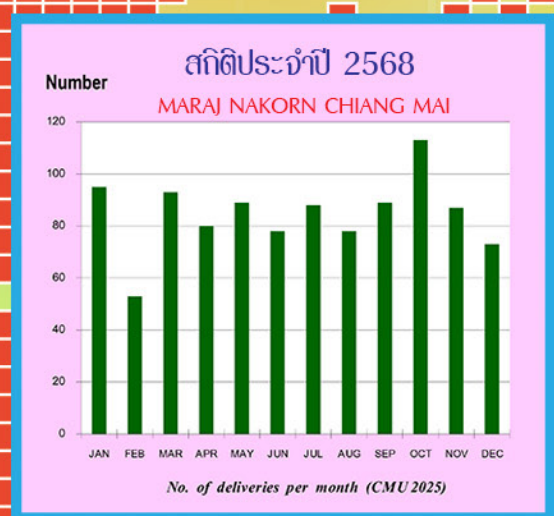


MATERNAL-FETAL MEDICINE 2025



หน่วยเวชศาสตร์มารดาและทารก
ภาควิชาสูติศาสตร์และนรีเวชวิทยา
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่



ANNUAL REPORT 2025

MATERNAL-FETAL MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY

CHIANG MAI, THAILAND

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MATERNAL-FETAL MEDICINE 2025

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PREFACE

It is my privilege to present the 2025 Maternal-Fetal Medicine Annual Report. The past year has been a defining chapter for our division at Chiang Mai University, characterized by our unwavering commitment to managing the most complex high-risk pregnancies in Northern Thailand. From advanced prenatal diagnostics to intricate fetal therapies, our mission remains steadfast: to secure the best possible beginnings for mothers and their children.

A review of this year's clinical landscape reveals pivotal shifts. For the first time in recent history, the decline in our total delivery volume has arrested. This stabilization is a promising development, potentially attributable to the inauguration of our modernized delivery room facilities. Our obstetric demographics, however, present evolving challenges. We continue to see a predominance of nulliparous women, who constitute approximately 60% of our patient volume. Practice patterns have also shifted markedly; vaginal breech deliveries have effectively ceased, with the cesarean section rate for breech presentations approaching 100%. Concurrently, our overall cesarean section rate has rebounded to over 31.5%, reversing the downward trend observed previously. This resurgence necessitates a rigorous re-evaluation of our clinical indications. This analysis is somewhat hindered by data gaps, specifically 46 cases in which indications were not recorded, underscoring an urgent need to strengthen our data quality protocols.

Medically, the complexity of our caseload is intensifying. We are witnessing an epidemiological transition with a sharp escalation in diabetes mellitus, which now affects 25% of our patients, a significant rise even after adjusting for updated screening methods. Similarly, pregnancy-induced hypertension has emerged as a critical concern, affecting 8.4% of cases, with a significant proportion presenting with severe features.

Amid these challenges, we have achieved significant progress in improving accessibility. We successfully implemented non-invasive prenatal testing (NIPT) for Down syndrome, a milestone now supported by the National Health Security Office (NHSO).

I extend my deepest gratitude to the Maternal-Fetal Medicine team for their dedication to clinical and academic excellence, and to Professor Theera Tongsong for his meticulous work in compiling this report.

Inspired by the resilience of our community, we move forward with a clear vision to build 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
January 2026*

PREFACE

The Annual Report of the Maternal–Fetal Medicine (MFM) Unit, Department of Obstetrics and Gynecology, Chiang Mai University, has been continuously established since 1990 to support and reflect our three core missions: education, research, and clinical service. The 2025 Annual Report highlights several important changes over the past year, representing both challenges and opportunities for sustaining excellence in maternal and fetal care.

During the past year, significant improvements were made to our clinical infrastructure, including the renovation of the labor room and the establishment of a modern and well-equipped Fetal Center. These developments have enhanced the care environment and patient experience, contributing to a 5% increase in the number of deliveries. Notably, this marks the first year in which the delivery rate has increased, returning to a level comparable to that of three years ago, despite an overall 10% decline in the national birth rate. This trend reflects growing confidence in our services and reinforces the role of our unit as a tertiary referral center for high-risk pregnancies.

In terms of prenatal screening and diagnosis, 2025 represents a major transition year. Since July 2025, non-invasive prenatal testing (NIPT) has been implemented as the primary screening method for common chromosomal aneuploidies, replacing conventional serum biomarker screening. This change has resulted in at least an 80% reduction in the number of invasive prenatal diagnostic procedures, thereby improving maternal and fetal safety while maintaining high screening performance.

The cesarean delivery rate in the past year was 31.5%. At the same time, the proportion of elderly gravidas and pregnancies complicated by medical and obstetric conditions continues to rise. These trends underscore the increasing complexity of case management and the need for multidisciplinary care, updated clinical guidelines, and continuous refinement of training curricula at all levels. The ultimate goal of the Maternal–Fetal Medicine Unit is to achieve the best possible outcomes for both mothers and fetuses. This goal cannot be fully realized without recognizing and responding to the evolving clinical, technological, and demographic realities highlighted in this report. Accordingly, this annual report serves not only as a summary of activity and performance but also as essential evidence to guide future planning in education, research, and clinical service.

Finally, I would like to express my sincere gratitude to all faculty members, physicians, nurses, and staff whose dedication and teamwork made this report possible. It is our hope that the 2025 Annual Report will serve as a valuable resource for academic advancement, clinical improvement, and the continued development of maternal–fetal medicine for future generations.

Associate Professor Fuanglada Tongprasert, MD

Head of Maternal-Fetal Medicine Unit

January 2026



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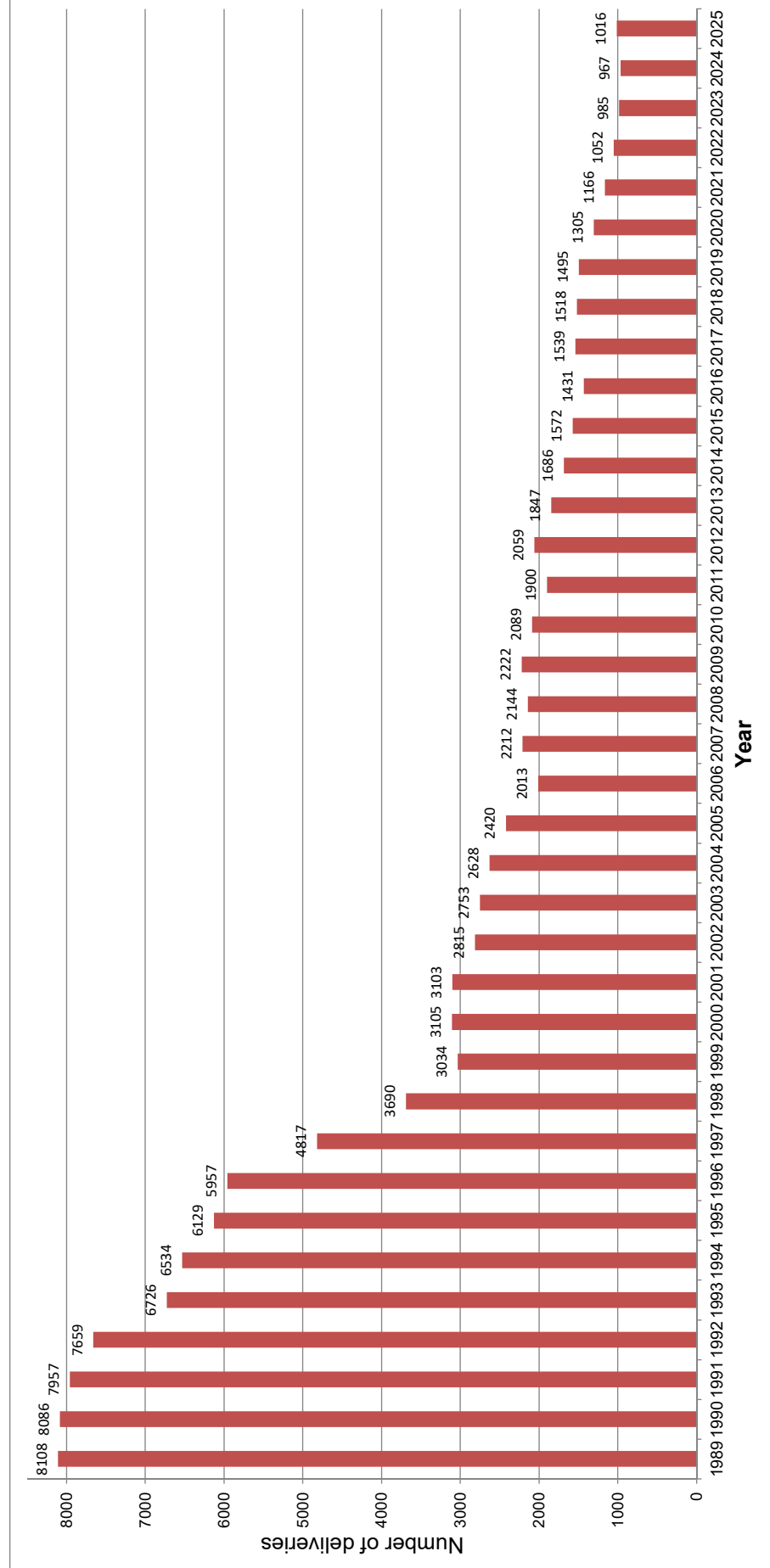
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Number of deliveris per year



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 I

OBSTETRIC MORTALITY

STILLBIRTH

Stillbirth 2025: For gestational age ≥ 22 weeks
: 17 cases of total birth = 1,016 cases)

■ *Gestational age between 22-27 weeks 12 cases (70.59 %)*

	CMU	Referred	Total
Low risk	1	6	7
High risk	0	5	5
Autopsy	1	2	3

Causes of death

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

Stillbirth 2025: For gestational age ≥ 28 weeks
: 5 cases of total birth = 967 cases)

■ *Gestational age between ≥ 28 weeks 5 cases (29.41 %)*

	CMU	Referred	Total
Low risk	0	0	0
High risk	1	4	5
Autopsy	1	2	3

Causes of death

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	0	1	1
2. Congenital malformations	1	2	3
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	1	1

Stillbirth rate :

Stillbirth rate = 4.92 per 1000 total births

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

Stillbirth rate = 16.73 per 1000 total births

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

Stillbirth rate = 11.81 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 2025:

4 cases (GA > 22 weeks) of total 965 live births

- *Gestational age between 22-27 weeks 2 cases (50.0 %)*
(Total livebirth 965 cases)

	CMU	Referred	Total
Low risk	0	0	0
High risk	0	2	2
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	0	2	2
5. Other specific conditions	0	0	0
6. Therapeutic termination related to PND	0	0	0

Neonatal death 2025:

2 cases (GA > 28 weeks) of total 965 live births

- *Gestational age between ≥ 28 weeks 2 cases (50.0 %)
(Total livebirth 965 cases)*

	CMU	Referred	Total
Low risk	0	0	0
High risk	0	2	2
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	0	0	0
5. Other specific conditions	0	0	0
6. Therapeutic termination related to PND	0	0	0

Early neonatal death rate 2.07 per 1,000 live births

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

Early neonatal death rate 4.15 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 = 6.89 per 1000 total births

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

perinatal death rate = 20.67 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	2025
Total birth	1,016
Stillbirth	17
22-27 weeks	12
≥ 28 weeks	5
Stillbirth rate/1000 births	
> 28 weeks / birthweight >1,000 gm	4.92
> 22 weeks / birthweight >500 gm	16.73
Early neonatal death	
● Early neonatal death rate / 1000 live birth (≥ 28 weeks)	2.07
● Early neonatal death rate / 1000 live birth (≥ 22 weeks)	4.15

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

Type of pregnancy	Number	Percent
Singleton	984	96.9
Twins	31	3.1
Triplet	1	0.1
Total	1016	100.0

TABLE 2 Categories of the Pregnant Women

	2024		2025	
	Number	Percent	Number	Percent
General Cases	941	97.3	981	96.6
Private Cases	26	2.7	35	3.4
Total	967	100.0	1016	100.0

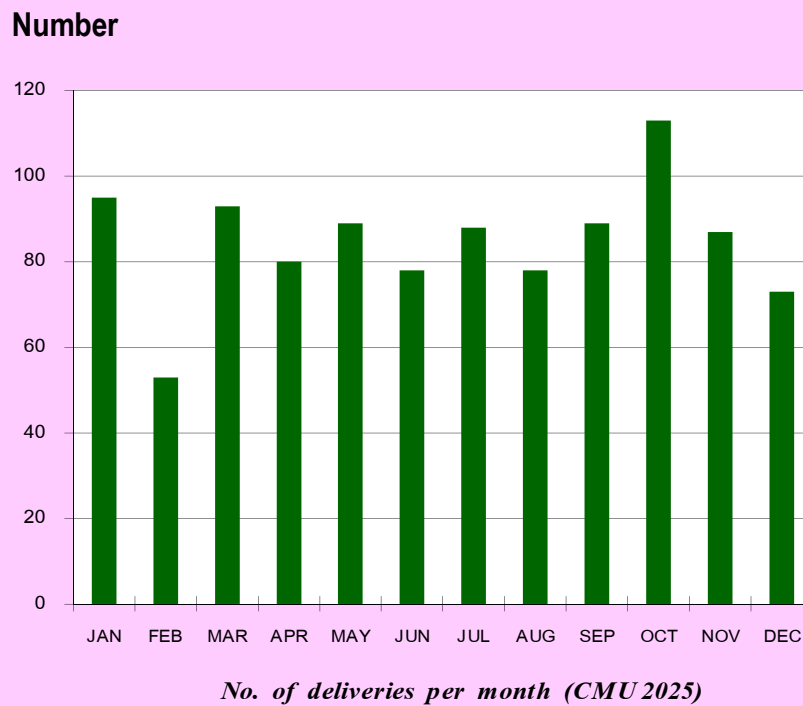
TABLE 3 Categories of the Pregnant Women

	Number	Percent
ANC at Maharaj Nakorn Chiang Mai Hospital	806	79.3
Private Clinic	35	3.4
ANC at Other Hospitals	145	14.3
No ANC	30	3.0
Total	1016	100.0

TABLE 4 Number and Percentage of Deliveries per Month

Month	Number (Mothers)	Percent
January	95	9.4
February	53	5.2
March	93	9.2
April	80	7.9
May	89	8.8
June	78	7.7
July	88	8.7
August	78	7.7
September	89	8.8
October	113	11.1
November	87	8.6
December	73	7.2
Total	1016	100.0

FIGURE 1 Histogram : Number of Deliveries from
January to December 2025



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

Total deliveries in 2025 = 1016 cases

TABLE 5 Number and percentage of parturients by age

Age	Number	Percent	Age	Number	Percent
13	1	0.1	30	73	7.2
15	1	0.1	31	89	8.8
16	5	0.5	32	69	6.8
17	3	0.3	33	80	7.9
18	5	0.5	34	64	6.3
19	6	0.6	35	60	5.9
20	14	1.4	36	48	4.7
21	9	0.9	37	40	3.9
22	14	1.4	38	33	3.2
23	20	2.0	39	28	2.8
24	28	2.8	40	27	2.7
25	26	2.6	41	10	1.0
26	36	3.5	42	13	1.3
27	56	5.5	43	9	0.9
28	61	6.0	44	11	1.1
29	76	7.5	46	1	0.1
Total				1016	100.0

