

CHAPTER IV

RESULTS

This study is a case-control study conducted to elucidate the risk factors associating with birth asphyxia in newborn at Maharaj Nakhon Si Thammarat Hospital which are maternal factor, fetal factor, intrapartum factor, maternal care factor and antenatal care service provided factor. Data has been collected through both the survey and the delivery room personnel's interview. The delivery records of eligible 792 expectant mothers resulting in the live births at Maharaj Nakhon Si Thammarat hospital during 1st October 2002 to 30 June 2003 have been also reviewed by the researcher. Eligible expectant mothers was divided into two groups, that is, a study group which consists of 264 expectant mothers with asphyxiated newborns and a control group which consists of 528 expectant mothers with non-asphyxiated newborns. In addition, the interview and observation of the skilled personnel at antenatal care unit and delivery room were included to this study. The data was computerized and analyzed by SPSS for Windows program. The result of this study will be presented in six parts as follows:

Part 1 : Maternal Personal Factor

Part 2 : Maternal Factor

Part 3 : Fetal Factor

Part 4: Intrapartum Factor

Part 5: Maternity Care service received Factor

Part 6: Logistic regression analysis of variable observed to be statistically Significant in Part 1-5

Part 7: Antenatal Care Service Provided Factor

Part 1 : Maternal Personal Data : education level, occupation and income

Education level : As can be seen from Table 1., out of 264 expectant mothers resulting in asphyxiated newborns, from the expectant mothers, 119 mothers (45.1 %) possess certificate in high school and 97 mothers (36.7 %) are uneducated and completed primary level respectively. It also indicates that 220 mothers (41.7 %) out of 528 expectant mothers resulting in non-asphyxiated newborns are uneducated and completed primary school and 175 mothers (33.1 %) completed High school. The statistical analysis shows statistically significant association between education level and asphyxia in newborn ($p < 0.05$).

Occupation: Table1 also depicts that 91 expectant mothers (34.5 %) out of expectant mothers resulting in asphyxiated newborns are employees and 66 expectant mothers (26.3 %) are the group of housewives and students. On the other hand, in the group of 528 expectant mother resulting in non-asphyxiated newborns, 185 mothers (35.0 %) are housewives and students and 136 mothers (25.8 %) are employees. The statistic significance test suggests that occupation is associated with birth asphyxia in newborn ($p < 0.05$).

Income: The estimated income of expectant mothers in both groups asphyxiated newborns and non-asphyxiate newborns lied in between 3,001-6000 bath/month are the largest group out of all the expectant mother. They are consisting of

37.6% and 38.6% from the total sample population. The second largest group are belong to the income category of less than or equal to 3,000 bath/month, there are 29.9% and 25.4% respectively. The remaining income categories are taking up equal proportion of the sample size at about 10% to 12%. When testing with statistical significance, it is found that the income is not associated with birth asphyxia in newborn ($p > 0.05$). The results are presented in Table form in Table 1.

Table 1: The personal data of expectant mothers, which include education level, occupation and income.

Personal Data	Asphyxiated infant Number (%)	Non-asphyxiated infant Number (%)	p - value
Education level			.001
Bachelor degree or higher	23 (8.7)	85 (16.1)	
Diploma or equivalence	25 (9.5)	48 (9.1)	
Secondary level	119 (45.1)	175 (33.1)	
Uneducated and primary level	97 (36.7)	220 (41.7)	
Occupation			.000
Government service and state enterprise	6 (2.3)	44 (8.3)	
Merchant	54 (20.5)	87 (16.5)	
Agriculture	47 (17.8)	76 (14.4)	
Employee	91 (34.5)	136 (25.8)	
Housewife and student	66 (26.3)	185 (35.0)	
Income (bath/month)			.675
0 – 3,000	79 (29.9)	134 (25.4)	
3,001 – 6,000	97 (36.7)	204 (38.6)	
6,001 – 9,000	31 (11.7)	65 (12.3)	
9,001 – 12,000	31 (11.7)	58 (11.0)	
More than 12,000	26. (9.8)	67 (12.7)	

Part 2: Maternal factor include maternal age, number of parity, diseases and complications in pregnancy.

