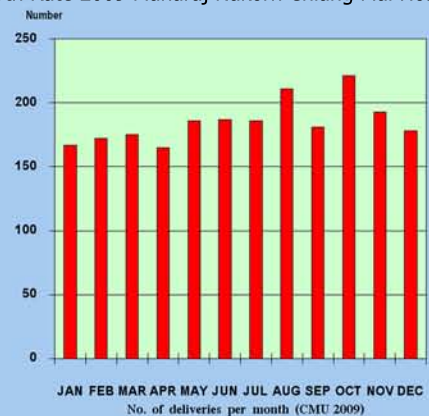


# MATERNAL-FETAL MEDICINE 2009



สถิติประจำปี 2552

Birth Rate 2009 Maharaj Nakorn Chiang Mai Hospital



หน่วยเวชศาสตร์มารดาและทารก  
ภาควิชาสูติศาสตร์และนรีเวชวิทยา  
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

**ANNUAL REPORT 2010**  
**MATERNAL-FETAL MEDICINE**  
**DEPARTMENT OF OBSTETRICS AND GYNECOLOGY**  
**FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY**  
**CHIANG MAI, THAILAND**

**MATERNAL-FETAL MEDICINE 2009**

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## สถิติประจำปี 2552

อนุสาขาเวชศาสตร์มารดาและทารก

ภาควิชาสูติศาสตร์และนรีเวชวิทยา

คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

## อนุสาขาเวชศาสตร์มารดาและทารก

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อัจฉราวรรณ แยมโพธิ์ใช้  
อภิรดี ตรรกไพจิตร  
อุบล เลี้ยวปรีชา

# PREFACE

Obstetrics and Gynecology department has three major missions which are teaching, research and service. Every mission needs information for improving the quality. Our department divides into three long standing subspecialties: maternal fetal medicine, reproductive medicine and gynecologic oncology, and one new subspecialty which is urogynecology unit. Each subspecialty worked hard for improving their mission and has summarized the service part into the annual report. These reports are also publishing the full report on our departmental website. Please visit: <http://www.med.cmu.ac.th/dept/obgyn/>

This annual report 2009 on maternal fetal medicine has been successfully published with great contribution of Assoc. Professor Pannee and her colleagues in MFM division. It reflects our work in obstetric care and can be used for benchmarking especially for the one who involve in this field. I would like to make an appreciation and expression of thanks to my colleagues for their dedication to our department.

Finally, I would be remiss if I did not underscore the fact that our work over these many years would not have been possible without the extraordinary generosity and foresight of so many individuals of our staff. I am grateful for these supports and gratefully acknowledge Associate Professor Pannee, chief of the MFM division and Professor Theera for their encouragement finishing this report.

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# PREFACE

Thank you for taking the time to review the 2009 annual report of Maternal Fetal Medicine, the Department of Obstetrics and Gynecology at Chiang Mai University. Our research programs in Maternal-Fetal Medicine is robust and continue to gain the unit recognition at the national and international level with total grant funding of almost 7 million Baht. Our educational program continues to thrive as evidenced by the large number of residency and fellow from other institutions who chose our Division as their electives training period. Our Division continues to serve as a resource for high risk mothers for the Northern region especially in prenatal diagnosis consultation. I would be remiss if I did not acknowledge all of the support that we received from our Head of the department, Associate Professor Chanane Wanapirak. Likewise, all of the support staff and personnel that contribute to the day to day operations of the Division make it possible for us to achieve this kind of success. I trust that the following pages will serve as the best evidence for research and education for our next generation of physicians.

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Associate Professor,  
Division of Maternal-fetal Medicine  
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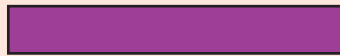
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**ANNUAL REPORT**



**2009**

**MATERNAL-FETAL MEDICINE**

**Presentation : January 2010**

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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** (gestational age  $\geq 22$  weeks)

44 cases of total births 2,283 cases

- *Gestational age between 22-27 weeks 29 cases (65.91 %)*

	<i>CMU cases</i>	<i>Referred cases</i>	<i>Total</i>
<i>Low risk</i>	2	1	3
<i>High risk</i>	14	12	26
<i>Autopsy</i>	7	7	14

### *Causes of death*

	<i>CMU cases</i>	<i>Referred cases</i>	<i>Total cases</i>
1. Normally formed macerated stillbirth	5	1	6
2. Congenital malformations	5	9	14
3. Conditions associated with immaturity	6	1	7
4. Asphyxia developed in labor	-	-	-
5. Other specific conditions	-	-	-
6. Therapeutic termination related to PND	-	2	2

■ *Gestational age between  $\geq 28$  weeks 15 cases (34.09 %)*

	<i>CMU cases</i>	<i>Referred cases</i>	<i>Total</i>
<i>Low risk</i>	3	-	3
<i>High risk</i>	5	7	12
<i>Autopsy</i>	2	5	7

*Causes of death*

	<i>CMU cases</i>	<i>Referred cases</i>	<i>Total cases</i>
1. Normally formed macerated stillbirth	3	3	6
2. Congenital malformations	-	4	4
3. Conditions associated with immaturity	-	-	-
4. Asphyxia developed in labor	3	1	4
5. Other specific conditions	1	-	1
6. Therapeutic termination related to PND	-	-	-

**Stillbirth rate :**

*Stillbirth rate = 6.57 per 1000 total births*

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

*Stillbirth rate = 19.27 per 1000 total births*

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

*Stillbirth rate = 10.51 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** 21 cases (GA > 22 weeks) of total 2184 live births

■ **Gestational age between 22-27 weeks 11 cases (52.38%) (Livebirth 2184)**

	<i>CMU cases</i>	<i>Referred cases</i>	<i>Total</i>
<i>Low risk</i>	-	-	-
<i>High risk</i>	9	2	11
<i>Autopsy</i>	2	-	2

***Causes of death***

1. Normally formed macerated stillbirth	-	-	-	cases
2. Congenital malformations	1	-	1	cases
3. Conditions associated with immaturity	2	1	3	cases
4. Asphyxia developed in labor	1	-	1	cases
5. Other specific conditions	5	-	5	cases
6. Therapeutic termination related to PND	-	1	1	cases

■ **Gestational age  $\geq$  28 weeks 10 cases (47.62%) (Livebirth 2184)**

	<i>CMU cases</i>	<i>Referred cases</i>	<i>Total</i>
<i>Low risk</i>	-	-	-
<i>High risk</i>	4	6	10
<i>Autopsy</i>	3	6	9

***Causes of death***

1. Normally formed macerated stillbirth	-	-	-	cases
2. Congenital malformations	3	4	7	cases
3. Conditions associated with immaturity	-	-	-	case
4. Asphyxia developed in labor	-	-	-	cases
5. Other specific conditions	1	2	3	cases
6. Therapeutic termination related to PND	-	-	-	cases

*Early neonatal death rate 4.58 per 1,000 live births*

*(up to 28 week's gestation or 1000 grams and died within first 7 days of life)*

*Early neonatal death rate 9.62 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)

1. Gestational age  $\geq 28$  weeks (stillbirths + early neonatal death)  
*perinatal death rate = 10.95 per 1000 total births*
2. Gestational age  $\geq 22$  weeks (stillbirths + neonatal death)  
*perinatal death rate = 28.47 per 1000 total births*

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

## MATERNAL DEATH

**Total** (All were referred cases)                      **3**                      **cases**

*Maternal mortality rate 1.37 per 1000 livebirths*

### Causes of maternal death

Postpartum hemorrhage	1 case
Triple pregnancy with PIH with cerebral hemorrhage	1 case
Pregnancy with active SLE with CHF with severe MR	1 case

## Summary

<b>DATA</b>	<b>2009</b>
Total birth (neonates)	2283
Stillbirth	44
• 22-27 weeks	29
• $\geq 28$ weeks	15
Stillbirth rate/1000 births	
• $> 28$ weeks / birthweight $>1,000$ gm	6.57
• $> 22$ weeks / birthweight $>500$ gm	19.27
Early neonatal death	
• Early neonatal death rate / 1000 live birth ( $\geq 28$ weeks)	4.58
• Early neonatal death rate / 1000 live birth ( $\geq 22$ weeks)	9.62

## Section II

# GENERAL OBSTETRICS

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

Type of pregnancy	Number	Percent
Singleton	2166	97.5
Twins	51	2.3
Triplet	5	0.2
<b>Total</b>	<b>2222</b>	<b>100.0</b>

**TABLE 2 Categories of the Pregnant Women**

	2008		2009	
	Number	Percent	Number	Percent
General Cases	1785	83.3	1921	86.5
Private Cases	359	16.7	301	13.5
<b>Total</b>	<b>2144</b>	<b>100.0</b>	<b>2222</b>	<b>100.0</b>

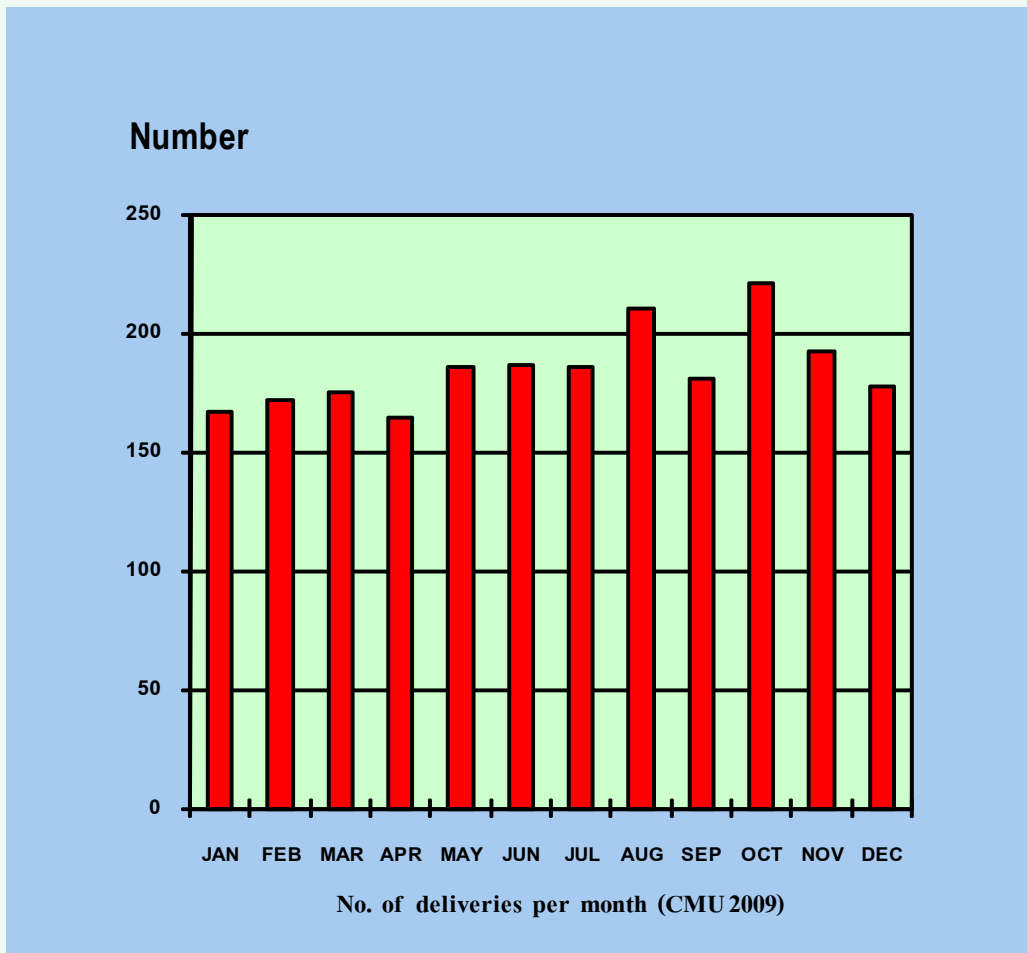
**TABLE 3 Categories of the Pregnant Women**

	Number	Percent
ANC at Maharaj Nakorn Chiang Mai Hospital	1212	54.5
Private Clinic	301	13.5
ANC at Other Hospitals	627	28.2
No ANC	74	3.3
<b>Total</b>	<b>2214</b>	<b>99.6</b>

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

Month	Number (Mothers)	Percent
January	167	7.52
February	172	7.74
March	175	7.88
April	165	7.43
May	186	8.37
June	187	8.42
July	186	8.37
August	211	9.50
September	181	8.15
October	221	9.95
November	193	8.69
December	178	8.01
<b>Total</b>	<b>2222</b>	<b>100.00</b>

**FIGURE 1 Histogram : Number of Deliveries from  
January to December 2009**



**Total deliveries in 2002 = 2815 cases**

**Total deliveries in 2003 = 2753 cases**

**Total deliveries in 2004 = 2654 cases**

**Total deliveries in 2005 = 2420 cases**

**Total deliveries in 2006 = 2013 cases**

**Total deliveries in 2007 = 2212 cases**

**Total deliveries in 2008 = 2144 cases**

**Total deliveries in 2009 = 2222 cases**



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

Age	Number	Percent	Age	Number	Percent
14	3	0.1	31	124	5.6
15	7	0.3	32	92	4.1
16	25	1.1	33	93	4.2
17	52	2.3	34	68	3.1
18	56	2.5	35	67	3.0
19	65	2.9	36	56	2.5
20	80	3.6	37	62	2.8
21	79	3.6	38	29	1.3
22	96	4.3	39	34	1.5
23	97	4.4	40	30	1.4
24	125	5.6	41	18	0.8
25	131	5.9	42	14	0.6
26	150	6.8	43	13	0.6
27	124	5.6	44	3	0.1
28	139	6.3	45	1	0.0
29	154	6.9	46	3	0.1
30	124	5.6	47	1	0.0
			50	1	0.0
<b>Total</b>				<b>2216</b>	<b>100.0</b>

