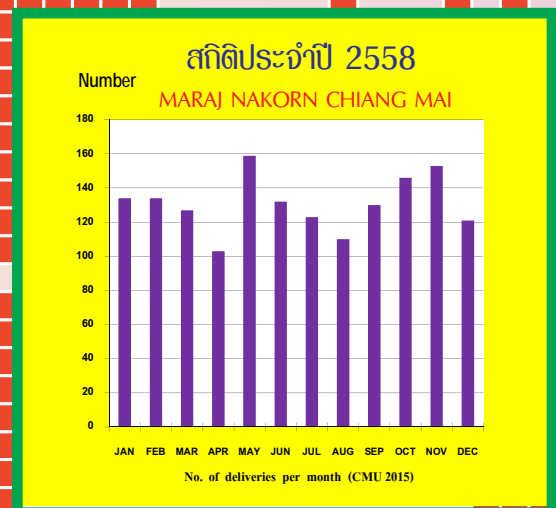


# MATERNAL-FETAL MEDICINE 2015



หน่วยเวชศาสตร์มารดาและทารก  
ภาควิชาสูติศาสตร์และนรีเวชวิทยา  
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

# **ANNUAL REPORT 2015**

**MATERNAL-FETAL MEDICINE**

**DEPARTMENT OF OBSTETRICS AND GYNECOLOGY**

**FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY**

**CHIANG MAI, THAILAND**

## **MATERNAL-FETAL MEDICINE 2015**

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อนุสาขาเวชศาสตร์มารดาและทารก

ภาควิชาสูติศาสตร์และนรีเวชวิทยา

คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

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# PREFACE

The Department of Obstetrics and Gynaecology was founded in 1958, the same time as the establishment of Faculty of Medicine, Chiang Mai University which is the third medical school in Thailand. The Faculty of Medicine, Chiang Mai University and Maharaj Nakorn Chiangmai Hospital has grown continuously and become the biggest medical school in Northern Thailand. The department consists of 25 academic staff responsible for teaching and training of 742 medical students, 4 interns, 33 residents and 14 clinical fellows. There is also a growing number of visiting residents, clinical fellows, interns and medical students from others institutes.

This annual report shows obstetric data including low risk and high risk patients, obstetric procedures and obstetric complications. Moreover, it also contains prenatal diagnosis procedures and outcomes which were performed by the Maternal-Fetal Medicine (MFM) staff and their colleagues. Interestingly, the number of total delivery decrease continuously. Pregnancies in advanced age mothers increased significantly. The number of HIV positive patients is still the same. There are cases of amniocentesis for prenatal diagnosis of thalassemia.

During the recent years, the MFM unit acquired over 30 million bahts of funding mainly by Professor Theera Tongsong from Thailand Research Fund (TRF) and National Research Council of Thailand (NRCT) into the department, generating hundreds of scientific publications and several textbooks. Associate Professor Chanane Wanapirak is the head of the MFM unit. This report was contributed mainly by Professor Theera Tongsong and his colleagues.

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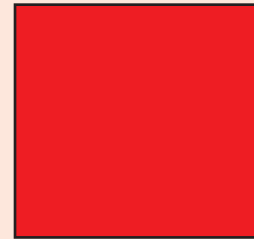
# PREFACE

The annual report of maternal fetal medicine unit, Department of Obstetrics and Gynecology, Faculty of Medicine, Chiang Mai University, has been established since 1990 for serving our 3 main missions: education, research and service. During the past 25 years, there are many changes of data that affect our mission especially educational programs for medical students, OB-GYN residency program and maternal-fetal medicine (MFM) fellowship training.

This 2014 annual report has some interesting data that affect educational programs as mentioned above. Firstly, the total number of delivery is lowest since we started our service but close to 70% of cases consider high risk cases. This may show the obstetrics service in this area has been changed from our center to other hospitals which our graduated residents take responsibility. The cesarean section rate in our institution still shows gradually increasing from 15.8% in the year 2000 to 26.6% in the year 2014, again a new record. This increasing rate may be reflected from the combination of parental expectation, legal issue and training program. The rate of teenage pregnancy and other complicated pregnancy are still high. Trend of the technique using for prenatal diagnosis also shift to different one. All of these information are the signal for the academic sector of faculty to plan for medical students curriculum, OB-GYN residency program and maternal-fetal medicine (MFM) fellowship training. MFM's ultimate purpose is better maternal and fetal outcome, this goal might not be achieved if our management do not consider the fact which some of them are present in this report.

Finally, I would like to be grateful for all our active and dedicated staff members who have contributed to this report and hope that it will serve as the best evidence for education and research including service for our next generations.

*Chanane Wanapirak, M.D.*  
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# CONTENT



	Page
<b>Section I Obstetric Mortality .....</b>	<b>9</b>
■ Stillbirth .....	9
■ Neonatal Mortality .....	10
■ Perinatal Mortality.....	12
■ Maternal Mortality .....	12
<b>Section II General Obstetrics .....</b>	<b>15</b>
■ Singleton & Multifetal pregnancies .....	15
■ Categories of parturients .....	15
■ Deliveries per month .....	16
■ Distribution of maternal age .....	18
■ Distribution of parity .....	21
■ Distribution of the occupations of the parturients.....	23
■ Distribution of the Residences of the parturients.....	26
■ Gestational age at delivery of singleton pregnancy .....	30
■ Gestational age at delivery of twins pregnancy .....	33
■ Number of antenatal clinic attendance .....	36
■ Fetal presentations in labor .....	40
■ Modes of deliveries .....	42
■ Modes of deliveries in breech presentation.....	44
■ Frequency of cesarean deliveries by diagnostic indications.....	46
■ Forceps delivery : Indications .....	47

■ Vacuum delivery : Indications .....	48
■ Sex of the fetus, Fetal sex.....	49
■ Apgar score at 1 and 5 minutes of total neonates.....	50
■ Congenital anomalies of fetuses .....	52
■ Distribution of neonatal birth weight .....	54
■ Distribution of neonatal birth weight for each gestational week.....	58
■ Comparison of birth weight, gestational age between .....	62
singleton and multifetal pregnancies	
■ Postpartum hemorrhage.....	63

### **Section III High-risk Pregnancies ..... 65**

---

■ Frequencies of pregnancies with major complications.....	65
■ Pregnancies with heart diseases.....	66
■ Pregnancies with diabetes melitus .....	67
■ Pregnancies with systemic lupus erythomatosus.....	69
■ Pregnancies with thyrotoxicosis.....	70
■ Pregnancies with hepatitis B antigen positive .....	72
■ Pregnancies with asthma .....	73
■ Pregnancies with chronic hypertension.....	75
■ Pregnancies-induced hypertension .....	76
■ Pregnancies with thalassemia.....	78
■ Pregnancies with placenta previa .....	79
■ Pregnancies with acute pyelonephritis .....	81
■ Pregnancies with small-for-gestational-age fetuses.....	82
■ Pregnancies with HIV infection .....	84

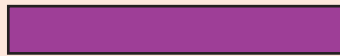
### **Section IV Perinatal Investigations..... 91**

---

■ Antepartum fetal testing.....	91
■ Prenatal diagnosis .....	91
■ Ultrasound service.....	92
■ Cordocentesis.....	93
■ Amniocentesis .....	94
■ Chorionic villous sampling.....	95
■ Thalassemia screening .....	96
■ Down syndrome screening.....	98
■ High-risk pregnancies .....	99



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**2015**

**MATERNAL-FETAL MEDICINE**

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**DIVISION OF MATERNAL-FETAL MEDICINE**

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**DEPARTMENT OF OBSTETRICS AND GYNECOLOGY**

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**FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY**

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**CHIANG MAI, THAILAND**

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## DATA SOURCE

Section I    Obstetric Mortality                      Patient Record Charts

Section II    General Obstetrics                                  Delivery Records

Section III    High-risk Pregnancies                              Patient Record Charts

Section IV    Perinatal Investigations                              Statistics of the Division

## Section I

# OBSTETRIC MORTALITY

## STILLBIRTH

**Stillbirth 2015:** For gestational age  $\geq 22$  weeks  
: 35 cases of total birth = 1651 cases)

■ *Gestational age between 22-27 weeks 25 cases (71.43 %)*

	CMU	Referred	Total
Low risk	1	3	4
High risk	6	15	21
Autopsy	2	9	11

### Causes of death

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	0	2	2
2. Congenital malformations	1	6	7
3. Condition associated with immaturity	4	5	9
4. Asphyxia developed in labor	0	0	0
5. Other specific conditions	1	1	2
6. Therapeutic termination related to PND	1	4	5

**Stillbirth 2015:** For gestational age  $\geq 28$  weeks  
: 10 cases of total birth = 1651 cases)

■ *Gestational age between  $\geq 28$  weeks 10 cases (28.57 %)*

	CMU	Referred	Total
Low risk	2	0	2
High risk	3	5	8
Autopsy	1	5	6

### Causes of death

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	2	1	3
2. Congenital malformations	1	4	5
3. Condition associated with immaturity	1	0	1
4. Asphyxia developed in labor	1	0	1
5. Other specific conditions	0	0	0
6. Therapeutic termination related to PND	0	0	0

### Stillbirth rate :

*Stillbirth rate = 6.06 per 1000 total births*

(by old WHO definition:  $\geq 28$  weeks or birth weight  $> 1000$  grams)

*Stillbirth rate = 21.20 per 1000 total births*

(by new WHO definition :  $\geq 22$  weeks or birth weight  $> 500$  grams)

*Stillbirth rate = 18.17 per 1000 total births*

(by new WHO definition :  $\geq 22$  weeks' gestation or birth weight  $> 500$  grams, not included therapeutic termination due to fetal malformations)

## NEONATAL DEATH

### Neonatal death 2015 :

10 cases (GA > 22 weeks) of total 1551 live births

- *Gestational age between 22-27 weeks 4 cases (40.0 %)  
(Total livebirth 1551 cases)*

	CMU	Referred	Total
Low risk	1	0	1
High risk	3	0	3
Autopsy	0	0	4

### Causes of death

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	0	0	0
2. Congenital malformations	1	0	1
3. Condition association with immaturity	1	0	1
4. Asphyxia developed in labor	1	0	1
5. Other specific conditions	1	0	1
6. therapeutic termination related to PND	0	0	0

**Neonatal death 2015 :**

6 cases (GA > 28 weeks) of total 1551 live births

- *Gestational age between  $\geq 28$  weeks 6 cases (60.0%)  
(Total livebirth 1551 cases)*

	CMU	Referred	Total
Low risk	1	1	2
High risk	1	3	4
Autopsy	0	2	2

**Causes of death**

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	0	0	0
2. Congenital malformations	0	2	2
3. Condition associated with immaturity	0	0	0
4. Asphyxia developed in labor	0	1	1
5. Other specific conditions	2	1	3
6. therapeutic termination related to PND	0	0	0

*Early neonatal death rate 3.87 per 1,000 live births*

*( $\geq 28$  week's gestation or 1000 grams and died within first 7 days of life)*

*Early neonatal death rate 6.45 per 1,000 live births*

*( $\geq 22$  week's gestation or 500 grams and died within first 7 days of life)*

**The most common cause of perinatal death was related to congenital anomalies referred for diagnosis from regional areas and terminated at Maharaj Nakorn Chiang Mai Hospital**

## PERINATAL DEATH

**Perinatal Mortality** (including the referral cases)

- Gestational age  $\geq 28$  weeks (stillbirths + early neonatal death)  
*perinatal death rate = 9.70 per 1000 total births*
- Gestational age  $\geq 22$  weeks (stillbirths + neonatal death)  
*perinatal death rate = 27.26 per 1000 total births*

*The most common related causes were fetal anomalies and immaturity (several cases associated with self attempt termination)*

## MATERNAL DEATH

**Total 1 cases**

*Maternal mortality rate 1 per 1551 livebirths*

**Causes of maternal death: (Referred case)**

Pregnancy-induced hypertension with intracerebral hemorrhage

### Summary

DATA	2015
Total birth (neonates)	1607
Stillbirth	35
22-27 weeks	25
$\geq 28$ weeks	10
<b>Stillbirth rate/1000 births</b>	
> 28 weeks / birthweight >1,000 gm	6.06
> 22 weeks / birthweight >500 gm	21.20
<b>Early neonatal death</b>	
• Early neonatal death rate / 1000 live birth ( $\geq 28$ weeks)	3.87
• Early neonatal death rate / 1000 live birth ( $\geq 22$ weeks)	6.45



## Section II

# GENERAL OBSTETRICS

**TABLE 1** Distribution of Singleton & Multifetal Pregnancies

Type of pregnancy	Number	Percent
Singleton	1534	97.6
Twins	30	1.9
Triplet	1	0.1
Quadruplet	1	0.1
<b>Total</b>	<b>1566</b>	<b>99.6</b>

**TABLE 2** Categories of the Pregnant Women

	2014		2015	
	Number	Percent	Number	Percent
General Cases	1567	92.8	1464	93.1
Private Cases	104	6.2	108	6.9
<b>Total</b>	<b>1671</b>	<b>100.0</b>	<b>1572</b>	<b>100.0</b>



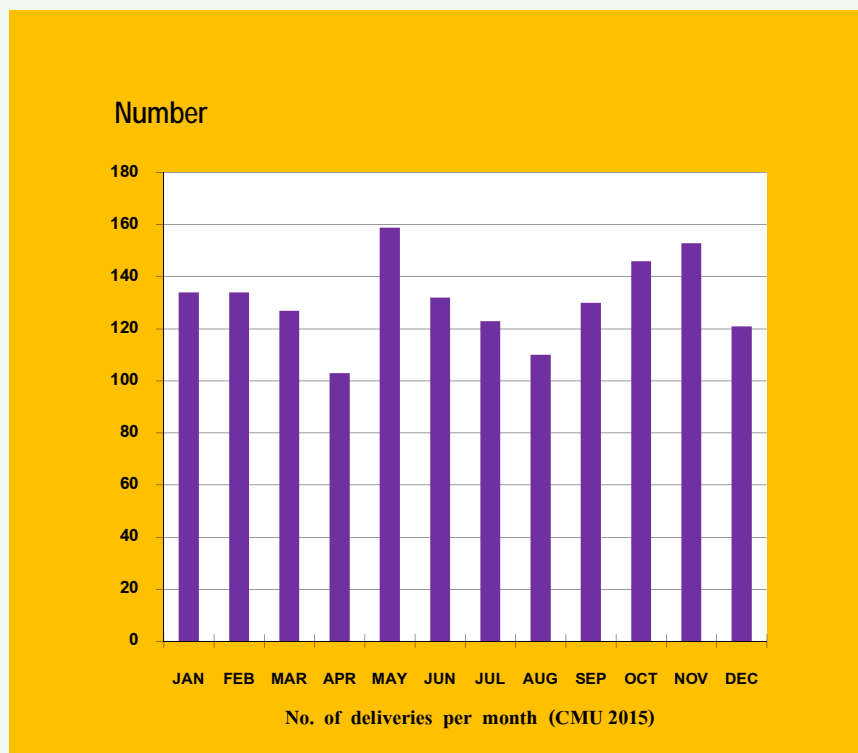
**TABLE 3** Categories of the Pregnant Women

	Number	Percent
ANC at Maharaj Nakorn Chiang Mai Hospital	1116	71.7
Private Clinic	108	6.9
ANC at Other Hospitals	304	19.5
No ANC	29	1.9
<b>Total</b>	<b>1557</b>	<b>100.0</b>

**TABLE 4** Number and Percentage of Deliveries per month

Month	Number (Mothers)	Percent
January	134	8.5
February	134	8.5
March	127	8.1
April	103	6.6
May	159	10.1
June	132	8.4
July	123	7.8
August	110	7.0
September	130	8.3
October	146	9.3
November	153	9.7
December	121	7.7
<b>Total</b>	<b>1572</b>	<b>100.0</b>

