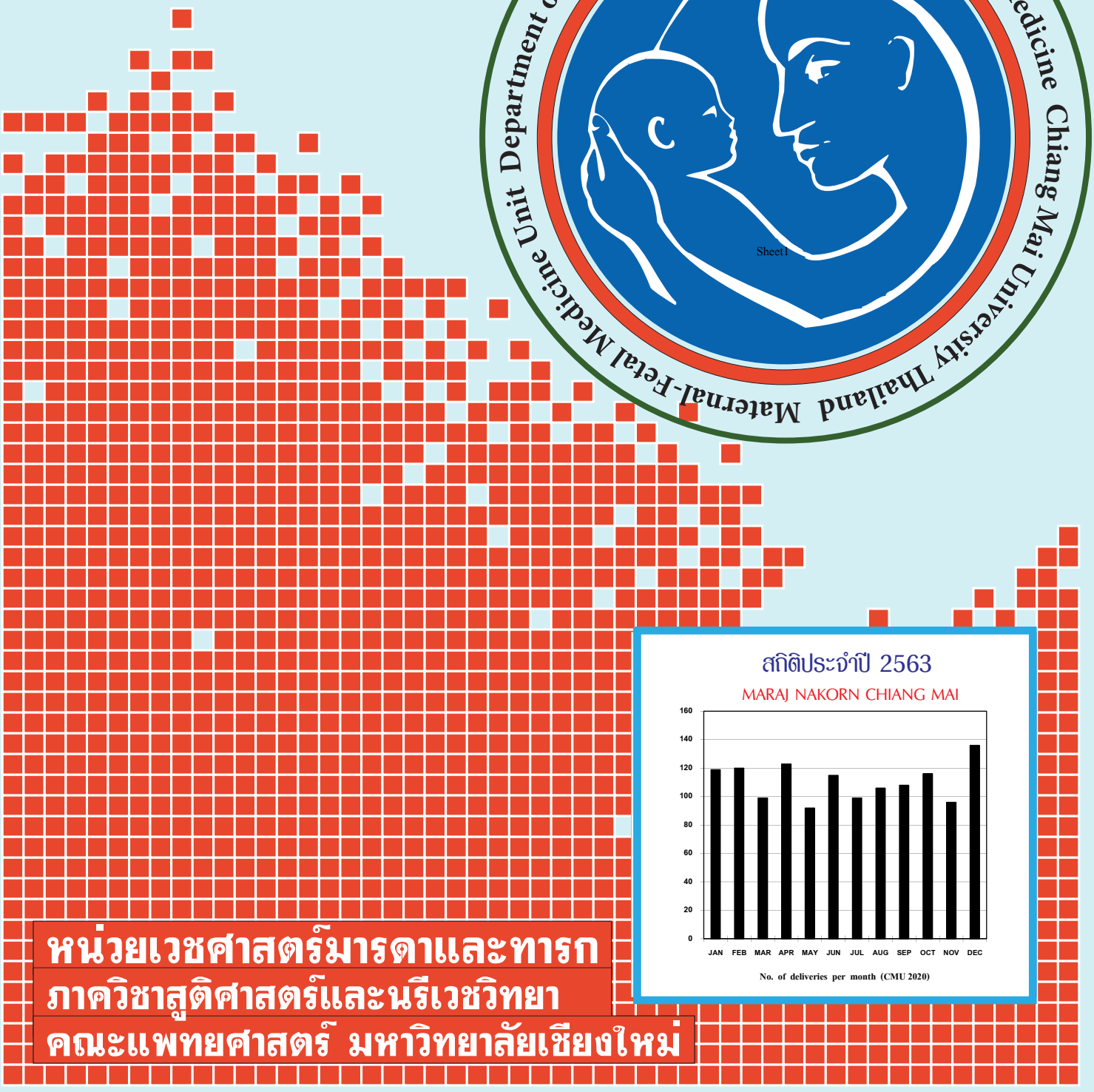
MATERNAL-FETAL MEDICINE 2020

Maternal-Fetal Medicine Unit Department of Obstetrics and Gynecology Faculty of Medicine Chiang Mai University Thailand



