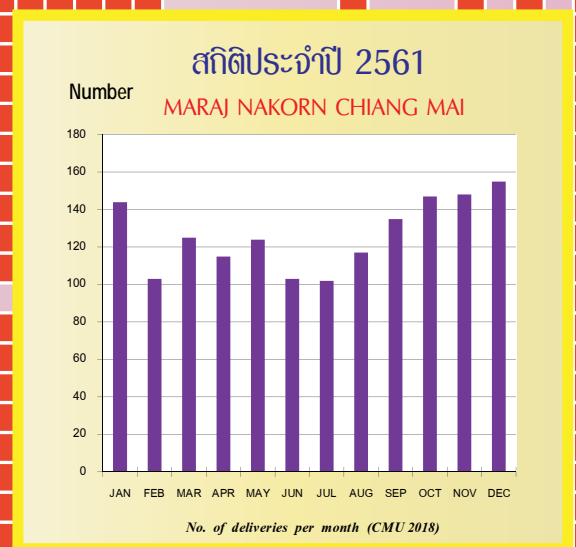


MATERNAL-FETAL MEDICINE 2018



หน่วยเวชศาสตร์มารดาและทารก
ภาควิชาสูติศาสตร์และนรีเวชวิทยา
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

ANNUAL REPORT 2018

MATERNAL-FETAL MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY

CHIANG MAI, THAILAND

MATERNAL-FETAL MEDICINE 2018

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อนุสาขาเวชศาสตร์มารดาและทารก

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PREFACE

One major field of our Department of Obstetrics and Gynecology is the Maternal-Fetal Medicine (MFM) division that serves the major of obstetrician's complicated patients mainly from the Northern part of Thailand. MFM Division is very famous in academic career so that many elective fellows from other institutes visit this unit every year.

This annual report 2019 presents their summarized hard-working outputs in last year. It is divided into 4 parts as follows; the obstetric mortality, the general obstetrics, the high-risk pregnancies, and the perinatal investigations. The number of total delivery is 1,518 cases; a little bit decreasing from the last year. The cesarean section rate is gradually increasing while the rate of vaginal operative delivery is decreased. Over 21.6% of pregnant women are older than 35 years old, the highest rate ever since. Many of specialized prenatal diagnostic procedures were carried out with the impressive outcomes.

Furthermore, the MFM Division is still acquired the funding mainly from Thailand Research Fund (TRF) and National Research Council of Thailand (NRCT) into the department, generating many 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. I have admired all MFM team for their hard- working in this field.

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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 2019 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 considered 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 26.9% in the year 2016, again a new record. This increasing rate may be reflected from the combination of parental expectation, legal issue and training program. The rate of elderly pregnancy and other complicated pregnancies are on the rise. 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.

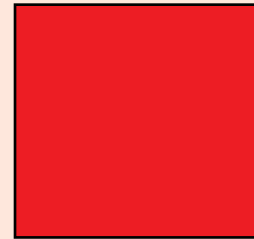
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ANNUAL REPORT



2018

MATERNAL-FETAL MEDICINE

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DIVISION OF MATERNAL-FETAL MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY

CHIANG MAI, THAILAND

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 2018: For gestational age ≥ 22 weeks
: 31 cases of total birth = 1,518 cases)

■ *Gestational age between 22-27 weeks 27 cases (87.09 %)*

	CMU	Referred	Total
Low risk	2	4	6
High risk	5	16	21
Autopsy	2	7	9

Causes of death

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	0	0	0
2. Congenital malformations	0	8	8
3. Condition associated with immaturity	3	3	6
4. Asphyxia developed in labor	0	1	1
5. Other specific conditions	0	1	1
6. Therapeutic termination related to PND	4	2	6

Stillbirth 2018: For gestational age ≥ 28 weeks
: 4 cases of total birth = 1518 cases)

■ *Gestational age between ≥ 28 weeks 4 cases (12.90 %)*

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

Causes of death

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

Stillbirth rate :

Stillbirth rate = 2.63 per 1000 total births
(by old WHO definition: ≥ 28 weeks or birth weight > 1000 grams)

Stillbirth rate = 20.42 per 1000 total births
(by new WHO definition : ≥ 22 weeks or birth weight > 500 grams)

Stillbirth rate = 16.5 per 1000 total births
(by new WHO definition : ≥ 22 weeks' gestation or birth weight > 500 grams, not included therapeutic termination due to fetal malformations)

NEONATAL DEATH

Neonatal death 2018 :

11 cases (GA > 22 weeks) of total 1487 live births

- *Gestational age between 22-27 weeks 5 cases (45.45 %)*
(Total livebirth 1487 cases)

	CMU	Referred	Total
Low risk	0	0	0
High risk	1	4	5
Autopsy	0	0	0

Causes of death

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

Neonatal death 2018 :

6 cases (GA > 28 weeks) of total 1487 live births

- *Gestational age between ≥ 28 weeks 6 cases (54.54 %)*
(Total livebirth 1487 cases)

	CMU	Referred	Total
Low risk	0	1	1
High risk	1	4	5
Autopsy	0	4	4

Causes of death

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

Early neonatal death rate 4.03 per 1,000 live births

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

Early neonatal death rate 7.40 per 1,000 live births

(≥ 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 ≥ 28 weeks (stillbirths + early neonatal death)
perinatal death rate = 6.66 per 1000 total births
2. Gestational age ≥ 22 weeks (stillbirths + neonatal death)
perinatal death rate = 27.82 per 1000 total births

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

MATERNAL DEATH

Total 0 case

Maternal mortality rate 0 per 1487 livebirths

Causes of maternal death: (Referred case)

Placenta previa totalis with postpartum hemorrhage with DIC

Summary

DATA	2018
Total birth	1518
Stillbirth	31
22-27 weeks	27
≥ 28 weeks	4
Stillbirth rate/1000 births	
> 28 weeks / birthweight >1,000 gm	2.63
> 22 weeks / birthweight >500 gm	20.42
Early neonatal death	
• Early neonatal death rate / 1000 live birth (≥ 28 weeks)	4.03
• Early neonatal death rate / 1000 live birth (≥ 22 weeks)	7.40

Section II

GENERAL OBSTETRICS

TABLE 1 Distribution of Singleton & Multifetal Pregnancies

Type of pregnancy	Number	Percent
Singleton	1472	97.0
Twins	43	2.8
Triplet	-	-
Total	1518	100.0

TABLE 2 Categories of the Pregnant Women

	2017		2018	
	Number	Percent	Number	Percent
General Cases	1454	94.6	1430	94.2
Private Cases	83	5.4	88	5.8
Total	1537	100.0	1518	100.0

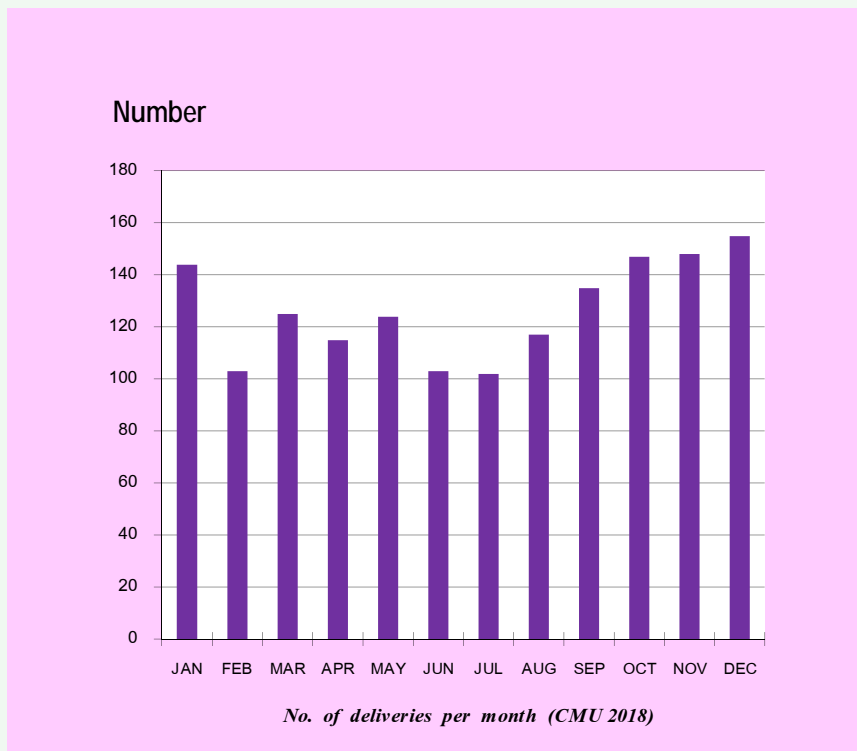
TABLE 3 Categories of the Pregnant Women

	Number	Percent
ANC at Maharaj Nakorn Chiang Mai Hospital	1192	78.5
Private Clinic	88	5.8
ANC at Other Hospitals	212	14.0
No ANC	26	1.7
Total	1518	100.0

TABLE 4 Number and Percentage of Deliveries per month

Month	Number (Mothers)	Percent
January	144	9.5
February	103	6.8
March	125	8.2
April	115	7.6
May	124	8.2
June	103	6.8
July	102	6.7
August	117	7.7
September	135	8.9
October	147	9.7
November	148	9.7
December	155	10.2
Total	1518	100.0

FIGURE 1 Histogram : Number of Deliveries from January to December 2018



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
 Total deliveries in 2016 = 1431 cases
 Total deliveries in 2017 = 1539 cases
 Total deliveries in 2018 = 1518 cases

TABLE 5 Number and percentage of parturients by age

Age	Number	Percent	Age	Number	Percent
12	2	0.1	31	92	6.1
14	1	0.1	32	82	5.4
15	3	0.2	33	85	5.6
16	6	0.4	34	79	5.2
17	11	0.7	35	85	5.6
18	10	0.7	36	60	4.0
19	26	1.7	37	52	3.4
20	27	1.8	38	30	2.0
21	32	2.1	39	38	2.5
22	47	3.1	40	21	1.4
23	52	3.4	41	15	1.0
24	78	5.1	42	7	0.5
25	69	4.5	43	7	0.5
26	92	6.1	44	6	0.4
27	97	6.4	45	4	0.3
28	93	6.1	46	1	0.1
29	102	6.7	47	1	0.1
30	104	6.9	53	1	0.1
Total				1518	100.0

Average age (Mean±Standard deviation) 29.68±5.8 (12-53) years

TABLE 6 Number and percentage of parturients by age group

Age Group	Number	Percent
10-14	3	0.2
15-19	56	3.7
20-24	236	15.5
25-29	453	29.8
30-34	442	29.1
35-39	265	17.5
40-44	56	3.7
≥ 45-50	7	0.5
Total	1518	100.0

Summary : Age of parturients

1. Adolescent Pregnancies (11-19 years) 59 (3.9 %)
 Early Adolescent Pregnancies (\leq 16 years) 12 (0.8 %)
 Late Adolescent Pregnancies (17-19 years) 47 (3.1 %)
2. Adult Pregnancies (20-34 years) 1131 (74.5%)
3. Elderly Pregnancies (\geq 35 years) 328 (21.6%)

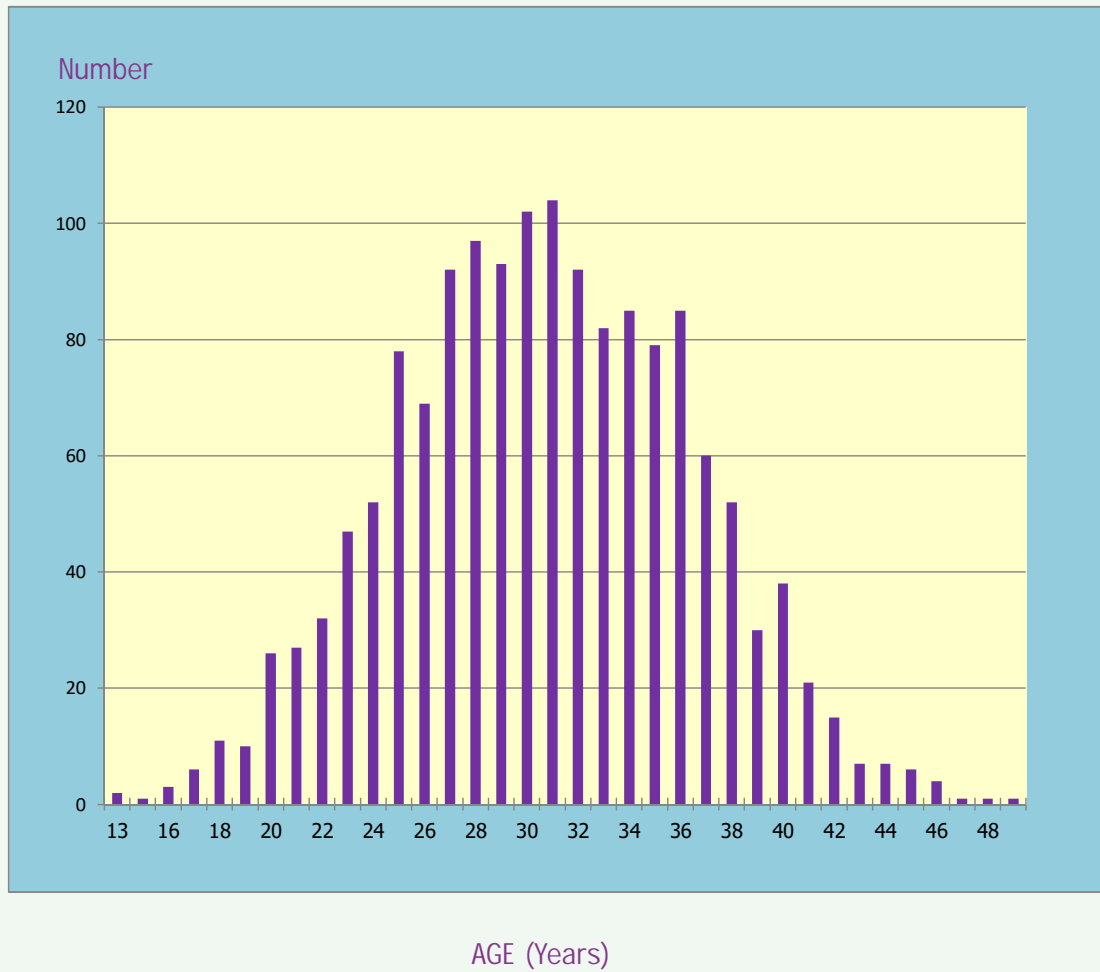
FIGURE 2 Histogram : Number of Parturients by Age

