives-Support-Scale (RSS): This questionnaire was designed to measure a degree of supportive relationship with relatives. Pregnant women rated, in their perception, how often helps between her relatives and her had occurred. The questionnaire consisted of six items originally. A four levels likert scale responses were used. Three items were dropped because their poor response distribution and low level of correlation with others. This left three items for the scale with Cronbach alpha value of 0.70. These three items were then summed up into relatives-support score (3-12) where a high score indicated support provided between pregnant women and their relatives.

Planned, wanted pregnancy, coping style are single-item variables with four responses. When analysis, we re-categorized these variables into dichotomy.

Marital-related variables

Courtship period before marriage is an ordinal variable taking value as < 1 month, 1 - 4 month, 4+ - 12 month, 12+ - 36 month, and > 36 month.

Marital choice, times, status, and satisfaction are single-item variables with four responses. We re-categorized these variables into dichotomy when analysis. Marital satisfaction was also designed to be an outcome variable in itself for further analysis. *Time living together* was originally a write-in type question. Its responses were then computed and transformed into dichotomy taking value of less than 20 days a month and 20 days or more per month.

Health behaviours relating to pregnancy

Pregnancy-related health behaviour (PRHB) questionnaire: A questionnaire was developed by research team to test the association between teenage pregnancy and pregnancy-related health behaviour and to use the questionnaire as an outcome in its own right. This was originally a twenty-five items questionnaire measuring women's health behaviour during pregnancy such as ANC attendant, physical care, eating habits, food supplements, physical exercise and so on. A four levels likert scale responses were used. Eleven items were dropped from the analyses because either their content was not related to the concept of health behaviour or they did not correlate well with the rest (item-total correlation < 0.25). The Cronbach alpha value was 0.70. These fourteen items were summed up into a pregnancy-related health behaviour score without weighting. The overall score of items scale therefore ranged from 14 to 56. A high score indicated healthy behaviours.

Smoking & drinking were single-item variables with four responses. We re-categorized these variables into dichotomy when analysis because responses were not well distributed.

Preparation for the new born was measured by a series of questions and then transformed into two categories, that is, none prepared and prepared. Originally, prepared response consisted of preparation of necessary information, instruments or both. However, the distribution of responses supported the differences of preparation be combined.

Birth complication was originally recorded in details but later collapsed into only absence or presence because only few endorsed on the presence category.

Newborn physical health

Birthweight was measured in gram then transformed into low birth weight using cut-off value at 2500.

DATA COLLECTION AND MANAGEMENT

Decisions on the way data should be collected depends on the nature of the information sought. This study involves considerable data collection because many variables need to be included. Interview questionnaires were the principal method of data collection because high follow-up rate was expected. Data extracted from hospital records were also collected for health-related variables.

Data received from investigation sites are checked against the original records before being entered by double data entry procedure. The data set was carefully checked and edited to identify and correct data entry errors. Cleaning and editing of data is performed by a statistical package. The cleaned data are systematically sorted. Missing data are checked and filled by the researchers who take the subjects concerned through the re-interview process. The distribution of continuous variables, such as age, was examined visually. Categorical variables were checked to ensure that the frequencies of each category made sense. All these processes were conducted through SPSS software and checking of original records.

Before analysing the data, some variables were grouped in order to make the results convenient to interpret. For continuous variables, decisions had to be made on how many categories and where the category boundaries should be. There are no definite rules for categorisation of continuous variables. The cut-off may be determined by the distribution of variables such as median, tertiles, or quartiles. Using the distribution can spread equal numbers of observations within categories which make them become statistically stable. In this study, categorisation based on the distribution was used for income variable.

Grouping was still necessary for some categorical variables especially ones with relatively large number of categories. When the observations are stretched over too many categories in relation to the number of observations, the number within categories may show large variation and be statistically unstable. For example, marital status which was originally designed for four categories was later grouping into two categories, married and non-married.

STATISTICAL ANALYSES

Specific statistical techniques were chosen depending on the aims of the study, the type of study design, and the level of variables. We intend to analyze data from each site separately corresponding with our original research design and also because of the unique characteristics of each site. To compensate for the small sample size (compared to pooled data analysis), an attempt to categorize interval-level outcome variables was refrained to preserve the power of the statistical analysis.

To determine the prevalence of teenage pregnancy

For a prospective study, the main measure of outcome frequency is incidence. In this study, establishing the incidence of teenage pregnancy in investigation sites was our main aim. The presence of teenage pregnancy will be presented as percentage units using all eligible subjects in each site as denominator.

To examine the relationship between variables

Although the primary objective of this study is the incidence of the outcome of interest, that is, teenage pregnancy, the association between teenage pregnancy and others, namely PRHB and Marital satisfaction can also be studied.

Univariate analyses: Univariate analyses with classical methods were used to examine the association of the outcome variables with each variable of interest in turn, ignoring all other variables. Non-parametric methods, mainly contingency tables, were used and Chi-square statistic was reported. By doing this, we were able to recheck the adequacy of observations in some particular categories and possibly consider further data reduction to

more manageable categories. Furthermore, univariate analysis provided a general idea of correlation between variables and the degree of change when further analyses were later performed.

Multivariate analyses: Confounders may lead to misleading results - either causing these to be an observed association where none is present, or to lead to a true association being mixed. To make the results valid, the effects of confounders should be removed. Regression modeling which can control many variables simultaneously was used.

As an exploratory study, many variables could be confounders. Criteria for including variables into the models were based on both theoretical and statistical relevance. All theoretically possible confounders were systematically included into the models. Other potential confounders were included based on the results of univariate analysis. However, to identify all theoretically relevant variables is impossible, especially in an social and health study. Modeling was therefore carried out by the process of deleting and fitting repeatedly until all the relevant variables were reasonably included and the clinically or statistically unimportant variables were excluded.

All explanatory variables were classified into the following categories: demographic, marital-related, psychosocial, and health behaviour related to pregnancy. Regression analyses either logistic (for marital satisfaction) or linear (for PRHB) were then performed in steps. We fitted successive models, and variables not associated with the outcomes at $p < 0.2$ were dropped from further models. The regression modeling began with demographic factors adjusted for other variables within the same category. The marital-related variables were then modeled adjusted for relevant demographic variables from the first step, and further adjusting for variables within their own group in the next step. This process of modeling stopped when all relevant variables were included.

All modeling was performed by STATA software package. All p-values calculated were two tailed.