Maternal age: The result indicates the largest group of mother with asphyxiated newborn is between 20-25 years old being 61.0% and second largest group is those 35 years old and greater at 25.8% and smallest at 13.3% on youngest mother 20 years old or lower. Similar result is found in mother with non- asphyxiated newborn with largest group being 20 –25 years old at 67.8%. The second largest group is those 35 years old and greater being 15.2%. The smallest group is found in youngest mother with ages between 20 years old and lower at 17.0%. The statistical analysis shows statistically significant association between maternal age and asphyxia in newborn ($p < 0.05$).

Number of parity: The study shows the mothers with null parity is largest group of mother with birth asphyxia being 49.6%. The second largest group being mother with multi parity (2-4) with asphyxiated newborn being 48.9% and the smallest group is those mothers with grand multi parity (>5) being 1.5% The similar result is again found in mother resulting in non-asphyxiated newborn with the null parity being the largest group at 49.6%. While the second largest group being mother with multi parity (2-4) being 48.1%. The smallest group is those mothers with grand multi parity (>5) at 3.6%. When testing with statistical significance, it is found that the number of parity is not associated with birth asphyxia in newborn ($p > 0.05$).

Disease and complications of pregnancy: The study shows that most mothers both with asphyxiated newborn and non- asphyxiated newborn do not have diseases or

complications during their pregnancy. The results express in percentage are 75.8% for the first group and 74.6% for the second group. Whereas those developed diseases or complications during their pregnancy are 24.2% in the first group and 25.4% in the second group. When testing with statistical significance, it is found that diseases and complications of pregnancy are not associated with birth asphyxia in newborn ($p > 0.05$). These results can be seen in Table 2 below.

Table 2: The association between maternal factor and birth asphyxia which include maternal age, number of parity, diseases and complications in pregnancy

Maternal Factor	Asphyxiated	Non-asphyxiated	p - value
	infant Number (%)	infant Number (%)	
Maternal Age(year)			.001
Less than 20 years	35 (13.3)	90 (17.0)	
20 – 35 years	161 (61.0)	358 (67.8)	
More than 35 years	68 (25.8)	80 (15.2)	
Number of parity (having previous birth)			.257
Nulliparity	131 (49.6)	255 (48.3)	
Multiparity (2-4)	129 (48.9)	254 (48.1)	
Grand multiparity(>5)	4 (1.5)	19 (3.6)	
Disease and complication			.749
Yes	64 (24.2)	134 (25.4)	
No	200 (75.8)	394 (74.6)	

Part 3: Fetal factor include gestational age, aspects of amniotic fluid and birth weight.

Gestational Age : The result shows mothers with asphyxiated newborn are mostly found in gestational age group between 37-42 weeks at 62.5% and 36.4% in 28-36 weeks and lowest at 42 weeks or greater at 1.1%. The similar result is also found in mother with non-asphyxiated newborn with most common being gestational age group between 37-42 weeks at 83.3% and 15.5% in 28-36 weeks and lowest in 42 weeks and greater group at 1.1%. When testing with statistic significance, it is found that gestational age is associated with birth asphyxia in newborn ($p < 0.05$).

Aspects of amniotic fluid: The result shows the mothers with asphyxiated newborn are mostly found in those with clear amniotic fluid being 75.8% of the sample size. The second largest group go to those with mild meconium stain at 12.8% and the smaller group being the thick meconium stain at 11.4%. Similar result is also found in mother with non-asphyxiated newborn with the largest group being the mother with clear amniotic fluid, then mild meconium stain and smallest group being thick meconium stain. The results are expressed in percentage from 79.6%, 10.5% and 9.8% respectively. The statistic significance test suggests that amniotic fluid is not associated with birth asphyxia in newborn ($p > 0.05$).

