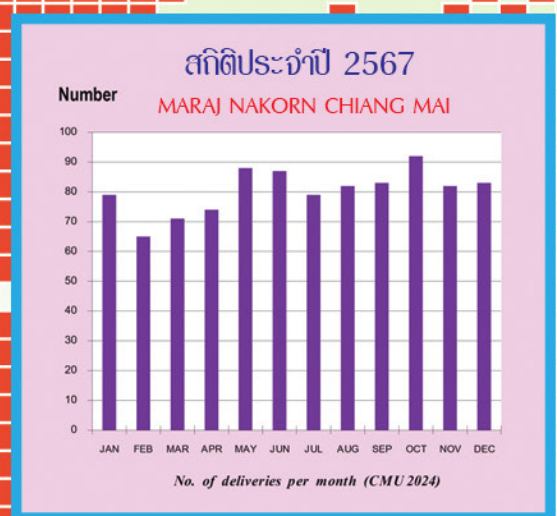


MATERNAL-FETAL MEDICINE 2024



หน่วยเวชศาสตร์มารดาและทารก
ภาควิชาสูติศาสตร์และนรีเวชวิทยา
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่



ANNUAL REPORT 2024

MATERNAL-FETAL MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY

CHIANG MAI, THAILAND

Published: February 2025

MATERNAL-FETAL MEDICINE 2024

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PREFACE

Welcome to the 2024 edition of the Maternal-Fetal Medicine Annual Report. This past year has been a transformative period for the Division of Maternal-Fetal Medicine at Chiang Mai University. We've dedicated ourselves to the complex, yet rewarding, challenge of providing specialized care to women with high-risk pregnancies in Northern Thailand. Our services encompass a broad spectrum, from prenatal diagnostics to sophisticated fetal therapies, all delivered with the goal of safeguarding maternal and child health.

This year's report highlights some significant trends and changes: Our total delivery count remains below one thousand, which is consistent with past years. A notable development has been the reduction in cesarean delivery rates, which fell sharply from 33.4% to 26.8%. This prompts us to consider the influence of our newly implemented labor care guidelines and other innovative strategies that could be contributing to this trend.

We also saw an encouraging uptick in vaginal breech deliveries—a testament to our evolving expertise and enhanced patient trust in less invasive delivery methods. Another point of interest is the continued rarity of forceps deliveries, aligning with broader shifts towards less interventionist obstetric practices.

Of note, we face a growing challenge with the rise in iron-deficiency anemia rates among our patients, signaling a need for increased nutritional and health support during pregnancy.

I am immensely grateful to Associate Professor Chanane Wanapirak and his dedicated team for their relentless pursuit of excellence in medical education and patient care. My thanks also go to Professor Theera Tongsong for his meticulous effort in assembling this comprehensive report.

As we look ahead, we are inspired by the resilience and dedication of our community. Together, we are shaping a future where every pregnancy is safer, and every outcome is better.

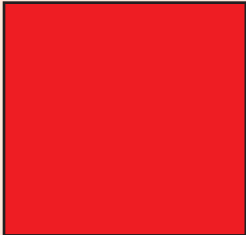
*Associate Professor Kittipat Charoenkwan, MD, MSc
Chairman Department of Obstetrics and Gynecology
Faculty of Medicine, Chiang Mai University
Chiang Mai 50200, Thailand
April 2025*

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. For the past year, there are some changes of data that may trigger us to plan for maintaining our mission. Firstly, the total number of delivery is under 1,000 for the first time since we started our service but high risk cases were majority cases. This may show the obstetrics service in this area has been decentralized to other hospitals apart from the reproductive rate of the country is decreased. The cesarean section rate in our institution showed gradually increasing from 15.8% in the year 2000 to more than 30% for many years, but surprisingly in the passing year the rate decrease to 26.8% which may cause by changing in labor care guide or many measures to control CSR.

The rate of elderly pregnancy and other complicated pregnancies are on the rise. Syphilis in pregnant is still rising which need multidisciplinary approach to solve this social-threaten problems. The increase in iron deficiency pregnant women is likely due to more efficient screening. Trend of the technique using for prenatal diagnosis also shift to different one. All of information are the signal for the academic sector of faculty to plan for training curriculum in all levels. 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 dedicated staff members who have contributed to this report and hope that it will serve as the evidence for education and research including service for our next generations.

*Chanane Wanapirak, M.D.
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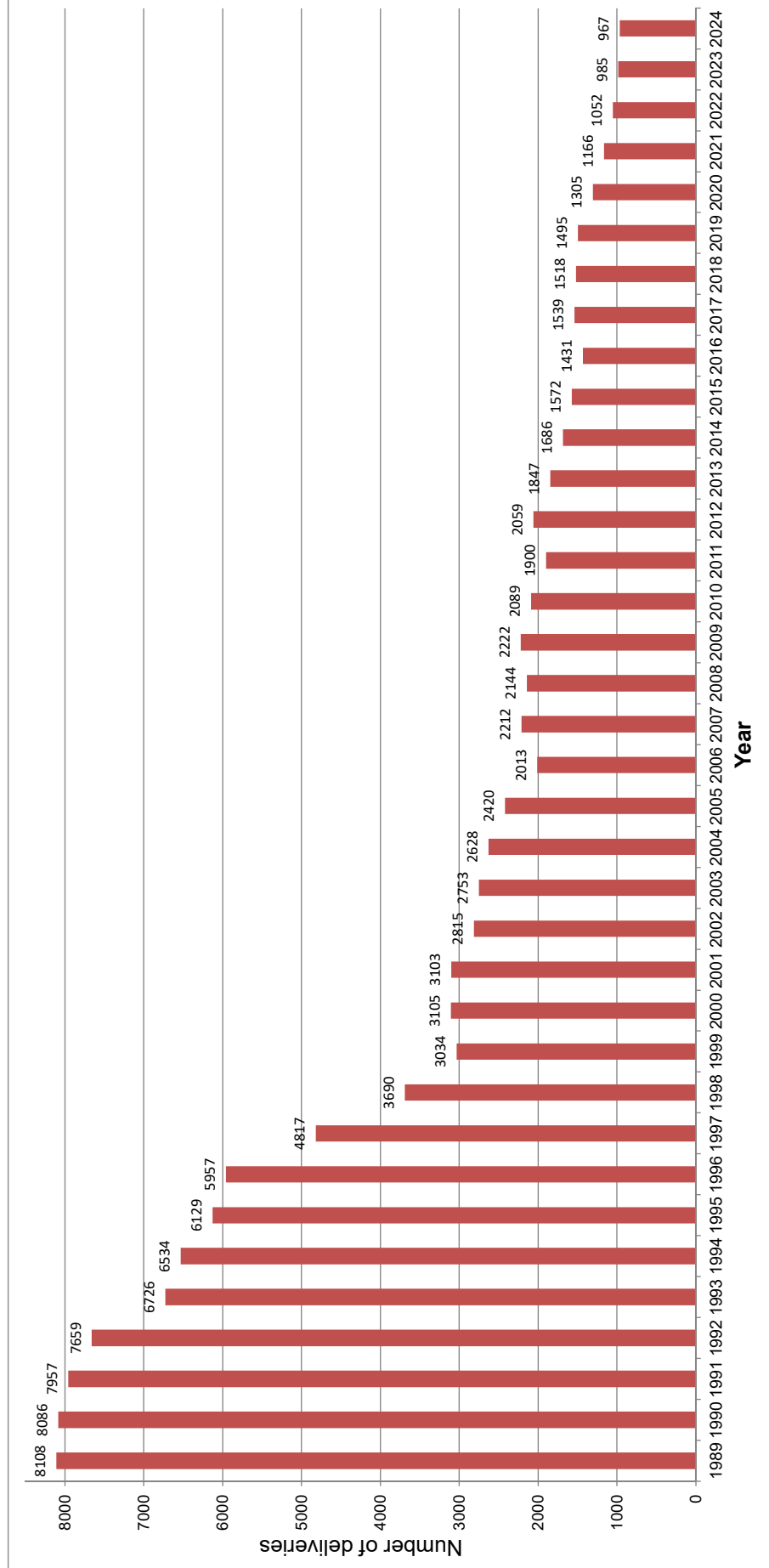
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Number of deliveris per year



DATA SOURCE

Section I	Obstetric Mortality	Patient Record Charts
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Section II	General Obstetrics	Delivery Records
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Section III	High-risk Pregnancies	Patient Record Charts
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Section IV	Perinatal Investigations	Statistics of the Division
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Section I

OBSTETRIC MORTALITY

STILLBIRTH

Stillbirth 2024: For gestational age ≥ 22 weeks
: 22 cases of total birth = 967 cases)

■ *Gestational age between 22-27 weeks 12 cases (54.55 %)*

	CMU	Referred	Total
Low risk	0	5	5
High risk	2	5	7
Autopsy	1	4	5

Causes of death

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	1	1	2
2. Congenital malformations	1	4	5
3. Condition associated with immaturity	0	3	3
4. Asphyxia developed in labor	0	0	0
5. Other specific conditions	0	2	2
6. Therapeutic termination related to PND	2	10	12

Stillbirth 2024: For gestational age ≥ 28 weeks
: 10 cases of total birth = 967 cases)

■ *Gestational age between ≥ 28 weeks 10 cases (45.45 %)*

	CMU	Referred	Total
Low risk	0	1	1
High risk	1	8	9
Autopsy	0	4	4

Causes of death

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

Stillbirth rate :

Stillbirth rate = 4.14 per 1000 total births

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

Stillbirth rate = 22.75 per 1000 total births

(by new WHO definition : ≥ 22 weeks or birth weight > 500 grams)

Stillbirth rate = 10.34 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 2024:

6 cases (GA > 22 weeks) of total 922 live births

- Gestational age between 22-27 weeks 3 cases (50.0 %)
(Total livebirth 922 cases)

	CMU	Referred	Total
Low risk	0	0	0
High risk	2	1	3
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	0	0
3. Condition association with immaturity	0	0	0
4. Asphyxia developed in labor	2	1	3
5. Other specific conditions	0	0	0
6. Therapeutic termination related to PND	0	0	0

Neonatal death 2024:

3 cases (GA > 28 weeks) of total 922 live births

- *Gestational age between ≥ 28 weeks 3 cases (50.0 %)
(Total livebirth 922 cases)*

	CMU	Referred	Total
Low risk	0	0	0
High risk	1	2	3
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	2	2
3. Condition associated with immaturity	0	0	0
4. Asphyxia developed in labor	1	0	1
5. Other specific conditions	0	0	0
6. Therapeutic termination related to PND	0	0	0

Early neonatal death rate 3.25 per 1,000 live births

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

Early neonatal death rate 6.51 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 = 14.10 per 1000 total births

2. Gestational age ≥ 22 weeks (stillbirths + neonatal death)

perinatal death rate = 30.37 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

Summary

DATA	2024
Total birth	967
Stillbirth	22
22-27 weeks	12
≥ 28 weeks	10
Stillbirth rate/1000 births	
> 28 weeks / birthweight >1,000 gm	4.14
> 22 weeks / birthweight >500 gm	22.75
Early neonatal death	
• Early neonatal death rate / 1000 live birth (≥ 28 weeks)	3.25
• Early neonatal death rate / 1000 live birth (≥ 22 weeks)	6.51

Section II**GENERAL OBSTETRICS****TABLE 1** Distribution of Singleton & Multifetal Pregnancies

Type of pregnancy	Number	Percent
Singleton	935	96.7
Twins	30	3.1
Triplet	2	.2
Total	967	100.0

TABLE 2 Categories of the Pregnant Women

	2023		2024	
	Number	Percent	Number	Percent
General Cases	946	96.0	941	97.3
Private Cases	39	4.0	26	2.7
Total	985	100.0	967	100.0

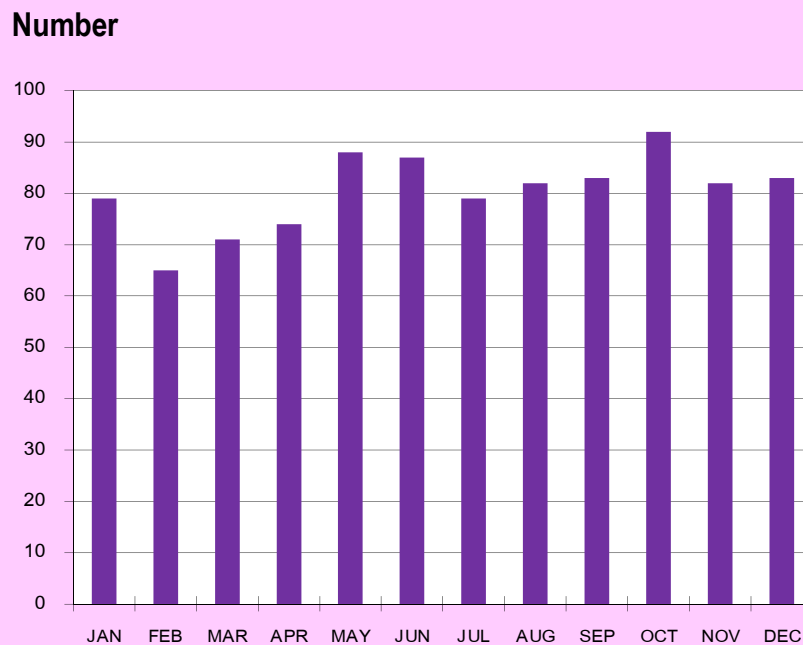
TABLE 3 Categories of the Pregnant Women

	Number	Percent
ANC at Maharaj Nakorn Chiang Mai Hospital	781	80.8
Private Clinic	26	2.7
ANC at Other Hospitals	133	13.8
No ANC	27	2.8
Total	967	100.0

TABLE 4 Number and Percentage of Deliveries per month

Month	Number (Mothers)	Percent
January	79	8.2
February	65	6.7
March	71	7.4
April	74	7.7
May	88	9.1
June	87	9.0
July	79	8.2
August	82	8.5
September	83	8.6
October	92	9.5
November	82	8.5
December	83	8.6
Total	965	100.0

FIGURE 1 Histogram : Number of Deliveries from
January to December 2024



No. of deliveries per month (CMU 2024)

Total deliveries in 2015 = 1572 cases

Total deliveries in 2016 = 1431 cases

Total deliveries in 2017 = 1539 cases

Total deliveries in 2018 = 1518 cases

Total deliveries in 2019 = 1495 cases

Total deliveries in 2020 = 1305 cases

Total deliveries in 2021 = 1166 cases

Total deliveries in 2022 = 1052 cases

Total deliveries in 2023 = 985 cases

Total deliveries in 2024 = 967 cases

TABLE 5 Number and percentage of parturients by age

Age	Number	Percent	Age	Number	Percent
13	1	.1	30	73	7.5
15	2	.2	31	74	7.7
16	3	.3	32	67	6.9
17	8	.8	33	61	6.3
18	5	.5	34	41	4.2
19	10	1.0	35	57	5.9
20	12	1.2	36	52	5.4
21	14	1.4	37	34	3.5
22	15	1.6	38	32	3.3
23	33	3.4	39	25	2.6
24	23	2.4	40	16	1.7
25	36	3.7	41	15	1.6
26	54	5.6	42	12	1.2
27	56	5.8	43	4	.4
28	68	7.0	44	6	.6
29	58	6.0			
Total				967	100.0

Average age (Mean+Standard deviation) 30.6+5.6 (13-44) years

TABLE 6 Number and percentage of parturients by age group

Age Group	Number	Percent
< 10	1	0.1
10 - 14	1	0.1
15 - 19	28	2.9
20 - 24	96	9.9
25 - 29	272	28.1
30 - 34	316	32.7
35 - 39	200	20.7
40 - 44	53	5.5
Total	967	100.0