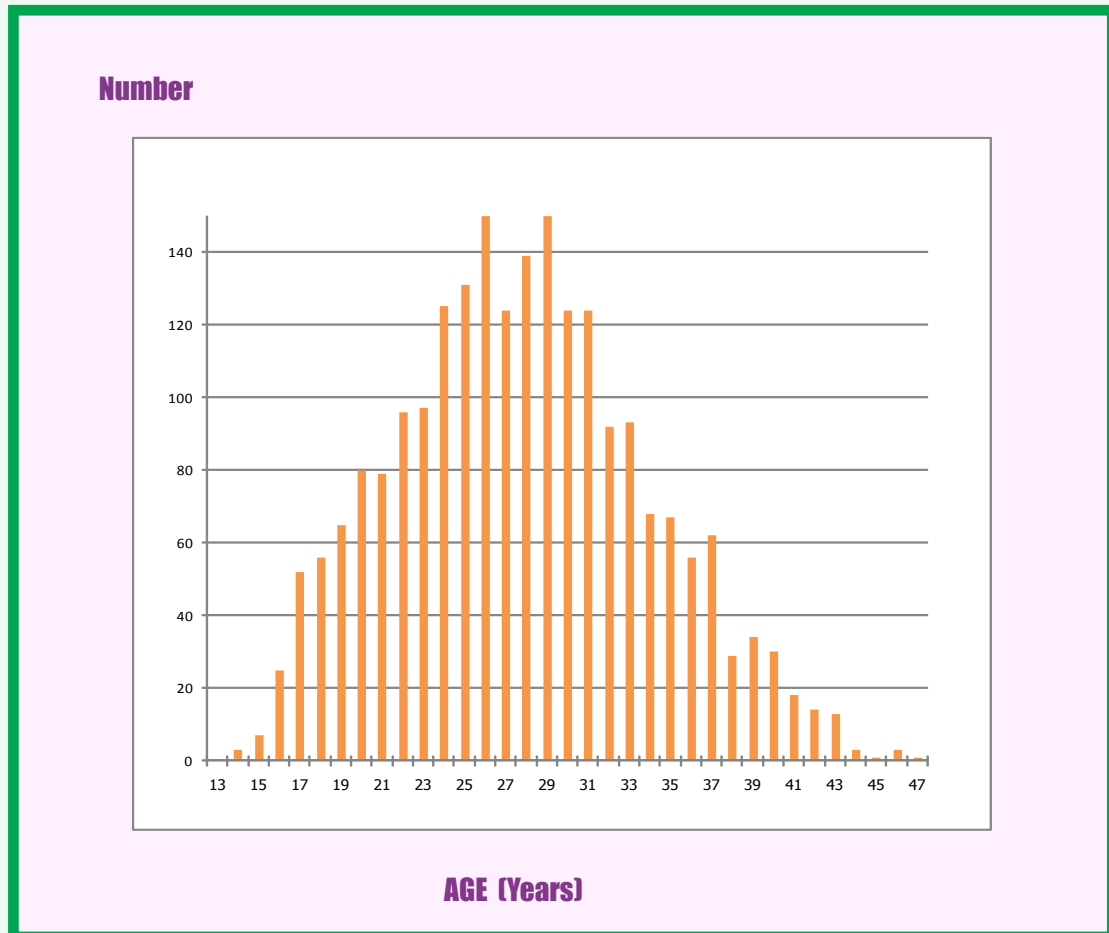
**Average age (Mean+Standard deviation) 27.81+6.2 years**

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

Age Group	Number	Percent
10-14	3	0.1
15-19	205	9.3
20-24	477	21.5
25-29	698	31.5
30-34	501	22.6
35-39	248	11.2
40-44	78	3.5
45-50	5	0.2
≥ 50	1	0.0
<b>Total</b>	<b>2216</b>	<b>100.0</b>

### Summary : Age of parturients

- Adolescent Pregnancies (11-19 years) 208 (9.4%)
  - Early Adolescent Pregnancies ( $\leq 16$  years) 35 (1.6 %)
  - Late Adolescent Pregnancies (17-19 years) 173 (7.8 %)
- Adult Pregnancies (20-34 years) 1676 (75.4 %)
- Elderly Pregnancies ( $\geq 35$  years) 332 (14.9 %)

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

**TABLE 7 Parity of parturients**

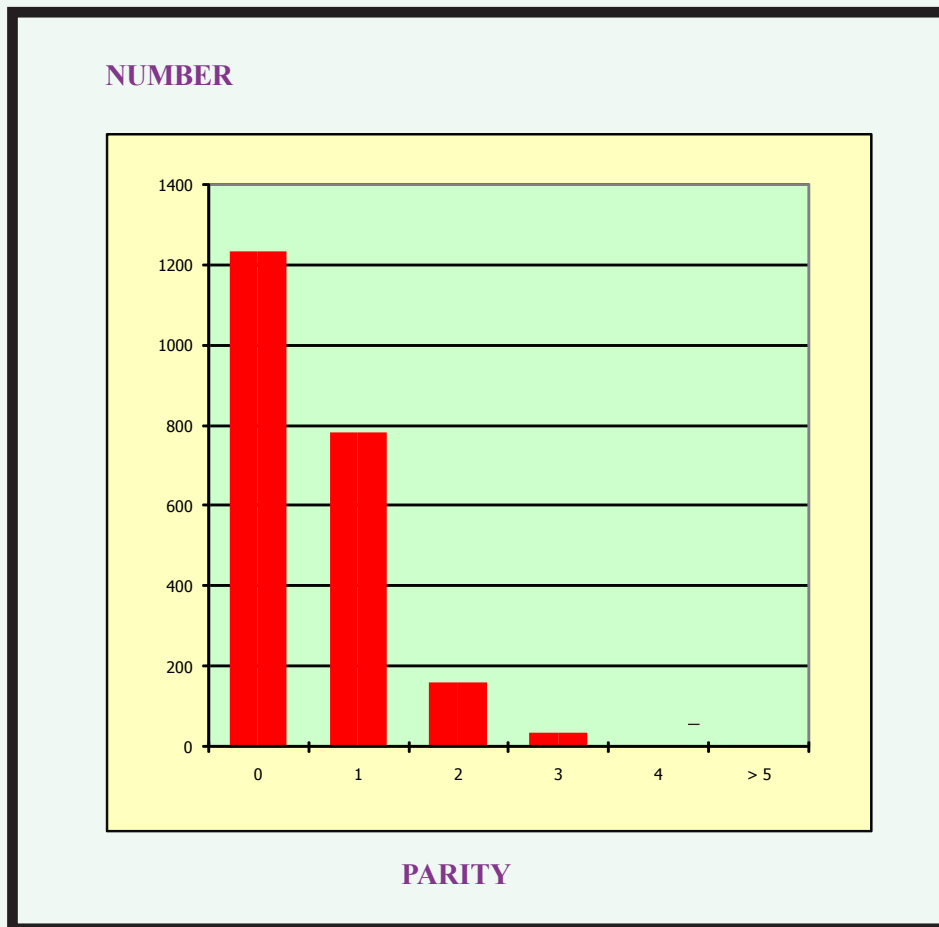
Parity	Number	Percent
0	1231	55.5
1	781	35.2
2	161	7.3
3	37	1.7
4	5	.2
5	4	.2
6	1	.0
<b>Total</b>	<b>2220</b>	<b>100.0</b>

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

**Nulliparous 55.5 %**

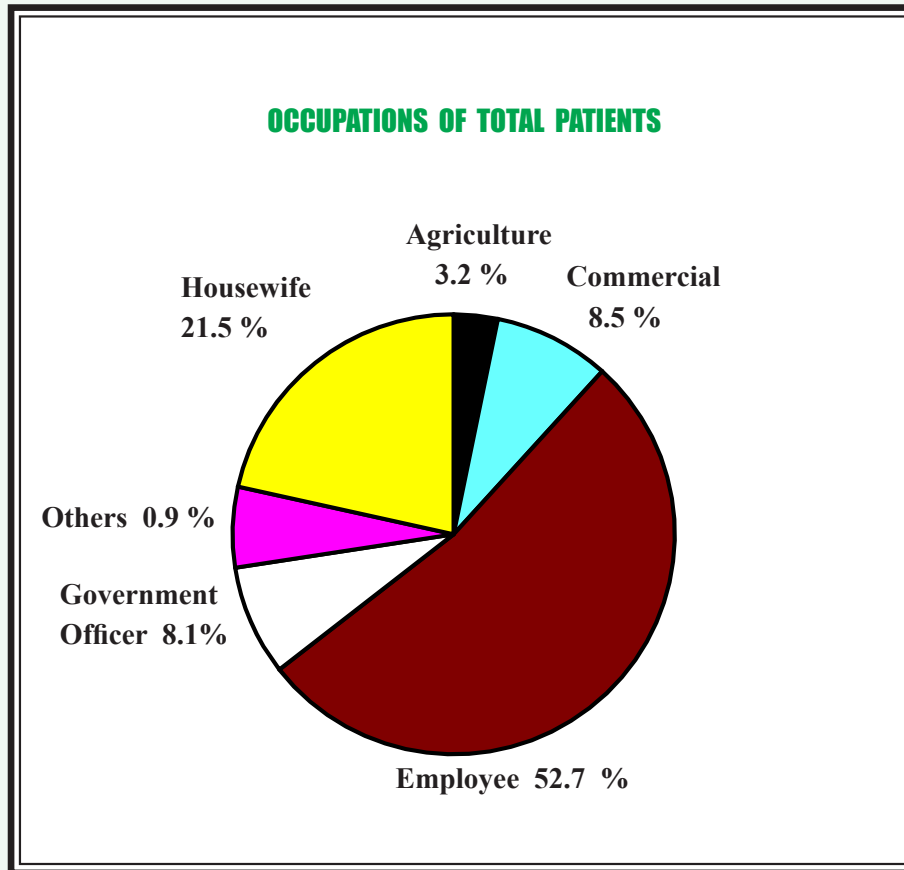
**Multiparous 44.5 %**

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

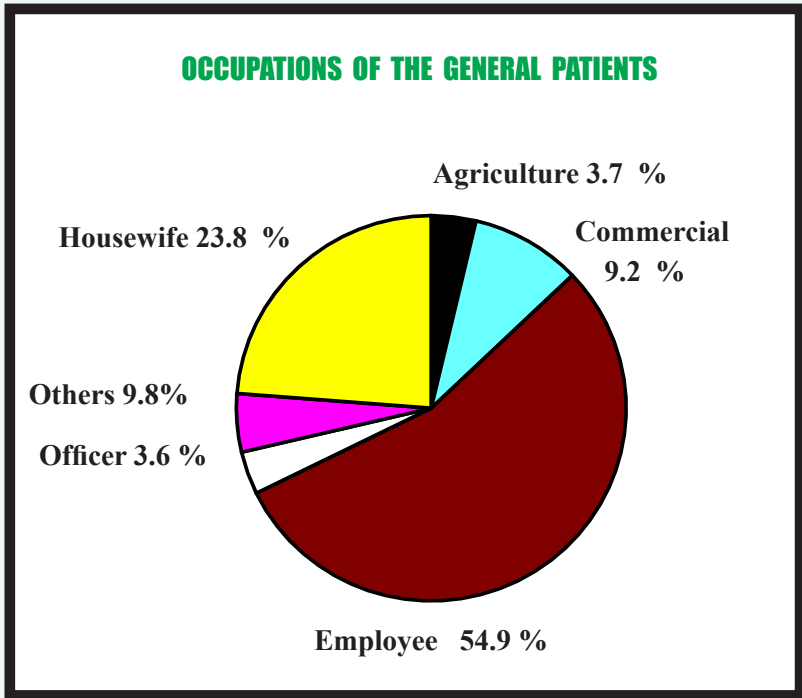


**TABLE 8** Distribution of the occupations of the parturients

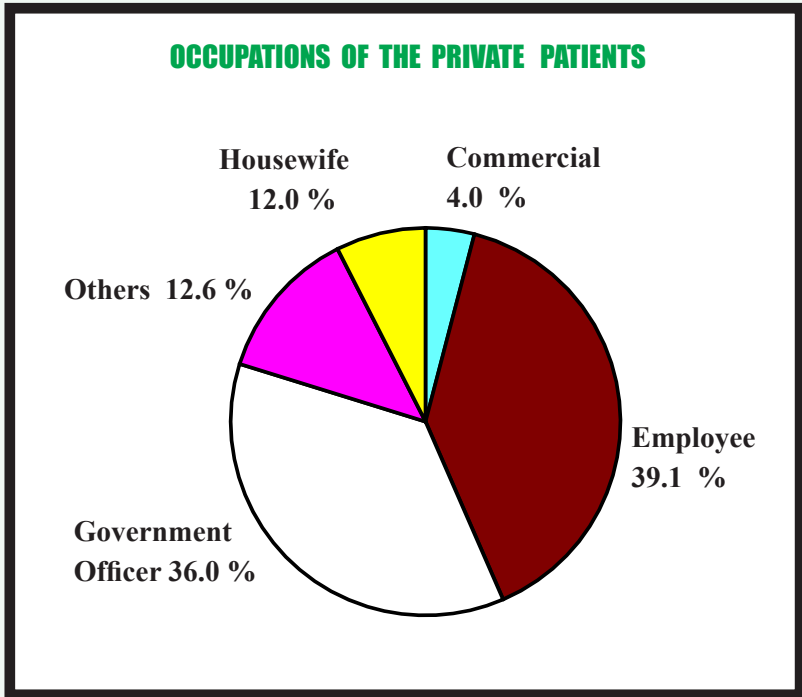
Occupations	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Agriculture	69	3.2	69	3.7	-	0.0
Commercial	181	8.5	169	9.2	12	4.0
Employee	1126	52.7	1010	54.9	116	39.1
Government Officer	174	8.1	67	3.6	107	36.0
Private Business	26	1.2	16	.9	10	3.4
Housewife	460	21.5	438	23.8	22	7.4
Student	45	2.1	42	2.3	3	1.0
State Enterprise	37	1.7	12	.7	25	8.4
Others	20	0.9	18	1.0	2	0.7
<b>Total</b>	<b>2138</b>	<b>100.0</b>	<b>1841</b>	<b>100.0</b>	<b>297</b>	<b>100.0</b>

