

# Epidemiology of Maternal Mortality in Thailand

Surasak Taneepanichskul MD, MPH.

Family Health Division,  
Department of Health, Ministry of Public Health.

**Abstract :** *A cross-sectional retrospective study of maternal mortality in Thailand was carried out for a period of 1 year, from 1 October 1989 to 30 September 1990 to evaluate the distribution, causes and characteristics of maternal deaths. Data were collected from hospitals, clinics, health centres of both government and private sectors. Maternal mortality rate was 27 per 100,000 live births, and highest in the Southern region. Age specific maternal mortality rate was highest in the aged group 35-39 years old. Most maternal deaths occurred in hospitals, doctors and nurses were involved because most of the severe cases were referred to hospitals. Low socio-economic status and education, lack of antenatal care, third trimester period and normal delivery were, factors commonly found among maternal deaths. Causes of deaths were haemorrhage, infection, preeclampsia and eclampsia and most of these were preventable. (Thai J Obstet Gynaecol 1994; 6: 79-90.)*

**Key words :** maternal mortality, Thailand, epidemiology

Maternal death is a major problem in maternal health among developing countries. No one knows exactly how many women died each year as a result of pregnancy. Approximately, half a million of women died, during childbirth and the majority of these deaths are preventable.<sup>(1,2)</sup> About 98 to 99% of these occurred in developing countries.<sup>(2,3)</sup> In Thailand, a decade ago, the maternal mortality rate is 40 per 100,000 livebirths.<sup>(4)</sup> However, detailed study in maternal death nationwide has not yet been carried out as well as in compiling with the World Health Organization Safe Motherhood Pro-

gramme. This study was undertaken to find out the real situation of maternal death in Thailand.

## Materials and Methods

### 1. Study design.

This study is a cross sectional descriptive study.

### 2. Data collection.

#### 2.1 Place of data collection.

2.1.1 All Ministry of Public Health Service units including provincial hospitals, community hospitals, health centers,

mother and child hospitals and other health service units.

2.1.2 Private clinics and hospitals at provincial level participated in the Safe Motherhood project of the Ministry of Public Health.

2.1.3 University hospitals and hospitals in Bangkok were not included in this study.

2.2 Sources of data.

2.2.1 Medical records.

2.2.2 Death certificates.

2.2.3 Maternal death reports from Safe Motherhood project

2.2.4 Mother and Child Health Handbook.

2.2.5 Routine reports of provincial medical offices.

2.3 Methods of collecting data.

2.3.1 Questionnaires and manuals.

2.3.2 Informing the provincial medical officers on the study and questionnaires.

2.3.3 Sending the questionnaires to provincial medical officers.

2.3.4 The provincial medical officers filed the questionnaire forms by using sources of data in 2.2. All variables in questionnaires can be found from the sources of data, particularly from maternal death reports.

2.3.5 Collecting the questionnaires.

3. *Data Processing.*

3.1 Checking the data by the staff of Family Health Division.

3.2 Coding the data by well-trained staffs.

3.3 Checking the coded data by the staff of Family Health Division.

4. *Data analysis.*

4.1 Analysis of data by using PC microcomputer 486 SX, the statistical package was SAS programme.

4.2 Statistic used were frequency distribution, percentage, mean, mode, standard deviation, specific rate and risk ratio.

5. *Variables in this study.*

5.1 Number of live births

5.2 Number of maternal deaths

5.3 Place of delivery

5.4 Region

5.5 Age

5.6 Education

5.7 Occupation

5.8 Family income

5.9 Parity

5.10 Number of antenatal care

5.11 Gestational age at first visit

5.12 Gestational age at delivery

5.13 Type of delivery

5.14 Type of birth attendant

5.15 Causes of death.

6. *Duration of study.*

From 1<sup>st</sup> October 1989 to 30<sup>th</sup>

September 1990.

### 7. Financial support.

This study was supported by the Royal Thai Government under Mother and Child Health Programme and World Health Organization under THA MCH 001 Plan.

## Results of the Study

### 1. Distribution of live births by region

There were 23.1 percent of live births in the Northern region, 33 percent in the Northeastern region, 32.8 percent in the Central region and

**Table 1** *Distribution of Live Births by Region*

Region	Number of live births	Percent
Northern	183,334	23.1
Northeastern	262,518	33.0
Central	260,415	32.8
Southern	88,103	11.1
Total	794,370	100

only 11.1 percent in the Southern region. As a whole country, there were 794,370 live births during the period under study. The details of distribution of live births is shown in Table. 1

### 2. Distribution of live births by age group of mother

Distribution of live births by age group of mother as well as number of women and age specific fertility rates are given in Table 2.

