

# Chapter 1

## Introduction

### 1.1 Statement of the problem

Complications in pregnancy are serious obstetrics conditions that increase maternal, perinatal and neonatal morbidity and mortality. Every year, over half a million women worldwide die from complications in pregnancy and childbirth. The vast majority of these maternal deaths occur among the world's poorest women. More than one-quarter of all adult women in low- and middle-income nations suffer childbirth-related illness and injuries from pregnancy (Laura and Fatimata 2003). More than nine million infants die before birth or in the first few weeks of life each year, and nearly all of these deaths occur in developing countries. Most of these deaths are caused by pregnancy related complications (World Health Organization 2006).

If the risk of such complications is assessed as high, then preventative medical practices to assist the baby's survival could be undertaken. All pregnancies should be evaluated to estimate these risks. The early detection of risk factors in pregnant women is important. Identifying a pregnancy as high risk helps health officers to ensure that pregnant women receive extra attention and proper care, thereby significantly decreasing maternal and neonatal morbidity and mortality rates (Arias 1993).

In Thailand the major important causes of maternal death in 2003 were hemorrhage (27.8%), indirect cause (21.4%), hypertension (16.7%), amniotic fluid embolism (11.9%), sepsis (8.7%), and direct cause (8.7%) (Ministry of Public Health 2004).

Caesarean delivery is an additional risk factor of pregnancy and is often classified as a delivery complication. Caesarean section rates have been increasing worldwide (Florica et al 2006). Factors influencing caesarean section that have been investigated included maternal age, neonatal birth weight, medical complications, induction of labour, type of hospital, education, attitude of the patient and attitude of obstetricians (Usha Kiran and Jayawikrama 2002, Penn and Ghaem-Maghani 2001, Sultana and un-Nisa 2003, and Kozinszky et al 2002).

However, caesarean sections are not risk free. The associated risks include increased chances of hemorrhage, longer recovery from child birth and increased odds of severe pain and infection (Jackson and Paterson-Brown 2001). Babies born by caesarean section may be also at increased risk. For example, respiratory problems following birth (Minkoff et al 2003) and difficulties initiating breastfeeding (DiGirolamo et al 2001) have been highlighted as concern for infants born by caesarean section.

Inappropriate caesarean section has been found to increase maternal and neonatal morbidity and health care costs (Belizan et al 1999 and Shearer 1993).

In this thesis two studies are reported. The first study investigated a method for assessing complication based risk factors for neonatal morbidity. In the second study we examined demographic determinants for caesarean deliveries. In each case we used data routinely collected in Pattani Hospital over a recent nine-year period (1996 to 2005).

## 1.2 Rationale for studies

In Pattani province maternal mortality is relatively high compared to other provinces of Thailand. Pattani province is located in southernmost area of Thailand with a Muslim majority population (85%), and delivery rates with traditional birth attendants, though decreasing, remain quite high at 37.9% (Teeraworn 2002). In 2005 and 2006 perinatal mortality rates were 10.1 and 11.1 per 1000 total births, respectively (Pattani Public Health province Office 2008), and maternal mortality rates were 54.5 and 37.4 whereas the rates for the whole country were 12.2 and 11.7 per 100,000 live births.

According to data from the Pattani Public Health Province (2009), most maternal deaths were associated with sepsis, obstetric hemorrhage and hypertensive disorders of pregnancy. Other factors include low skills of health workers affecting the decision to refer the pregnant women to hospital, primigravida (first pregnancy), more than four previous pregnancies, lack of continuous or incomplete antenatal care, and low knowledge regarding complications that can occur in pregnant women, as well as low birth weight. Characteristics of perinatal mortality were dead fetus in uterus, birth asphyxia and co-digital anomaly.

To fill the knowledge gap we conducted a prospective study on maternal morbidity in Pattani Hospital. We created a score for predicting the *risk* of morbidity in newborns based on complications to the mother recorded at the time of delivery. Such clinical assessments of newborns are very important. Because the risk to newborns is difficult to diagnose, treatment is challenging for the primary care pediatrician. If we have more appropriate information a treatment plan can be established to minimize the

medical and psychological problems that give rise to emergencies and the need for urgent intervention in newborns in Pattani Hospital.

In addition, there has been a continuous rise in the rate of caesarean delivery in Pattani Hospital during the last 9 years, from 30.5% in 1996 to 34.3% in 2005, according to data recorded at Pattani Hospital. The World Health Organization recommends that the caesarean delivery rate should not go above 15% in any country (Arjun 2008).

So, there is a concern for maternally requested caesarean deliveries without any indicated necessity for the procedure.

Caesarean section rates are also increasing throughout the world (Leung et al 2001, Cai et al 1998). Besides the medical decision, other postulated reasons for caesarean delivery include changing attitudes towards caesarean section among staff and patients. In fact maternal demographic characteristics largely determine the type of delivery. So a study to determine the demographic determinants for caesarean section delivery cases will be potentially important for those who wish to reduce caesarean section rates, since it allows early identification of women at an increased risk.

The study of demographic factors for caesarean deliveries can also help policy makers to organize an appropriate necessary medical staff and facilities. Furthermore, such a study will serve as a guideline for the recently established global concern for safe motherhood and child survival program (Confidential Enquiry into Maternal and child Health 2007), which is one of the priorities in health policy of Pattani Province in Thailand.

Despite recognizing maternal and neonatal mortality as a major health problem in Pattani Province and the implication on the rising caesarean rate, no study has yet

been conducted in Pattani Province on simple screening of complications, or on demographic factors associated with neonatal morbidity, or on the demographic determinants for caesarean delivery at Pattani Hospital.