**FIGURE 4 Pie : Distribution of patient's occupations**

**OCCUPATIONS OF THE GENERAL PATIENTS**



**OCCUPATIONS OF THE PRIVATE PATIENTS**

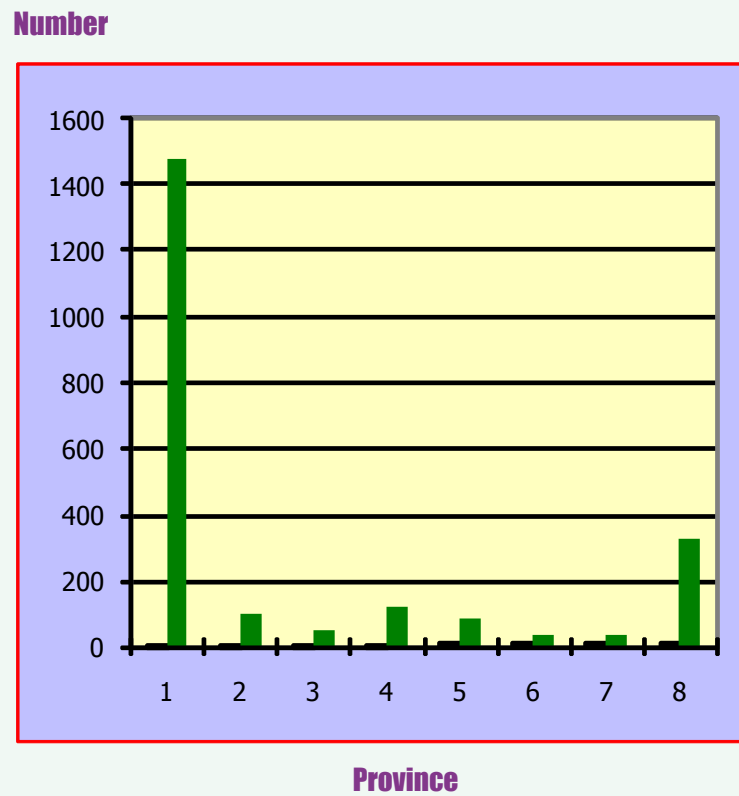




**TABLE 9 Distributions of the residence (province)  
of the parturients**

<b>Province</b>	<b>Number</b>	<b>Percent</b>
Chiang Mai (เชียงใหม่)	1480	66.6
Chiang Rai (เชียงราย)	99	4.5
Lampang (ลำปาง)	47	2.1
Lamphun (ลำพูน)	119	5.4
Maehongsorn (แม่ฮ่องสอน)	82	3.7
Payao (พะเยา)	35	1.6
Prae (แพร่)	34	1.5
Others (อื่นๆ)	326	14.7
<b>Total</b>	<b>2222</b>	<b>100.0</b>

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

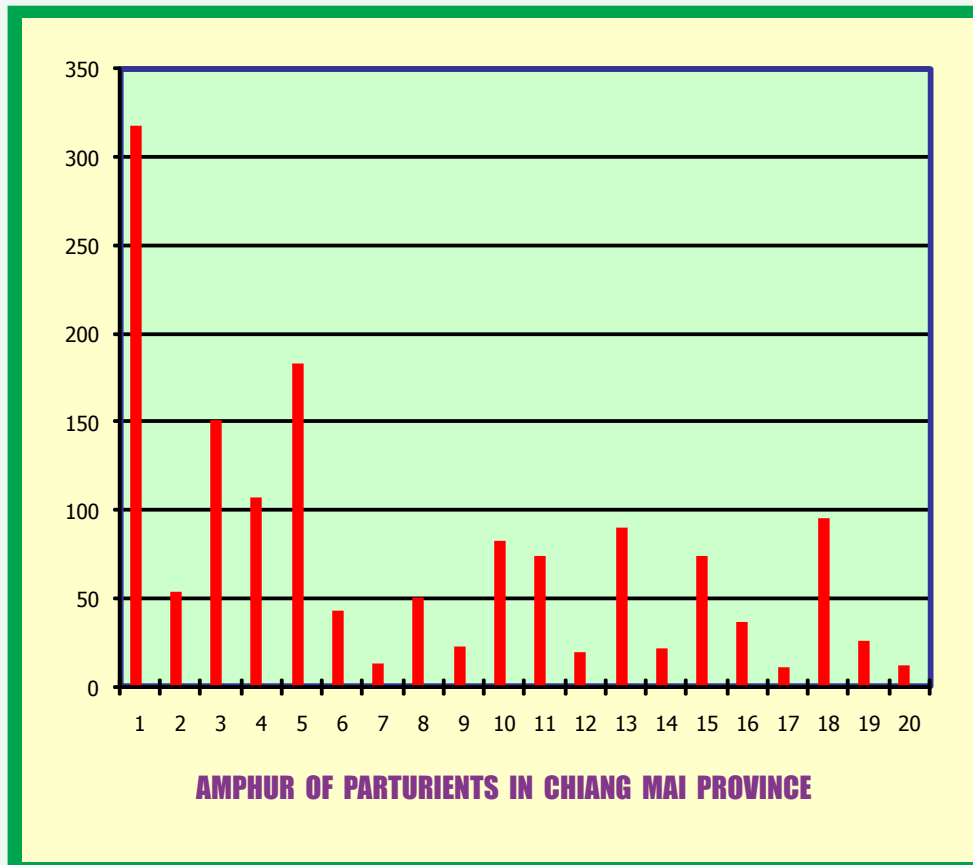


- |                             |                           |
|-----------------------------|---------------------------|
| 1. Chiang Mai (เชียงใหม่)   | 2. Chiang Rai (เชียงใหม่) |
| 3. Lampang (ลำปาง)          | 4. Lamphun (ลำพูน)        |
| 5. Maehongsorn (แม่ฮ่องสอน) | 6. Payao (พะเยา)          |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

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

Amphur	Number	Percent
1. Meung (เมือง)	318	21.5
2. Maerim (แม่ริม)	53	3.6
3. Doisaked (ดอยสะเก็ด)	151	10.2
4. Sanpatong (สันป่าตอง)	107	7.2
5. Hangdong (หางดง)	183	12.4
6. Jomtong (จอมทอง)	43	2.9
7. Mae-ai (แม่เมาะ)	13	0.9
8. Prao (พร้าว)	50	3.4
9. Hod (ฮอด)	22	1.5
10. Sarapee (สารภี)	82	5.5
11. Maetang (แม่แตง)	74	5.0
12. Omkoi (อมก๋อย)	19	1.3
13. Sankampang (สันกำแพง)	90	6.1
14. Samoeng (สะเมิง)	21	1.4
15. Chiangdao (เชียงดาว)	74	5.0
16. Phang (ฝาง)	36	2.4
17. Doitao (ดอยเต่า)	11	0.7
18. Santrai (สันทราย)	95	6.4
19. Maejam (แม่แจ่ม)	26	1.8
20. Chaiprakarn (ไชยปราการ)	12	0.8
<b>Total</b>	<b>1480</b>	<b>100.0</b>

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



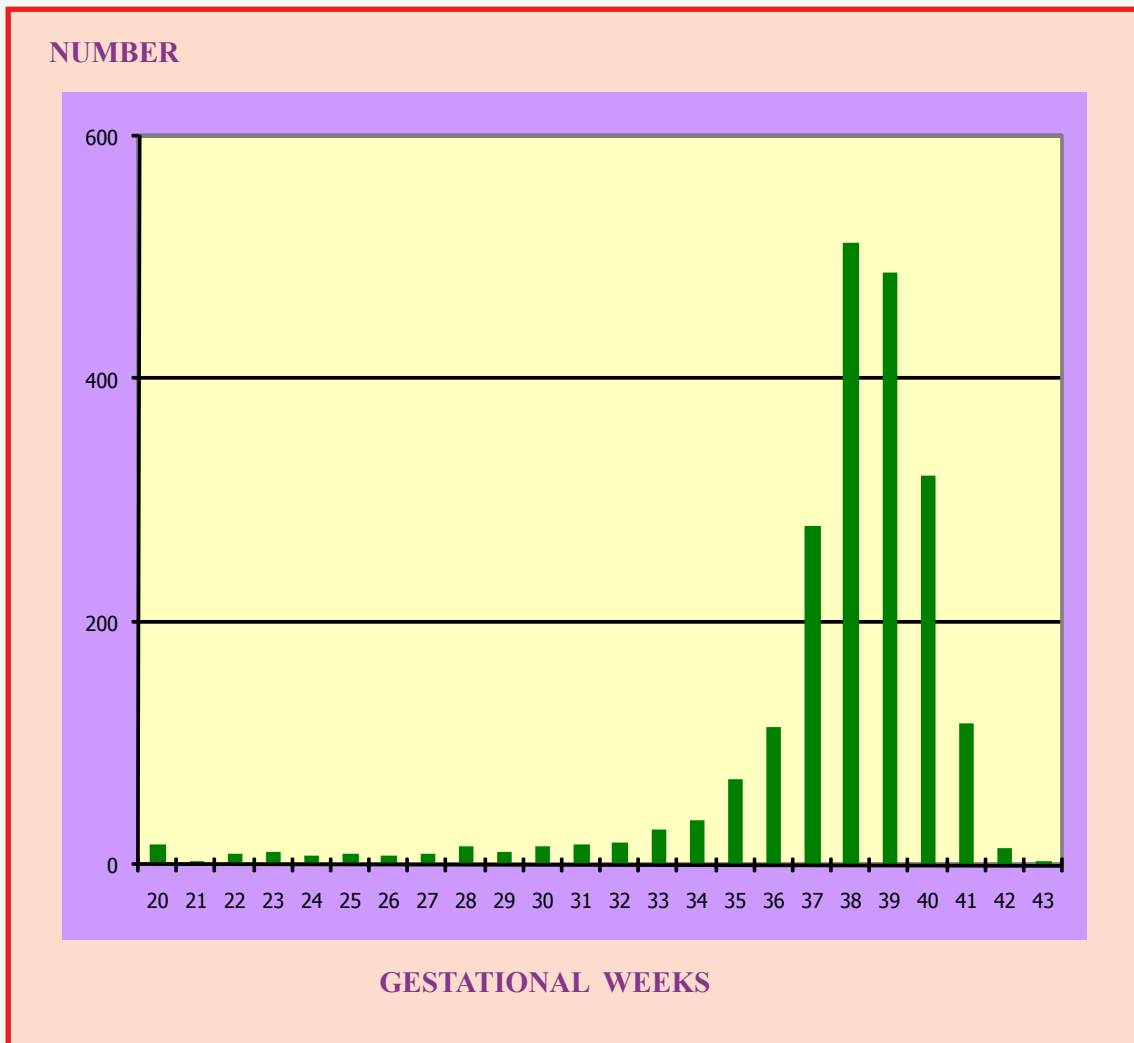
- |                |             |               |                 |
|----------------|-------------|---------------|-----------------|
| 1. Meung       | 2. Maerim   | 3. Doisaked   | 4. Sanpatong    |
| 5. Hangdong    | 6. Jomtong  | 7. Mae-ai     | 8. Prao         |
| 9. Hod         | 10. Sarapee | 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	17	0.8	32	19	0.9
21	3	0.1	33	29	1.4
22	9	0.4	34	37	1.7
23	10	0.5	35	71	3.3
24	8	0.4	36	114	5.3
25	9	0.4	37	280	13.1
26	7	0.3	38	513	24.0
27	9	0.4	39	488	22.9
28	15	0.7	40	321	15.0
29	10	0.5	41	116	5.4
30	16	0.7	42	14	0.7
31	17	0.8	43	3	0.1
<b>Total</b>				<b>2135</b>	<b>100.0</b>

**Average of Gestational Age 37.47±3.5 Weeks**

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



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

<b>Gestational Age Group</b>	<b>Number</b>	<b>Percent</b>
Immature (20-27 weeks)	72	3.4
Premature (28-36 weeks)	328	15.4
Term (37-41 weeks)	1718	80.5
Postterm (42 weeks or more)	17	0.8
<b>Total</b>	<b>2135</b>	<b>100.0</b>

*Premature delivery included the referred cases*

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

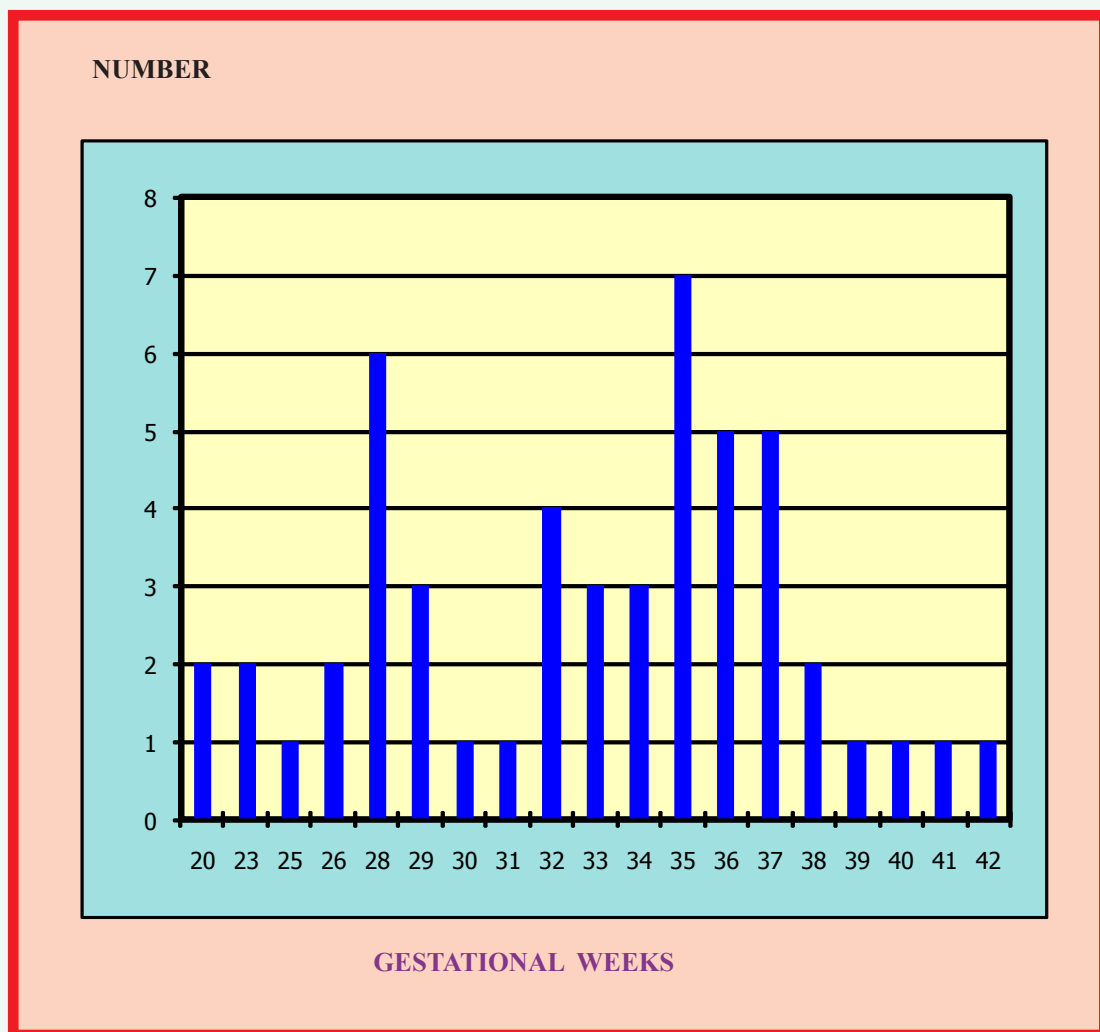
**TABLE 13** Number and percentage of parturients by gestational age in twin pregnancies