**FIGURE 1** Histogram : Number of Deliveries from January to December 2015



**Total deliveries in 2008 = 2144 cases**

**Total deliveries in 2009 = 2222 cases**

**Total deliveries in 2010 = 2089 cases**

**Total deliveries in 2011 = 1900 cases**

**Total deliveries in 2012 = 2059 cases**

**Total deliveries in 2013 = 1823 cases**

**Total deliveries in 2014 = 1686 cases**

**Total deliveries in 2015 = 1572 cases**

**TABLE 5** Number and percentage of parturients by age

Age	Number	Percent	Age	Number	Percent
14	4	0.3	30	105	6.7
15	5	0.3	31	95	6.1
16	11	0.7	32	86	5.5
17	8	0.5	33	83	5.3
18	23	1.5	34	63	4.0
19	41	2.6	35	66	4.2
20	43	2.7	36	68	4.3
21	57	3.6	37	50	3.2
22	63	4.0	38	36	2.3
23	55	3.5	39	27	1.7
24	78	5.0	40	20	1.3
25	98	6.3	41	14	.9
26	77	4.9	42	6	.4
27	90	5.7	43	6	.4
28	100	6.4	44	3	.2
29	83	5.3	45	3	.2
<b>Total</b>				<b>1567</b>	<b>100.0</b>

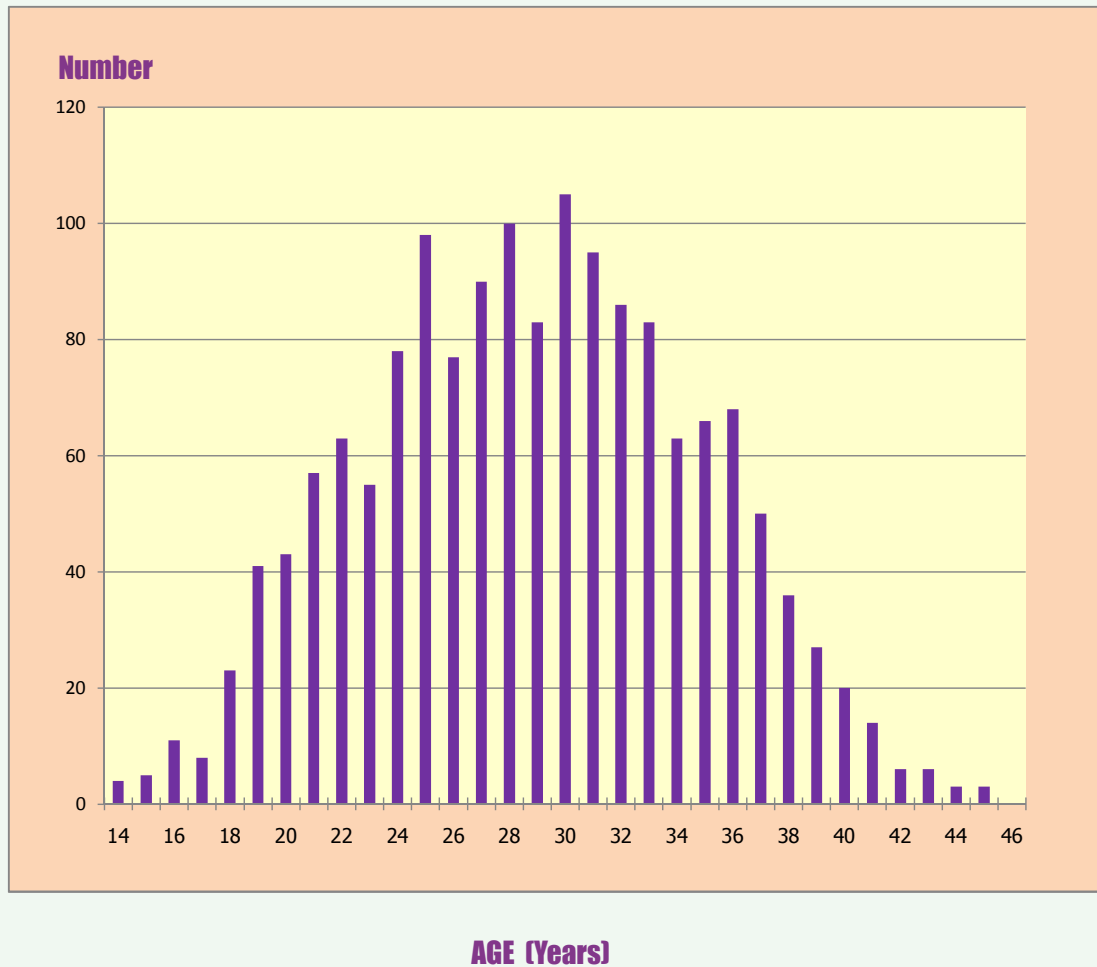
**Average age (Mean+Standard deviation) 28.85+5.9 years**

**TABLE 6** Number and percentage of parturients by age group

Age Group	Number	Percent
10-14	4	0.3
15-19	88	5.6
20-24	296	18.9
25-29	448	28.6
30-34	432	27.6
35-39	247	15.8
40-44	49	3.1
45-50	3	0.2
<b>Total</b>	<b>1567</b>	<b>100.0</b>

### Summary : Age of parturients

- Adolescent Pregnancies (11-19 years) 92 (5.9 %)
  - Early Adolescent Pregnancies ( $\leq 16$  years) 20 (1.3 %)
  - Late Adolescent Pregnancies (17-19 years) 72 (4.6 %)
- Adult Pregnancies (20-34 years) 1176 (75.0%)
- Elderly Pregnancies ( $\geq 35$  years) 299 (19.1 %)

**FIGURE 2** Histogram : Number of Parturients by Age

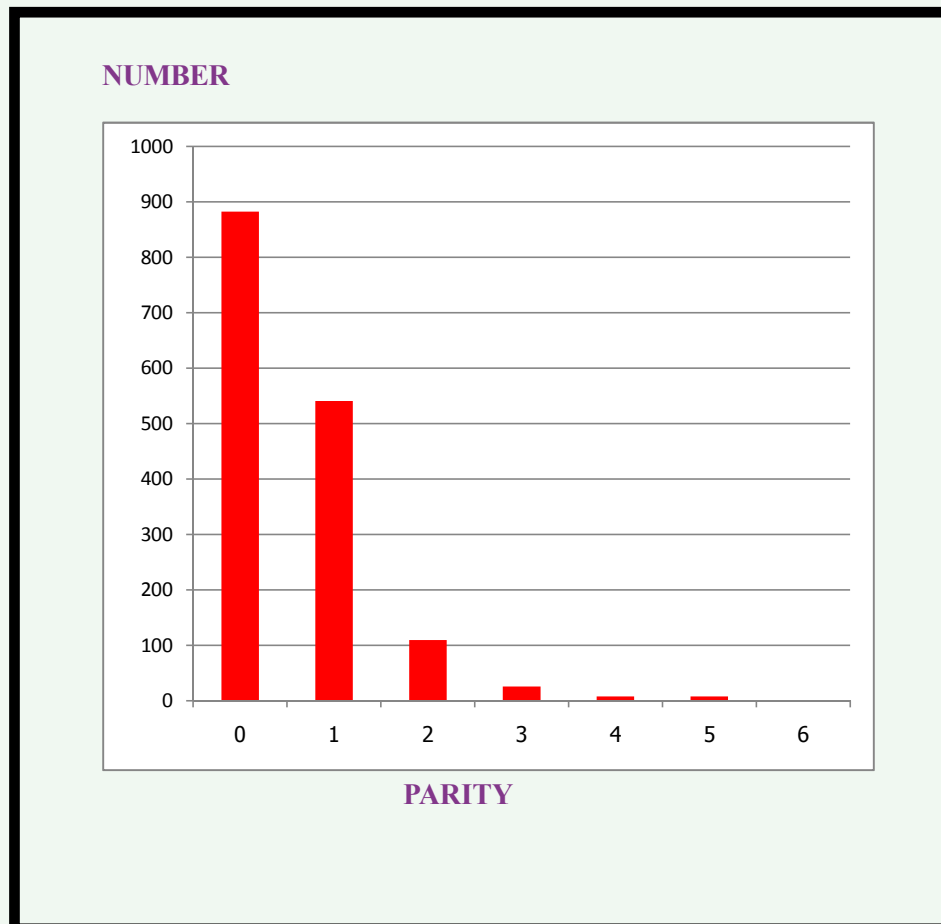
**TABLE 7** Parity of parturients

Parity	Number	Percent
0	882	56.3
1	541	34.5
2	110	7.0
3	26	1.7
4	4	.3
5	4	.3
<b>Total</b>	<b>1567</b>	<b>100.0</b>

*Parity = Number of pregnancies reaching the stage of fetal viability (more than 20 weeks) in this report*

**Nulliparous 56.3 %**

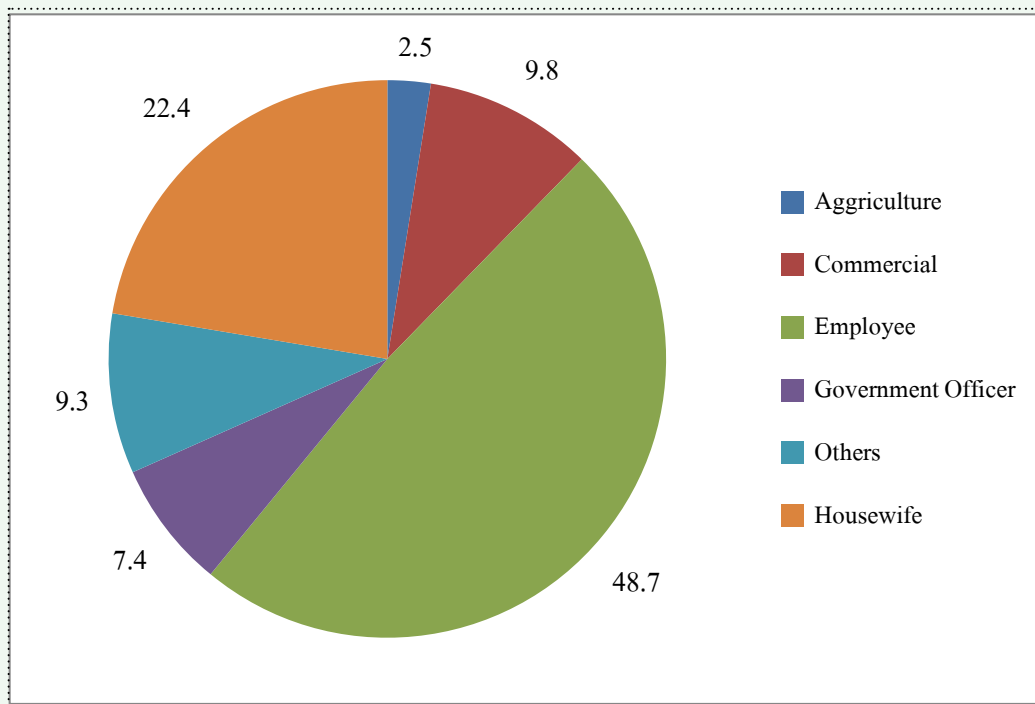
**Multiparous 43.6 %**

**FIGURE 3 Histogram : Number of parturients by parity**

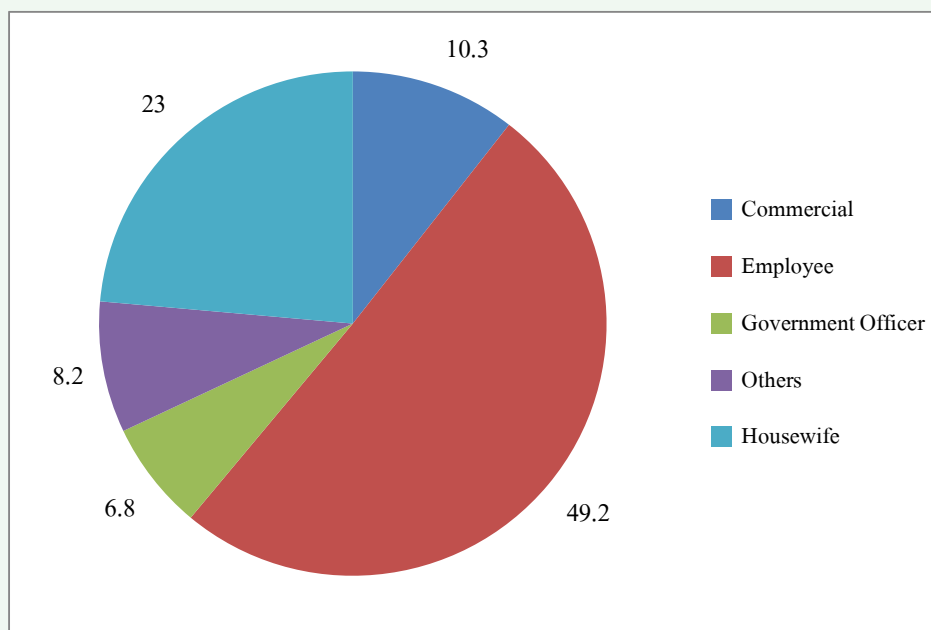
**TABLE 8** Distribution of the occupations of the parturients

Occupations	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Agriculture	39	2.5	39	2.7	-	-
Commercial	152	9.8	149	10.3	3	2.8
Employee	755	48.7	710	49.2	45	42.5
Government Officer	115	7.4	98	6.8	17	16.0
Private Business	69	4.5	59	4.1	10	9.4
Housewife	347	22.4	332	23	15	14.2
Student	45	2.9	43	3	2	1.9
State Enterprise	6	0.4	4	0.3	2	1.9
Others	22	1.5	10	0.8	12	11.4
<b>Total</b>	<b>1550</b>	<b>100</b>	<b>1444</b>	<b>100</b>	<b>106</b>	<b>100</b>

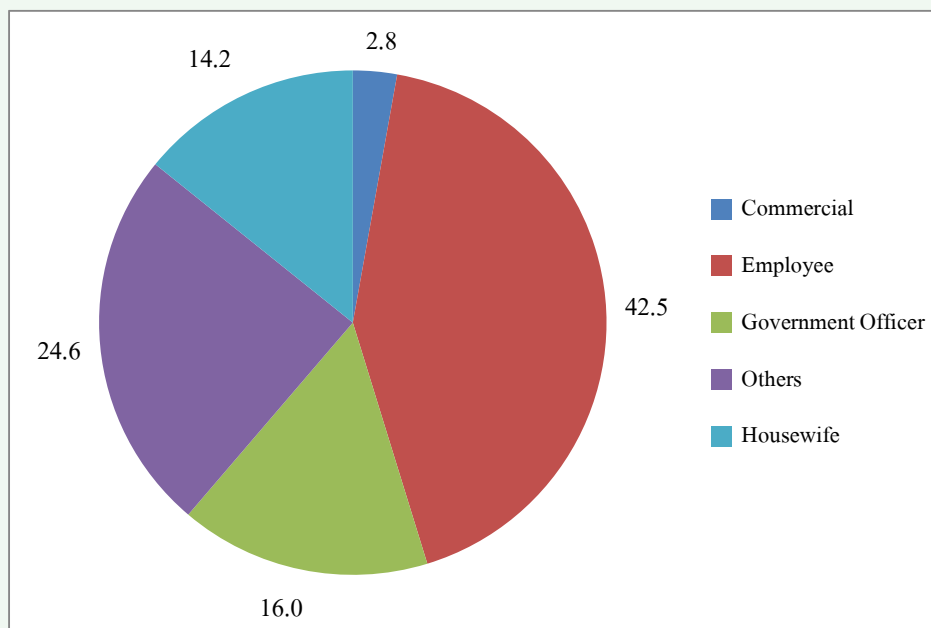


**FIGURE 4** Pie : Distribution of patient's occupations**OCCUPATIONS OF TOTAL PATIENTS**

**OCCUPATIONS OF THE GENERAL PATIENTS**



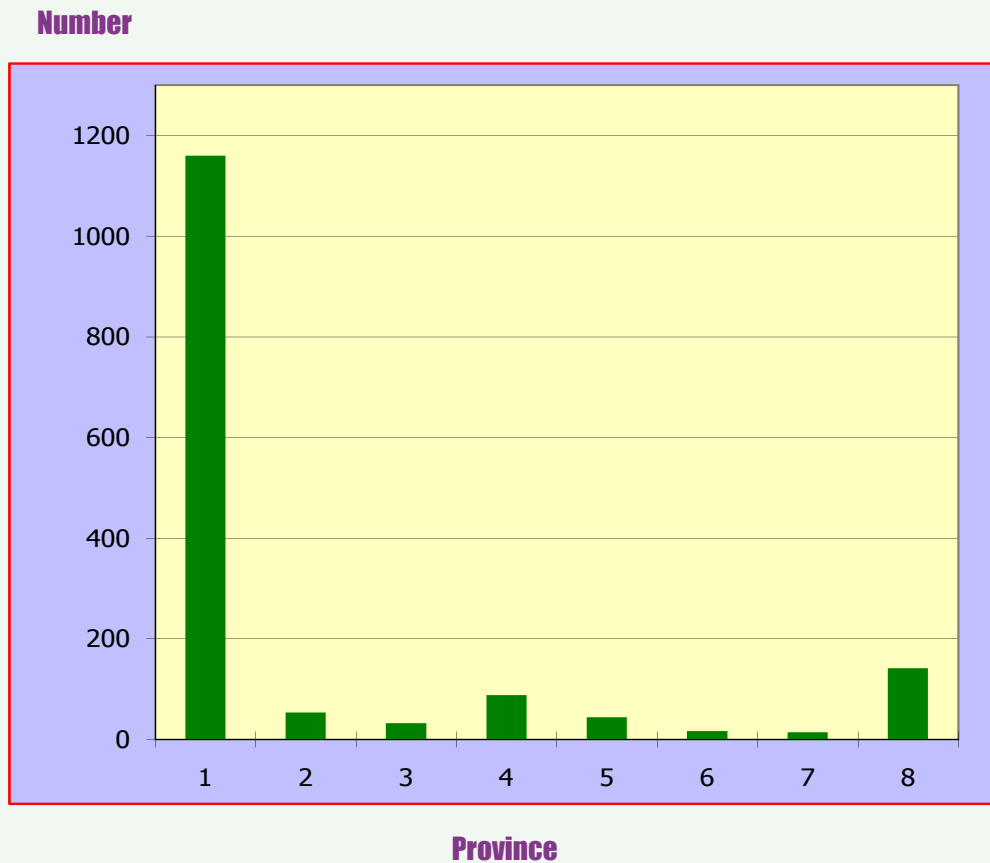
**OCCUPATIONS OF THE PRIVATE PATIENTS**



**TABLE 9** Distributions of the residence (province)  
of the parturients

Province	Number	Percent
Chiang Mai (เชียงใหม่)	1160	74.6
Chiang Rai (เชียงราย)	54	3.5
Lampang (ลำปาง)	33	2.1
Lamphun (ลำพูน)	89	5.7
Maehongson (แม่ฮ่องสอน)	45	2.9
Payao (พะเยา)	17	1.1
Phrae (แพร่)	15	1.0
Others (อื่นๆ)	142	9.1
<b>Total</b>	<b>1555</b>	<b>100.0</b>