Summary : Age of parturients

- Adolescent Pregnancies (11-19 years) 30 (3.1 %)
 - Early Adolescent Pregnancies (≤ 16 years) 7 (0.7 %)
 - Late Adolescent Pregnancies (17-19 years) 23 (2.4 %)
- Adult Pregnancies (20-34 years) 684 (70.7 %)
- Elderly Pregnancies (≥ 35 years) 253 (26.2 %)

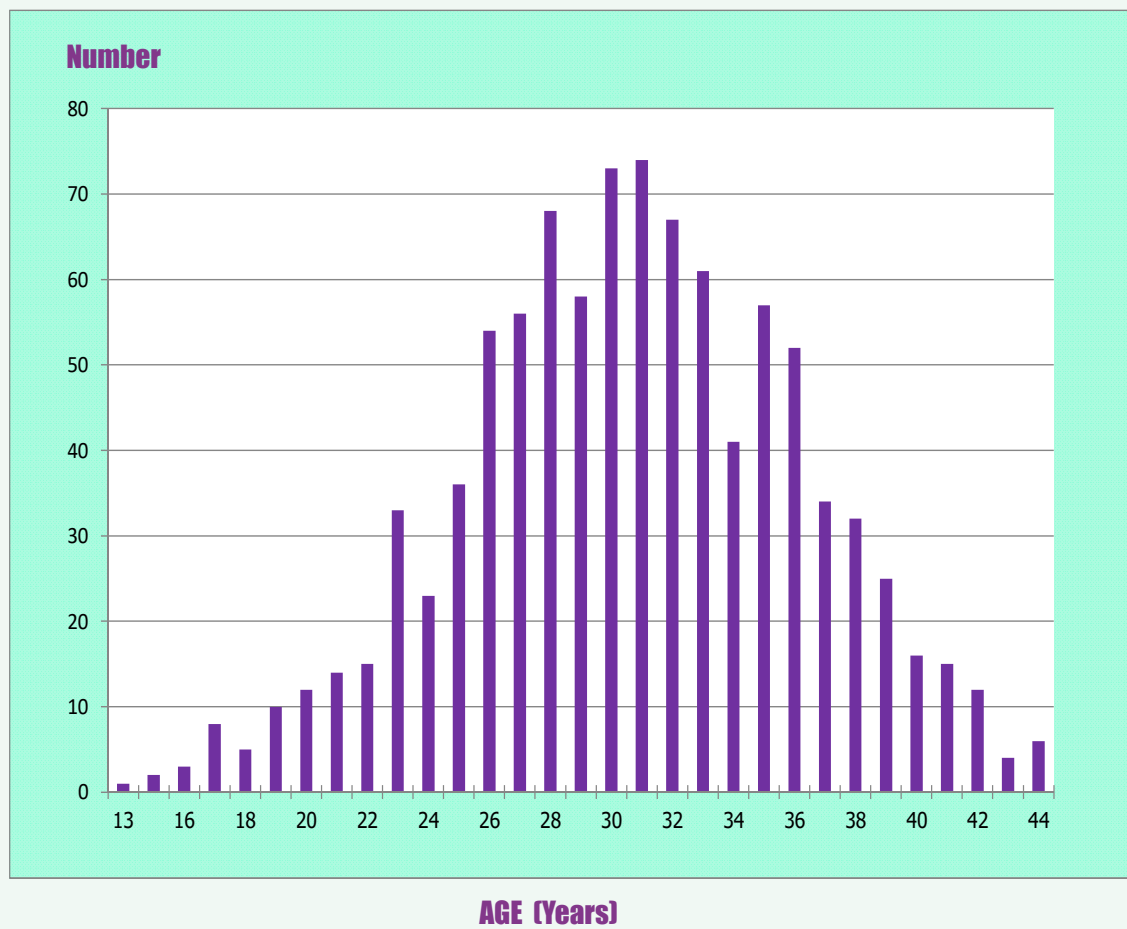
FIGURE 2 Histogram : Number of Parturients by Age

TABLE 7 Parity of parturients

Parity	Number	Percent
0	559	57.8
1	329	34.0
2	65	6.7
3	13	1.3
4	1	0.1
Total	967	100.0

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

Nulliparous 57.8 %

Multiparous 42.2 %

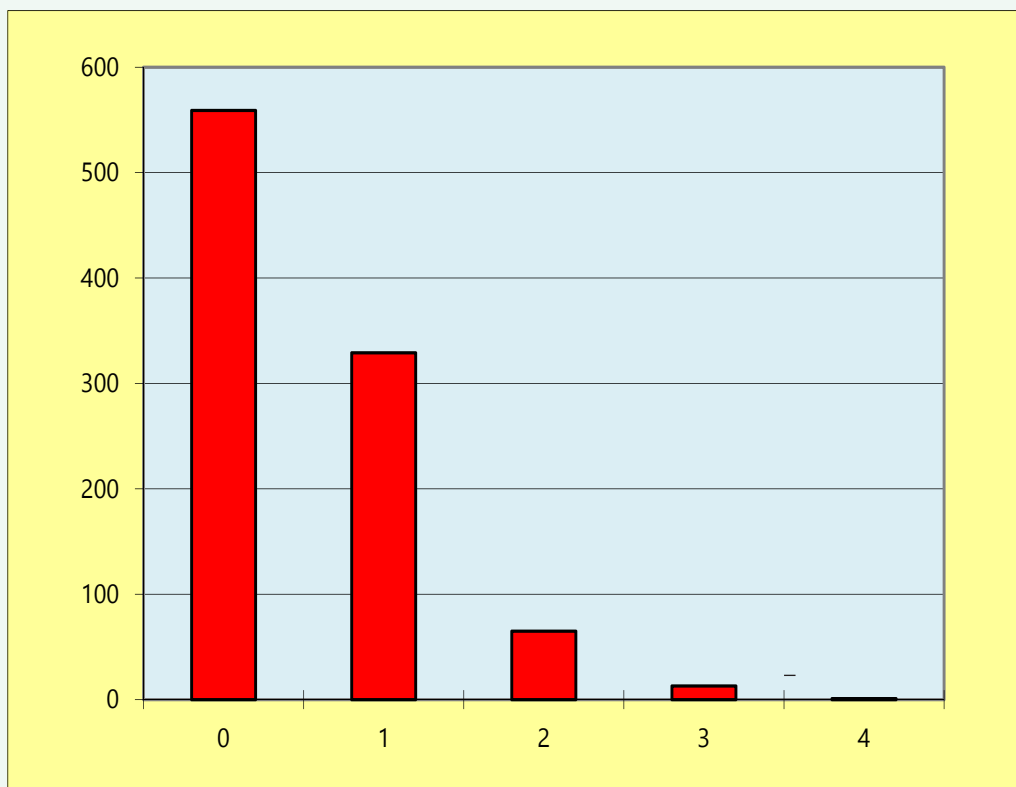
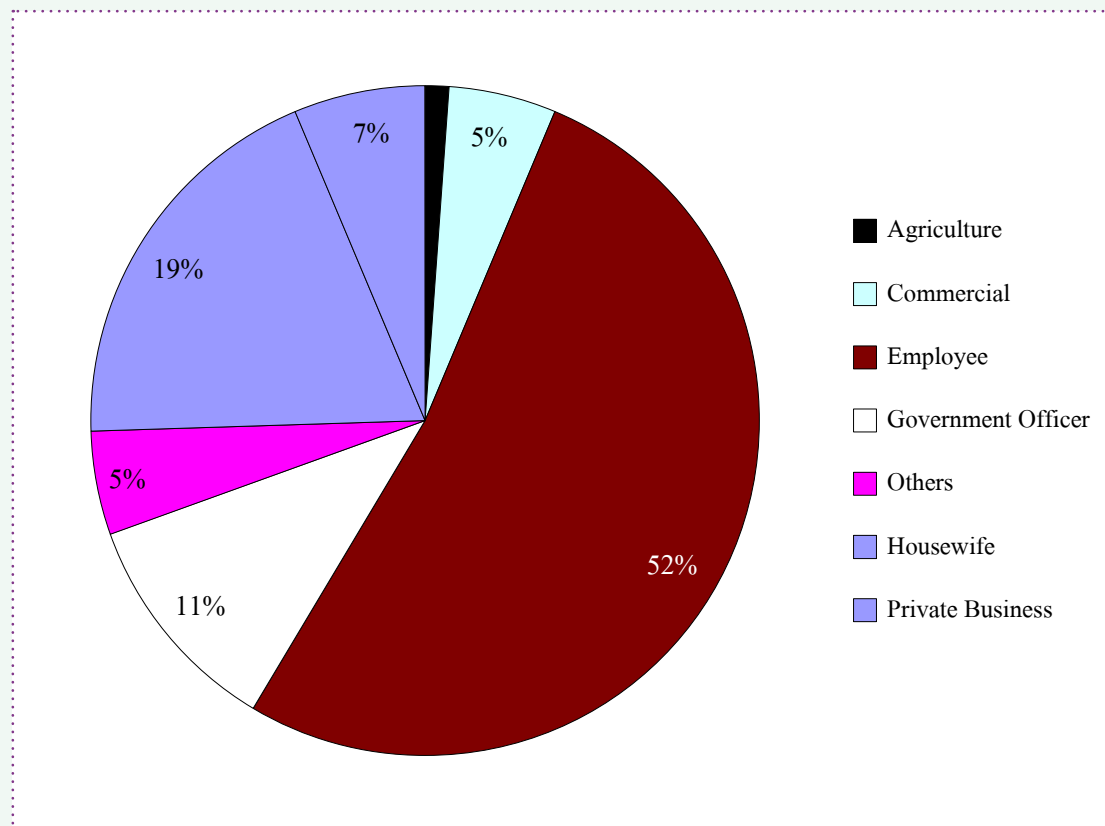
FIGURE 3 Histogram : Number of parturients by parity**NUMBER****PARITY**

TABLE 8 Distribution of the occupations of the parturients

Occupations	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Aggriculture	11	1.1	11	1.2	-	-
Commercial	50	5.2	49	5.2	1	3.8
Employee	502	52.2	491	52.5	11	42.3
Government Officer	105	10.9	103	11.0	2	7.7
Private Business	61	6.3	59	6.3	2	7.7
Housewife	184	19.1	179	19.1	5	19.2
State Enterprise	3	0.3	3	0.3	-	-
Staff Officer	7	0.7	6	0.6	1	3.8
Physician	2	0.2	1	0.1	1	3.8
Phamacist	23	2.4	20	2.1	3	11.5
Others	14	1.5	14	1.5	-	-
Total	962	100.0	936	100.0	26	100.0

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

OCCUPATIONS OF TOTAL PATIENTS



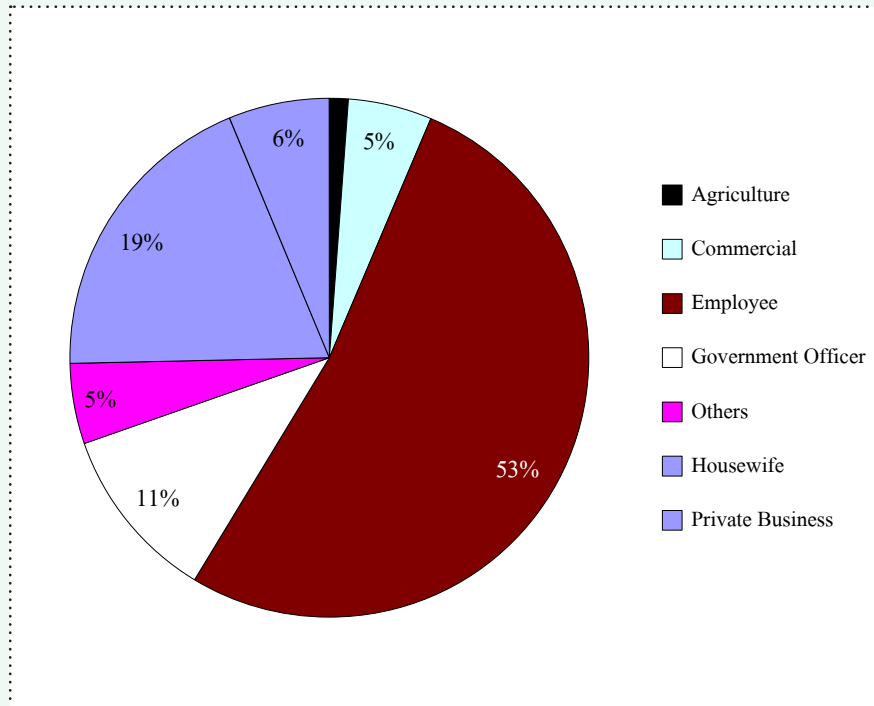
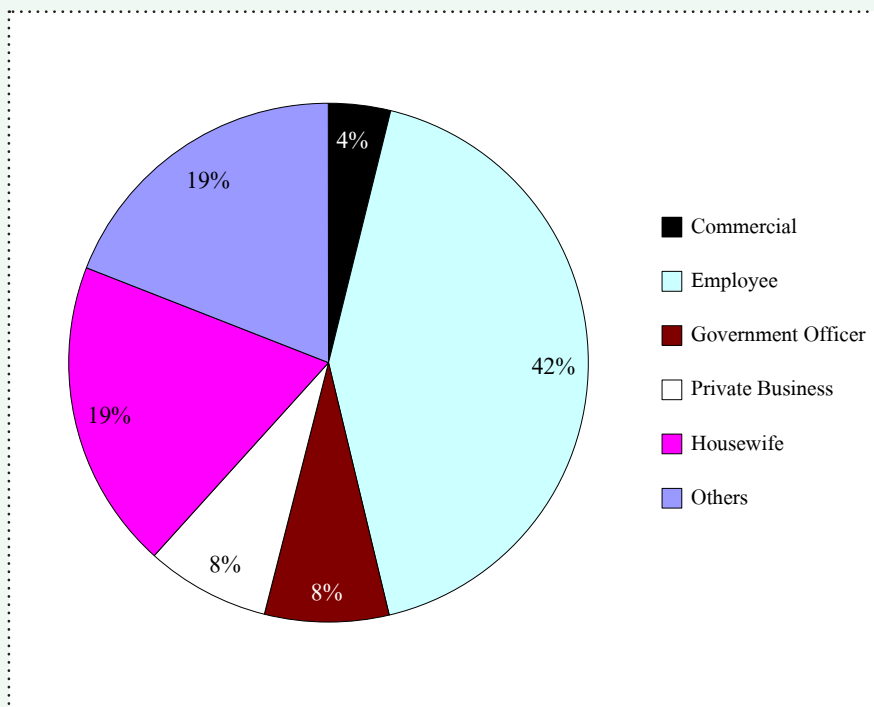
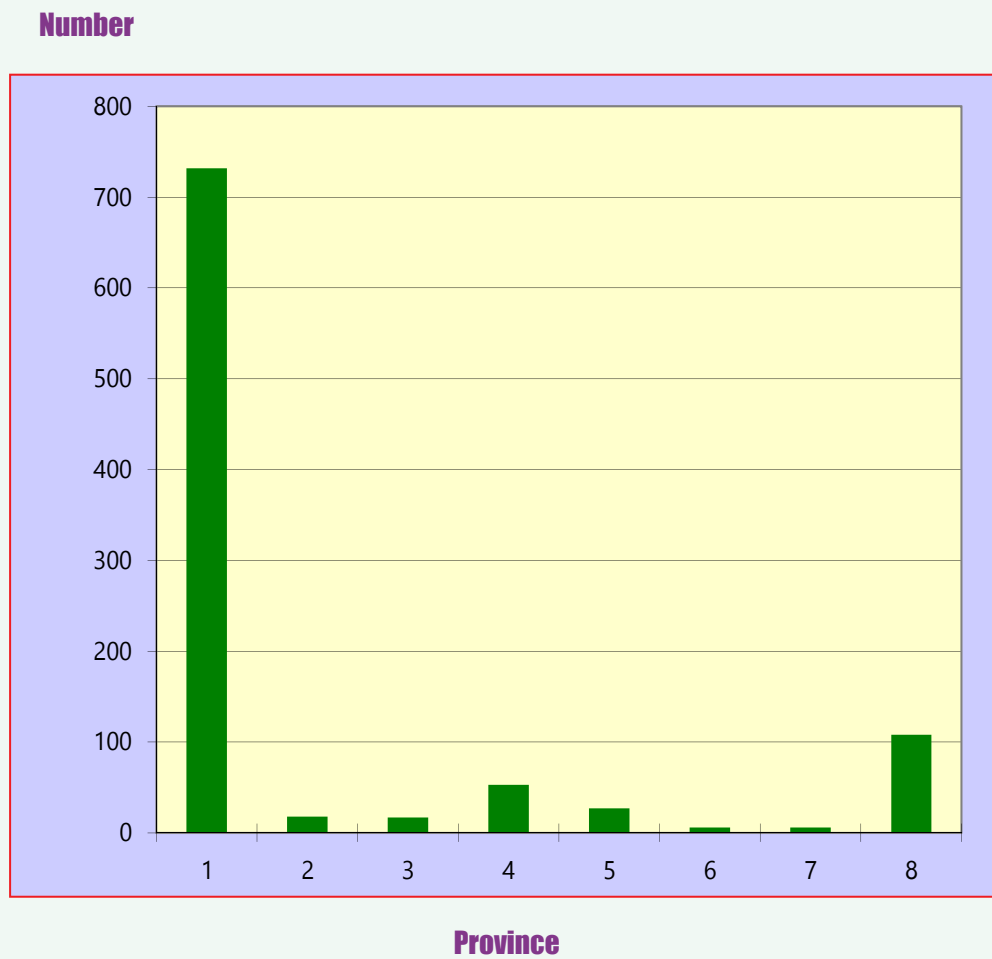
OCCUPATIONS OF THE GENERAL PATIENTS**OCCUPATIONS OF THE PRIVATE PATIENTS**