GA (Week)	Number (Twin sets)	Percent
20	2	3.9
23	2	3.9
25	1	2.0
26	2	3.9
28	6	11.8
29	3	5.9
30	1	2.0
31	1	2.0
32	4	7.8
33	3	5.9
34	3	5.9
35	7	13.7
36	5	9.8
37	5	9.8
38	2	3.9
39	1	2.0
40	1	2.0
41	1	2.0
42	1	2.0
<b>Total</b>	<b>51</b>	<b>100</b>

**Average of Gestational Age 32.41±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.

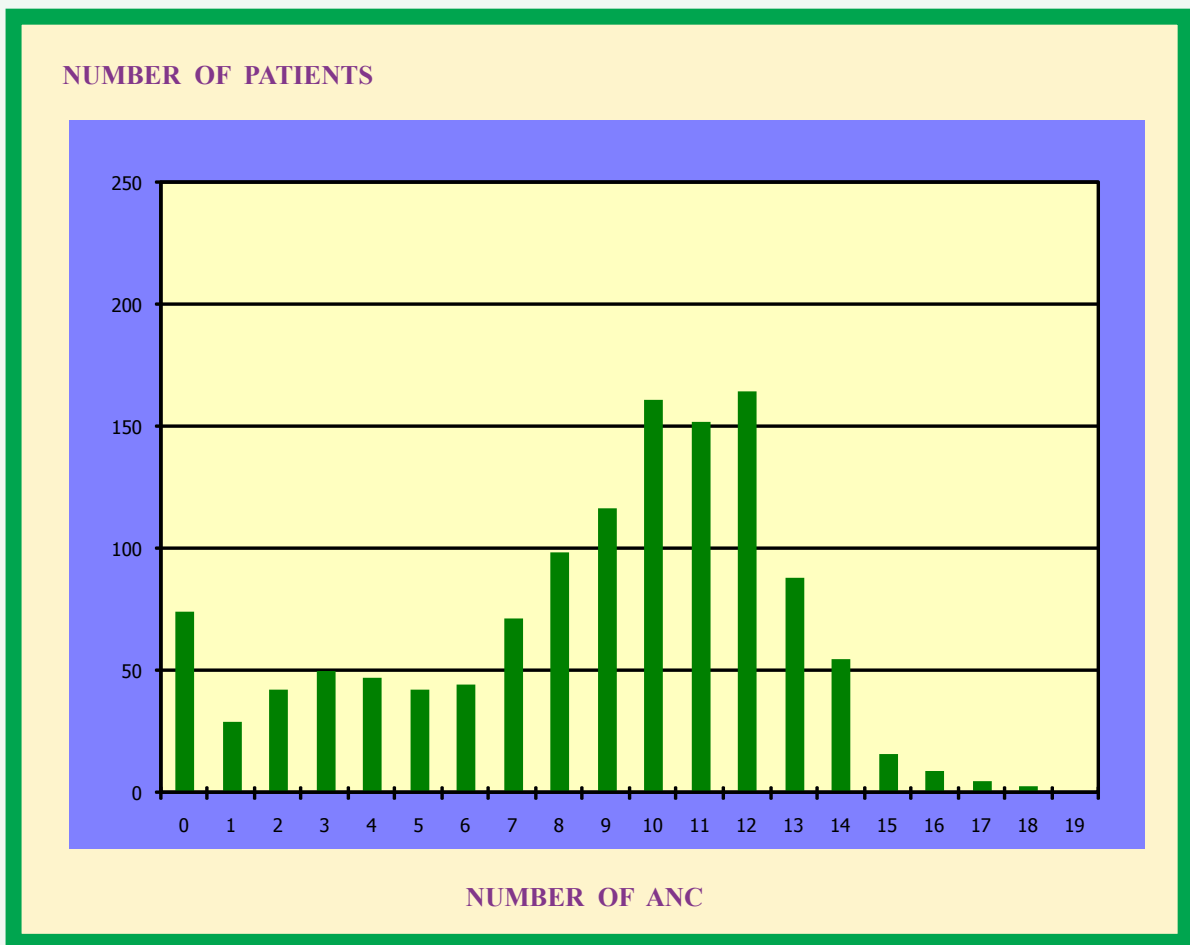
Gestational Age Group	Number	Percent
Immature (20-27 weeks)	7	13.7
Premature (28-36 weeks)	33	64.7
Term (37-41 weeks)	10	19.6
Postterm ( $\geq$ 42 weeks)	1	2.0
<b>Total</b>	<b>51</b>	<b>100.0</b>

**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	74	5.8
1	29	2.3
2	42	3.3
3	50	3.9
4	47	3.7
5	42	3.3
6	44	3.5
7	71	5.6
8	98	7.7
9	116	9.2
10	161	12.7
11	152	12.0
12	164	12.9
13	88	6.9
14	55	4.3
15	16	1.3
16	9	.7
17	5	.4
18	3	.2
19	1	.1
<b>Total</b>	<b>1267</b>	<b>100.0</b>

**Attending ANC at other hospitals 28.3 % of total parturients**

**FIGURE 9 Histogram : Number of ANC attendance of general patients (excluding private patients and ANC at other hospitals)**



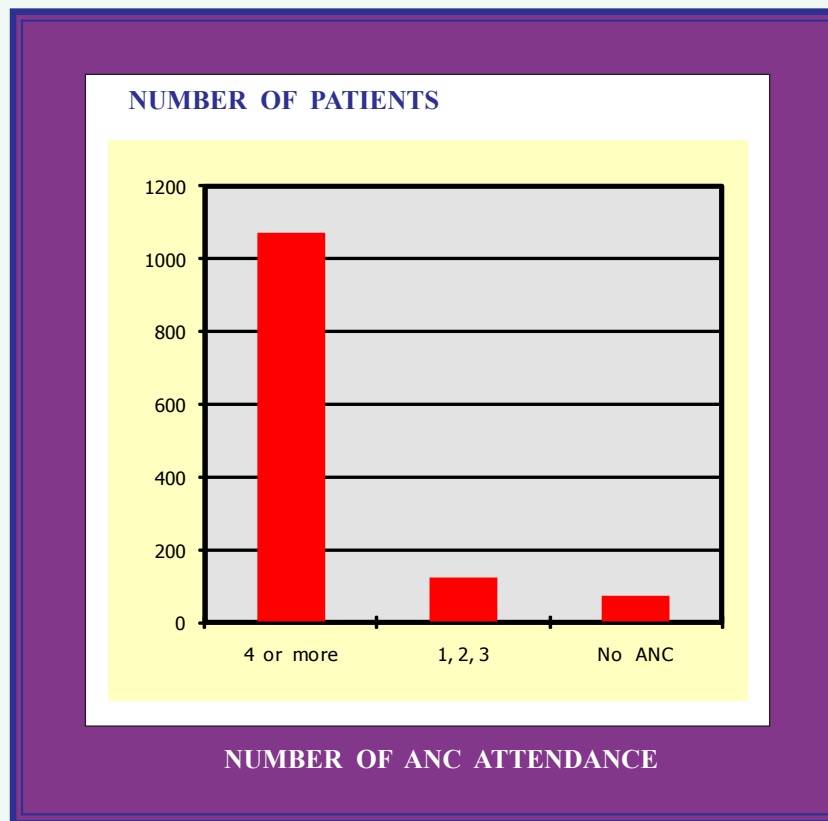
**TABLE 16** Number of antenatal care attendance : General patients (not include the patients attending ANC at other hospitals)

Number of ANC	Number of Parturients	Percent
4 or more	1072	83.4
1-3	121	9.4
No ANC	74	5.8
<b>Total</b>	<b>1267</b>	<b>100.0</b>

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

**Inadequate ANC 15.2%**

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

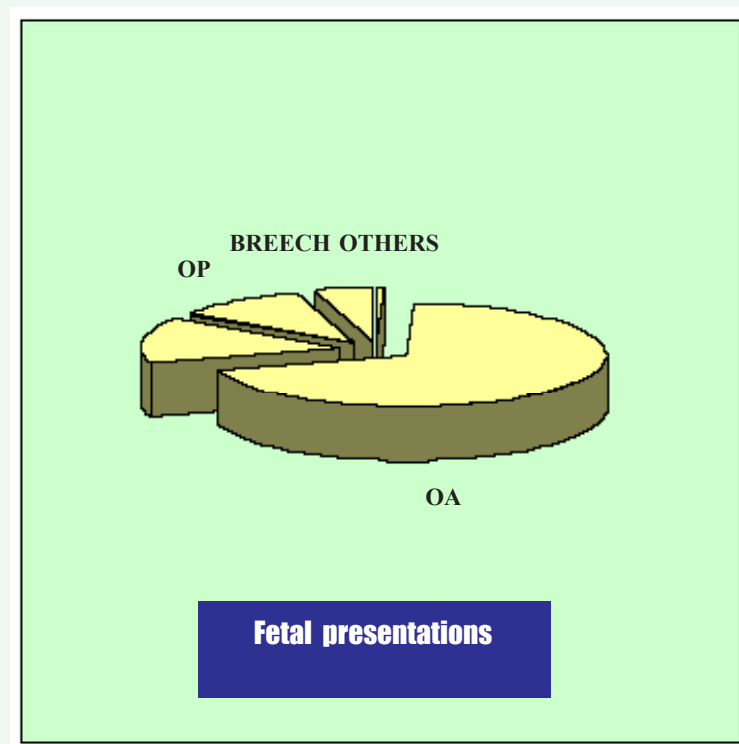


**TABLE 17 Distribution of fetal presentations in labor (Singleton)**

<b>Fetal Presentation</b>	<b>Percent</b>
Vertex	93.8
Breech	5.7
Transverse lie	0.2
Face	0.1
Compound	0.1

**Breech Presentation was 5.7 % of Total Birth**

**FIGURE 11 Pie : 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**

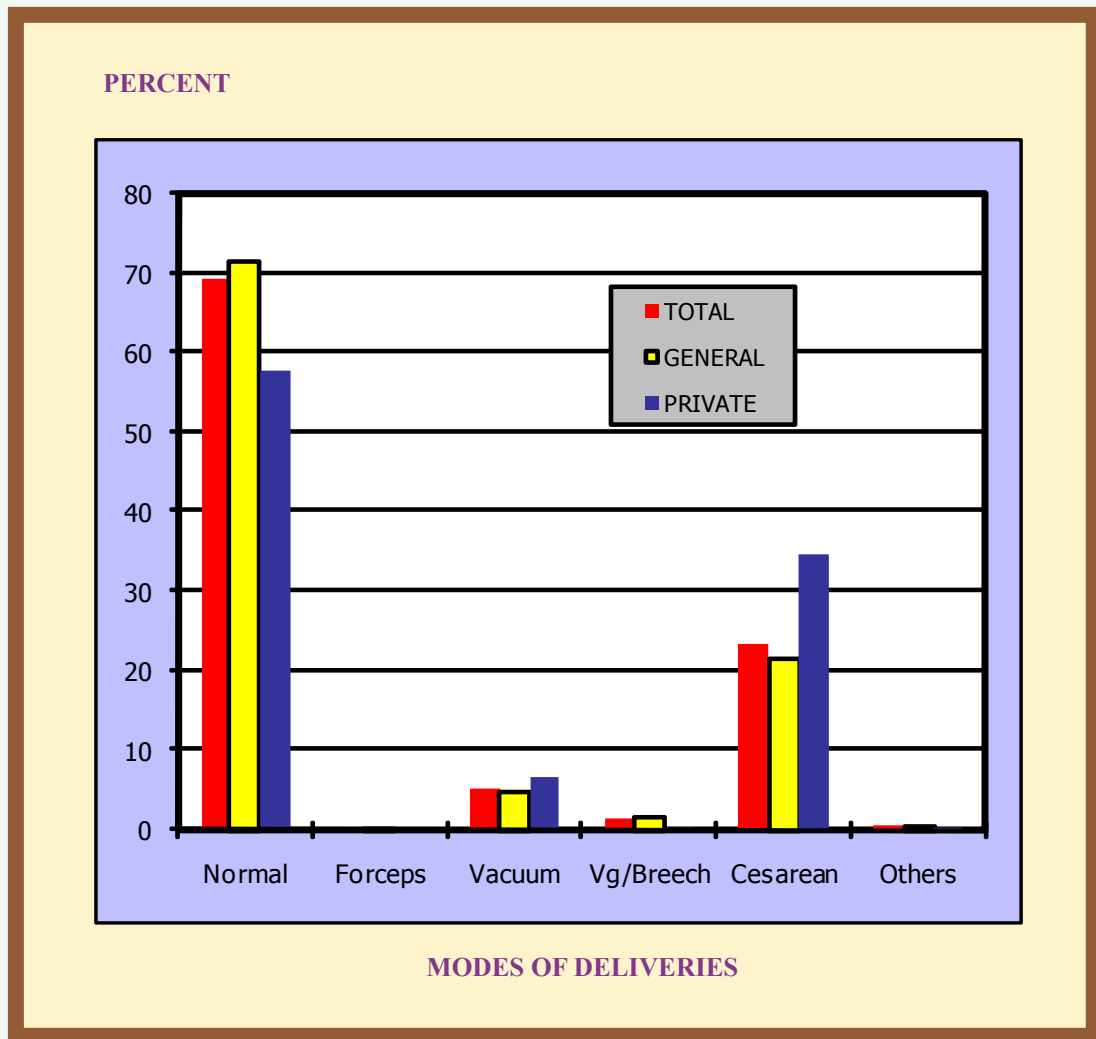
Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Normal Delivery	1504	69.4	1336	71.3	168	57.7
Forceps Delivery	5	0.2	4	0.2	1	0.3
Vacuum Delivery	110	5.1	91	4.9	19	6.5
Vaginal Breech Delivery	31	1.4	30	1.6	1	0.3
Cesarean Section	505	23.3	404	21.5	101	34.7
Other*	11	0.5	10	0.5	1	0.3
<b>Total</b>	<b>2166</b>	<b>100.0</b>	<b>1875</b>	<b>100.0</b>	<b>291</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	28	54.9	23	53.5	5	62.5
Vaginal Delivery	23	45.1	20	46.5	3	37.5
<b>Total</b>	<b>51</b>	<b>100.0</b>	<b>43</b>	<b>100.0</b>	<b>8</b>	<b>100.0</b>