TABLE 7 Parity of parturients

Parity	Number	Percent
0	859	56.6
1	532	35.0
2	95	6.3
3	27	1.8
4	3	0.2
7	1	0.1
10	1	0.1
Total	1518	100.0

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

Nulliparous 56.6 %

Multiparous 43.4 %

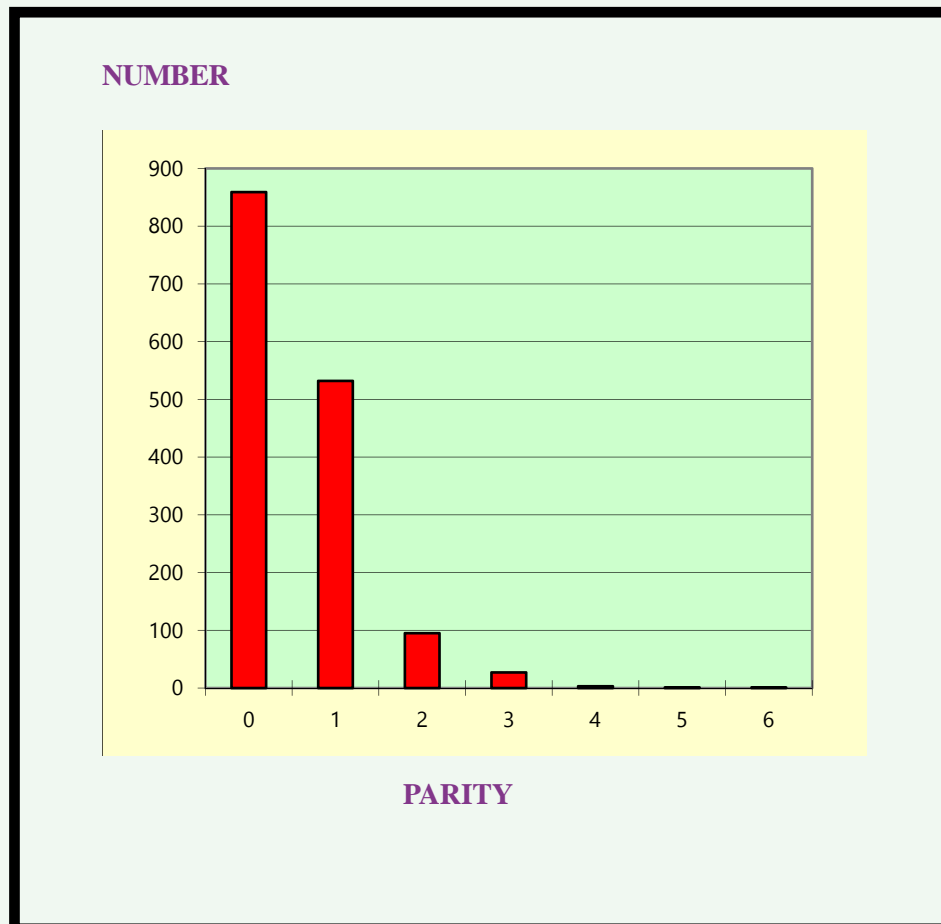
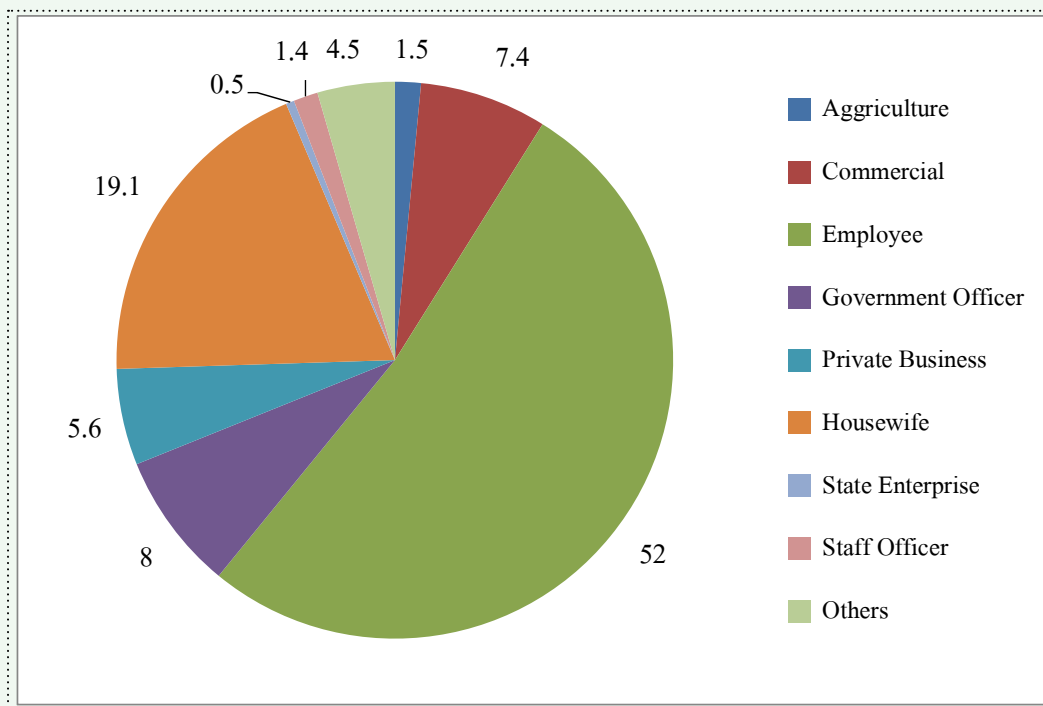
FIGURE 3 Histogram : Number of parturients by parity

TABLE 8 Distribution of the occupations of the parturients

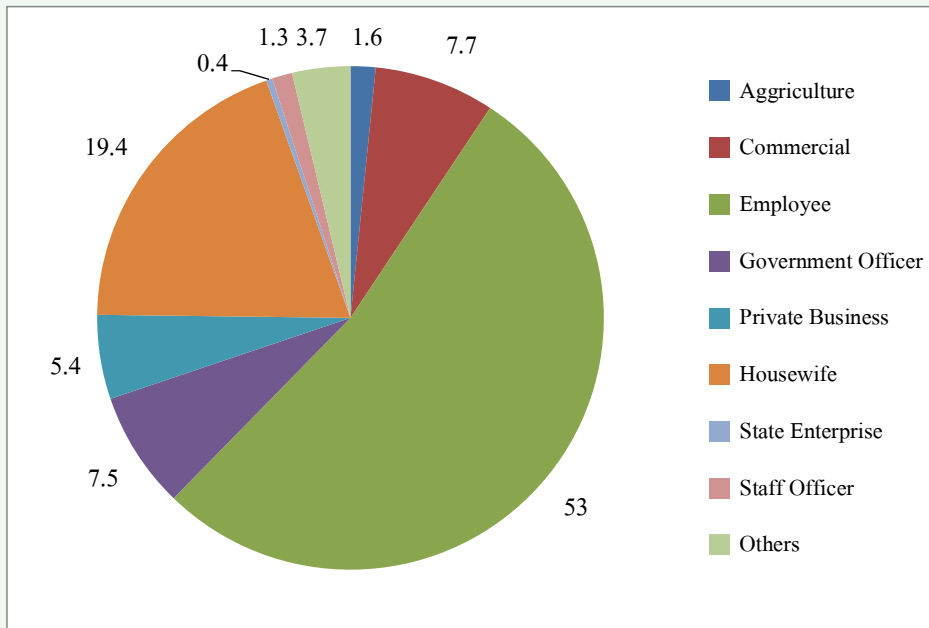
Occupations	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Aggriculture	22	1.5	22	1.6	0	0.0
Commercial	112	7.4	109	7.7	3	3.4
Employee	783	52.0	752	53.0	31	35.6
Government Officer	121	8.0	107	7.5	14	16.1
Private Business	85	5.6	77	5.4	8	9.2
Housewife	288	19.1	275	19.4	13	14.9
State Enterprise	7	0.5	6	0.4	1	1.1
Staff Officer	21	1.4	19	1.3	2	2.3
Physician	9	0.6	2	0.1	7	8.0
Phamacist	25	1.7	18	1.3	7	8.0
Others	33	2.2	32	2.3	1	1.1
Total	1506	100.0	1419	100.0	87	100.0

FIGURE 4 Pie : Distribution (percentage) of patient's occupations

OCCUPATIONS OF TOTAL PATIENTS



OCCUPATIONS OF THE GENERAL PATIENTS



OCCUPATIONS OF THE PRIVATE PATIENTS

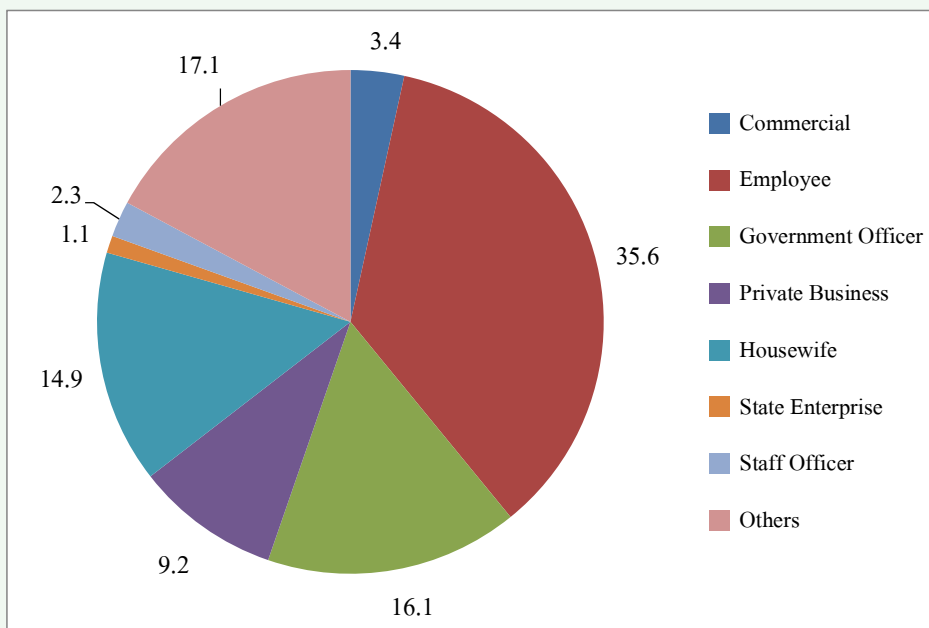
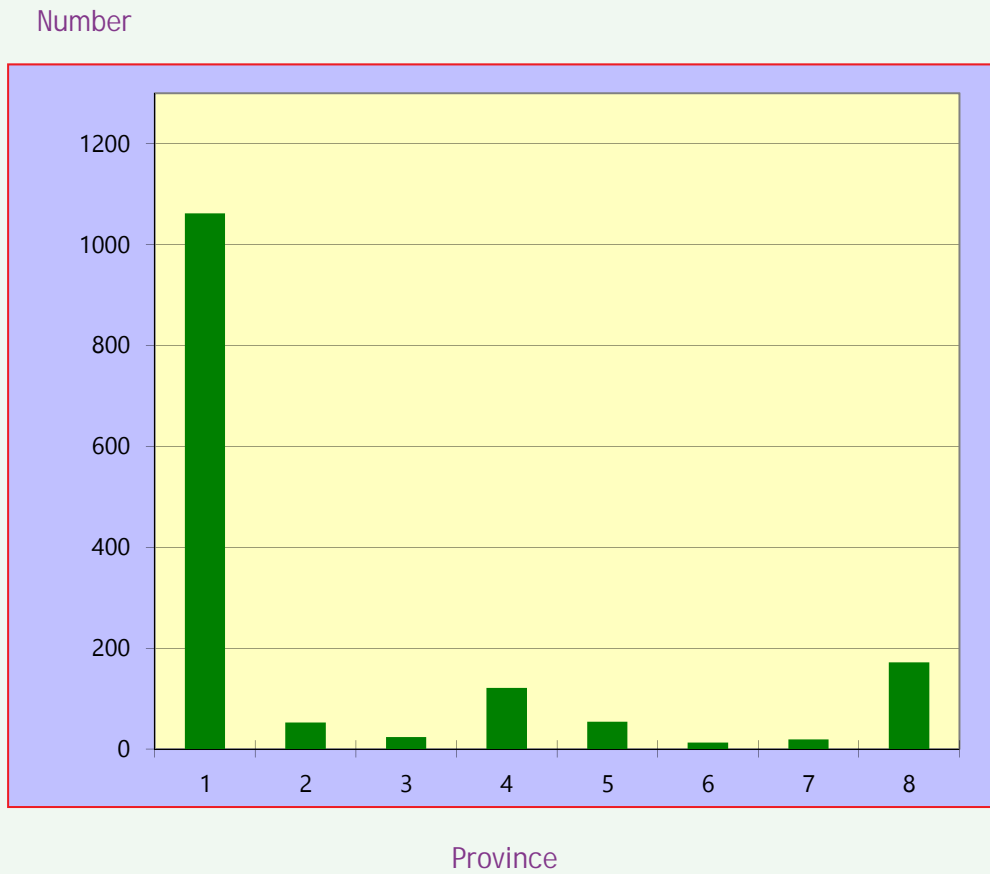


TABLE 9 Distributions of the residence (province)
of the parturients

Province	Number	Percent
Chiang Mai (เชียงใหม่)	1062	70.0
Chiang Rai (เชียงราย)	53	3.5
Lampang (ลำปาง)	24	1.6
Lamphun (ลำพูน)	121	8.0
Maehongson (แม่ฮ่องสอน)	54	3.6
Payao (พะเยา)	13	.9
Prae (แพร่)	19	1.3
Others (อื่นๆ)	172	11.3
Total	1518	100.0