หน่วยเวชศาสตร์มารดาและทารก
ภาควิชาสูติศาสตร์และนรีเวชวิทยา
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

ANNUAL REPORT 2020

MATERNAL-FETAL MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY

CHIANG MAI, THAILAND

MATERNAL-FETAL MEDICINE 2020

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อนุสาขาเวชศาสตร์มารดาและทารก
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อนุสาขาเวชศาสตร์มารดาและทารก

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สุกัญญา จันตา

PREFACE

I am very pleased to present the Maternal-Fetal Medicine Annual Report 2020, which represents a significant milestone for the evolving journey of the Division of Maternal-Fetal Medicine (MFM). The division has been an integral part of our Department since its conception. The division offers a comprehensive service for Northern Thai women with high-risk pregnancies including prenatal care and diagnosis, fetal assessment and therapy, ambulatory care, peripartum management, and future pregnancy planning. The advances in the care of these women are made possible by significant individuals who believe in education and research with the availability of state-of-the-art obstetric ultrasound unit, cutting-edge molecular genetics and thalassemia laboratory, expert genetic counseling, nutrition counseling, social support groups, regional network, and international collaboration. The division has been playing a major role in the development of the national guidelines for thalassemia and Down syndrome screening through innovative research outcomes.

This annual report reflects the activities of the Division of Maternal-Fetal Medicine over the past year. The year 2020 was marked by the global coronavirus pandemic, which resulted in a historic shutdown of most of our services from March to May. We were lucky enough not to be hit too hard by the pandemic. However, the situation did have certain effects on the accessibility to maternal-fetal care and the number of pregnant women the division could serve. Of note, in 2020, the division faced emerging challenges such as the growing prevalence of elderly gravida and gestational diabetes and the rising incidence of cesarean delivery. These concerning trends need close monitoring, systematic causal exploration, and timely action. Despite a challenging year, the division continued to deliver excellent clinical care, strong teaching, and robust research activities with numerous high-impact publications and massive funding.

Finally, I would like to commend Associate Professor Chanane Wanapirak and all the members of his team for their commitment to academic excellence and vital contribution to the field of MFM. I would also like to express my sincere gratitude to Professor Theera Tongsong for his tremendous work on the compilation of this report.

Associate Professor Kittipat Charoenkwan, MD.
Acting Chairman, Department of Obstetrics and Gynecology
Faculty of Medicine, Chiang Mai University

PREFACE

The annual report of maternal fetal medicine unit, Department of Obstetrics and Gynecology, Faculty of Medicine, Chiang Mai University, has been established since 1990 for serving our 3 main missions: education, research and service. During the past 30 years, there are many changes of data that affect our mission especially educationalprograms for medical students, OB-GYN residency program and maternal-fetal medicine (MFM) fellowship training.

This 2020 annual report has some interesting data that affect educational programs as mentioned above. Firstly, the total number of delivery is new lowest since we started our service but close to 70% of cases considered high risk cases. This may show the obstetrics service in this area has been changed from our center to other hospitals which our graduated residents take responsibility. The cesarean section rate in our institution still shows gradually increasing from 15.8% in the year 2000 to 29.6% in the year 2020, again a new high record. This increasing rate may be reflected from the combination of parental expectation, legal issue and training program. The rate of elderly pregnancy and other complicated pregnancies are on the rise. Trend of the technique using for prenatal diagnosis also shift to different one. All of these information are the signal for the academic sector of faculty to plan for medical students curriculum, OB-GYN residency program and maternal-fetal medicine (MFM) fellowship training. MFM's ultimate purpose is better maternal and fetal outcome, this goal might not be achieved if our management do not consider the fact which some of them are present in this report.