Average age (Mean±Standard deviation) 31.4±5.4 (13-46) years

TABLE 6 Number and percentage of parturients by age group

Age Group	Number	Percent
10 - 14	1	0.1
15 - 19	20	2.0
20 - 24	85	8.4
25 - 29	255	25.1
30 - 34	375	36.9
35 - 39	209	20.6
40 - 44	70	6.9
45+	1	0.1
Total	1016	100.0

Summary : Age of parturients

- Adolescent Pregnancies (11-19 years) 21 (2.1 %)
 Early Adolescent Pregnancies (≤ 16 years) 7 (0.7 %)
 Late Adolescent Pregnancies (17-19 years) 14 (1.4 %)
- Adult Pregnancies (20-34 years) 715 (70.4 %)
- Elderly Pregnancies (≥ 35 years) 280 (27.6 %)

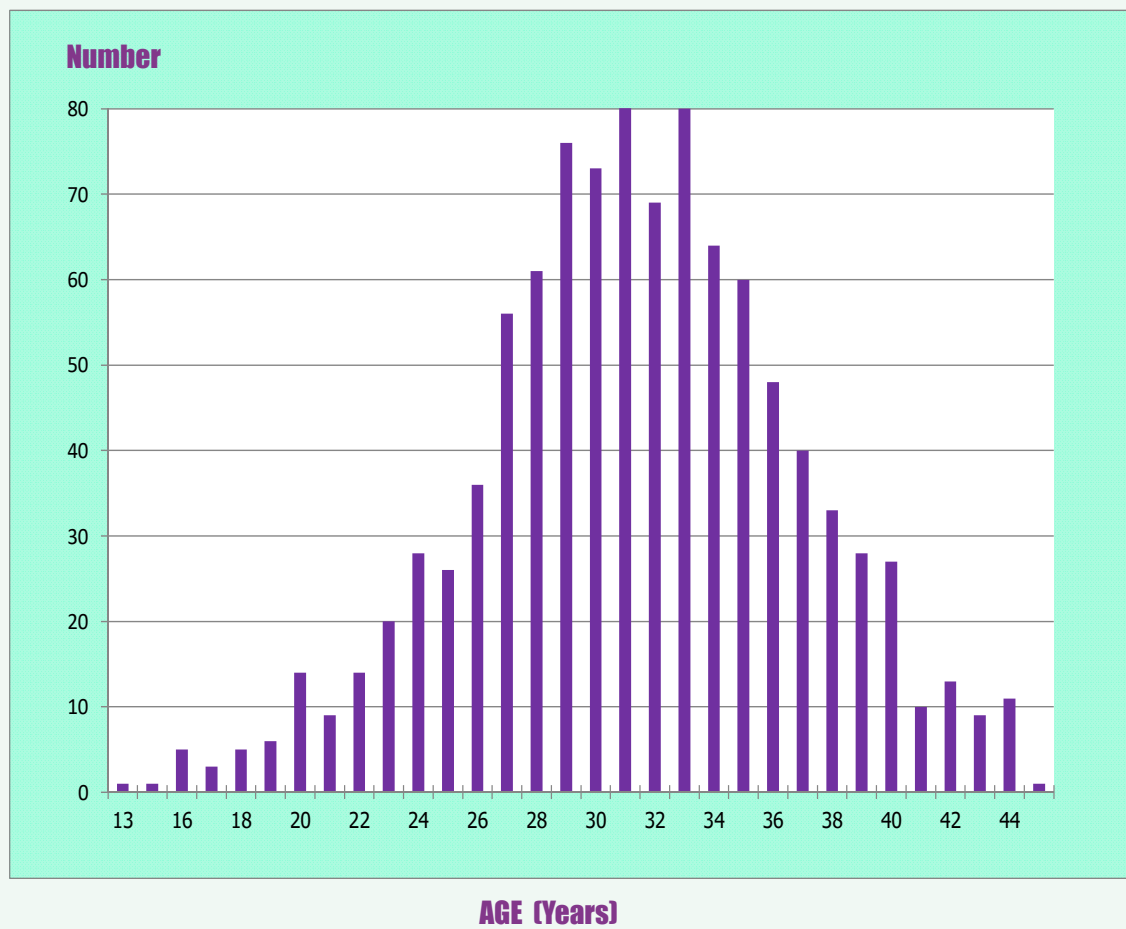
FIGURE 2 Histogram : Number of Parturients by Age

TABLE 7 Parity of parturients

Parity	Number	Percent
0	608	59.8
1	321	31.6
2	62	6.1
3	19	1.9
4	4	0.4
5	2	0.2
Total	1016	100.0

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

Nulliparous 59.8 %

Multiparous 40.2 %

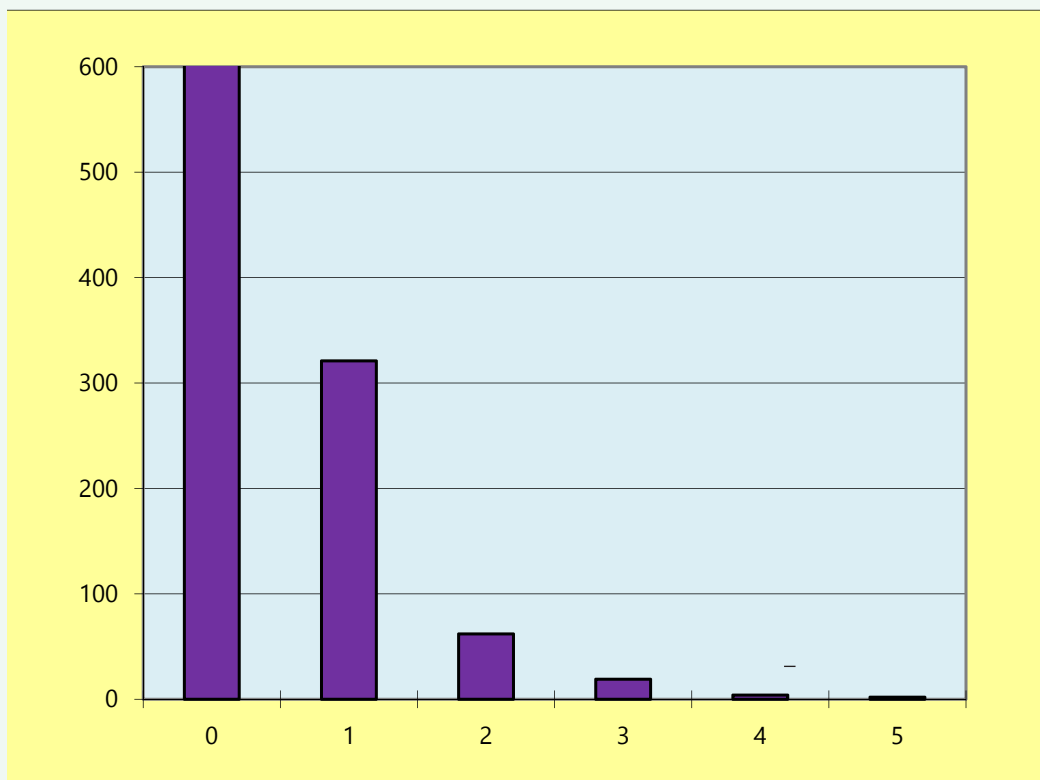
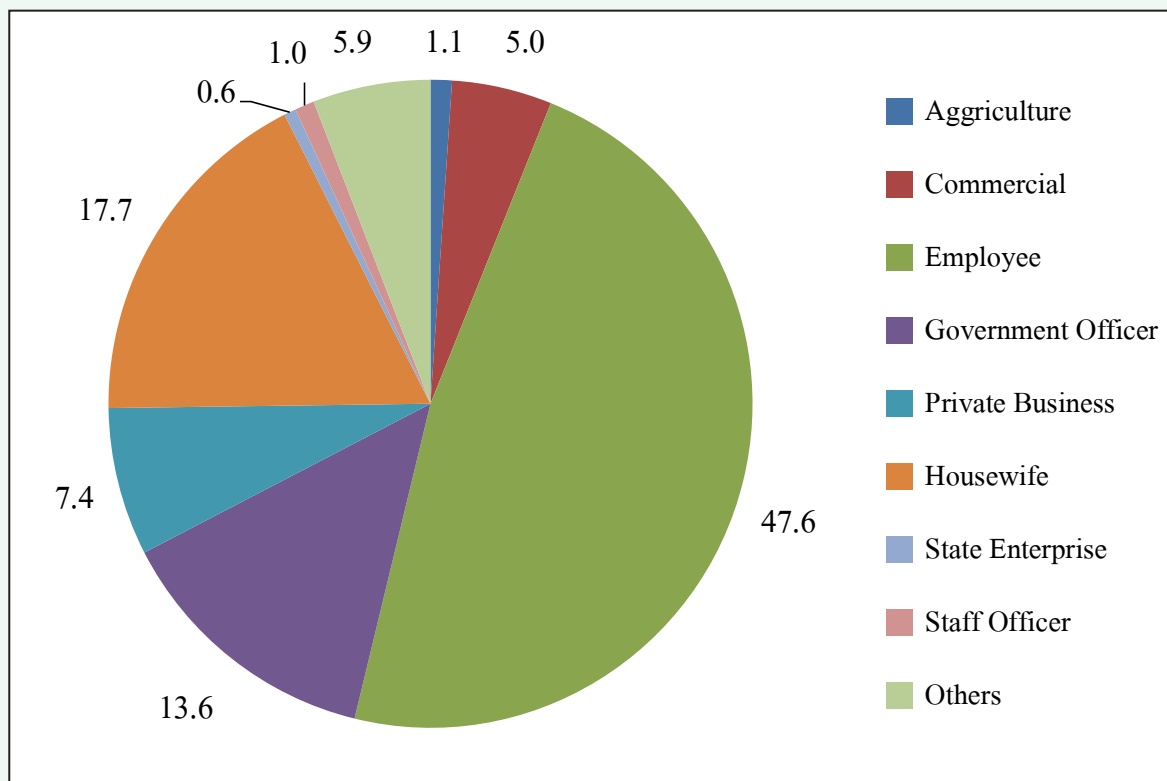
FIGURE 3 Histogram : Number of parturients by parity**NUMBER****PARITY**

TABLE 8 Distribution of the occupations of the parturients

Occupations	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Aggriculture	11	1.1	10	1.0	1	2.9
Commercial	51	5.0	50	5.1	1	2.9
Employee	484	47.7	469	47.9	15	42.9
Government Officer	138	13.6	133	13.6	5	14.3
Private Business	75	7.4	75	7.7	-	-
Housewife	180	17.7	178	18.2	2	5.7
State Enterprise	6	0.6	6	.6	-	-
Staff Officer	10	1.0	9	.9	1	2.9
Physician	11	1.1	7	.7	4	11.4
Phamacist	38	3.7	33	3.4	5	14.3
Others	11	1.1	10	1.0	1	2.9
Total	1015	100.0	980	100.0	35	100.0

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

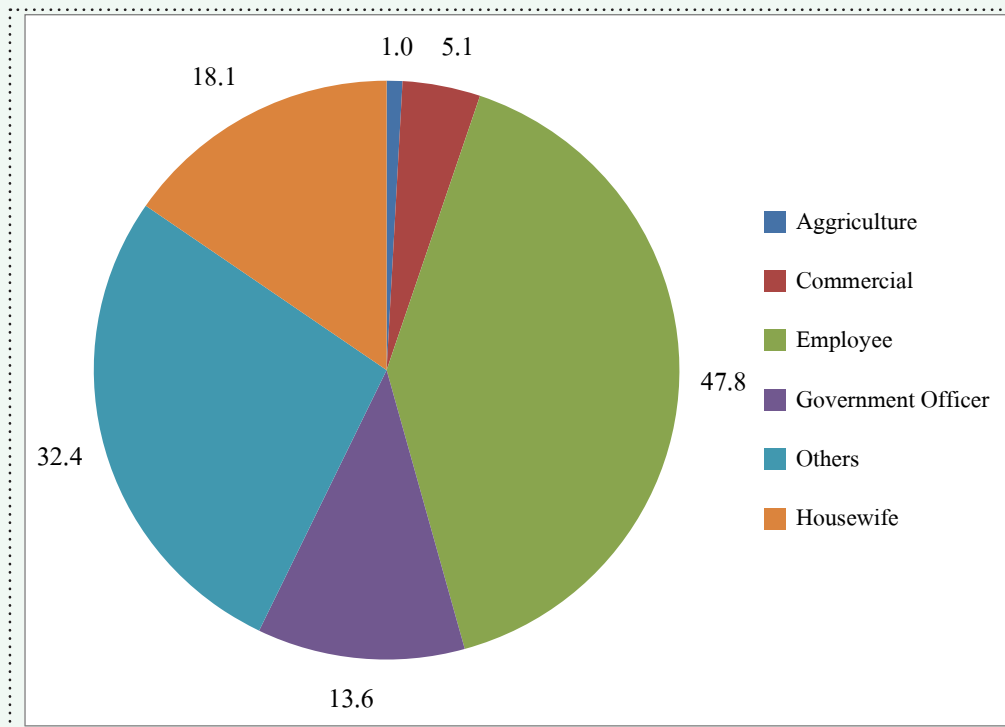
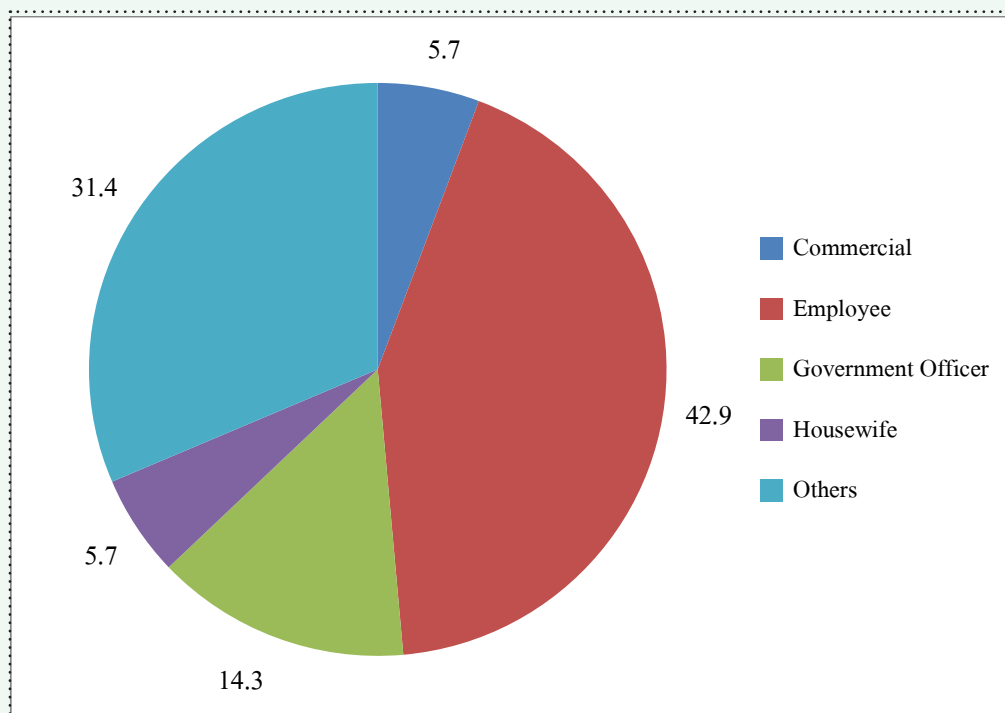
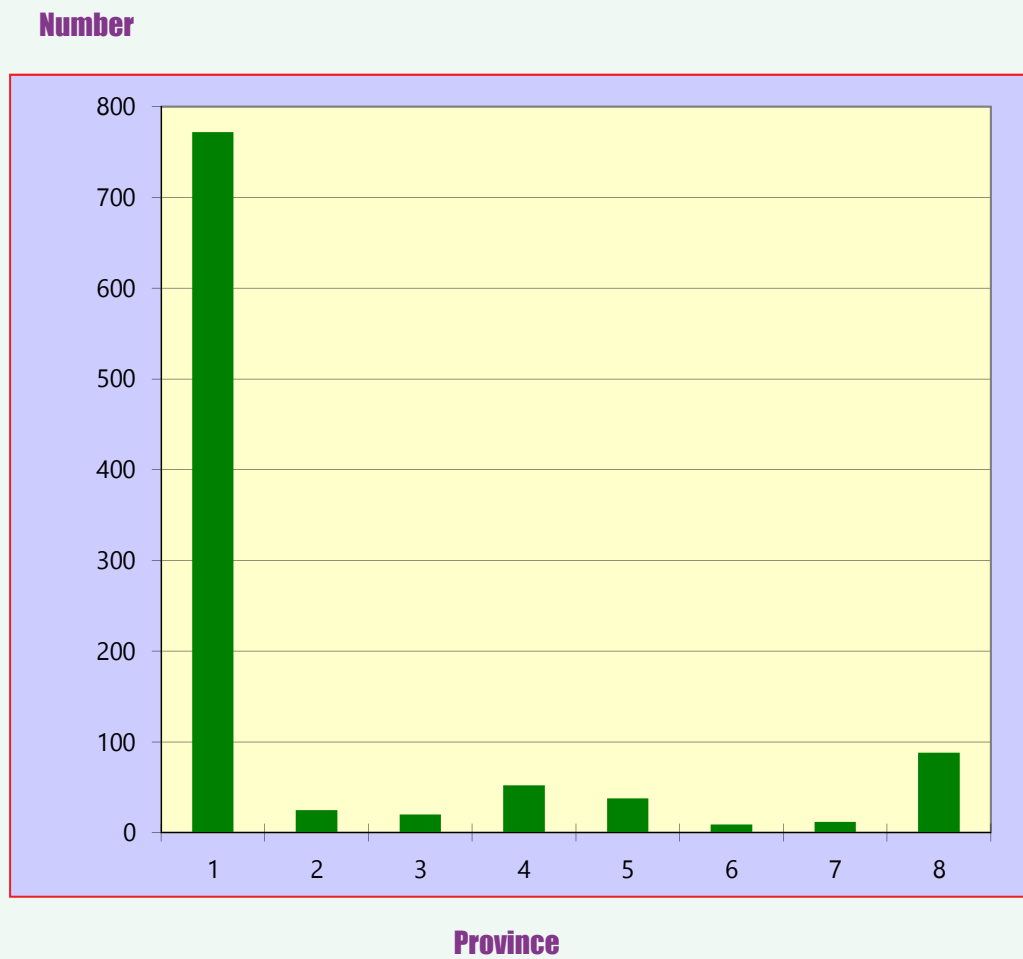
OCCUPATIONS OF THE GENERAL PATIENTS**OCCUPATIONS OF THE PRIVATE PATIENTS**