**FIGURE 5** Histogram : Distribution of parturients by province of the parturients

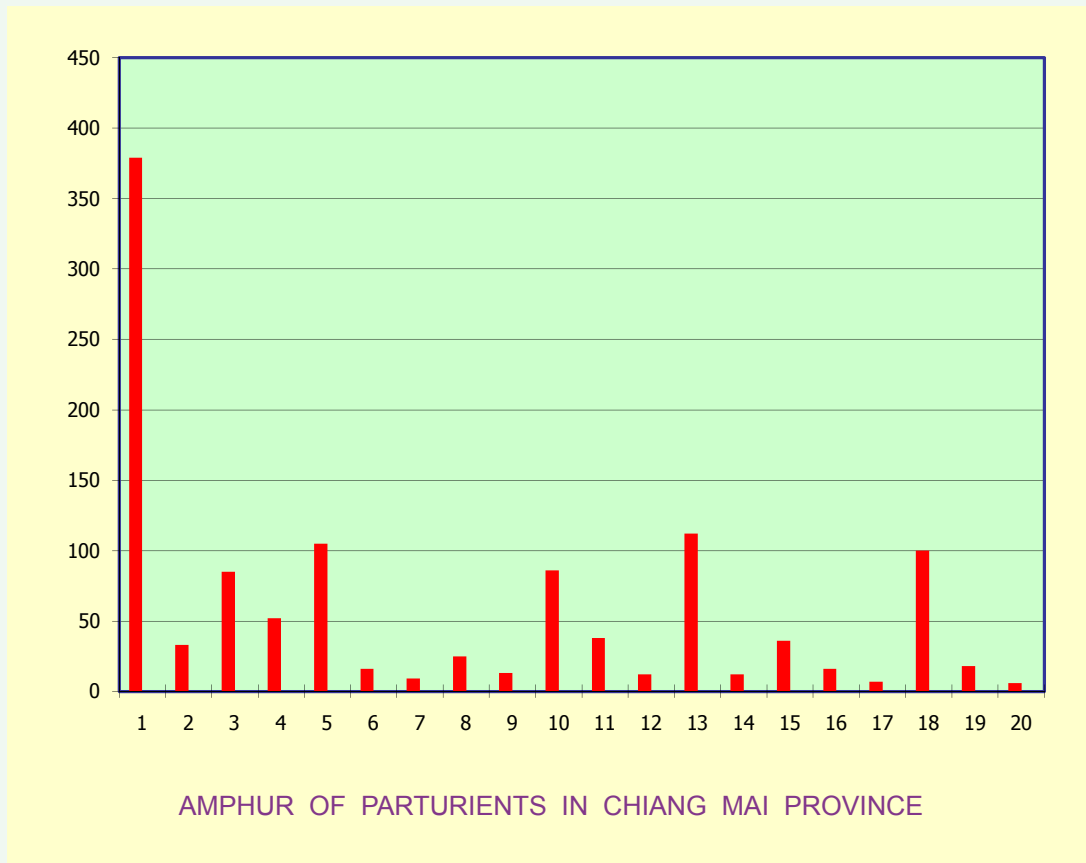


- |                             |                           |
|-----------------------------|---------------------------|
| 1. Chiang Mai (เชียงใหม่)   | 2. Chiang Rai (เชียงใหม่) |
| 3. Lampang (ลำปาง)          | 4. Lamphun (ลำพูน)        |
| 5. Maehongsorn (แม่ฮ่องสอน) | 6. Payao (พะเยา)          |
| 7. Phrae (แพร่)             | 8. Others (อื่นๆ)         |

**TABLE 10** Distributions of Amphur of the parturients in Chiang Mai province

	Amphur	Number	Percent
1.	Meung (เมือง)	379	32.7
2.	Maerim (แมริม)	33	2.8
3.	Doisaked (ดอยสะเก็ด)	85	7.3
4.	Sanpatong (สันป่าตอง)	52	4.5
5.	Hangdong (หางดง)	105	9.1
6.	Jomtong (จอมทอง)	16	1.4
7.	Mae-ai (แม่อาย)	9	0.8
8.	Prao (พร้าว)	25	2.2
9.	Hod (ฮอด)	13	1.1
10.	Sarapee (สารภี)	86	7.4
11.	Maetang (แม่แตง)	38	3.3
12.	Omkoii (อมก๋อย)	12	1.0
13.	Sankampang (สันกำแพง)	112	9.7
14.	Samoeng (สะเมิง)	12	1.0
15.	Chiangdao (เชียงดาว)	36	3.1
16.	Phang (ฝาง)	16	1.4
17.	Doitao (ดอยเต่า)	7	0.6
18.	Santrai (สันทราย)	100	8.6
19.	Maejam (แม่แจ่ม)	18	1.6
20.	Chaiprakarn (ไชยปราการ)	6	0.5
	<b>Total</b>	<b>1160</b>	<b>100.0</b>

**FIGURE 6** Histogram: Number of parturients in each Amphur of Chiang Mai



1. Meung	2. Maerim	3. Doisaked	4. Sanpatong
5. Hangdong	6. Jomtong	7. Mae-ai	8. Prao
9. Hod	10. Sarapee	11. Maetang	12. Omkoi
13. Sankampang	14. Samoeng	15. Chiangdao	16. Phang
17. Doitao	18. Santrai	19. Maejam	20. Chaiprakarn

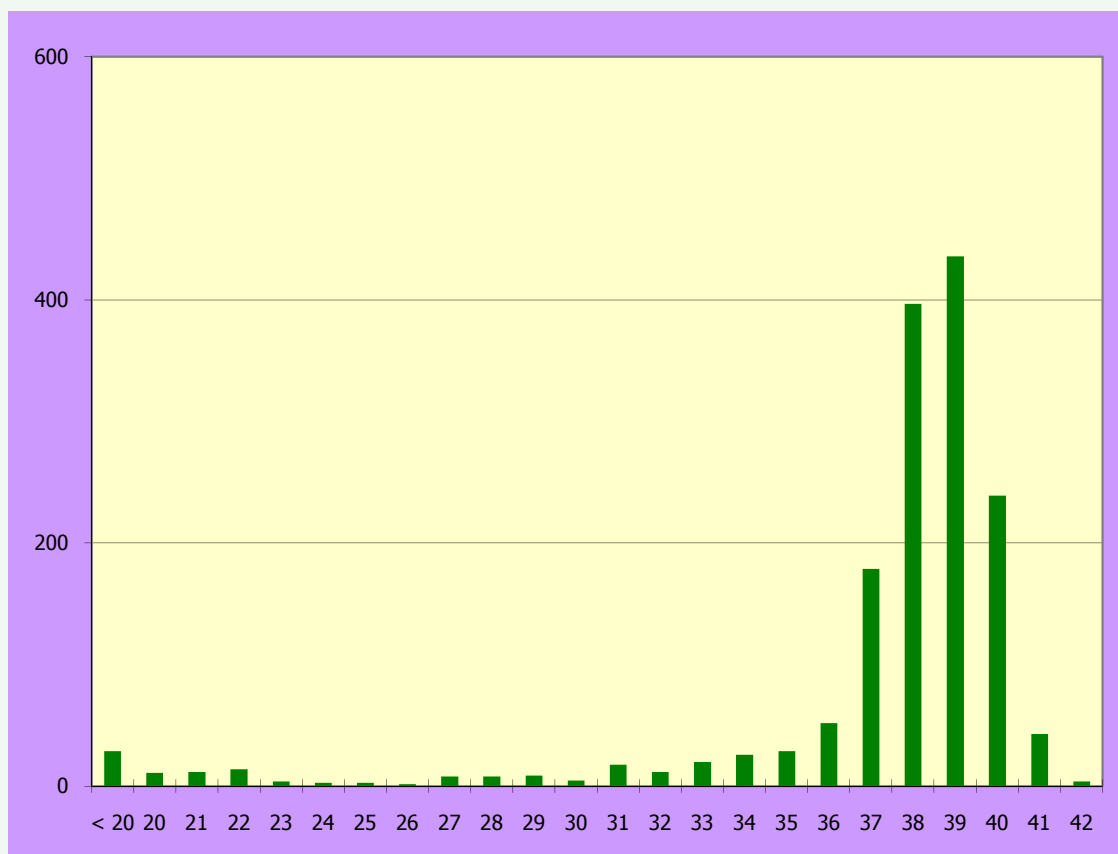
**TABLE 11** Number and percentage of parturients by gestational age in singleton pregnancies

GA (Weeks)	Number	Percent	GA (Weeks)	Number	Percent
< 20	29	1.9	31	18	1.1
20	11	0.7	32	12	.8
21	12	0.8	33	20	1.3
22	14	0.9	34	26	1.7
23	4	0.3	35	29	1.8
24	3	0.2	36	52	3.3
25	3	0.2	37	179	11.4
26	2	0.1	38	397	25.3
27	8	0.5	39	436	27.7
28	8	0.5	40	239	15.2
29	9	0.6	41	43	2.7
30	5	0.3	42	4	.3
<b>Total</b>				<b>1563</b>	<b>100.0</b>

**Average of Gestational Age 37.09+4.6 Weeks**

**FIGURE 7** Histogram : Number of parturients at various gestational age in singleton pregnancies

NUMBER



GESTATIONAL WEEKS



**TABLE 12** Number and percentage of parturients by gestational age group in singleton pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 weeks)	29	1.9
Immature (20-27 weeks)	57	3.6
Premature (28-36 weeks)	179	11.5
Term (37-41 weeks)	1294	82.8
Postterm (42 weeks or more)	4	0.3
<b>Total</b>	<b>1563</b>	<b>100.0</b>

*Premature delivery included the referred cases*

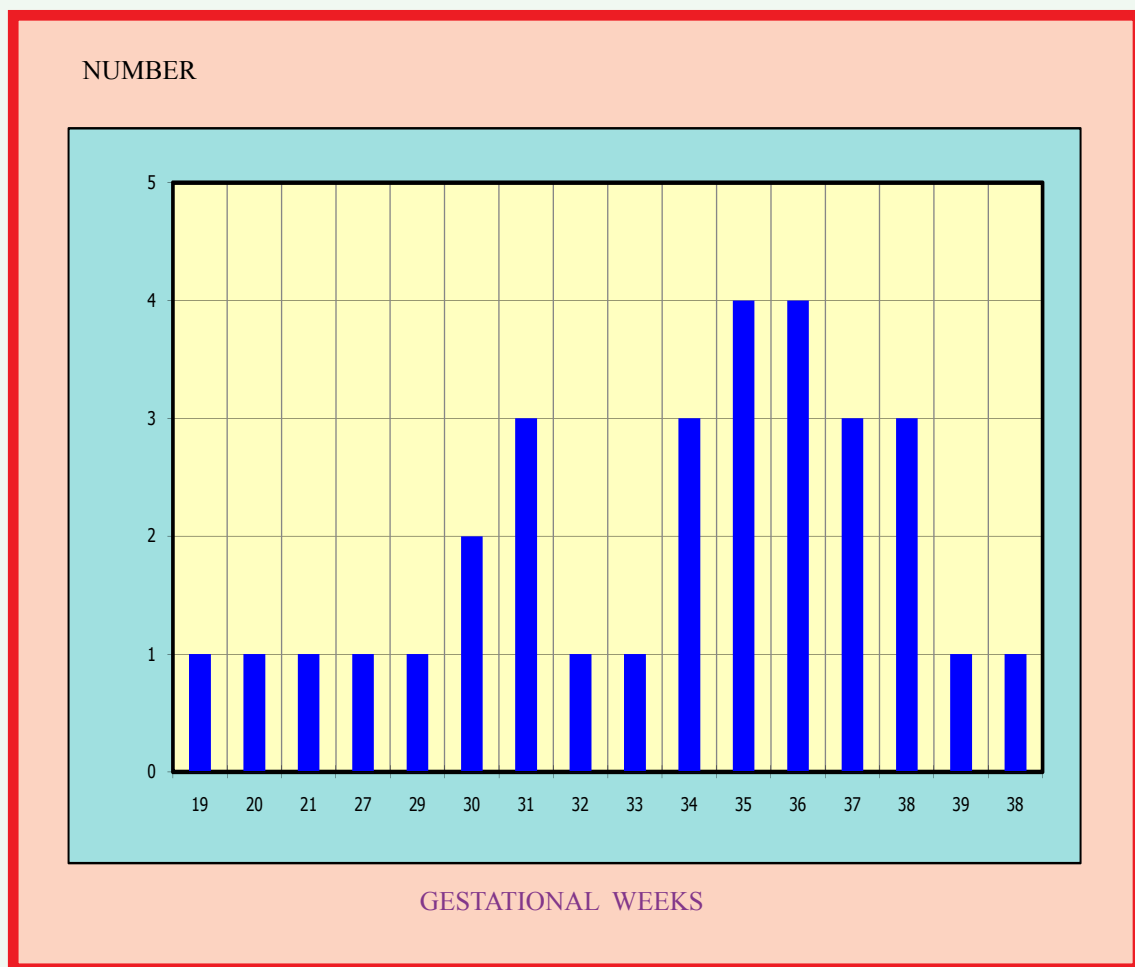
*Immature cases included termination of pregnancies due to various indications especially serious anomalies.*

**TABLE 13** Number and percentage of parturients by gestational age in twin pregnancies

GA (Week)	Number (Twin sets)	Percent
19	1	3.3
20	1	3.3
21	1	3.3
27	1	3.3
29	1	3.3
30	2	6.7
31	3	10.0
32	1	3.3
33	1	3.3
34	3	10.0
35	4	13.3
36	4	13.3
37	3	10.0
38	3	10.0
39	1	3.3
<b>Total</b>	<b>30</b>	<b>100.0</b>