RESULTS

Descriptive characteristics of the sample

Four thousand two hundred and forty-five infants born from 4215 mothers have been recruited for the PCTC study. Of those, only 4177 pregnant women had been previously identified and followed for this study. The reason for an inconsistent number was that 38 women moved into the investigation sites with their children after the project had been started. Basic data were then unavailable. We therefore took 4177 as reference denominator for general statistical analysis. Denominator for each analysis could, however, vary due to missing data.

The characteristics of samples by sites were shown in Table 3. The total number of subjects varied due to missing values. There were statistically significant associations ($p\text{-value} < 0.01$) between study sites and all demographic variables, namely; age, religions, education, housing, annual income, occupation. Pregnant women in Bangkok tended to be older than other sites. Most of pregnant women in Thepa (Southern representative) were Muslim. Considerable number of subjects' religion in Nan was in "Others" category, which was mainly "animism" belief shared among Hilltribe people. Education, annual income, and occupation were distributed at higher end in Bangkok compared to other sites. The result supported different sites differed markedly in many characteristics which were consistent with the rational of our research design (see above). For these reasons, further analyses would carry out separately by sites.

Incidence of teenage pregnancy

Incidence of teenage pregnancy as defined in this study - pregnancy at the age younger than 20 years old, varied by sites from approximately 4 to 20 % (Table 4). Bangkok had lowest incidence of teenage pregnancy.

Table 3 Demographic characteristics by sites

	Panontuan karnchanaburi	Thepa Songkhla	Kranuan Khonkhaen	Mueng Nan	bangkok	P
Age (yrs)						
< 20	104 (13.2)	117 (10.9)	155 (18.0)	88 (11.3)	29 (4.1)	<.01
20-24	233 (29.7)	273 (25.6)	303 (35.4)	185 (23.9)	120 (17.1)	
25-30	233 (28.6)	279 (26.2)	217 (25.4)	214 (27.7)	210 (29.9)	
30-34	136 (17.4)	231 (21.7)	126 (14.7)	170 (22.0)	209 (29.8)	
>= 35	84 (10.8)	167 (15.7)	56 (6.5)	116 (15.0)	134 (19.1)	
Religions						
Buddhism	776 (99.6)	332 (31.2)	847 (99.6)	654 (84.8)	677 (96.6)	<.01
Islam	3 (4)	730 (68.6)	3 (4)	0	16 (2.3)	
Christianism	0	2 (1.2)	0	17 (2.2)	8 (1.1)	
Others	0	0	0	100 (13.0)	0	
Education						
<= Gr. 6	512 (65.9)	703 (66.1)	532 (62.6)	341 (44.3)	114 (16.3)	<.01
Gr. 7-12	197 (25.4)	277 (26.0)	257 (30.2)	225 (29.2)	229 (32.7)	
college	43 (5.5)	47 (4.4)	39 (4.6)	89 (11.6)	141 (20.1)	
>= Bachelor degree	25 (3.2)	37 (3.5)	22 (2.6)	115 (14.9)	217(31.0)	
housing						
Living with others	492 (63.6)	469 (44.0)	615 (72.0)	397 (51.5)	201 (28.6)	<.01
Renting/ governmental	31 (4.0)	37 (3.5)	35 (4.1)	110 (14.3)	304 (43.3)	
Self-own	251 (32.4)	559 (52.5)	204 (23.9)	264 (34.2)	197 (28.1)	
Annual income (Baht)						
< 50,000	112 (14.5)	379 (35.8)	249 (29.3)	239 (32.3)	6 (.9)	<.01
50,000-99,999	224 (29.1)	364 (34.4)	235 (27.6)	150 (20.3)	35 (5.2)	
100,000-199,999	257 (33.4)	243 (23.0)	226 (26.6)	167 (22.6)	184 (27.4)	
>=200,000	177 (23.0)	72 (6.8)	140 (16.5)	183 (24.8)	447 (66.5)	
Occupation						
Unpaid job	141 (18.1)	232 (21.8)	101 (11.8)	135 (17.5)	137 (19.5)	<.01
Unskilled manual	130 (16.7)	491 (46.1)	49 (5.7)	123 (15.9)	27 (3.8)	
Skilled manual	335 (42.9)	179 (16.8)	216 (25.2)	224 (29.0)	436 (62.1)	
Self-employed: farmer	154 (19.7)	137 (12.9)	469 (54.8)	217 (28.1)	0	
Self-employed: managerial or professional	20 (2.6)	27 (2.5)	21 (2.5)	74 (9.6)	102 (14.5)	

Note: denominator for each variable differs due to missing data

Table 4 Incidence of teenage pregnancy (N=4177)

	Total pregnancy	Teenage pregnancy (T-preg)	%
Panontuan	780	104	13.3
Thepa	1066	116	10.9
Kranuan	856	154	18.0
Mueng Nan	773	88	11.4
Bangkok	702	29	4.1

Associations with teenage pregnancy

Table 5 showed associations between demographic variables and teenage pregnancy (T-preg).

Panomtuan: Housing and occupation were among demographic variables that showed significant association with teenage pregnancy. Teenage pregnant women were less likely to live independently ($p<0.01$), and to be in paid-job ($p<0.01$) than adult pregnancy (A-preg) counter part.

Thepa: Housing and occupation were among demographic variables that showed significant association with teenage pregnancy. Teenage pregnant women were less likely to live independently ($p<0.01$), and to be in paid-job ($p<0.01$).

Kranuan: Education, housing, income and occupation were among demographic variables that showed significant association with teenage pregnancy. Teenage pregnant women were more likely to achieve high education (OR=1.3, 95% CI=1.1, 1.7; $p=0.01$), but less likely to live independently ($p<0.01$), to have high income (OR=0.8, 95% CI=0.7, 0.9; $p<0.01$), and to be in paid-job ($p<0.01$).

Mueng Nan: Education, housing, income and occupation were among demographic variables that showed significant association with T-preg. T-preg women were less likely to achieve high education (OR=0.7, 95% CI=0.6, 0.9, $p=0.01$), to live independently ($p<0.01$), to have high income (OR=0.8, 95% CI=0.6, 0.9; $p<0.01$), and to work for paid-job ($p<0.01$).

Bangkok: Education, housing, income and occupation were among demographic variables that showed significant association with teenage pregnancy. Teenage pregnant women were less likely to achieve high education (OR=0.6, 95% CI=0.4, 0.8, $p<0.01$), to live independently ($p<0.01$), to have high income (OR=0.4, 95% CI=0.3, 0.7; $p<0.01$), and to be in paid-job ($p<0.01$).