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

Chanane Wanapirak, M.D.
Associate Professor,
Division of Maternal-fetal Medicine
Department of Obstetrics and Gynecology,
Faculty of Medicine, CMU. Chiang Mai, Thailand

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ANNUAL REPORT

2020

MATERNAL-FETAL MEDICINE

Published : April 2021

DIVISION OF MATERNAL-FETAL MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY

CHIANG MAI, THAILAND

DATA SOURCE

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

Section I

OBSTETRIC MORTALITY

STILLBIRTH

Stillbirth 2020: For gestational age ≥ 22 weeks
: 20 cases of total birth = 1,305 cases)

- ***Gestational age between 22-27 weeks 16 cases (80.00 %)***

	CMU	Referred	Total
Low risk	4	6	10
High risk	3	3	6
Autopsy	4	3	7

Causes of death

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

Stillbirth 2020: For gestational age ≥ 28 weeks
: 4 cases of total birth = 1,305 cases)

- ***Gestational age between ≥28 weeks 4 cases (20.00%)***

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

Causes of death

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

Stillbirth rate :

Stillbirth rate = 3.07 per 1000 total births
(by old WHO definition: ≥ 28 weeks or birth weight > 1000 grams)

Stillbirth rate = 15.33 per 1000 total births
(by new WHO definition : ≥ 22 weeks or birth weight > 500 grams)

Stillbirth rate = 9.96 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 2020 :

2 cases (GA > 22 weeks) of total 1,248 live births

- ***Gestational age between 22-27 weeks 2 cases (100.00 %) (Total livebirth 1248 cases)***

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

Causes of death

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

Neonatal death 2020 :

0 cases (GA > 28 weeks) of total 1,424 live births

- ***Gestational age between ≥ 28 weeks 3 cases (0.00 %)***
  (Total livebirth 1424 cases)

	CMU	Referred	Total
Low risk	0	0	0
High risk	0	0	0
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 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 0 per 1,000 live births
(≥ 28 week's gestation or 1000 grams and died within first 7 days of life)

Early neonatal death rate 1.6 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 referal cases)*

1. Gestational age ≥ 28 weeks (stillbirths + early neonatal death)
   perinatal death rate = 3.07 per 1000 total births
2. Gestational age ≥ 22 weeks (stillbirths + neonatal death)
   perinatal death rate = 16.86 per 1000 total births

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

MATERNAL DEATH

Total **2 cases** *(1,248 livebirths)*

Causes of maternal death: (Referred case 1, CMU case 1)

CMU case: *Preeclampsia with intracerebral hemorrhage*

Referred case: *Preeclampsia with pulmonary edema*

Summary

DATA	2020
Total birth	1,305
Stillbirth	20
22-27 weeks	16
≥ 28 weeks	4
Stillbirth rate/1000 births	
> 28 weeks / birthweight >1,000 gm	3.07
> 22 weeks / birthweight >500 gm	15.33
Early neonatal death	
● Early neonatal death rate / 1000 live birth (≥ 28 weeks)	0
● Early neonatal death rate / 1000 live birth (≥ 22 weeks)	1.6

Section II

GENERAL OBSTETRICS

TABLE 1 Distribution of Singleton & Multifetal Pregnancies

Type of pregnancy	Number	Percent
Singleton	1265	96.9
Twins	39	3.0
Triplet	1	0.1
Total	**1305**	**100.0**

TABLE 2 Categories of the Pregnant Women

	2019		2020	
	Number	Percent	Number	Percent
General Cases	1418	94.8	1255	96.2
Private Cases	77	5.2	50	3.8
Total	**1495**	**100.0**	**1305**	**100.0**