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

Province	Number	Percent
Chiang Mai (เชียงใหม่)	772	76.0
Chiang Rai (เชียงราย)	25	2.5
Lampang (ลำปาง)	20	2.0
Lamphun (ลำพูน)	52	5.1
Maehongsorn (แม่ฮ่องสอน)	38	3.7
Payao (พะเยา)	9	.9
Prae (แพร่)	12	1.2
Others (อื่นๆ)	88	8.7
Total	1016	100.0

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

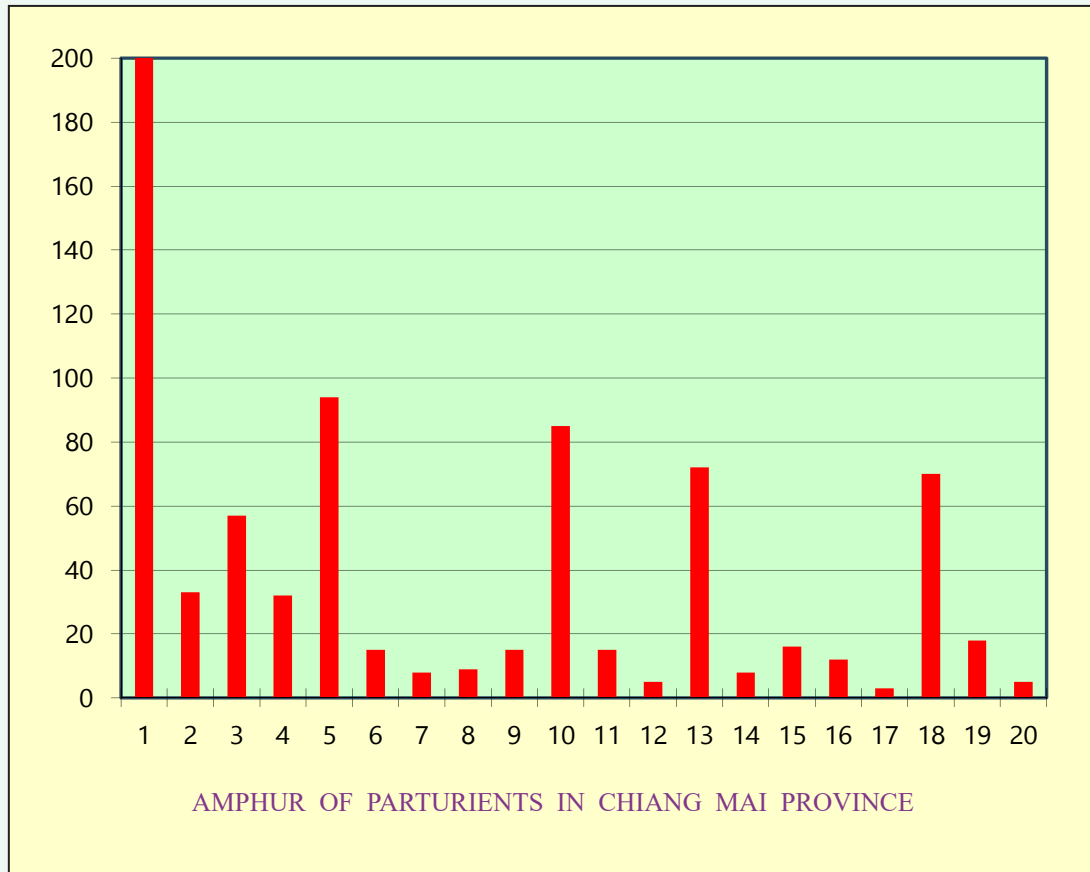


- | | |
|-----------------------------|--------------------------|
| 1. Chiang Mai (เชียงใหม่) | 2. Chiang Rai (เชียงราย) |
| 3. Lampang (ลำปาง) | 4. Lamphun (ลำพูน) |
| 5. Maehongsorn (แม่ฮ่องสอน) | 6. Payao (พะเยา) |
| 7. Phrae (แพร่) | 8. Others (อื่นๆ) |

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

	Amphur	Number	Percent
1.	Meung (เมือง)	200	25.9
2.	Maerim (แมริม)	33	4.3
3.	Doisaked (ดอยสะเก็ด)	57	7.4
4.	Sanpatong (สันป่าตอง)	32	4.1
5.	Hangdong (หางดง)	94	12.2
6.	Jomtong (จอมทอง)	15	1.9
7.	Mae-ai (แม่สาย)	8	1.0
8.	Prao (พร้าว)	9	1.2
9.	Hod (ฮอด)	15	1.9
10.	Sarapee (สารภี)	85	11.0
11.	Maetang (แม่แตง)	15	1.9
12.	Omkoï (อมก๋อย)	5	0.6
13.	Sankampang (สันกำแพง)	72	9.3
14.	Samoeng (สะเมิง)	8	1.0
15.	Chiangdao (เชียงดาว)	16	2.1
16.	Phang (ฝาง)	12	1.6
17.	Doitao (ดอยเต่า)	3	0.4
18.	Santrai (สันทราย)	70	9.1
19.	Maejam (แม่แจ่ม)	18	2.3
20.	Chaiprakarn (ไชยปราการ)	5	0.6
	Total	772	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 |

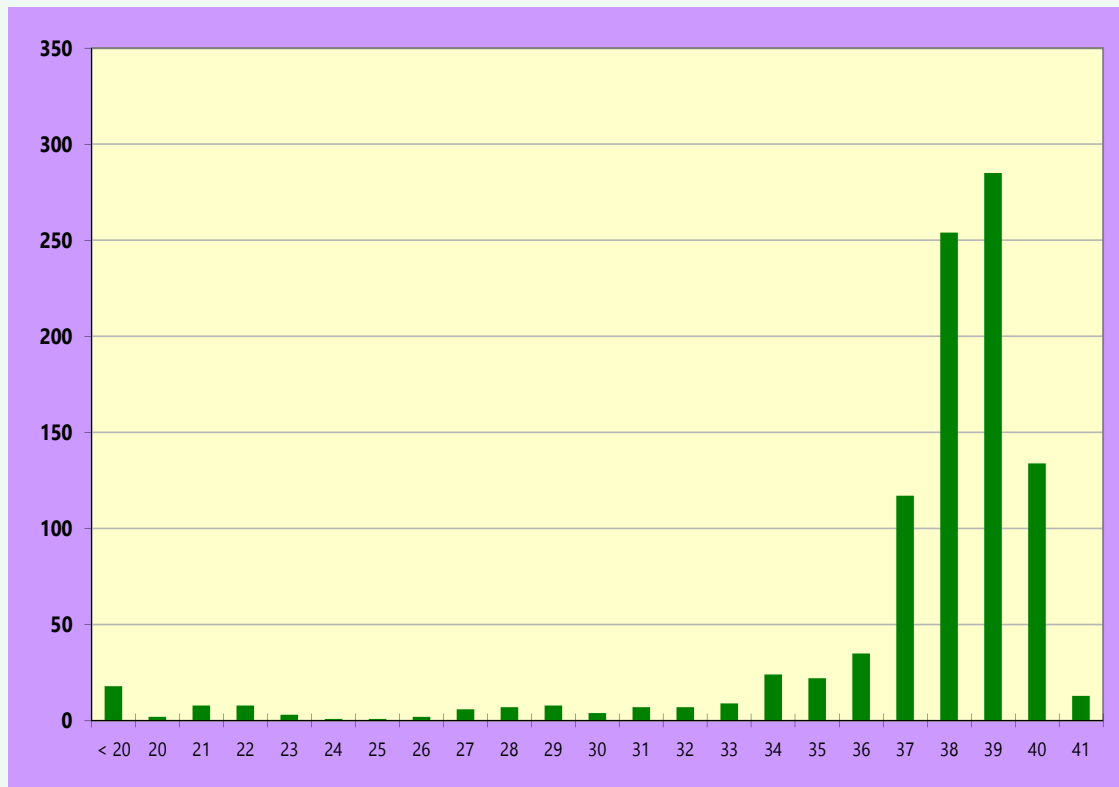
TABLE 11 Number and percentage of parturients by gestational age in singleton pregnancies

GA (Weeks)	Number	Percent	GA (Weeks)	Number	Percent
≤ 20	29	2.9	31	7	0.7
21	8	0.8	32	7	0.7
22	8	0.8	33	9	0.9
23	3	0.3	34	24	2.4
24	1	0.1	35	22	2.2
25	1	0.1	36	35	3.6
26	2	0.2	37	117	11.9
27	6	0.6	38	254	25.8
28	7	0.7	39	285	29.0
29	8	0.8	40	134	13.6
30	4	0.4	41	13	1.3
Total				984	100.0

Average of Gestational Age 36.86±4.87 (13-41) 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)	27	2.7
Immature (20-27 weeks)	31	3.2
Premature (28-36 weeks)	123	12.5
Term (37-41 weeks)	803	81.6
Postterm (42 weeks or more)	-	-
Total	984	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
23	1	3.2
24	1	3.2
27	1	3.2
28	1	3.2
29	1	3.2
30	1	3.2
31	1	3.2
32	4	12.9
33	2	6.5
34	5	16.1
35	2	6.5
36	3	9.7
37	8	25.8
Total	31	100.0

Average of Gestational Age 33.23±3.81 (23-37) Weeks

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

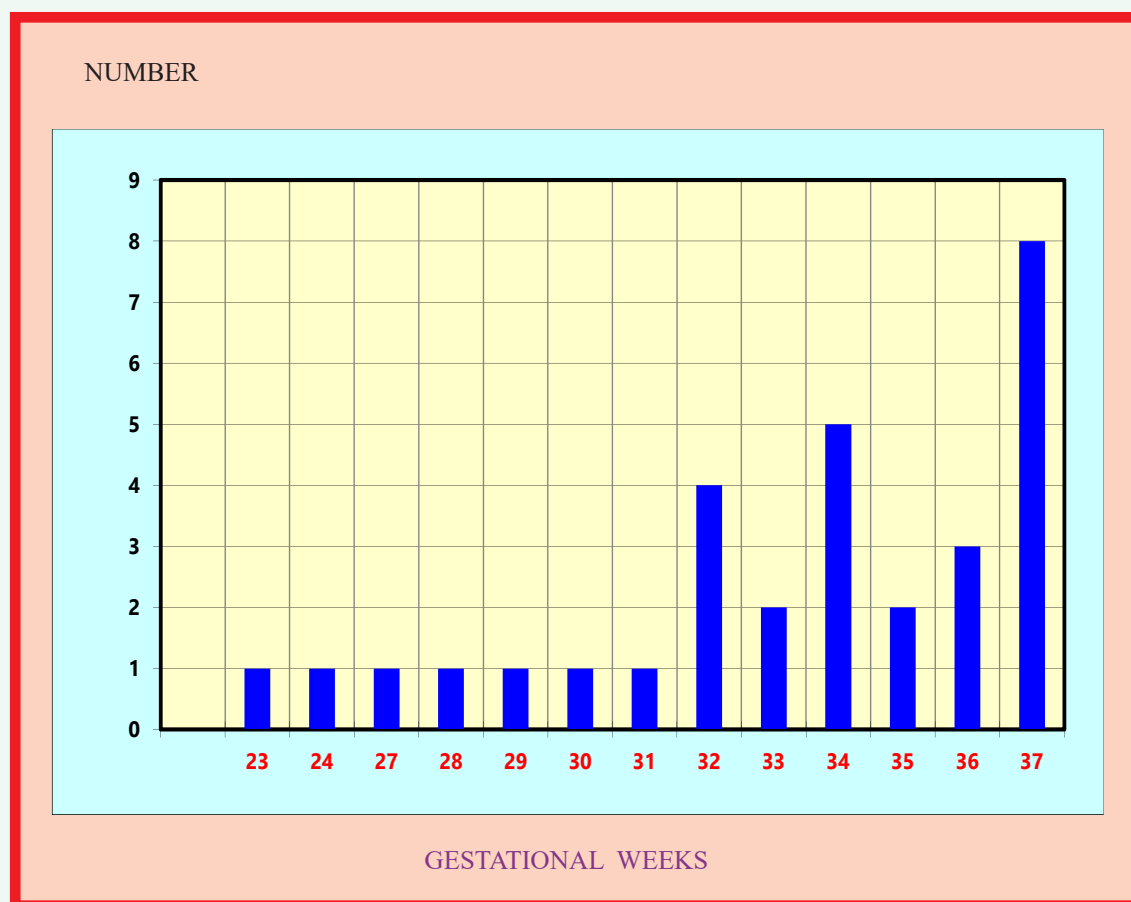


TABLE 14 Number and percentage of parturients by gestational age group in twin pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 week)	-	-
Immature (20-27 weeks)	3	9.7
Preterm (28-36 weeks)	20	64.5
Term (37-41 weeks)	8	25.8
Total	31	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	39	3.8
1	13	1.3
2	36	3.5
3	49	4.8
4	58	5.7
5	49	4.8
6	54	5.3
7	44	4.3
8	43	4.2
9	54	5.3
10	79	7.8
11	89	8.8
12	97	9.5
13	103	10.1
14	75	7.4
15	53	5.2
16	37	3.6
17	18	1.8
18	15	1.5
19	6	0.6
≥ 20	5	0.4
Total	1016	100.0