**Average of Gestational Age 32.80 $\pm$ 5.3 Weeks**

**FIGURE 8** Histogram : Number of parturients at various gestational week (in twin pregnancies)



**TABLE 14** Number and percentage of parturients by gestational age group in twin pregnancies.

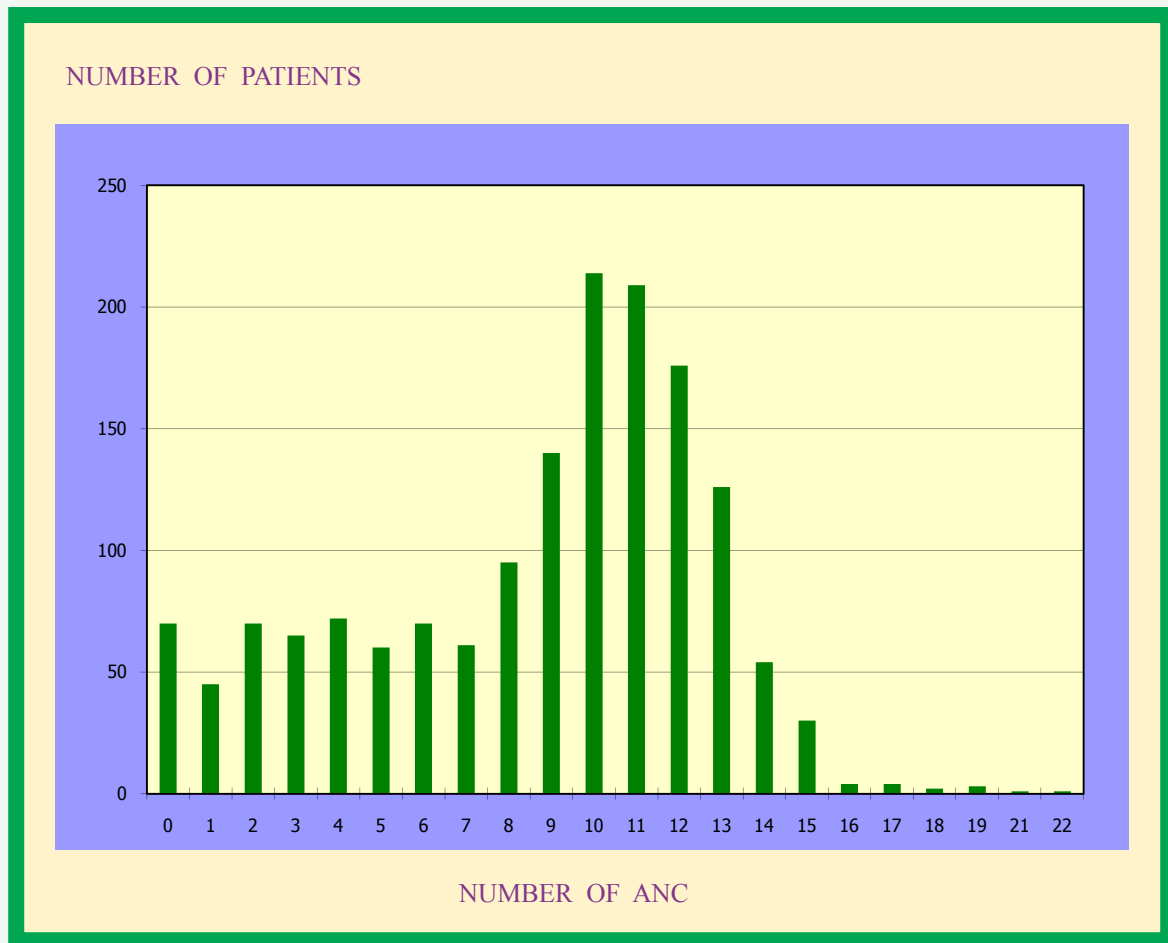
Gestational Age Group	Number	Percent
Abort	1	3.3
Immature	3	10.0
Preterm	19	63.3
Term	7	23.3
<b>Total</b>	<b>30</b>	<b>100.0</b>

**TABLE 15** Number and percentage of antenatal care attendance :  
General patients (not included the patients attending at  
other hospitals)

Number of ANC	Number of Parturients	Percent
0	70	4.5
1	45	2.9
2	70	4.5
3	65	4.1
4	72	4.6
5	60	3.8
6	70	4.5
7	61	3.9
8	95	6.0
9	140	8.9
10	214	13.6
11	209	13.3
12	176	11.2
13	126	8.0
14	54	3.4
15	30	1.9
16	4	0.3
17	4	0.3
18	2	0.1
19	3	0.2
21	1	0.1
22	1	0.1
<b>Total</b>	<b>1572</b>	<b>100.0</b>

**Attending ANC at other hospitals 23.5% of total parturients**

**FIGURE 9** Histogram : Number of ANC attendances of general patients



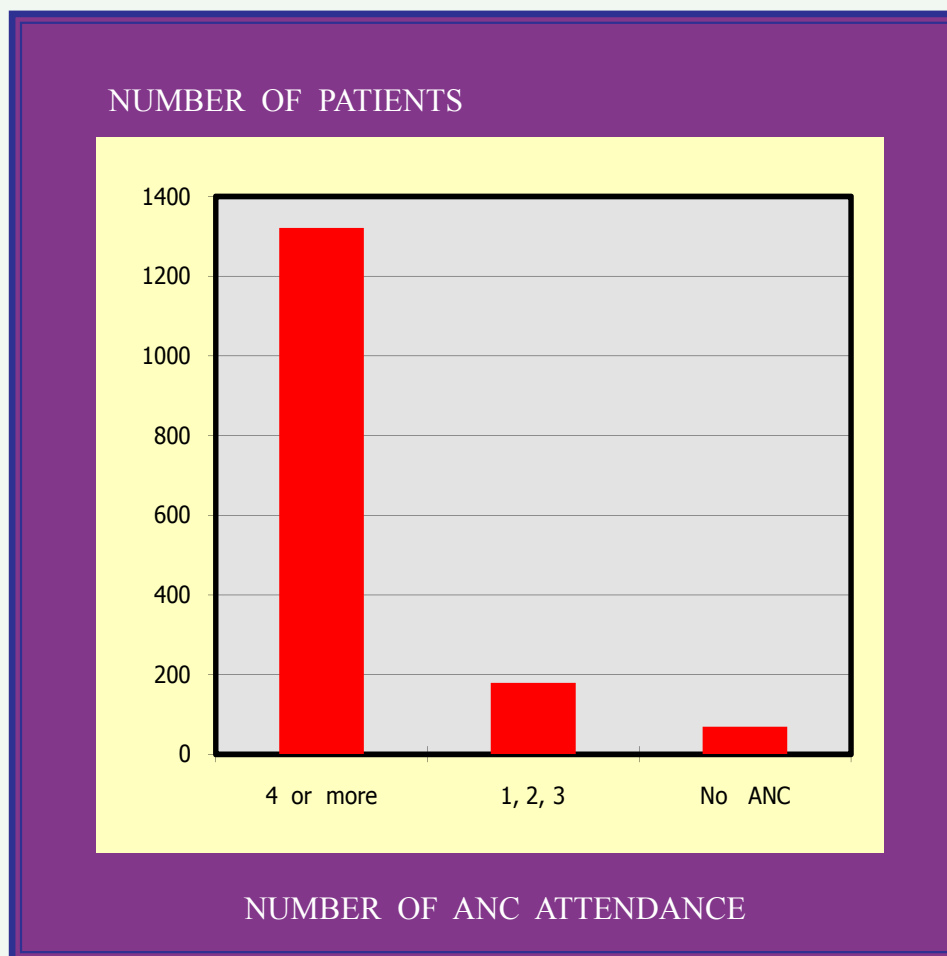
**TABLE 16** Number of antenatal care attendance : General patients  
(not include the patients attending ANC at other hospitals)

Number of ANC	Number of Parturients	Percent
4 or more	1322	84.1
1-3	180	11.5
No ANC	70	4.5
<b>Total</b>	<b>1572</b>	<b>100.0</b>

*Note ANC less than 4 is considered to be inadequate*

**Inadequate ANC 16.0%**

**FIGURE 10** Histogram : Number of ANC attendance of general patients (excluding private patients and ANC at other hospitals)

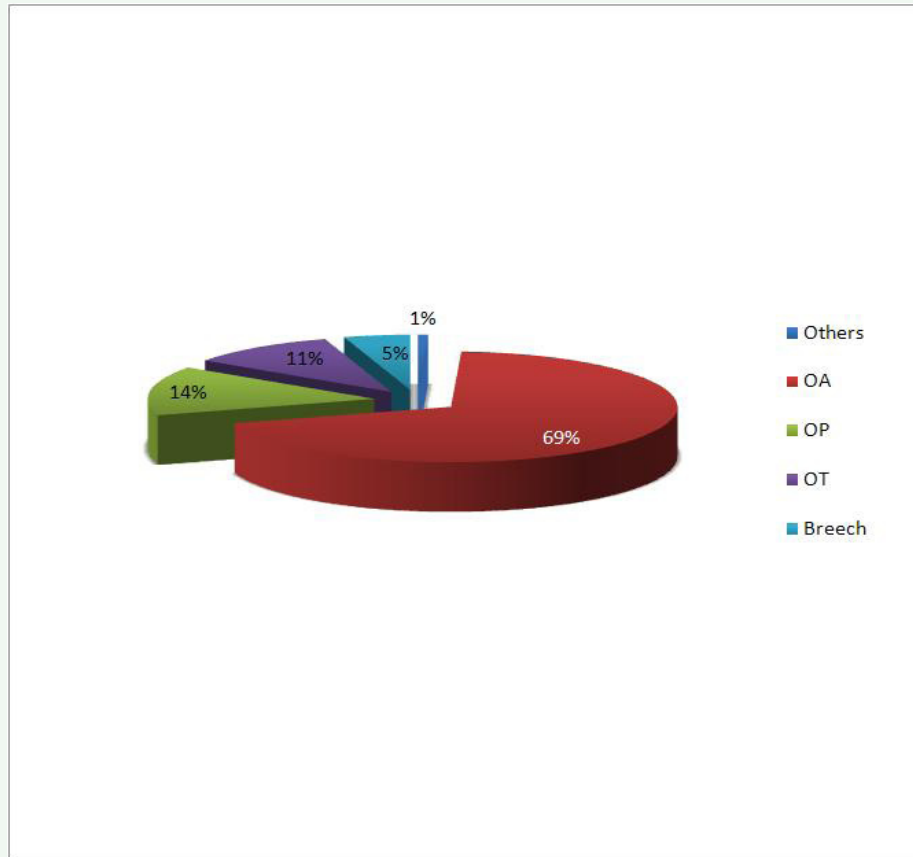




**TABLE 17** Distribution of fetal presentations in labor (Singleton)

Fetal Presentation	Percent
Vertex	94.5
Breech	4.7
Transverse lie	0.3
Face	0.2
Others	0.3

**Breech Presentation was 4.3% of Total Birth**

**FIGURE 11** Proportion of fetal presentations during labor

*OA = occiput anterior, OP = occiput posterior, OT = occiput transverse*

**TABLE 18** Mode of delivery: General and private patients**Singleton**

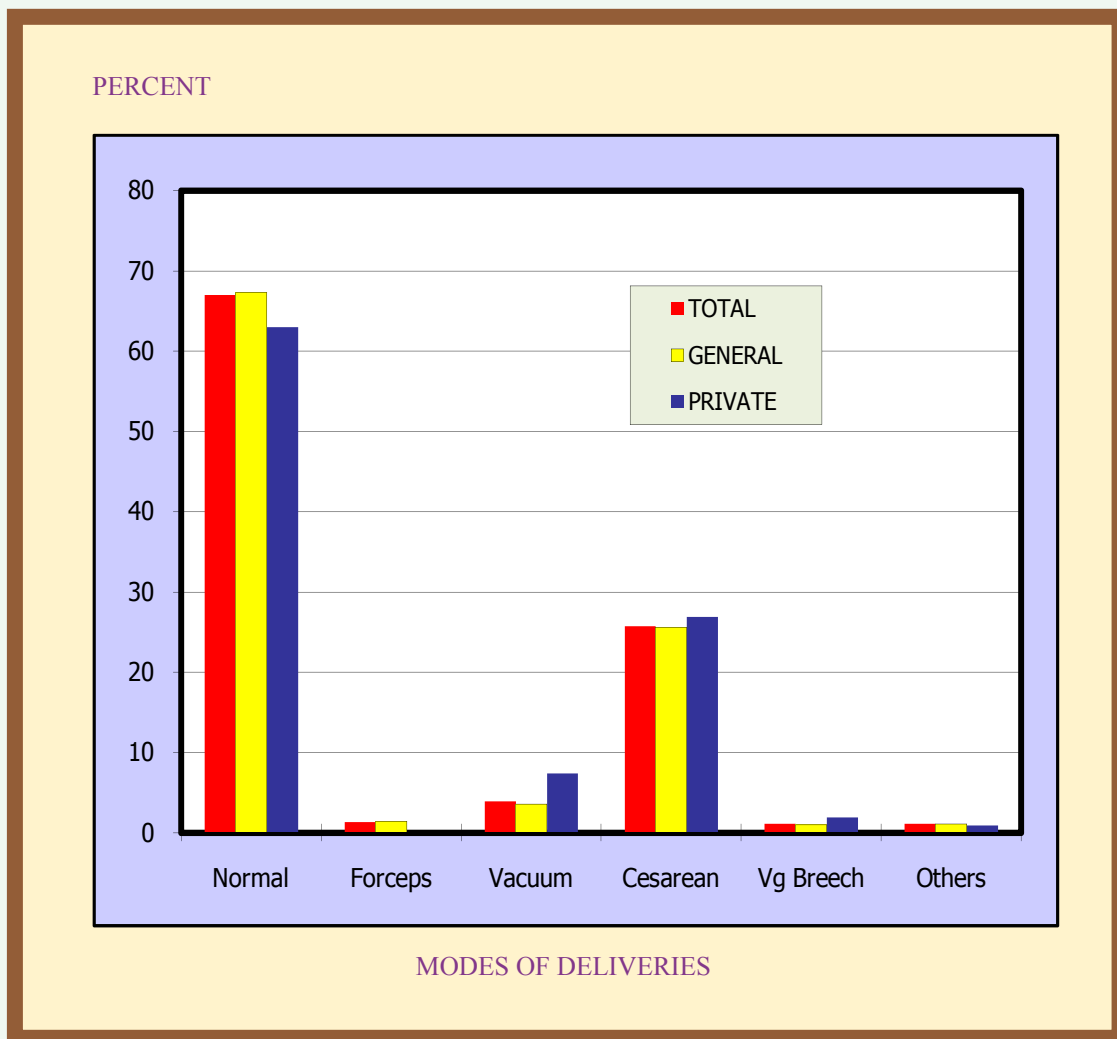
Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Normal Delivery	1053	67.0	985	67.3	68	63.0
Forceps Delivery	20	1.3	20	1.4	0	0
Vacuum Delivery	61	3.9	53	3.6	8	7.4
Cesarean Section	404	25.7	375	25.6	29	26.9
Vaginal Breech Delivery	17	1.1	15	1.0	2	1.9
Other*	17	1.1	16	1.1	1	0.9
<b>Total</b>	<b>1572</b>	<b>100.0</b>	<b>1464</b>	<b>100.0</b>	<b>108</b>	<b>100.0</b>

\* other = *conduplicato corpore, hysterotomy, internal version, caul etc.*

**Twins**

Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	17	56.7	13	52.0	4	80.0
Vaginal Delivery	13	43.3	12	48.0	1	20.0
<b>Total</b>	<b>30</b>	<b>100.0</b>	<b>25</b>	<b>100.0</b>	<b>5</b>	<b>100.0</b>