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

Province	Number	Percent
Chiang Mai (เชียงใหม่)	732	75.7
Chiang Rai (เชียงราย)	18	1.9
Lampang (ลำปาง)	17	1.8
Lamphun (ลำพูน)	53	5.5
Maehongson (แม่ฮ่องสอน)	27	2.8
Payao (พะเยา)	6	0.6
Prae (แพร่)	6	0.6
Others (อื่นๆ)	108	11.2
Total	967	100.0

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

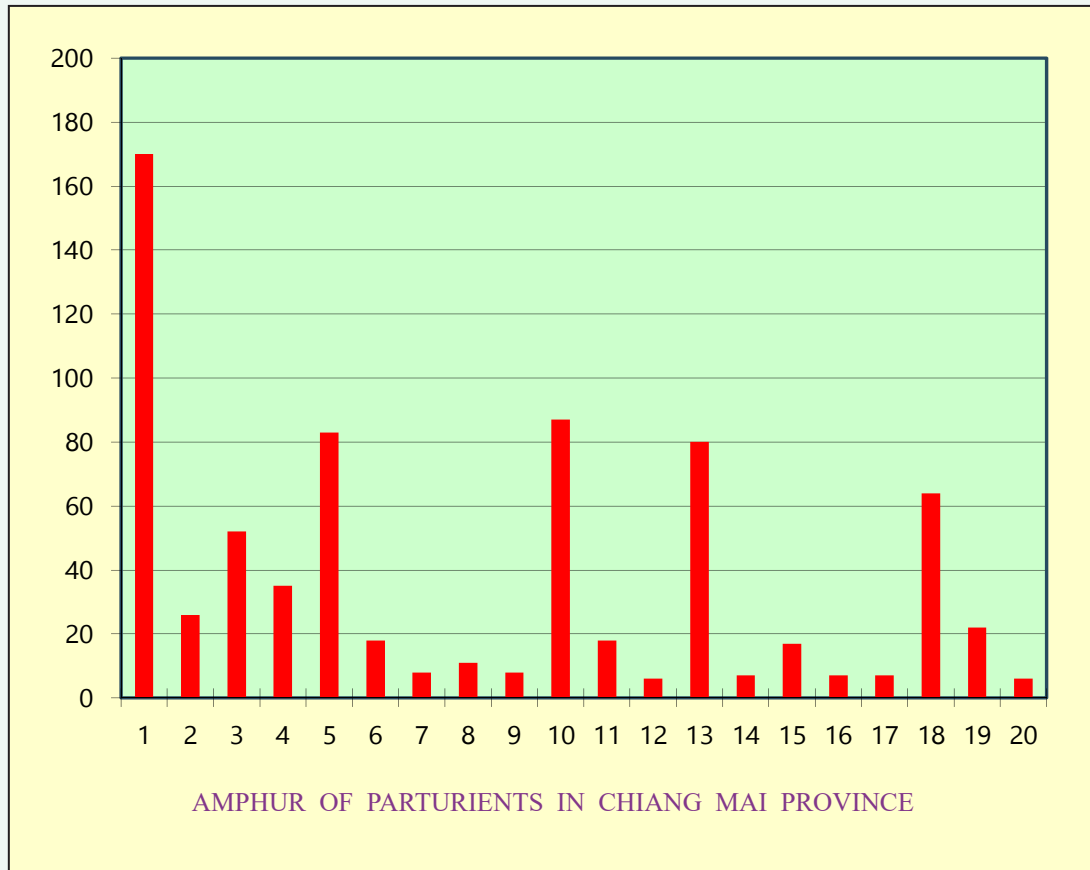


- | | |
|-----------------------------|--------------------------|
| 1. Chiang Mai (เชียงใหม่) | 2. Chiang Rai (เชียงราย) |
| 3. Lampang (ลำปาง) | 4. Lamphun (ลำพูน) |
| 5. Maehongsorn (แม่ฮ่องสอน) | 6. Payao (พะเยา) |
| 7. Phrae (แพร่) | 8. Others (อื่นๆ) |

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

	Amphur	Number	Percent
1.	Meung (เมือง)	170	23.2
2.	Maerim (แมริม)	26	3.6
3.	Doisaked (ดอยสะเก็ด)	52	7.1
4.	Sanpatong (สันป่าตอง)	35	4.8
5.	Hangdong (หางดง)	83	11.3
6.	Jomtong (จอมทอง)	18	2.5
7.	Mae-ai (แม่อาย)	8	1.1
8.	Prao (พร้าว)	11	1.5
9.	Hod (ฮอด)	8	1.1
10.	Sarapee (สารภี)	87	11.9
11.	Maetang (แม่แตง)	18	2.5
12.	Omkoï (อมก๋อย)	6	0.8
13.	Sankampang (สันกำแพง)	80	10.9
14.	Samoeng (สะเมิง)	7	1.0
15.	Chiangdao (เชียงดาว)	17	2.3
16.	Phang (ฝาง)	7	1.0
17.	Doitao (ดอยเต่า)	7	1.0
18.	Santrai (สันทราย)	64	8.7
19.	Maejam (แม่แจ่ม)	22	3.0
20.	Chaiprakarn (ไชยปราการ)	6	0.8
	Total	732	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 |

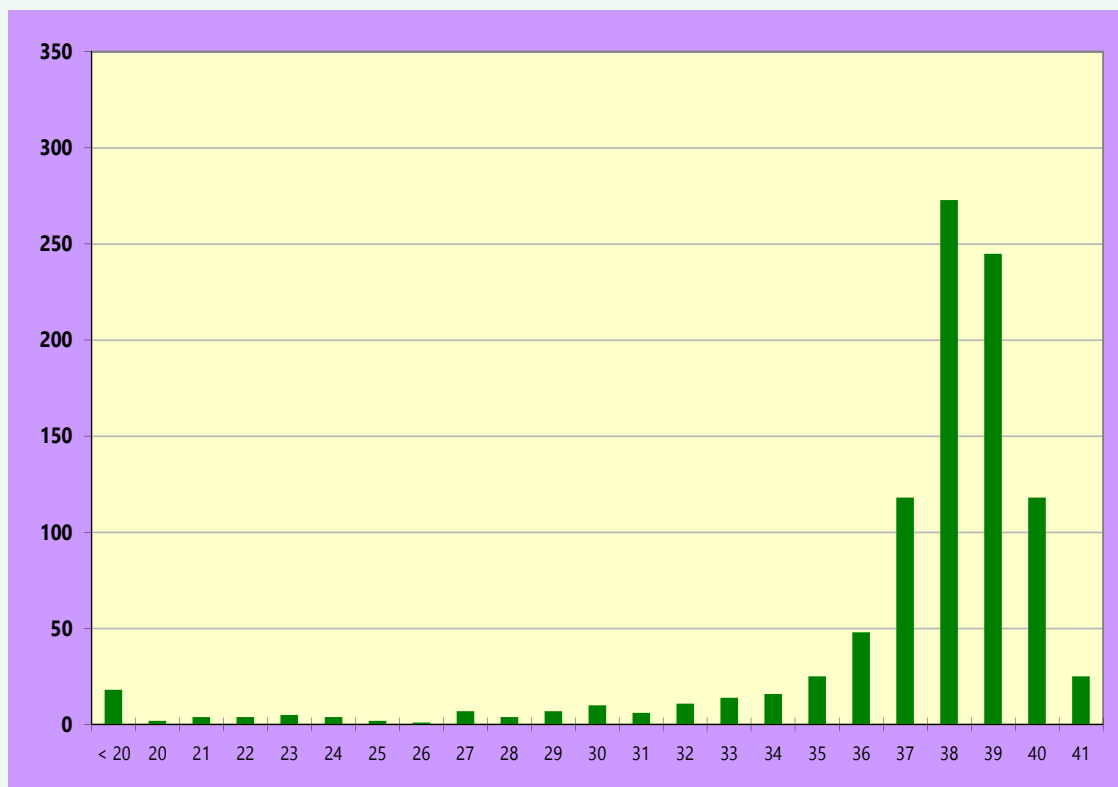
TABLE 11 Number and percentage of parturients by gestational age in singleton pregnancies

GA (Weeks)	Number	Percent	GA (Weeks)	Number	Percent
≤ 20	20	2.1	31	6	0.6
21	4	0.4	32	11	1.1
22	4	0.4	33	14	1.4
23	5	0.5	34	16	1.7
24	4	0.4	35	25	2.6
25	2	0.2	36	48	5.0
26	1	0.1	37	118	12.2
27	7	0.7	38	273	28.2
28	4	0.4	39	245	25.3
29	7	0.7	40	118	12.2
30	10	1.0	41	25	2.6
Total				967	100.0

Average of Gestational Age 36.98±4.43 (12-41) 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)	19	2.0
Immature (20-27 weeks)	29	3.0
Premature (28-36 weeks)	141	14.6
Term (37-41 weeks)	778	80.5
Postterm (42 weeks or more)	-	-
Total	967	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
22	1	3.3
24	2	6.7
25	1	3.3
27	1	3.3
29	2	6.7
31	1	3.3
33	5	16.7
34	3	10.0
35	2	6.7
36	3	10.0
37	7	23.3
38	2	6.7
Total	30	100.0

Average of Gestational Age 33.03 $\pm$ 4.62 (22-38) Weeks

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

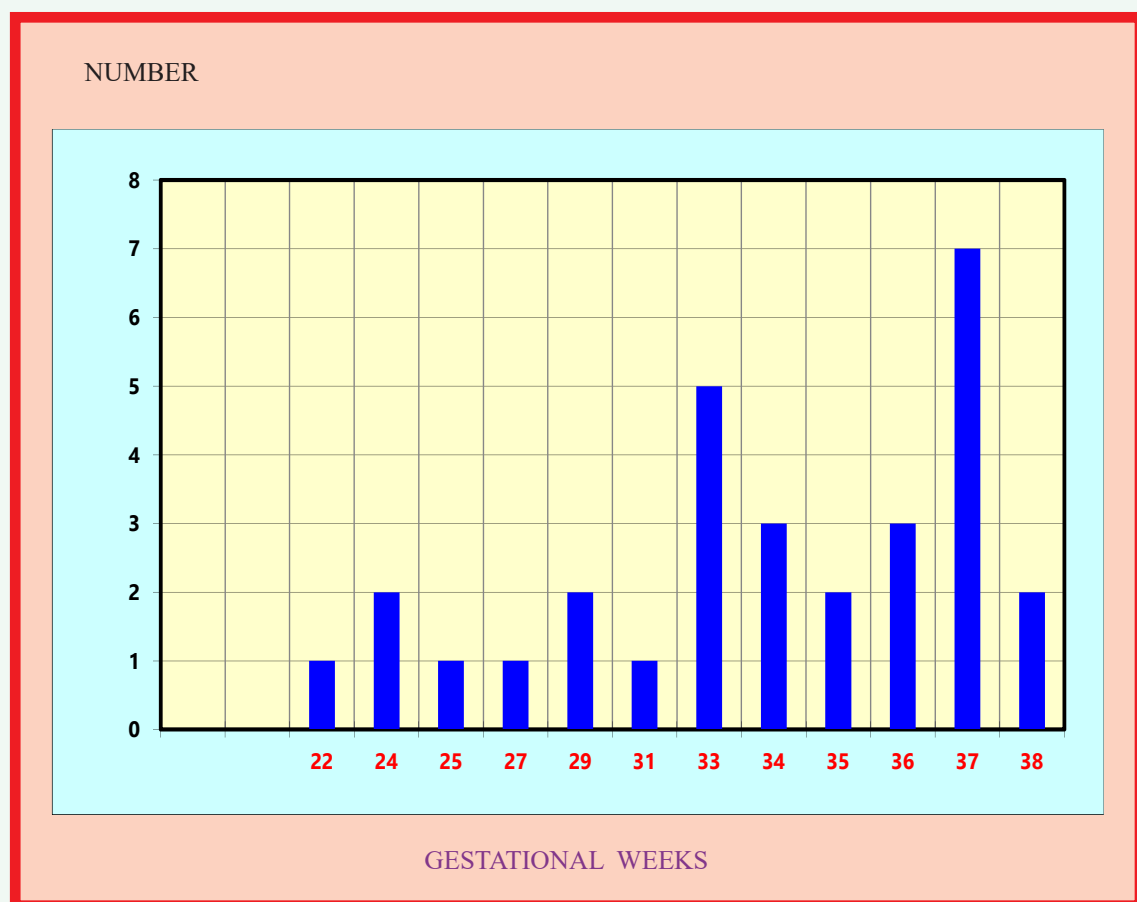


TABLE 14 Number and percentage of parturients by gestational age group in twin pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 week)	-	-
Immature (20-27 weeks)	5	16.7
Preterm (28-36 weeks)	16	53.3
Term (37-41 weeks)	9	30.0
Total	30	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	1	0.1
1	15	1.6
2	29	3.1
3	42	4.5
4	55	5.9
5	55	5.9
6	54	5.8
7	40	4.3
8	52	5.6
9	47	5.0
10	74	7.9
11	95	10.1
12	109	11.6
13	95	10.1
14	66	7.1
15	48	5.1
16	26	2.8
17	10	1.1
18	5	.5
19	2	00.2
≥ 20	16	1.7
Total	936	100.0