Table 5. Demographic factors and teenage pregnancy (Univariate analysis)

	Panontuan			Thepa			Kranuan			Mueng			Bangkok		
	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P
Religions															
Buddhism	103 (99.0)	673 (99.7)	.35	41 (35.3)	291 (30.7)	.53	152 (99.3)	695 (99.7)	.45	66 (75.0)	588 (86.1)	.02	28 (96.6)	649 (96.6)	.76
Islam	1 (1.0)	2 (.3)		75 (64.7)	655 (69.1)		1 (.7)	2 (.3)		0	0		1 (3.4)	15 (2.2)	
Christianism	0	0		0	2 (.2)		0	0		2 (2.3)	15 (2.2)		0	8 (1.2)	
Others	0	0		0	0		0	0		20 (22.7)	80 (11.7)		0	0	
Education															
<= Gr. 6	49 (47.1)	463 (68.8)	.06	52 (44.8)	651 (68.7)	.10	65 (42.5)	467 (67.0)	.01	36 (40.9)	305 (44.7)	<.01	3 (10.3)	111 (16.5)	<.01
Gr. 7-12	49 (47.1)	148 (22.0)		63 (54.3)	214 (22.6)		84 (54.9)	173 (24.8)		44 (50.0)	181 (26.5)		21 (72.4)	208 (31.0)	
college	6 (5.8)	37 (5.5)		1 (.9)	46 (4.9)		4 (2.6)	35 (5.0)		8 (9.1)	81 (11.9)		5 (17.2)	136 (20.2)	
>= Bachelor degree	0	25 (3.7)		0	37 (3.9)		0	22 (3.2)		0	0		0	217 (32.2)	
housing															
Living with others	88 (86.3)	404 (60.1)	<.01	91 (78.4)	378 (39.8)	<.01	144 (93.5)	471 (67.3)	<.01	75 (85.2)	322 (47.1)	<.01	15 (51.7)	186 (27.6)	.01
Renting/ governmental	2 (2.0)	29 (4.3)		2 (1.7)	35 (3.7)		3 (1.9)	32 (4.6)		9 (10.2)	101 (14.8)		11 (37.9)	293 (43.5)	
Self-own	12 (11.8)	239 (35.6)		23 (19.8)	536 (56.5)		7 (4.5)	197 (28.1)		4 (4.5)	260 (38.1)		3 (10.3)	194 (28.8)	
Annual income (Baht)															
< 50,000	15 (14.4)	97 (14.6)	.12	31 (27.0)	348 (36.9)	.39	53 (34.4)	196 (28.2)	<.01	33 (39.3)	206 (31.5)	.02	2 (7.1)	4 (.6)	<.01
50,000-99,999	35 (33.7)	189 (28.4)		49 (42.6)	315 (33.4)		50 (32.5)	185 (26.6)		20 (23.8)	130 (19.8)		5 (17.9)	30 (4.7)	
100,000-199,999	40 (38.5)	217 (32.6)		30 (26.1)	213 (22.6)		37 (24.0)	189 (27.2)		20 (23.8)	147 (22.4)		7 (25.0)	177 (27.5)	
>=200,000	14 (13.5)	163 (24.5)		5 (4.3)	67 (7.1)		14 (9.1)	126 (18.1)		11 (13.1)	172 (26.3)		14 (50.0)	433 (67.2)	
Occupation															
Unpaid job	44 (42.3)	97 (14.3)	<.01	40 (3.5)	192 (20.2)	<.01	28 (18.2)	73 (10.4)	<.01	42 (47.7)	93 (13.6)	<.01	17 (58.6)	120 (17.8)	<.01
Unskilled manual	18 (17.3)	112 (16.6)		57 (49.1)	434 (45.7)		12 (7.8)	37 (5.3)		18 (20.5)	105 (15.3)		0	27 (4.0)	
Skilled manual	34 (32.7)	301 (44.5)		16 (13.8)	163 (17.2)		47 (30.5)	169 (24.1)		11 (12.5)	213 (31.1)		12 (41.4)	424 (63.0)	
Self-employed: farmer	8 (7.7)	146 (21.6)		3 (2.6)	134 (14.1)		67 (43.5)	402 (57.3)		17 (19.3)	200 (29.2)		0	0	
Self-employed: managerial/ professional	0	20 (3.0)		0	27 (2.8)		0	21 (3.0)		0	74 (10.8)		0	102 (15.2)	

Table 6. Marital-related factors and teenage pregnancy (univariate analysis)