**FIGURE 12** Histogram : Distribution of modes of deliveries : general & private patients (Singleton)

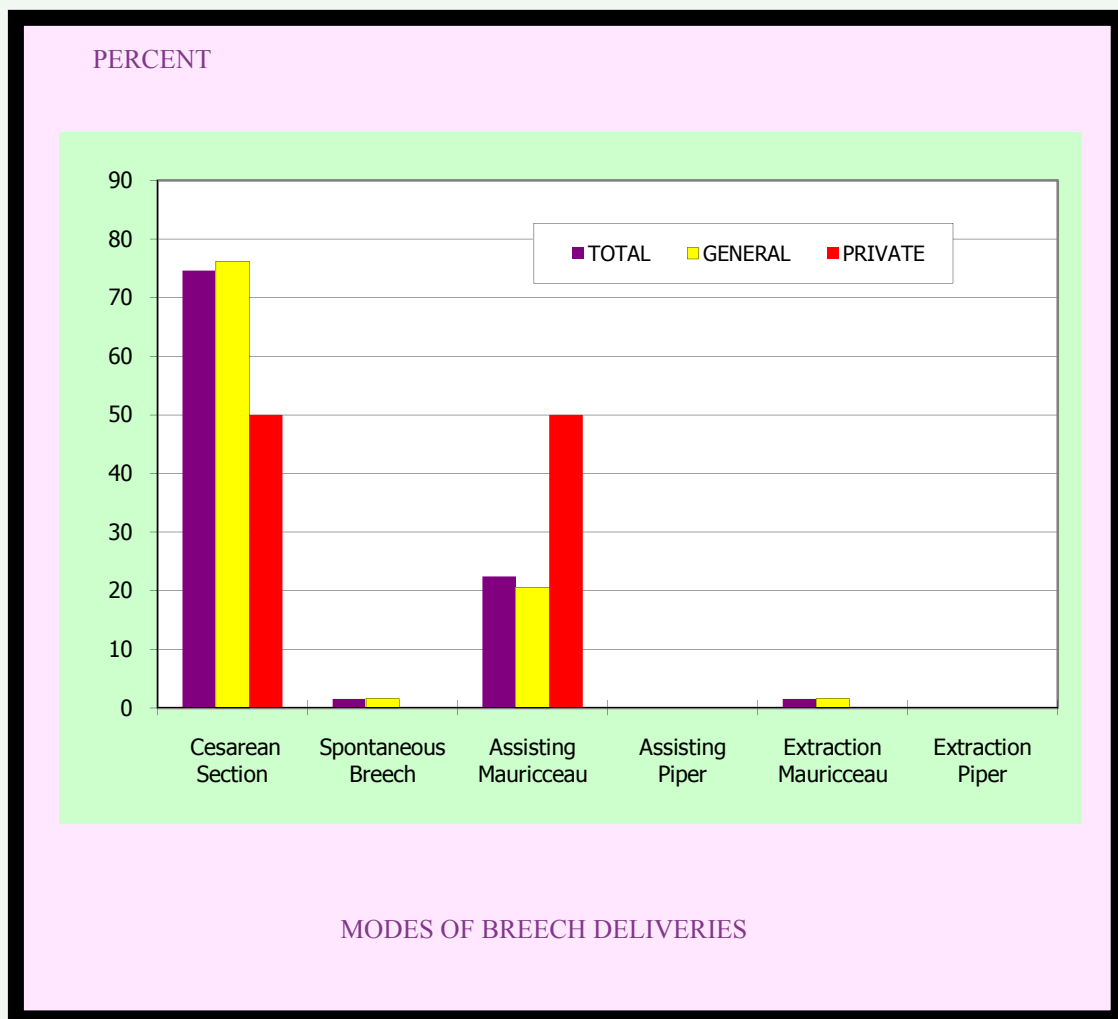


**TABLE 19** Modes of deliveries in breech presentation : general and private patients (Singleton)

Mode of Deliveries	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	50	74.6	48	76.2	2	50.0
Spontaneous Breech	1	1.5	1	1.6	-	-
Assisting Mauriceau-Smelliveit	15	22.4	13	20.6	2	50.0
Total Extraction Mauriceau-Smelliveit	1	1.5	1	1.6	-	-
<b>Total</b>	<b>67</b>	<b>100.0</b>	<b>63</b>	<b>100.0</b>	<b>4</b>	<b>100.0</b>

**Total Cesarean Section Rate in Breech presentation 76.6 %  
(General patients; 76.2%, Private patients; 50.0%)**

**FIGURE 13** Histogram : Distribution of modes of deliveries in breech presentation : general & private



**TABLE 20** Frequency of cesarean deliveries according to diagnostic indication (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
CPD	127	33.1	121	33.7	6	24.0
Previous C/S	120	31.3	112	31.2	8	32.0
Breech presentation	50	13.0	48	13.4	2	8.0
Fetal distress	47	12.2	43	12.0	4	16.0
Placenta previa	9	2.3	9	2.5	-	-
PIH	6	1.6	5	1.4	1	4.0
HIV positive	1	.3	1	.3	-	-
Malpresentation	5	1.3	5	1.4	-	-
Not recorded	19	4.9	15	4.2	4	16.0
Total	384	100.0	359	100.0	25	100.0

\* Others = Vasa previa, IVF, Active herpes genitalis, Fetal anomalies with time schedule, HELLP syndrome etc.

**TABLE 21** Indications of forceps deliveries : general & private patients (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Fetal distress	2	10.0	2	10.0	-	-
Expected prolonged second stage	5	25.0	5	25.0	-	-
Poor expulsive force & training	2	10.0	2	10.0	-	-
Maternal disease	11	55	11	55	-	-
Others (OPP, failed vacuum, etc)	-	-	-	-	-	-
<b>Total</b>	<b>20</b>	<b>100.0</b>	<b>20</b>	<b>100.0</b>	<b>-</b>	<b>-</b>

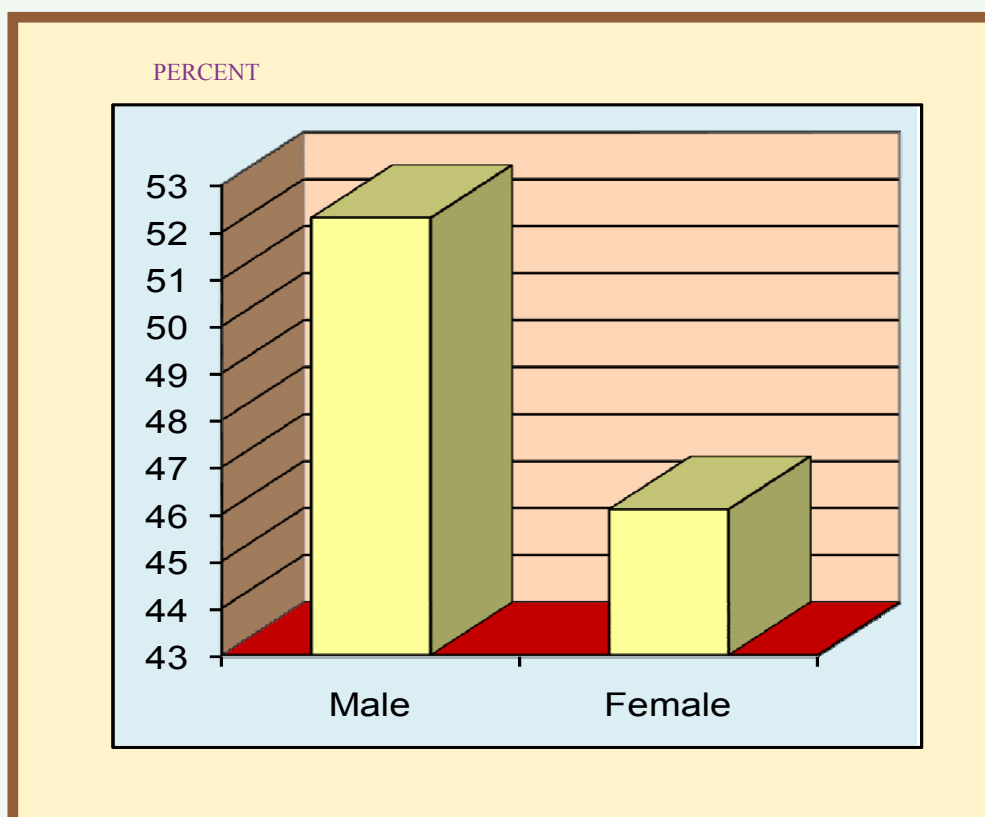


**TABLE 22** Indications of vacuum deliveries : general & private patients (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Fetal distress	6	9.8	6	11.3	-	-
Expected prolonged second stage	3	4.9	3	5.7	-	-
Poor expulsive force & training	35	57.4	28	52.8	7	87.5
Maternal disease	17	27.9	16	30.2	1	12.5
Others	-	-	-	-	-	-
<b>Total</b>	<b>61</b>	<b>100.0</b>	<b>53</b>	<b>100.0</b>	<b>8</b>	<b>100</b>

**TABLE 23** Sex of Fetuses (Including Multiple Pregnancies)

Sex	Number	Percent
Male	837	52.3
Female	738	46.1
Unspecified	26	1.6
<b>Total</b>	<b>1601</b>	<b>100.0</b>

**FIGURE 14** Histogram : Distribution of fetal sex (including twins)

**TABLE 24** Apgar score at 1 minute of total neonates

Apgar Scores	Number	Percent
0-3 (severe depression)	129	8.1
4-6 (mild depression)	96	6.0
7-10 (no depression)	1374	85.9
<b>Total</b>	<b>1599</b>	<b>100.0</b>

**TABLE 25** Apgar score at 5 minutes of total neonates

Apgar Score	Number	Percent
0-3 (severe depression)	100	6.3
4-6 (mild depression)	25	1.6
7-10 (no depression)	1474	92.2
<b>Total</b>	<b>1599</b>	<b>100.0</b>

**TABLE 26** Apgar score at 1 and 5 minutes of total neonates

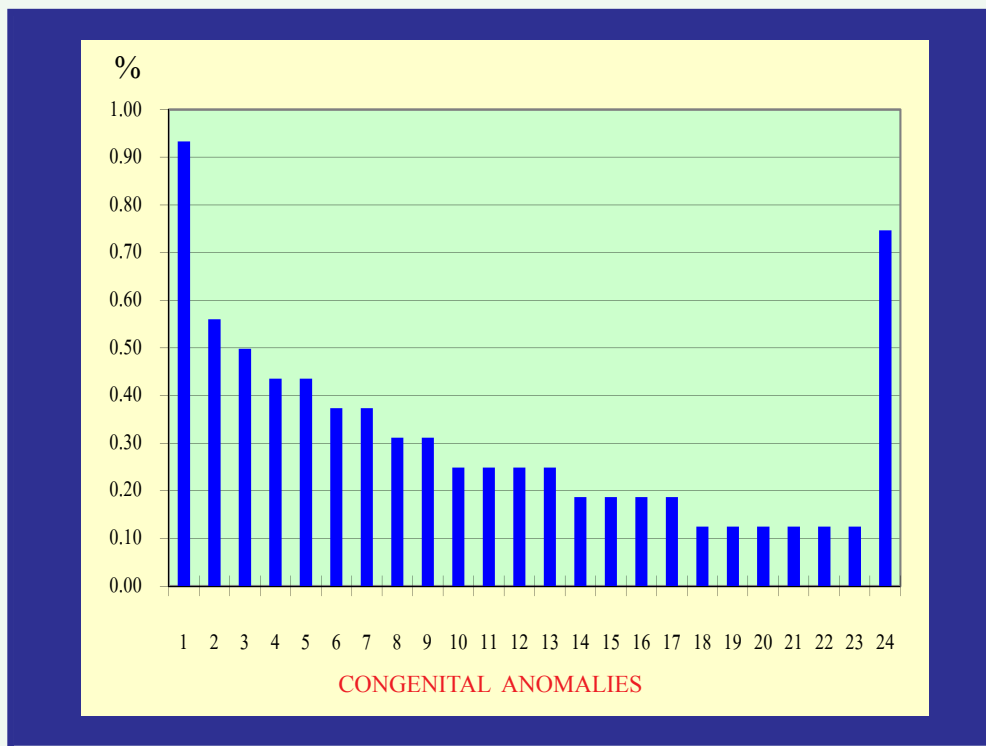
Apgar Score	1-Minute		5-Minute	
	Number	Percent	Number	Percent
0	88	5.5	88	5.5
1	12	0.8	3	0.2
2	11	0.7	3	0.2
3	18	1.1	6	0.4
4	8	0.5	2	0.1
5	37	2.3	13	0.8
6	51	3.2	10	0.6
7	95	5.9	22	1.4
8	303	18.9	105	6.6
9	898	56.2	599	37.5
10	78	4.9	748	46.8
<b>Total</b>	<b>1599</b>	<b>100.0</b>	<b>1599</b>	<b>100.0</b>

**TABLE 27** Prenatal sonographic diagnosis of structural anomalies\*

	Congenital Anomalies	Number	Percent
1	Cardiac anomaly	15	0.93
2	Cystic hygroma	9	0.56
3	Hb Bart's hydrops	8	0.50
4	Trisomy 18	7	0.44
5	Trisomy 21	7	0.44
6	Multiple anomalies	6	0.37
7	Hydronephrosis	6	0.37
8	Gastroschisis	5	0.31
9	Hydrops fetalis (other causes)	5	0.31
10	Cleft lip / palate	4	0.25
11	Hydrocephalus	4	0.25
12	Limb abnormalities	4	0.25
13	Destructive brain lesion	4	0.25
14	Omphalocele	3	0.19
15	Bowel obstruction	3	0.19
16	Ear abnormalities	3	0.19
17	Neural tube defect	3	0.19
18	Diaphragmatic hernia	2	0.12
19	Renal agenesis	2	0.12
20	Trisomy 13	2	0.12
21	Skeleton dysplasia	2	0.12
22	Imperforate anus	2	0.12
23	Holoprosencephaly	2	0.12
24	Others	12	0.75
		<b>120</b>	<b>7.47</b>

\* Only diagnosed after 20 weeks and terminated at Maharaj Nakorn Chiang Mai, Most were referred cases

**FIGURE 15 Histogram : Number of congenital anomalies (including chromosomal abnormalities with structural defects)**



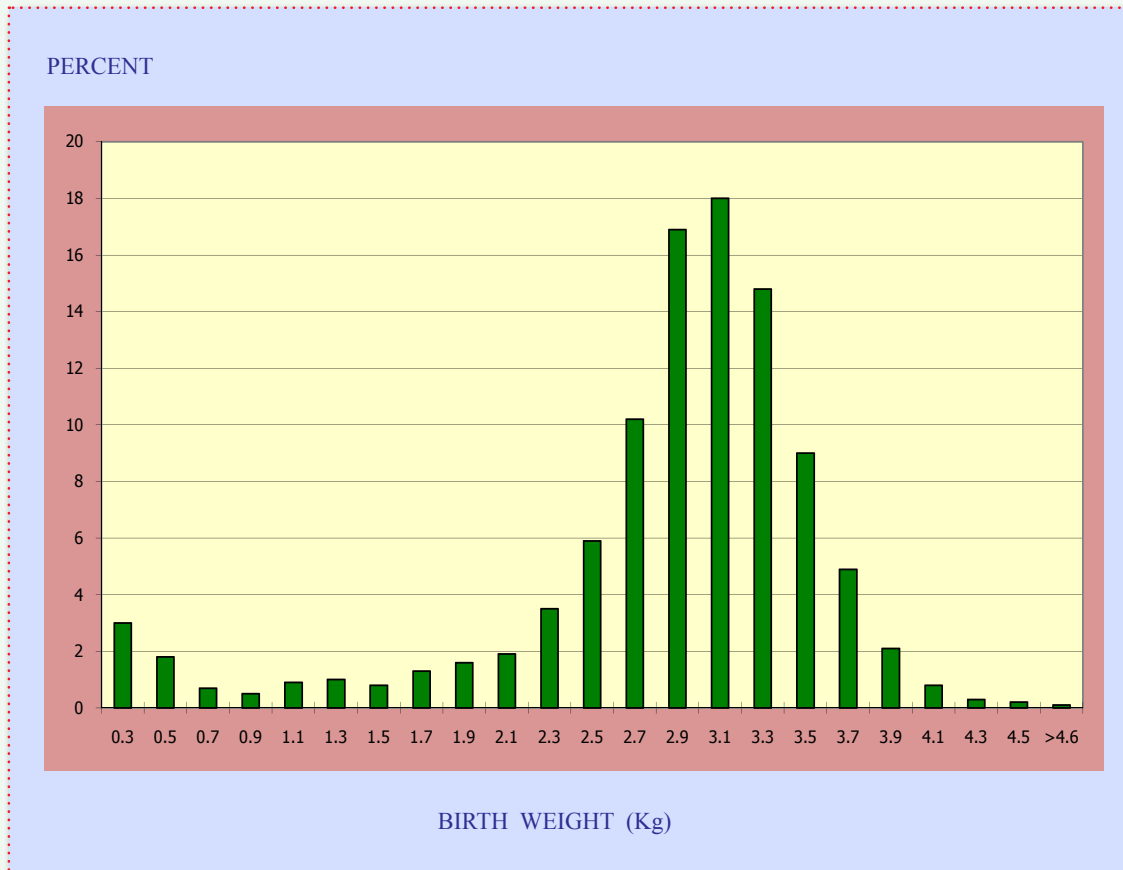
- |                                  |                             |
|----------------------------------|-----------------------------|
| 1 Cardiac anomaly                | 13 Destructive brain lesion |
| 2 Cystic hygroma                 | 14 Omphalocele              |
| 3 Hb Bart's hydrops              | 15 Bowel obstruction        |
| 4 Trisomy 18                     | 16 Ear abnormalities        |
| 5 Trisomy 21                     | 17 Neural tube defect       |
| 6 Multiple anomalies             | 18 Diaphragmatic hernia     |
| 7 Hydronephrosis                 | 19 Renal agenesis           |
| 8 Gastroschisis                  | 20 Trisomy 13               |
| 9 Hydrops fetalis (other causes) | 21 Skeleton dysplasia       |
| 10 Cleft lip / palate            | 22 Imperforate anus         |
| 11 Hydrocephalus                 | 23 Holoprosencephaly        |
| 12 Limb abnormalities            | 24 Others                   |