Attending ANC at other hospitals 13.8% of total parturients

FIGURE 9 Histogram : Number of ANC attendances of general patients

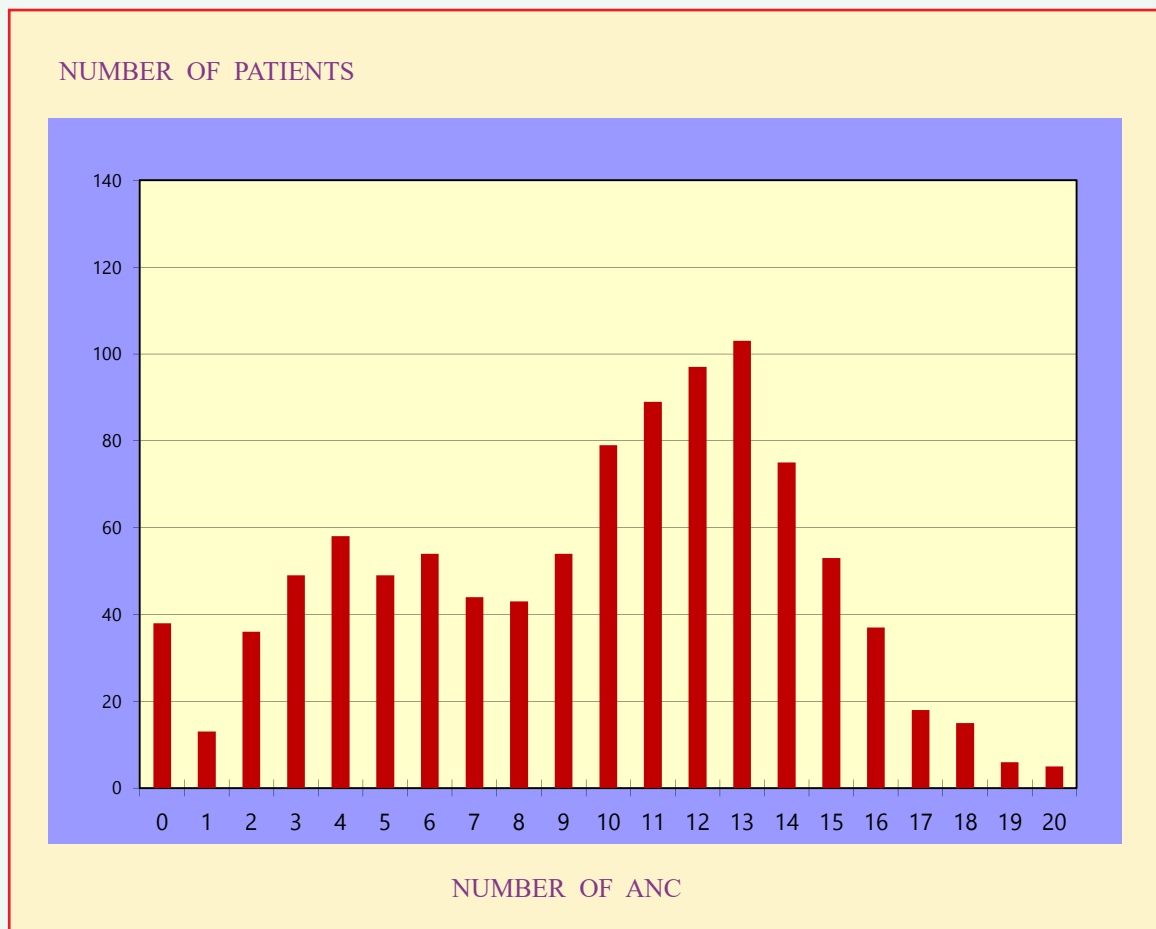


TABLE 16 Number of antenatal care attendance : General patients
(not include the patients attending ANC at other hospitals)

Number of ANC	Number of Parturients	Percent
4 or more	879	86.5
1-3	98	9.6
No ANC	39	3.8
Total	1016	100.0

Note ANC less than 4 is considered to be inadequate

Inadequate ANC 13.4%

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

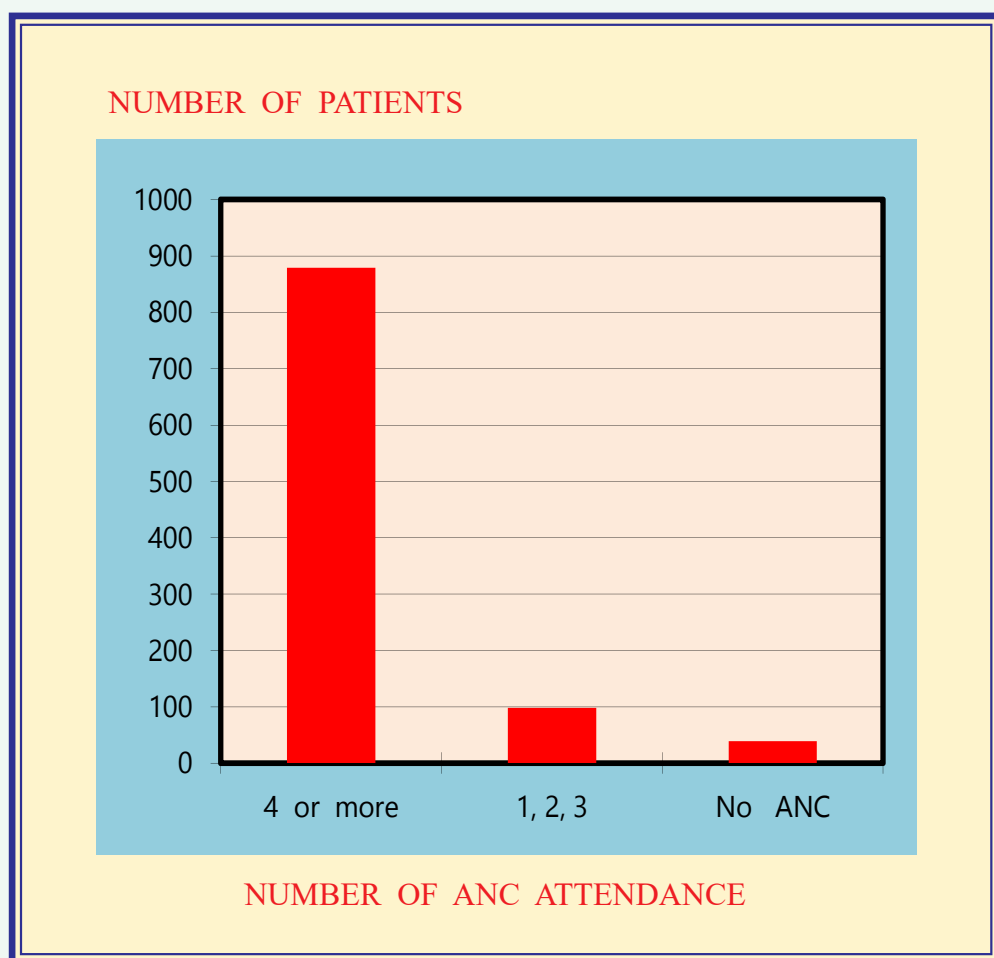
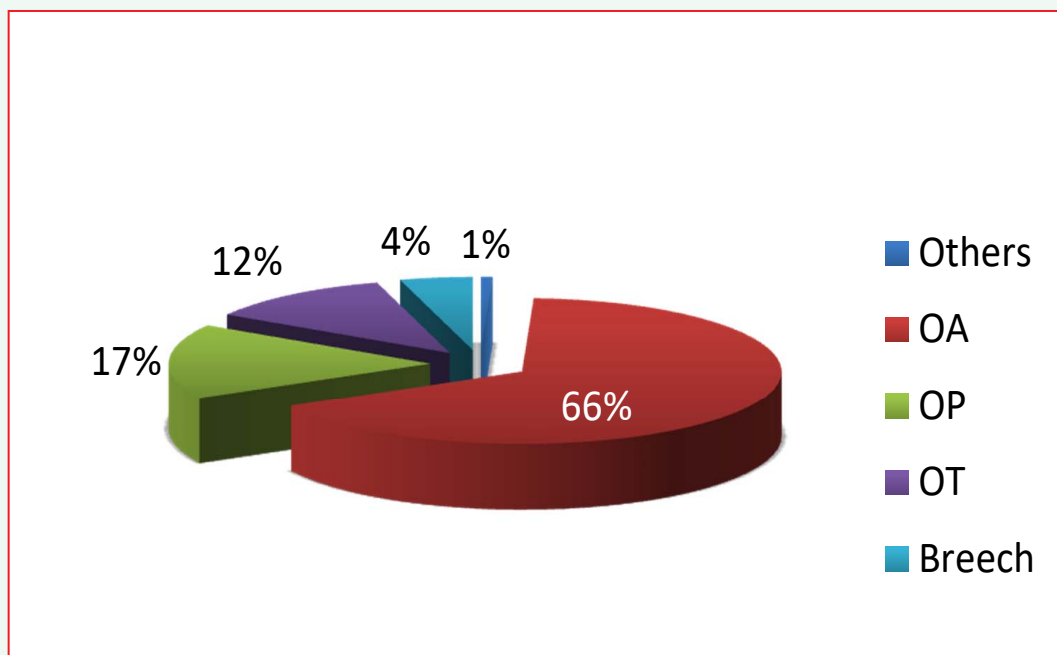


TABLE 17 Distribution of fetal presentations in labor (Singleton)

Fetal Presentation	Percent
Vertex	95.0
Breech	4.6
Transverse lie	0.2
Compound	0.1
Face	-
Others	0.1

Breech Presentation was 4.6% 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	568	57.7	556	58.5	12	38.7
Forceps Delivery	6	0.6	6	0.6	-	-
Vacuum Delivery	58	5.9	56	5.9	2	6.5
Cesarean Section	310	31.5	294	30.9	15	48.4
Vaginal Breech Delivery	2	0.2	2	0.2	-	-
Other*	40	4.1	37	3.9	2	6.5
Total	984	100.0	951	100.0	31	100.0

* other = cearean hysterectomy, hysterotomy, evacuation etc.

Twins

Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Vaginal Delivery	4	12.9	4	13.8	0	0.0
Cesarean Section	27	87.1	25	86.2	2	100.0
Total	30	100.0	29	100.0	2	100.0

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

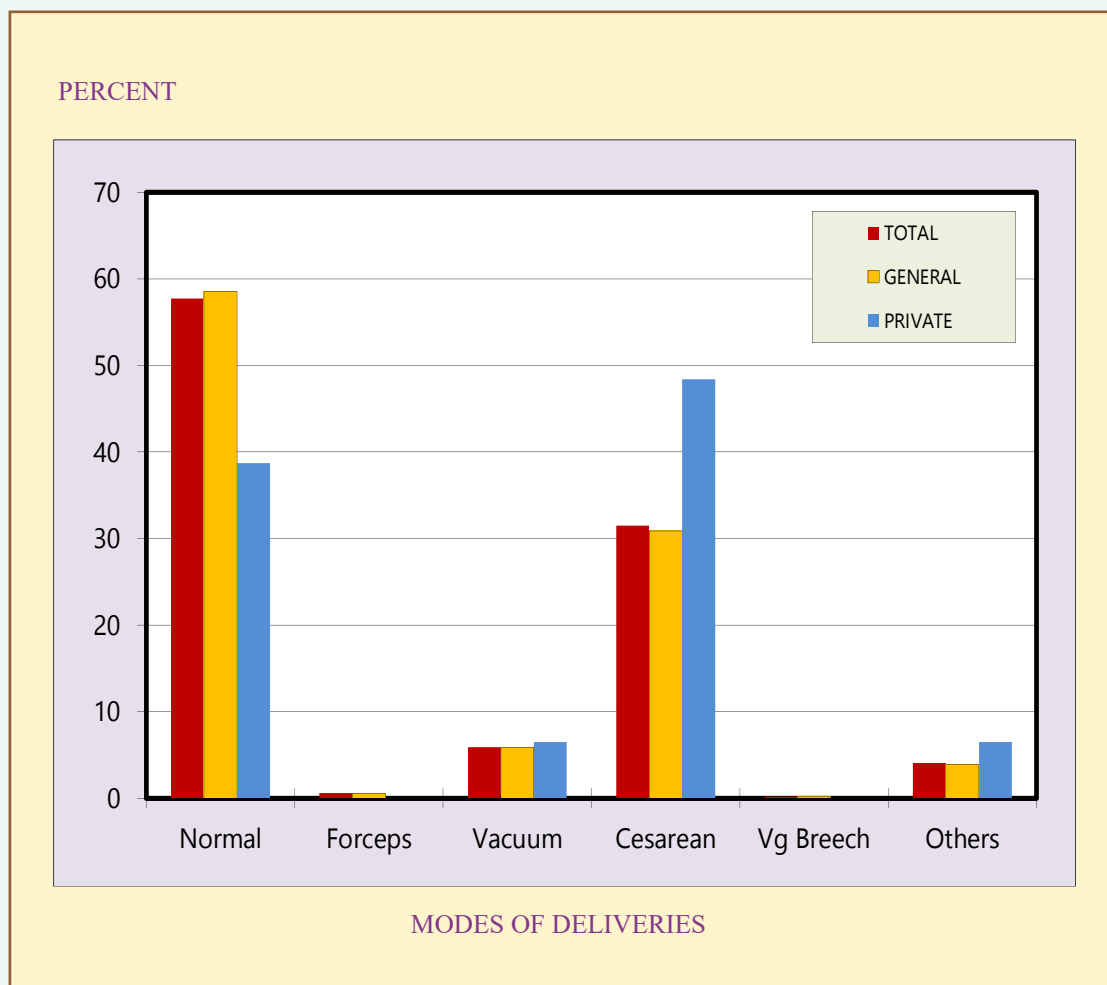


TABLE 19 Modes of deliveries in breech presentation : general and private patients (Singleton)

Mode of Deliveries	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	43	95.6	41	95.3	2	100.0
Assisting Mauriceau-Smelliveit	1	2.2	1	2.3	-	-
Total Extraction Mauriceau-Smelliveit	0	0	0	0	-	-
Total Extraction Piper forceps	1	2.2	1	2.3	-	-
Total	45	100.0	43	100.0	2	100.0