Fetal presentation: The study shows that head presentation of fetal are common in both mothers with asphyxiated newborn and non- asphyxiated newborn which consist of 86.7% and 92.0% of the sample. Whereas the breech/ malpresentation of fetal are not common and only consist of 13.3% and 8.0% of the sample

respectively. The statistic significance test suggests that fetal presentation is associated with birth asphyxia in newborn ($p < 0.05$).

Birth weight: The result shows the mothers with asphyxiated newborn are mostly found in birth weight between 2,500–4,000 grams being 61.1%. While the second largest group are newborns with birth weight lower than 2,500 grams (35.2%) and the smallest group are those with birth weight of 4,000 grams or more (3.4%). The similar result appears with mother with non-asphyxiated newborns with largest weight group being 2,500-4,000 grams (85.2%), second largest being lower than 2,500 grams (12.3%) and the smallest group being those with birth weight of 4,000 gram or more (2.5%). The statistic significance test suggests that birth weight of new born is directly associated with birth asphyxia in new born ($p < 0.05$). The results are presented in Tab13.

Table 3: The association between birth asphyxia in newborn and the fetal factor: gestational age, aspects of amniotic fluid, fetal presentation and birth weight

Fetal factor	Asphyxiated	Non- asphyxiated	p - value
	newborn	newborn	
	Number (%)	Number (%)	
Gestational age			.000
28 - 36 weeks	96 (36.4)	82 (15.5)	
37 - 42 weeks	165 (62.5)	440 (83.3)	
More than 42 weeks	3 (1.1)	6 (1.1)	
Aspects of amniotic fluid			.522
clear	166 (75.8)	356 (79.6)	
Mild meconium stain	28 (12.8)	47 (10.5)	
Thickmeconium stain	25 (11.4)	44 (9.8)	
Fetal presentation			.022
Head presentation	229 (86.7)	486 (92.0)	
Breech/abnormal presentation	35 (13.3)	42 (8.0)	
Birth weight			.000
Less than 2,500grams	93 (35.2)	65 (12.3)	
2,500 – 4,000 grams	162 (61.1)	450 (85.2)	
More than4,000grams	9 (3.4)	13 (2.5)	

Part 4: Intrapartum factor includes the first stage of delivery, second stage of delivery and route of delivery.

First stage of delivery: The result in time study in the first stage of delivery shows that about 95.5% of mother with asphyxiated newborn and 97.5% of mother with non-asphyxiated newborn took less than 12 hours in 1st stage of delivery. Whereas only about 4.5% of mother with asphyxiated newborn and 2.5% of mother with non-asphyxiated newborn took more than 12 hours. The statistic significance test suggests

that the time taken in first stage of delivery is not directly associated with birth asphyxia in newborn ($p>0.05$).

Second stage of delivery: The result in time study of second stage of delivery shows that about 49.6% of mother with asphyxiated newborn took less than one hour and about 50.4% took one hour or more. In comparison with mother with non-asphyxiated newborn, 69.9% took less than one hour and about 30.1% took one hour or more. From the statistical significance test, the result suggests that the time taken in second stage of delivery is associated with birth asphyxia in newborn ($p<0.05$).

Route of delivery: The result in route of delivery shows that about 54.9% of mother with asphyxiated newborn have breech or abnormal delivery while 45.1% have normal delivery route. In contrast to mothers with non-asphyxiated newborn, 59.3% have normal delivery route while 40.7% have breech or abnormal delivery route. From the statistic significance test result, it suggests significant associated between delivery route and birth asphyxia in newborn ($p<0.05$). The results are presented in Table 4.