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

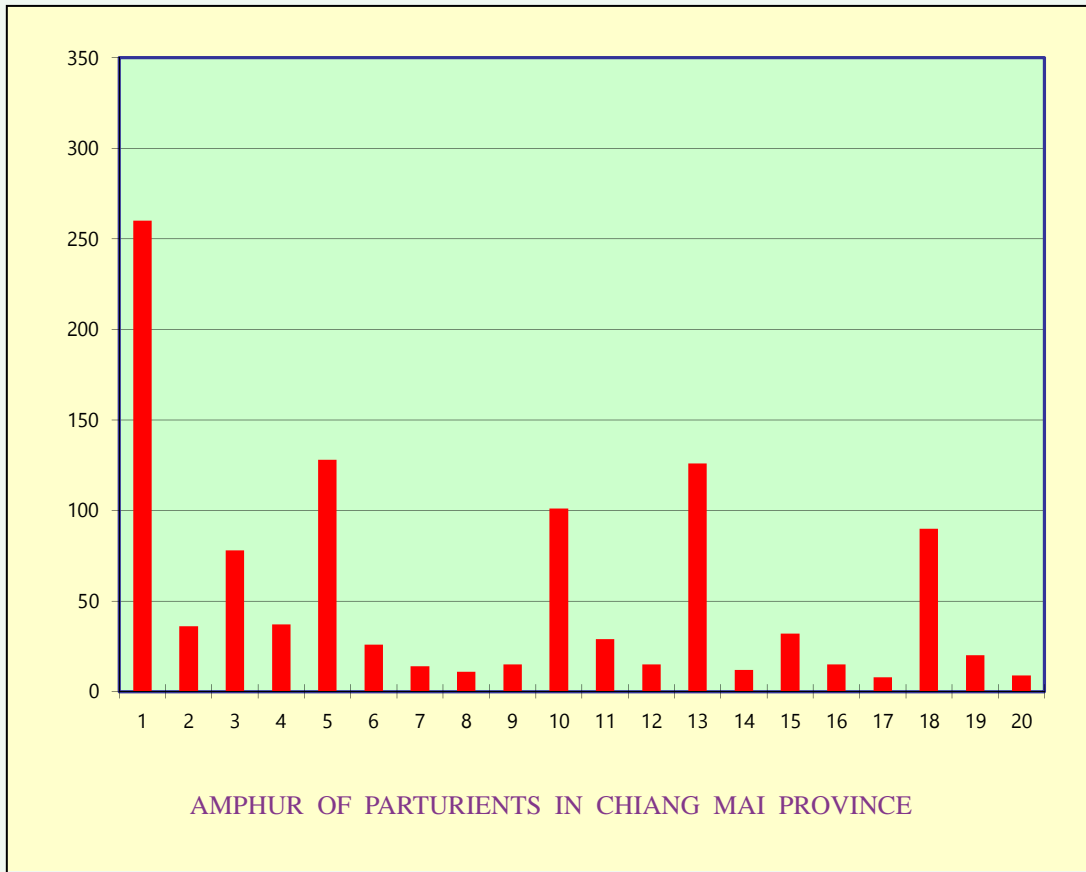


- | | |
|-----------------------------|---------------------------|
| 1. Chiang Mai (เชียงใหม่) | 2. Chiang Rai (เชียงใหม่) |
| 3. Lampang (ลำปาง) | 4. Lamphun (ลำพูน) |
| 5. Maehongsorn (แม่ฮ่องสอน) | 6. Payao (พะเยา) |
| 7. Phrae (แพร่) | 8. Others (อื่นๆ) |

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

	Amphur	Number	Percent
1.	Meung (เมือง)	260	24.5
2.	Maerim (แมร์ิม)	36	3.4
3.	Doisaked (ดอยสะเก็ด)	78	7.3
4.	Sanpatong (สันป่าตอง)	37	3.5
5.	Hangdong (หางดง)	128	12.1
6.	Jomtong (จอมทอง)	26	2.4
7.	Mae-ai (แม่อาย)	14	1.3
8.	Prao (พร้าว)	11	1.0
9.	Hod (ฮอด)	15	1.4
10.	Sarapee (สารภี)	101	9.5
11.	Maetang (แม่แตง)	29	2.7
12.	Omkoï (อมก๋อย)	15	1.4
13.	Sankampang (สันกำแพง)	126	11.9
14.	Samoeng (สะเมิง)	12	1.1
15.	Chiangdao (เชียงดาว)	32	3.0
16.	Phang (ฝาง)	15	1.4
17.	Doitao (ดอยเต่า)	8	0.8
18.	Santrai (สันทราย)	90	8.5
19.	Maejam (แม่แจ่ม)	20	1.9
20.	Chaiprakarn (ไชยปราการ)	9	0.8
	Total	1062	100.0

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 |

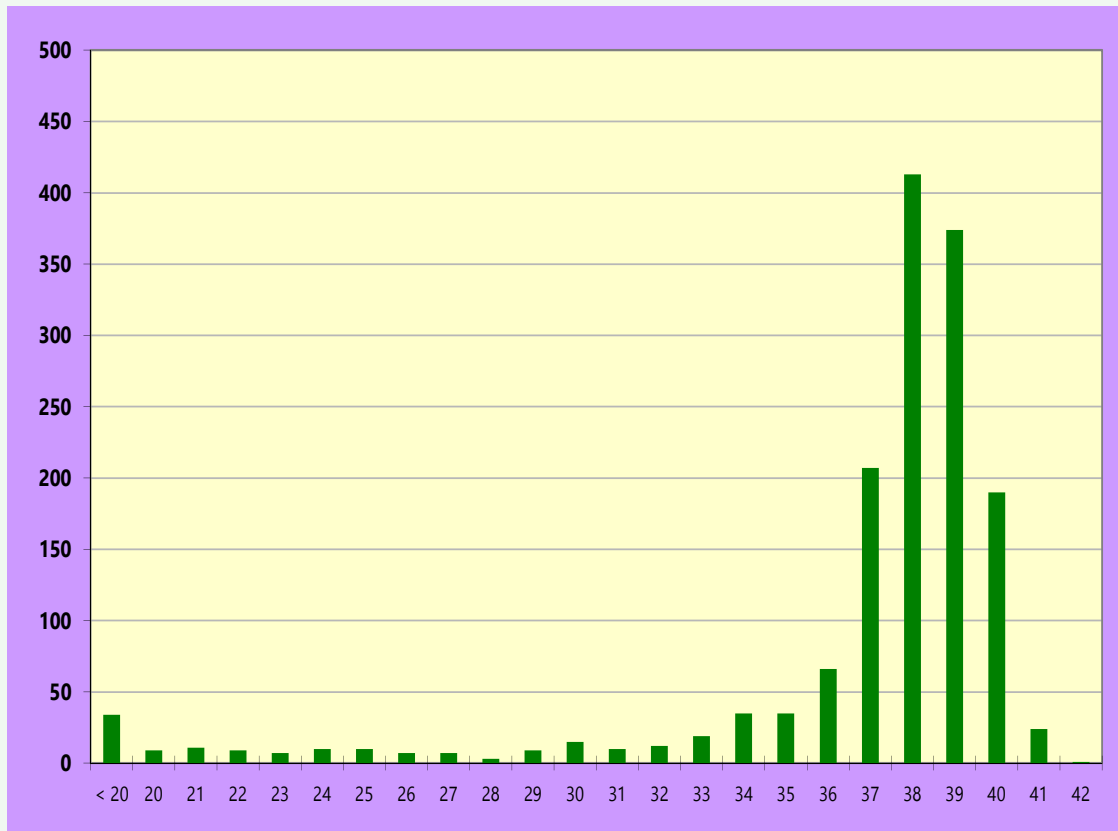
TABLE 11 Number and percentage of parturients by gestational age in singleton pregnancies

GA (Weeks)	Number	Percent	GA (Weeks)	Number	Percent
< 20	34	2.2	31	10	0.7
20	9	0.6	32	12	0.8
21	11	0.7	33	19	1.3
22	9	0.6	34	35	2.3
23	7	0.5	35	35	2.3
24	10	0.7	36	66	4.4
25	10	0.7	37	207	13.6
26	7	0.5	38	413	27.2
27	7	0.5	39	374	24.7
28	3	0.2	40	190	12.5
29	9	0.6	41	24	1.6
30	15	1.0	42	1	0.1
Total				1517	100.0

Average of Gestational Age 36.69 ± 4.8 (12-42) 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)	34	2.2
Immature (20-27 weeks)	70	4.6
Premature (28-36 weeks)	204	13.4
Term (37-41 weeks)	1208	79.6
Postterm (42 weeks or more)	1	0.1
Total	1517	100.0

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	1	2.3
23	2	4.7
24	2	4.7
25	1	2.3
26	2	4.7
28	1	2.3
29	1	2.3
30	1	2.3
31	3	7.0
32	1	2.3
33	4	9.3
34	3	7.0
35	2	4.7
36	8	18.6
37	9	20.9
38	2	4.7
Total	43	100.0

Average of Gestational Age 32.65 ± 4.9 Weeks

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

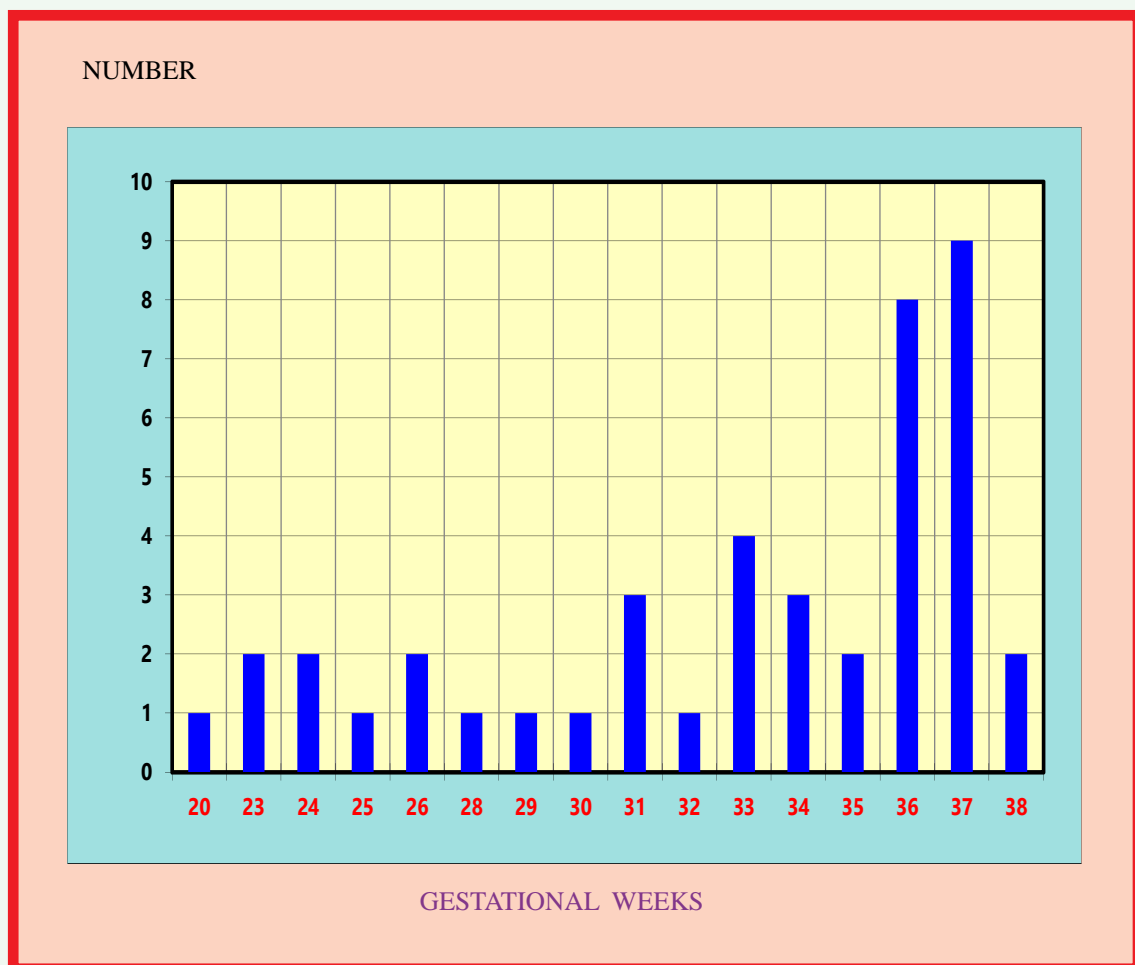


TABLE 14 Number and percentage of parturients by gestational age group in twin pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 week)	-	-
Immature (20-27 weeks)	8	18.6
Preterm (28-36 weeks)	24	55.8
Term (37-41 weeks)	11	25.6
Total	43	100.0

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	46	3.8
1	49	4.0
2	35	2.9
3	38	3.1
4	44	3.6
5	40	3.3
6	47	3.9
7	52	4.3
8	72	5.9
9	100	8.2
10	145	11.9
11	151	12.4
12	161	13.2
13	108	8.9
14	68	5.6
15	36	3.0
16	14	1.1
17	3	0.2
18	4	0.3
19	4	0.3
20	1	0.1
Total	1218	100.0

Attending ANC at other hospitals 14.0 % of total parturients

FIGURE 9 Histogram : Number of ANC attendances of general patients

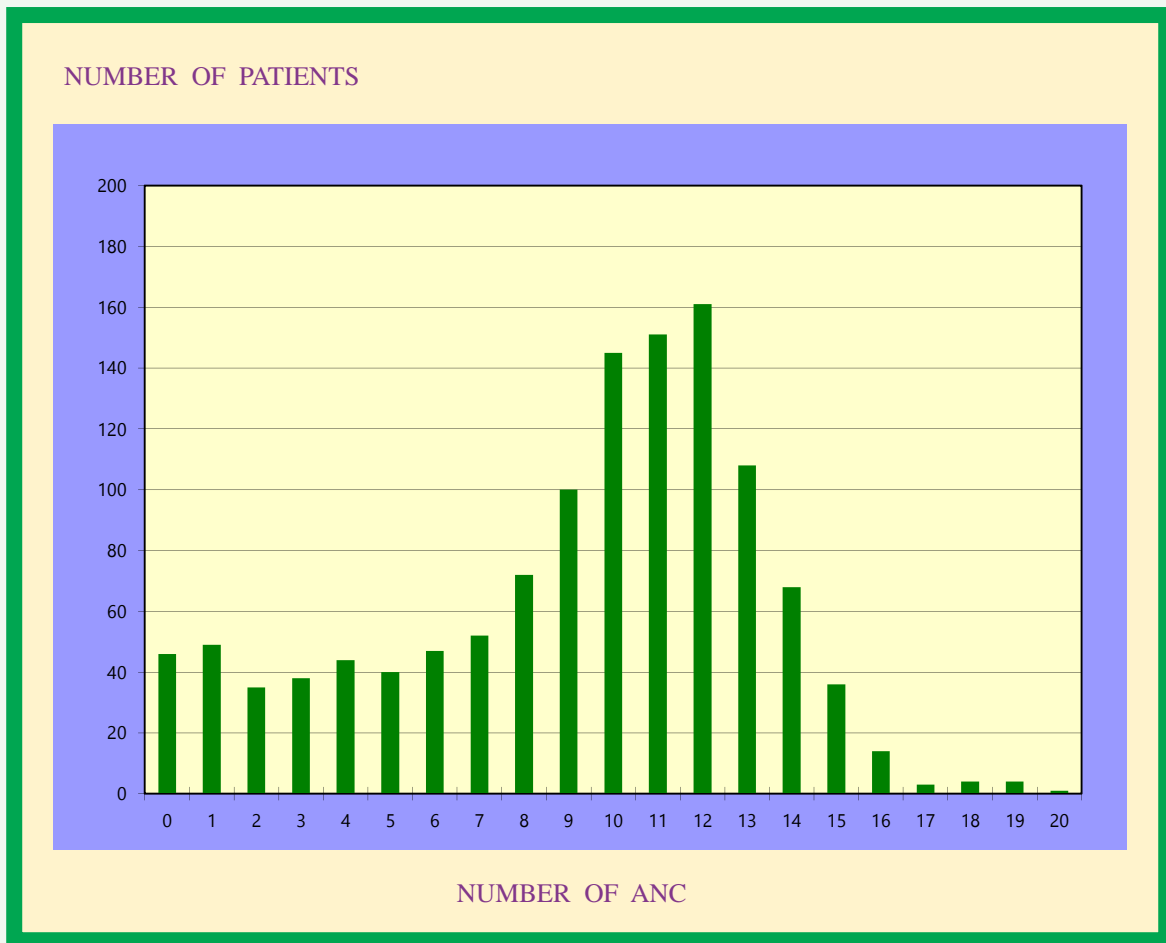


TABLE 16 Number of antenatal care attendance : General patients (not include the patients attending ANC at other hospitals)