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



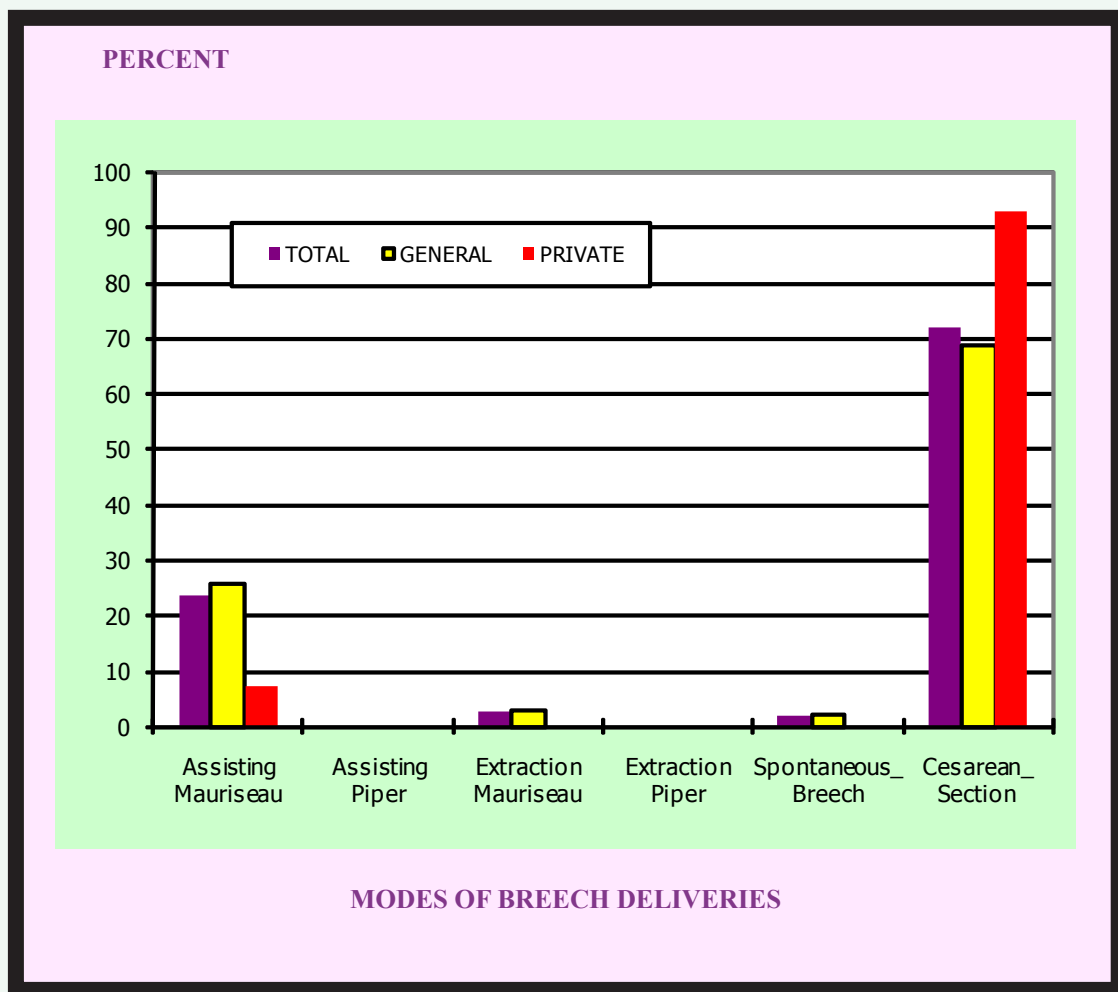
**TABLE 19 Modes of deliveries in breech presentation :  
general and private patients (Singleton)**

Mode of Deliveries	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
1. Assisting (Mauriceau)	26	23.6	25	26.0	1	7.1
2. Assisting (Piper Forceps)	0	0.0	0	0.0	0	0.0
3. Total Extraction (Mauriceau-)	3	2.7	3	3.1	0	0.0
4. Spontaneous Breech	2	1.8	2	2.1	0	0.0
5. Cesarean Section	79	71.8	66	68.8	13	92.9
<b>Total</b>	<b>110</b>	<b>100.0</b>	<b>96</b>	<b>100.0</b>	<b>14</b>	<b>100.0</b>

**Total Cesarean Section Rate in Breech presentation 71.8 %**

**(General patients; 68.8 %, Private patients; 92.9 %)**

**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
1. Previous C / S	157	30.8	119	29.2	38	37.3
2. CPD	156	30.6	120	29.5	36	35.3
3. Breech	79	15.5	66	16.2	13	12.7
4. Fetal distress	49	9.6	42	10.3	7	6.9
5. Placenta previa	15	2.9	11	2.7	4	3.9
6. Transverse lie	8	1.6	8	2.0	0	0.0
7. Prolapsed cord	6	1.2	6	1.5	0	0.0
8. HIV + ve	8	1.6	8	2.0	0	0.0
9. Others*	31	6.1	27	6.6	4	3.9
<b>Total</b>	<b>509</b>	<b>100.0</b>	<b>407</b>	<b>100.0</b>	<b>102</b>	<b>100.0</b>

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

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

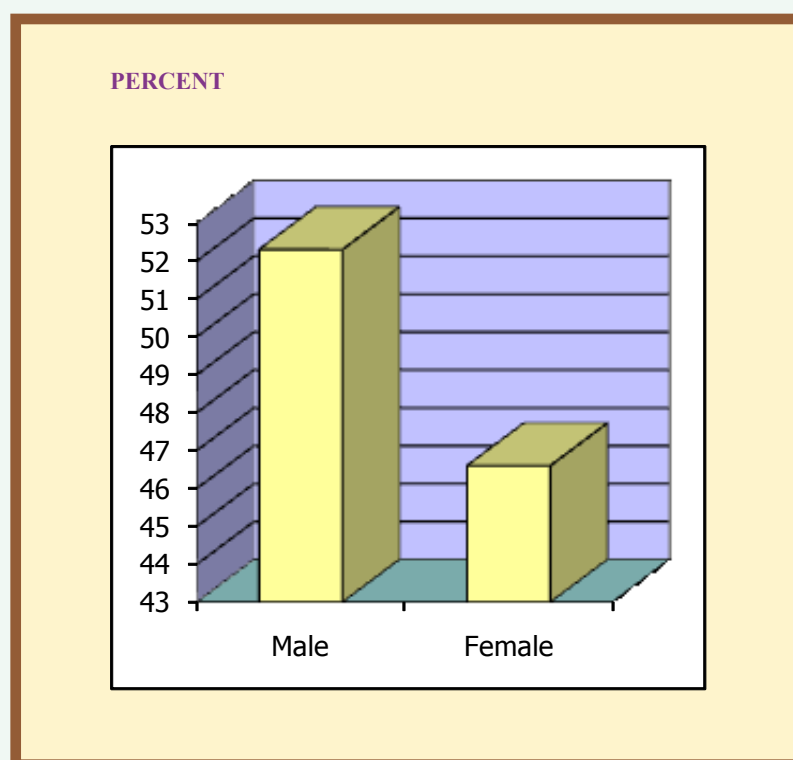
Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
1. Fetal distress	1	20.0	1	25.0	-	-
2. Expected prolonged second stage	0	0.0	0	0.0	-	-
3. Poor expulsive force & training	2	40.0	2	50.0	-	-
4. Maternal disease	2	40.0	1	25.0	1	100.0
5. Others (OPP, failed vaccuum, etc)	-	-	-	-	-	-
<b>Total</b>	<b>5</b>	<b>100.0</b>	<b>4</b>	<b>100.0</b>	<b>1</b>	<b>100.0</b>

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

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
1. Fetal distress	19	17.3	16	17.6	3	15.8
2. Expected prolonged second stage	5	4.5	1	1.1	0	0.0
3. Poor expulsive force & training	50	45.5	36	39.6	14	73.7
4. Maternal disease (PIH, ect)	36	32.7	34	37.4	2	10.5
5. Others (OPP, OT, etc)	0	0.0	0	0.0	0	0.0
<b>Total</b>	<b>110</b>	<b>100.0</b>	<b>91</b>	<b>100.0</b>	<b>19</b>	<b>100.0</b>

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

Sex	Number	Percent
Male	1194	52.3
Female	1063	46.6
Unspecified	22	1.0
<b>Total</b>	<b>2279</b>	<b>100.0</b>

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



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

<b>Apgar Scores</b>	<b>Number</b>	<b>Percent</b>
0-3 (severe depression)	165	7.2
4-6 (mild depression)	100	4.4
7-10 (no depression)	2015	88.4
<b>Total</b>	<b>2280</b>	<b>100.0</b>

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

<b>Apgar Score</b>	<b>Number</b>	<b>Percent</b>
0-3 (severe depression)	123	5.4
4-6 (mild depression)	30	1.3
7-10 (no depression)	2126	93.3
<b>Total</b>	<b>2179</b>	<b>100.0</b>

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

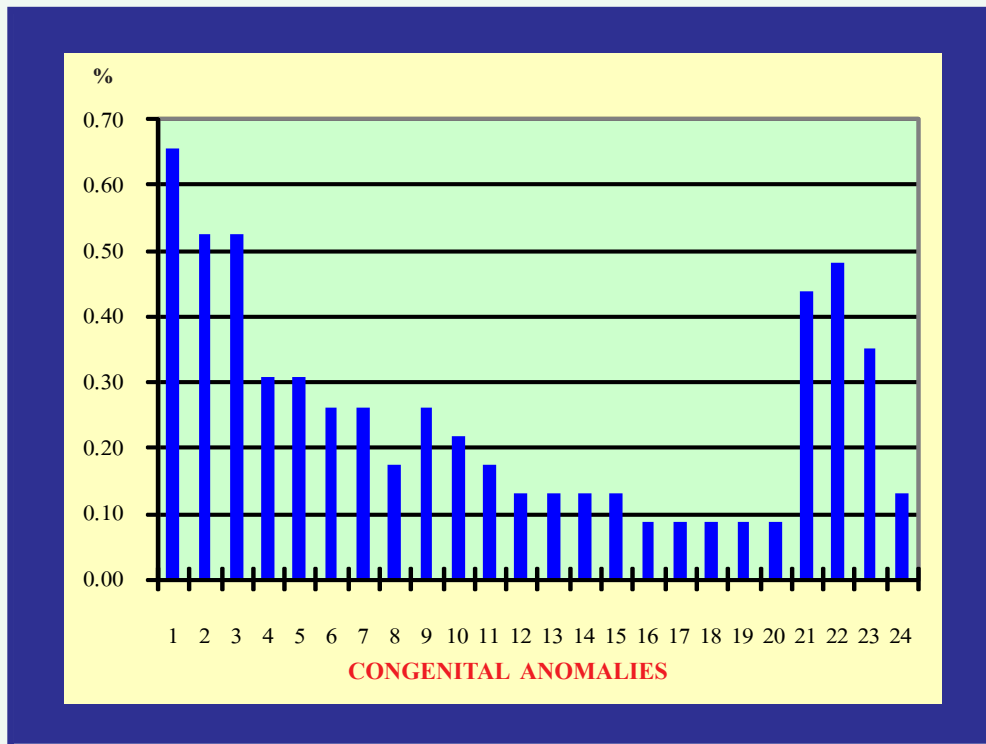
Apgar Score	1-Minute		5-Minute	
	Number	Percent	Number	Percent
0	109	4.8	109	4.8
1	29	1.3	6	0.3
2	15	0.7	4	0.2
3	12	0.5	4	0.2
4	14	0.6	8	0.4
5	38	1.7	10	0.4
6	48	2.1	12	0.5
7	115	5.0	16	0.7
8	192	8.4	47	2.1
9	916	40.2	139	6.1
10	792	34.7	1924	84.4
<b>Total</b>	2280	100.0	2279	100.0

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

<b>Congenital Anomalies</b>	<b>Number</b>	<b>Percent</b>
<b>Non chromosome-related anomaly</b>		
1. Hydrops fetalis (frank)	15	0.66
Hb Bart's	7	
Cystic hygroma	4	
Others (hemolysis, heart disease)	4	
2 Multiple malformations	10	0.53
3 Congenital heart disease	12	0.53
4 Gastroschisis	7	0.31
5 Abnormalities of extremities	7	0.31
6 Cystic hygroma	6	0.26
7 Hydrocephalus	6	0.26
8 Hydronephrosis (frank)	4	0.18
9 Porencephaly / Hydranencephaly	6	0.26
10 Omphalocele	4	0.22
11 Small bowel obstruction	3	0.18
12 Isolated cleft lip, cleft palate	3	0.13
13 Anencephaly & exencephaly	3	0.13
14 Cephalocele	3	0.13
15 Holoprosencephaly	3	0.13
16 Pulmonary sequestration	2	0.09
17 Diaphragmatic hernia	2	0.09
18 Other brain disorders	2	0.09
19 Bladder outlet obstruction	2	0.09
20 Cystic adenomatoid malformations	2	0.09
21 Others	10	0.44
<b>Chromosome-related Anomaly (structures)</b>		
22. Trisomy 21	11	0.48
23. Trisomy 18	8	0.35
24. Othes chromosomes	3	0.13
<b>Total</b>	<b>138</b>	<b>6.04</b>