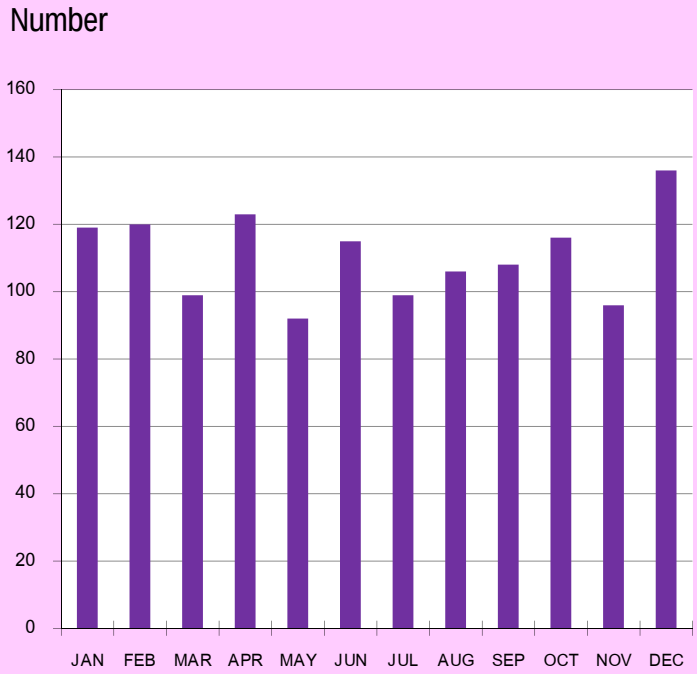
TABLE 3 Categories of the Pregnant Women

	Number	Percent
ANC at Maharaj Nakorn Chiang Mai Hospital	1070	82.0
Private Clinic	50	3.8
ANC at Other Hospitals	172	13.2
No ANC	13	1.0
Total	**1305**	**100.0**

TABLE 4 Number and Percentage of Deliveries per month

Month	Number (Mothers)	Percent
January	123	9.4
February	92	7.0
March	115	8.8
April	99	7.6
May	106	8.1
June	108	8.3
July	116	8.9
August	96	7.4
September	136	10.4
October	103	7.9
November	112	8.6
December	99	7.6
Total	**1305**	**100.0**

FIGURE 1 Histogram : Number of Deliveries from January to December 2020



No. of deliveries per month (CMU 2020)

Total deliveries in 2012 = 2059 cases

Total deliveries in 2013 = 1823 cases

Total deliveries in 2014 = 1686 cases

Total deliveries in 2015 = 1572 cases

Total deliveries in 2016 = 1431 cases

Total deliveries in 2017 = 1539 cases

Total deliveries in 2018 = 1518 cases

Total deliveries in 2019 = 1495 cases

Total deliveries in 2020 = 1305 cases

TABLE 5 Number and percentage of parturients by age

Age	Number	Percent	Age	Number	Percent
13	1	.1	30	94	7.2
15	1	.1	31	83	6.4
16	6	.5	32	63	4.8
17	2	.2	33	81	6.2
18	9	.7	34	74	5.7
19	14	1.1	35	64	4.9
20	22	1.7	36	62	4.8
21	21	1.6	37	47	3.6
22	34	2.6	38	28	2.2
23	50	3.8	39	27	2.1
24	57	4.4	40	26	2.0
25	59	4.5	41	24	1.8
26	65	5.0	42	13	1.0
27	79	6.1	43	7	0.5
28	93	7.1	44	3	0.2
29	91	7.0	45	1	0.1
			49	1	0.1
Total				**1302**	**100.0**

Average age (Mean±Standard deviation) 30.18±5.6 (13-49) years

TABLE 6 Number and percentage of parturients by age group

Age Group	Number	Percent
10-14	1	.1
15-19	32	2.5
20-24	184	14.1
25-29	387	29.7
30-34	395	30.3
35-39	228	17.5
40-44	73	5.6
≥ 45-50	2	.2
Total	**1302**	**100.0**