Number of ANC	Number of Parturients	Percent
4 or more	1050	86.2
1-3	122	10.0
No ANC	46	3.8
Total	1218	100.0

Note ANC less than 4 is considered to be inadequate

Inadequate ANC 13.8%

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

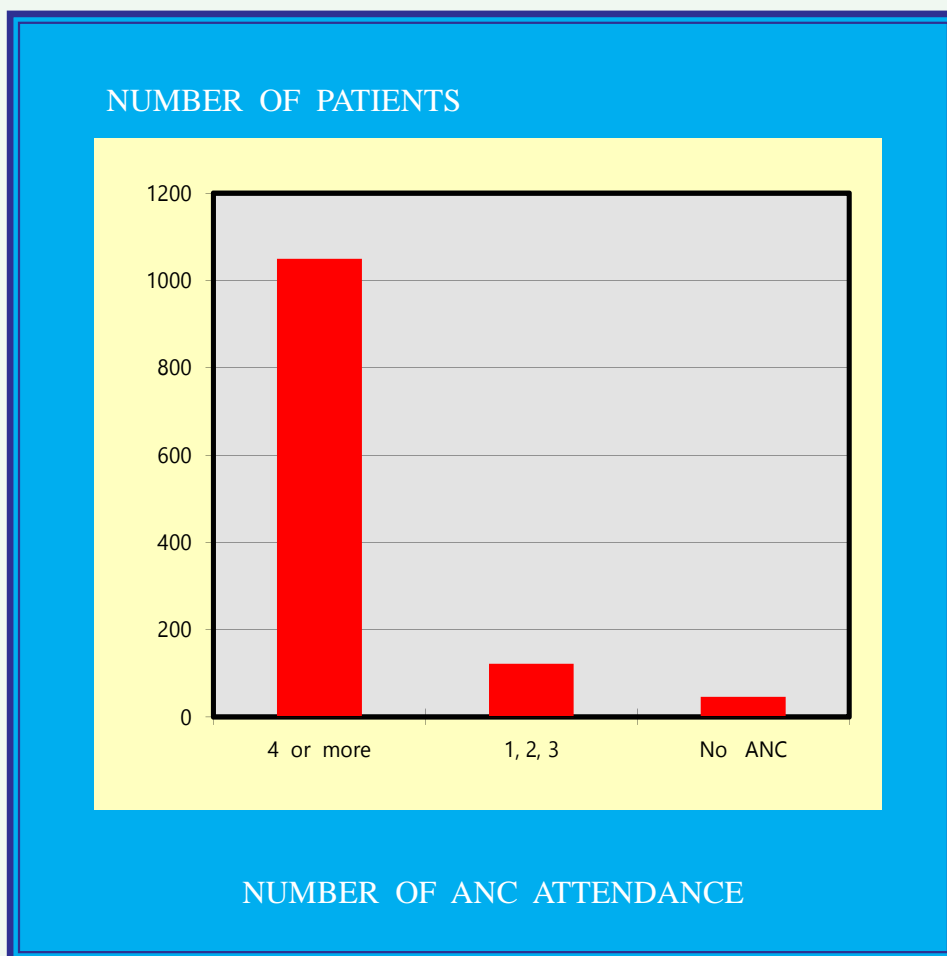
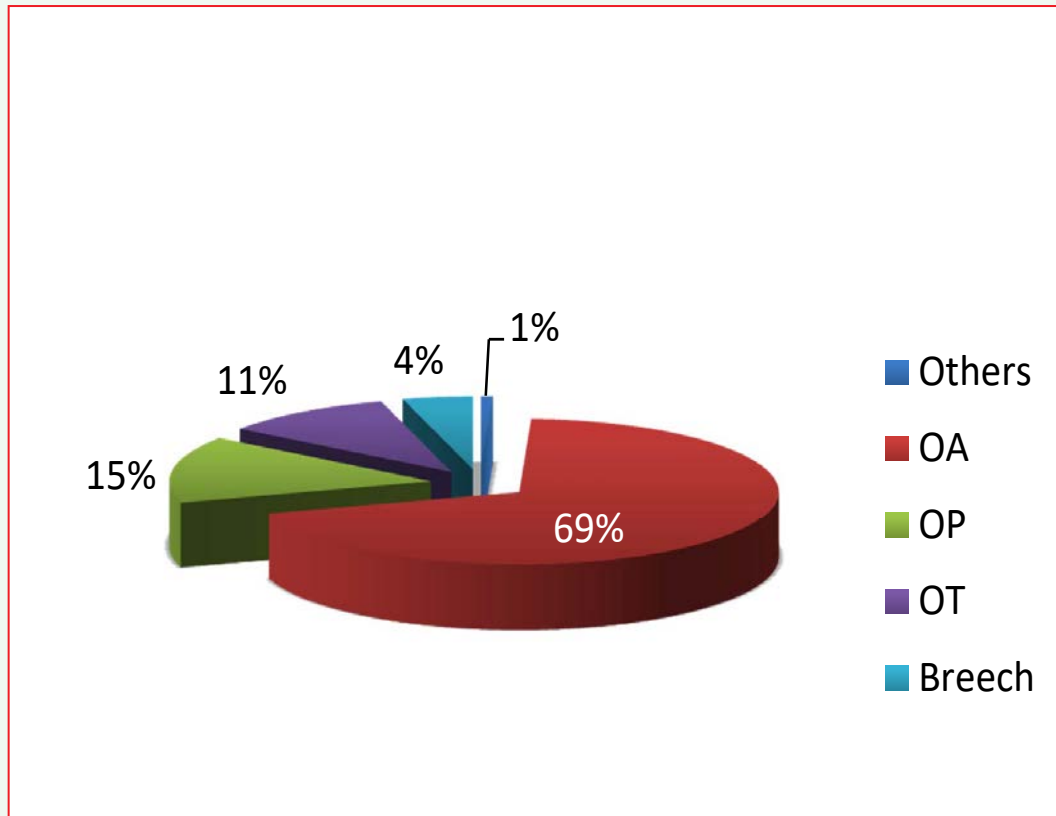


TABLE 17 Distribution of fetal presentations in labor (Singleton)

Fetal Presentation	Percent
Vertex	95.2
Breech	4.3
Transverse lie	0.2
Compound	0.1
Face	0.1
Others	0.1

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	993	67.3	948	68.1	45	54.2
Forceps Delivery	23	1.6	22	1.6	1	1.2
Vacuum Delivery	28	1.9	26	1.9	2	2.4
Cesarean Section	398	27.0	368	26.4	30	36.1
Vaginal Breech Delivery	15	1.0	14	1.0	1	1.2
Other*	18	1.2	14	1.0	4	4.8
Total	1475	100.0	1392	100.0	83	100.0

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

Twins

Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Vaginal Delivery	12	27.9	12	31.6	-	-
Cesarean Section	31	72.1	26	68.4	5	100.0
Total	43	100.0	38	100.0	5	100.0

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

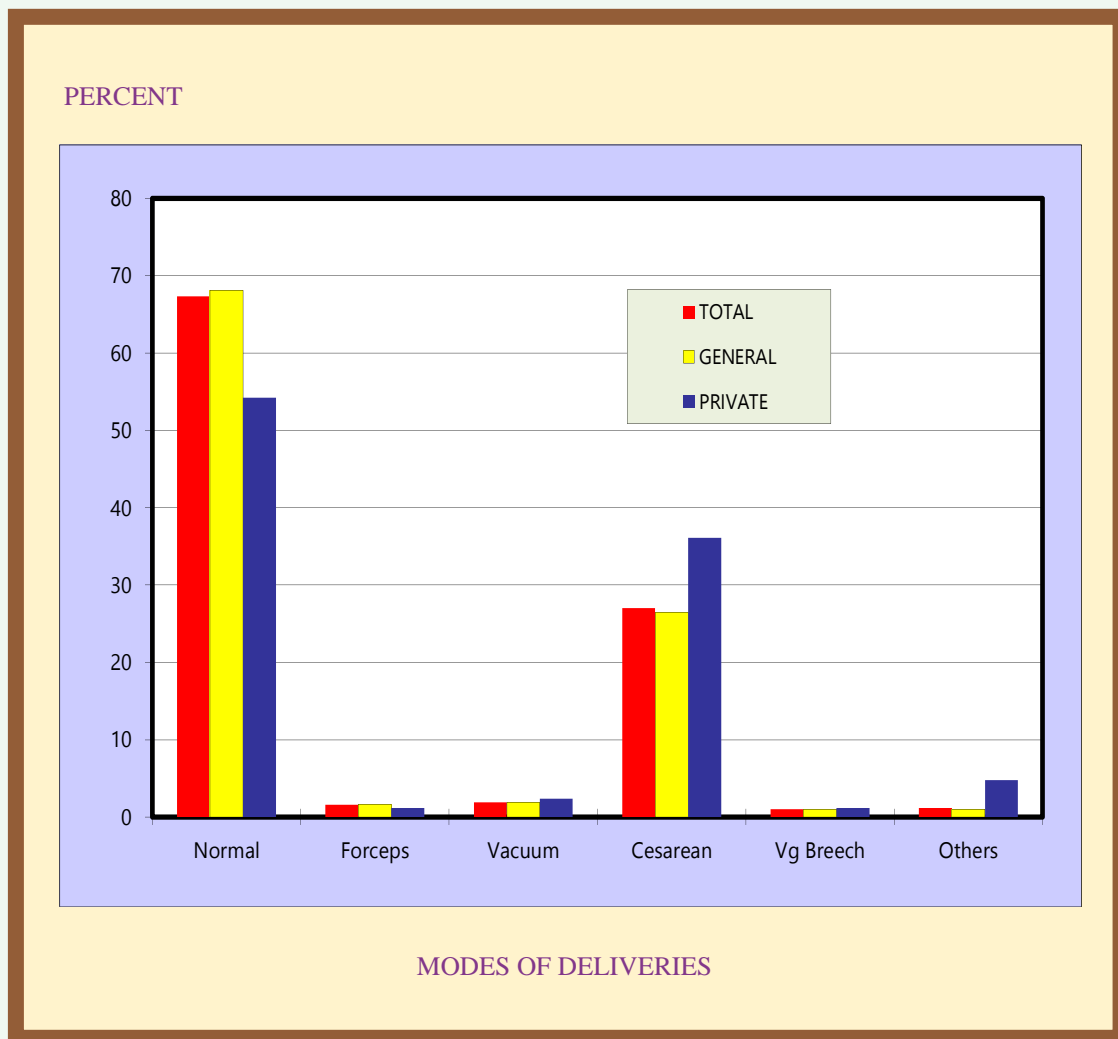


TABLE 19 Modes of deliveries in breech presentation : general and private patients (Singleton)

Mode of Deliveries	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	49	76.6	44	75.9	5	83.3
Assisting Mauriceau-Smelliveit	11	17.2	10	17.2	1	16.7
Total Extraction Mauriceau-Smelliveit	3	4.7	3	5.2	-	-
Spontaneous Breech	1	1.6	1	1.7	-	-
Total	64	100.0	58	100.0	6	100.0