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

**FIGURE 15 Histogram : Number of fetal congenital anomalies (not including chromosomal abnormalities)**



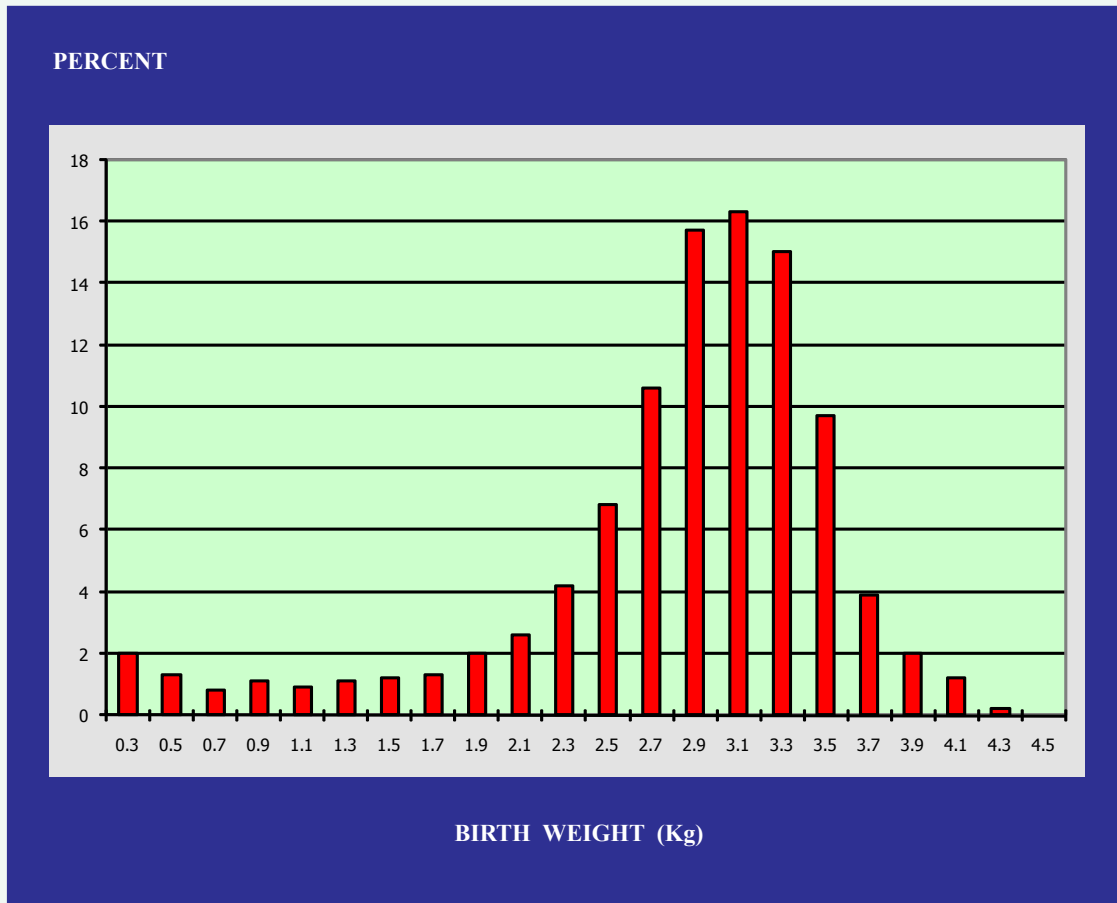
- |   |  |
|---|--|
| 1 <i>Hydrops fetalis (frank)</i>        | 12 <i>Isolated cleft lip, cleft palate</i> |
| 2 <i>Multiple malformations</i>         | 14 <i>Cephalocele</i>                      |
| 3 <i>Congenital heart disease</i>       | 15 <i>Holoprosencephaly</i>                |
| 4 <i>Gastroschisis</i>                  | 16 <i>Pulmonary sequestration</i>          |
| 5 <i>Abnormalities of extremities</i>   | 17 <i>Diaphragmatic hernia</i>             |
| 6 <i>Cystic hygroma</i>                 | 18 <i>Other brain disorders</i>            |
| 7 <i>Hydrocephalus</i>                  | 19 <i>Bladder outlet obstruction</i>       |
| 8 <i>Hydronephrosis (frank)</i>         | 20 <i>Cystic adenomatoid malformations</i> |
| 9 <i>Porencephaly / Hydranencephaly</i> | 21 <i>Others</i>                           |
| 13 <i>Anencephaly &amp; exencephaly</i> | 22 <i>Trisomy 21</i>                       |
| 10 <i>Omphalocele</i>                   | 23 <i>Trisomy 18</i>                       |
| 11 <i>Small bowel obstruction</i>       | 24 <i>Other chromosomes</i>                |

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

Birth Weight (grams)	Number	Percent
< 400	45	2.0
400-599	30	1.3
600-799	18	0.8
800-999	25	1.1
1000-1199	21	0.9
1200-1399	26	1.1
1400-1599	27	1.2
1600-1799	29	1.3
1800-1999	45	2.0
2000-2199	58	2.6
2200-2399	96	4.2
2400-2599	154	6.8
2600-2799	240	10.6
2800-2999	356	15.7
3000-3199	370	16.3
3200-3399	341	15.0
3400-3599	219	9.7
3600-3799	89	3.9
3800-3999	46	2.0
4000-4199	28	1.2
4200-4399	5	0.2
4400-4599	1	0.0
<b>Total</b>	<b>2269</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*

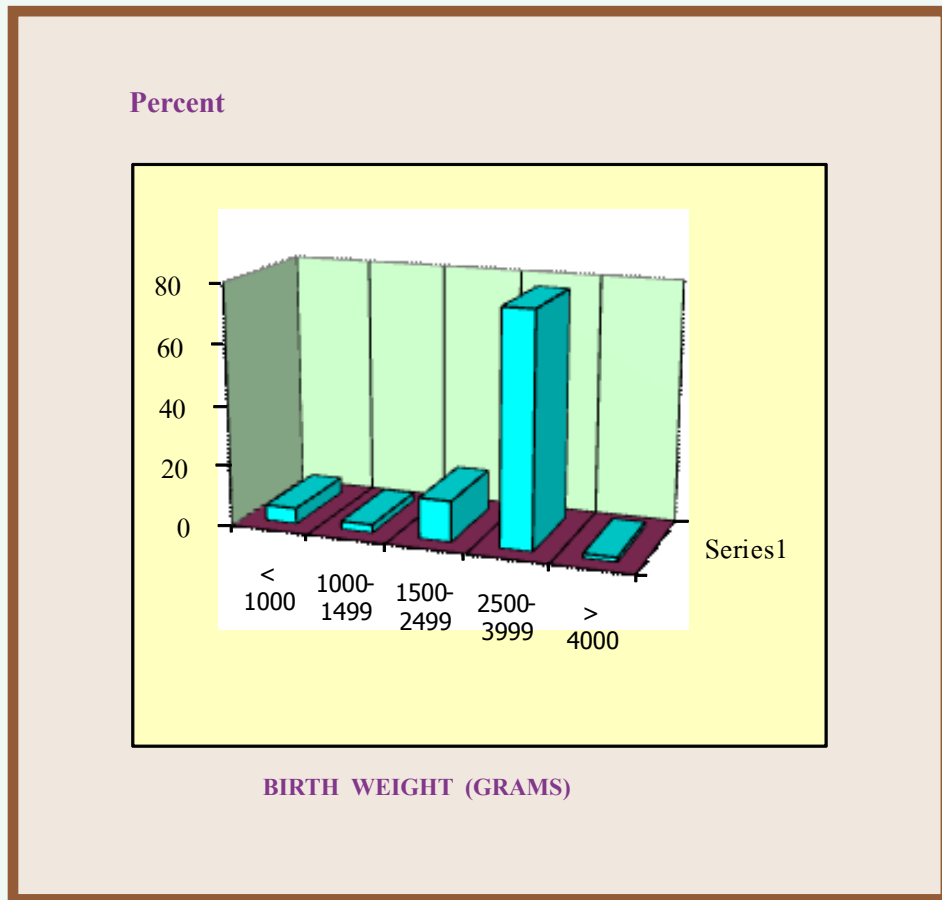
**TABLE 29** Number and percentage of neonates by birth weight group (total)

<b>Birth Weight (grams)</b>	<b>Number</b>	<b>Percent</b>
Extremely low birth weight (< 1000)	118	5.2
Very low birth weight (1000-1499)	62	2.7
Low birth weight (1500-2499)	308	13.5
Average birth weight (2500-3999)	1747	76.5
Macrosomia (> 4000)	34	1.5
<b>Total</b>	<b>2269</b>	<b>100.0</b>

*\* Including therapeutic termination of pregnancy*

**Average Birth Weight of Total Infants 2841±694 grams**  
**range 310-5240 grams**

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

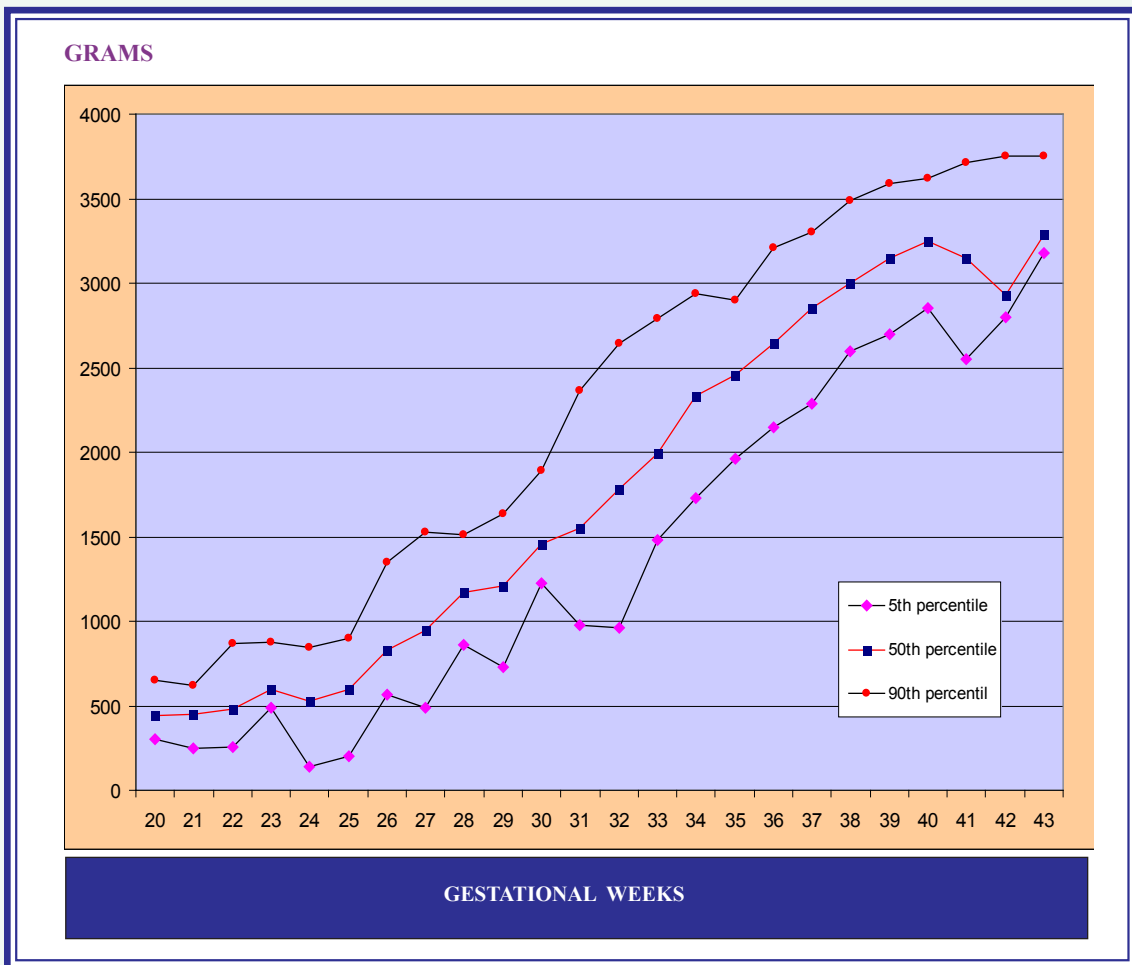




**TABLE 30 Fetal weight (grams) : the 10th, 50th, 90th percentile at various gestational age**

Gestational Age ( weeks)	Weight (grams) 10th Percentile	Weight (grams) 50th Percentile	Weight (grams) 90th Percentile
20	236.00	350.00	660.00
21	250.00	445.00	.
22	300.00	525.00	.
23	400.00	600.00	.
24	690.00	735.00	.
25	290.00	850.00	.
26	582.00	900.00	1166.00
27	800.00	960.00	.
28	983.00	1190.00	1838.00
29	868.00	1300.00	1682.00
30	1072.00	1470.00	1900.00
31	1228.00	1495.00	2260.00
32	1179.00	1620.00	2156.00
33	1588.00	1960.00	2726.00
34	1700.00	2350.00	2771.00
35	1982.00	2400.00	3012.00
36	2144.00	2600.00	3174.00
37	2400.00	2850.00	3355.00
38	2550.00	3050.00	3550.00
39	2700.00	3150.00	3608.00
40	2800.00	3250.00	3749.00
41	2788.00	3350.00	3857.00
42	2770.00	3300.00	.

**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)**

<b>Gestational Age (weeks)</b>	<b>Number of Neonates</b>	<b>Means (grams)</b>	<b>Standard Deviation</b>
20	16	406.25	216.206
21	3	345.00	70.534
22	8	480.00	167.843
23	10	633.00	275.804
24	8	702.50	464.504
25	9	838.89	373.344
26	7	838.57	397.971
27	9	1060.00	261.295
28	14	1132.86	456.583
29	9	1271.11	331.717
30	16	1298.13	310.617
31	17	1770.00	257.124
32	19	1906.32	475.771
33	29	2016.90	458.243
34	36	2373.61	374.945
35	70	2475.29	496.698
36	113	2720.62	381.883
37	280	2846.29	425.082
38	513	3046.14	376.407
39	487	3152.36	379.285
40	320	3209.41	326.827
41	116	3265.34	361.647
42	14	3209.29	323.406
43	3	3546.67	949.754

**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
18	1	250.00	.
19	1	200.00	.
23	2	550.00	70.711
25	1	650.00	.
26	2	700.00	282.843
28	5	1106.00	192.691
29	3	1210.00	160.935
30	1	1270.00	.
31	1	1310.00	.
32	4	1895.00	607.755
33	3	1950.00	50.000
34	3	2006.67	247.857
35	7	2030.00	216.949
36	5	2170.00	360.624
37	5	2182.00	443.813
38	2	2500.00	141.421
39	1	2300.00	.
40	1	2930.00	.
41	1	3190.00	.
42	1	2600.00	.