Table 4: The association between birth asphyxia and intrapartum factor which includes the first stage of delivery, second stage of delivery and route of delivery

Intrapartum factor	Asphyxiated	Non- asphyxiated	p - value
	newborn	newborn	
	Number (%)	Number (%)	
First stage of delivery			.132
< 12 hours	252 (95.5)	515 (97.5)	
≥ 12 hour	12 (4.5)	13 (2.5)	
Second stage of delivery			.000
< 1 hour	131 (49.6)	369 (69.9)	
≥ 1 hour	133 (50.4)	159 (30.1)	
Route of delivery			.000
Normal delivery	119 (45.1)	313 (59.3)	
Breech and other abnormal delivery	145 (54.9)	215 (40.7)	

Part 5: Maternity care service received factor include antenatal care visit, narcotic drug intake during labor, Oxytocin induction, and time of birth.

Antenatal care visit: The study of antenatal care visit shows there are about 83.7% of mothers with asphyxiated newborn who complete the minimum of four visit in antenatal care program and 14.4% did not complete the program and 1.9% of that did not attended the program at all. Similar result found in mother with non-asphyxiated newborn, about 78.4% complete the program, 18.8% did not complete the program and 2.8% did not attended any kind if care program. The statistical significant analysis result suggests that antenatal care visit is not associated with birth asphyxia in newborn ($p>0.05$).

Narcotic Drug Intake: The study of influence of narcotic drug intake shows that in mother with asphyxiated newborn about 93.2% never take narcotic drug and only 6.8% have taken narcotic drug. A similar result found in mother with non-asphyxiated newborn, there are 90.5% never taken narcotic drug and 9.5% have taken this drug. The statistical significant analysis result suggests that using of narcotic drug is not associated with birth asphyxia in newborn ($p>0.05$).

Oxytocin Induction: The study of oxytocin induction shows that in mother with birth asphyxia about 67.0% did not use oxytocin induction while 33.0% did. A similar result found in mother with non-birth asphyxia, there are about 62.9% did not receive oxytocin induction drug while 37.1% did. The statistical significant analysis result suggests that oxytocin induction is not associated with birth asphyxia in newborn ($p>0.05$).

Time of birth: The study of influence of time of birth shows there are about 43.6% of mother with asphyxiated newborn give birth at time between 08.31-16.30, 36.4% during 16.31-0.30 and the smallest group 20.1% during 0.31-08.30. A similar result found in mother with non-asphyxiated newborn, about 45.6% give birth between 08.31-16.30, 32.2% during 16.31-0.30 and the smallest group 22.2% during 0.31-08.30. The statistical significant analysis result suggests that time of birth is not associated with birth asphyxia in newborn ($p>0.05$).

Table 5: The association between birth asphyxia in newborn and antenatal care service provided factor which includes antenatal care, maternity care training for pregnant women and family or spouse, delivery/obstetric service, neonatal care, and referral system.

Antenatal care service provided factor	Asphyxiated newborn Number (%)	Non- asphyxiated newborn Number (%)	p - value
Antenatal care visit			.205
Null	5 (1.9)	15 (2.8)	
Complete as required	221 (83.7)	414 (78.4)	
Incomplete	38 (14.4)	99 (18.8)	
Narcotic drug induction			.228
Yes	18 (6.8)	50 (9.5)	
No	246 (93.2)	478 (90.5)	
Oxytocin Induction			.271
Yes	87 (33.0)	196 (37.1)	
No	177(67.0)	332 (62.9)	
Time of birth			.488
08.31 am – 4.30 pm.	115 (43.6)	241 (45.6)	
4.31 pm – 00.30 am.	96 (36.4)	170 (32.2)	
00.31 am – 08.30 am.	53 (20.1)	117 (22.2)	

Part 6: A logistic regression model was constructed. The dependent variable was presence of birth asphyxia. Independent variable were factors with statistically significant effects ($p < 0.05$) in bivariate analysis in Part 1-5. Specifically, independent variable were education level, occupation, maternal age, gestation age, fetal presentation, birth weigh, second stage of delivery, and route of delivery. It found that the new born from mother have education level in secondary school, primary level and uneducated will

have 1.5 time higher odds of asphyxia than those Bachelor degree or higher Diploma or equivalence. The new born from mother who took more than one hours in the second stage of delivery will have 2.3 times higher risk in birth asphyxia than those from mother who took one hour or less (OR = 2.304). The mothers with gestational age between 28-36 weeks and more than 42 weeks will have 2.0 times higher odds of birth asphyxia than those whose gestational age are between 37-42 weeks. Moreover, newborn with birth weight below 2500 grams or above 4000 grams will have 2.6 times the odds of birth asphyxia than those of birth weight 2500-3999 grams. The results of logistic regression analysis are presented in Table 6.