Total Cesarean Section Rate in Breech presentation 76.6 %

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

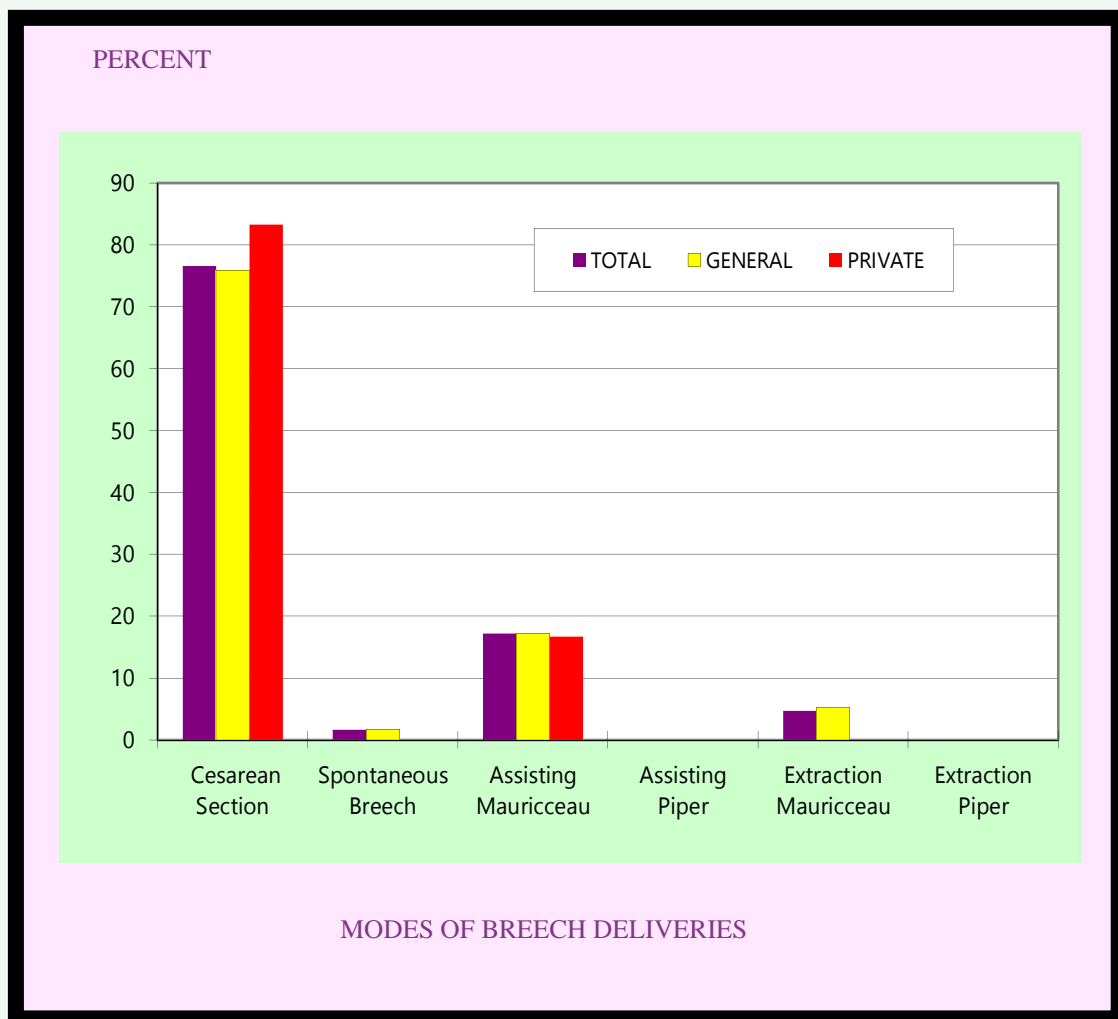


TABLE 20 Frequency of cesarean deliveries according to diagnostic indication (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
CPD	137	34.4	129	35.1	8	26.7
Previous C/S	123	30.9	115	31.3	8	26.7
Breech presentation	49	12.3	44	12.0	5	16.7
Fetal distress	34	8.5	33	9.0	1	3.3
Placenta previa	19	4.8	17	4.6	2	6.7
PIH	8	2.0	7	1.9	1	3.3
HIV positive	1	0.3	1	0.3	-	-
Abruptio placentae	1	0.3	1	0.3	-	-
Malpresentation	4	1.0	2	0.5	2	6.7
Others	11	2.8	8	2.2	3	10.0
Not recorded	11	2.8	11	3.0	0	0
Total	398	100.0	368	100.0	30	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	8.7	2	9.1	-	-
Poor expulsive force	1	4.3	1	4.5	-	-
Prophylactic, training	16	69.6	15	68.2	1	100.0
Shortened second stage of labour	4	17.4	4	18.2	-	-
Total	23	100.0	22	100.0	1	100.0

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

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Fetal distress	6	21.4	6	23.1	-	-
Poor expulsive force	7	25.0	6	23.1	1	50.0
Prophylactic, training	2	7.1	2	7.7	-	-
Shortened second stage of labour	13	46.4	12	46.2	1	50.0
Total	28	100.0	26	100.0	2	100.0

TABLE 23 Sex of Fetuses (Including Multiple Pregnancies)

Sex	Number	Percent
Male	788	50.7
Female	752	48.4
Unspecified	13	0.8
Total	1553	100.0

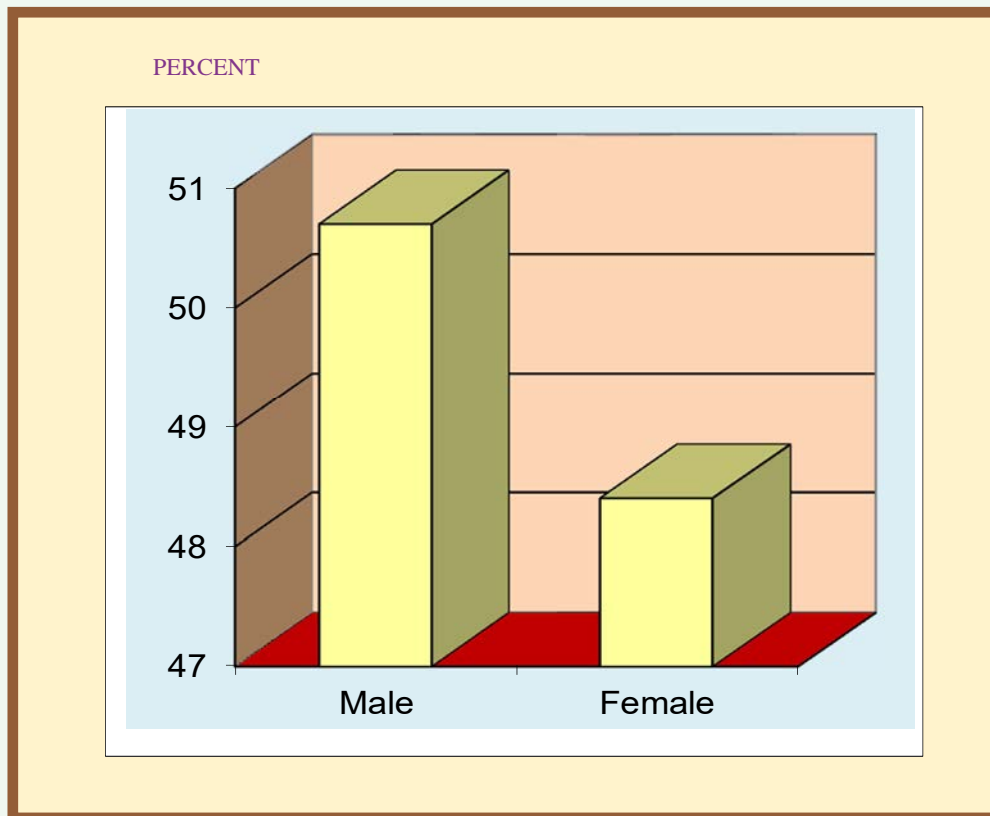
FIGURE 14 Histogram : Distribution of fetal sex (including twins)

TABLE 24 Apgar score at 1 minute of total neonates

Apgar Scores	Number	Percent
0-3 (severe depression)	116	7.5
4-6 (mild depression)	75	4.8
7-10 (no depression)	1363	87.7
Total	1554	100.0

TABLE 25 Apgar score at 5 minutes of total neonates

Apgar Score	Number	Percent
0-3 (severe depression)	94	6.0
4-6 (mild depression)	39	2.5
7-10 (no depression)	1421	91.4
Total	1554	100.0

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

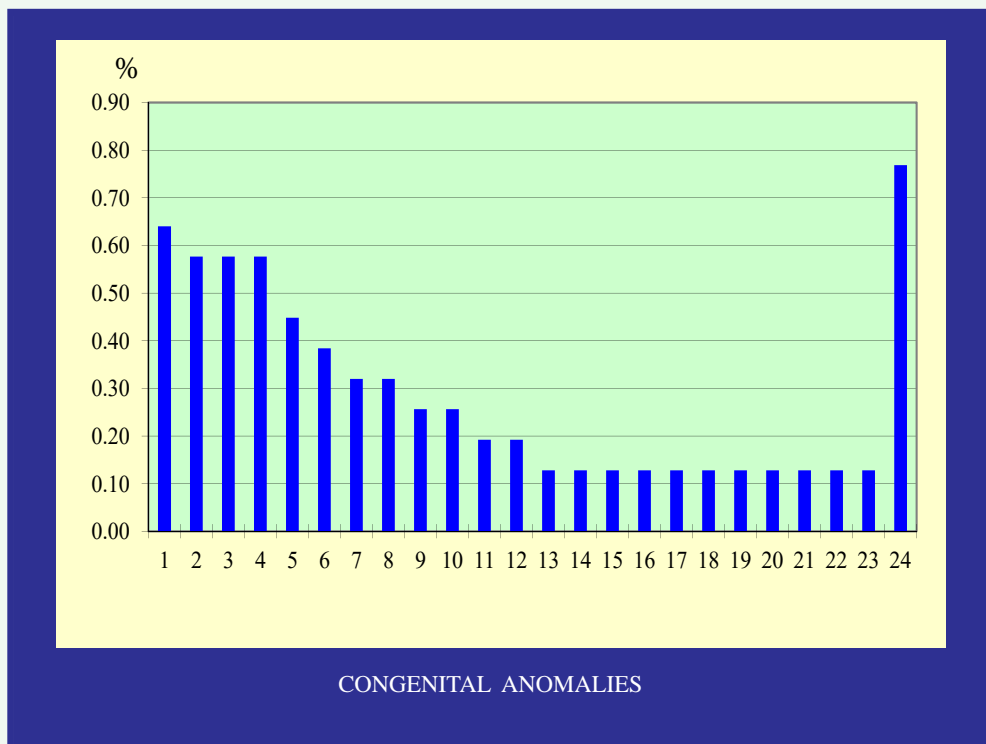
Apgar Score	1-Minute		5-Minute	
	Number	Percent	Number	Percent
0	86	5.5	87	5.6
1	13	0.8	6	0.4
2	7	0.5	1	0.1
3	14	0.9	2	0.1
4	18	1.2	6	0.4
5	30	1.9	10	0.6
6	24	1.5	22	1.4
7	89	5.7	30	1.9
8	265	17.1	81	5.2
9	929	59.8	481	31.0
10	79	5.1	828	53.3
Total	1554	100.0	1554	100.0

TABLE 27 Prenatal sonographic diagnosis of structural anomalies*

	Congenital Anomalies	Number	Percent
1	Cardiac anomaly	10	0.64
2	Multiple anomalies	9	0.58
3	Trisomy 21	9	0.58
4	Hydrops fetalis (other causes)	9	0.58
5	Thal.Hb Bart's	7	0.45
6	Cystic hygroma	6	0.38
7	Gastroschisis	5	0.32
8	Omphalocele	5	0.32
9	Hydrocephalus	4	0.26
10	CCAM	4	0.26
11	Porencephaly	3	0.19
12	Limb defect	3	0.19
13	Diaphragmatic hernia	2	0.13
14	Duodenal atresia	2	0.13
15	Holoprocencephaly	2	0.13
16	Renal agenesis	2	0.13
17	Sacrocoegeous teratoma	2	0.13
18	Spina bifida	2	0.13
19	Trisomy 13	2	0.13
20	Trisomy 18	2	0.13
21	Pulmonary sequestration	2	0.13
22	Exen/anencephaly	2	0.13
23	Cleft lip / palate	2	0.13
24	Others	12	0.77
	Total	108	6.92

* 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 Diaphragmatic hernia |
| 2 Multiple anomalies | 14 Duodenal atresia |
| 3 Trisomy 21 | 15 Holoprocencephaly |
| 4 Hydrops fetalis (other causes) | 16 Renal agenesis |
| 5 Thal.Hb Bart's | 17 Sacrococegeous teratoma |
| 6 Cystic hygroma | 18 Spina bifida |
| 7 Gastroschisis | 19 Trisomy 13 |
| 8 Omphalocele | 20 Trisomy 18 |
| 9 Hydrocephalus | 21 Pulmonary sequestration |
| 10 CCAM | 22 Exen/anencephaly |
| 11 Porencephaly | 23 Cleft lip / palate |
| 12 Limb defect | 24 Others |

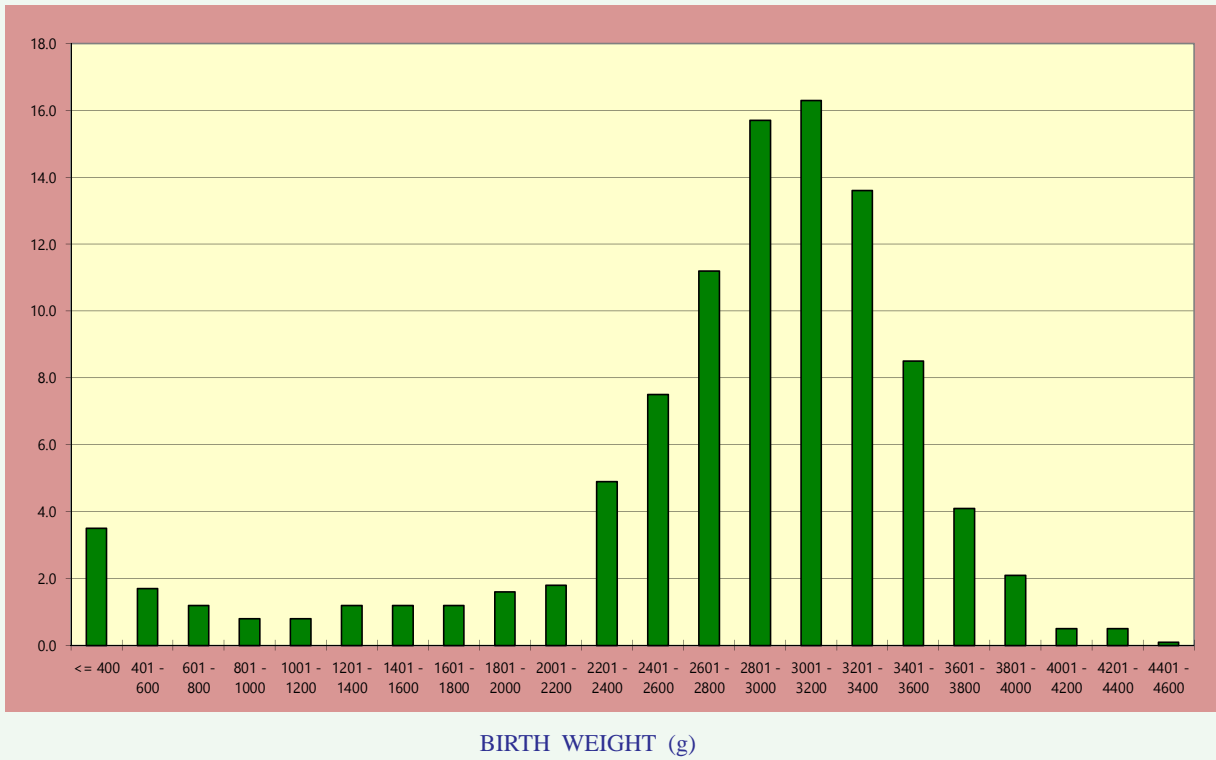
TABLE 28 Number and percentage of neonates by birth weight*