Summary : Age of parturients

1. Adolescent Pregnancies (11-19 years) 33 (2.5%)
   Early Adolescent Pregnancies (≤ 16 years) 8 (0.6 %)
   Late Adolescent Pregnancies (17-19 years) 25 (1.9 %)
2. Adult Pregnancies (20-34 years) 966 (74.0%)
3. Elderly Pregnancies (≥ 35 years) 303 (23.2%)

FIGURE 2 Histogram : Number of Parturients by Age

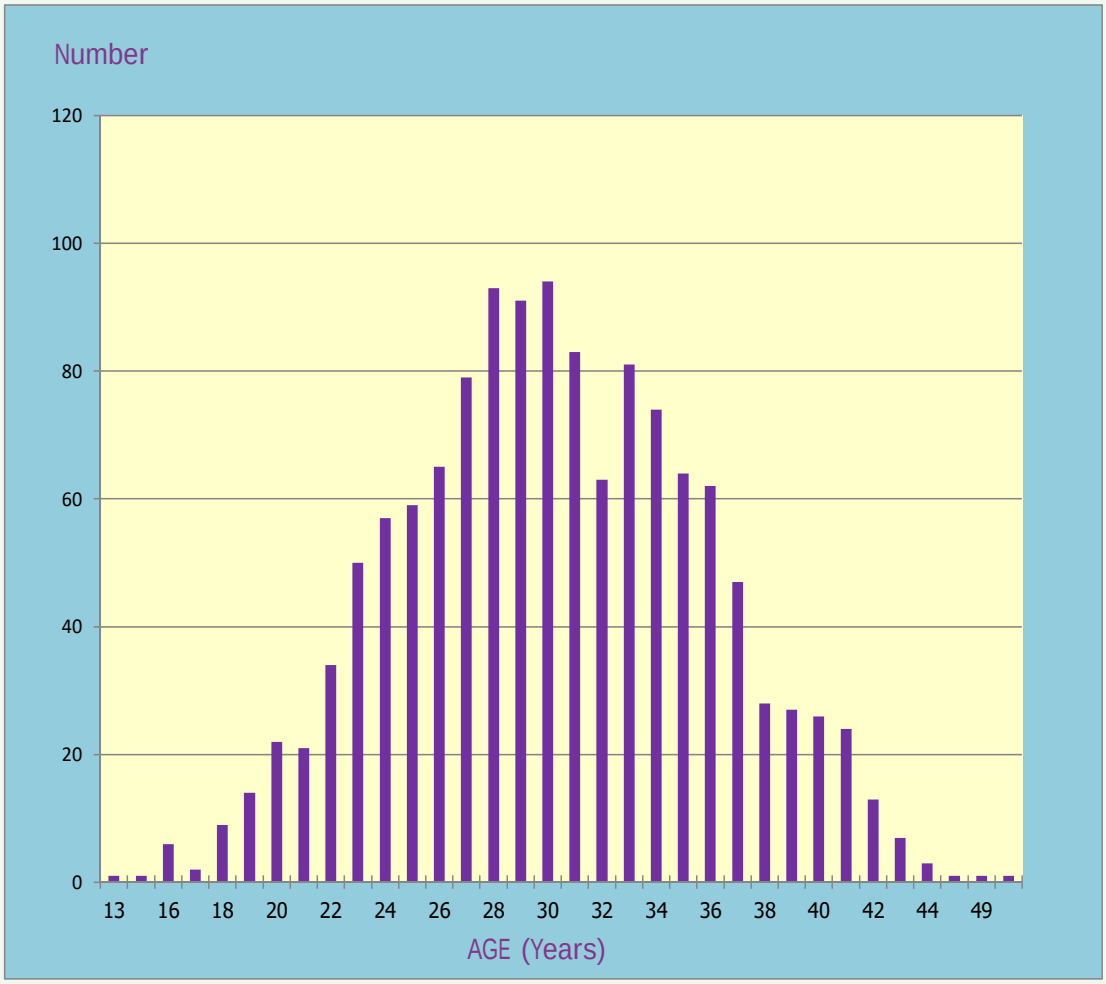


TABLE 7 Parity of parturients

Parity	Number	Percent
0	713	54.6
1	474	36.3
2	102	7.8
3	10	0.8
4	3	0.2
5	2	0.2
6	1	0.1
Total	**1305**	**100.0**