We undertook two studies. Our first study constructed complication-based estimates of neonatal morbidity risks as outcomes and then investigated demographic risk factors for these outcomes. Our second study investigated demographic determinants for caesarean deliveries.

### **1.3 Data source**

Pattani Hospital has an ongoing well-maintained computerized database with case-by-case records containing birth outcomes including complications as well as 1- and 5-minute Apgar scores and birth weights, and demographic and pregnancy history data for the mother, for all deliveries since 1 October 1996. These data are recorded consistently by birth attendants in the labour room and can be used to estimate the risk of a serious complication, and to compare these risks with respect to demographic and pregnancy history factors.

There is a limitation in these data. Some information on complications was not available. At most one complication was recorded for each delivery. And since multiple births and caesarean deliveries were recorded as “complications”, no information about any other complications was recorded for these groups of mothers.

It should be noted that since a routine epidemiological database using the WHO-supported *EpiInfo* system has been used since 1996 at Pattani Hospital for storing patient records, it would have been possible to retrieve information about any additional complications associated with deliveries from this database. However,

given that any complication recorded in the labour room database was the principal (most serious) complication for a singleton non-caesarean delivery, we decided that for our studies the cost of retrieving such information was not justified by the benefit of doing so. However, it would be desirable to reconsider this issue in future studies, particularly in view of technological improvements in data quality and the increasing accuracy, versatility and internet connectivity of hospital databases.

#### **1.4 Literature review**

Despite global declines in under-five and infant mortality rates in recent decades, neonatal mortality rates have remained relatively unchanged (Black and Kelley 1999). Neonatal mortality now accounts for approximately two-thirds of the 8 million deaths in children less than 1 year of age, and nearly 40% of all deaths in children less than 5 years of age (WHO 1994). Studies have simultaneously considered the importance of intra-partum morbidity, socio-demographic factors, and prevalent maternal illnesses as risk factors for neonatal mortality (Renay et al 2001). A WHO report on maternal and new-born health in the WHO European Region in 2005 showed that rural populations have higher mortality than urban ones, rates can vary widely by ethnicity or wealth status, and remote areas bear a disproportionate burden of deaths (WHO 2005). Older women (above 30 years) had higher risks than younger women (Uma et al 2006). A study in India found that early neonatal morbidity and mortality was 1.5 times higher in maternal age group less than 20 and maternal age more than 30 years of age than in the age group 20-29 years (Das et al 1998).

Islam et al (2004) found that mothers delivering for the first time were at higher risks than others. Raum et al (2001) identified that the mother's education largely

determines neonatal morbidity, because higher educated mothers take care of themselves during pregnancy and delivery. However, assessing the pregnancy complication risk based on the mother's demographic and pregnancy history has not been seriously addressed, especially in developing countries like Thailand.

Panichkul et al (2007) found risk factors associated with quality of meconium-stained amniotic fluid were maternal age and route of delivery. Pitaphrom and Sukcharoen (2006) reported that placental abruption with pregnancy induces hypertension, disseminated intravascular coagulation and blood transfusion had significantly higher incidence of perinatal mortality. Grijbovski et al (2002) found that the most significant factor associated with poor infant outcome was secondary or less education with mothers age 30 years and older.

Increasing caesarean section rates are a trend observed worldwide (Leung et al 2001, Cai et al 1998). The exact reasons for the increase in caesarean section rate are unknown. A major reason could be the improved safety of surgical and aesthetic skills in modern obstetrics (Steer 1998). Other postulated reasons include changing attitudes towards caesarean section among staff and patients. Because of the increasing emphasis on patients' participation in medical decisions in recent years, women's demands for caesarean section have become a main reason for the abdominal route of delivery (Cotzias et al 2001, Efeckhar and Steer 2000).

There are several socio-demographic factors identified in the literature as being associated with caesarean section. For example, many studies have found ethnicity (Jonas et al 1992), social class, nature of employment (Hung et al 2002) and activity during pregnancy (Bungun et al 2000) to be associated with caesarean section.

Zhang et al (2008) found that women's occupation was associated with a higher rate of caesarean delivery on maternal request. Older mothers had higher caesarean section rates and the risk of major complications increased with repeated (multiple) caesareans section.

Guilherme et al (2000) studied factors associated with caesarean section in primipara women with one previous caesarean section. The risk factors which showed to be significant associated with a caesarean section on the second delivery were higher maternal age, previous abortions induced labor, premature rupture of membranes, not having an epidural analgesia performed during labour.

### **1.5 Specific objectives**

1. To investigate the association between demographic factors and neonatal outcome.
2. To determine the association between complications on maternal history and infant mortality or morbidity.
3. To determine the association between complication-based risk score and Apgar score at 1 minute and birth weight.
4. To investigate the association between demographic factors and caesarean delivery.

### **1.6 Road map of thesis**

This thesis contains four chapters, including this introductory chapter. It begins with a statements of the problems of complication in pregnant women, the situation of maternal and child health and problems in abnormal delivery in Pattani Province.



This chapter includes a review of related studies on the factors associated with neonatal morbidity and neonatal mortality and factors associated with caesarean section. This chapter gives an overview of the rationale, scope and objectives of the two studies reported in the thesis.

Chapter 2 provides a description of the data and overviews the statistical methods used, including data transformation, and univariate and multiple logistic regressions are described.

Chapter 3 includes the two published articles namely:

- (1) A method for assessing complication-based risk factors for neonatal morbidity with application to Pattani hospital deliveries, and
- (2) Demographic Determinants for Caesarean Delivery in Pattani Hospital.

Chapter 4 presents the summaries and lesson learnt from the studies, their implications and limitations and suggestions for further study.