Birth Weight (grams)	Number	Percent
≤ 400	54	3.5
401-600	26	1.7
601-800	18	1.2
801-1000	13	0.8
1001-1200	13	0.8
1201-1400	19	1.2
1401-1600	18	1.2
1601-1800	18	1.2
1801-2000	25	1.6
2001-2200	28	1.8
2201-2400	76	4.9
2401-2600	116	7.5
2601-2800	174	11.2
2801-3000	244	15.7
3001-3200	254	16.3
3201-3400	212	13.6
3401-3600	132	8.5
3601-3800	64	4.1
3801-4000	33	2.1
4001-4200	8	0.5
4201-4400	8	0.5
4401-4600	1	0.1
Total	1554	100.0

* Including therapeutic termination of pregnancy

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

PERCENT



** 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)	44	3.0
Very low birth weight (1000-1499)	46	3.1
Low birth weight (1500-2499)	203	13.6
Average birth weight (2500-3999)	1178	79.1
Macrosomia (> 4000)	19	1.3
Total	1490	100.0

** Including therapeutic termination of pregnancy and weight > 200 gm*

Average Birth Weight of Total Infants 2807 ± 766 grams

range 200-4540 grams

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

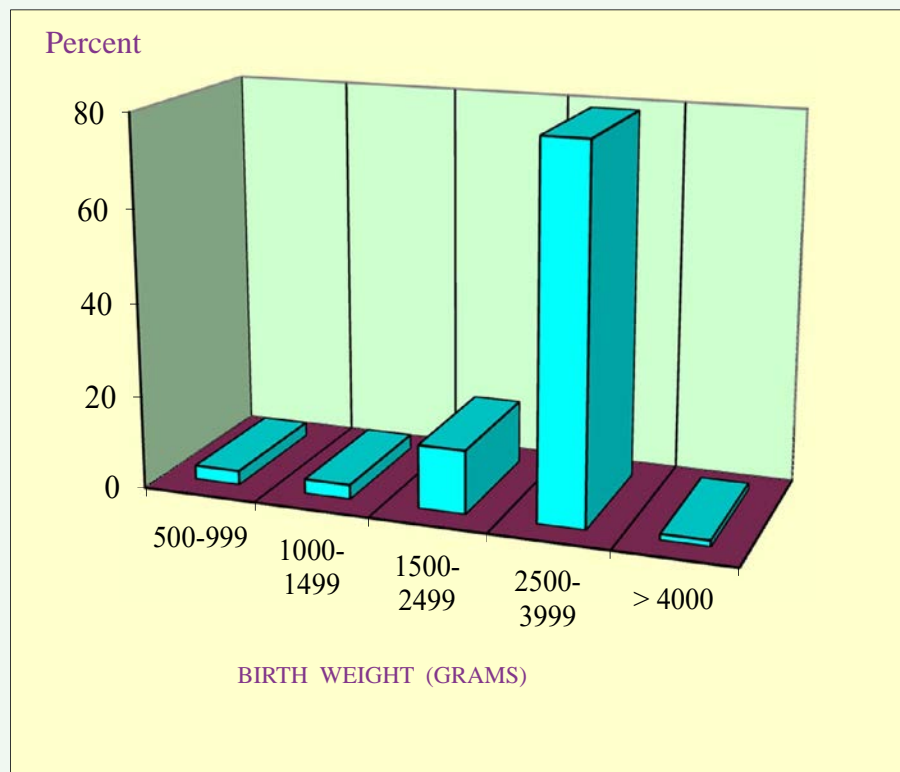


TABLE 30 Fetal weight (grams): the 10th, 50th, 90th percentile at various gestational age (singleton)

Gestational Age (weeks)	Weight (grams) 10th Percentile	Weight (grams) 50th Percentile	Weight (grams) 90th Percentile
20	180.0	300.0	.
21	188.0	360.0	460.0
22	390.0	470.0	.
23	500.0	580.0	.
24	505.0	637.5	.
25	540.0	730.0	.
26	495.0	765.0	.
27	460.0	675.0	.
28	800.0	940.0	.
29	1005.0	1312.5	.
30	985.0	1370.0	2417.5
31	1350.0	1590.0	.
32	1375.0	1865.0	2362.0
33	1388.0	1900.0	2441.0
34	1563.0	2210.0	2741.0
35	2068.0	2420.0	2952.0
36	2165.0	2605.0	3077.0
37	2430.0	2832.5	3371.0
38	2620.0	3040.0	3505.0
39	2723.0	3140.0	3600.0
40	2840.0	3275.0	3710.0
41	3055.0	3382.5	3967.5
42	3015.00	3640.00	.

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

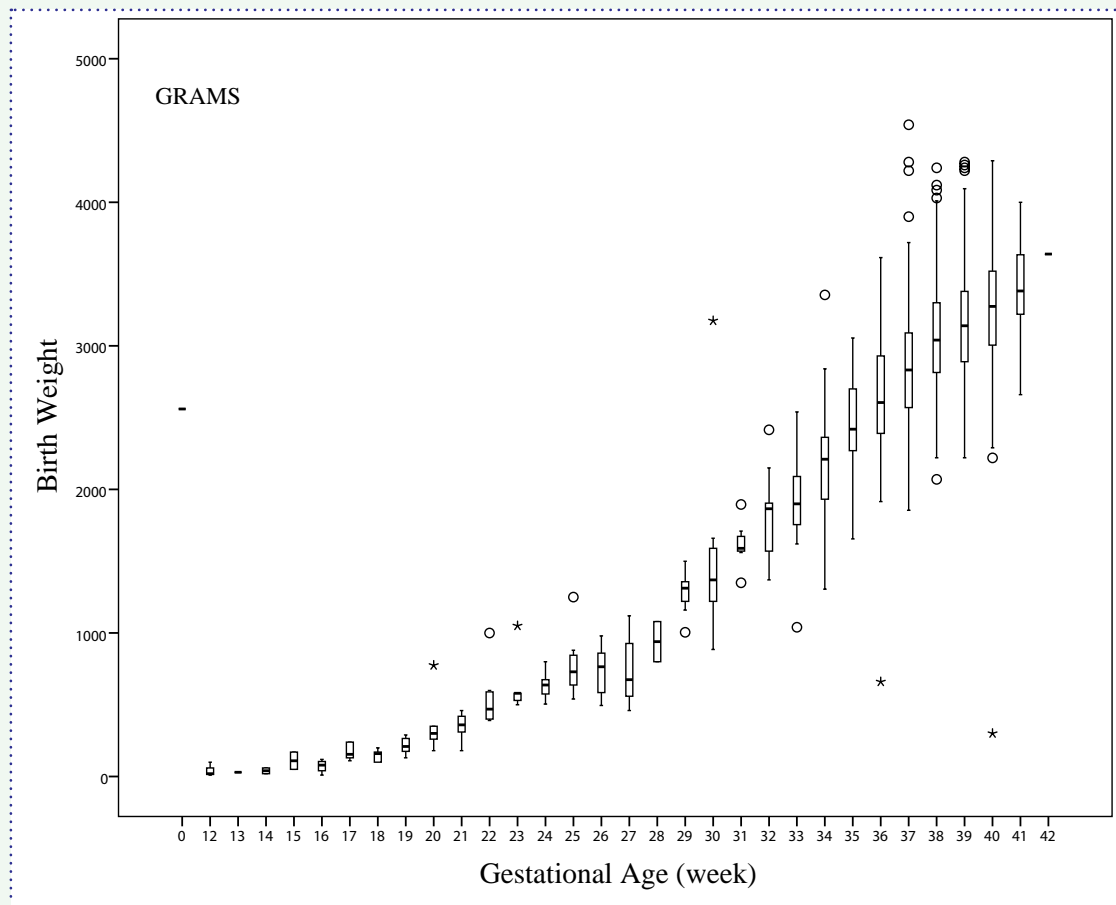


TABLE 31 Means and standard deviation of birth weight
at various gestational age (singleton)

Gestational Age (weeks)	Number of Neonates	Means (grams)	Standard Deviation
20	8	346.88	182.78
21	11	351.82	91.85
22	9	537.78	194.67
23	5	648.00	227.31
24	8	635.00	90.28
25	8	776.88	221.28
26	5	737.00	197.88
27	7	747.14	253.67
28	2	940.00	197.99
29	8	1285.63	147.85
30	14	1472.93	539.78
31	7	1617.14	164.77
32	11	1806.36	315.17
33	15	1918.33	349.15
34	32	2182.78	423.05
35	33	2471.82	327.62
36	58	2610.69	430.19
37	198	2872.07	404.23
38	410	3065.57	359.19
39	372	3151.09	362.77
40	189	3251.14	412.62
41	24	3433.75	335.24
42	1	3640.00	.
Total	1468	2817.15	806.07

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
20	2	145.00	35.36
23	4	370.00	134.91
24	4	638.75	107.73
25	2	677.50	208.60
26	4	837.50	142.86
28	2	1005.00	134.35
29	2	1264.50	127.99
30	2	907.50	88.39
31	6	1274.33	261.68
32	2	1420.00	49.50
33	7	1477.14	297.40
34	6	1881.67	238.91
35	4	1955.00	704.49
36	16	2248.44	329.77
37	18	2515.83	249.28
38	4	2298.75	130.15
Total	85	1715.00	771.27

TABLE 33 Comparison of birth weight (singleton & twins)

Type	Means Birth Weight	Standard Deviation	Range
Singleton	2,817	806	40-4,540
Twins	1,715	771	120-3,020

TABLE 34 Comparison of gestational age (singleton & twins)

Type	Means Gestational Age	Standard Deviation	Range
Singleton	36.78	4.8	20-42
Twins	32.65	4.9	20-38

TABLE 35 Early postpartum morbidity

Cause	Number	Percent
Uterine Atony	18	1.19
Lacerations	3	0.20
Retained Pieces of Placenta	7	0.46
Placenta Adherens	4	0.26
Wound / Uterine infection	15	0.99
Total	47	3.10

Section III

HIGH RISK PREGNANCIES

TABLE 36 Major complications during pregnancy

Complications	Numbers	Prevalence (%)
Diabetes Mellitus	303	19.96
Previous cesarian section	160	10.54
Intrauterine growth restriction	131	8.39
Pregnancy-induced hypertension	77	5.07
HBsAg positive	74	4.87
Breech presentation	65	4.28
Prolonged PROM	55	3.62
Iron deficiency	49	3.23
Chronic hypertension	31	2.04
Myoma uteri	29	1.91
Placenta previa	23	1.52
Asthma	20	1.32
HIV infection	18	1.19
Thalassemia	14	0.92
Polyhydramnios	14	0.92
Oligohydramnios	14	0.92
Upper urinary tract infection	13	0.86
Thyrotoxicosis	11	0.72
Heart disease	9	0.59
Systemic Lupus Erythematosus	7	0.46
Transverse lie	7	0.46
Chorioamnionitis	4	0.26
Epilepsy	4	0.26
Incompetent cervix	4	0.26
Condyloma accuminata	4	0.26

Pregnancy with Heart Disease

Total 9 cases (0.59 percent of total parturients)
 Singleton : 8 (not included 1 cases of therapeutic abortion)

Age range 23-39 years
 average 31.3 ± 5.6 years
 age of 35 years or more 3 cases (33.3 %)

Functional Class (At delivery 8 cases)

Class I	5	cases
Class II	3	cases
Class III	1	cases
Class IV	-	case

Gestational Age at Birth

range 29-39 weeks (not included therapeutic abortion)
 average 37.3 ± 3.2 weeks
 premature delivery (before completed 37 weeks)
 1 cases (11.1 %)

Birth Weight

range 1005-3850 grams
 average 2868 ± 882 grams
 number of low birth weight fetus (less than 2,500 grams)
 2 cases (22.2 %)

Apgar Scores at 1 minute (less than 7) 1 case (11.1%)

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

Small-for-gestational-age (less than 10th percentile) 1 case (11.1%)

Perinatal death 0 (0.0%)

Congenital Anomalies -**Other complications (No maternal death)**

<i>Breech presentation</i>	<i>1</i>
<i>Prolonged PROM</i>	<i>1</i>
<i>Diabetes mellitus</i>	<i>2</i>
<i>Short stature</i>	<i>1</i>

Pregnancy with Diabetes Mellitus

Total 303 cases (19.96 percent of total parturients)

(Singleton : 296, Twins : 7)

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 31.8±4.9 years

age of 35 years or more 93 cases (30.7%)

Gestational Age at Birth

range 20-41 weeks

average 37.5±2.7 weeks

premature delivery (before completed 37 weeks)

49 cases (16.2%)

Birth Weight

range 220-4540 grams

average 3019±616 grams

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

50 cases (16.5 %)

Apgar Scores at 1 minute (less than 7) 16 cases (5.3 %)

Apgar Scores at 5 minutes (less than 7) 6 cases (2.0 %)

Small-for-gestational-age (less than 10th percentile) 12 cases (4.0 %)

Perinatal Death 2 cases (0.7%) (dead in utero 1; anomaly 1)

Congenital Anomalies 2 cases (0.7%) (diaphragmatic hernia, cleft lips/palate)

Other complications

<i>Previous cesarean section</i>	41	13.53
<i>Pre-eclampsia</i>	21	6.93
<i>HBsAg positive</i>	12	3.96
<i>Breech presentation</i>	9	2.97
<i>Iron deficiency</i>	9	2.97
<i>Prolonged PROM</i>	8	2.64
<i>Marked Obesity</i>	7	2.31
<i>Myoma uteri</i>	7	2.31
<i>Chronic HT</i>	5	1.65
<i>Fever</i>	5	1.65
<i>Thyrotoxicosis</i>	4	1.32
<i>UTI</i>	3	0.99
<i>APH</i>	2	0.66
<i>Heart disease</i>	2	0.66
<i>Hypothyroidism</i>	2	0.66
<i>Oligohydramnios</i>	2	0.66
<i>Placenta previa</i>	2	0.66
<i>Polyhydramnios</i>	2	0.66
<i>Short stature</i>	2	0.66
<i>Thalassemia</i>	2	0.66
<i>Asthma</i>	1	0.33
<i>Chorioamnionitis</i>	1	0.33
<i>Herpes genitalis</i>	1	0.33
<i>Incompetent cervix</i>	1	0.33
<i>Low lying placenta</i>	1	0.33
<i>Transverse lie</i>	1	0.33

Classifications

Pregestational DM (diagnosed before pregnancy) 58 cases (19.1 %)

Poorly controlled before pregnancy 22 cases

Overt DM with renal involvement 5 cases

Gestational DM (diagnosed during pregnancy)	245 cases (80.9 %)
<i>GDM (Class A1)</i>	195 cases
<i>Overt DM (Class A2)</i>	50 cases
Method of Glucose Control	
Insulin	66 cases
Diet Control only	237 cases

Pregnancy with Systemic Lupus Erythomatosus

Total 7 cases (0.46 percent of total parturients)
(Singleton : 7)