Attending ANC at other hospitals 13.8% of total parturients

FIGURE 9 Histogram : Number of ANC attendances of general patients

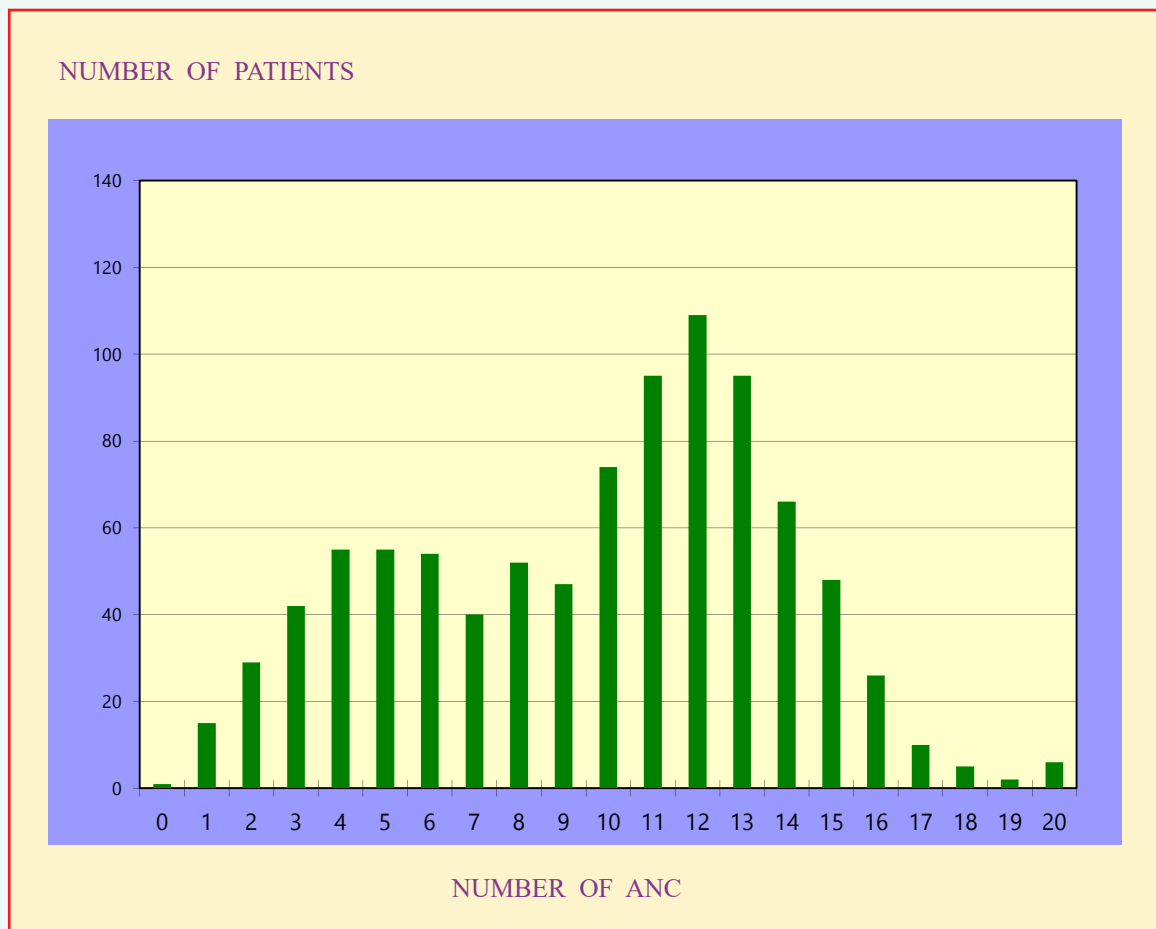


TABLE 16 Number of antenatal care attendance : General patients
(not include the patients attending ANC at other hospitals)

Number of ANC	Number of Parturients	Percent
4 or more	849	87.8
1-3	86	8.9
No ANC	32	3.3
Total	967	100.0

Note ANC less than 4 is considered to be inadequate

Inadequate ANC 12.2%

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

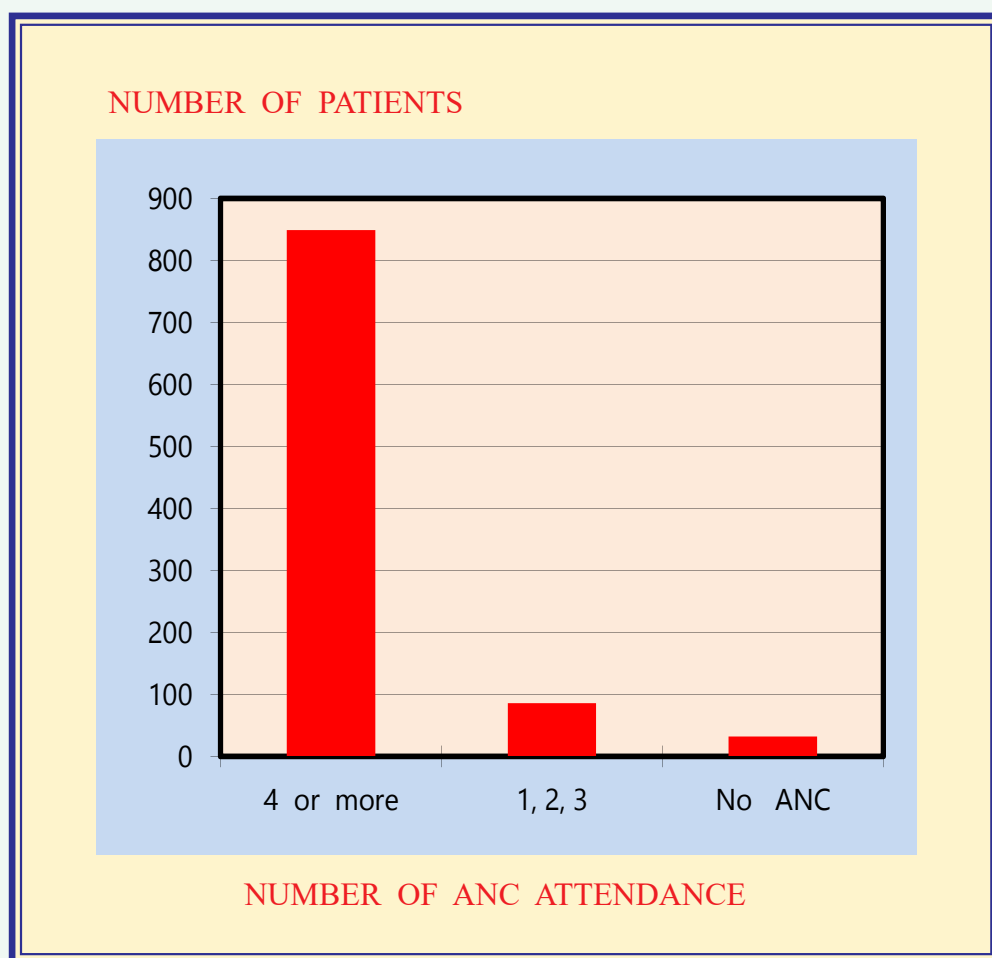
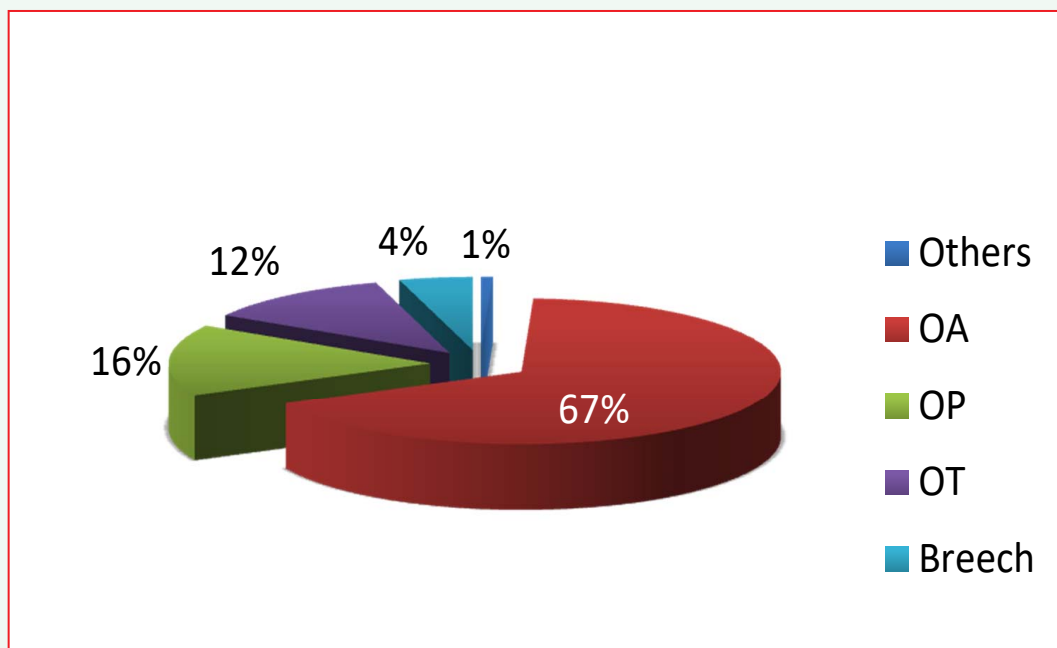


TABLE 17 Distribution of fetal presentations in labor (Singleton)

Fetal Presentation	Percent
Vertex	95.2
Breech	4.5
Transverse lie	0.1
Compound	0.1
Face	-
Others	0.1

Breech Presentation was 4.5% of Singleton Birth

FIGURE 11 Proportion of fetal presentations (singleton) 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	576	61.6	566	62.1	10	43.5
Forceps Delivery	3	.3	3	.3	-	-
Vacuum Delivery	62	6.6	60	6.6	2	8.7
Cesarean Section	252	27.0	244	26.8	8	34.8
Vaginal Breech Delivery	10	1.1	10	1.1	-	-
Other*	32	3.4	28	3.1	3	13.0
Total	935	100.0	911	100.0	23	100.0

* other = cearean hysterectomy, hysterotomy, evacuation etc.

Twins

Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Vaginal Delivery	6	20.0	6	22.2	0	0.0
Cesarean Section	24	80.0	21	77.8	3	100.0
Total	30	100.0	27	100.0	3	100.0

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

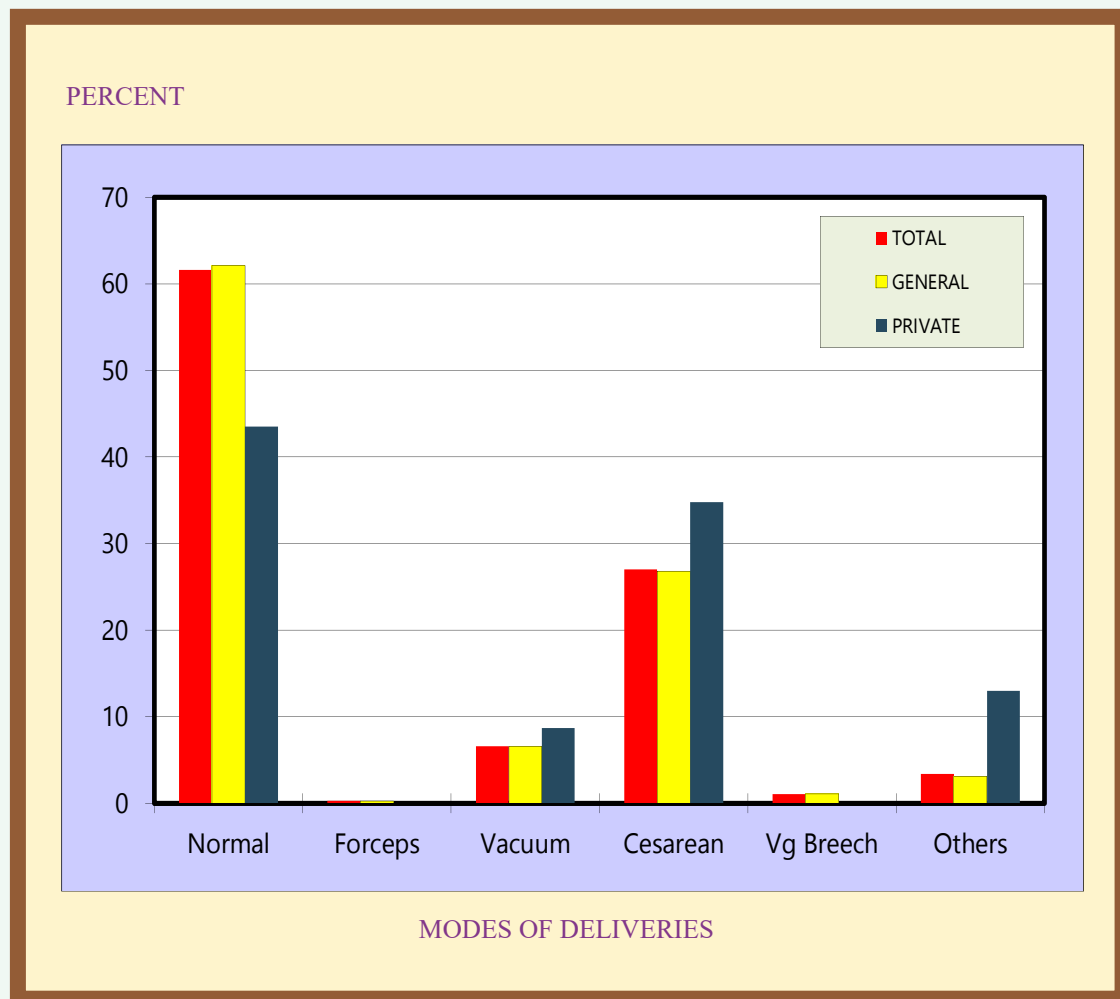


TABLE 19 Modes of deliveries in breech presentation : general and private patients (Singleton)

Mode of Deliveries	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	34	77.3	33	76.7	1	100.0
Assisting Mauriceau-Smelliveit	8	18.2	8	18.6	-	-
Total Extraction Mauriceau-Smelliveit	2	4.5	2	4.7	-	-
Total Extraction Piper forceps	-	-	-	-	-	-
Total	44	100.0	43	100.0	1	100.0