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

Type	Means Birth Weight	Standard Deviation	Range
Singleton	2888.76	668	180-5240
Twins	1747.94	711	180-3190

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

Type	Means Gestational Age	Standard Deviation	Range
Singleton	37.47	3.5	20-43
Twins	32.41	5.3	18-42

**TABLE 35 Early postpartum hemorrhage**

Cause	Number	Percent
Uterine Atony	20	0.90
Lacerations	6	0.27
Retained Pieces of Placenta	7	0.32
Placenta Adherens	4	0.18
Uterine infection	4	0.18
<b>Total</b>	41	1.85

## Section III

# HIGH RISK PREGNANCIES

**TABLE 36 Major complications during pregnancy**

Complications	Numbers	Prevalence (%)
Previous cesarean section	177	7.97
Small-for-gestational Age (SGA)	165	7.43
Pregnancy-induced hypertension (PIH)	150	6.75
Diabetes mellitus	148	6.66
Hepatitis B antigen positive	130	5.85
Prolonged PROM (> 18 hours)	52	2.34
Chronic Hypertension	30	1.35
Anti-HIV positive	29	1.31
Placenta previa	27	1.22
Iron deficiency anemia	24	1.08
Heart Disease	22	0.99
Asthma	21	0.95
Marked obesity	19	0.86
Upper urinary tract Infection	16	0.72
Thyrotoxicosis	15	0.68
Myoma Uteri	14	0.63
Thalassemia	14	0.63
SLE	12	0.54
Chorioamnionitis	8	0.36
Renal diseases	8	0.36
Genital tract infection	6	0.27
Epilepsy	5	0.23
Autoimmune thrombocytopenia	5	0.23
Abruptio placentae	3	0.14
Ovarian tumor	3	0.14

## Pregnancy with Heart Disease

<b>Total</b>	22 cases (0.99 percent of total parturients) All were singleton (not included 3 cases of therapeutic abortion)
<b>Age</b>	range 17-42 years average 27.3±6.8 years age of 35 years or more 3 cases (13.6 %)
<b>Functional Class (At delivery 22 cases)</b>	
Class I	10 cases
Class II	7 cases
Class III	5 cases
Class IV	- case
<b>Gestational Age at Birth</b>	range 24-40 weeks (not included therapeutic abortion) average 36.2±4.3 weeks premature delivery (before completed 37 weeks) 6 cases (27.3 %)
<b>Birth Weight</b>	range 450-3550 grams average 2576±886 grams number of low birth weight fetus (less than 2,500 grams) 6 cases (27.3 %)
<b>Apgar Scores at 1 minute (less than 7)</b>	3 cases (13.6 %)
<b>Apgar Scores at 5 minutes (less than 7)</b>	2 cases (9.1 %)
<b>Small-for-gestational-age (less than 10th percentile)</b>	4 cases (18.2 %)

**Perinatal death** 3 cases (13.6 %) (immaturity)

**Congenital Anomalies** -

**Other complications (No maternal death)**

<i>Diabetes mellitus</i>	2 cases
<i>Hepatitis B surface antigen positive</i>	1 case
<i>Pregnancy-induced hypertension</i>	3 cases
<i>Myoma uteri</i>	1 case
<i>Thyrotoxicosis</i>	1 case
<i>Previous cesarean section</i>	2 cases

## Pregnancy with Diabetes Mellitus

**Total** 148 cases (6.67 percent of total parturients)  
(Singleton : 146, Twins : 2)

*Note : Glucose challenge test was used as a screening test only in women at risk for diabetes melitus and age > 30 yr.*

**Age** range 19-44 years  
average  $32.9 \pm 5.3$  years  
age of 35 years or more 57 cases (38.5 %)

**Gestational Age at Birth**

range 19-41 weeks  
average  $37.5 \pm 3.2$  weeks  
premature delivery (before completed 37 weeks)  
29 cases (19.6 %)

**Birth Weight**

range 360-4270 grams  
average  $2895 \pm 709$  grams  
number of low birth weight fetus (less than 2,500 grams)  
26 cases (17.6 %)



<b>Apgar Scores at 1 minute (less than 7)</b>	14 cases (9.5 %)
<b>Apgar Scores at 5 minutes (less than 7)</b>	5 case (3.4 %)
<b>Small-for-gestational-age (less than 10th percentile)</b>	12 cases (8.1 %)
<b>Perinatal Death</b>	5 cases (3.4 %)

**Congenital Anomalies** 4 cases (2.7 %) (cystic hygroma, imperforate anus, cystic adenomatoid malformation, Tetralogy of Fallot)

#### **Other complications**

<i>Pregnancy-induced hypertension</i>	19 cases
<i>Previous cesarean section</i>	15 cases
<i>Hepatitis B antigen positive</i>	10 cases
<i>Chronic hypertension</i>	9 cases
<i>Prolonged PROM (&gt; 18 hours)</i>	9 cases
<i>HIV positive</i>	6 cases
<i>Myoma uteri</i>	3 cases
<i>Heart disease</i>	2 cases
<i>Placenta previa</i>	2 cases
<i>Systemic lupus erythematosus</i>	2 cases
<i>Upper urinary tract infection</i>	2 cases
<i>Condyloma</i>	2 cases
<i>Oligohydramnios</i>	2 cases
<i>Polyhydramnios</i>	2 cases
<i>Asthma</i>	1 case
<i>Iron deficiency anemia</i>	1 case
<i>Ovarian tumor</i>	1 case
<i>Thyrotoxicosis</i>	1 case

#### **Classifications**

<b>Pregestational DM (diagnosed before pregnancy)</b>	24 cases (16.2 %)
<i>Chemical DM (Class A)</i>	4 cases
<i>Overt DM (Class B-T)</i>	20 cases
<i>Class B</i>	16 cases
<i>Class D, F, R</i>	4 cases

Gestational DM (diagnosed during pregnancy)	108 cases (73.0 %)
<i>Chemical DM (Class A1)</i>	82 cases
<i>Overt DM (Class A2)</i>	26 cases

#### Method of Glucose Control

Insulin	49 cases
Oral hypoglycemic drugs	2 cases
Oral hypoglycemic drugs & Insulin -	cases
Diet Control only	97 cases

## Pregnancy with Thalassemia

**Total** 14 cases (0.63 percent of total parturients)  
(All were singleton)  
(Including only the patients with hemoglobin less than 10 gm%)

#### Type of Thalassemia

β-thalassemia / HbE	6 cases
alpha-thalassemia (HbH disease)	8 cases

**Age** range 20-38 years  
average 27.4±5.0 years  
age of 35 years or more 1 cases (7.1 %)

#### Gestational Age at Birth

range 33-40 weeks  
average 37.9±1.7 weeks  
premature delivery (before completed 37 weeks)  
2 case (14.3 %)

**Birth Weight**

range 1580-3410 grams

average 2644±603 grams

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

5 cases (35.7 %)

**Apgar Scores at 1 minute (less than 7)** 2 cases (14.3 %)**Apgar Scores at 5 minutes (less than 7)** 1 case (7.1 %)**Small-for-gestational-age (less than 10th percentile)** 6 cases (42.9 %)**Perinatal death** 1 cases (7.1 %)**Other complications***Hepatitis B surface antigen positive* 2 cases*Chronic hypertension* 1 case*Pregnancy-induced-hypertension* 1 case*Iron deficiency* 1 case*Oligohydramnios* 1 case**Pregnancy with Thyrotoxicosis****Total** 15 cases (0.67 percent of total parturients)

All were singleton

*Diagnosed before pregnancy* 6 cases*Diagnosed during pregnancy* 7 cases

**Age** range 21-37 years  
 average  $28.5 \pm 5.3$  years  
 age of 35 years or more 2 cases (13.3 %)

**Gestational Age at Birth**

range 18-40 weeks  
 average  $36.3 \pm 5.2$  weeks  
 premature delivery (before completed 37 weeks)  
 5 cases (33.3 %)

**Birth Weight**

range 210-4160 grams  
 average  $2862 \pm 882$  grams  
 number of low birth weight fetus (less than 2,500 grams)  
 2 cases (13.3 %)

**Apgar Scores at 1 minute (less than 7)** 1 cases (6.7 %)

**Apgar Scores at 5 minutes (less than 7)** 1 cases (6.7 %)

**Small-for-gestational-age (less than 10th percentile)** 4 cases (26.7 %)

**Perinatal death** 1 cases (6.7%, anomaly)

**Congenital Anomalies** 1 case (Imperforate anus)

**Other complications**

*Premature rupture of membrane* 3 cases  
*Hepatitis B surface antigen positive* 1 case  
*Heart disease* 1 case  
*Diabetes mellitus* 1 case  
*Pregnancy-induced hypertension* 1 case

## Pregnancy with Hepatitis B Antigen Positive

<b>Total</b>	130 cases (5.85 percent of total parturients) (singleton : 128; twins : 1; triplet : 1)
<b>Age</b>	range 16-46 years average 28.1±5.1 years age of more than 35 years 16 cases (12.3 %)
<b>Gestational Age at Birth</b>	range 20-42 weeks average 37.3±4.3 weeks premature delivery (before completed 37 weeks) 22 cases (16.9 %)
<b>Birth Weight</b>	range 300-4050 grams average 2893±766 grams number of low birth weight fetus (less than 2,500 grams) 23 cases (17.7 %)
<b>Apgar Scores at 1 minute (less than 7)</b>	14 cases (10.8 %)
<b>Apgar Scores at 5 minutes (less than 7)</b>	7 cases (5.4 %)
<b>Small-for-gestational-age (less than 10th percentile)</b>	12 cases (9.2 %)
<b>Perinatal Death</b>	6 cases (4.6 %) (dead in utero 2 cases)
<b>Congenital Anomalies</b>	2 cases ( <i>Hydrops fetalis, beta-thal/HbE disease</i> )

**Other complications**

<i>Diabetes melitus</i>	10 cases
<i>Pregnancy-induced hypertension</i>	10 cases
<i>Prolonged PROM (&gt; 18 hours)</i>	6 cases
<i>Iron deficiency</i>	4 cases
<i>Previous cesarean section</i>	4 cases
<i>Asthma</i>	3 cases
<i>Myoma uteri</i>	3 cases
<i>anti-HIV positive</i>	2 cases
<i>Oligohydramnios</i>	2 cases
<i>Polyhydramnios</i>	2 cases
<i>Thalassemia</i>	2 cases
<i>Chronic hypertension</i>	1 case
<i>Heart disease</i>	1 case
<i>Thyrotoxicosis</i>	1 case
<i>Placenta previa</i>	1 case

## Pregnancy with Asthma

**Total**                    21 cases (0.95 percent of total parturients)  
(All were singleton)

**Activity of Disease**

Well-controlled	17 cases
Poorly-controlled	4 cases

**Age**                    range 20-37 years  
average 28.2±5.0 years  
age of 35 years or more 3 cases (14.3%)

**Gestational Age at Birth**

range 36-40 weeks  
 average 38.4±1.4 weeks  
 premature delivery (before completed 37 weeks)  
 3 cases (14.3 %)

**Birth Weight (not included abortion)**

range 2400-3450 grams  
 average 2954±283 grams  
 number of low birth weight fetus (less than 2,500 grams)  
 3 cases (14.3 %)

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

**Apgar Scores at 5 minutes (less than 7)** 0 case (0.0 %)

**Small-for-gestational-age (less than 10th percentile)** 2 cases (9.5%)

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

**Congenital Anomalies** -

**Other complications**

<i>Hepatitis B surface antigen</i>	3 cases
<i>Previous cesarean section</i>	2 cases
<i>Diabetes mellitus</i>	1 case
<i>Iron deficiency anemia</i>	1 case
<i>Pregnancy-induced hypertension</i>	1 case
<i>Oligohydraminos</i>	1 case

## Pregnancy with Chronic Hypertension

**Total** 30 cases (1.35 percent of total parturients)  
(Singleton : 29; Twin : 1)

### Severity of Hypertension

Severe (start treatment during pregnancy)	5	cases
Severe (controlled prior to pregnancy)	8	cases
Mild (no medication BP less than 160/90)	11	cases
Mild (BP less than 160/90 but treated with antihypertensive drug)	6	cases

**Age** range 20-42 years  
average 32.7±6.3 years  
age of 35 years or more 15 cases (50.0 %)

### Gestational Age at Birth

range 23-40 weeks  
average 35.4±4.2 weeks  
premature delivery (before completed 37 weeks)  
15 cases (50.0%)

**Birth Weight** range 1220-3800 grams  
average 2506±912 grams  
number of low birth weight fetus (less than 2,500 grams)  
11 cases (36.7 %)

**Apgar Scores at 1 minute (less than 7)** 4 cases (13.3 %)

**Apgar Scores at 5 minutes (less than 7)** 2 cases (6.7 %)



**Small-for-gestational-age (less than 10th percentile)** 5 cases (16.7%)

**Perinatal death** 1 case (3.3%)

**Congenital Anomalies** -

**Other complications**

<i>Diabetes mellitus</i>	9 cases
<i>Pregnancy-aggravated hypertension</i>	5 cases
<i>Hepatitis B surface antigen</i>	1 case
<i>Previous cesarean section</i>	1 case
<i>Candidiasis</i>	1 case
<i>HIV antibody positive</i>	1 case
<i>Oligohydramnios</i>	1 case
<i>Thalassemia</i>	1 case

## Pregnancy-induced Hypertension

**Total** 150 (6.75 percent of total parturients)  
(Singleton : 142; Twins : 7; Triplet : 1)

**Age** range 17-46 years  
average  $20.0 \pm 6.7$  years  
age of 35 years or more 41 cases (27.3%)

**Gestational Age at Birth**  
range 27-43 weeks  
average  $37.4 \pm 2.8$  weeks  
premature delivery (before completed 37 weeks)  
42 cases (28.0%)

**Classification of PIH**

Gestational hypertension (without proteinuria)	48 cases (33.6 %)
Mild Preeclampsia	65 cases (42.7 %)
Severe Preeclampsia	31 cases (18.2 %)
Pregnancy-aggravated hypertension	5 cases (4.2 %)
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>1 case</i>
<i>ANC at Maharaj Nakorn Chiang Mai</i>	<i>0 case</i>

**Birth Weight** range 750-4330 grams  
 average 2790±726 grams  
 number of low birth weight fetus (less than 2,500 grams)  
 40 cases (26.7 %)

**Apgar Scores at 1 minute (less than 7)** 15 cases (10.0 %)

**Apgar Scores at 5 minutes (less than 7)** 4 cases (2.7 %)

**Small-for-gestational-age (less than 10th percentile)** 25 cases (16.7 %)

**Perinatal death** 3 cases (2.0 %; imperforan)

**Congenital Anomalies**

<i>Hydrops fetalis</i>	<i>2 cases</i>
<i>Imperforate anus</i>	<i>1 case</i>

**Other complications**

<i>Diabetes Mellitus</i>	19 cases
<i>Hepatitis B antigen positive</i>	10 cases
<i>Chronic hypertension</i>	5 cases
<i>Marked obesity</i>	5 cases
<i>Previous cesarean section</i>	4 cases
<i>Prolonged ruptured membranes</i>	4 cases
<i>Heart disease</i>	3 cases
<i>Anti-HIV positive</i>	3 cases
<i>Oligohydramnios</i>	3 cases
<i>Myoma uteri</i>	2 cases
<i>Urinary tract infection</i>	2 cases
<i>Asthma</i>	1 case
<i>Iron deficiency</i>	1 case
<i>Placental previa</i>	1 case
<i>Thalassemia</i>	1 case
<i>Thyrotoxicosis</i>	1 case
<i>Transverse lie</i>	1 case
<i>Renal stone</i>	1 case

## Placenta Previa

<b>Total</b>	27 cases (1.21 percent of total parturients) All were singleton
<b>Age</b>	range 16-38 years average $29.15 \pm 5.7$ years age of 35 years or more 4 cases (14.8 %)

**Gestational Age at Birth**

range 18-39 weeks  
 average  $32.4 \pm 6.2$  weeks  
 premature delivery (before completed 37 weeks)  
 16 cases (59.3 %)

**Birth Weight**

range 280-3500 grams  
 average  $2101 \pm 969$  grams  
 number of low birth weight fetus (less than 2,500 grams)  
 14 cases (51.9 %)