**TABLE 28** Number and percentage of neonates by birth weight\*

Birth Weight (grams)	Number	Percent
≤ 400	48	3.0
401-600	28	1.8
601-800	11	.7
801-1000	8	.5
1001-1200	14	.9
1201-1400	16	1.0
1401-1600	12	.8
1601-1800	21	1.3
1801-2000	25	1.6
2001-2200	31	1.9
2201-2400	56	3.5
2401-2600	95	5.9
2601-2800	163	10.2
2801-3000	270	16.9
3001-3200	287	18.0
3201-3400	236	14.8
3401-3600	144	9.0
3601-3800	78	4.9
3801-4000	34	2.1
4001-4200	12	0.8
4201-4400	4	0.3
4401-4600	3	0.2
> 4600	2	0.1
<b>Total</b>	<b>1598</b>	<b>100.0</b>

\* Including therapeutic termination of pregnancy

**FIGURE 16** Histogram : Percentage of neonates at various points of birth weight



*\* Including therapeutic termination of pregnancy*



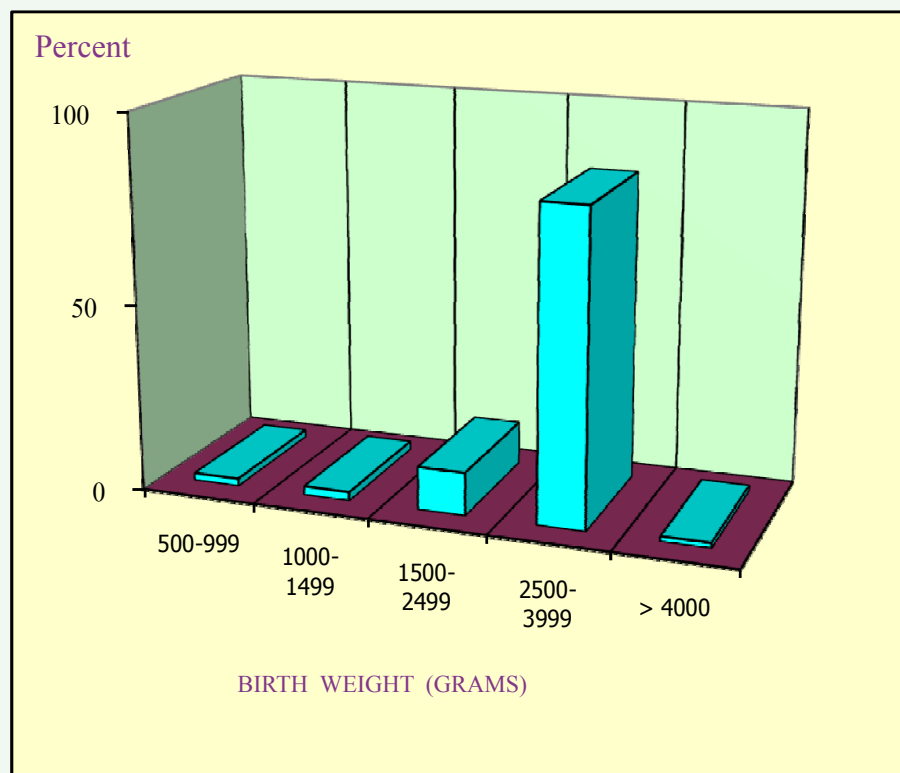
**TABLE 29** Number and percentage of neonates by birth weight group (total)

Birth Weight (grams)	Number	Percent
Extremely low birth weight (500-999)	31	2.0
Very low birth weight (1000-1499)	36	2.3
Low birth weight (1500-2499)	177	11.5
Average birth weight (2500-3999)	1270	82.7
Macrosomia (> 4000)	21	1.4
<b>Total</b>	<b>1535</b>	<b>100.0</b>

*\* Including therapeutic termination of pregnancy*

**Average Birth Weight of Total Infants  $2826 \pm 806$  grams  
range 50-5405 grams**

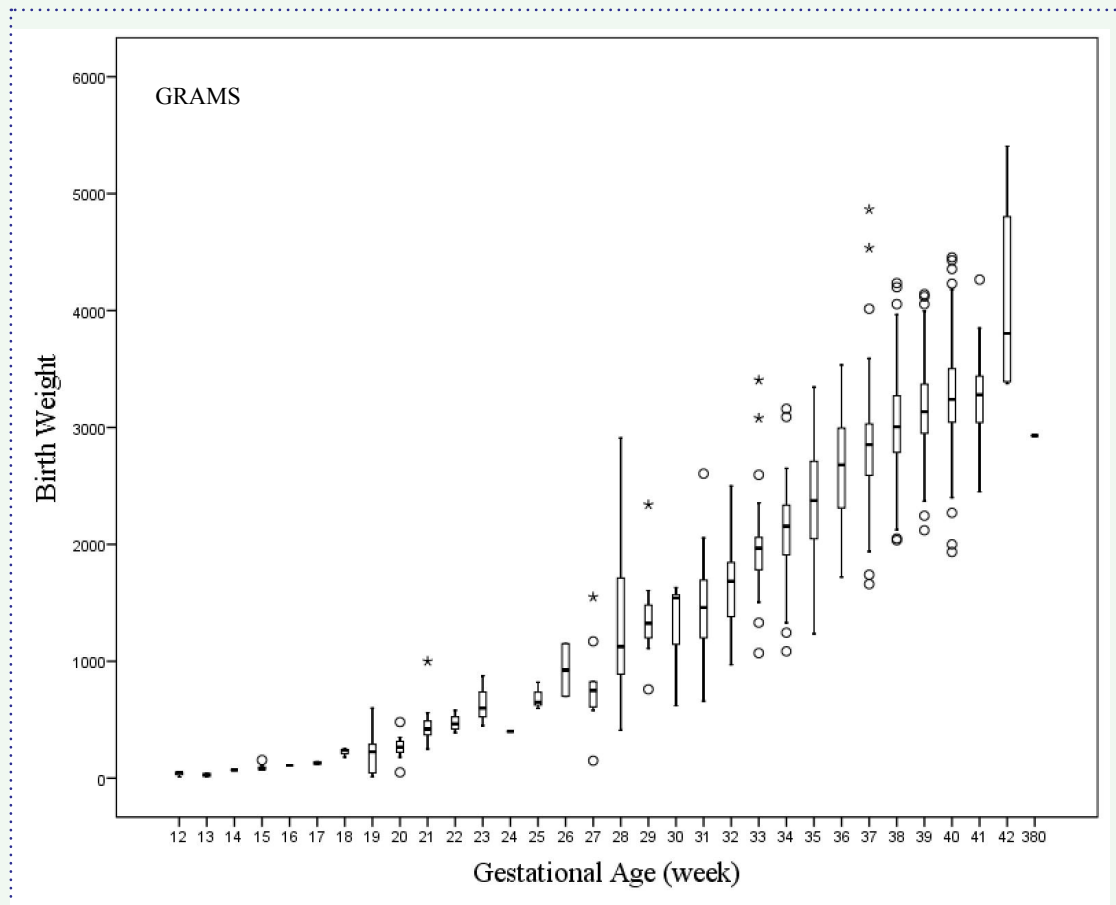
**FIGURE 17** Histogram : Percentage of neonates among various birth weight groups



**TABLE 30** Fetal weight (grams): the 10th, 50th, 90th percentile at various gestational age (singleton)

Gestational Age ( weeks)	Weight (grams) 10th Percentile	Weight (grams) 50th Percentile	Weight (grams) 90th Percentile
20	89	265	441
21	278	420	824
22	395	465	565
23	450	600	-
24	460	640	920
25	600	650	-
26	700	925	-
27	150	750	-
28	410	1125	-
29	795	1325	2266
30	620	1540	-
31	760	1460	1996
32	1026	1685	2290
33	1348	1968	3032
34	1330	2155	2650
35	1803	2375	2884
36	2085	2680	3302
37	2322	2853	3342
38	2590	3005	3530
39	2739	3135	3630
40	2795	3240	3760
41	2752	3280	3662
42	3375	3805	-

**FIGURE 18** Graph : The 10th, 50th, 90th percentiles of fetal weight at various gestational age



**TABLE 31** Means and standard deviation of birth weight  
at various gestational age (singleton)

Gestational Age (weeks)	Number of Neonates	Means (grams)	Standard Deviation
20	12	267.9	104.1
21	13	461.9	181.5
22	14	471.1	62.4
23	4	631.3	177.2
24	2	400.0	0.0
25	3	690.0	115.3
26	2	925.0	318.2
27	9	781.7	394.1
28	8	1346.9	794.0
29	10	1381.4	405.9
30	7	1316.4	382.2
31	21	1444.3	451.2
32	16	1648.4	428.1
33	20	2017.8	535.4
34	29	2114.0	496.5
35	35	2367.6	435.9
36	56	2660.0	444.5
37	182	2841.7	425.6
38	400	3031.4	366.0
39	437	3165.9	342.0
40	239	3265.4	392.9
41	43	3262.4	365.8
42	4	4097.5	951.3
<b>Total</b>	<b>1633</b>	<b>2826.8</b>	<b>806.2</b>

**TABLE 32** Means and standard deviation of birth weight  
at various gestational age (twins)

Gestational Age (weeks)	Number of Twin Sets	Means (grams)	Standard Deviation
19	2	45.0	0.0
20	2	480.0	0.0
21	2	420.0	0.0
27	2	1170.0	0.0
29	2	1200.0	0.0
30	4	1562.5	26.0
31	6	1615.0	120.1
32	2	1670.0	0.0
33	2	1925.0	0.0
34	6	1616.7	417.3
35	8	2231.3	139.5
36	8	2232.5	93.2
37	6	2223.3	496.6
38	6	2423.3	144.9
39	2	2730.0	0.0
<b>Total</b>	<b>60</b>	<b>1808.5</b>	<b>667.2</b>

**TABLE 33** Comparison of birth weight (singleton & twins)

Type	Means Birth Weight	Standard Deviation	Range
Singleton	2871.7	779	60-5405
Twins	1808.5	667	45-2770

**TABLE 34** Comparison of gestational age (singleton & twins)

Type	Means Gestational Age	Standard Deviation	Range
Singleton	37.18	4.5	12-42
Twins	32.80	5.2	19-39

**TABLE 35** Early postpartum hemorrhage

Cause	Number	Percent
Uterine Atony	22	1.40
Lacerations	6	0.38
Retained Pieces of Placenta	4	0.25
Placenta Adherens	5	0.32
Uterine infection	4	0.25
<b>Total</b>	<b>41</b>	<b>2.61</b>





## Section III

# HIGH RISK PREGNANCIES

**TABLE 36** Major complications during pregnancy

Complications	Numbers	Prevalence (%)
Previous cesarean section	144	9.16
Diabetes mellitus	117	7.44
Intrauterine growth restriction	96	6.11
HBsAg positive	85	5.41
Pregnancy-induced hypertension	72	4.58
Breech presentation	70	4.45
Prolonged PROM (> 18 hours)	49	3.12
Chronic hypertension	36	2.29
HIV positive	32	2.04
Iron deficiency anemia	29	1.84
Marked obesity	28	1.78
Asthma	17	1.08
Myoma uteri	14	0.89
Placenta previa	12	0.76
Systemic lupus erythematosus	12	0.76
Urinary tract infection	12	0.76
Thalassemia	11	0.70
Heart disease	9	0.57
Polyhydramnios	8	0.51
Thyrotoxicosis	7	0.45
Chorioamnionitis	6	0.38
Severe oligohydramnios	6	0.38
Epilepsy	5	0.32
Condyloma accuminata	5	0.32
Transverse lie	4	0.25

## Pregnancy with Heart Disease

**Total** 9 cases (0.57 percent of total parturients)  
 singleton :9, twins : 0  
 (not included 2 cases of therapeutic abortion)

**Age** range 15-37 years  
 average  $25.9 \pm 7.0$  years  
 age of 35 years or more 1 cases (11.1 %)

**Functional Class (At delivery 18 cases)**

Class I	6	cases
Class II	2	cases
Class III	1	cases
Class IV	-	case

**Gestational Age at Birth**

range 34-41 weeks (not included therapeutic abortion)  
 average  $37.7 \pm 2.0$  weeks  
 premature delivery (before completed 37 weeks)  
 1 cases (11.1 %)

**Birth Weight**

range 1740-4010 grams  
 average  $2720 \pm 712$  grams  
 number of low birth weight fetus (less than 2,500 grams)  
 4 cases (44.4 %)

**Apgar Scores at 1 minute (less than 7)** 2 cases (22.2%)

**Apgar Scores at 5 minutes (less than 7)** 1 cases (11.1 %)

**Small-for-gestational-age (less than 10th percentile)** 2 cases (22.2 %)

**Perinatal death** 0 (0.0%)

**Congenital Anomalies** -

**Other complications (No maternal death)**

<i>Chronic HT</i>	<i>1 case</i>
<i>Diabetes mellitus</i>	<i>1 case</i>
<i>HBsAg positive</i>	<i>1 case</i>
<i>Prolonged PROM</i>	<i>1 case</i>
<i>Teenage preg</i>	<i>1 case</i>

## Pregnancy with Diabetes Mellitus

**Total** 117 cases (7.44 percent of total parturients)

(Singleton : 114, Twins : 3)

*Note : Glucose challenge test was used as a screening test only in women at risk for diabetes melitus and age > 25 yr.*

**Age** range 19-45 years

average  $32.5 \pm 5.7$  years

age of 35 years or more 43 cases (36.8%)

**Gestational Age at Birth**

range 19-41 weeks

average  $37.2 \pm 3.1$  weeks

premature delivery (before completed 37 weeks)

24 cases (20.5%)

**Birth Weight**

range 120-4535 grams

average  $2930 \pm 726$  grams

number of low birth weight fetus (less than 2,500 grams)

23 cases (19.7 %)

<b>Apgar Scores at 1 minute (less than 7)</b>	11 cases (9.4 %)
<b>Apgar Scores at 5 minutes (less than 7)</b>	5 cases (4.3 %)
<b>Small-for-gestational-age (less than 10th percentile)</b>	9 cases (7.7 %)
<b>Perinatal Death</b>	2 cases (1.7%) (Diaphragmatic hernia, Hydrops fetalis)
<b>Congenital Anomalies</b>	2 cases (1.7 %) (cleft lip, trisomy 13)

#### **Other complications**

<i>Previous cesarean section</i>	16 cases
<i>Pregnancy-induced hypertension</i>	14 cases
<i>Chronic HT</i>	11 cases
<i>HBsAg positive</i>	5 cases
<i>Marked Obesity</i>	3 cases
<i>Prolonged PROM</i>	2 cases
<i>Systemic lupus erythomatosus</i>	2 cases
<i>Thyrotoxicosis</i>	2 cases
<i>Polyhydramnios</i>	2 cases
<i>Myoma uteri</i>	2 cases
<i>Iron deficiency</i>	1 case
<i>Oligohydramnios</i>	1 case
<i>Abruptio placentae</i>	1 case
<i>Thalassemia</i>	1 case
<i>Ovarian tumor</i>	1 case
<i>Prolonged PROM</i>	1 case
<i>Asthma</i>	1 case
<i>HIV positive</i>	1 case
<i>Heart disease</i>	1 case

#### **Classifications**

Pregestational DM (diagnosed before pregnancy)	19 cases (16.7 %)
<i>Chemical DM (Class A)</i>	1 cases
<i>Overt DM (Class B-T)</i>	18 cases
<i>Class B</i>	15 cases
<i>Class D, F, R</i>	3 cases