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

Nulliparous	54.6 %
Multiparous	45.4 %

FIGURE 3 Histogram : Number of parturients by parity

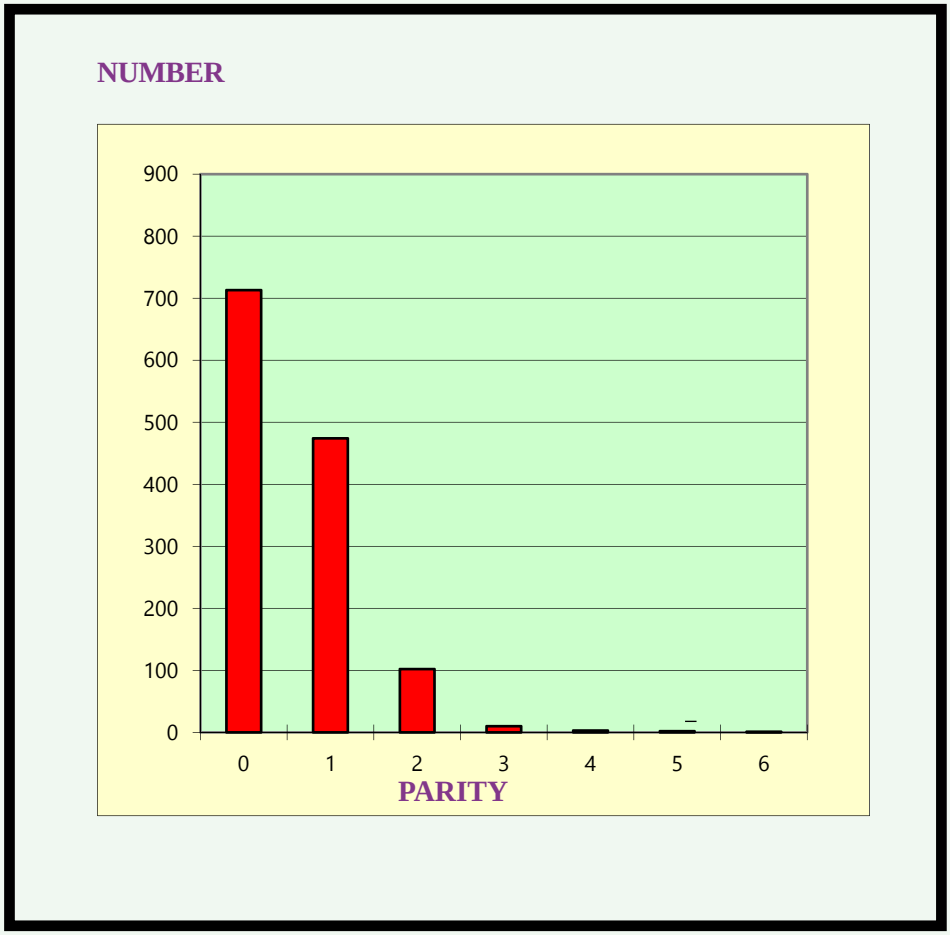
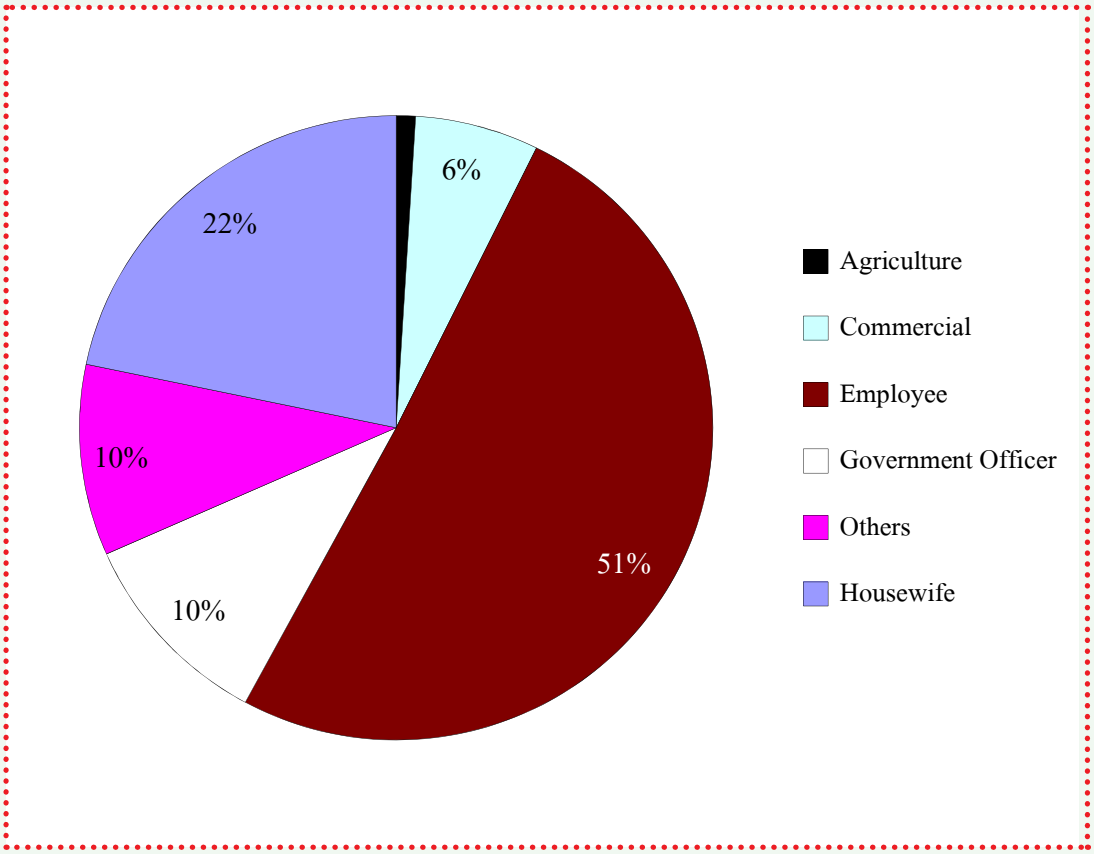