	Panontuan			Thepa			Kranuan			Mueng			bangkok		
	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P
courtship period before marriage															
< 1 month	15 (14.7)	41 (6.1)	<.01	23 (20.0)	295 (31.1)	.81	11 (7.2)	115 (16.6)	.22	16 (18.2)	54 (7.9)	<.01	1 (3.4)	16 (2.4)	<.01
1 - 4 month	19 (18.6)	72 (10.8)		22 (19.1)	94 (9.9)		39 (25.5)	131 (18.9)		10 (11.4)	74 (10.8)		3 (10.3)	44 (6.5)	
4* - 12 month	34 (33.3)	194 (29.0)		37 (32.2)	219 (23.1)		49 (32.0)	217 (31.3)		23 (26.1)	219 (32.0)		18 (62.1)	171 (25.4)	
12* - 36 month	28 (27.5)	204 (30.5)		23 (20.0)	172 (18.1)		41 (26.8)	162 (23.4)		33 (37.5)	224 (32.7)		7 (24.1)	228 (33.9)	
>36 month	6 (5.9)	158 (23.6)		10 (8.7)	169 (17.8)		13 (8.5)	68 (9.8)		6 (6.8)	113 (16.5)		0 (31.8)	214 (31.8)	
Marital choice															
Own choice	77 (88.5)	543 (90.2)	.57	92 (80.7)	560 (59.1)	<.01	141 (92.2)	537 (82.6)	<.01	80 (92.0)	652 (95.3)	.19	26 (89.7)	629 (93.5)	.44
Under other influences	10 (11.5)	59 (9.8)		22 (19.3)	387 (40.9)		12 (7.8)	121 (17.4)		7 (8.0)	32 (4.7)		3 (10.3)	44 (6.5)	
Marital times															
First time	98 (95.1)	561 (84.0)	<.01	108 (93.9)	793 (83.6)	<.01	145 (94.8)	553 (79.7)	<.01	84 (95.5)	596 (87.3)	.02	28 (96.6)	583 (86.6)	.16
Not the first	5 (4.9)	107 (16.0)		7 (6.1)	156 (16.4)		8 (5.2)	141 (20.3)		4 (4.5)	87 (12.7)		1 (3.4)	90 (13.4)	
Time living together each month															
< 20 days	27 (26.0)	85 (12.7)	<.01	8 (6.9)	52 (5.5)	.52	25 (16.3)	85 (12.2)	.18	18 (20.9)	71 (10.4)	.01	3 (10.3)	40 (6.0)	.41
>= 20 days	77 (74.0)	585 (87.3)		108 (93.1)	898 (94.5)		128 (83.7)	610 (87.8)		68 (79.1)	612 (89.6)		26 (89.7)	632 (94.0)	
Marital satisfaction															
Apathy/dissatisfied	21 (24.1)	129 (21.8)	.67	21 (20.6)	199 (22.5)	.71	20 (13.1)	146 (21.0)	.02	13 (14.8)	96 (14.1)	.87	9 (31.0)	89 (13.2)	.01
satisfied	66 (75.9)	463 (78.2)		81 (79.4)	684 (77.5)		133 (86.9)	548 (79.0)		75 (85.2)	587 (85.9)		20 (69.0)	584 (86.8)	
Marital status															
Couple/cohabitat	94 (90.4)	647 (96.6)	<.01	112 (96.6)	937 (98.6)	.10	149 (97.4)	683 (98.3)	.51	79 (91.9)	673 (98.5)	<.01	28 (96.6)	658 (97.9)	.47
Divorced/separate/widowed	10 (9.6)	23 (3.4)		4 (3.4)	13 (1.4)		4 (2.6)	12 (1.7)		7 (8.1)	10 (1.5)		1 (3.4)	14 (2.1)	

Table 6 showed associations between Marital-related factors and teenage pregnancy. *Panomtuan*: courtship period, marital times, time living together in each month, and marital status were among marital-related variables that showed significant association with teenage pregnancy. Teenage pregnant women spent less time on courtship before marriage (OR=0.6, 95% CI=0.5, 0.8; $p<.01$). They were more likely to be married first time ($p<.01$). They tended to spend less time together with their spouse each month compared to adult pregnant counterpart ($p<.01$). The likelihood of being in divorce/separate/widowhood among T-reg was 3 times as high as that of adult-pregnant women (OR=3.0, 95% CI=1.4, 6.5; $p<.01$).

Thepa: marital choice and marital times were among marital-related variables that showed significant association with teenage pregnancy. They were more likely to choose their own spouse ($p<.01$). They were more likely to be married first time ($p<.01$).

Kranuan: marital choice, marital times, and marital satisfaction were among marital-related variables that showed significant association with teenage pregnancy. They were more likely to choose their own spouse ($p<.01$) and satisfied with their marriage (OR=1.8, 95% CI=1.1, 2.9; $p=.02$). They were more likely to be married first time ($p<.01$).

Muang Nan: courtship period, marital times, time living together in each month, and marital status were among marital-related variables that showed significant association with teenage pregnancy. Teenage pregnant women spent less time on courtship before marriage (OR=0.8, 95% CI=0.6, 0.9; $p<.01$). They were more likely to be married first time ($p<.01$). They tended to spend less time together with their spouse each month compared to adult pregnant counterpart ($p=.01$). The likelihood of being in divorce/separate/widowhood among teenage pregnancy was 6 times as high as that of adult-pregnant women (OR=6.0, 95% CI=2.2, 16.1; $p<.01$).

Bangkok: courtship period and marital satisfaction were among marital-related variables that showed significant association with teenage pregnancy. Teenage pregnant women spent less time on courtship before marriage (OR=0.5, 95% CI=0.4, 0.7; $p<.01$). They were less likely to satisfied with their marriage (OR=0.3, 95% CI=0.1, 0.8; $p=.01$).

Table 7 Psychosocial factors and teenage pregnancy (univariate analysis)

	Panontuan			Thepa			Kranuan			Mueng			Bangkok			P
	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	
Planned pregnancy																
planned	38 (41.3)	351 (56.6)	<.01	70 (63.3)	591 (71.7)	.12	97 (66.9)	470 (72.8)	.18	36 (54.4)	445 (75.4)	<.01	11 (37.9)	296 (63.5)		.01
unplanned	54 (58.7)	269 (43.4)		40 (36.4)	240 (28.9)		48 (33.1)	176 (27.2)		30 (45.5)	145 (24.6)		18 (62.1)	170 (36.5)		
Child wanted																
wanted	70 (76.1)	501 (80.8)	.32	94 (85.5)	761 (91.6)	.05	137 (94.5)	607 (94.0)	1.00	60 (90.9)	572 (96.9)	.03	25 (86.2)	427 (91.6)		.30
unwanted	22 (23.9)	119 (19.2)		16 (14.5)	70 (8.4)		8 (5.5)	39 (6.0)		6 (9.1)	18 (3.1)		4 (13.8)	39 (8.4)		
Relative-support-scale (RSS)																
Mean (SD)	6.0 (2.31)	6.7 (2.40)	.01	7.4 (1.89)	7.0 (2.06)	.08	7.2 (2.26)	7.4 (2.51)	.52	7.5 (2.52)	7.5 (2.69)	.84	7.0 (2.30)	6.9 (2.37)		.95
GHQ score																
Mean (SD)	3.2 (2.60)	3.2 (2.68)	.95	2.0 (2.55)	2.1 (2.37)	.56	2.7 (2.70)	2.3 (2.49)	.06	3.9 (3.40)	2.7 (2.87)	.01	3.5 (3.54)	3.0 (2.60)		.45
Coping style																
Passive	47 (50.5)	244 (39.5)	.05	311 (47.4)	89 (49.2)	.36	47 (33.6)	221 (34.8)	.84	30 (46.9)	260 (44.3)	.69	8 (27.6)	152 (33.3)		.68
Active	46 (49.5)	373 (60.5)		345 (52.6)	92 (50.8)		93 (66.4)	414 (65.2)		34 (53.1)	327 (55.7)		21 (72.4)	305 (66.7)		

Table 7 showed associations between psychosocial factors and teenage pregnancy.

Panomtuan: planned pregnancy, relatives-support, and coping style were among psychosocial variables that showed significant association with teenage pregnancy.