### 3. Distribution of maternal deaths by region

There were 211 cases of maternal deaths in this study. The maternal mortality rate of the whole country was 27 per 100,000 live births. The maternal mortality rate of the Northern region was 30 per 100,000 live-births and in the Northeastern region was 32 per 100,000 live births. In the Central and Southern regions, the maternal mortality rates were 11 and 50 per 100,000 live births respectively (Table 3).

**Table 2** *Age specific Fertility Rates*

Age of mother (year)	Number of live births	Number of women	Fertility rate (per 1,000)
10 - 14	1,589	3,040,000	0.5
15 - 19	103,268	2,995,000	34.9
20 - 24	277,235	2,767,000	100.2
25 - 29	220,836	2,365,000	93.4
30 - 34	115,184	2,010,000	57.3
35 - 39	48,456	1,579,000	30.7
40 - 44	17,476	1,225,000	14.3
45 - 49	10,326	1,081,000	9.6

**Table 3** *Distribution of Maternal Deaths by Region*

Region	Number of maternal deaths	Number of live births	Maternal mortality rate (per 100,000 live-births)
Northern	55	183,334	30
Northeastern	84	262,518	32
Central	28	260,415	11
Southern	44	88,103	50
Total	211	794,370	27

**Table 4** *Age Specific Maternal Mortality Rate*

Age (years)	Number of maternal deaths	Number of live-births	Age-specific maternal mortality rate (per 100,000 live births)
below 20	25	104,857	23.8
20 - 24	49	277,235	17.7
25 - 29	43	220,836	19.5
30 - 34	43	115,184	37.3
35 - 39	33	48,456	68.1
over 40	18	27,802	64.7

**Table 5.** *Maternal Deaths by Place of Delivery*

Place of delivery	Number of maternal deaths	Percent
Regional hospital	33	15.6
Provincial hospital	72	34.1
Community hospital	51	24.2
Health centre	14	6.6
Home	38	18.0
Private hospital	3	1.4
Total	211	100

**Table 6** *Education of Women in Relation to Maternal Deaths*

Educational Levels	Number of maternal deaths	Percent
Illiteracy (no education)	60	28.4
Primary school	76	36.0
Secondary school	39	18.5
High or Vocational school	25	11.9
University	2	0.9
Unknown	9	4.3
Total	211	100

#### 4. Age specific maternal mortality rates

The age-specific maternal mortality rates are shown in Table 4. The maximum age of maternal death was 48 years old and the minimum age of maternal death was 13 years old. However, the mean age of maternal death was 28.5 years old with a standard deviation of 7.4 years.

#### 5. Place of delivery

The maternal deaths occurred in regional hospital is 15.6%, provincial hospital 34.1%, community hospital 24.2% health centre 6.6%, home 18% and private hospital 1.4%. Details can be seen in Table 5. However, these statistics have to be interpreted with caution as denominators are not available for rates to be compared.

#### 6. Education

From the study, it was obvious that most maternal deaths occurred in women with low or no education at all. There were 28.4% with no education and 36.0% primary school. There

were 18.5% in secondary school level, 11.9% in high or vocational school level and only 0.9% in university education (Table 6). Again, these statistics should be treated only as crude indicators as denominators were not available for the computation of rates.

#### 7. Occupation

With regard to this variable, maternal deaths occurred in housewives 47.4%, farmers 27.0%, employees 14.2%, government services 3.8%, business 3.3 and unknown occupation 4.3% (Table 7). These statistics should be treated as crude indicators as denominators for the computation of rates were not available.

#### 8. Family income

Family income reflects the socio-economic status of women in relation to maternal deaths. In this study, family income was considered per month. As to be expected, most of the maternal deaths occurred among families in the lower income groups.

**Table 7 Occupation of Women in Relation to Maternal Deaths**

Maternal Occupation	Number of maternal deaths	Percent
Housewives	100	47.4
Farmers	57	27.0
Employees	30	14.2
Government services	8	3.8
Business women	7	3.3
Unknown	9	4.3
Total	211	100

As denominators are not available these statistics should, again, be treated as crude indicators.

### 9. Parity

According to the parity, the maximum parity of maternal death was eleven and the minimum parity was primipara. Distribution of maternal death by parity and parity specific maternal mortality rate are shown in Table 9.

### 10. Number of antenatal care

There were many variation of antenatal care. The number of antenatal care varied from zero to nine

times. No antenatal care accounted for all of maternal deaths. 26.1% had antenatal care between one to four and only 10.4% had more than 5 (Table 10).