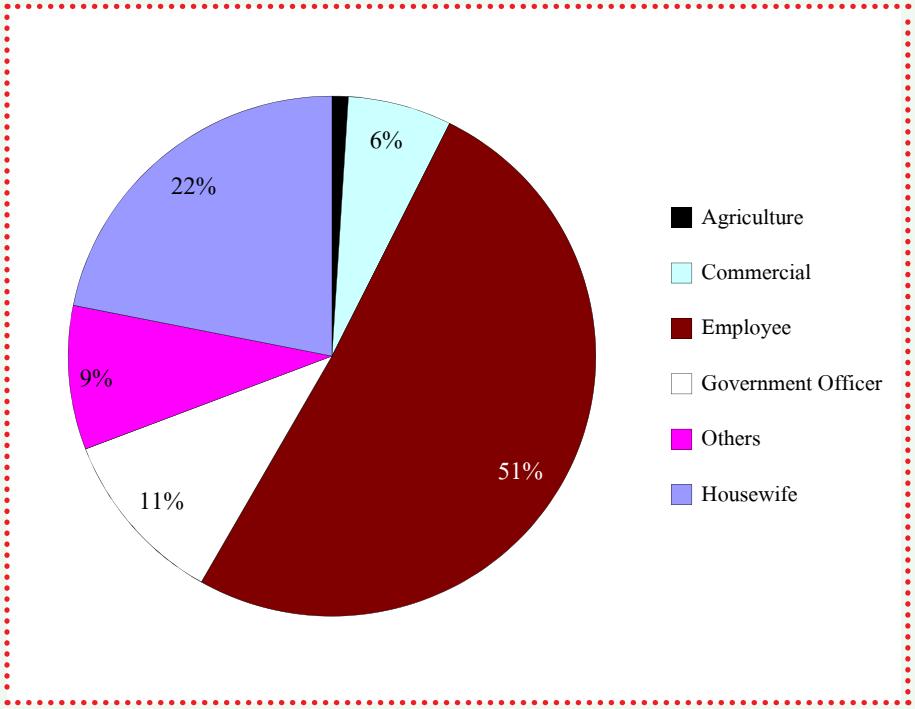
TABLE 8 Distribution of the occupations of the parturients