Teenage pregnant women tended to be pregnant unplanned (OR=1.8, 95% CI=1.2, 2.9; $p<.01$). They were less likely to have supportive relationship with relatives ($p=.01$).

They tended to use passive coping style (OR=0.6, 95% CI=0.4, 1.0; $p=.05$).

Thepa: child wanted was only psychosocial variable that showed significant association with teenage pregnancy. Teenage pregnant women were more likely to state that they did not want to have a child, compared to adult pregnant women (OR=1.8, 95% CI=1.0, 3.3; $p=.05$).

Kranuan: None of psychosocial variables showed significant association with teenage pregnancy in this site

Mueng Nan: planned pregnancy, child wanted, and GHQ score were among psychosocial variables that showed significant association with teenage pregnancy.

Teenage pregnant women tended to be pregnant unplanned (OR=2.6, 95% CI=1.5, 4.3; $p<.01$). They were more likely to state that they did not want to have a child, compared to adult pregnant women (OR=3.2, 95% CI=1.2, 8.3; $p=.03$), were more likely to have mental problem ($p=.01$).

Bangkok: planned pregnancy was only psychosocial variable that showed significant association with teenage pregnancy. Teenage pregnant women tended to be pregnant unplanned (OR=2.8, 95% CI=1.3, 6.2; $p=.01$), compared to that of adult pregnant women.

Table 8 showed associations between Health behaviour related to pregnancy and teenage pregnancy. Teenage pregnant women in all sites had lower score on pregnancy-related health behaviour (PRHB) i.e. worse in health behaviour related to pregnancy than adult counterpart ($P<0.01$). There was no statistical evidence of association between teenage pregnancy and smoking or drinking variables in all sites. For preparation for the new born variable after being re-categorized to make the variable more meaningful, the result showed that only in Mueng Nan that the variable showed significant association with teenage pregnancy. Teenage pregnant women in Mueng Nan were less likely to prepare for the new born than that of A-preg (OR=0.5, 95% CI=0.3, 0.8; $p<.01$). We were interested in factors determining PRHB. Regression analysis would then be performed (see below)

Table 8. Health behaviour related to pregnancy and teenage pregnancy (univariate analysis)

	Panontuan			Thapa			Kranuan			Mueng			Bangkok			P
	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	
Pregnancy-related health behaviours																
(PRHB) mean (SD)																
drinking																
no	1.1 (.37)	1.9 (.78)	<.01	1.2 (.48)	2.3 (.78)	<.01	1.1 (.31)	2.0 (.73)	<.01	1.3 (.56)	2.0 (.77)	<.01	1.3 (.55)	1.9 (.80)	<.01	<.01
yes	89 (95.7)	597 (96.8)	.54	109 (100)	817 (99.5)	1.00	126 (89.4)	552 (86.9)	.48	59 (92.2)	556 (94.6)	.40	25 (86.2)	423 (92.6)	.27	.27
	4 (4.3)	20 (3.2)		0	4 (.5)		15 (10.6)	83 (13.1)		5 (7.8)	32 (5.4)		4 (13.8)	34 (7.4)		
smoking																
no	68 (98.6)	470 (98.1)	1.00	87 (97.8)	675 (97.3)	1.00	140 (99.3)	632 (99.4)	1.00	63 (98.4)	584 (99.3)	.40	29 (100.0)	443 (96.9)	1.00	1.00
yes	1 (1.4)	9 (1.9)		2 (2.2)	19 (2.7)		1 (.7)	4 (.6)		1 (1.6)	4 (.7)		0 (3.1)	14 (3.1)		
Preparation for the newborn																
none	9 (9.8)	70 (11.3)	.86	46 (42.2)	328 (39.7)	.03	23 (16.1)	121 (18.9)	.05	24 (37.5)	128 (21.7)	.01	3 (10.3)	50 (10.8)	.81	.81
Necessary information	18 (19.6)	99 (16.0)		12 (11.0)	41 (5.0)		41 (28.7)	132 (20.6)		13 (20.3)	115 (19.5)		4 (13.8)	73 (15.7)		
instrument	9 (9.8)	63 (10.2)		28 (25.7)	260 (31.4)		12 (8.4)	94 (14.7)		0	35 (5.9)		1 (3.4)	33 (7.1)		
Both information and instrument	56 (60.9)	383 (62.0)		20 (18.3)	137 (16.6)		66 (46.2)	278 (43.3)		21 (32.8)	263 (44.7)		21 (72.4)	297 (64.0)		
others	0	3 (.5)		3 (2.8)	61 (7.4)		1 (.7)	16 (2.5)		6 (9.4)	48 (8.1)		0 (2.4)	11 (2.4)		

Table 9. Birth & physical factors and teenage pregnancy (univariate analysis)