Table 6: The degree of association between birth asphyxia in newborn and risk factors which consist of education level, occupation, maternal age, gestational age, fetal presentation second stage of delivery, route of delivery and birth weight.

Risk factors	OR Adjusted	95% CI	P - value
Mother at education level in secondary school, primary level and uneducated	1.513	1.0460 - 01.296	.028
Mother at occupation in employees, housewife and student	.953	.795 – 1.296	.73
Mother at age less than 20 years old or more than 35 years old	1.137	.816 – 1.555	.448
Mother at second stage of deliver greater than 1 hour.	2.304	1.463 – 3.006	.000

Table 6: (Cont.) The degree of association between birth asphyxia in newborn and risk factors which consist of education level, occupation, maternal age, gestational age, fetal presentation second stage of delivery, route of delivery and birth weight.

Risk factors	OR Adjusted	95% CI	P - value
Mother at 28-36 weeks gestation and those of 42 weeks gestation	2.064	1.403 – 3.038	.000
Breech presentation and other mal presentation	1.642	.967 – 2.787	.06
Mother with less 2500 grams or more than 4000 gram newborn	2.678	1.817 – 3.947	.000

Part 7: Antenatal care service provided factor includes antenatal care service, maternity training for pregnant women and family or spouses, delivery/obstetric service, neonatal care and referral system.

Based on the assessment criteria of Safe Motherhood hospital program, the interview is conducted for 7 staff members from Antenatal care unit at primary healthcare facility in the network of Maharaj Nakhon Si Thammarat, 4 staff memnrs from Antenatal care unit and 7 staff members from the labor room at Maharaj Nakhon Si Thammarat hospital combined with the observation for their work procedure and antenatal care service system, the result can be summarized as follow:

Antenatal care service: Antenatal unit at primary health care facility in the network of Maharaj Nakorn Si Thammarat hospital provide antenatal care service one day a week with a professional nurse. The average of both new and old patient is 7-10 persons per day. At the initial antenatal visit, all pregnant women will be asked for the

details of their medical history and examination, physical check-up, checks on maternal and fetal well-being to assess the risk (20 items) , the maternal and antenatal care logbook were provided. The pregnant women will be offered a pathology test at Maharaj Nakhon Si Thammarat hospital and an appointment with obstetrician to have an initial assessment of the risk factor in pregnancy. Unless the pregnancy is considered at risk, the pregnant women will be asked to get the continuous antenatal care at the primary health center and go to the hospital for the later appointment. If it is identified as being a high-risk pregnancy, the pregnant women will be considered to have their antenatal care at Maharaj Nakhon Si Thammarat hospital and need to meet the obstetrician for every antenatal care appointments until delivery. In case of the pregnant women who are in the responsible area can be offered the antenatal care visits and delivery service from Maharaj Nakhon Si Thammarat hospital in the same respect. Such services include details of their medical history and examination, physical check-up, checks on maternal and fetal well-being, pathology test, maternity care training and risk monitoring.

The antenatal care service provided at the primary health care center of Maharaj Nakhon Si Thammarat hospital can complies with the minimum standard criteria. Nonetheless, the health care personnel have to take care all patients, not only the pregnant women. This causes them lack of skill and competency in antenatal care both in terms of medical examination and provision of important instruction for pregnant women. Another crucial problem is the shortage of health care personnel for the antenatal care unit at Maharaj Nakhon Si Thammarat hospital. In case of the antenatal clinic at Maharaj Nakhon Si Thammarat hospital, the antenatal care management is also

in accordance to the standard criteria of Safe Motherhood Hospital program. Generally, the antenatal service is evaluated every year. There are 60-70 patients per day. Likewise, the personnel shortage is problematic.