Activity of the disease

Remission before pregnancies	5 cases
Active disease during pregnancies	2 cases
Hypertension	2 cases
Lupus nephritis	3 cases

Age range 24-35 years
average 29.1 ± 3.3 years
age of 35 years or more 1 cases (14.3 %)

Gestational Age at Birth

range 24-38 weeks
average 31.6 ± 5.2 weeks
premature delivery (before completed 37 weeks)
6 cases (85.7 %)

Birth Weight

range 505-2980 grams
average 1598 ± 920 grams
number of low birth weight fetus (less than 2,500 grams)
6 cases (85.7 %)

Apgar Scores at 1 minute (less than 7)	2 cases (28.6 %)
Apgar Scores at 5 minutes (less than 7)	2 cases (28.6 %)
Small-for-gestational-age (less than 10th percentile)	4 cases (57.1 %)
Perinatal death	1 case (14.3 %; dead in utero)
Congenital Anomalies	-
Other complications	
<i>Pre-eclampsia</i>	3 cases
<i>Breech presentation</i>	2 cases
<i>Cervical cancer</i>	1 case
<i>Low lying placenta</i>	1 case
<i>Prolonged PROM</i>	1 case

Pregnancy with Thyrotoxicosis

Total 11 cases (0.72 percent of total parturients)

All were singleton

Diagnosed before pregnancy 7 cases

Diagnosed during pregnancy 4 cases

Age range 24-41 years

average 31.5±5.9 years

age of 35 years or more 4 cases (36.4 %)

Gestational Age at Birth

range 34-39 weeks

average 37.9±1.5 weeks

premature delivery (before completed 37 weeks)

1 case (9.1 %)

Birth Weight

range 1305-3490 grams

average 2851±636 grams

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

3 cases (27.3 %)

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)** 3 cases (27.3 %)**Perinatal death** 0 cases (0.0%)**Congenital Anomalies** 1 case (imperforate anus)**Other complications***Gestational diabetes* 4 cases*Previous cesarean section* 2 cases*Chronic HT* 1 case*HBsAg positive* 1 case*Oligohydramnios* 1 case*Prolonged PROM* 1 case**Pregnancy with Hepatitis B Antigen Positive****Total** 74 cases (4.87 percent of total parturients)

Singleton : 72 (97.3 %); twins : 2 (2.7 %)

Age range 18-43 years

average 32.2±4.6 years

age of 35 years or more 26 cases (35.1 %)

Gestational Age at Birth

range 17-40 weeks
 average 37.5 ± 3.7 weeks
 premature delivery (before completed 37 weeks)
 10 cases (13.5 %)

Birth Weight

range 100-3970 grams
 average 2882 ± 642 grams
 number of low birth weight fetus (less than 2,500 grams)
 10 cases (13.5 %)

Apgar Scores at 1 minute (less than 7) 4 cases (5.4 %)

Apgar Scores at 5 minutes (less than 7) 3 cases (4.1 %)

Small-for-gestational-age (less than 10th percentile) 5 cases (6.8 %)

Perinatal Death 2 cases (2.7 %) (renal agenesis 1; *hydrops fetalis* 1)

Congenital Anomalies 3 cases (gastroschisis, renal agenesis, *hydrops fetalis*)

Other complications

<i>Diabetes mellitus</i>	12
<i>Breech presentation</i>	6
<i>Previous cesarean section</i>	5
<i>Pre-eclampsia</i>	3
<i>Prolonged PROM</i>	3
<i>Myoma uteri</i>	2
<i>Asthma</i>	1
<i>Chronic hypertension</i>	1
<i>Decrease fetal movement</i>	1
<i>Fever</i>	1
<i>HIV positive</i>	1
<i>Iron deficiency</i>	1
<i>Placenta previa</i>	1
<i>Short stature</i>	1
<i>Thyrotoxicosis</i>	1

Pregnancy with Asthma

Total 20 cases (1.32 percent of total parturients)
(Singleton : 1; Twins : 1)

Activity of Disease

Well-controlled	18 cases
Poorly-controlled	2 cases

Age range 20-36 years
average 29.3±4.7 years
age of 35 years or more 3 cases (15.0 %)

Gestational Age at Birth

range 18-41 weeks
average 36.6±5.2 weeks
premature delivery (before completed 37 weeks)
6 cases (30.0 %)

Birth Weight (not included abortion)

range 200-3540 grams
average 2587±773 grams
number of low birth weight fetus (less than 2,500 grams)
7 cases (35.0 %)

Apgar Scores at 1 minute (less than 7) 2 cases (10.0 %)

Apgar Scores at 5 minutes (less than 7) 2 cases (10.0 %)

Small-for-gestational-age (less than 10th percentile) 3 cases (15.0 %)

Perinatal death 1 (5.0 %)

Congenital Anomalies - case**Other complications**

<i>Myoma uteri</i>	2
<i>Chronic HT</i>	1
<i>Diabetes</i>	1
<i>HBsAg positive</i>	1
<i>Iron deficiency</i>	1
<i>Marked Obesity</i>	1
<i>Placenta previa</i>	1
<i>Previous cesarean section</i>	1
<i>Prolonged PROM</i>	1
<i>Thalassemia</i>	1
<i>VDRL +ve</i>	1

Pregnancy with Chronic Hypertension

Total 31 cases (2.04 percent of total parturients)

Singleton : 30; Twins : 1

Severity of Hypertension

Severe (start treatment during pregnancy)	3	cases
Severe (controlled prior to pregnancy)	10	cases
Mild (no medication BP less than 160/90)	13	cases
Mild (BP less than 160/90 but treated with antihypertensive drug)	5	cases

Age range 17-42 years

average 32.4 ± 6.3 years

age of 35 years or more 11 cases (35.5 %)

Gestational Age at Birth

range 13-40 weeks

average 34.9 ± 6.9 weeks
 premature delivery (before completed 37 weeks)
 12 cases (38.7 %)

Birth Weight

range 30-3710 grams
 average 2403 ± 1073 grams
 number of low birth weight fetus (less than 2,500 grams)
 12 cases (38.7 %)

Apgar Scores at 1 minute (less than 7) 24 cases (77.4 %)

Apgar Scores at 5 minutes (less than 7) 25 cases (80.6 %)

Small-for-gestational-age (less than 10th percentile) 4 cases (12.9 %)

Perinatal death 5 cases (16.1%) (immaturity)

Congenital Anomalies -

Other complications

<i>Pre-eclampsia</i>	9 case
<i>Diabetes mellitus</i>	5 cases
<i>Previous cesarean section</i>	5 cases
<i>Marked Obesity</i>	2 cases
<i>Oligohydramnios</i>	2 cases
<i>Asthma</i>	1 case
<i>Breech presentation</i>	1 case
<i>HBsAg positive</i>	1 case
<i>Iron deficiency</i>	1 case
<i>Incompetent cervix</i>	1 case
<i>Myoma uteri</i>	1 case
<i>Teenage preg</i>	1 case
<i>Thyrotoxicosis</i>	1 case

Pregnancy-induced Hypertension

Total 77 (5.07 percent of total parturients)

Singleton: 72; Twins: 5

Age range 19-47 years

average 30.0 ± 6.2 years

age of 35 years or more 14 cases (18.2 %)

Gestational Age at Birth

range 20-40 weeks

average 35.1 ± 4.6 weeks

premature delivery (before completed 37 weeks)

35 cases (45.5 %)

Classification of PIH

Gestational hypertension (without proteinuria)	16 cases (20.0 %)
Mild Preeclampsia	42 cases (52.5 %)
Severe Preeclampsia	17 cases (21.2 %)
Pregnancy-aggravated hypertension	5 cases (6.2 %)
Eclampsia	- cases (0.0 %)
<i>First eclamptic attack before admission</i>	<i>0 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 220-4220 grams

average 2330 ± 951 grams

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

36 cases (46.8 %)

Apgar Scores at 1 minute (less than 7)	12 cases (15.6 %)
Apgar Scores at 5 minutes (less than 7)	7 cases (9.1 %)
Small-for-gestational-age (less than 10th percentile)	13 cases (16.9 %)
Perinatal death	3 cases (3.9 %; immaturity)
Congenital Anomalies	1 case (1.3 %; hydrops fetalis)

Other complications

<i>Diabetes mellitus</i>	21 cases
<i>Chronic hypertension</i>	9 cases
<i>Breech presentation</i>	6 cases
<i>Previous cesarean section</i>	6 cases
<i>PIH</i>	4 cases
<i>PROM</i>	4 cases
<i>Upper urinary tract infection</i>	4 cases
<i>HBsAg positive</i>	3 cases
<i>Systemic lupus erythematosus</i>	3 cases
<i>Prolonged PROM</i>	3 cases
<i>Placenta previa</i>	2 cases
<i>Marked Obesity</i>	2 cases
<i>Thalassemia</i>	2 cases
<i>Chorioamnionitis</i>	1 case
<i>Thalassemia</i>	1 case
<i>Myoma uteri</i>	1 case
<i>Oligohydramnios</i>	1 case

Pregnancy with Thalassemia

Total 14 cases (0.92 percent of total parturients)

Singleton: 13; Twins: 1

Type of thalassemia

beta-thalassemia / HbE disease 6 cases

alpha-thalassemia (Hb H/variant disease) 8 cases

Age range 17-34 years

average 26.6 ± 5.1 years

age of 35 years or more 0 cases (0.0 %)

Gestational Age at Birth

range 22-40 weeks

average 36.4 ± 5.2 weeks

premature delivery (before completed 37 weeks)

4 cases (28.6 %)

Birth Weight

range 845-2980 grams

average 2396 ± 680 grams

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

4 cases (28.6 %)

Apgar Scores at 1 minute (less than 7) 3 cases (21.4 %)

Apgar Scores at 5 minutes (less than 7) 2 case (14.3 %)

Small-for-gestational-age (less than 10th percentile) 2 cases (14.3 %)

Perinatal death 1 case (7.1 %)

Congenital Anomalies 1 cases (7.1 %; hydrops fetalis)

Other complications

<i>Pre-eclampsia</i>	3 cases
<i>Diabetes mellitus</i>	2 cases
<i>Fever</i>	1 case
<i>Placenta previa</i>	1 case
<i>Asthma</i>	1 case
<i>Previous cesarean section</i>	1 case

Placenta Previa

Total 23 cases (1.52 percent of total parturients)

Singleton : 21; Twins : 2

Age range 22-53 years

average 33.4 ± 4.9 years

age of 35 years or more 8 cases (34.8 %)

Gestational Age at Birth

range 21-40 weeks

average 33.4 ± 4.9 weeks

premature delivery (before completed 37 weeks)

16 cases (69.6 %)

Birth Weight

range 360-3200 grams

average 2170 ± 760 grams

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

14 cases (60.9 %)

Apgar Scores at 1 minute (less than 7)	8 cases (34.8 %)
Apgar Scores at 5 minutes (less than 7)	4 case (17.4 %)
Small-for-gestational-age (less than 10th percentile)	2 case (8.7 %)
Perinatal death	3 cass (13.0 %)
Congenital Anomalies	2 cass (Hb Bart's disease, Trisomy 13)
Other complications	
<i>Previous cesarean section</i>	3
<i>Breech presentation</i>	3
<i>Diabetes mellitus</i>	3
<i>Pre-eclampsia</i>	2
<i>Placental adherens</i>	1
<i>Asthma</i>	1
<i>Iron deficiency</i>	1
<i>Transverse lie</i>	1
<i>HBsAg positive</i>	1
<i>Systemic lupus erythematosus</i>	1
<i>Thalassemia</i>	1

Pregnancy with Acute Pyelonephritis

Total 13 cases (0.86 percent of total parturients)
(All were singleton; 13)

Age range 21-36 years
average 27.7 ± 5.1 years
age of more than 35 years 1 cases (7.7 %)

Gestational Age at Birth
range 29-40 weeks
average 36.1 ± 3.2 weeks
premature delivery (before completed 37 weeks)
6 cases (46.2 %)

Onset

First trimester	3	case
Second trimester	4	cases
Third trimester	5	cases
Postpartum	1	cases

Number of Episodes

1	11	cases
2	2	case
3	-	case

Birth Weight range 1040-3000 grams
average 2494 ± 740 grams
number of low birth weight fetus (less than 2,500 grams)
6 cases (46.2 %)

Apgar Scores at 1 minute (less than 7)	1 cases (7.7 %)
Apgar Scores at 5 minutes (less than 7)	0 case (0.0 %)
Small-for-gestational-age (less than 10th percentile)	1 cases (4.3%)
Perinatal death	1 case
Congenital Anomalies	-
Other complications	
<i>Pre-eclampsia</i>	4
<i>Diabetes mellitus</i>	3
<i>Fever</i>	2
<i>Breech presentation</i>	1
<i>Diarrhea</i>	1
<i>Decrease fetal movement</i>	1
<i>Prolonged PROM</i>	1

Small-for-Gestational-Age Fetuses

Birthweight less than 10th percentile

Total 131 (8.39 percent of total babies; 1561 fetuses)
 Singleton : 95 fetuses, Multifetal pregnancies : 36 fetuses

Age range 12-47 years
 average 29.8 ± 6.1 years
 age of 35 years or more 30 cases (22.9 %)

Gestational Age at Birth

range 22-41 weeks
 average 34.8 ± 5.2 weeks
 premature delivery (before completed 37 weeks)
 60 cases (45.8 %)

Birth Weight

range 90-2600 grams
 average 1723 ± 751 grams
 number of low birth weight fetus (less than 2,500 grams)
 122 cases (93.1 %)

Apgar Scores at 1 minute (less than 7) 33 cases (25.2 %)

Apgar Scores at 5 minutes (less than 7) 25 cases (19.1 %)

Perinatal Death 13 cases (9.9 %)

Congenital Anomalies 9 cases (6.9 %)

<i>Gastroschisis</i>	4 cases
<i>Multiple anomalies</i>	3 cases
<i>Duodenal atresia</i>	1 case
<i>Trisomy 13</i>	1 case

Other complications

<i>Poor maternal weight gain</i>	20 cases
<i>Medical diseases</i>	15 cases
<i>Pregnancy-induced hypertension</i>	13 cases
<i>Fetal anomalies</i>	9 cases

Pregnant women with HIV infection

Pregnant women with HIV infection at Maharaj Nakorn Chiang Mai Hospital (1989-1997) 1989-1996--> No ANC screening for anti HIV antibody 1997-now--> Voluntary screening for anti-HIV antibody among pregnant women and their husbands and antiviral prescription for +ve female cases