### 11. Gestational age at first visit of maternal deaths

There were also variations of gestational age at first visit. They varied from 6 to 39 weeks of pregnancy among the dead mothers who attended the antenatal care. The gestational age of first visit is shown in Table 11.

**Table 8 Family Income Per Month of Women in Relation to Maternal Deaths**

Family income per month (Baht)	Number of maternal deaths	Percent
Less than 1,000	13	6.2
1,000 - 1,999	82	38.9
2,000 - 2,999	75	35.5
3,000 - 3,999	30	14.2
4,000 - 4,999	5	2.4
5,000 - 5,999	4	1.9
More than 6,000	2	0.9
Total	211	100

**Table 9 Parity Specific Maternal Mortality Rate**

Parity	Number of maternal deaths	Number of live births	Parity-specific maternal mortality rate (per 100,000 live births)
1	132	370,177	35.7
2	29	239,899	12.1
3	21	100,091	21.0
4	8	41,307	19.4
5	9	19,859	45.3
Above 5	12	23,037	52.1

**12. Gestational age at delivery of maternal deaths**

There were 3.8% of dead motheres delivered in the first trimester, 9.5% were in second trimester and 86.7% were in third trimester. The maximum of gestational age at delivery was 42 weeks and the minimum was 10 weeks. Details can be seen in Table 12.

**13. Types of delivery of maternal deaths**

The types of delivery included normal delivery, Caesarean section, forceps extraction, vacuum and breech extractions. Details can be seen in Table 13. However, 14.2% were undelivered or aborted in this study.

Again, these statistics should be treated with caution. As to be expected, the highest frequency for ma-

**Table 10 Number of Antenatal Care Associated with Maternal Deaths**

Number of antenatal care	Number of maternal deaths	Percent
No antenatal care	134	63.5
1 - 4	55	26.1
More than 5	22	10.4
Total	211	100.0

**Table 11 Gestational Age at First Visit of Maternal Deaths**

Gestational age (weeks)	Number of maternal deaths	Percent
No antenatal care	134	63.5
1 - 12	12	5.7
13 - 28	56	26.5
29 - 40	9	4.3
Total	211	100.0

**Tbale 12 Gestational age at Delivery of Maternal Deaths**

Gastational age (weeks)	Number of maternal deaths	Percent
1 - 12	8	3.8
13 - 28	20	9.5
29 - 40	183	86.7
Total	211	100.0

ternal deaths were recorded in normal deliveries as most of the deliveries were expected to come under this category.

#### *14. Types of birth attendant of maternal deaths*

There were 4 types of birth attendants : doctor, nurse, midwife and traditional birth attendant. 52.6% of birth attendants were doctor. Nurse, midwife and traditional birth attendant were 22.7%, 6.6% and 18.0% respectively (Table 14).

#### *15. Causes of maternal deaths*

Most maternal deaths in this study were due to direct obstetric

causes such as haemorrhage, infection, pre-eclampsia, eclampsia, amniotic fluid embolism, septic abortion, rupture uterus, etc. Details are shown in Table 15.

#### **Discussion**

This study was a cross-sectional retrospective study for a period of one year from 1<sup>st</sup> October 1989 to 30<sup>th</sup> September 1990. The data of maternal deaths were collected from medical records and death certificates at hospitals, clinics, health centers and health service units of the country, both the Government and private sectors. These data were the most common sources used to estimate

**Table 13** *Types of Delivery of Maternal Deaths*

Type of delivery	Number of maternal deaths	Percent
Normal delivery	114	54.0
Caesarean section	43	20.4
Forceps extraction	10	4.7
Vacuum extraction	9	4.3
Breech extraction	5	2.4
Undelivery or abortion	30	14.2
Total	211	100.0

**Table 14** *Types of Birth Attendant of Maternal Deaths*

Type of birth attendants	Number of maternal deaths	Percent
Doctor	111	52.6
Nurse	48	22.7
Midwife	14	6.6
Traditional birth attendant	38	18.0
Total	211	100