Gestational DM (diagnosed during pregnancy)	98 cases (86.0 %)
<i>Chemical DM (Class A1)</i>	75 cases
<i>Overt DM (Class A2)</i>	23 cases

#### Method of Glucose Control

Insulin	25 cases
Oral hypoglycemic drugs	3 cases
Oral hypoglycemic drugs & Insulin	10 cases
Diet Control only	79 cases

## Pregnancy with Systemic Lupus Erythomatosus

**Total** 12 cases (0.76 percent of total parturients)  
(All were singleton)

#### Activity of the disease

Remission before pregnancies	9 cases
Active disease during pregnancies	3 cases
Hypertension	3 cases
Lupus nephritis	4 cases

**Age** range 21-36 years

average  $27.3 \pm 4.9$  years

age of 35 years or more 2 cases (16.7 %)

#### Gestational Age at Birth

range 31-39 weeks

average  $37.0 \pm 2.4$  weeks

premature delivery (before completed 37 weeks)

3 cases (25.0 %)

**Birth Weight**

range 940-3230 grams

average 2432±603 grams

number of low birth weight fetus (less than 2,500 grams)

7 cases (58.3 %)

**Apgar Scores at 1 minute (less than 7)** 1 case (8.3%)**Apgar Scores at 5 minutes (less than 7)** - case (0.0 %)**Small-for-gestational-age (less than 10th percentile)** 3 cases (25.3 %)**Perinatal death** 0 case (0.0 %)**Congenital Anomalies** -**Other complications***Pregnancy-induced hypertension* 2 cases*Diabetes mellitus* 2 cases*Thalassemia* 1 case*Polyhydramnios* 1 case*Oligohydramnios* 1 case**Pregnancy with Thyrotoxicosis****Total** 7 cases (0.45 percent of total parturients)

All were singleton

*Diagnosed before pregnancy* 5 cases*Diagnosed during pregnancy* 2 cases

**Age** range 20-44 years  
 average 29.4±9.2 years  
 age of 35 years or more 2 cases (28.6 %)

**Gestational Age at Birth**

range 31-40 weeks  
 average 36.9±3.4 weeks  
 premature delivery (before completed 37 weeks)  
 2 cases (28.6 %)

**Birth Weight**

range 1930-3865 grams  
 average 2749±686 grams  
 number of low birth weight fetus (less than 2,500 grams)  
 2 cases (28.6 %)

**Apgar Scores at 1 minute (less than 7)** 0 cases (0.0 %)

**Apgar Scores at 5 minutes (less than 7)** 1 case (14.3 %)

**Small-for-gestational-age (less than 10th percentile)** 2 cases (28.6 %)

**Perinatal death** 0 cases (0.0%)

**Congenital Anomalies** -

**Other complications**

<i>Previous cesarean section</i>	2 case
<i>Diabetes mellitus</i>	2 cases
<i>HBsAg positive</i>	1 case
<i>Myoma uteri</i>	1 case



## Pregnancy with Hepatitis B Antigen Positive

**Total** 85 cases (5.41 percent of total parturients)  
(singleton : 84 (98.8 %); twins : 1 (1.2 %))

**Age** range 14-41 years  
average 29.6±5.3 years  
age of 35 years or more 14 cases (16.5 %)

**Gestational Age at Birth**  
range 22-41 weeks  
average 37.6±2.7 weeks  
premature delivery (before completed 37 weeks)  
11 cases (12.9 %)

**Birth Weight**  
range 150-4865 grams  
average 2952±662 grams  
number of low birth weight fetus (less than 2,500 grams)  
13 cases (15.3 %)

**Apgar Scores at 1 minute (less than 7)** 11 cases (12.9 %)

**Apgar Scores at 5 minutes (less than 7)** 5 cases (5.9 %)

**Small-for-gestational-age (less than 10th percentile)** 5 cases (5.9 %)

**Perinatal Death** 3 cases (3.5 %) (severe disease 4 cases)

**Congenital Anomalies** 3 cases  
(*diaphragmatic hernia, hydronephrosis, omphalocele*)

**Other complications**

<i>Previous cesarean section</i>	7 cases
<i>Diabetes mellitus</i>	5 cases
<i>Pregnancy-induced hypertension</i>	3 cases
<i>Iron deficiency</i>	3 cases
<i>Prolonged PROM</i>	2 cases
<i>Teenage preg</i>	2 cases
<i>Placenta previa</i>	2 cases
<i>Polyhydramnios</i>	2 cases
<i>Thalassemia</i>	1 case
<i>Thyrotoxicosis</i>	1 case
<i>Oligohydramnios</i>	1 case
<i>Short stature</i>	1 case
<i>Marked Obesity</i>	1 case
<i>Ovarian tumor</i>	1 case
<i>Heart disease</i>	1 case
<i>HIV positive</i>	1 case
<i>Incompetent cervix</i>	1 case

## Pregnancy with Asthma

**Total** 17 cases (1.08 percent of total parturients)  
(Singleton 16; Twins 1)

**Activity of Disease**

Well-controlled	14 cases
Poorly-controlled	3 cases

**Age** range 23-44 years  
average 30.9±5.5 years  
age of 35 years or more 3 cases (17.6 %)

**Gestational Age at Birth**

range 19-40 weeks

average 36.5±6.5 weeks

premature delivery (before completed 37 weeks)

2 cases (11.8 %)

**Birth Weight (not included abortion)**

range 480-38780 grams

average 2771±909 grams

number of low birth weight fetus (less than 2,500 grams)

2 cases (11.8 %)

**Apgar Scores at 1 minute (less than 7)** 2 cases (11.8 %)**Apgar Scores at 5 minutes (less than 7)** 2 cases (11.8 %)**Small-for-gestational-age (less than 10th percentile)** 0 cases (0.0%)**Perinatal death** 2 (11.8%)**Congenital Anomalies** - case**Other complications***Marked Obesity* 3 cases*Chronic HT* 1 case*Diabetes mellitus* 1 case*Previous cesarean section* 1 case*Prolonged PROM* 1 case

## Pregnancy with Chronic Hypertension

**Total** 36 cases (2.29 percent of total parturients)

Singleton : 36

### Severity of Hypertension

Severe (start treatment during pregnancy)	6	cases
Severe (controlled prior to pregnancy)	11	cases
Mild (no medication BP less than 160/90)	9	cases
Mild (BP less than 160/90 but treated with antihypertensive drug)	10	cases

**Age** range 22-41 years

average  $33.2 \pm 4.7$  years

age of 35 years or more 17 cases (47.2 %)

### Gestational Age at Birth

range 21-42 weeks

average  $36.8 \pm 3.7$  weeks

premature delivery (before completed 37 weeks)

7 cases (19.4 %)

### Birth Weight

range 370-4200 grams

average  $2755 \pm 836$  grams

number of low birth weight fetus (less than 2,500 grams)

8 cases (22.2 %)

**Apgar Scores at 1 minute (less than 7)** 6 cases (16.7 %)

**Apgar Scores at 5 minutes (less than 7)** 3 cases (8.3 %)

**Small-for-gestational-age (less than 10th percentile)** 3 cases (8.3 %)

**Perinatal death** 1 cases (2.8 %)

**Congenital Anomalies** 2 cases (renal agenesis, trisomy 21)

**Other complications**

<i>Diabetes mellitus</i>	<i>11 cases</i>
<i>Previous cesarean section</i>	<i>5 cases</i>
<i>Marked Obesity</i>	<i>5 cases</i>
<i>Pregnancy-induced hypertension</i>	<i>4 cases</i>
<i>Short stature</i>	<i>2 cases</i>
<i>Heart disease</i>	<i>1 case</i>
<i>HIV positive</i>	<i>1 case</i>
<i>UTI</i>	<i>1 case</i>
<i>Asthma</i>	<i>1 case</i>
<i>Iron deficiency</i>	<i>1 case</i>
<i>Ovarian tumor</i>	<i>1 case</i>
<i>Myoma uteri</i>	<i>1 case</i>
<i>Oligohydramnios</i>	<i>1 case</i>
<i>Placenta previa</i>	<i>1 case</i>

## Pregnancy-induced Hypertension

**Total** 72 (4.58 percent of total parturients)

Singleton : 71; Twins : 1

**Age** range 20-45 years

average  $31.3 \pm 5.7$  years

age of 35 years or more 25 cases (34.7 %)

**Gestational Age at Birth**

range 24-41 weeks  
 average  $36.5 \pm 3.7$  weeks  
 premature delivery (before completed 37 weeks)  
 23 cases (31.9 %)

**Classification of PIH**

Gestational hypertension (without proteinuria)	16 cases (22.2 %)
Mild Preeclampsia	33 cases (45.8 %)
Severe Preeclampsia	18 cases (25.0 %)
Pregnancy-aggravated hypertension	4 cases (5.6 %)
Eclampsia	1 cases (1.4 %)
<i>First eclamptic attack before admission</i>	<i>1 case</i>
<i>First eclamptic attack after admission</i>	<i>0 case</i>
<i>No ANC at Maharaj Nakorn Chiang Mai</i>	<i>0 case</i>
<i>ANC at Maharaj Nakorn Chiang Mai</i>	<i>0 case</i>

**Birth Weight** range 400-4535 grams

average  $2602 \pm 873$  grams  
 number of low birth weight fetus (less than 2,500 grams)  
 27 cases (37.5 %)

**Apgar Scores at 1 minute (less than 7)** 20 cases (27.8 %)

**Apgar Scores at 5 minutes (less than 7)** 8 cases (11.1 %)

**Small-for-gestational-age (less than 10th percentile)** 15 cases (20.8 %)

**Perinatal death** 2 cases (2.8 %)

**Congenital Anomalies** 2 case (2.8 %) (Cleft lip / palate : 1 case;  
 hydrops fetalis due to Hb Bart's disease : 1 case)

**Other complications**

<i>Diabetes mellitus</i>	<i>14 cases</i>
<i>Previous cesarean section</i>	<i>10 cases</i>
<i>Chronic HT</i>	<i>4 cases</i>
<i>HBsAg positive</i>	<i>3 cases</i>
<i>Marked Obesity</i>	<i>2 cases</i>
<i>SLE</i>	<i>2 cases</i>
<i>Myoma uteri</i>	<i>2 cases</i>
<i>UTI</i>	<i>2 cases</i>
<i>Iron deficiency</i>	<i>2 cases</i>
<i>Oligohydramnios</i>	<i>2 cases</i>
<i>HIV positive</i>	<i>1 case</i>
<i>Abruptio placentae</i>	<i>1 case</i>
<i>Polyhydramnios</i>	<i>1 case</i>
<i>Prolonged PROM</i>	<i>1 case</i>
<i>Short stature</i>	<i>1 case</i>

## Pregnancy with Thalassemia

**Total** 11 cases (0.70 percent of total parturients)

Singleton : 11 (100.0%)

**Type of thalassemia**

beta-thalassemia / HbE disease	2 cases
alpha-thalassemia (Hb H disease)	7 cases
Hb H Constant disease	2 cases

**Age** range 21-39 years

average  $29.5 \pm 5.9$  years

age of 35 years or more 3 cases (27.3 %)

**Gestational Age at Birth**

range 37-40 weeks

average  $38.7 \pm 1.3$  weeks  
 premature delivery (before completed 37 weeks)  
 3 cases (27.3 %)

**Birth Weight** range 2400-3765 grams  
 average  $2975 \pm 377$  grams  
 number of low birth weight fetus (less than 2,500 grams)  
 1 cases (9.1 %)

**Apgar Scores at 1 minute (less than 7)** - case (0.0 %)

**Apgar Scores at 5 minutes (less than 7)** - case (0.0 %)

**Small-for-gestational-age (less than 10th percentile)** 1 case (9.1 %)

**Perinatal death** 0 cases (0.0 %)

**Congenital Anomalies** 0 cases (0.0 %)

**Other complications**

<i>HBsAg positive</i>	2 cases
<i>Diabetes mellitus</i>	1 case
<i>SLE</i>	1 case
<i>Previous cesarean section</i>	1 case
<i>Short stature</i>	1 case

## Placenta Previa

**Total** 12 cases (0.76 percent of total parturients)  
 Singleton : 12 (100.0%)



**Age** range 16-43 years  
average 32.0±6.8 years  
age of 35 years or more 3 cases (25.0 %)

**Gestational Age at Birth**  
range 27-41 weeks  
average 36.1±4.0 weeks  
premature delivery (before completed 37 weeks)  
3 cases (25.0 %)

**Birth Weight** range 150-3405 grams  
average 2401±949 grams  
number of low birth weight fetus (less than 2,500 grams)  
5 cases (41.7 %)

**Apgar Scores at 1 minute (less than 7)** 3 cases (25.0 %)

**Apgar Scores at 5 minutes (less than 7)** 1 case (8.3 %)

**Small-for-gestational-age (less than 10th percentile)** 3 cases (25.0%)

**Perinatal death** 1 case (8.3 %)

**Congenital Anomalies** - case (0.0 %)

**Other complications**

<i>Previous cesarean section</i>	<i>2 cases</i>
<i>HBsAg positive</i>	<i>2 cases</i>
<i>Chronic HT</i>	<i>1 case</i>
<i>Transverse lie</i>	<i>1 case</i>

## Pregnancy with Acute Pyelonephritis

**Total** 12 cases (0.76 percent of total parturients)  
(Singleton 11, Twins 1)

**Age** range 16-36 years  
average  $27.17 \pm 6.1$  years  
age of more than 35 years 2 cases (16.7 %)

**Gestational Age at Birth**  
range 30-40 weeks  
average  $36.7 \pm 2.8$  weeks  
premature delivery (before completed 37 weeks)  
5 cases (41.7 %)

**Onset**

First trimester	1 case
Second trimester	5 cases
Third trimester	4 cases
Postpartum	2 cases

**Number of Episodes**

1	10 cases
2	2 case
3	- case

**Birth Weight** range 1630-3410 grams  
average  $2768 \pm 507$  grams  
number of low birth weight fetus (less than 2,500 grams)  
3 cases (25.0 %)

<b>Apgar Scores at 1 minute (less than 7)</b>	3 cases (25.0 %)
<b>Apgar Scores at 5 minutes (less than 7)</b>	1 case (8.3 %)
<b>Small-for-gestational-age (less than 10th percentile)</b>	2 cases (16.7%)
<b>Perinatal death</b>	0 case (0.0 %)
<b>Congenital Anomalies</b>	-
<b>Other complications</b>	
<i>Pregnancy-induced hypertension</i>	2 cases
<i>Previous cesarean section</i>	1 case
<i>Chronic HT</i>	1 case
<i>Chorioamnionitis</i>	1 case
<i>Oligohydramnios</i>	1 case
<i>Teenage preg</i>	1 case

## Small-for-Gestational-Age Fetuses

**Birthweight less than 10<sup>th</sup> percentile**

**Total** 96 (6.11 percent of total babies; 1607 fetuses)  
Singleton : 87 fetuses, Multifetal pregnancies : 11 fetuses

**Age** range 16-41 years  
 average  $29.8 \pm 5.9$  years  
 age of 35 years or more 25 cases (26.0 %)

**Gestational Age at Birth**

range 21-41 weeks  
 average  $35.7 \pm 4.3$  weeks  
 premature delivery (before completed 37 weeks)  
 41 cases (42.7 %)

**Birth Weight**

range 150-2580 grams  
 average  $1839 \pm 675$  grams  
 number of low birth weight fetus (less than 2,500 grams)  
 88 cases (91.7 %)