TABLE 37 Pregnant women with positive HIV, having delivery at Maharaj Nakorn Chiang Mai (2007-2018)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of Deliveries	2144	2222	2089	1900	2059	1847	1686	1572	1431	1545	1518
No. of women with positive HIV	19	24	41	36	42	46	37	43	16	20	18
Deliveries	19	27	37	35	38	36	30	33	24*	14	12
Therapeutic abortion	-	1	4	-	-	-	-	2	1	1	-
Spontaneous abortion	-	1	-	1	2	1	2	1	-	-	1
Illegal abortion	-	-	-	-	-	-	-	-	-	-	-

* Many cases giving birth at Maharaj Nakorn Chiang Mai hospital, but attending antenatal care at other hospitals

FIGURE 19 Pregnant women with positive HIV antibody at Maharaj Nakorn Chiang Mai (1989-2018) (no screening program during 1989 -1996)

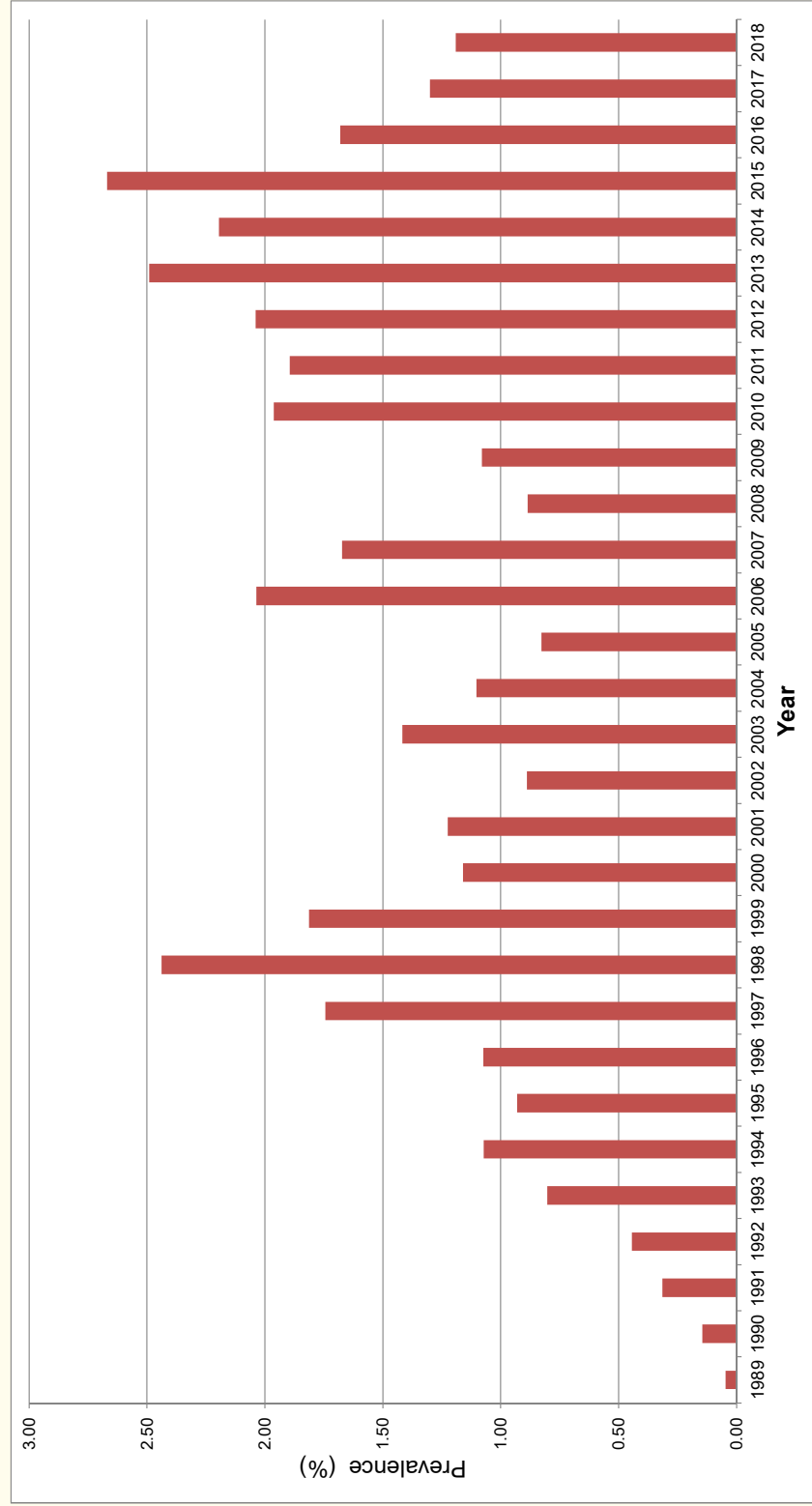


TABLE 38 Voluntary screening (2018) among pregnant women for anti-HIV antibody

Pregnant women (Counselling)	1607	cases
Voluntary screening	1607	cases
+ve anti-HIV antibody	18	cases
% positive case	1.1	%

TABLE 39 Age of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2018)

Age (years)	No. of cases	Percent
15-19	-	-
20-24	4	33.3
25-29	-	-
30-34	3	25.0
35-39	5	41.7
40-44	-	-
45-49	-	-
Total	12	100

Mean age (years) 30.92

Standard deviation 5.915

Range 23-38 years

TABLE 42 Number of marriages of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2018)

Number	No. of cases	Percent
1	2	16.7
2	5	41.6
3	3	25.0
4	-	-
Unknown	2	16.7
Total	12	100

TABLE 43 Occupations of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2018)

Occupations	No. of cases	Percent
Employee	6	50.0
Housewife	3	25.0
Commercial	1	8.3
Government officer	2	16.7
Total	12	100

TABLE 44 Residence (province) of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2018)

Province	Number	Percent
Chiang Mai (เชียงใหม่)	9	75.1
Lamphun (ลำพูน)	1	8.3
Chiang Rai (เชียงราย)	-	-
Lampang (ลำปาง)	1	8.3
Maehongson (แม่ฮ่องสอน)	1	8.3
Total	12	100

TABLE 45 Complications of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2018)

	Cases	Percent
Without complicaiton	7	58.3
With complication	5	41.7
● Antepartum	5	
● Intrapartum	-	
● Postpartum	-	
Total	12	100

TABLE 46 Birth weight in the pregnant women with posi-tive HIV at Maharaj Nakorn Chiang Mai (2018)

Birth weight (grams)	Number	Percent
1,500 - 1,999	-	-
2,000 - 2,499	-	-
2,500 - 2,999	6	50.0
3,000 - 3,499	4	33.3
3,500 - 3,999	2	16.7
Total	12	100

Mean birthweight (grams) 3,095
Standard deviation (grams) 390
Range (grams) 2,620-3,900

TABLE 47 Postpartum contraception of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2018)

Method	No. of cases	Percent
Female sterilization	6	50.0
Male sterilization	1	8.3
DMPA	1	8.3
Oral contraception	1	8.3
Condom	2	16.7
Unknown	1	8.3
Total	12	100

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** 2818 tests

(*OPD4 = 2283; LR = 435; OB = 100*)

Secondary Surveillance

Contraction stress test

or **Nipple stimulation test** 4 tests

Biophysical profile/ultrasonography 130 tests

Doppler velocimetry 300 tests

Prenatal Diagnosis

1. **Ultrasonography** 9,073 examinations
(~ 20 % for gynecologic and infertile examinations)
2. **Amniocentesis** 992 cases
3. **Cordocentesis** 225 cases
4. **Chorionic villous sampling** 108 cases

OBSTETRIC ULTRASOUND SERVICE

Number of Patients undergoing sonographic examinations (OB&GYN) in 2018

9,073 cases

Several examinations involved in the researches without specific indications

Indications for sonographic examination	
■ Obstetric ultrasound	73.9 %
■ Perinatal research & Down screening research	23.0 %
■ Obstetric ultrasound (others)	77.0 %
■ Gestational age estimation	
■ Obstetric hemorrhage	
■ Follow-up fetal anomalies	
■ Fetal growth surveillance	
■ etc.	
■ Gynecologic ultrasound	26.1 %
■ General gynecology	70.1 %
■ Gynecologic oncology	13.6 %
■ Reproductive medicine	16.3 %

Cordocentesis (2018)

Total 225 cases

Indications	No.	%
1. Previous child with Hb bart's disease	9	4.0
2. Previous child with β thal / HbE disease	2	0.9
3. Previous child with β thal major disease	1	0.4
4. Pregnancy at risk for Hb Bart's hydrops fetalis	20	8.8
5. Pregnancy at risk for β thal major disease	28	12.4
6. Pregnancy at risk for β thal / HbE disease	88	39.1
7. Pregnancy at risk for Hb Bart's and β thal/HbE disease	1	0.4
8. Pregnancy at risk for Hb Bart's and β thal major disease	1	0.4
9. Pregnancy at risk for uncertain OFT	3	1.2
10. Chromosome analysis	31	13.8
11. Combined chromosome and risk for Hb bart's disease	9	4
12. Combined chromosome and risk for β thal major disease	3	1.3
13. Combined chromosome and risk for β thal Hb/E	30	13.3
14. Combined chromosome analysis and uncertain OFT	1	0.4
15. Repeated for chromosome study	3	1.3
Total	225	100

Amniocentesis (2018)

Total 992 cases

Indications for amniocentesis	
Elderly gravida (age of more than 35 years)	719
■ <i>with no other obvious risk</i>	551
■ <i>with high risk for Down syndrome screening</i>	156
■ <i>with fetal anomaly and sonomarkers</i>	8
■ <i>with previous child with Down syndrome</i>	2
■ <i>with previous child with anomaly</i>	2
Pregnancy with high risk for Down syndrome screening	230
■ <i>Pregnancy with Down syndrome in previous child</i>	4
■ <i>Pregnancy with previous child with abnormal chromosome</i>	2
■ <i>Pregnancy with high risk for trisomy 18</i>	1
■ <i>Pregnancy with previous child with multiple anomaly</i>	1
Pregnancy with fetal anomaly / sonomarkers	33
Amniocentesis for diagnosis of thalassemia	8
■ <i>Pregnancy at risk of beta-thalassaemia major</i>	1
■ <i>Pregnancy at risk of beta-thalassaemia/HbE disease</i>	7
Others (Maternal request)	2

Chorionic Villous Sampling (2018)

Total 108 procedures

Indications	Number
1. Fetal chromosome study	15
■ Elderly gravida	3
■ Thickened nuchal translucency	4
■ Elderly gravida and thickened nuchal translucency	5
■ Fetal cystic hygroma	1
■ Previous child with trisomy 13	1
■ Fetal omphalocele	1
2. Risk for fetal severe thalassemia	77
■ Risk for Hb Bart's disease	26
■ Risk for beta thalassemia major	12
■ Risk for beta thalassemia/Hb E disease	38
■ Risk for hereditary elliptocytosis	1
3. Fetal chromosome study and thalassemia diagnosis	16
■ Elderly gravida with fetal risk for Hb Bart's disease	5
■ Elderly gravida with fetal risk for homozygous beta-thalassemia	2
■ Elderly gravida with beta thalassemia/Hb E disease	8
■ Thickened translucency and risk for Hb Bart's disease	1

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)
 - HbA₂ level & PCR for α -thal1 if MCV (2 min OF) is positive
 - HbA₂ 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 = ≤ 78 fl +ve % HbA₂ = HbA₂ > 4%

PROSPECTIVE SCREENING FOR THALASSEMIA PROGRAM 2018

	Number
Total number of pregnant screened	1,343
Positive MCV or Hb E	196
Number of couple at risk for thalassemia	30
■ Risk for Hb Bart's	4
■ Risk for Beta-thalassemia major	8
■ Risk for Beta thalassemia/Hb E	18
The choice which selected by couples	
■ Cordocentesis	17
■ Chorionic villus samplings	4
■ Amniocentesis	1
■ Ultrasonography	2
■ Waiting for PND	2
■ No PND [risk for minor thalassemia]	3
■ No data	1
Result of PND	
■ Hb bart's	2
■ Beta thalassemia major	2
■ Beta thalassemia/Hb E	1

Down Syndrome Screening (2018)

Total 9,815 tests (NHSO)

Trimester	Risk			Total
	Low	Intermediate	High	
Second	9,063 (92.3%)	-	752 (7.7%)	9,815

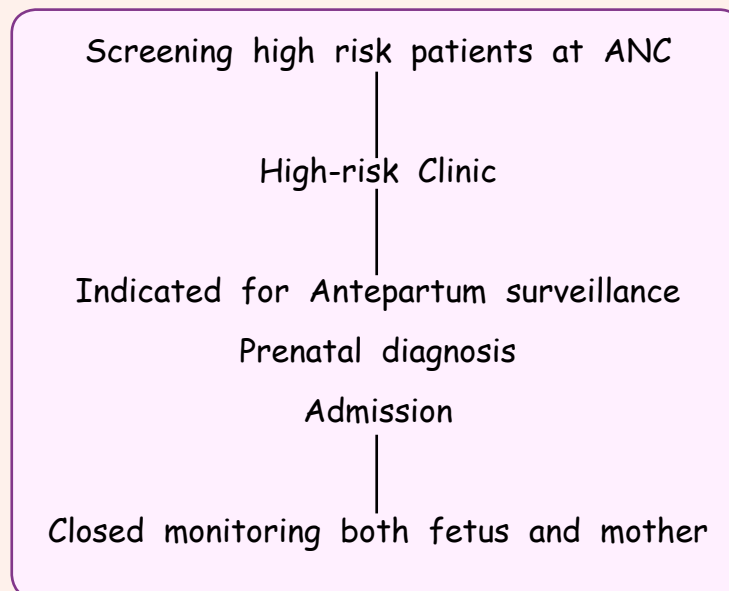
Total 937 tests (Service cases)

Trimester	Risk		Total
	Low	High	
First	723 (97.44%)	19 (2.56%)	742
Second	166 (85.13%)	29 (14.87%)	195
Summary	889	48	937

High Risk Pregnancy

Number of patients approximately 400 cases

Management Guideline



High-risk patients at Maharaj Nakorn Chiang Mai Hospital in 2018

- | | |
|---|--------|
| 1. Elderly Gravida (age of 35 years or more) | 21.6 % |
| 2. Teenage Pregnancy (age of less than 20 years) | 3.9 % |
| <i>Early adolescence (age of less than 17 years)</i> | 0.8 % |
| <i>Late adolescence (age of 17-19 years)</i> | 3.1 % |
| 3. Pregnancy complicated with medical or obstetrical diseases | 12.9 % |

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.