Table 15 *Causes of Maternal Deaths*

Cause of death	Number of maternal deaths	Percent
Haemorrhage	86	40.8
Infection	24	11.4
Pre-eclampsia/eclampsia	21	10.0
Amniotic fluid embolism	18	8.5
Heart disease	14	6.6
Cerebral haemorrhage	10	4.7
Malaria	10	4.7
Septic abortion	9	4.3
Rupture uterus	7	3.3
Others	9	4.3
Unknown	3	1.4
Total	211	100

maternal mortality in developing countries<sup>(5)</sup>

During the study period, the maternal mortality rate of Thailand was 27 per 100,000 livebirths. The maternal death rate was highest in the Southern region, 50 per 100,000 livebirths, in contrast, the maternal death rate of Central region was lowest, only 11 per 100,000 live births. The maternal mortality rate among mothers in the Southern region was higher than that among mothers in the Central region with a risk ratio of 4.5. The maternal mortality rate in the Northern and Northeastern regions were also higher than that in the Central region with risk ratio of 2.7 and 2.9 respectively. The maternal death distribution was not homogeneous for the whole country. There were many considerable variations in maternal death. In the Central region, the health infrastructure, transportation,

education and socioeconomic status were better than other regions. Most of the maternal deaths occurred in the Southern region because it is remote and fundamentally very rural in some areas. Steep mountains and forests are obstacles to transportation and communication. Cultures and beliefs of people in this region as well as different religions upbringing are also the constraints. The accessibility of health services is also one of the problems. Some prefer to have child birth at home because of culture and beliefs and so the risks are increased when it is compared to others. Contraception, the strategy to prevent maternal deaths, is also neglected in the Southern region<sup>(6)</sup> The recent maternal mortality rate of Thailand was still high when compared to developed countries, for example, Europe, the United States of America and neighbouring countries such as Sing-

apore<sup>(7-15)</sup>. With regard to the characteristics of maternal deaths, it appeared that deaths occurred in mothers who were poor, uneducated, very young or very old, high parity and with no or inadequate antenatal care. These are high risk factors in pregnancy.<sup>(16)</sup> Improving standard of living, quality of life and education are the most important factors in the reduction of maternal deaths in Thailand. Increasing coverage of health services, adequate logistic, infrastructure as well as transportation and communication development are also important strategies to solve maternal death problems.

The gestational age at first visit was also important. Early antenatal care was beneficial to mothers because they could obtain proper care and early detection of abnormality.<sup>(16)</sup> In this study, only 5.7% of mothers commenced antenatal care in the first trimester, most come to the antenatal clinic in late pregnancy and some had no antenatal care at all.

Most of maternal deaths occurred in hospitals with doctors and nurses as birth attendants. The reason for this was that mothers who had severe complications were referred to the hospitals, often too late. Massive haemorrhage, convulsion and unconsciousness from eclampsia and sepsis had already occurred at home in these high risk mothers before they were referred to hospitals. As a result, the study showed that most maternal deaths occurred in hospitals and most of the birth attendants were doctors

and nurses.

Causes of maternal deaths are also significant. The major causes of maternal deaths were haemorrhage, infection, pre-eclampsia and eclampsia. These are direct obstetric causes which are preventable.<sup>(1,2)</sup> Similar to other developing countries, lack of budget, inadequate manpower and supply and ineffective management are the constraints in solving these problems.<sup>(1,2)</sup> Improving antenatal care, appropriate referral system, aseptic technique in delivery, adequate supply of blood, antibiotic and good transportation system are the most effective means of preventing and reducing the number of maternal deaths.

## **Conclusion and Recommendation of the Study**

### ***Conclusion***

Like many developing countries, Thailand has a relatively high maternal mortality rate. During the period 1989-1990, it was 27 per 100,000 live births. The highest maternal mortality rate was found in the Southern region and the lowest in the Central region. The mean age of mothers was 28.5 with standard deviation of 7.4 years old. These mothers had little or no education and were from low socio-economic families. Inadequate or no antenatal care with delivery in the third trimester were common. The study revealed that doctors and nurses were the main

groups of birth attendants as most maternal deaths occurred in hospital. This was due to most of the severe cases were referred to hospitals often too late. Direct obstetric causes such as haemorrhage, infection, pre-eclampsia and eclampsia were most responsible for maternal deaths which could be prevented.

### ***Recommendation***

To reduce maternal mortality rate in Thailand, some recommendation may be proposed.

1. Increase coverage, quantity and quality of antenatal care.
2. Increase health education for pregnant women.
3. Conduct proper screening, identification and referral of high risk cases.
4. Monitor maternal health throughout pregnancy.
5. Supply adequate blood replacement.
6. Institute proper training for birth attendant.
7. Promote coverage and appropriate delivery care.
8. Promote coverage and appropriate postpartum care.
9. Encourage family planning.

The study show that the situation, with regard to authorities must implement policies and institute actions to lower the occurrence of death in mothers before, during or after child birth. The results of the study revealed that the problem is not purely a medical one, it is also socio-

economic and education. To solve this problem, it needs community participation, appropriate technology and intersectoral collaboration. Primary health care should be an important tool to reduce maternal deaths.

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