Total Cesarean Section Rate in Breech presentation 77.3%

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

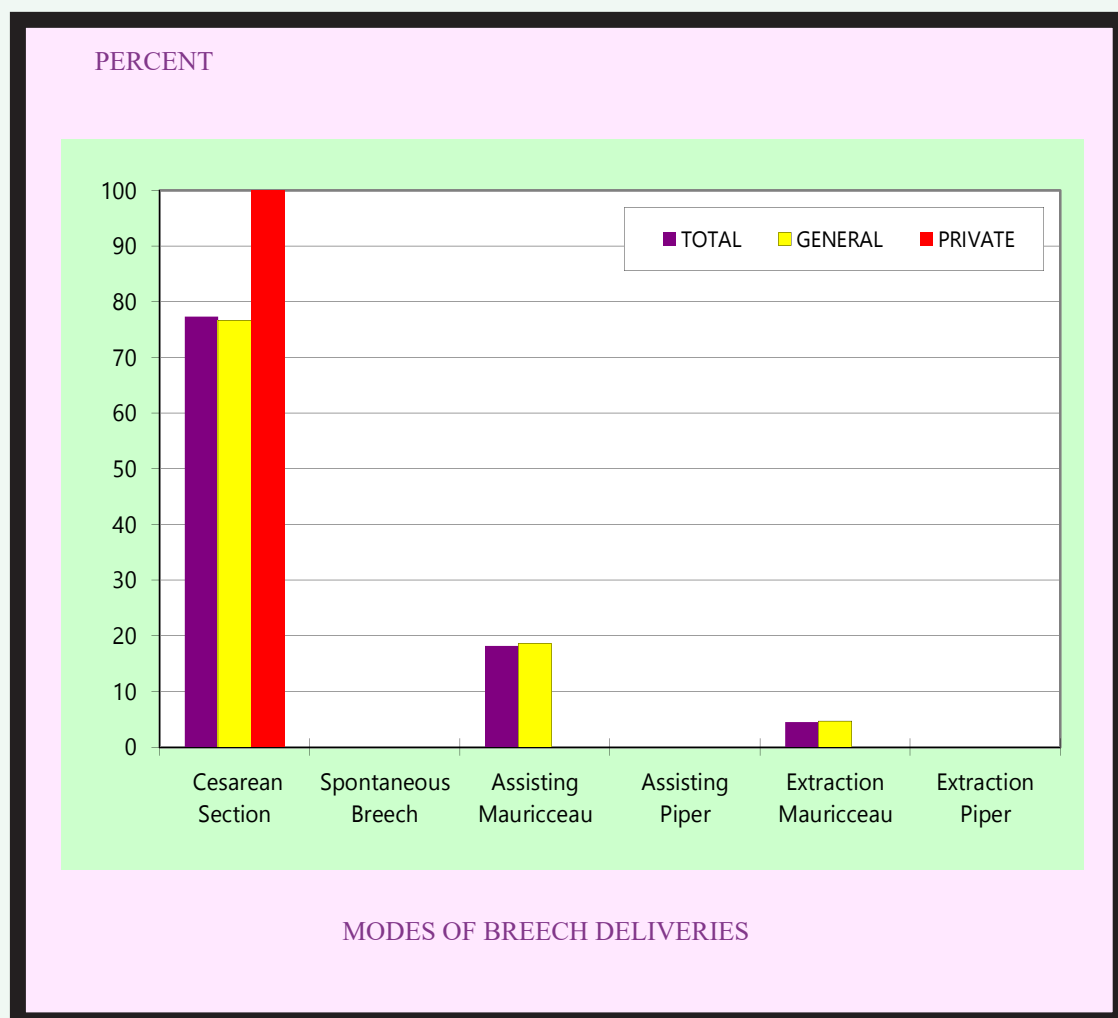


TABLE 20 Frequency of cesarean deliveries according to diagnostic indication (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
CPD	65	25.0	62	24.6	3	37.5
Previous C/S	82	31.5	81	32.1	1	12.5
Breech presentation	34	13.1	33	13.1	1	12.5
Fetal distress	29	11.2	28	11.1	1	12.5
Placenta previa	11	4.2	11	4.4	0	0
Malpresentation	2	0.8	2	0.8	0	0
Others	7	2.7	6	2.4	1	12.5
Not recorded	30	11.5	29	11.5	1	12.5
Total	260	100.0	252	100.0	8	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
Cephalopelvic disproportion	-	-	-	-	-	-
Fetal distress	1	33.3	1	33.3	-	-
Prophylactic, training	1	33.3	1	33.3	-	100.0
Shortened second stage of labour	1	33.3	1	33.3	-	-
Failed vacuum extraction	0	0	0	0	-	-
Total	3	100.0	3	100.0	0	100.0

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

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cephalopelvic disproportion	3	4.8	3	5.0	0	0
Fetal distress	16	25.8	16	26.7	0	0
Poor expulsive forceS	30	48.4	29	48.3	1	50.0
Previous cesarean section	1	1.6	1	1.7	0	0
Prolonged 2nd stage of labour	2	3.2	2	3.3	0	0
Shortened 2nd stage of labour	6	9.7	6	10.0	0	0
Others	2	3.2	2	3.3	0	0
Not recorded	2	3.2	1	1.7	1	1
Total	62	100.0	60	100.0	2	100.0

TABLE 23 Sex of Fetuses (Including Multiple Pregnancies)

Sex	Number	Percent
Male	512	51.7
Female	466	47.1
Unspecified	12	1.2
Total	990	100.0

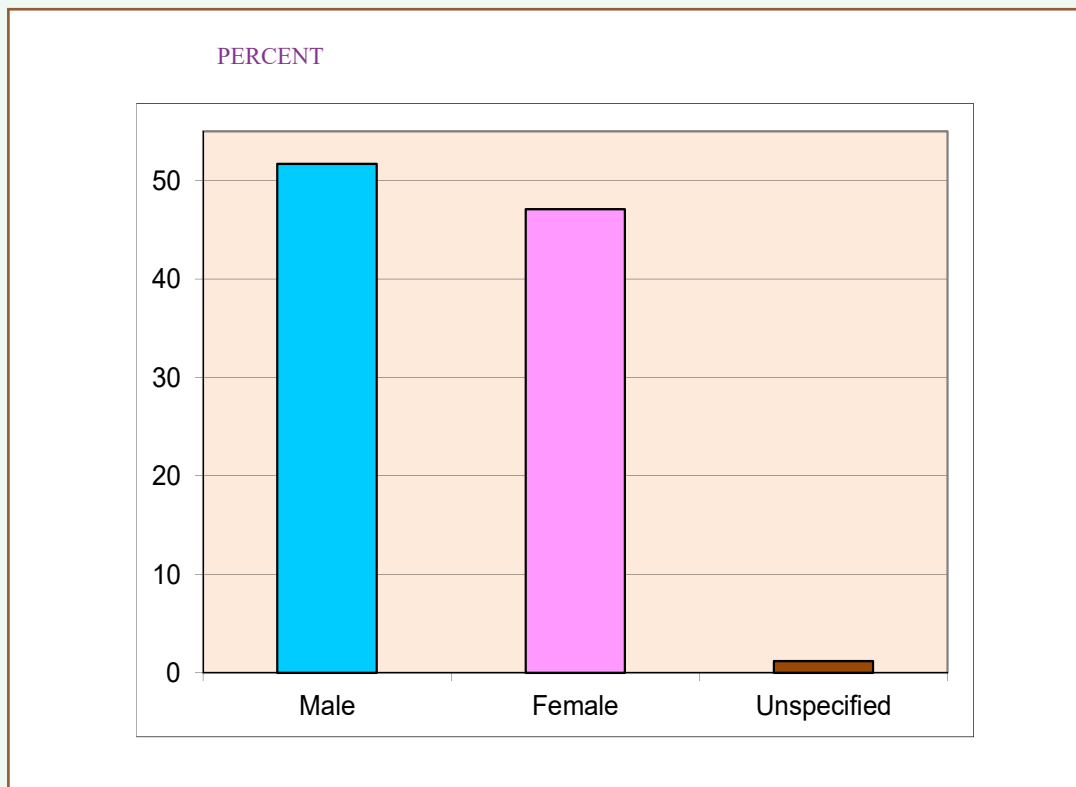
FIGURE 14 Histogram : Distribution of fetal sex (including twins)

TABLE 24 Apgar score at 1 minute of total neonates

Apgar Scores	Number	Percent
0-3 (severe depression)	71	7.2
4-6 (mild depression)	44	4.4
7-10 (no depression)	878	88.4
Total	993	100.0

TABLE 25 Apgar score at 5 minutes of total neonates

Apgar Score	Number	Percent
0-3 (severe depression)	54	5.4
4-6 (mild depression)	15	1.5
7-10 (no depression)	925	93.1
Total	994	100.0

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

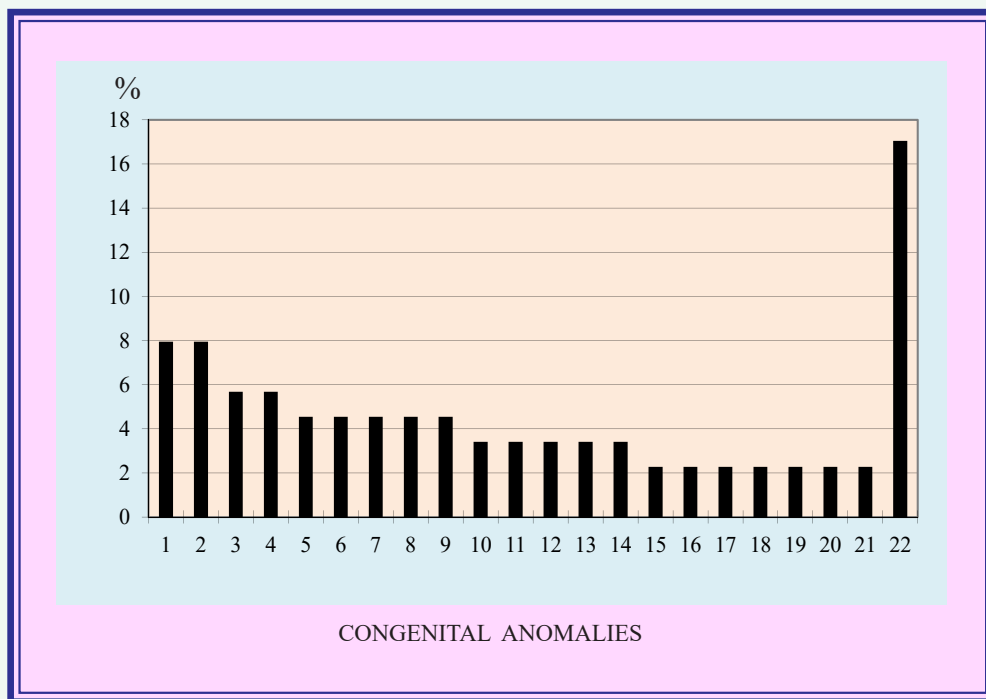
Apgar Score	1-Minute		5-Minute	
	Number	Percent	Number	Percent
0	50	5.0	48	4.8
1	6	0.6	3	0.3
2	9	0.9	1	0.1
3	8	0.8	2	0.2
4	7	0.7	3	0.3
5	20	2.0	2	0.2
6	21	2.1	13	1.3
7	81	8.2	22	2.2
8	372	37.5	80	8.0
9	406	40.9	440	44.3
10	13	1.3	380	38.2
Total	993	100.0	994	100.0

TABLE 27 Prenatal sonographic diagnosis of structural anomalies*

	Congenital Anomalies	Number	Percent
1	Cardiac defect	8	11.11
2	Urinary tract anomaly	5	6.94
3	Trisomy 21	5	6.94
4	Hb Barts disease	4	5.56
5	Multiple anomalies	4	5.56
6	Skeletal dysplasia	4	5.56
7	Non-Bart Hydrops fetalis	4	5.56
8	Cystic hygroma	3	4.17
9	Trisomy 18	3	4.17
10	Limb defects	3	4.17
11	Lung mass	3	4.17
12	Omphalocele	2	2.78
13	Ventriculomegaly	2	2.78
14	Gastroschisis	2	2.78
15	Cleft lip/palate	2	2.78
16	Diaphragmatic hernia	2	2.78
17	Ear malformation	2	2.78
18	Holoprosencephaly	2	2.78
19	Destructive brain lesions	2	2.78
20	Exen/Anencephaly	2	2.78
21	Others	8	11.11
	Total	72	-

* 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 defect | 12 Limb defect |
| 2 Multiple anomalies | 13 Trisomy 21 |
| 3 Cleft lips | 14 Ventriculomegaly |
| 4 Pyelectasis | 15 'Ambiguous genitalia' |
| 5 Cystic hygroma | 16 Anencephaly/exencephaly |
| 6 Non-Hb Bart's hydrops fetalis | 17 Bowel obstruction |
| 7 Omphalocele | 18 CPAM |
| 8 Thal.Hb Barts | 19 Destructive brain lesions |
| 9 Trisomy 18 | 20 Diaphragmatic hernia |
| 10 Gastroschisis | 21 Trisomy 13 |
| 11 Lethal skeleton dysplasia | 22 Others |

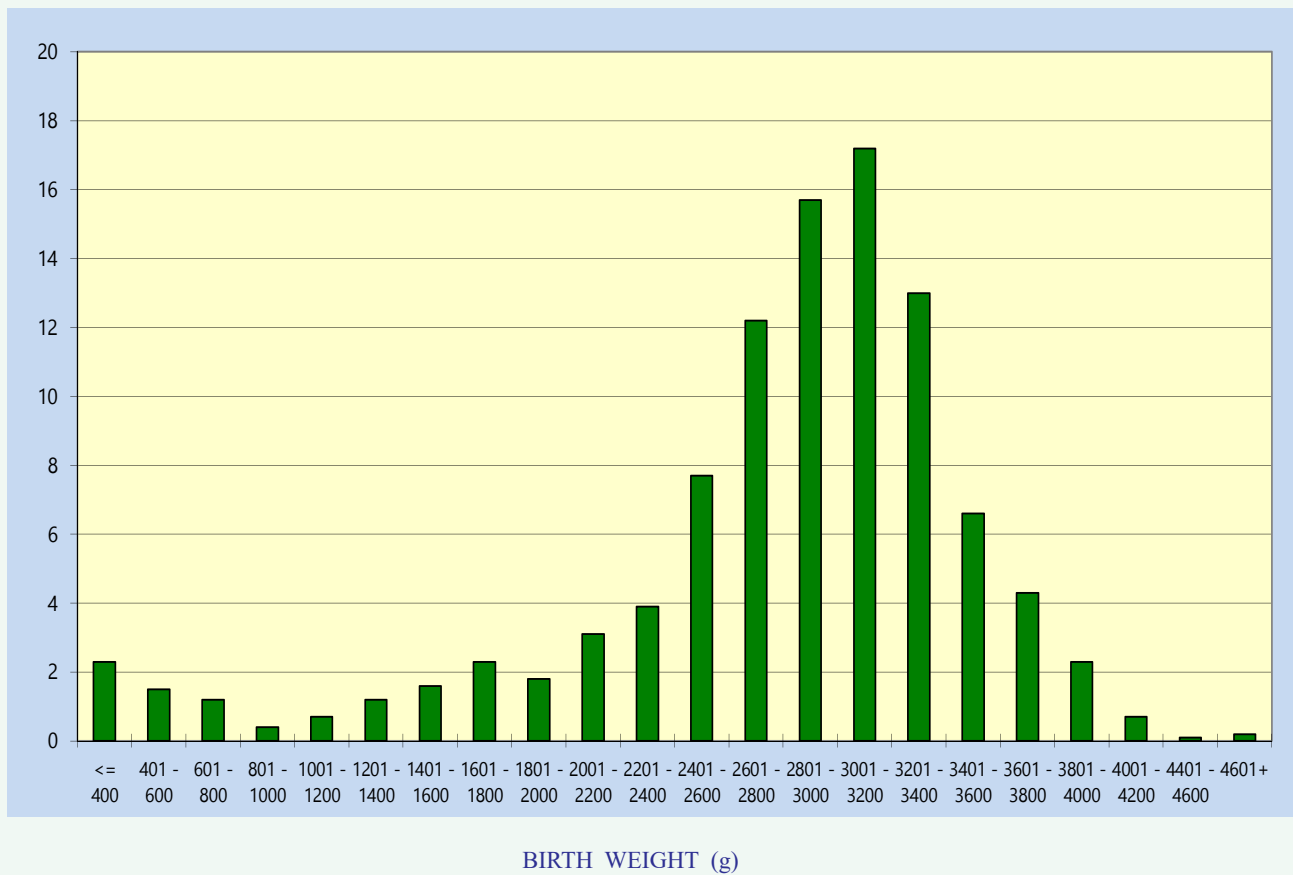
TABLE 28 Number and percentage of neonates by birth weight*