Pregnancy times	Panontuan			Thapa			Kranuan			Mueng			bangkok		
	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P
- first	81 (89.0)	207 (33.5)	<.01	92 (8.6)	167 (20.1)	<.01	130 (91.5)	176 (27.6)	<.01	47 (73.4)	179 (30.5)	<.01	20 (69.0)	175 (37.0)	<.01
- not the first time	11 (12.0)	410 (66.5)		18 (16.4)	664 (79.9)		12 (8.5)	461 (72.4)		17 (26.6)	408 (69.5)		9 (31.0)	298 (63.0)	
term time															
< 37 wk	7 (7.1)	49 (7.6)	.88	8 (7.5)	77 (9.1)	.59	23 (16.8)	64 (10.3)	.03	12 (14.6)	57 (8.5)	.07	2 (9.1)	45 (7.4)	.67
>=37	91 (92.9)	564 (87.3)		98 (92.5)	766 (90.9)		114 (83.2)	559 (89.9)		70 (85.4)	616 (91.5)		20 (90.9)	567 (92.6)	
height															
≥ 145 cm	102 (99.0)	655 (98.5)	1.00	112 (96.6)	900 (95.5)	.81	149 (98.0)	672 (97.0)	.60	82 (93.2)	635 (93.5)	.82	29 (100.0)	666 (99.1)	1.00
< 145 cm	1 (1.0)	10 (1.5)		4 (3.4)	42 (4.5)		3 (2.0)	21 (3.0)		6 (6.8)	44 (6.5)		0 (0.0)	6 (.9)	
weightgain															
>=10 kg	46 (64.8)	281 (67.5)	.65	45 (57.0)	342 (60.1)	.59	78 (66.1)	343 (67.0)	.85	49 (65.3)	436 (74.4)	.09	20 (90.9)	528 (88.3)	1.00
< 10 kg	25 (35.2)	135 (32.5)		34 (43.0)	227 (39.5)		40 (33.9)	169 (33.0)		26 (34.7)	150 (25.6)		2 (9.1)	70 (11.7)	
anemia															
Absence	72 (86.7)	493 (92.3)	.09	50 (89.3)	436 (93.6)	.26	138 (96.5)	608 (94.0)	.31	62 (80.5)	531 (89.4)	.04	19 (86.4)	447 (79.4)	.59
presence	11 (13.3)	41 (7.7)		6 (10.7)	30 (6.4)		5 (3.5)	39 (6.0)		15 (19.5)	63 (10.6)		3 (13.6)	116 (20.6)	
History of complicated pregnancy															
no	98 (94.2)	535 (79.1)	<.01	108 (93.1)	724 (76.2)	<.01	148 (96.1)	552 (78.6)	<.01	76 (86.4)	518 (75.6)	.02	23 (79.3)	457 (67.9)	.22
yes	6 (5.8)	141 (20.9)		8 (6.9)	226 (23.8)		6 (3.9)	150 (21.4)		12 (13.6)	167 (24.4)		6 (20.7)	216 (32.1)	
Disease during pregnancy															
no	83 (90.2)	565 (91.1)	.70	104 (94.5)	810 (92.3)	.56	141 (95.9)	647 (96.1)	.82	79 (96.3)	590 (90.1)	.06	21 (75.0)	457 (72.2)	.83
yes	9 (9.8)	55 (8.9)		6 (5.5)	68 (7.7)		6 (4.1)	26 (3.9)		3 (3.7)	65 (9.9)		7 (25.0)	176 (27.8)	
Birth complication															
No	98 (97.0)	645 (97.7)	.72	97 (95.1)	788 (96.7)	.39	149 (100)	660 (98.7)	.38	64 (80.0)	497 (78.9)	.82	18 (85.7)	560 (91.8)	.41
yes	3 (3.0)	15 (2.3)		5 (4.9)	27 (3.3)		0 (0.0)	9 (1.3)		16 (20.0)	133 (21.1)		3 (14.3)	50 (8.2)	

Table 10. New born outcome and teenage pregnancy (univariate analysis)

	Panontuan			Thapa			Kranuan			Mueng			Bangkok			P
	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	T-Preg	A-Preg	P	
Low birthweight																
No	92 (90.2)	622 (92.1)	.50	95 (82.6)	841 (91.2)	<.01	123 (81.5)	619 (90.5)	<.01	75 (88.2)	627 (91.5)	.31	22 (95.7)	575 (95.0)	1.0	
yes	10 (9.8)	53 (7.9)		20 (17.4)	81 (8.8)		28 (18.5)	65 (9.5)		10 (11.5)	58 (8.5)		1 (4.3)	30 (5.0)		
Apgar score at 5 minutes																
< 7	0	7 (1.1)	.60	0	6 (.7)	1.00	1 (.7)	2 (.3)	.45	1 (1.3)	10 (1.6)	1.00	0	0	-	
>= 7	98 (100.0)	642 (98.9)		102 (100.0)	795 (99.3)		143 (99.3)	647 (99.7)		79 (98.8)	614 (98.4)		23 (100.0)	595 (100.0)		
Newborn death within the first week																
No	104 (100)	667 (97.9)	.24	116 (99.1)	949 (99.0)	1.0	154 (99.4)	703 (99.3)	1.00	88 (100)	686 (99.3)	1.0	29 (100)	657 (100)	-	
yes	0	14 (2.1)		1 (.9)	10 (1.0)		1 (.6)	4 (.6)		0	5 (.7)		0	0		

Table 9 showed associations between Birth and physical factors and teenage pregnancy.

There were no associations between teenage pregnancy and height, weightgain, disease during pregnancy, and birth complication across all sites. In contrast, Pregnancy time was significantly associated with teenage pregnancy and so was having history of previous complicated pregnancy, for all but Bangkok site. These two variables might be highly correlated with age which was in turn related to teenage pregnancy.

Table 10 showed associations between New born outcomes and teenage pregnancy.

No evident of association between apgar at 5 minutes and new born death and teenage pregnancy across all sites. Regarding low birth weight, teenage pregnant women were 1 times more likely to have low birth weight new born than that of adult pregnant women in Thepa and Kranuan (OR=2.3, 95% CI=1.3, 4.0; $p<.01$: OR=2.1, 95% CI=1.3, 3.5; $p<.01$, respectively).

To examine independent associations for marital satisfaction we did logistic regression analysis. We fitted successive models by entering variables in steps. Demographic variables were included first and only those considerably associated with the outcome remained, then marital-related group and psychosocial group of variables followed in the same fashion. Final models with only variables significant associated with the outcome were shown in Table 11. Marital choice was the only variable associated positively with marital satisfaction across all sites. Except at Bangkok site, GHQ score also showed negative association with marital satisfaction.

To examine independent associations for PRHB we did linear regression analysis. We fitted successive models by entering variables in steps as mentioned above. Demographic variables were included first and only those considerably associated with the outcome remained, then marital-related group and psychosocial group of variables followed in the same fashion. Health behaviour related to pregnancy variables were finally added. The results were shown by sites as following.

Pranomtuan: Adjusted R-square=0.18, $p<.001$

PRHB = 35.5 – 1.7 (T-preg) + 0.6 (income: each level increased) + 3.9 (occupation: professional) – 3.1 (marital status: divorce/separation/widow) + 1.2 (marital satisfaction) + 0.9 (coping: active) + 0.5 (RSS score)

Thepa: Adjusted R-square=0.27, $p<.001$

$$\text{PRHB} = 30.2 + 0.7 (\text{income: each level increased}) + 1.4 (\text{occupation: skilled manual}) + 3.4 (\text{occupation: professional}) - 1.8 (\text{religion: islam}) + 1.8 (\text{education: each level increased}) + 1.3 (\text{coping: active}) + 0.3 (\text{RSS score})$$

Kranuan: Adjusted R-square=0.16, $p<.001$

$$\text{PRHB} = 34.4 + 0.7 (\text{income: each level increased}) + 2.0 (\text{occupation: skilled manual}) + 1.3 (\text{education: each level increased}) + 2.9 (\text{house: rented/government support}) + 0.8 (\text{house: self-own}) - 0.8 (\text{unplanned pregnancy}) + 0.2 (\text{RSS score})$$