Total Cesarean Section Rate in Breech presentation 95.6%

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

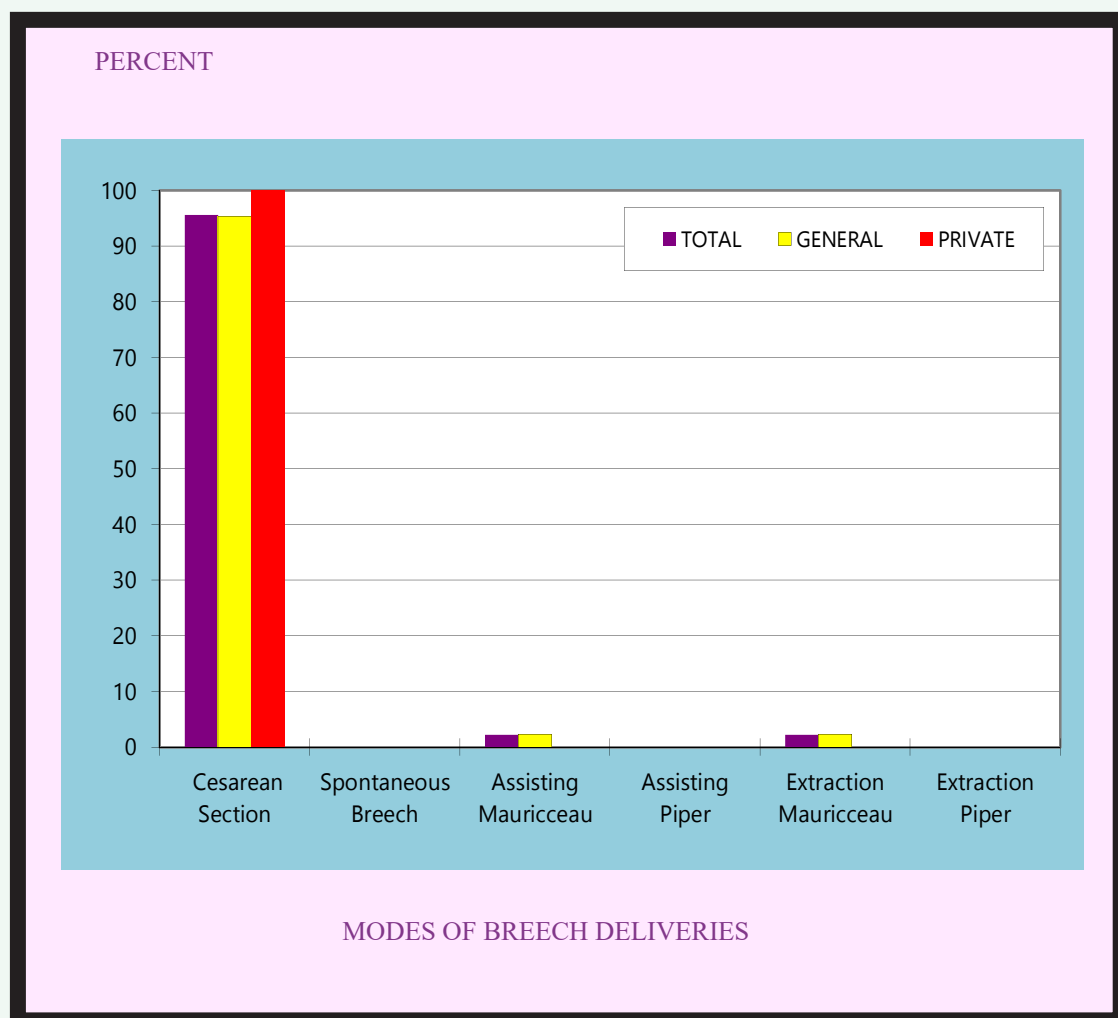


TABLE 20 Frequency of cesarean deliveries according to diagnostic indication (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
CPD	84	26.1	80	26.1	4	26.7
Previous C/S	88	27.3	84	27.5	4	26.7
Breech presentation	43	13.4	41	13.4	1	6.7
Fetal distress	34	10.6	33	10.8	1	6.7
Placenta previa	17	5.3	17	5.6	0	0
Abruptio placentae	2	0.6	2	0.7	0	0
Malpresentation	2	0.6	2	0.7	0	0
Others	6	1.9	6	2.0	0	0
Not recorded	46	14.3	41	13.4	5	33.3
Total	322	100.0	306	100.0	15	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	16.7	1	16.7	-	-
Poor expulsive force	1	16.7	1	16.7	-	100.0-
Shortened second stage of labour	2	33.3	2	33.3	-	-
Prophylactic, training	2	33.3	2	33.3	-	-
Total	6	100.0	6	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	5.2	3	5.4	0	0
Failure progression'	1	1.7	1	1.8	0	0
Fetal distress'	15	25.8	15	26.8	0	0
Poor expulsive force'	23	39.7	23	41.1	0	0
Previous C_S'	4	6.9	4	7.1	0	0
Pprolonged leakage of AF'	2	3.4	0	0	2	100.0
Shortened 2nd stage of labour'	5	8.6	5	8.9	0	0
Others	5	8.6	5	8.9	0	0
Total	58	100.0	56	100.0	2	100.0

TABLE 23 Sex of Fetuses (Including Multiple Pregnancies)

Sex	Number	Percent
Male	533	51.0
Female	500	47.8
Unspecified	13	1.2
Total	1046	100.0

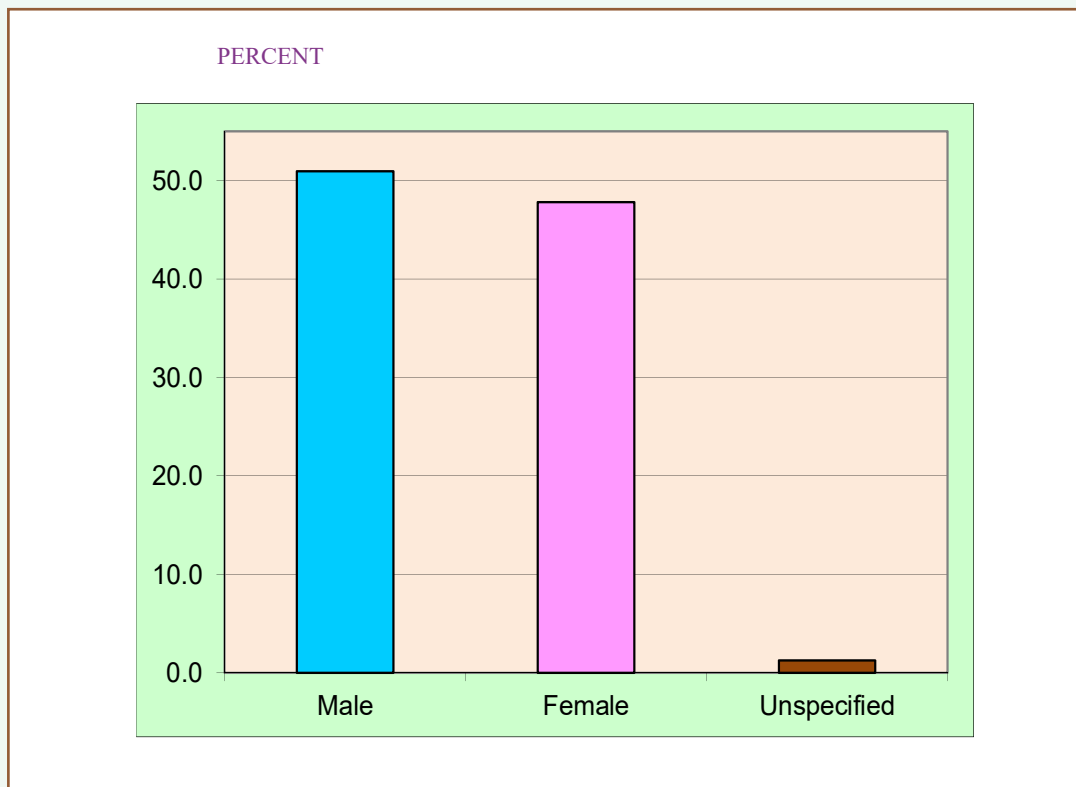
FIGURE 14 Histogram : Distribution of fetal sex (including twins)

TABLE 24 Apgar score at 1 minute of total neonates

Apgar Scores	Number	Percent
0-3 (severe depression)	81	7.8
4-6 (mild depression)	63	6.0
7-10 (no depression)	901	86.2
Total	1045	100.0

TABLE 25 Apgar score at 5 minutes of total neonates

Apgar Score	Number	Percent
0-3 (severe depression)	56	5.4
4-6 (mild depression)	33	3.2
7-10 (no depression)	957	91.5
Total	1046	100.0

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

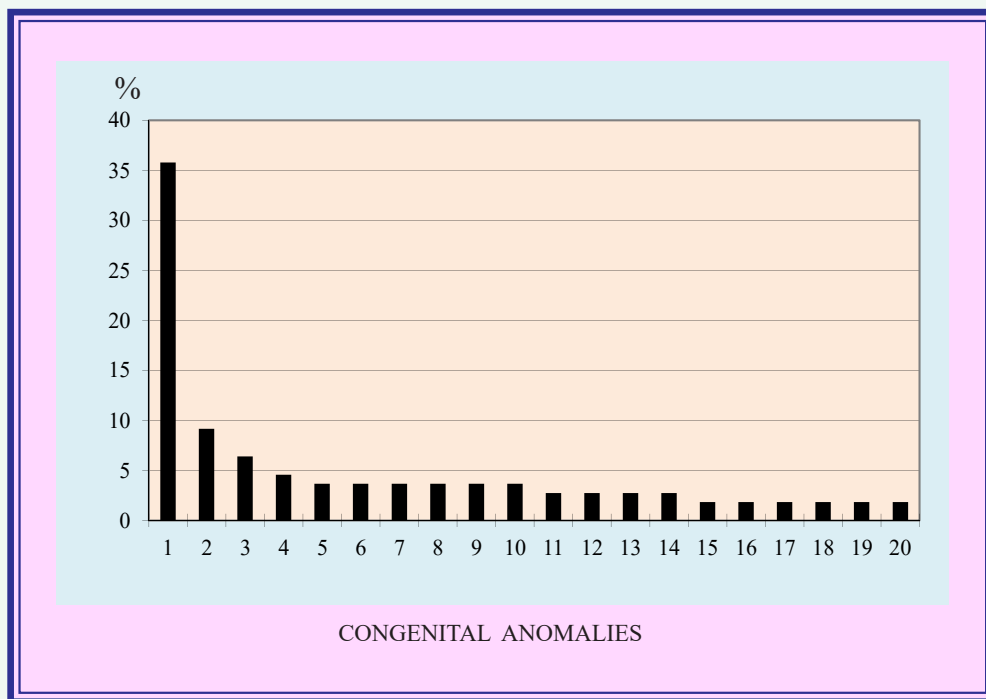
Apgar Score	1-Minute		5-Minute	
	Number	Percent	Number	Percent
0	53	5.1	49	4.7
1	9	.9	4	.4
2	7	.7	2	.2
3	14	1.3	4	.4
4	23	2.2	4	.4
5	15	1.4	12	1.1
6	26	2.5	15	1.4
7	69	6.6	23	2.2
8	437	41.7	104	9.9
9	382	36.4	495	47.2
10	14	1.3	337	32.1
Total	1049	100.0	1049	100.0

TABLE 27 Prenatal sonographic diagnosis of structural anomalies*

	Congenital Anomalies	Number	Percent
1	Others	39	35.78
2	Cardiac defect	10	9.17
3	Trisomy 21	7	6.42
4	Thal.Hb Barts	5	4.59
5	Cleft lips	4	3.67
6	Hydronephrosis	4	3.67
7	Hydrops fetalis	4	3.67
8	Ventriculomegaly	4	3.67
9	Trisomy 18	4	3.67
10	Limb anomaly	4	3.67
11	Diaphragmatic hernia	3	2.75
12	Neural tube defect	3	2.75
13	Cystic hygroma	3	2.75
14	Multiple anomalies	3	2.75
15	Holoprocencephaly	2	1.83
16	Heterotaxy	2	1.83
17	CPAM	2	1.83
18	Gastroschisis	2	1.83
19	Omphalocele	2	1.83
20	Trisomy 13	2	1.83
	Total	109	100.00

* Only diagnosed after 20 weeks and termination / delivery at Maharaj Nakorn Chiang Mai, Most were referred cases

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



1	Others	11	Diaphragmatic hernia
2	Cardiac defect	12	Neural tube defect
3	Trisomy 21	13	Cystic hygroma
4	Thal.Hb Barts	14	Multiple anomalies
5	Cleft lips	15	Holoprosencephaly
6	Hydronephrosis	16	Heterotaxy
7	Hydrops fetalis	17	CPAM
8	Ventriculomegaly	18	Gastroschisis
9	Trisomy 18	19	Omphalocele
10	Limb anomaly	20	Trisomy 13

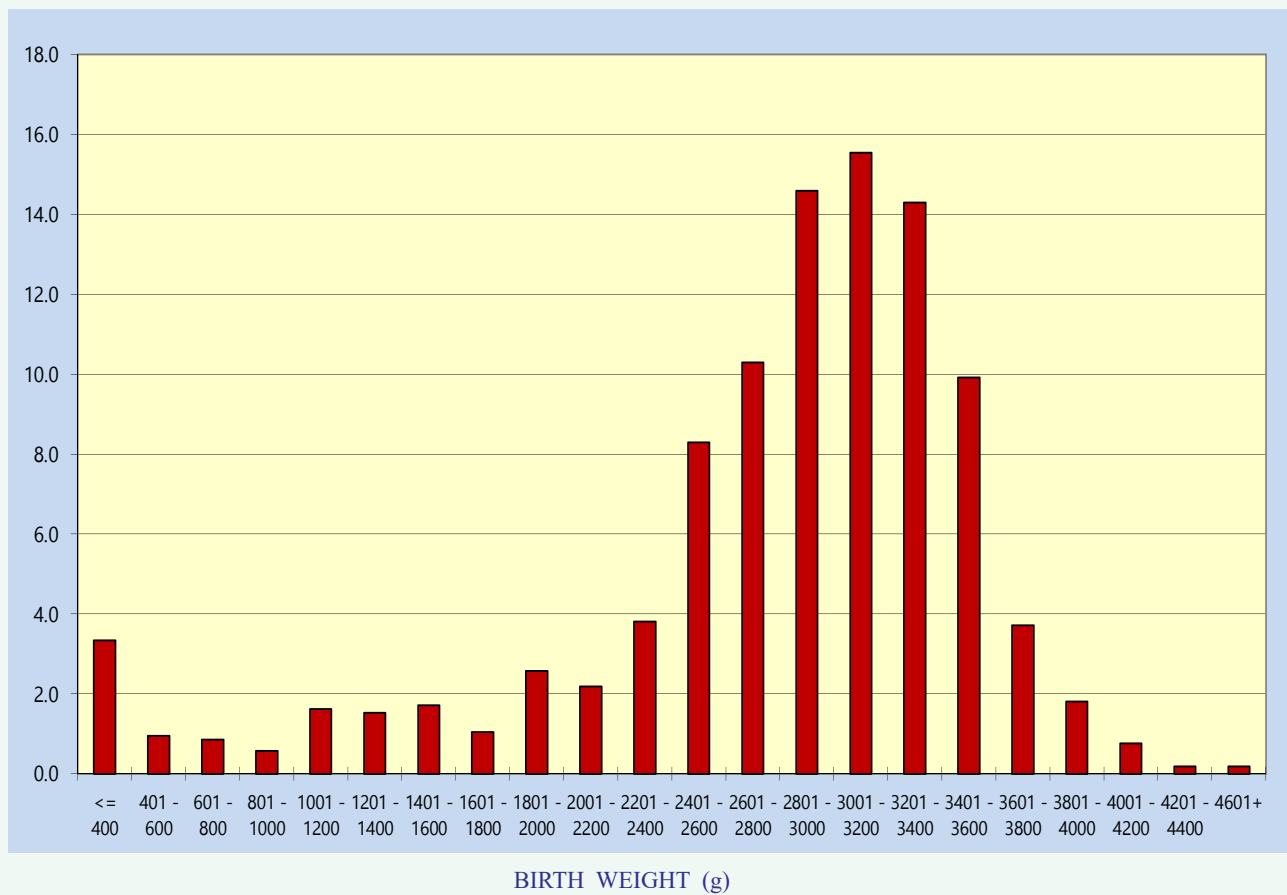
TABLE 28 Number and percentage of neonates by birth weight*