Birth Weight (grams)	Number	Percent
≤ 400	23	2.3
401 - 600	15	1.5
601 - 800	12	1.2
801 - 1000	4	0.4
1001 - 1200	7	0.7
1201 - 1400	12	1.2
1401 - 1600	16	1.6
1601 - 1800	23	2.3
1801 - 2000	18	1.8
2001 - 2200	31	3.1
2201 - 2400	39	3.9
2401 - 2600	77	7.7
2601 - 2800	122	12.2
2801 - 3000	157	15.7
3001 - 3200	172	17.2
3201 - 3400	130	13.0
3401 - 3600	66	6.6
3601 - 3800	43	4.3
3801 - 4000	23	2.3
4001 - 4200	7	0.7
4401 - 4600	1	0.1
4601+	2	0.2
Total	1000	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)	24	2.5
Very low birth weight (1000-1499)	26	2.7
Low birth weight (1500-2499)	148	15.3
Average birth weight (2500-3999)	760	78.4
Macrosomia (> 4000)	12	1.2
Total	970	100.0

* Including therapeutic termination of pregnancy and weight > 200 gm

Average Birth Weight of Total Infants 2816 ± 709 grams
range 250-5065 grams

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

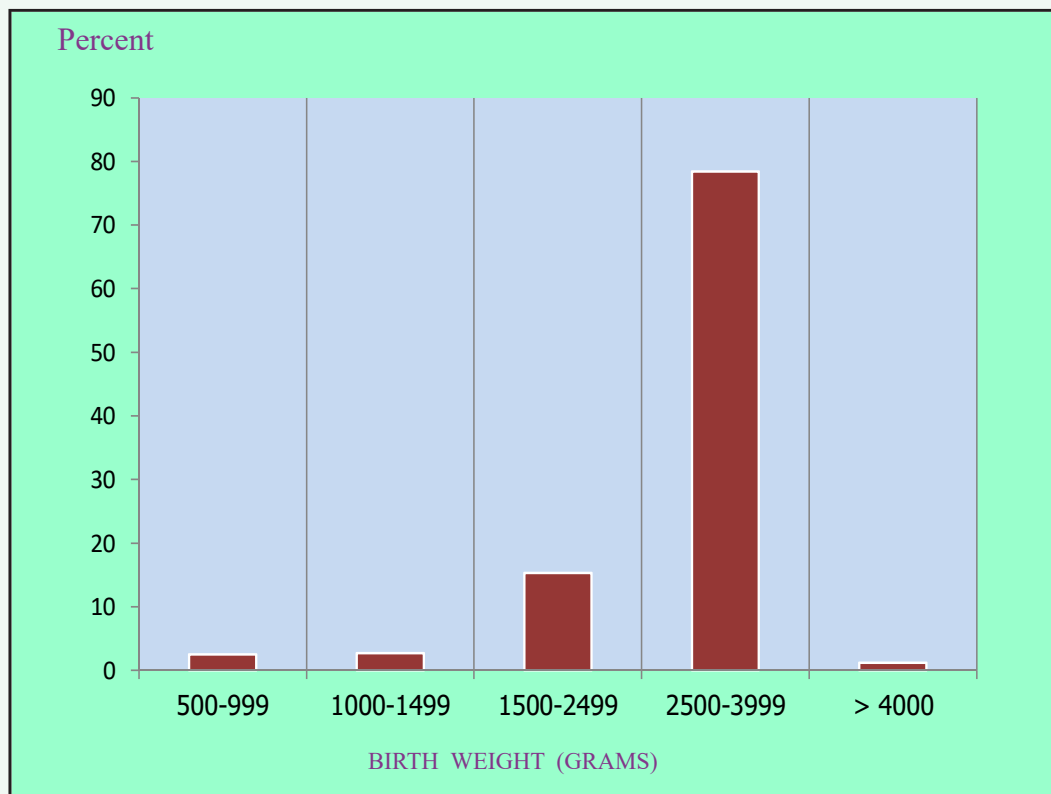


TABLE 30 Fetal weight (grams): the 10th, 50th, 90th percentile at various gestational age (singleton)

Gestational Age (weeks)	Weight (grams) 10th Percentile	Weight (grams) 50th Percentile	Weight (grams) 90th Percentile
20	110	205	.
21	250	405	.
22	430	450	.
23	160	550	.
24	610	615	.
25	.	.	.
26	.	.	.
27	570	854	.
28	49	835	.
29	850	1440	.
30	620	1250	.
31	1500	1790	.
32	1035	1473	2127
33	1505	1870	.
34	1782	2300	2886
35	2033	2330	3032
36	2170	2583	3203
37	2263	2715	3325
38	2542	2990	3540
39	2715	3110	3618
40	2854	3205	3741
41	3007	3370	3754

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

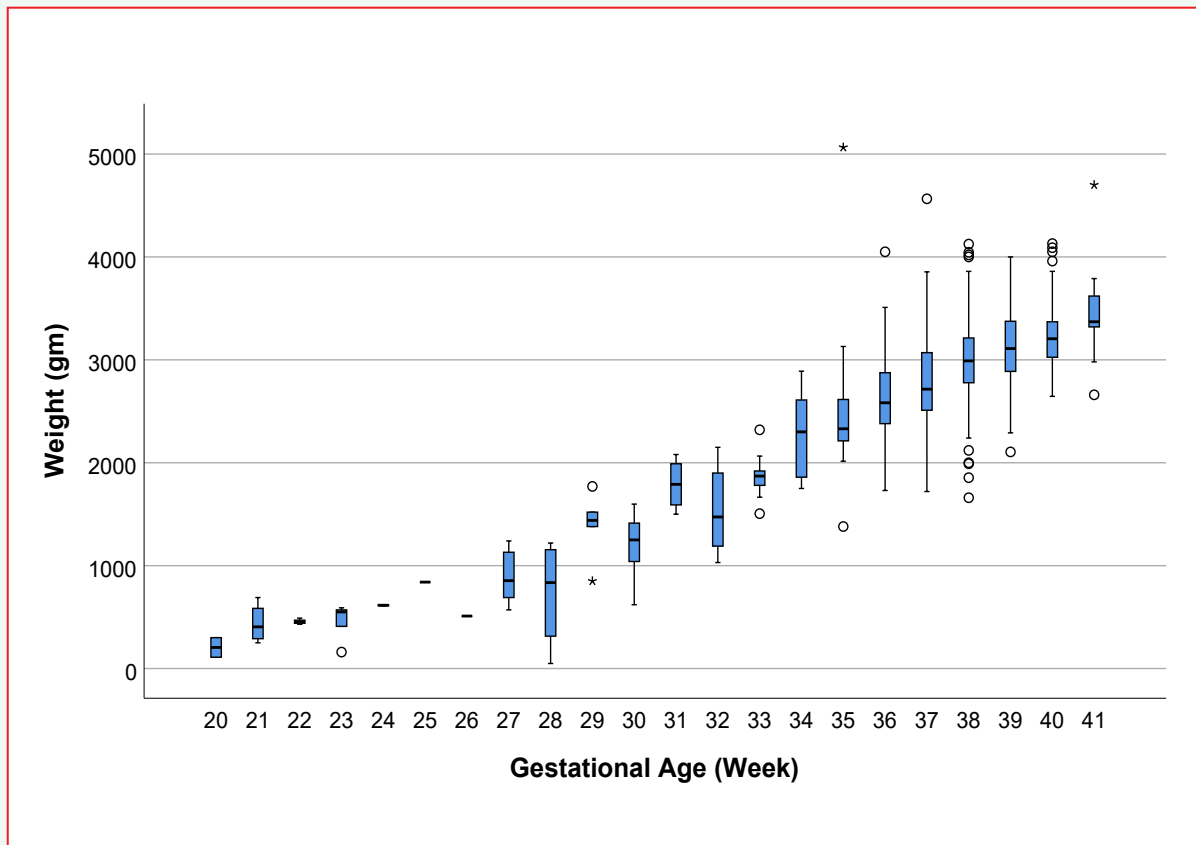


TABLE 31 Means and standard deviation of birth weight
at various gestational age (singleton)

Gestational Age (weeks)	Number of Neonates	Means (grams)	Standard Deviation
20	2	205.00	134.350
21	4	437.50	193.455
22	3	456.67	30.551
23	5	456.00	179.944
24	2	615.00	7.071
25	1	840.00	.
26	1	510.00	.
27	6	889.67	262.116
28	4	734.75	534.126
29	5	1392.00	337.446
30	9	1176.00	326.328
31	4	1790.00	253.246
32	10	1507.70	393.763
33	9	1869.44	233.016
34	13	2290.38	418.731
35	23	2496.74	661.398
36	44	2636.93	438.161
37	110	2779.43	448.169
38	271	3004.61	385.865
39	244	3138.87	359.275
40	117	3239.24	317.058
41	25	3427.40	374.035
Total	934	2829.98	759.212

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
22	490.00	2	28.284
24	592.25	4	32.766
25	735.00	2	35.355
27	847.00	2	66.468
29	1063.25	4	366.027
31	1300.00	2	551.543
33	1819.00	10	376.215
34	1921.83	6	301.633
35	2192.50	4	206.741
36	2217.50	6	148.551
37	2526.43	14	343.558
38	2900.00	4	231.084
Total	1868.87	60	760.225

TABLE 33 Comparison of birth weight (singleton & twins)

Type	Means Birth Weight	Standard Deviation	Range
Singleton	2829.98	759.212	20-5,065
Twins	1868.87	760.225	470-3185

TABLE 34 Comparison of gestational age (singleton & twins)

Type	Means Gestational Age	Standard Deviation	Range
Singleton	36.97	4.581	12-41
Twins	33.03	4.208	22-38

TABLE 35 Early postpartum morbidity

Cause	Number	Percent
Uterine Atony	9	0.93
Lacerations	6	0.62
Retained Pieces of Placenta / Manual removal	3	0.31
Placenta Adherens	5	0.52
Wound / Uterine infection	4	0.41
Total	27	2.79

Section III

HIGH RISK PREGNANCIES

TABLE 36 Common complications during pregnancy

Complications	Numbers	Prevalence (%)
Diabetes mellitus	195	20.17
Iron deficiency	119	12.31
Pre-eclampsia	76	7.86
Fetal growth restriction	71	7.34
Previous cesarean section	70	7.24
Breech presentation	44	4.55
Chronic HT	39	4.03
Prolonged PROM	39	4.03
Oligohydramnios	26	2.69
HBsAg positive	24	2.48
Myoma uteri	22	2.28
Thyrotoxicosis	13	1.34
Placenta previa	11	1.14
Urinary tract infection	11	1.14
VDRL +ve	10	1.03
Hypothyroidism	10	1.03
HIV +ve	9	0.93
Asthma	8	0.83
Thalassemia	8	0.83
Heart disease	8	0.83
Polyhydramnios	6	0.62
Systemic lupus erythematosus	6	0.62
Condyloma accuminata	4	0.41
Incompetent cervix	3	0.31

Pregnancy with Syphilis

Total 10 cases (1.03 percent of total parturients)
 Singleton: 10; Twin: 0

Age range 16-31 years
 average 24.5 ± 5.2 years
 age of 35 years or more 0 case (0.0 %)

Gestational Age at Birth
 range 33-41 weeks (including therapeutic abortion)
 average 37.9 ± 2.5 weeks
 premature delivery (before completed 37 weeks)
 2 cases (20.0 %)

Birth Weight
 range 1870-3780 grams
 average 2892 ± 607 grams
 number of low birth weight fetus (less than 2,500 grams)
 3 cases (30.0 %)

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

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

Small-for-gestational-age (less than 10th percentile) 0 case (0.0%)

Perinatal death 1 (10.0%)

Congenital Anomalies 2 case (truncus arteriosus, anemia)

Other complications (No maternal death)

<i>Diabetes mellitus</i>	2	<i>cases</i>
<i>Excessive weight gain</i>	2	<i>cases</i>

<i>Teenage pregnancy</i>	2	<i>cases</i>
<i>Thyrotoxicosis</i>	1	<i>case</i>
<i>Marked Obesity</i>	1	<i>case</i>
<i>Breech presentation</i>	1	<i>case</i>
<i>Condyloma accuminata</i>	1	<i>case</i>

Pregnancy with Diabetes Mellitus

Total 195 cases (20.17 percent of total parturients)

Singleton: 188 (96.4%), Twins : 6 (3.1%), Triplet 1 (0.5%)

*Note : Glucose challenge test was used as a screening test
(Two-step screening approach)*

Age range 20-44 years

average 33.4 ± 4.6 years

age of 35 years or more 82 cases (42.1%)

Gestational Age at Birth

range 12-41 weeks

average 37.5 ± 3.5 weeks

premature delivery (before completed 37 weeks)

30 cases (15.4 %)

Birth Weight

range 49-5065 grams

average 2906 ± 687 grams

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

34 cases (17.4 %)

Apgar Scores at 1 minute (less than 7) 16 cases (8.2 %)

Apgar Scores at 5 minutes (less than 7) 8 cases (4.1 %)

Small-for-gestational-age (less than 10th percentile) 19 cases (9.7%)

Perinatal Death 3 cases (1.5 %)

Congenital Anomalies 7 cases (3.6 %) (*Cleft lips, Kleifelter syndrome, multiple anomalies, CPAM, Thalassemia/HbE disease, Tetralogy of Fallot*)

Other complications

<i>Preeclampsia</i>	21	10.8 %
<i>Chronic HT</i>	20	10.3 %
<i>Iron deficiency</i>	18	9.2 %
<i>Marked Obesity</i>	17	8.7 %
<i>Previous cesarean section</i>	12	6.2 %
<i>HBsAg positive</i>	8	4.1 %
<i>Large for gestational age</i>	8	4.1 %
<i>Gestational hypertension</i>	7	3.6 %
<i>Myoma uteri</i>	7	3.6 %
<i>Breech presentation</i>	6	3.1 %
<i>Prolonged PROM</i>	5	2.6 %
<i>Excessive Wt.gain</i>	4	2.1 %
<i>Oligohydramnios</i>	4	2.1 %
<i>Short stature</i>	4	2.1 %
<i>Asthma</i>	3	1.5 %
<i>Placenta previa</i>	3	1.5 %
<i>Thalassemia</i>	2	1.0 %
<i>Thyrotoxicosis</i>	2	1.0 %
<i>Urinary tract infection</i>	2	1.0 %
<i>VDRL +ve</i>	2	1.0 %
<i>Polyhydramnios</i>	2	1.0 %
<i>Epilepsy</i>	1	0.5 %
<i>GBS colonization</i>	1	0.5 %
<i>HIV positive</i>	1	0.5 %
<i>Hypothyroidism</i>	1	0.5 %
<i>Vasa previa</i>	1	0.5 %
<i>Condyloma acuminata</i>	1	0.5 %

Classifications

Pregestational DM (diagnosed before pregnancy) 21 cases (10.8 %)

<i>Poorly controlled before pregnancy</i>	4 cases
<i>Overt DM with renal involvement</i>	2 cases

Gestational DM (diagnosed during pregnancy)	174 cases (89.2 %)
<i>GDM (Class A1)</i>	<i>168 cases</i>
<i>GDM (Class A2)</i>	<i>8 cases</i>

Method of Glucose Control

Insulin	31 cases
Diet Control only	164 cases

Pregnancy with Iron Deficiency

Total 119 cases (12.31 percent of total parturients)
(Singleton : 114; Twins : 4; Triplet : 1)

Age range 15-42 years
average 30.8 ± 6.1 years
age of 35 years or more 35 cases (29.4 %)

Gestational Age at Birth

range 13-41 weeks
average 37.3 ± 4.1 weeks
premature delivery (before completed 37 weeks)
23 cases (19.3 %)

Birth Weight

range 160-3915 grams
average 2871 ± 592 grams
number of low birth weight fetus (less than 2,500 grams)
20 cases (16.8 %)

Apgar Scores at 1 minute (less than 7) 9 cases (7.6 %)

Apgar Scores at 5 minutes (less than 7) 5 cases (4.2 %)