Mueng Nan: Adjusted R-square=0.54, $p<.001$

$$\text{PRHB} = 46.1 - 2.0 (\text{T-preg}) + 0.7 (\text{income: each level increased}) - 2.6 (\text{religion: christian}) - 6.4 (\text{religion: animism/others}) - 7.2 (\text{illiterate}) - 1.8 (\text{unplanned pregnancy}) - 0.2 (\text{GHQ score})$$

Bangkok: Adjusted R-square=0.14, $p<.001$

$$\text{PRHB} = 39.8 + 1.9 (\text{house: self-own}) + 2.4 (\text{occupation: skilled manual}) + 3.9 (\text{occupation: professional}) - 1.3 (\text{unplanned pregnancy}) + 1.0 (\text{coping: active}) + 0.2 (\text{RSS score})$$

Table 12 summarized regression results from all sites. Social factors especially income, occupation, and supportive relationship with relatives had high level of association with pregnancy-related health behaviours.

Table 11. Adjusted OR (95% CI) for factors significantly associated with Marital satisfaction

	Panontuan karnchanaburi	Thepa Songkhla	Kranuan Khonkhaen	Mueng Nan	Bangkok
Teenage pregnancy	.	.	.	.	0.42 (0.18, 0.98)
Education level (level increased)	.	.	.	.	1.37 (1.11, 1.69)
Marital choice (under other influence)	0.35 (0.19, 0.64)	0.29 (0.20, 0.41)	0.42 (0.26, 0.68)	0.30 (0.14, 0.67)	0.40 (0.20, 0.80)
Courtship period (level increased)	1.23 (1.02, 1.48)	.	1.21 (1.01, 1.44)	.	.
Living together (≥ 20 days each month)	.	.	1.88 (1.09, 3.25)	2.51 (1.33, 4.72)	4.1 (2.07, 8.08)
GHQ score (unit increased)	0.89 (0.82, 0.96)	0.91 (0.85, 0.98)	0.91 (0.85, 0.97)	0.87 (0.81, 0.94)	.
Relatives support score (unit increased)	.	.	0.92 (0.85, 0.99)	.	.
Coping style (active)	.	.	1.94 (1.30, 2.87)	.	.

Table 12. Summary of variables associated with pregnancy-related health behaviour (PRHB)

	Panontuan karnchanaburi	Thepa Songkhla	Kranuan Khonkhaen	Mueng Nan	bangkok
Education/ literacy	.	.	++	++	.
Housing	.	.	++	.	++
Religion	.	++	.	++	.
Income	++	++	++	++	.
Occupation	+	++	++	.	++
Marital status	++	.	.	.	.
Marital satisfaction	+	.	.	.	.
Teenage pregnancy	+	.	.	++	.
Unplanned pregnancy	.	.	+	++	++
GHQ score	.	.	.	++	.
Coping style	+	++	.	.	+
Relatives support score	++	++	++	.	+

Note: ++ = strongly significant association $p < 0.001$, + = significant association $p < 0.05$

DISCUSSION

This study combines elements of both descriptive and analytic methods. In the descriptive part, the information on the frequency of teenage pregnancy is collected and accumulated over a period of one year. The frequency of teenage pregnancy can be estimated roughly as an incidence. Incidence of teenage pregnancy for all investigation sites is approximately 8.5 % (491/4177). The incidence is lower than the prevalence reported by Bureau of Health Promotion in 2002. However, this figure is perhaps misleading if the variation in incidences across different areas are not taken into account. This study showed that in some area; for example Kranuan in the Northeast, the incidence rate of teenage pregnancy is still high (18 %).

This observational study can also investigate the association between exposures and outcomes of interest as an analytic part. For that purpose, studies can be analysed according to case-control methodologies. Subjects with teenage pregnancy will be assigned as cases and those without become controls. The controls automatically come from the same source. Both teenage pregnant women and adult pregnant women are therefore comparable.

Our study shows that teenage pregnant women are less likely to live independently and to be in paid-job compared to adult pregnant women across areas. Our findings also support that teenage pregnant women at Bangkok investigation site are more likely to be dissatisfied with their marriage life. At Panomtuan and Nan, teenage pregnancy poses some risk of having poor health behaviours relating to pregnancy compared to adult pregnancy.

Among marital-related variables we found that only marital time is consistent across sites. This variable might be highly correlated with age which is in turn related to teenage pregnancy. Regarding marital satisfaction, women whose marital choice is under other people's influences are more likely to be dissatisfied with their marriage. An increased likelihood of having mental problem is related to marital dissatisfaction for all sites but Bangkok. Only at Bangkok site does teenage pregnancy decrease risk of marital satisfaction. Longer courtship period, more time spending together, and active

coping style are related to an increased likelihood of being satisfied with marriage in some sites.

Pregnancy-related health behaviour score is lower in teenage pregnant women in all sites compared to adult-pregnant counterpart in univariate analysis. When other confounding factors are controlled to determine independent risk factors of pregnancy-related behaviours, only in Panomtuan and Nan does teenage pregnancy decrease the likelihood of low score. The result of regression analysis favours rather the effects of income, occupation, and supportive relationship with relatives on pregnancy-related health behaviour. It is likely that teenage pregnancy per se is not a strong determinant of poor healthcare behaviour during pregnancy but their inadequate living condition and socioeconomic support might be.

Associations between psychosocial factors, birth outcomes are not associated with teenage pregnancy. The findings also support previous studies that teenage pregnancy per se are not significantly associated with increased birth complication (Piyasil V, 1998; Bungachart R, Pinchareon S., 1998; Panprapa A, Duangmanee S, 1998).

The above results of the various analyses conducted in this study must be interpreted in the light of the limitation of the methods used. The weakness of the design is that being teenager is relatively permanent. The variable therefore lacks variation to be qualified as dependent variables. Teenage pregnancy is analyzed at the same level as demographic variable, being rather an exposure for other outcome variables such as marital satisfaction and pregnancy-related health behaviours. These exposures and outcomes are measured simultaneously, which leads to problems in determining cause and effect from any observed associations.

For this reason, despite the longitudinal design, it can only give clues as to potential aetiological factors. Any associations in this study, no matter how strong, need to be interpreted in the light of this limitation. Regarding birth outcome variables, teenage pregnancy can be interpreted as one of possible risk factors because cause and effect can be soundly inferred. The reason is that the birth outcomes were measured after other variables collected. However, only limit number of relevant biological variables has

been collected. The conclusion of cause and effect has to be rigorously verified by further study.