**Apgar Scores at 1 minute (less than 7)** 31 cases (32.3 %)

**Apgar Scores at 5 minutes (less than 7)** 17 cases (17.7 %)

**Perinatal Death** 14 cases (12.4 %)

**Congenital Anomalies**

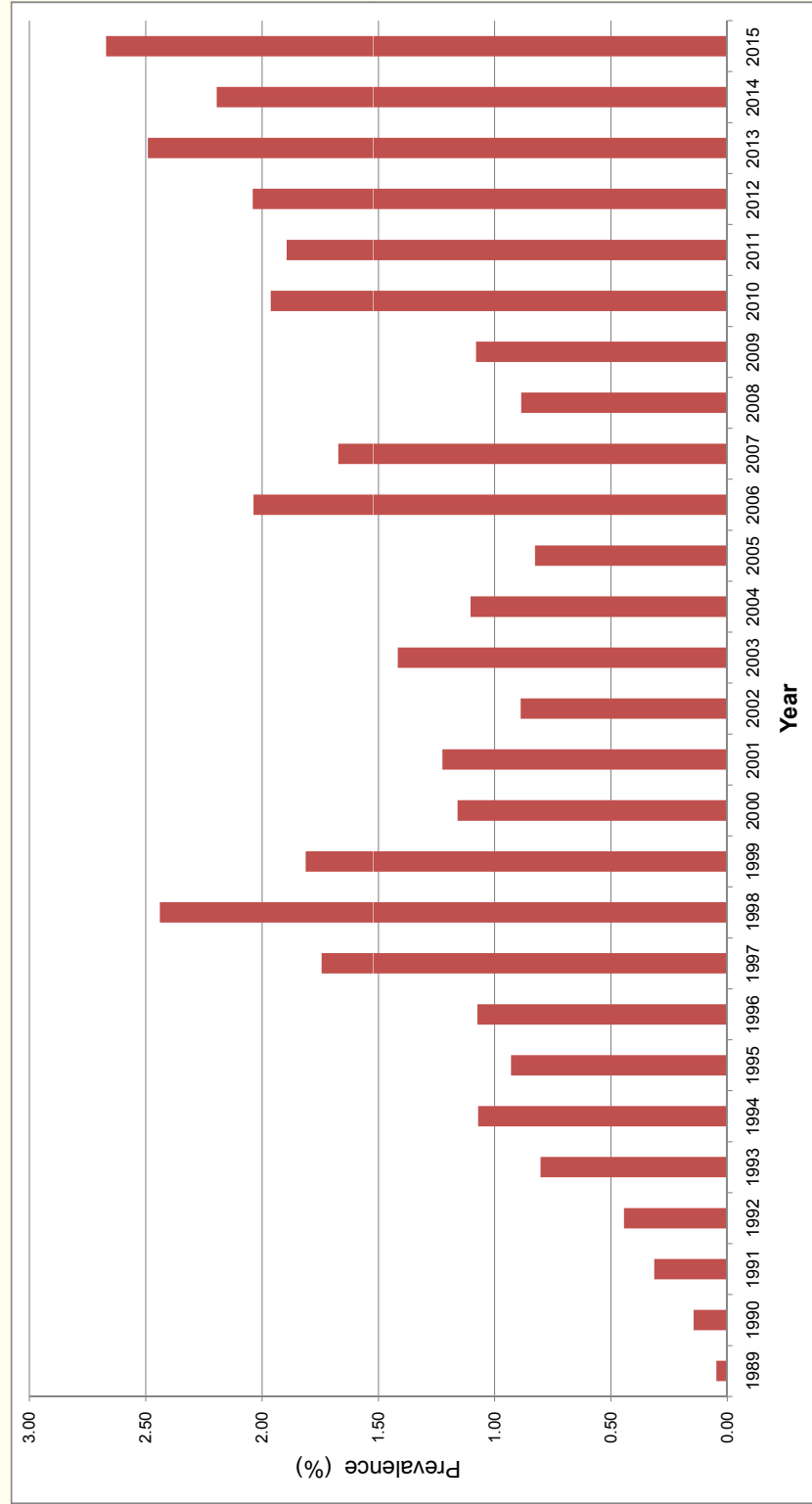
<i>Multiple anomalies</i>	3 cases
<i>CNS abnormalities</i>	2 cases
<i>Cardiac diseases</i>	2 cases
<i>Gastroschisis</i>	2 cases
<i>Neural tube defect</i>	1 case
<i>Trisomy 18</i>	1 cases
<i>Cleft lip / palate</i>	1 case
<i>Trisomy 13</i>	1 case
<i>Trisomy 21</i>	1 case

**Other complications**

<i>Medical diseases</i>	16 cases
<i>Pregnancy-induced hypertension</i>	10 cases
<i>Poor maternal weight gain</i>	22 cases



**FIGURE 19** Pregnant women with positive HIV antibody at Maharaj Nakorn Chiang Mai (1989-2015) (no screening program during 1989 -1996)



**TABLE 38** Voluntary screening (2015) among pregnant women for anti-HIV antibody

Pregnant women (Counselling)	1661	cases
Voluntary screening	1661	cases
+ve anti-HIV antibody	43	cases
% positive case	2.6	%

**TABLE 39** Age of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2015)

Age (years)	No. of cases	Percent
15-19	2	6
20-24	9	27.3
25-29	3	9.1
30-34	7	21.2
35-39	9	27.3
40-44	3	9.1
45-49	-	-
<b>Total</b>	<b>33</b>	<b>100</b>

*Mean age (years)* 30.39

*Standard deviation* 7.17

*Range 19-43 years*





**TABLE 42** Number of marriages of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2015)

Number	No. of cases	Percent
1	11	33.3
2	7	21.2
3	9	27.3
4	3	9.1
Unknown	3	9.1
<b>Total</b>	<b>33</b>	<b>100</b>

**TABLE 43** Occupations of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2015)

Occupations	No. of cases	Percent
Employee	27	81.8
Housewife	4	12.2
Commercial	1	3.0
Business	-	-
Government officer	-	-
Agriculture	1	3.0
<b>Total</b>	<b>33</b>	<b>100</b>

**TABLE 44** Residence (province) of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2015)

Province	Number	Percent
Chiang Mai (เชียงใหม่)	26	78.8
Lamphun (ลำพูน)	3	9.1
Chiang Rai (เชียงราย)	2	6.1
Lampang (ลำปาง)	1	3
Maehongson (แม่ฮ่องสอน)	1	3
<b>Total</b>	<b>33</b>	<b>100</b>

**TABLE 45** Complications of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2015)

	Cases	Percent
Without complicaiton	18	54.5
With complication	15	45.5
● Antepartum	10	
● Intrapartum	2	
● Postpartum	3	
<b>Total</b>	<b>33</b>	<b>100</b>

**TABLE 46** Birth weight in the pregnant women with posi-tive HIV at Maharaj Nakorn Chiang Mai (2015)

Birth weight (grams)	Number	Percent
< 1,500	1	2.9
1,500 - 1,999	1	2.9
2,000 - 2,499	7	20.6
2,500 - 2,999	11	32.4
3,000 - 3,499	11	32.4
3,500 - 3,999	3	8.8
<b>Total (twins =1)</b>	<b>34</b>	<b>100</b>

*Mean birthweight (grams)*                      2,827.06  
*Standard deviation (grams)*                    582.38  
*Range (grams)*                                      1310-3,680

**TABLE 47** Postpartum contraception of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2015)

Method	No. of cases	Percent
Female sterilization	10	30.3
DMPA	10	30.3
Oral contraception	8	24.2
Condom	3	9.1
Unknown	2	6.1
<b>Total</b>	<b>33</b>	<b>100</b>

## Section IV

# PRENATAL INVESTIGATION

### Antepartum Fetal Testing

#### Primary Surveillance

**Fetal Movement Count:** For low-risk and high-risk pregnancies

**Non-stress test**

or **Acoustic stimulation test** 2035 tests

(OPD4 = 1586; LR = 384; OB2&3 = 65)

#### Secondary Surveillance

**Contraction stress test**

or **Nipple stimulation test** 5 tests

**Biophysical profile/ultrasonography** 80 tests

**Doppler velocimetry** 300 tests

### Prenatal Diagnosis

1. **Ultrasonography** 8,728 examinations  
(~ 25 % for gynecologic and infertile examinations)
2. **Amniocentesis** 1,002 cases
3. **Cordocentesis** 365 cases
4. **Chorionic villous sampling** 169 procedures

## OBSTETRIC ULTRASOUND SERVICE

*Number of Patients undergoing sonographic examinations (OB&GYN) in 2,015*

*8,728 cases*

*Several examinations involved in the researches without specific indications*

Indications for sonographic examination	
■ Obstetric ultrasound (anomaly screening)	76.8 %
■ Obstetric ultrasound (perinatal research)	21.5 %
■ Obstetric ultrasound (others)	78.5 %
■ Gestational age estimation	
■ Obstetric hemorrhage	
■ Follow-up fetal anomalies	
■ Fetal growth surveillance	
■ etc.	
■ Gynecologic ultrasound	27.6 %
■ Infertile investigation	1.0 %
■ Perinatal research	15.3 %
■ Screening in menopausal women	1.7 %

## Cordocentesis (2015)

### Total 365 cases

Indications	No.	%
1. Previous child with Hb bart's	5	1.4
2. Previous child with $\beta$ thal major	1	0.3
3. Previous child with $\beta$ thal / HbE	2	0.5
4. Pregnancy at risk for Hb Bart's	51	14.0
5. Early sign of hydrops fetalis	5	1.4
6. Pregnancy at risk for $\beta$ thal major	36	9.9
7. Pregnancy at risk for $\beta$ thal / HbE	152	41.6
8. Pregnancy at risk for uncertain OFT	3	0.8
9. Chromosome analysis	51	14.0
10. Combined chromosome and risk for Hb bart's disease, $\beta$ thal major and $\beta$ thal Hb/E	45	12.3
11 .Combined chromosome & previous child with $\beta$ thal major	1	0.3
12. Combined chromosome analysis and uncertain OFT	4	1.1
13. Repeat for chromosome confirmation	8	2.2
14. Repeat for HPLC	1	0.3
<b>Total</b>	<b>365</b>	<b>100</b>

## Amniocentesis (2015)

**Total 1,002 cases**

Indications for amniocentesis	
<b>Elderly gravida ( age of more than 35 years )</b>	<b>801</b>
■ <i>with no other obvious risk</i>	692
■ <i>with previous child with Down syndrome</i>	1
■ <i>with high risk for Down syndrome screening</i>	104
■ <i>with fetal anomaly and sonomarkers</i>	4
<b>Genetic diagnosis for thalassemia</b>	<b>13</b>
■ <i>Pregnancy at risk for Hb Bart's disease</i>	1
■ <i>Pregnancy at risk for beta-thalassemia major disease</i>	1
■ <i>Pregnancy at risk for beta-thalassemia / Hb Edisease</i>	8
■ <i>Combined chromosome &amp; risk for Hb bart's and <math>\beta</math> thal Hb/E</i>	3
<b>Pregnancy with high risk for Down syndrome screening</b>	<b>174</b>
■ <i>Pregnancy with Down syndrome in previous child</i>	4
■ <i>Pregnancy with fetal anomaly in previous child</i>	2
■ <i>Pregnancy with fetal anomaly and sonomarkers</i>	16
■ <i>Pregnancy with previous child with mental retardation</i>	1
■ <i>Others (Polyhydramnios, Maternal request)</i>	4

## Chorionic Villous Sampling (2015)

### Total 169 Procedures

Indications	Number
<b>1. Fetal chromosome study</b>	<b>27</b>
■ Elderly gravid	10
■ Thickened nuchal translucency	5
■ Fetal cystic hygroma	7
■ Previous child with chromosomal abnormality	4
■ Paternal balanced translocation chromosome	1
<b>2. Risk for fetal severe thalassemia</b>	<b>121</b>
■ Risk for Hb Bart's disease	32
■ Risk for beta thalassemia major	17
■ Risk for beta thalassemia/Hb E disease	71
■ Risk for beta thalassemia/Hb E disease and Hb Bart's disease	1
<b>3. Fetal chromosome study and thalassemia diagnosis</b>	<b>20</b>
■ Elderly gravida with fetal risk for Hb Bart's disease	6
■ Elderly gravida with fetal risk for homozygous beta-thalassemia	3
■ Elderly gravida with beta thalassemia/Hb E disease	10
■ Previous trisomy 21 and fetal risk for Hb Bart's disease	1
■ Previous fetal anomaly and risk for beta thalassemia/Hb E disease	1
<b>4. Others (risk for KLF1 mutation)</b>	<b>1</b>



## Prevention and Control Thalassemia Program

### *Chiang Mai strategy*

- 1) Genetic counseling
- 2) Identification of pregnancy at risk
  - 2.1 Retrospective screening (history review for known risk)
  - 2.2 Prospective screening
    - Screening test
      - MCV or 2 min OF (2-minute osmotic fragility test)
      - HbE screening test (only if MCV or 2 min OF is negative)
    - Diagnostic test (if both of the couple are positive screening test)
      - HbA<sub>2</sub> level & PCR for  $\alpha$ -thal1 if MCV (2 min OF) is positive
      - HbA<sub>2</sub> level (negative MCV (2 min OF) but positive Hb E)
- 3) Prenatal diagnosis for pregnancy at risk
  - 3.1 Prenatal counseling
  - 3.2 Cordocentesis (16-22 weeks of gestation)
  - 3.3 Fetal blood analysis (checking maternal blood with acid elution test and hemoglobin typing with HPLC)
- 4) Counseling and termination of affected pregnancy

+ve OFT = OFT < 60%, MCV +ve =  $\leq 78$  fl +ve % HbA<sub>2</sub> = HbA<sub>2</sub> > 4%

## PROSPECTIVE SCREENING FOR THALASSEMIA PROGRAM 2015

	Number
Total number of pregnant screened	1,290
Positive MCV or Hb E	224
Number of couple at risk for thalassemia	26
■ Risk for Hb Bart's	7
■ Risk for Beta-thalassemia major	3
■ Risk for Beta thalassemia/Hb E	16
The choice which selected by couples	
■ Cordocentesis	8
■ Chorionic villus samplings	11
■ Amniocentesis	1
■ Ultrasonography	1
■ Not PND [ risk for minor thalassemia ]	3
■ Refused PND	2
Result of PND	
■ Hb bart's	2
■ Beta thalassemia major	1
■ Beta thalassemia/Hb E	3

## Down Syndrome Screening (2015)

### Total 11,686 tests (Research cases)

Trimester	Risk			Total
	Low	Intermediate	High	
First	3,403 (59.06%)	2,325 (40.35%)	34 (0.59%)	5,762
Second	5,103 (86.15%)	-	821 (13.86%)	5,924
Summary	8,506	2,325	855	11,686

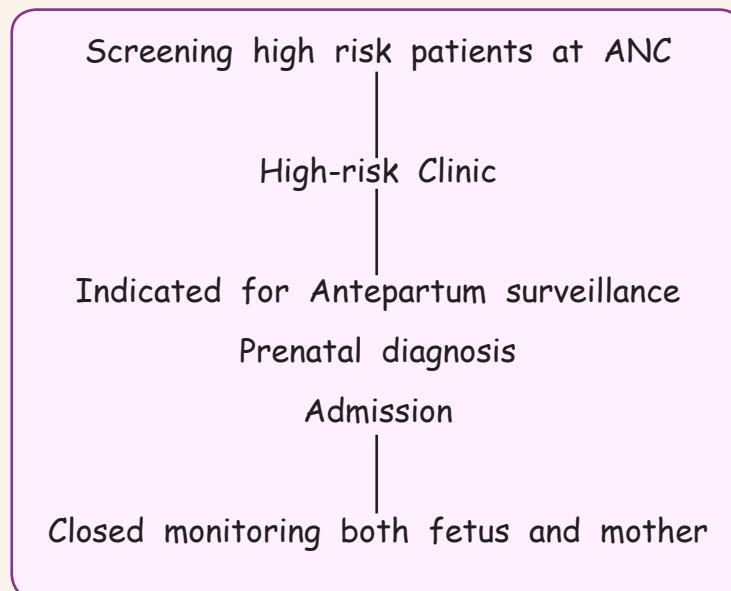
### Total 1,646 tests (Service cases)

Trimester	Risk		Total
	Low	High	
First	1,306 (99.70%)	4 (0.30%)	1,310
Second	298 (88.69%)	38 (11.31%)	336
Summary	1,604	42	1,646

## High Risk Pregnancy

Number of patients approximately 400 cases

### Management Guideline



#### *High-risk patients at Maharaj Nakorn Chiang Mai Hospital in 2015*

- |   |        |
|---|--------|
| 1. Elderly Gravida (age of 35 years or more)                  | 19.1 % |
| 2. Teenage Pregnancy (age of less than 20 years)              | 5.9 %  |
| <i>Early adolescence (age of less than 17 years)</i>          | 1.3 %  |
| <i>Late adolescence (age of 17-19 years)</i>                  | 4.2 %  |
| 3. Pregnancy complicated with medical or obstetrical diseases | 8.7 %  |

*Note* Some high-risk pregnancies were not included in the high-risk clinic and in this report e.g. maternal short stature, breech presentation, and previous cesarean section.