Maternity care training for pregnant woman and family / Spouse

From the interview, it can be concluded that pregnant women and family or spouse that attend the antenatal care at Maharaj Nakhon Si Thammarat hospital and the primary healthcare facility in the network of Maharaj Nakhon Si Thammarat hospital are educated in group, not in person. Each group will have to attend two sessions of training. The first training is performed when gestational age is less than 28 weeks and the second one is provided when gestational age between 28-36 weeks. The content of first training will cover a number of aspects such as how to use health logbook, thing for mother to do during her pregnancy period. The importance of completing the antenatal care program, receiving tetanus immunization, preparing for breast feeding, maintaining health during pregnancy, knowing complication of pregnancy and protecting against sexually transmitted disease were emphasized. The second training is about preparation for delivery, family planning and how to observe the danger signs that require medical attention.

It is important to note that the number of pregnant women attending the seminar is much smaller than that expected. The contents cover in seminar is lack of practical application in particular these that deal with handling pain during delivery process. The lecture is replace by video screening session.

Delivery/ Obstetric service

The delivery room is equipped according to the standard criteria of Safe Motherhood hospital program and also its delivery service system. Annually, the delivery service performance will be appraised in the same respect of the antenatal care service. At delivery room, the service provided include routine use of pantograph for monitoring the progress of delivery, availability of resuscitation equipment, availability of skilled attendant for maternal resuscitation, provision of caesarean delivery or facilitating an immediate referral. When fetal asphyxia and birth asphyxia is present, the immediate essential basic newborn resuscitation will be given by in charge obstetricians and nurses.

Through a routine observation, it is found that there is the provision of maternal and neonatal care after birth. In addition, the pregnant women's spouses or family are allowed to participate in caring the pregnant women during delivery period.

Newborn / Neonatal Care: According to the result of interview from the personnel in antenatal clinic, it can be concluded that not only the initial assessment of fetal well-being in every visits but also the fetal movement counting instruction are provided for all pregnant women. When a reduction of fetal movement is perceived, the mothers should come to see the obstetrician right away. In the labor/delivery room, a fetal monitoring method, such as, a periodic fetal heart rate assessment is provided. When any abnormal sign arising, the immediate and appropriate resuscitation care will be supported by the skilled attendants, such as, obstetrician, pediatrician and nurse and also equipment and supplies are available to resuscitate both mother and newborns.

After the first minute of newborn's life, the auxiliary nurse will quantify the newborn's initial condition by using a simple assessment, the Apgar score at one minute. Infants whose score of 7 or less will be resuscitated immediately according to the guideline for basic newborn resuscitation. In some cases, the infants has been considered abnormal due to fetal heart rate problem when being in the uterus, the neonatal resuscitation will be prepared. After birth, the immediate newborn resuscitation will be given without Apgar assessment score at one minute. For the Apgar assessment, all in charge attendants will be examined periodically. They will be tested to score the assessment of the same infant's condition and then compare the differentiation among the group.

From the observation, it is clearly shown that there are 24-hour responsible personnel, standard of procedure including equipments and supplies for newborn resuscitation available at the obstetric room. However, personnel shortage can be noticed when compared to the number of patients.

Referral System

Generally, the pregnant women will be referred to the delivery room at Maharaj Nakhon Si Thammarat by most of community-level hospital in Nakhon Si Thammarat province. The vast majority of mothers have complications of pregnancy or having a prolonged delivery. In some cases, the fetus are put a greater risk of birth asphyxia or being suffered from the birth asphyxia. The most possible cause of problem includes a delay in referral consideration, lack of referral data, and the improper care during referral. These all make the delay in resuscitation both mother and children.