Birth Weight (grams)	Number	Percent
≤ 400	35	3.3
401 - 600	10	1.0
601 - 800	9	.9
801 - 1000	6	.6
1001 - 1200	17	1.6
1201 - 1400	16	1.5
1401 - 1600	18	1.7
1601 - 1800	11	1.1
1801 - 2000	27	2.6
2001 - 2200	23	2.2
2201 - 2400	40	3.8
2401 - 2600	87	8.3
2601 - 2800	108	10.3
2801 - 3000	153	14.6
3001 - 3200	163	15.6
3201 - 3400	150	14.3
3401 - 3600	104	9.9
3601 - 3800	39	3.7
3801 - 4000	19	1.8
4001 - 4200	8	0.8
4201 - 4400	2	0.2
4601+	2	0.2
Total	1047	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)	18	1.8
Very low birth weight (1000-1499)	40	4.0
Low birth weight (1500-2499)	161	16.0
Average birth weight (2500-3999)	773	76.9
Macrosomia (> 4000)	13	1.3
Total	1005	100.0

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

Average Birth Weight of Total Infants 2803 ± 746 grams
range 210-4390 grams

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

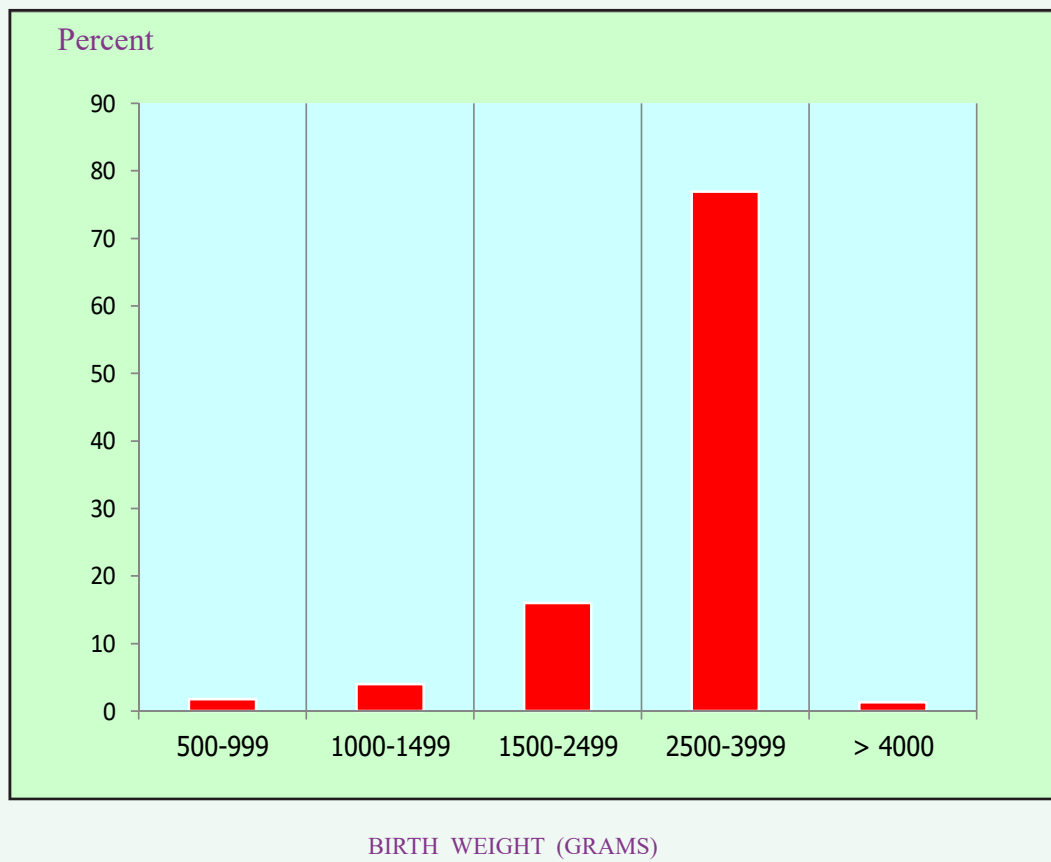


TABLE 30 Fetal weight (grams): the 10th, 50th, 90th percentile at various gestational age (singleton)

Gestational Age (weeks)	Weight (grams) 10th Percentile	Weight (grams) 50th Percentile	Weight (grams) 90th Percentile
20	240	260	.
21	350	380	.
22	190	440	.
23	330	610	.
24	-	-	.
25	.	.	.
26	690	710	.
27	700	1080	.
28	890	1020	.
29	775	1350	.
30	920	1440	.
31	940	1630	.
32	1100	1750	.
33	1195	2250	.
34	1615	2230	2605
35	1640	2428	3015
36	1924	2660	3147
37	2302	2800	3294
38	2510	3003	3545
39	2666	3180	3574
40	2830	3245	3700
41	3028	3480	3906

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

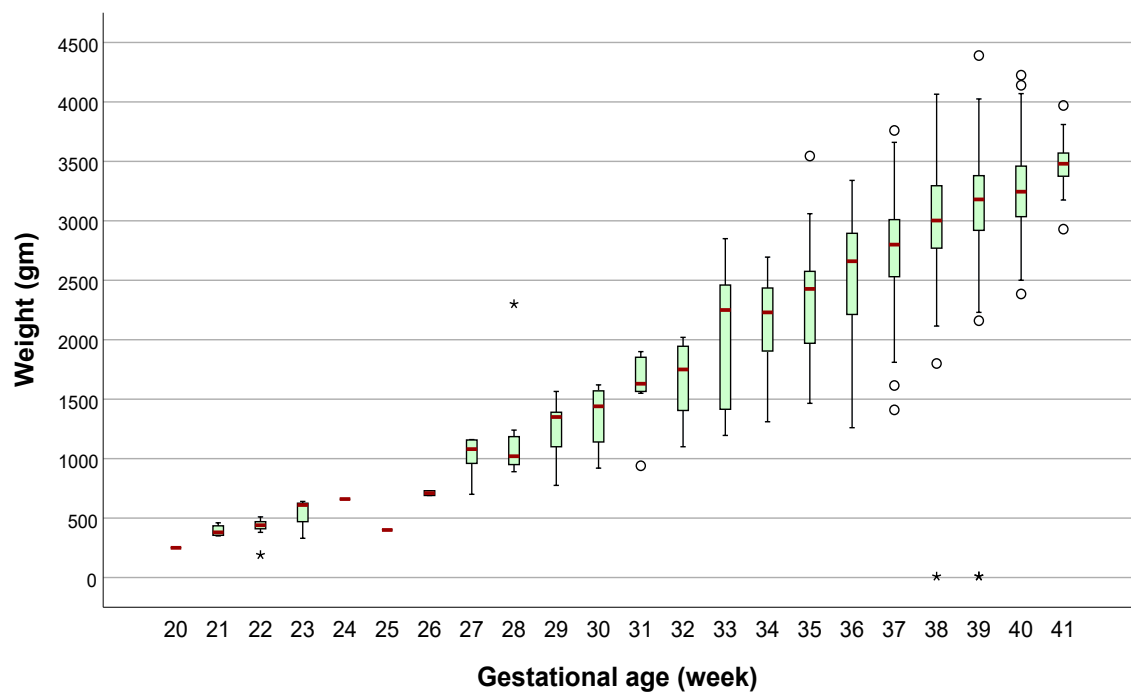


TABLE 31 Means and standard deviation of birth weight
at various gestational age (singleton)

Gestational Age (weeks)	Number of Neonates	Means (grams)	Standard Deviation
20	1	250.0	
21	8	393.8	44.4
22	7	414.3	106.7
23	3	526.7	171.0
24	1	660.0	
25	1	400.0	
26	2	710.0	28.3
27	6	1022.8	174.1
28	7	1211.4	496.0
29	8	1252.5	263.8
30	4	1355.0	309.1
31	7	1615.0	331.0
32	7	1652.9	368.0
33	9	2079.4	602.3
34	24	2164.8	354.9
35	22	2361.4	495.0
36	35	2566.7	480.6
37	117	2782.1	402.3
38	254	3014.4	439.2
39	285	3140.1	436.7
40	134	3262.8	347.2
41	13	3478.8	274.7
Total	982	2812.3	801.9

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
23	2	270.0	381.8
24	2	680.0	28.3
27	2	1145.0	21.2
28	2	1190.0	268.7
29	2	1047.5	166.2
30	2	1245.0	7.1
31	2	1620.0	49.5
32	8	1536.3	271.0
33	4	1745.0	438.8
34	10	1847.1	358.3
35	4	2088.8	192.9
36	6	2220.0	321.2
37	16	2517.8	358.1
Total	62	1840.3	650.1

TABLE 33 Comparison of birth weight (singleton & twins)

Type	Means Birth Weight	Standard Deviation	Range
Singleton	2812.3	801.9	120-4,390
Twins	1840.3	650.1	270-3260

TABLE 34 Comparison of gestational age (singleton & twins)

Type	Means Gestational Age	Standard Deviation	Range
Singleton	36.86	4.87	13-41
Twins	33.23	3.80	23-37

TABLE 35 Early postpartum morbidity

Cause	Number	Percent
Uterine Atony	15	1.48
Manuanl removal of the placenta	6	0.59
Placenta Adherens	6	0.59
Lacerations	5	0.49
Wound / Uterine infection	5	0.49
Total	27	2.66

Section III

HIGH RISK PREGNANCIES

TABLE 36 Common complications during pregnancy

Complications	Numbers	Prevalence (%)
Diabetes mellitus	257	25.30
Iron deficiency	110	10.83
Previous cesarean section	107	10.53
Small for gestational age	96	9.45
Preeclampsia	85	8.37
Breech presentation	45	4.43
Chronic HT	40	3.94
Prolonged PROM	32	3.15
HBsAg positive	25	2.46
Hypothyroidism	22	2.17
Myoma uteri	20	1.97
Thyrotoxicosis	16	1.57
Oligohydramnios	14	1.38
Placenta previa	14	1.38
Asthma	11	1.08
Systemic lupus erythematosus	11	1.08
Thalassemia	11	1.08
VDRL +ve	10	0.98
Heart disease	8	0.79
UTI	6	0.59
HIV +ve	4	0.40
Chorioamnionitis	3	0.30
Condyloma accuminata	3	0.30
Epilepsy	3	0.30

Pregnancy with Syphilis

Total 10 cases (0.98 percent of total parturients)
Singleton: 10; Twin: 0

Age range 20-41 years
average 26.5 ± 7.7 years
age of 35 years or more 2 case (20.0 %)

Gestational Age at Birth
range 29-39 weeks (including therapeutic abortion)
average 37.6 ± 3.1 weeks
premature delivery (before completed 37 weeks)
1 cases (10.0 %)

Birth Weight
range 1565-3640 grams
average 2906 ± 671 grams
number of low birth weight fetus (less than 2,500 grams)
3 cases (30.0 %)

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

Apgar Scores at 5 minutes (less than 7) 1 case (10.0%)

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

Perinatal death 1 (10.0%)

Congenital Anomalies 1 case (diaphragmatic hernia)

Other complications (No maternal death)

Diabetes mellitus 2 cases

<i>Thyrotoxicosis</i>	<i>1</i>
<i>Gestational hypertension</i>	<i>1</i>
<i>Condyloma</i>	<i>1</i>
<i>Marked Obesity</i>	<i>1</i>
<i>Prolonged PROM</i>	<i>1</i>

Pregnancy with Diabetes Mellitus

Total 257 cases (25.3 percent of total parturients)

Singleton: 245 (95.7%), Twins : 6 (3.9%), Triplet 1 (0.4%)

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

Age range 21-44 years

average 32.9 ± 4.8 years

age of 35 years or more 88 cases (34.2%)

Gestational Age at Birth

range 13-41 weeks

average 37.5 ± 2.9 weeks

premature delivery (before completed 37 weeks)

46 cases (17.9 %)

Birth Weight

range 20-4225 grams

average 2882 ± 648 grams

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

56 cases (21.8 %)

Apgar Scores at 1 minute (less than 7) 24 cases (9.3 %)

Apgar Scores at 5 minutes (less than 7) 9 cases (3.5 %)

Small-for-gestational-age (less than 10th percentile) 27 cases (10.5%)

Perinatal Death 4 cases (1.6 %)

Congenital Anomalies 16 cases (6.2 %) (*CPAM (2), Cleft lips, Hb Bart's dis, pyelectasis, Trisomy 21, Thalassemia/HbE disease, VSD, others*)

Other complications

<i>Marked Obesity</i>	28	10.89%
<i>Previous cesarean section</i>	27	10.51%
<i>Iron deficiency</i>	27	10.51%
<i>Pre-eclampsia</i>	21	8.17 %
<i>Chronic HT</i>	18	7.00 %
<i>Large baby</i>	7	2.72 %
<i>Prolonged PROM</i>	6	2.33 %
<i>HBsAg positive</i>	5	1.95 %
<i>Gestational hypertension</i>	5	1.95 %
<i>Thyrotoxicosis</i>	5	1.95 %
<i>Myoma uteri</i>	5	1.95 %
<i>Placenta previa</i>	5	1.95 %
<i>Asthma</i>	4	1.56 %
<i>Breech presentation</i>	4	1.56 %
<i>Thalassemia</i>	4	1.56 %
<i>Breech presentation</i>	4	1.56 %
<i>Hypothyroidism</i>	3	1.17 %
<i>Heart disease</i>	2	0.78 %
<i>VDRL +ve</i>	2	0.78 %
<i>Oligohydramnios</i>	2	0.78 %
<i>CA cervix</i>	1	0.39 %
<i>Epilepsy</i>	1	0.39 %
<i>HIV positive</i>	1	0.39 %
<i>Covid</i>	1	0.39 %
<i>UTI</i>	1	0.39 %
<i>Incompetent cervix</i>	1	0.39 %
<i>Nephrotic synd.</i>	1	0.39 %

Classifications

Pregestational DM (diagnosed before pregnancy) 25 cases (9.73 %)

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

Gestational DM (diagnosed during pregnancy)	232 cases (90.27 %)
<i>GDM (A1)</i>	<i>204 cases</i>
<i>GDM (A2)</i>	<i>28 cases</i>

Method of Glucose Control

Insulin	42 cases
Diet Control only	215 cases

Pregnancy with Iron Deficiency

Total 110 cases (10.83 percent of total parturients)
(Singleton : 107; Twins : 3)