**Apgar Scores at 1 minute (less than 7)** 8 cases (29.6 %)

**Apgar Scores at 5 minutes (less than 7)** 7 cases (25.9 %)

**Small-for-gestational-age (less than 10th percentile)** 3 cases (11.1 %)

**Perinatal death** 5 cases (18.5 %)

**Congenital Anomalies** 3 cases (hydrops fetalis; 3)

**Other complications**

<i>Transverse lie</i>	3 cases
<i>Diabetes mellitus</i>	2 cases
<i>Previous cesarean section</i>	2 cases
<i>Hepatitis B surface antigen positive</i>	1 case
<i>HIV antibody positive</i>	1 case
<i>Pregnancy-induced hypertension</i>	1 case
<i>Polyhydramnios</i>	1 case
<i>Premature rupture of membrane</i>	1 case

## Pregnancy with Acute Pyelonephritis

<b>Total</b>	16 cases (0.72 percent of total parturients) (All singleton)	
<b>Age</b>	range 17-36 years average 25.6±5.9 years age of more than 35 years 2 cases (12.5 %)	
<b>Gestational Age at Birth</b>	range 28-40 weeks average 35.1±4.0 weeks premature delivery (before completed 37 weeks) 8 cases (50.0 %)	
<b>Onset</b>		
	First trimester	1 cases
	Second trimester	6 cases
	Third trimester	8 cases
	Postpartum	1 case
<b>Number of Episodes</b>		
	1	11 cases
	2	3 cases
	3	2 case
<b>Birth Weight</b>	range 860-3270 grams average 2398±929 grams number of low birth weight fetus (less than 2,500 grams) 8 cases (50.0 %)	

<b>Apgar Scores at 1 minute (less than 7)</b>	1 cases (6.3 %)
<b>Apgar Scores at 5 minutes (less than 7)</b>	0 cases (0.0 %)
<b>Small-for-gestational-age (less than 10th percentile)</b>	2 cases (12.5 %)
<b>Perinatal death</b>	0 case (0.0%)
<b>Congenital Anomalies</b>	0 case (0.0%)
<b>Other complications</b>	
<i>Diabetes mellitus</i>	2 cases
<i>Pregnancy-induced hypertension</i>	2 cases
<i>Condyloma accuminata</i>	1 case
<i>HIV antibody positive</i>	1 case
<i>Prolonged PROM</i>	1 case

## Small-for-Gestational-Age Fetuses

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

<b>Total</b>	165 (7.23 percent of total babies; 2283 fetuses)
	Singleton 125 fetuses
	Multiple pregnancies 40 fetuses
<b>Age</b>	range 15-46 years

average  $28.9 \pm 6.2$  years  
 age of 35 years or more 31 cases (18.8 %)

#### **Gestational Age at Birth**

range 24-42 weeks  
 average  $34.8 \pm 7.1$  weeks  
 premature delivery (before completed 37 weeks)  
 26 cases (15.7 %)

**Birth Weight** range 240-2620 grams  
 average  $2154 \pm 752$  grams  
 number of low birth weight fetus (less than 2,500 grams)  
 139 cases (84.2 %)

**Apgar Scores at 1 minute (less than 7)** 42 cases (25.5 %)

**Apgar Scores at 5 minutes (less than 7)** 9 cases (5.5 %)

**Perinatal Death** 8 in 165 cases (4.84 %)

#### **Congenital Anomalies**

<i>Twin transfusion syndrome</i>	7 cases
<i>Chromosomal abnormalities</i>	5 cases
<i>Suspected of intrauterine infection</i>	3 cases
<i>Multiple anomalies</i>	2 cases
<i>Congenital heart disease</i>	2 cases
<i>Gastroschisis</i>	1 case
<i>Omphalocele</i>	1 case

#### **Other complications**

<i>Pregnancy-induced hypertension</i>	25 cases
<i>Medical diseases</i>	26 cases
<i>Poor maternal weight gain</i>	16 cases





**TABLE 38 Voluntary screening (2009) among pregnant women for anti-HIV antibody**

Pregnant women (Counselling)	1,646 cases
Voluntary screening	1,598 cases
+ve anti-HIV antibody	24 cases
% positive case	1.50 %

**TABLE 39 Age of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)**

Age (years)	No. of cases	Percent
15-19	1	3.5
20-24	7	24.1
25-29	7	24.1
30-34	10	34.5
35-39	4	13.8
40-45	-	-
<b>Total</b>	<b>29</b>	<b>100</b>
<i>Mean age (years)</i>	<i>28.38</i>	
<i>Standard deviation</i>	<i>5.57</i>	
<i>Range</i>	<i>18-39</i>	<i>years</i>

**TABLE 40 Parity of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)**

Parity	No. of cases	Percent
0	8	27.6
1	11	37.9
2	6	20.7
3	3	10.3
≥ 4	1	3.5
<b>Total</b>	<b>19</b>	<b>100</b>

**TABLE 41 Age at first marriage of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)**

Age (years)	No. of cases	Percent
15-19	12	41.4
20-24	8	27.6
25-29	3	10.3
30-34	-	-
Unknown	6	20.78
<b>Total</b>	<b>29</b>	<b>100</b>
<i>Mean age (years)</i>	<i>19.87</i>	
<i>Standard deviation</i>	<i>2.86</i>	
<i>Range</i>	<i>16-27</i>	<i>years</i>

**TABLE 42** Number of marriages of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)

Number	No. of cases	Percent
1	4	13.8
2	19	65.6
3	3	10.3
Unknown	3	10.3
<b>Total</b>	<b>29</b>	<b>100</b>

**TABLE 43** Occupations of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)

Occupations	No. of cases	Percent
Employee	13	44.8
Housewife	6	20.6
Commercial	4	13.8
Business	4	13.8
Others	2	6.8
<b>Total</b>	<b>29</b>	<b>100</b>

**TABLE 44 Residence (province) of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)**

Province	Number	Percent
Chiang Mai (เชียงใหม่)	21	72.4
Lamphun (ลำพูน)	3	10.3
Chiangrai (เชียงใหม่)	2	6.8
Others	3	10.3
<b>Total</b>	<b>19</b>	<b>100</b>

**TABLE 45 Complications of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)**

	Cases	Percent
Without complication	14	48.3
With complication	15	51.7
• Antepartum	11	
• Intrapartum	2	
• Postpartum	2	

**TABLE 46 Birth weight in the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)**

<b>Birth weight (grams)</b>	<b>Number</b>	<b>Percent</b>
< 1,499	4	12.9
1,500 - 1,999	3	9.7
2,000 - 2,499	3	9.7
2,500 - 2,999	11	35.5
3,000 - 3,499	8	25.8
3,500 - 3,999	2	6.4
<b>Total</b>	<b>29</b>	<b>100</b>

<i>Mean birthweight (grams)</i>	<i>2,517.10</i>
<i>Standard deviation (grams)</i>	<i>903.77</i>
<i>Range (grams)</i>	<i>280-3,680</i>

**TABLE 47 Postpartum contraception of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2009)**

<b>Method</b>	<b>No. of cases</b>	<b>Percent</b>
Female sterilization	19	65.5
DMPA	4	13.8
Combined pills	-	-
Unknown	6	20.7
<b>Total</b>	<b>29</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** 1775 tests

(OPD, 1277; LR, 95; OB2&3, 20)

#### Secondary Surveillance

**Contraction stress test**

or **Nipple stimulation test** 6 tests

**Biophysical profile/ultrasonography** 78 tests

**Doppler velocimetry** 320 tests

### Prenatal Diagnosis

1. **Ultrasonography** 9,017 examinations  
(~ 25 % for gynecologic and infertile examinations)
2. **Amniocentesis** 1,175 cases
3. **Cordocentesis** 437 cases
4. **Chorionic villous sampling** 85 procedures

## OBSTETRIC ULTRASOUND SERVICE

*Number of Patients undergoing sonographic examinations (OB&GYN) in 2,009*

*9,017 cases*

Several examinations involved in the researches without specific indications

### Indications for sonographic examinations

■ Uncertained date of gestation <i>uterine size incompatible with gestational age unrecognized last menstrual period</i>	13.9 %
■ Suspected intrauterine growth retardation	1.6 %
■ Bleeding in first half of pregnancy	2.0 %
■ Antepartum hemorrhage	0.6 %
■ Suspected fetal death	0.7 %
■ Rule out fetal anomalies	36.3 %
■ Fetal growth surveillance	10.1 %
■ Gynecologic ultrasound	25.6 %
■ Infertile investigation	3.0 %
■ Perinatal research	2.4 %
■ creening in menopausal women	3.8 %

## Cordocentesis (2009)

### Total 437 cases

#### Indications

	No.	(%)
1. Previous child with hydrops fetalis	6	1.4
2. Pregnancy at risk for Hb Bart's	71	16.2
3. Pregnancy with early signs of hydrops fetus	9	2.1
4. Previous child with $\beta$ thal major	2	0.5
5. Pregnancy at risk for $\beta$ thal major	42	9.6
6. Previous child with $\beta$ thal Hb/E	3	0.7
7. Pregnancy at risk for $\beta$ thal Hb/E	135	30.9
8. Chromosome analysis	49	11.2
9. Combined chromosome and risk for Hb bart's , $\beta$ thal major, $\beta$ thal Hb/E and risk Hb bart's + $\beta$ thal major	68	15.6
10. Combined chromosome and previous child with Hb bart's , $\beta$ thal major and $\beta$ thal Hb/E	12	2.8
11. Combined chromosome analysis and uncertain OFT	17	3.9
12. Uncertain OFT	4	0.9
13. Repeat for chromosome confirmation	16	3.7
14. Repeat for Hb typing	2	0.5
15. Other	1	0.2
<b>Total</b>	<b>437</b>	<b>cases</b>



## Amniocentesis (2009)

**Total 1,175 cases**

### Indications

1. Elderly gravida (age of more than 35 years)	1123 cases
<i>with no other obvious risk</i>	1116 cases
<i>with previous child with Down syndrome</i>	1 case
<i>with previous child abnormal chromosome</i>	1 case
<i>with previous child mental retardation</i>	1 case
<i>with previous child with fetal anomaly</i>	1 case
<i>with high risk for Down syndrome screening</i>	2 cases
2. Pregnancy with +ve serum markers screening	19 cases
2. Pregnancy with sonomarkers / anomalies	14 cases
3. Pregnancy with Down syndrome in previous child	5 cases
4. Pregnancy with abnormal chromosomes in previous child	3 cases
5. Pregnancy with fetal anomaly in previous child	2 cases
6. Pregnancy with previous child of other mental deficiency	2 cases
7. Others	6 cases

## Chorionic Villous Sampling (2009)

### Total 85 procedures

#### Indications

1. Fetal chromosome study	16 cases
- elderly gravida	8 cases
- Thickened nuchal translucency	5 cases
- Previous fetal trisomy	1 case
- Fetal cystic hygroma	1 case
- Elderly gravida with previous fetal trisomy	1 case
2. Risk for fetal severe thalassemia	60 cases
- Risk for Hb Bart's disease	26 cases
- Risk for beta thalassemia major	8 cases
- Risk for beta thalassemia/Hb E disease	25 cases
- Risk for Hb Bart's and beta thalassemia/Hb E disease	1 case
3. Fetal chromosome study and thalassemia diagnosis	9 cases
- Elderly gravida with fetal risk for Hb Bart's disease	5 cases
- Elderly gravida with fetal risk for beta thalassemia major	1 case
- Elderly gravida with beta thalassemia/Hb E disease	3 cases

## 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 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 2 min OF is positive
      - HbA<sub>2</sub> level (negative 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 = > 78 fl +ve % HbA<sub>2</sub> = HbA<sub>2</sub> > 4%

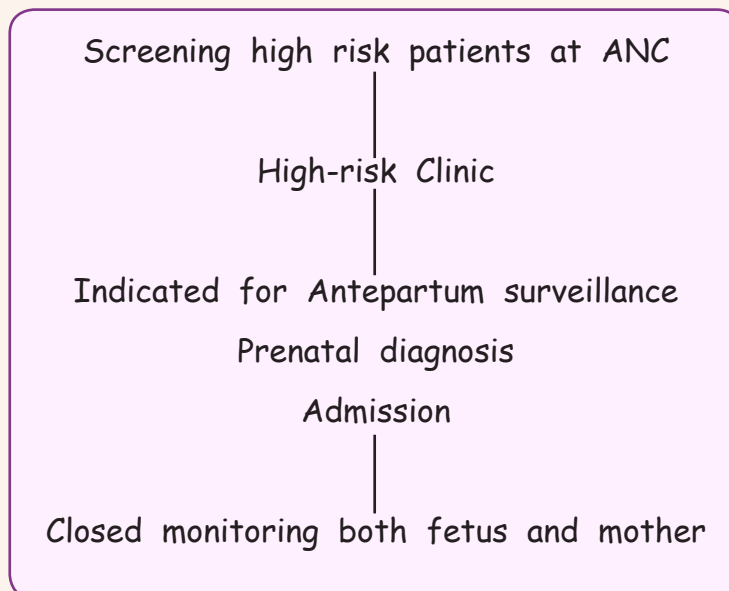
## PROSPECTIVE SCREENING FOR THALASSEMIA PROGRAM 2009

■ Total number of pregnant screened	1,400 cases
■ Positive MCV/OFT or Hb E	403 cases
■ Number of couple at risk for thalassemia	25 couples
<i>Risk for Hb Bart's</i>	10 cases
<i>Risk for Beta-thalassemia major</i>	2 cases
<i>Risk for Beta thalassemia/Hb E</i>	13 cases
■ The choice which selected by couples	
<i>Cordocentesis</i>	17 cases
<i>Chorionic villus samplings</i>	1 cases
<i>Refused PND</i>	1 case
<i>GA (too advanced)</i>	1 case
<i>Abortion before selection</i>	2 cases
<i>Ultrasonography</i>	1 case
<i>No information</i>	2 cases
■ Result of PND	
<i>Hb bart's</i>	3 cases
<i>Beta thalassemia major</i>	- cases
<i>Beta thalassemia/Hb E</i>	2 cases

## High Risk Pregnancy

Number of patients approximately 480 cases

### Management Guideline



#### *High-risk patients at Maharaj Nakorn Chiang Mai Hospital in 2009*

- |   |        |
|---|--------|
| 1. Elderly Gravida (age of 35 years or more)                  | 14.9 % |
| 2. Teenage Pregnancy (age of less than 20 years)              | 9.4 %  |
| <i>Early adolescence (age of less than 17 years)</i>          | 1.6 %  |
| <i>Late adolescence (age of 17-19 years)</i>                  | 7.8 %  |
| 3. Pregnancy complicated with medical or obstetrical diseases | 8.4 %  |

*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.