Small-for-gestational-age (less than 10th percentile) 4 cases (3.4 %)

Perinatal death 4 cases (3.4 %)

Congenital Anomalies 5 cases (Kleifelter syndrome 1; omphalocele 1; multiple anomalies 1; others 2)

Other complications

<i>Diabetes mellitus</i>	17	<i>cases</i>
<i>Previous cesarean section</i>	7	<i>cases</i>
<i>Oligohydramnios</i>	5	<i>cases</i>
<i>Teenage pregnancy</i>	5	<i>cases</i>
<i>Excessive weight gain</i>	4	<i>cases</i>
<i>Marked obesity</i>	4	<i>cases</i>
<i>Myoma uteri</i>	3	<i>cases</i>
<i>Preeclampsia</i>	3	<i>cases</i>
<i>Prolonged PROM</i>	3	<i>cases</i>
<i>Breech presentation</i>	2	<i>cases</i>
<i>Heart disease</i>	2	<i>cases</i>
<i>Placenta previa</i>	2	<i>cases</i>
<i>Polyhydramnios</i>	2	<i>cases</i>
<i>Short stature</i>	2	<i>cases</i>
<i>Thyrotoxicosis</i>	2	<i>cases</i>
<i>Chronic hypertension</i>	1	<i>case</i>
<i>CA cervix</i>	1	<i>case</i>
<i>HBsAg positive</i>	1	<i>case</i>
<i>HIV positive</i>	1	<i>case</i>
<i>Hypothyroidism</i>	1	<i>case</i>
<i>Incompetent cervix</i>	1	<i>case</i>
<i>Psoriasis</i>	1	<i>case</i>
<i>Systemic lupus erythematosus</i>	1	<i>case</i>

Pregnancy with Thyrotoxicosis

Total 13 cases (1.34 percent of total parturients)

All were singleton

Diagnosed before pregnancy 8 cases

Diagnosed during pregnancy 5 cases

Age range 23-40 years
 average 33.9 ± 4.8 years
 age of 35 years or more 6 cases (46.2 %)

Gestational Age at Birth

range 35-41 weeks
 average 38.0 ± 1.4 weeks
 premature delivery (before completed 37 weeks)
 2 cases (15.4 %)

Birth Weight

range 2325-3850 grams
 average 3136 ± 430 grams
 number of low birth weight fetus (less than 2,500 grams)
 1 cases (7.7 %)

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

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

Small-for-gestational-age (less than 10th percentile) 0 case (0.0 %)

Perinatal death 0 case (0.0 %)

Congenital Anomalies 1 case

Other complications

<i>Previous cesarean section</i>	3	<i>cases</i>
<i>Diabetes mellitus</i>	2	<i>cases</i>
<i>Iron deficiency</i>	2	<i>cases</i>
<i>Gestational hypertension</i>	1	<i>case</i>
<i>Marked Obesity</i>	1	<i>case</i>
<i>Tuberculosis</i>	1	<i>case</i>
<i>VDRL +ve</i>	1	<i>case</i>
<i>Condyloma acuminata</i>	1	<i>case</i>

Pregnancy with Hepatitis B Antigen Positive

Total 24 cases (2.48 percent of total parturients)

Singleton: 23; Triplet: 1

Age range 24-44 years

average 32.5 ± 5.4 years

age of 35 years or more 8 cases (33.3 %)

Gestational Age at Birth

range 27-41 weeks

average 37.7 ± 2.9 weeks

premature delivery (before completed 37 weeks)

4 cases (16.7 %)

Birth Weight

range 758-3730 grams

average 2900 ± 609 grams

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

2 cases (8.3 %)

Apgar Scores at 1 minute (less than 7) 3 cases (12.5 %)

Apgar Scores at 5 minutes (less than 7) 1 case (4.2 %)

Small-for-gestational-age (less than 10th percentile) 1 case (4.2 %)

Perinatal Death 1 case (4.2 %)

Congenital Anomalies 1 case (4.2 %)

Other complications

<i>Diabetes mellitus</i>	8	<i>cases</i>
<i>Chronic hypertension</i>	3	<i>cases</i>
<i>Previous cesarean section</i>	2	<i>cases</i>
<i>Prolonged PROM</i>	2	<i>cases</i>
<i>Excessive Wt.gain</i>	1	<i>case</i>
<i>Iron deficiency</i>	1	<i>case</i>
<i>Marked Obesity</i>	1	<i>case</i>
<i>Urinary tract infection</i>	1	<i>case</i>

Pregnancy with Hypothyroidism

Total 10 cases (1.03 percent of total parturients)
(All were singleton)

Activity of Disease

Well-controlled	8	cases
Poorly-controlled	2	cases

Age range 27-42 years
average 32.2 ± 4.9 years
age of 35 years or more 3 cases (30.0 %)

Gestational Age at Birth

range 36-40 weeks
average 38.4 ± 1.3 weeks
premature delivery (before completed 37 weeks)
1 case (10.0 %)

Birth Weight (not included abortion)

range 2120-3780 grams

average 2955 ± 570 grams

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

2 cases (20.0 %)

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

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

Small-for-gestational-age (less than 10th percentile) 2 cases (20.0 %)

Perinatal death 1 (10.0 %)

Congenital Anomalies - case

Other complications

<i>Marked Obesity</i>	2	<i>cases</i>
<i>Diabetes mellitus</i>	1	<i>case</i>
<i>Breech presentation</i>	1	<i>case</i>
<i>Iron deficiency</i>	1	<i>case</i>
<i>Myoma uteri</i>	1	<i>case</i>
<i>Preeclampsia</i>	1	<i>case</i>
<i>Prolonged PROM</i>	1	<i>case</i>
<i>Thalassemia</i>	1	<i>case</i>

Pregnancy with Chronic Hypertension

Total 39 cases (4.03 percent of total parturients)

(Singleton : 39; twins : -)

Severity of Hypertension

Severe (start treatment during pregnancy)	4	cases
Severe (controlled prior to pregnancy)	8	cases
Mild (no medication BP less than 160/90)	3	cases
Mild (BP less than 160/90 but treated with antihypertensive drug)	24	cases

Age range 23-44 years
 average 34.0 ± 5.6 years
 age of 35 years or more 19 cases (48.7 %)

Gestational Age at Birth

range 27-40 weeks
 average 36.2 ± 3.3 weeks
 premature delivery (before completed 37 weeks)
 12 cases (30.8 %)

Birth Weight

range 570-3860 grams
 average 2478 ± 873 grams
 number of low birth weight fetus (less than 2,500 grams)
 17 cases (43.6 %)

Apgar Scores at 1 minute (less than 7) 7 cases (17.9 %)

Apgar Scores at 5 minutes (less than 7) 1 cases (2.6 %)

Small-for-gestational-age (less than 10th percentile) 10 cases (25.6 %)

Perinatal death 1 cases (2.6 %)

Congenital Anomalies 1 case

Other complications

<i>Diabetes mellitus</i>	20	<i>cases</i>
<i>Preeclampsia</i>	17	<i>cases</i>
<i>Marked Obesity</i>	9	<i>cases</i>
<i>HBsAg positive</i>	3	<i>cases</i>
<i>Oligohydramnios</i>	3	<i>cases</i>
<i>Previous cesarean section</i>	3	<i>cases</i>
<i>Prolonged PROM</i>	3	<i>cases</i>
<i>Systemic lupus erythematosus</i>	3	<i>cases</i>
<i>Breech presentation</i>	1	<i>case</i>
<i>Chronic renal failure</i>	1	<i>case</i>
<i>Epilepsy</i>	1	<i>case</i>

<i>Excessive Wt.gain</i>	<i>1</i>	<i>case</i>
<i>HIV positive</i>	<i>1</i>	<i>case</i>
<i>Iron deficiency</i>	<i>1</i>	<i>case</i>
<i>Large-for date</i>	<i>1</i>	<i>case</i>
<i>Nephrotic synd.</i>	<i>1</i>	<i>case</i>
<i>Placenta accreta</i>	<i>1</i>	<i>case</i>
<i>Urinary tract infection</i>	<i>1</i>	<i>case</i>

Pregnancy-induced Hypertension

Total 77 (7.96 percent of total parturients)

Singleton: 73; Twins: 4

Age range 15-44 years

average 31.7 ± 5.9 years

age of 35 years or more 27 cases (35.1 %)

Gestational Age at Birth

range 27-41 weeks

average 36.3 ± 2.9 weeks

premature delivery (before completed 37 weeks)

29 cases (37.7 %)

Classification of PIH

Gestational hypertension (without proteinuria)	26	cases (33.7 %)
Mild Preeclampsia	25	cases (32.4 %)
Severe Preeclampsia	26	cases (33.7 %)
Pregnancy-aggravated hypertension	17	cases (22.1 %)
Eclampsia	1	case (0.0 %)
<i>First eclamptic attack before admission</i>		<i>- case</i>
<i>First eclamptic attack after admission</i>		<i>1 case</i>

Birth Weight	range 690-4050 grams
	average 2581 ± 768 grams
	number of low birth weight fetus (less than 2,500 grams)
	32 cases (41.6 %)
Apgar Scores at 1 minute (less than 7)	14 cases (18.2 %)
Apgar Scores at 5 minutes (less than 7)	5 cases (6.5 %)
Small-for-gestational-age (less than 10th percentile)	11 cases (14.3 %)
Perinatal death	2 cases (2.6 %)
Congenital Anomalies	2 cases (multiple anomalies)
Other complications	
<i>Diabetes mellitus</i>	26 cases
<i>Chronic HT</i>	17 cases
<i>Marked Obesity</i>	6 cases
<i>Prolonged PROM</i>	6 cases
<i>Oligohydramnios</i>	5 cases
<i>Iron deficiency</i>	3 cases
<i>Previous cesarean section</i>	3 cases
<i>Breech presentation</i>	2 cases
<i>Excessive weight gain</i>	2 cases
<i>Myoma uteri</i>	2 cases
<i>Urinary tract infection</i>	2 cases
<i>Asthma</i>	1 case
<i>CA cervix</i>	1 case
<i>chronic renal failure</i>	1 case
<i>Heart disease</i>	1 case
<i>Hypothyroidism</i>	1 case
<i>Large-for-date</i>	1 case
<i>Placenta accreta</i>	1 case
<i>Short stature</i>	1 case
<i>Systemic lupus erythematosus</i>	1 case
<i>Teenage preg</i>	1 case
<i>Thyrotoxicosis</i>	1 case

Pregnancy with Heart Disease

Total 8 cases (0.83 percent of total parturients)
 Singleton: 8; Twins: 0

Age range 24-35 years
 average 30.5 ± 4.3 years
 age of 35 years or more 2 cases (25.0 %)

Gestational Age at Birth
 range 14-40 weeks
 average 32.9 ± 9.5 weeks
 premature delivery (before completed 37 weeks)
 3 cases (37.5 %)

Birth Weight
 range 90-3395 grams
 average 2119 ± 1239 grams
 number of low birth weight fetus (less than 2,500 grams)
 4 cases (50.0 %)

Apgar Scores at 1 minute (less than 7) 2 cases (25.0 %)

Apgar Scores at 5 minutes (less than 7) 2 cases (25.0 %)

Small-for-gestational-age (less than 10th percentile) 1 case (12.5 %)

Perinatal death 2 cases (28.6 %)

Congenital Anomalies 0 case

Other complications

<i>Iron deficiency</i>	2	<i>cases</i>
<i>Previous cesarean section</i>	2	<i>cases</i>
<i>Oligohydramnios</i>	1	<i>case</i>
<i>Gestational hypertension</i>	1	<i>case</i>

Placenta Previa

Total 11 cases (1.14 percent of total parturients)

Singleton : 10; Twins : 1

Age range 20-42 years

average 32.6 ± 6.6 years

age of 35 years or more 5 cases (45.5 %)

Gestational Age at Birth

range 21-38 weeks

average 33.8 ± 5.3 weeks

premature delivery (before completed 37 weeks)

7 cases (63.6 %)

Birth Weight

range 330-3155 grams

average 2066 ± 931 grams

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

7 cases (63.6 %)

Apgar Scores at 1 minute (less than 7) 2 cases (18.2 %)

Apgar Scores at 5 minutes (less than 7) 1 case (9.1 %)

Small-for-gestational-age (less than 10th percentile) 3 cases (27.3 %)

Perinatal death 1 case (9.1 %)

Congenital Anomalies 1 case (beta-thal/HbE disease)

Other complications

Diabetes mellitus 3 cases

Previous cesarean section 3 cases

<i>Breech presentation</i>	2	case
<i>Iron deficiency</i>	2	case
<i>Asthma</i>	1	case
<i>Vasa previa</i>	1	case
<i>Placenta accreta spectrum</i>	1	case

Pregnancy with Acute Pyelonephritis

Total 11 cases (1.14 percent of total parturients)
(Singleton: 10; Twins: 1)

Age range 21-37 years
average 30.7 ± 5.7 years
age of more than 35 years 3 cases (27.3 %)

Gestational Age at Birth
range 24-40 weeks
average 35.5 ± 5.1 weeks
premature delivery (before completed 37 weeks)
5 cases (45.5 %)

Onset

First trimester	1	case
Second trimester	3	cases
Third trimester	5	cases
Postpartum	2	cases

Number of Episodes

1	7	cases
2	2	cases
3	2	cases

Birth Weight
range 550-3920 grams
average 2597 ± 917 grams

number of low birth weight fetus (less than 2,500 grams)
3 cases (27.3 %)

Apgar Scores at 1 minute (less than 7) 2 cases (18.2 %)

Apgar Scores at 5 minutes (less than 7) 1 case (9.1 %)

Small-for-gestational-age (less than 10th percentile) 0 case (0.0 %)

Perinatal death 1 case (9.1 %)

Congenital Anomalies 2 cases

Other complications

<i>Diabetes mellitus</i>	<i>2</i>
<i>Marked Obesity</i>	<i>2</i>
<i>Preeclampsia</i>	<i>2</i>
<i>Chronic hypertension</i>	<i>1</i>
<i>Excessive weight gain</i>	<i>1</i>
<i>HBsAg positive</i>	<i>1</i>
<i>Myoma uteri</i>	<i>1</i>
<i>Prolonged PROM</i>	<i>1</i>

Small-for-Gestational-Age Fetuses

Birthweight less than 10th percentile

Total 71 (7.34 percent)

Singleton: 67 cases, Twins: 4 cases

Age range 20-42 years

average 30.1 ± 5.7 years

age of 35 years or more 16 cases (22.5 %)

Gestational Age at Birth

range 21-41 weeks
average 35.1 ± 4.7 weeks
premature delivery (before completed 37 weeks)
28 cases (39.4 %)

Birth Weight

range 49-2660 grams
average 1801 ± 715 grams
number of low birth weight fetus (less than 2,500 grams)
66 cases (93.0 %)

Apgar Scores at 1 minute (less than 7) 20 cases (28.2 %)

Apgar Scores at 5 minutes (less than 7) 14 cases (19.7 %)

Perinatal Death 6 cases (8.5 %)

Congenital Anomalies 6 cases

<i>Trisomy 18</i>	<i>2</i>
<i>Multiple anomalies</i>	<i>2</i>
<i>Omphalocele</i>	<i>1</i>
<i>Gastroschisis</i>	<i>1</i>
<i>Ambiguous genitalia</i>	<i>1</i>

Other complications

<i>Poor maternal weight gain</i>	<i>11 cases</i>
<i>Pregnancy-induced hypertension</i>	<i>11 cases</i>
<i>Medical diseases</i>	<i>8 cases</i>
<i>Fetal anomalies</i>	<i>7 cases</i>