Age range 16-44 years
average 30.7 ± 5.4 years
age of 35 years or more 23 cases (20.9 %)

Gestational Age at Birth
range 21-41 weeks
average 37.7 ± 2.9 weeks
premature delivery (before completed 37 weeks)
14 cases (12.7 %)

Birth Weight
range 90-3930 grams
average 2872 ± 672 grams
number of low birth weight fetus (less than 2,500 grams)
17 cases (15.5 %)

Apgar Scores at 1 minute (less than 7) 10 cases (9.1 %)

Apgar Scores at 5 minutes (less than 7) 5 cases (4.5 %)

Small-for-gestational-age (less than 10th percentile) 8 cases (7.3 %)

Perinatal death 1 case (0.9 %)

Congenital Anomalies 7 cases (renal agenesis: 1; VSD: 2; others: 4)

Other complications

<i>Diabetes mellitus</i>	24	<i>cases</i>
<i>Previous cesarean section</i>	7	<i>cases</i>
<i>Marked Obesity</i>	6	<i>cases</i>
<i>Breech presentation</i>	4	<i>cases</i>
<i>HBsAg positive</i>	4	<i>cases</i>
<i>pre-eclampsia</i>	4	<i>cases</i>
<i>Thalassemia</i>	4	<i>cases</i>
<i>Placenta previa</i>	3	<i>cases</i>
<i>Prolonged PROM</i>	3	<i>cases</i>
<i>Chronic HT</i>	2	<i>cases</i>
<i>Condyloma</i>	2	<i>cases</i>
<i>Gestational hypertension</i>	2	<i>cases</i>
<i>Myoma uteri</i>	2	<i>cases</i>
<i>Thyrotoxicosis</i>	2	<i>cases</i>
<i>Abruptio placentae</i>	1	<i>case</i>
<i>Chorioamnionitis</i>	1	<i>case</i>
<i>Excessive Wt.gain</i>	1	<i>case</i>
<i>LSIL</i>	1	<i>case</i>
<i>Rheumatoid arthritis</i>	1	<i>case</i>
<i>Systemic lupus erythematosus</i>	1	<i>case</i>
<i>UTI</i>	1	<i>case</i>

Pregnancy with Thyrotoxicosis

Total 16 cases (1.57 percent of total parturients)

All were singleton

Diagnosed before pregnancy 10 cases

Diagnosed during pregnancy 6 cases

Age range 19-41 years
 average 33.3 ± 4.9 years
 age of 35 years or more 5 cases (31.3 %)

Gestational Age at Birth

range 22-41 weeks
 average 37.3 ± 4.3 weeks
 premature delivery (before completed 37 weeks)
 2 cases (12.5 %)

Birth Weight

range 510-3440 grams
 average 2828 ± 695 grams
 number of low birth weight fetus (less than 2,500 grams)
 2 cases (12.5 %)

Apgar Scores at 1 minute (less than 7) 2 cases (12.5 %)

Apgar Scores at 5 minutes (less than 7) 1 case (6.3 %)

Small-for-gestational-age (less than 10th percentile) 1 case (6.3 %)

Perinatal death 1 case (6.3 %)

Congenital Anomalies 1 case

Other complications

<i>Diabetes mellitus</i>	4	<i>cases</i>
<i>Previous cesarean section</i>	3	<i>cases</i>
<i>Iron deficiency</i>	3	<i>cases</i>
<i>Pre-eclampsia</i>	2	<i>cases</i>
<i>Myoma uteri</i>	1	<i>case</i>
<i>Premature contraction</i>	1	<i>case</i>
<i>Gestational hypertension</i>	1	<i>case</i>
<i>UTI</i>	1	<i>case</i>
<i>VDRL +ve</i>	1	<i>case</i>

Pregnancy with Hepatitis B Antigen Positive

Total 25 cases (2.46 percent of total parturients)
Singleton: 24; Twins: 1

Age range 25-42 years
average 34.0 ± 5.2 years
age of 35 years or more 12 cases (48.0 %)

Gestational Age at Birth
range 13-39 weeks
average 35.4 ± 6.8 weeks
premature delivery (before completed 37 weeks)
6 cases (24.0 %)

Birth Weight
range 350-3605 grams
average 2694 ± 892 grams
number of low birth weight fetus (less than 2,500 grams)
7 cases (28.0 %)

Apgar Scores at 1 minute (less than 7) 4 cases (16.0 %)

Apgar Scores at 5 minutes (less than 7) 2 cases (8.0 %)

Small-for-gestational-age (less than 10th percentile) 5 cases (20.0 %)

Perinatal Death 2 cases (8.0 %)

Congenital Anomalies 1 case (8.0 %) (cystic hygroma)

Other complications

<i>Diabetes mellitus</i>	5	<i>cases</i>
<i>Iron deficiency</i>	4	<i>cases</i>
<i>Previous cesarean section</i>	3	<i>cases</i>
<i>Marked Obesity</i>	2	<i>cases</i>
<i>Chronic hypertension</i>	1	<i>case</i>
<i>Covid</i>	1	<i>case</i>
<i>Epilepsy</i>	1	<i>case</i>
<i>Incompetent cervix</i>	1	<i>case</i>
<i>Placenta previa</i>	1	<i>case</i>

Pregnancy with Hypothyroidism

(All were singleton)

Activity of Disease

Well-controlled	17	cases
Poorly-controlled	5	cases

Age range 25-42 years

average 31.6 ± 4.8 years

age of 35 years or more 6 cases (27.3 %)

Gestational Age at Birth

range 33-40 weeks

average 37.6 ± 2.1 weeks

premature delivery (before completed 37 weeks)

6 cases (27.3 %)

Birth Weight (not included abortion)

range 1415-3640 grams

average 2887 ± 642 grams

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

4 cases (18.2 %)

Apgar Scores at 1 minute (less than 7)	3 cases (13.6 %)
Apgar Scores at 5 minutes (less than 7)	0 case (0.0 %)
Small-for-gestational-age (less than 10th percentile)	4 cases (18.2 %)
Perinatal death	2 cases (9.1%)
Congenital Anomalies	2 cases (9.1 %) (diaphragmatic hernia, coarctation of the aorta)

Other complications

<i>Pre-eclampsia</i>	6	<i>cases</i>
<i>Previous cesarean section</i>	4	<i>cases</i>
<i>Chronic hypertension</i>	3	<i>cases</i>
<i>Diabetes mellitus</i>	3	<i>cases</i>
<i>Marked Obesity</i>	3	<i>cases</i>
<i>Prolonged PROM</i>	2	<i>cases</i>
<i>Systemic lupus erythmatosus</i>	2	<i>cases</i>
<i>Thalassemia</i>	2	<i>cases</i>
<i>Heart disease</i>	1	<i>case</i>
<i>Polyhydramnios</i>	1	<i>case</i>

Pregnancy with Chronic Hypertension

Total 40 cases (3.94 percent of total parturients)
(Singleton : 40; twins : -)

Severity of Hypertension

Severe (start treatment during pregnancy)	5	cases
Severe (controlled prior to pregnancy)	11	cases
Mild (no medication BP less than 160/90)	3	cases
Mild (BP less than 160/90 but treated with antihypertensive drug)	21	cases

Age range 22-43 years
 average 32.7 ± 5.3 years
 age of 35 years or more 16 cases (40.0 %)

Gestational Age at Birth

range 13-39 weeks
 average 35.7 ± 5.7 weeks
 premature delivery (before completed 37 weeks)
 9 cases (22.5 %)

Birth Weight

range 360-3870 grams
 average 2799 ± 930 grams
 number of low birth weight fetus (less than 2,500 grams)
 9 cases (22.5 %)

Apgar Scores at 1 minute (less than 7) 6 cases (15.0 %)

Apgar Scores at 5 minutes (less than 7) 2 cases (5.0 %)

Small-for-gestational-age (less than 10th percentile) 4 cases (10.0 %)

Perinatal death 1 case (2.5 %)

Congenital Anomalies 3 cases (7.5%) (cardiac defect: 2; diaphragmatic hernia)

Other complications

<i>Diabetes mellitus</i>	18	<i>cases</i>
<i>Marked Obesity</i>	15	<i>cases</i>
<i>Preeclampsia</i>	8	<i>cases</i>
<i>Previous cesarean section</i>	5	<i>cases</i>
<i>Hypothyroidism</i>	3	<i>cases</i>
<i>Myoma uteri</i>	3	<i>cases</i>
<i>Iron deficiency</i>	2	<i>cases</i>
<i>Systemic lupus erythematosus</i>	2	<i>cases</i>
<i>HBsAg positive</i>	1	<i>case</i>
<i>Oligohydramnios</i>	1	<i>case</i>
<i>UTI</i>	1	<i>case</i>

Pregnancy-induced Hypertension

Total 85 (8.37 percent of total parturients)

Singleton: 82; Twins: 3

Age range 16-44 years

average 31.6 ± 6.4 years

age of 35 years or more 29 cases (34.1 %)

Gestational Age at Birth

range 24-40 weeks

average 36.4 ± 3.5 weeks

premature delivery (before completed 37 weeks)

31 cases (36.5 %)

Classification of PIH

Gestational hypertension 26 cases (30.6 %)

Preeclampsia without severe feture 17 cases (20.0 %)

Preeclampsia with severe feture 42 cases (49.1 %)

Pregnancy-aggravated hypertension 5 cases (5.9 %)

Eclampsia 1 case (1.2 %)

Birth Weight range 300-3995 grams

average 2538 ± 803 grams

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

34 cases (40.0 %)

Apgar Scores at 1 minute (less than 7) 22 cases (25.9 %)

Apgar Scores at 5 minutes (less than 7) 7 cases (8.2 %)

Small-for-gestational-age (less than 10th percentile) 18 cases (21.2 %)

Perinatal death 1 case (1.2 %)

Congenital Anomalies 5 cases (cardiac defect: 3; others: 2)

Other complications

<i>Diabetes mellitus</i>	26	<i>cases</i>
<i>Chronic hypertension</i>	7	<i>cases</i>
<i>Hypothyroidism</i>	6	<i>cases</i>
<i>Marked Obesity</i>	6	<i>cases</i>
<i>Iron deficiency</i>	5	<i>cases</i>
<i>Marked Obesity</i>	3	<i>cases</i>
<i>Myoma uteri</i>	3	<i>cases</i>
<i>Prolonged PROM</i>	3	<i>cases</i>
<i>Thyrotoxicosis</i>	3	<i>cases</i>
<i>Asthma</i>	2	<i>cases</i>
<i>Previous cesarean section</i>	2	<i>cases</i>
<i>Systemic lupus erythematosus</i>	2	<i>cases</i>
<i>HBsAg positive</i>	1	<i>case</i>
<i>Heart disease</i>	1	<i>case</i>
<i>Thalassemia</i>	1	<i>case</i>
<i>VDRL +ve</i>	1	<i>case</i>

Pregnancy with Heart Disease

Total 8 cases (0.79 percent of total parturients)

Singleton: 8; Twins: 0

Age range 28-44 years

average 32.8 ± 5.2 years

age of 35 years or more 2 cases (25.0 %)

Gestational Age at Birth

range 21-40 weeks

average 36.0 ± 6.4 weeks

premature delivery (before completed 37 weeks)
3 cases (37.5 %)

Birth Weight

range 390-3705 grams
average 2590 ± 994 grams
number of low birth weight fetus (less than 2,500 grams)
2 cases (25.0 %)

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

Apgar Scores at 5 minutes (less than 7) 1 case (12.5 %)

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

Perinatal death 1 case (12.5 %)

Congenital Anomalies 1 case (trisomy 21)

Other complications

<i>Diabetes mellitus</i>	2	<i>cases</i>
<i>Hypothyroidism</i>	1	<i>case</i>
<i>Preeclampsia</i>	1	<i>case</i>
<i>Previous cesarean section</i>	1	<i>case</i>

Placenta Previa

Total 14 cases (1.38 percent of total parturients)

Singleton : 14; Twins : 0

Age range 24-44 years

average 34.4 ± 6.1 years

age of 35 years or more 8 cases (57.1 %)

Gestational Age at Birth

range 22-38 weeks
 average 34.4 ± 4.3 weeks
 premature delivery (before completed 37 weeks)
 7 cases (50.0 %)

Birth Weight

range 440-3350 grams
 average 2442 ± 824 grams
 number of low birth weight fetus (less than 2,500 grams)
 7 cases (50.0 %)

Apgar Scores at 1 minute (less than 7) 2 cases (14.3 %)

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

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

Perinatal death 1 case (7.1 %)

Congenital Anomalies 0 case

Other complications

<i>Diabetes mellitus</i>	5	<i>cases</i>
<i>Placenta previa</i>	5	<i>cases</i>
<i>Previous cesarean section</i>	4	<i>cases</i>
<i>Iron deficiency</i>	3	<i>cases</i>
<i>HBsAg positive</i>	1	<i>case</i>

Pregnancy with Thalassemia

Total 11 cases (1.08 percent of total parturients)
 (Singleton: 11; Twins: 0)

Type

Hb H disease	5 cases
Hb H CS	1 cases
Beta-thalassemia/Hb E	3 cases
Beta-thalassemia major	2 cases

Age range 19-41 years

average 32.2±6.5 years

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

Gestational Age at Birth

range 14-40 weeks

average 36.1±7.6 weeks

premature delivery (before completed 37 weeks)

2 cases (18.2 %)

Birth Weight

range 40-3325 grams

average 2496±909 grams

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

2 cases (18.2 %)

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)** 1 case (9.1 %)**Perinatal death** 1 case (9.1 %)**Congenital Anomalies** 1 case (Hb Bart's disease)**Other complications**

<i>Diabetes mellitus</i>	4
<i>Iron deficiency</i>	3
<i>Chronic renal failure</i>	1
<i>Condyloma</i>	1
<i>Hypothyroidism</i>	1

<i>Hypothyroidism</i>	<i>1</i>
<i>LSIL</i>	<i>1</i>
<i>Preeclampsia</i>	<i>1</i>

Systemic Lupus Erythromatosus

Total 11 cases (1.08 percent of total parturients)
(Singleton: 10; Twins: 1)

Activity

Remission	7 cases
Active	4 cases
<i>CNS vasculitis</i>	<i>2 cases</i>
<i>Renal insufficiency</i>	<i>2 cases</i>

Age range 16-41 years
average 31.8 ± 7.4 years
age of more than 35 years 5 cases (45.5 %)

Gestational Age at Birth

range 24-40 weeks
average 36.3 ± 4.5 weeks
premature delivery (before completed 37 weeks)
3 cases (27.3 %)

Birth Weight

range 660-3465 grams
average 2501 ± 858 grams
number of low birth weight fetus (less than 2,500 grams)
4 cases (36.4 %)

Apgar Scores at 1 minute (less than 7)	1 case (9.1 %)
Apgar Scores at 5 minutes (less than 7)	1 case (9.1 %)
Small-for-gestational-age (less than 10th percentile)	2 cases (18.2 %)
Perinatal death	1 case (9.1 %)
Congenital Anomalies	0 case
Other complications	
<i>Previous cesarean section</i>	3
<i>Chronic hypertension</i>	2
<i>Hypothyroidism</i>	2
<i>Preeclampsia</i>	2
<i>Iron deficiency</i>	1
<i>Prolonged PROM</i>	1

Small-for-Gestational-Age Fetuses

Birthweight less than 10th percentile

Total 96 (9.45 percent)
 Singleton: 88 cases, Twins: 8.3 cases

Age range 20-44 years
 average 31.7 ± 5.6 years
 age of 35 years or more 31 cases (32.3 %)