Bias is a systematic error which results in an estimate of the association between exposure and outcome being either above or below the true value. Selection bias, by any means, is not really what we concern. We select sample purposively by the virtue of practicality. We do not intend to use our results to generalize to the whole population. In the present study which is primarily a longitudinal design, subjects were recruited before being identified as teenagers or adults. Some variables actually occurred at the time subjects were selected. Others occur later on while the study proceeds such as birth outcomes. This decreased chance of selecting cases on the basis of exposure status or vice versa. The bias from this source is therefore eliminated. Another source of selection bias is from non-response. In this study, unit non-response has been prevented by our strong research assistant teams whose good relationships with subjects and subjects' families ensure none of unit response presence so far.

Type of bias which may compromise our results is mainly from information bias both from participants and interviewers. Subjective data such as marital satisfaction, pregnancy-related health behaviours are subject to lack of understanding, and social desirable bias. This reflects in difficult or undesirable items are missing. This source of bias has been minimized by the questionnaires having been heavily tested before use, all interviewers are extensively trained and monitored, and confidentiality are strictly ensured.

Confounding is a mixing of the effect of the exposure on the outcome with that of a third factor. Confounding is present in all observational studies and can lead to under or over estimate of the true association between exposures and outcomes (marital satisfaction and pregnancy-related health behaviours score in this study). The present study measures a large number of potential confounders we therefore use regression modelling to control confounding effects in the study. Although many possible confounders were already included in this study, it is impossible to collect information on every variable which could be a confounder. Some has not yet included because of lack of knowledge especially when the condition of interest – marital satisfaction or health behaviours related to pregnancy - has not been well studied. The results of the

effect estimate should therefore be interpreted in the light of these limitations. Variables which were theoretically possible confounders but not included in the present study should be taken into account.

IMPLICATIONS

For the users

Teenage pregnancy is still common. In some place makes up almost 1 in 5 of all pregnancy. Reports reflecting global prevalence or incidence have to be verified because marked differences in incidence across sites are strongly evident. Likewise, associated factors with teenage pregnancy and also effects of teenage pregnancy on other variables of interest vary. Interpretation and use of research results regarding teenage pregnancy should be taken in the light of this fact.

Teenage pregnant women in all sites are less likely to live independently and more likely to be in un-paid job. These perhaps affect negatively on their psychosocial and health conditions. Support provide regarding such living and working condition may help reverse their effect. Health authorities should promote teenage population to delay marriage and having children. As our results show, the longer the time before marriage teenage pregnant women spend with their future-spouse, the more likely the marital satisfaction would be. This in turn will clearly affect their psychosocial well-being.

For further study

The general purpose of the present study is to explore characteristics of teenage pregnancy. More exploration and confirmation are needed to improve understanding of the teenage pregnancy and its associations. All these elements can be improved.

Our estimate of incidence in different communities can be more precise if probability sampling is employed. And if not being limited by resource and time constraints, population-based study should be the option because its results are more generalisable. Associations between teenage pregnancy and other variables of interest should be confirmed by more valid study design such as cohort type of epidemiological study.

Further research, which may build on the present study concerning the teenage pregnancy as a risk factors for health outcomes, can be conducted by increasing number of variables measured and improving the method of data collection. Physical characteristics of living conditions, interaction between teenage pregnant women and their partners, for example, can be applied by direct observation or using video recording. Appropriate method of measurement and data collection relating to fact-based type of data will provide reliable result by reducing possible bias.

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ภาคผนวก 10
ข้อคิดเห็นโครงการ
ประธานคณะกรรมการบริหารโครงการฯ

โครงการวิจัยเด็กระยะยาว : ระยะเปลี่ยนผ่าน (ครั้งที่ 3)

Additional opinion from the Chair

In a way, this is a defense of what the committee had achieved and a defense of some decisions which I made from material provided by experts. These decisions however did not meet with disagreement by members of the committee during the face to face discussion. This comment is in addition to the detail report and parts are to answer "instruction" from the meeting held between สกว – สวรส – มสส on 10.11.47 : eg. "ผลงานวิจัยในช่วงเปลี่ยนผ่านในส่วนของ สกว. ได้แก่ บทความวิชาการควรจัดให้มีการ review ผลงานก่อนนำ สกว". Lastly it allows me to express my feeling of the project as of today.

I'll itemized my headings :

1. Data management. This is now fairly accurate, secure and accessible to the primary researchers. The potential problem will be how to maintain or upkeep these data. Future additional data (e.g. their continuing measurement of development of the cohort) will need new grants.

2. Publications : what had been done is that several manuscripts (about 4 or more) had been submitted to international journals. Several manuscripts had been written but incomplete in the sense that sections on 'discussions' had to be done. Several manuscripts in Thai had been altered to English versions. These were accomplished only because of a large contribution by Virasak Chongsuvivatwong who sat with small groups of investigators on at least 8 occasions. Since the 4 submitted manuscript will have been peer-reviewed any way and since several of the near completed manuscripts had been worked with Virasak, I considered that these had been reviewed. I also wish to remind the granting agencies that I and the committee looked at finished manuscripts as either completely written, may need a rewrite, may be turned down for whatever reason and may need resubmission. You'll just have to trust the judgement and honesty of me and my group. Yes, some of the investigators are highly seasoned and hence need very little guide but others need a lot of help. What our committee had done via Virasak is to show that given the right stimuli and circumstances, the publication can be done. I look at the quality rather than the quantity (hence I asked that the promise of '25' publication during this interim need not be exact but rely more on quality and in 'English' so that the researchers learned in the process)

3. Finally, the long term project. I am not that acquainted with this type of project. But from what I have read in the literature and from manuscripts that this group had produced, I think such project should be kept going now that the hardest hurdle had been accomplished (albeit with

many stumble). I think if blames had to be made, it must be that this is a path which neither the granting agencies (due to their inexperience), nor the manager of the project nor the researchers (in their zeal but lack of experience especially in writing and lack of time commitments) realized the potential pit falls. Now that everybody had learnt from their mistakes, it may be worth reconsidering how to keep this project going since it 'may' give us another vista in child development.

As an aside, I am willing to present my opinion or reply to queries by the board of the granting agencies with regard to what I have written.

Y. H. Lee 15.1.48