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 (2014-2024)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
No. of Deliveries	1686	1572	1431	1545	1518	1522	1300	1166	1052	985	967
No. of women with positive HIV	37	43	16	20	18	9	17	12	18	9	9
Prevalence (%)	2.19	2.74	1.12	1.29	1.19	0.59	1.31	1.03	1.71	0.91	0.93
Deliveries	30	33	24*	14	12	13	13	8	12	9	9
Therapeutic abortion	-	2	1	1	-	-	1	-	-	-	-
Spontaneous abortion	2	1	-	-	1	1	1	-	1	-	-

* 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 (1989-2024) (no screening program during 1989 -1996)

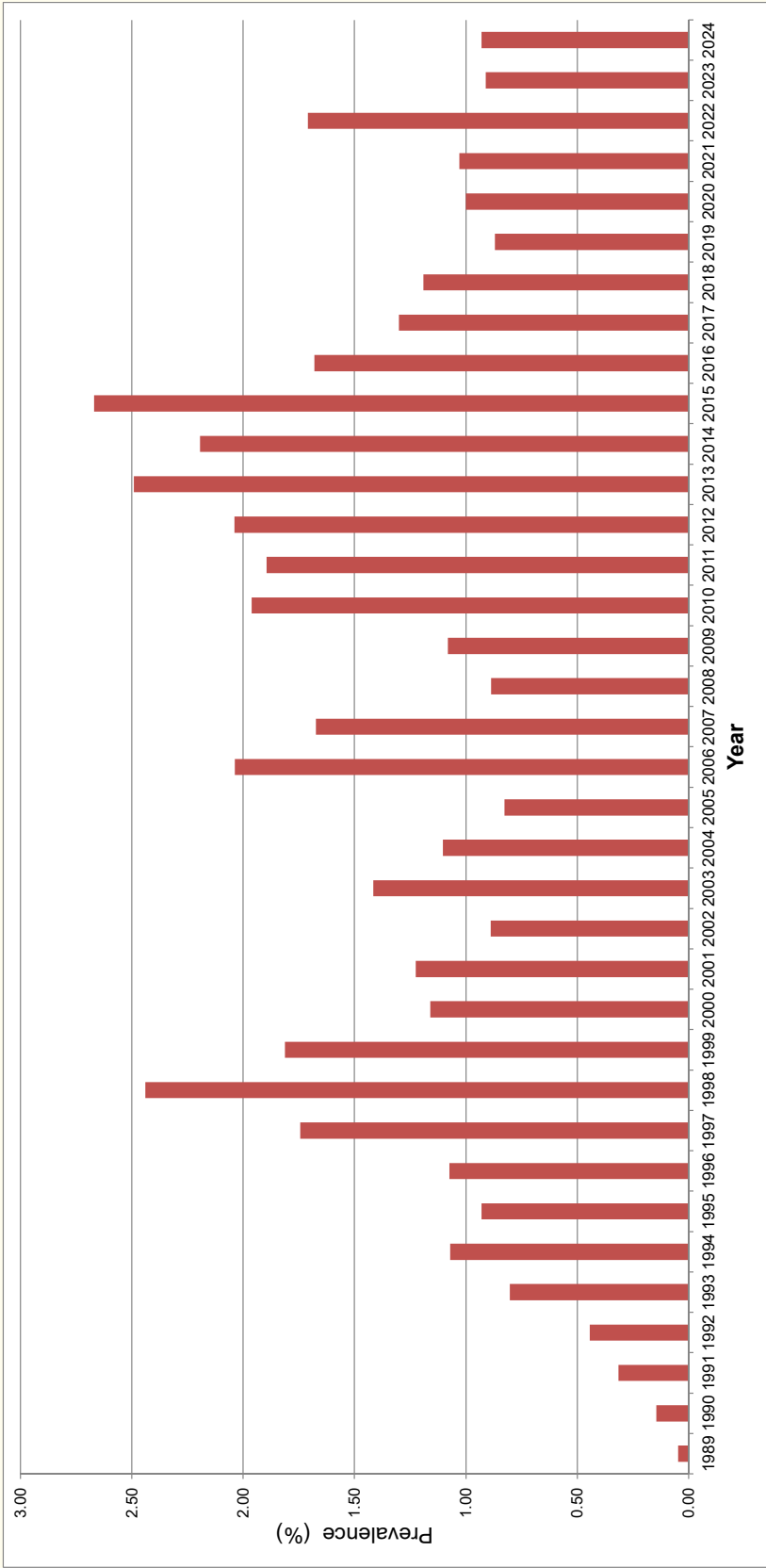


TABLE 38 Voluntary screening (2024) among pregnant women for anti-HIV antibody

Pregnant women (Counselling)	698	cases
Voluntary screening	698	cases
+ve anti-HIV antibody	4	case
% positive case	0.57	%

TABLE 39 Age of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Age (years)	No. of cases	Percent
15-19	-	-
20-24	1	11.11
25-29	3	33.33
30-34	3	33.33
35-39	2	22.22
40-44	-	-
45-49	-	-
Total	9	100

Mean age (years) 30
Standard deviation 4.47
Range 20-36 years

TABLE 40 Parity of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Parity	No. of cases	Percent
0	6	66.67
1	3	33.33
2	-	-
≥ 3	-	-
Total	9	100

TABLE 41 Age at first marriage of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Age (years)	No. of cases	Percent
10-14	-	-
15-19	5	55.56
20-24	0	0
25-29	0	0
30-34	4	44.44
Total	9	100

<i>Mean age (years)</i>	<i>23.56</i>	
<i>Standard deviation</i>	<i>6.73</i>	
<i>Range</i>	<i>16-31</i>	<i>years</i>

TABLE 42 Number of marriages of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Number	No. of cases	Percent
1	7	77.78
2	2	22.22
3	0	0
4	0	0
Total	9	100

TABLE 43 Occupations of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Occupations	No. of cases	Percent
Employee	2	22.22
Housewife	2	22.22
Commercial	2	22.22
Business	1	11.11
Government officer	1	11.11
Nurse	1	11.11
Total	9	100

TABLE 44 Residence (province) of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Province	Number	Percent
Chiang Mai (เชียงใหม่)	7	77.78
Lamphun (ลำพูน)	2	22.22
Chiang Rai (เชียงราย)	-	-
Lampang (ลำปาง)	-	-
Maehongson (แม่ฮ่องสอน)	-	-
Total	9	100

TABLE 45 Complications of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

	Cases	Percent
Without complicaiton	2	22.22
With complication	7	77.78
● Antepartum	4	
● Intrapartum	5	
● Postpartum	0	
Total	9	100

TABLE 46 Birth weight in the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Birth weight (grams)	Number	Percent
1,000 - 1,499	-	-
1,500 - 1,999	-	-
2,000 - 2,499	3	33.33
2,500 - 2,999	3	33.33
3,000 - 3,499	1	11.11
3,500 - 3,999	2	22.22
Total	9	100

Mean birthweight (grams) 2923.89
Standard deviation (grams) 467.17
Range (grams) 2430-3780

TABLE 47 Postpartum contraception of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2024)

Method	No. of cases	Percent
Female sterilization	3	33.33
Condom	5	55.56
DMPA	1	11.11
Oral contraception	-	-
Total	9	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** 2,796 tests

($OPD4 = 1,723$; $LR = 993$; $OB = 80$)

Secondary Surveillance

Contraction stress test

or **Nipple stimulation test**

Biophysical profile/ultrasonography

Doppler velocimetry

Prenatal Diagnosis

1. **Ultrasonography** 6,302 examinations
(1,249 cases [19.82%] for gynecologic and infertile examinations)
2. **Amniocentesis** 560 cases
3. **Cordocentesis** 74 cases
4. **Chorionic villous sampling** 63 cases

OBSTETRIC ULTRASOUND SERVICE

Number of Patients undergoing sonographic examinations (OB&GYN) in 2024

6,302 cases

Several examinations involved in the researches without specific indications

Indications for sonographic examination		
■ Obstetric ultrasound	5,053	80.18%
■ Perinatal research	188	3.72 %
■ Down screening research	471	9.32%
■ Obstetric ultrasound (others)	4,394	86.96%
■ Gestational age estimation	(OB 4,265+ LR 129)	
■ Suspected fetal growth restriction		
■ Bleeding in first half of pregnancy		
■ Antepartum hemorrhage		
■ Suspected fetal death		
■ Rule out fetal anomalies		
■ Fetal growth surveillance		
■ Gynecologic ultrasound	1,249	19.82 %
■ General gynecology		
■ Gynecologic oncology		
■ Reproductive medicine		

Cordocentesis (2024)

Total 74 cases

Indications	No.	%
1. Previous child with Hb bart's	1	1.35
2. Early signs Hydrops fetalis	2	2.70
3. Pregnancy at risk for Hb Bart' hydrops fetalis	5	6.76
4. Pregnancy at risk for β thal major	4	5.41
5. Pregnancy at risk for β thal / HbE	10	13.51
6. Chromosome analysis	34	45.95
7. Combined chromosome and risk for Hb bart's	6	8.11
8. Combined chromosome and Previous child with Hb bart's	1	1.35
9. Combined chromosome and risk for β thal major	1	1.35
10. Combined chromosome and risk for β thal Hb/E	6	8.11
11. Combined chromosome analysis and Hb typing	3	4.05
12. Fetal thyriod	1	1.35
Total	74	100

Amniocentesis (2024)

Total 560 cases

Indications for amniocentesis	
1. Elderly gravida (age of more than 35 years)	298
■ With No Ther Obvious Risk	47
■ With High Risk for Down Syndrome Screening	225
■ With Hight Risk Trisomy 18 or Trisomy 13, NTD	8
■ Maternal Request	8
■ With Fetal Anomaly and Sonomarkers	2
■ Others (FGR, NIPT→HR or no call, twins)	8
2. Pregnancy with high risk for Down syndrome screening	201
3. Pregnancy with high risk for Trisomy 18, 13, NTD HR	8
4. Pregnancy with fetal anomaly and sonomarkers	15
5. Maternal request	29
6. Twin	0
7. Previous DS	2
8. R/O Chromosome Abnormality	0
9. Other	7
- NIPT →XXY	
- NIPT →XO	
- Previous child (G1) →46, XX }Del (9) (q22)	
- Previous child T13	
- Oligohydramnios	
- Fetal growth restriction; FGR	
- ambiguous genitalia	

Amniocentesis (2024)

Amniocentesis for thalassemia (2024)

Total : 96 cases

Indications	No. cases
1. Previous child with β thal Hb/E	2
2. Pregnancy at risk for Hb Bart's	10
3. Pregnancy at risk for β thal major	12
4. Pregnancy at risk for β thal Hb/E	31
5. Combined risk for β thal major and β thal Hb/E	2
6. Combined risk for Hb Bart's and β thal Hb/E	1
7. Combined chromosome and risk for Hb bart's	6
8. Combined chromosome and risk for β thal major	11
9. Combined chromosome and risk for β thal Hb/E	17
10. Combined chromosome and previous child with β thal major	2
11. Combined chromosome and previous child with Hb bart's	2

Chorionic Villous Sampling (2024)

Total 63 procedures

Indications	Number
1. Fetal chromosome study	11
■ Elderly gravida	1
■ Thickening nuchal translucency	8
■ Fetal anomaly	1
■ Fetal cystic hygroma	1
2. Risk for fetal severe thalassemia	3
■ Risk for homozygous beta thalassemia	3
3. Fetal chromosome study and thalassemia diagnosis	49
■ Elderly gravida with fetal risk for Hb Bart's disease	2
■ Risk for Hb Bart's disease and maternal request for chromosomes study	11
■ Risk for homozygous beta thalassemia and maternal request for chromosomes study	6
■ Elderly gravida with fetal risk for homozygous beta thalassemia	5
■ Elderly gravida with fetal risk for beta thalassemia/Hb E	5
■ Risk for beta thalassemia/Hb E and maternal request for chromosomes study	20

Prevention and Control Thalassemia Program

- 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)
 - beta mutation analysis in indicated case
- 3) Prenatal diagnosis for pregnancy at risk
 - 3.1 Prenatal counseling
 - 3.2 Cordocentesis (16-22 weeks of gestation)
 - 3.3 Fetal blood analysis (checking maternal blood with acid elution test and hemoglobin typing with HPLC)
- 4) Counseling and termination of affected pregnancy

$$+ve\ OFT = OFT < 60\%,\ MCV +ve = \leq 78\ fl\ +ve\ \%HbA_2 = HbA_2 > 4\%$$

PROSPECTIVE SCREENING FOR THALASSEMIA PROGRAM 2024

	Number
Total number of pregnant screened	752
Positive MCV or Hb E	256
Number of couple at risk for severe Thalassemia	42
■ Risk for Hb Bart's	4
■ Risk for Homozygous beta thalassemia	11
■ Risk for Beta thalassemia/Hb E	27
The choice which selected by couples	
■ Cordocentesis	2
■ Chorionic villus sampling	8
■ Amniocentesis	24
■ GA above 24 weeks	-
■ Not PND [risk for minor thalassemia]	2
■ Not PND [Accept risk severe thalassemia]	3
■ Ultrasonography	2
■ Abortion before selection	-
■ No data	1
Result of PND	
■ Hb Bart's	0
■ Homozygous beta thalassemia	1
■ Beta thalassemia/Hb E	5

Down Syndrome Screening (2024)

Total 10,717 cases (NHSO)

Trimester	Risk			Total
	Low	Intermediate	High	
Second	10,015 (93.45%)	-	702 (6.55 %)	10,717

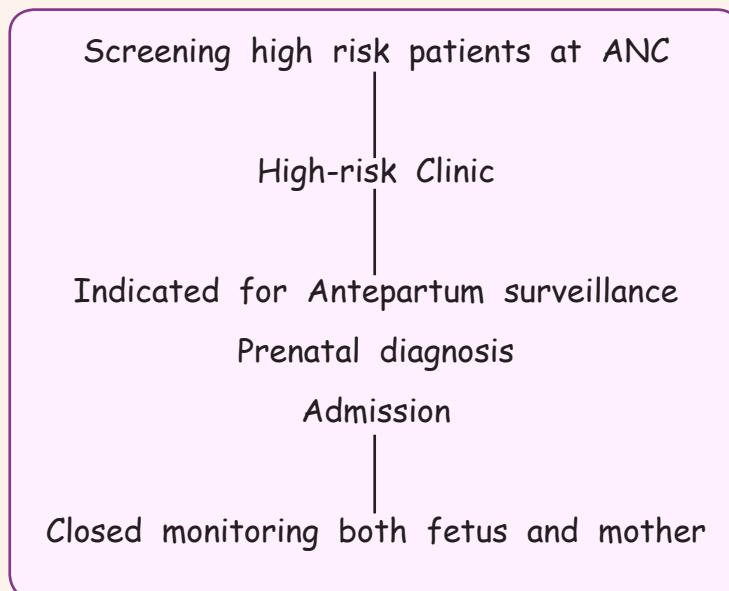
Total 146 cases (Service cases)

Trimester	Risk		Total
	Low	High	
First	55 (94.83%)	3 (5.17 %))	58
Second	83 (94.32%)	5 (5.68%)	88
Summary	138	8	146

High Risk Pregnancy

Number of patients approximately 300 cases

Management Guideline



High-risk patients at Maharaj Nakorn Chiang Mai Hospital in 2024

- | | |
|---|--------------|
| 1. Elderly Gravida (age of 35 years or more) | 26.2 % |
| 2. Teenage Pregnancy (age of less than 20 years) | 3.1 % |
| <i>Early adolescence (age of less than 17 years)</i> | <i>0.7 %</i> |
| <i>Late adolescence (age of 17-19 years)</i> | <i>2.4 %</i> |
| 3. Pregnancy complicated with medical or obstetrical diseases | 18.0 % |

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.