Gestational Age at Birth

range 22-40 weeks
 average 36.0 ± 3.8 weeks
 premature delivery (before completed 37 weeks)
 39 cases (40.6 %)

Birth Weight

range 90-2680 grams
 average 1877 ± 681 grams
 number of low birth weight fetus (less than 2,500 grams)
 84 cases (87.5 %)

Apgar Scores at 1 minute (less than 7) 20 cases (20.8 %)

Apgar Scores at 5 minutes (less than 7) 8 cases (8.3 %)

Perinatal Death 4 cases (4.2 %)

Congenital Anomalies 13 cases

<i>Hydrops fetalis</i>	2
<i>Tetralogy of Fallot</i>	2
<i>Heterotaxy</i>	1
<i>Transposition of great artery</i>	1
<i>Gastroschisis</i>	1
<i>Others</i>	6

Other complications

<i>Pregnancy-induced hypertension</i>	18 cases
<i>Fetal anomalies</i>	13 cases
<i>Medical diseases</i>	12 cases
<i>Poor maternal weight gain</i>	11 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 (2015-2025)

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
No. of Deliveries	1572	1431	1545	1518	1522	1300	1166	1052	985	967	1016
No. of women with positive HIV	43	16	20	18	9	17	12	18	9	9	8
Prevalence (%)	2.74	1.12	1.29	1.19	0.59	1.31	1.03	1.71	0.91	0.93	0.79
Deliveries	33	24*	14	12	13	13	8	12	9	9	3
Therapeutic abortion	2	1	1	-	-	1	-	-	-	-	1
Spontaneous abortion	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 (1989-2025) (no screening program during 1989 -1996)

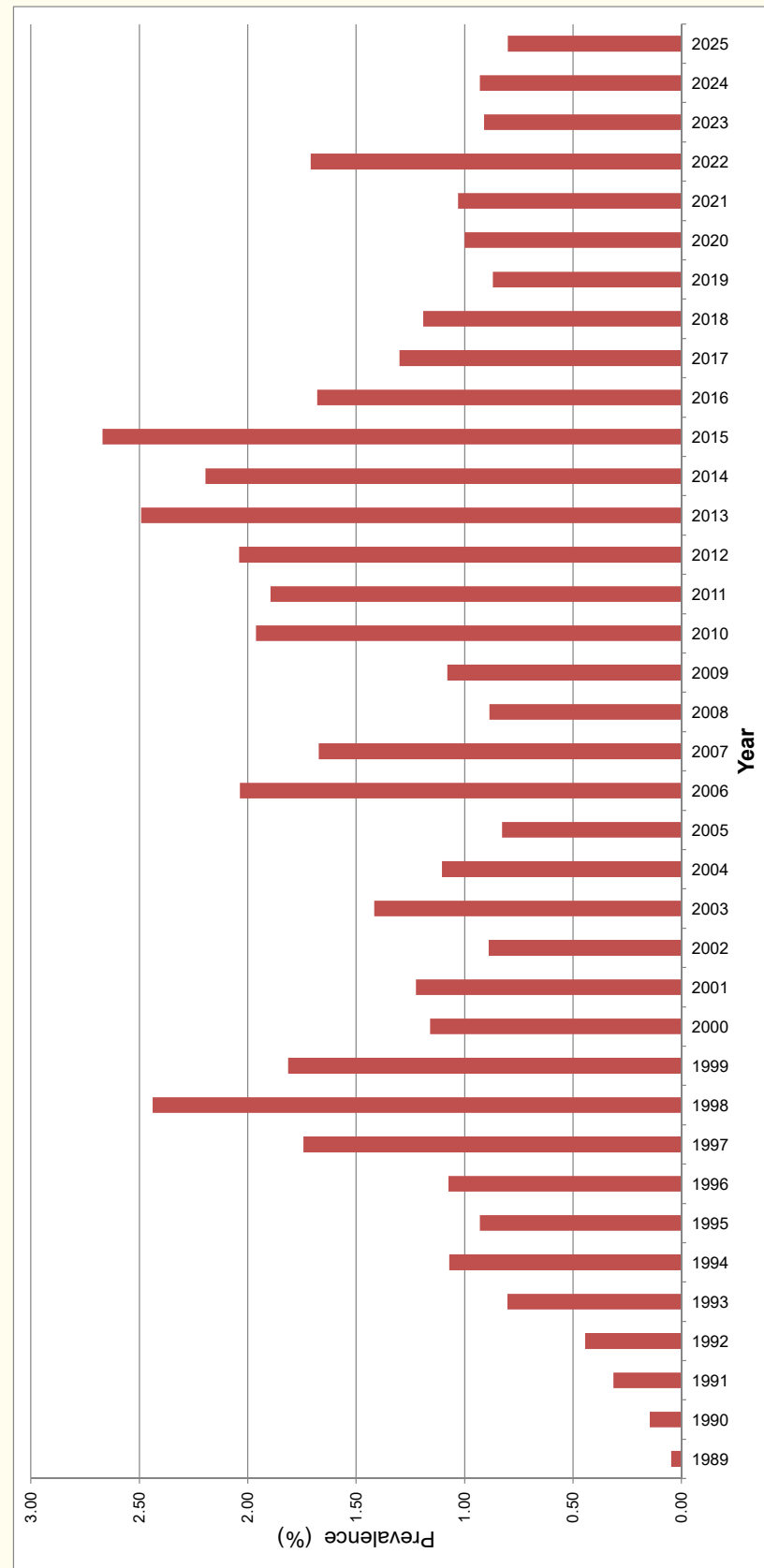


TABLE 38 Voluntary screening (2025) among pregnant women for anti-HIV antibody

Pregnant women (Counselling)	998	cases
Voluntary screening	998	cases
+ve anti-HIV antibody	8	case
% positive case	0.8	%

TABLE 39 Age of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

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

Mean age (years) 31.33

Standard deviation 2.08

Range 29-33 years

TABLE 40 Parity of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

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

TABLE 41 Age at first marriage of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

Age (years)	No. of cases	Percent
10-14	-	-
15-19	-	-
20-24	-	-
25-29	2	66.67
30-34	1	33.33
Total	3	100

<i>Mean age (years)</i>	28.67	
<i>Standard deviation</i>	2.53	
<i>Range</i>	26-31	years

TABLE 42 Number of marriages of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

Number	No. of cases	Percent
1	3	100
2	0	0
3	0	0
4	0	0
Total	3	100

TABLE 43 Occupations of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

Occupations	No. of cases	Percent
Employee	2	66.67
Housewife	-	-
Commercial	-	-
Business	-	-
Government officer	1	33.33
Total	3	100

TABLE 44 Residence (province) of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

Province	Number	Percent
Chiang Mai (เชียงใหม่)	3	100
Lamphun (ลำพูน)	-	-
Chiang Rai (เชียงราย)	-	-
Lampang (ลำปาง)	-	-
Maehongson (แม่ฮ่องสอน)	-	-
Total	3	100

TABLE 45 Complications of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

	Cases	Percent
Without complicaiton	1	33.33
With complication	2	66.67
● Antepartum	2	
● Intrapartum	2	
● Postpartum	0	
Total	3	100

TABLE 46 Birth weight in the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

Birth weight (grams)	Number	Percent
1,000 - 1,499	-	-
1,500 - 1,999	-	-
2,000 - 2,499	-	-
2,500 - 2,999	2	66.67
3,000 - 3,499	1	33.33
3,500 - 3,999	-	-
Total	3	100

Mean birthweight (grams) 2810
Standard deviation (grams) 238.17
Range (grams) 2670-3085

TABLE 47 Postpartum contraception of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2025)

Method	No. of cases	Percent
Female sterilization	1	33.33
Condom	1	33.33
Implant	1	33.33
Oral contraception	-	-
Total	3	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** 3,238 tests

(OPD4 = 1,790; LR= 1190; OB = 258)

Secondary Surveillance

Contraction stress test

or **Nipple stimulation test**

Biophysical profile/ultrasonography

Doppler velocimetry

Prenatal Diagnosis

1. **Ultrasonography** 6,432 examinations
(1,400 cases [21.77%] for gynecologic and infertile examinations)
2. **Amniocentesis** 562 cases
3. **Cordocentesis** 68 cases
4. **Chorionic villous sampling** 52 cases

OBSTETRIC ULTRASOUND SERVICE

Number of Patients undergoing sonographic examinations (OB&GYN) in 2025

6,432 cases

Several examinations involved in the researches without specific indications

Indications for sonographic examination		
■ Obstetric ultrasound	5,032	78.23%
■ Perinatal research (PhD research)	35	0.7 %
■ Down screening research	556	11.05%
■ Obstetric ultrasound (others)	4,441	88.25%
■ Gestational age estimation	(OB 4,047+ LR 394)	
■ Suspected fetal growth restriction		
■ Bleeding in first half of pregnancy		
■ Antepartum hemorrhage		
■ Suspected fetal death		
■ Rule out fetal anomalies		
■ Fetal growth surveillance		
■ Gynecologic ultrasound	1,400	21.77 %
■ General gynecology		
■ Gynecologic oncology		
■ Reproductive medicine		

Cordocentesis (2025)

Total 68 cases

Indications	No.	%
1. Previous child with Hb bart's	2	2.94
2. Pregnancy at risk for Hb Bart' hydrops fetalis	8	11.76
3. Pregnancy at risk for β thal major	3	4.41
4. Pregnancy at risk for β thal / HbE	9	13.24
5. Chromosome analysis	28	41.18
6. Combined risk for Hb bart's and β thal Hb/E	1	1.47
7. Combined risk for β thal major and β thal Hb/E	1	1.47
8. Combined chromosome and risk for Hb bart's	4	5.88
9. Combined chromosome and risk for β thal major	2	2.94
10. Combined chromosome and risk for β thal Hb/E	8	11.76
11. Combined chromosome analysis and Hb typing	1	1.47
12. Fetal thyriod	1	1.47
Total	68	100

Amniocentesis (2025)

Total 436 cases

Indications for amniocentesis	
1. Elderly Gravida (Age of More Than 35 Years)	197
■ With No Ther Obvious Risk	46
■ With High Risk for Down Syndrome Screening	136
■ With Hight Risk Trisomy 18 or Trisomy 13,NTD HR	4
■ Maternal Request	4
■ With Fetal Anomaly and Sonomarkers	4
■ With Other (NIPT XYY=1; NIPT XXX=1; NIPT XO=1)	3
2. Pregnancy with high risk for Down syndrome	162
screening	5
3. Pregnancy with high risk for Trisomy 18, 13, NTD HR	26
4. Pregnancy with fetal anomaly and sonomarkers	36
5. Maternal request	
6. Other	10
- NIPT XO =4	
- NIPT XYY=1	
- NIPT XXY=1	
- NIPT no call=1	
- chromosome 7 abnormal =1	
- Polyhydramnios=2	
Total	436

Amniocentesis (2025)

Amniocentesis for thalassemia (2025)

Total : 126 cases

Indications	No. cases
1.Pregnancy at risk for Hb Bart's	14
2.Pregnancy at risk for β thal major	19
3.Pregnancy at risk for β thal Hb/E	47
4.Combined risk for β thal major and β thal Hb/E	1
5. Combined chromosome and risk for Hb bart's	10
6. Combined chromosome and risk for β thal major	13
7. Combined chromosome and risk for β thal Hb/E	20
8. Combined chromosome and previous child with β thal Hb/E	2

Chorionic Villous Sampling (2025)

Total 52 procedures

Indications	Number
1. Fetal chromosome study	11
■ HR NIPT	5
■ Thickening nuchal translucency	4
■ Gene TK2	1
■ Fetal cystic hygroma	1
2. Risk for fetal severe thalassemia	1
■ Risk for homozygous beta thalassemia	3
3. Fetal chromosome study and thalassemia diagnosis	40
■ Elderly gravida with fetal risk for Hb Bart's disease	6
■ Risk for Hb Bart's disease and maternal request for chromosomes study	11
■ Elderly gravida with fetal risk for homozygous beta thalassemia	2
■ Risk for homozygous beta thalassemia and maternal request for chromosomes study	5
■ Elderly gravida with fetal risk for beta thalassemia/Hb E	9
■ Risk for beta thalassemia/Hb E and maternal request for chromosomes study	7

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

$+ve\ OFT = OFT < 60\%,\ MCV +ve = \leq 78\ fl\ +ve\ \%HbA2 = HbA2 > 4\%$

PROSPECTIVE SCREENING FOR THALASSEMIA PROGRAM 2025

	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 Serum biomarker (Jan-Sep 2025)

Total 5,536 cases (NHSO)

Trimester	Risk			Total
	Low	Intermediate	High	
Second	5,160 (93.21%)	-	376 (6.79 %)	5,536

Total 62 cases (Service cases)

Trimester	Risk		Total
	Low	High	
First	27 (100%)	0 (0%)	27
Second	29 (82.86%)	6 (17.14%)	35
Summary	56	6	62

Down Syndrome Screening
NIPT (July-December 2025)

Total 591 cases (NHSO)

Trimester	Risk		Total
	Low	High	
First	292 (100%)	0 (0%)	292
Second	299 (100%)	0 (0%)	299
Summary	591	0	591

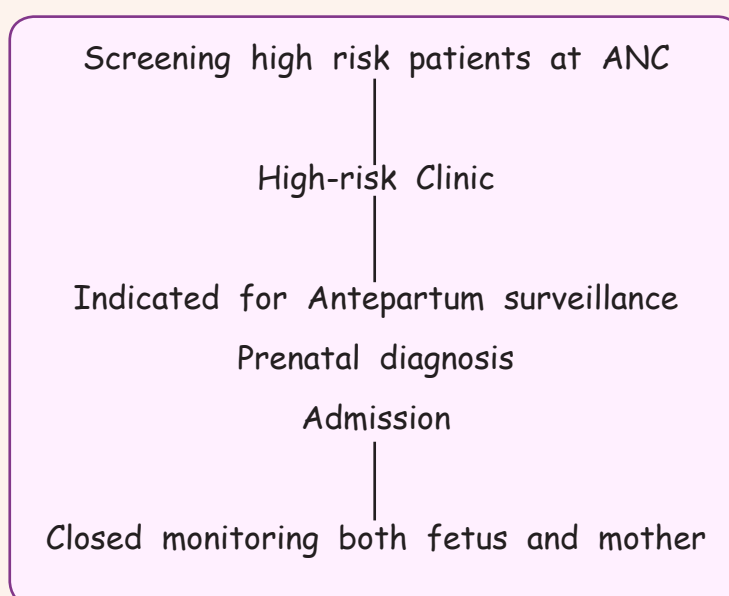
Total 35 cases (Service cases)

Trimester	Risk		Total
	Low	High	
First	17 (100%)	0 (0%)	17
Second	18 (100%)	0 (0%)	18
Summary	35	0	35

High Risk Pregnancy

Number of patients approximately 300 cases

Management Guideline



High-risk patients at Maharaj Nakorn Chiang Mai Hospital in 2025

- | | |
|---|--------------|
| 1. Elderly Gravida (age of 35 years or more) | 27.6 % |
| 2. Teenage Pregnancy (age of less than 20 years) | 2.1 % |
| <i>Early adolescence (age of less than 17 years)</i> | <i>0.7 %</i> |
| <i>Late adolescence (age of 17-19 years)</i> | <i>1.4 %</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.