Occupations	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Agriculture	11	0.9	11	0.9	0	0.0
Commercial	82	6.4	80	6.4	2	4.1
Employee	649	50.3	635	51.1	14	28.6
Government Officer	117	9.1	113	9.1	4	8.2
Private Business	77	6.0	67	5.4	10	20.4
Housewife	284	22.0	277	22.3	7	14.3
State Enterprise	7	0.5	7	0.6	0	0.0
Staff Officer	20	1.5	18	1.4	2	4.1
Physician	5	.4	1	0.1	4	8.2
Phamacist	20	1.5	15	1.2	5	10.2
Others	19	1.5	18	1.4	1	2.0
Total	**1291**	**100.0**	**1242**	**100.0**	**49**	**100.0**

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



OCCUPATIONS OF THE GENERAL PATIENTS



OCCUPATIONS OF THE PRIVATE PATIENTS

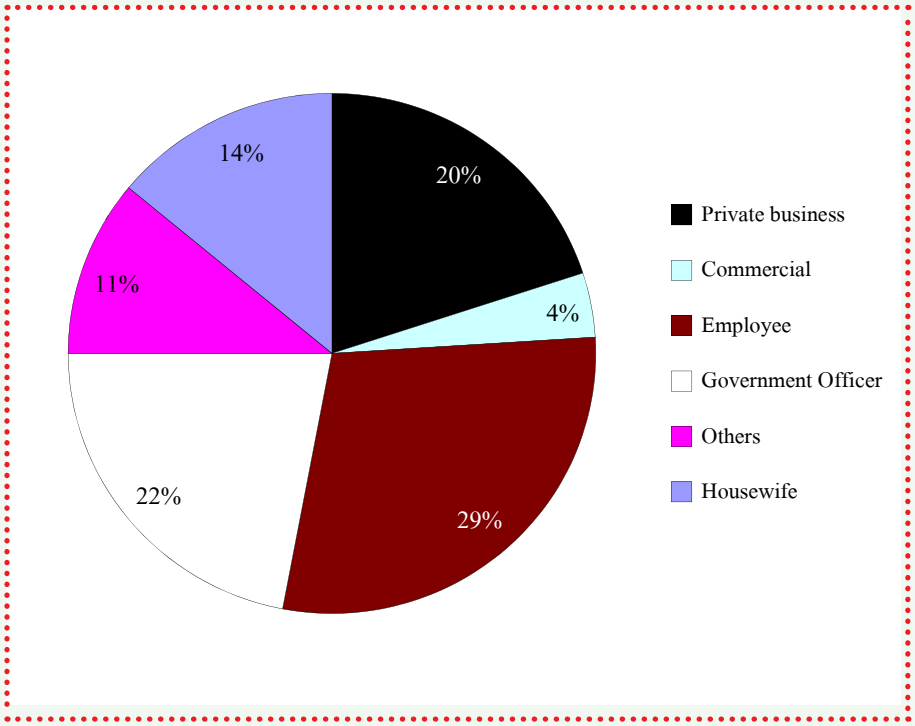
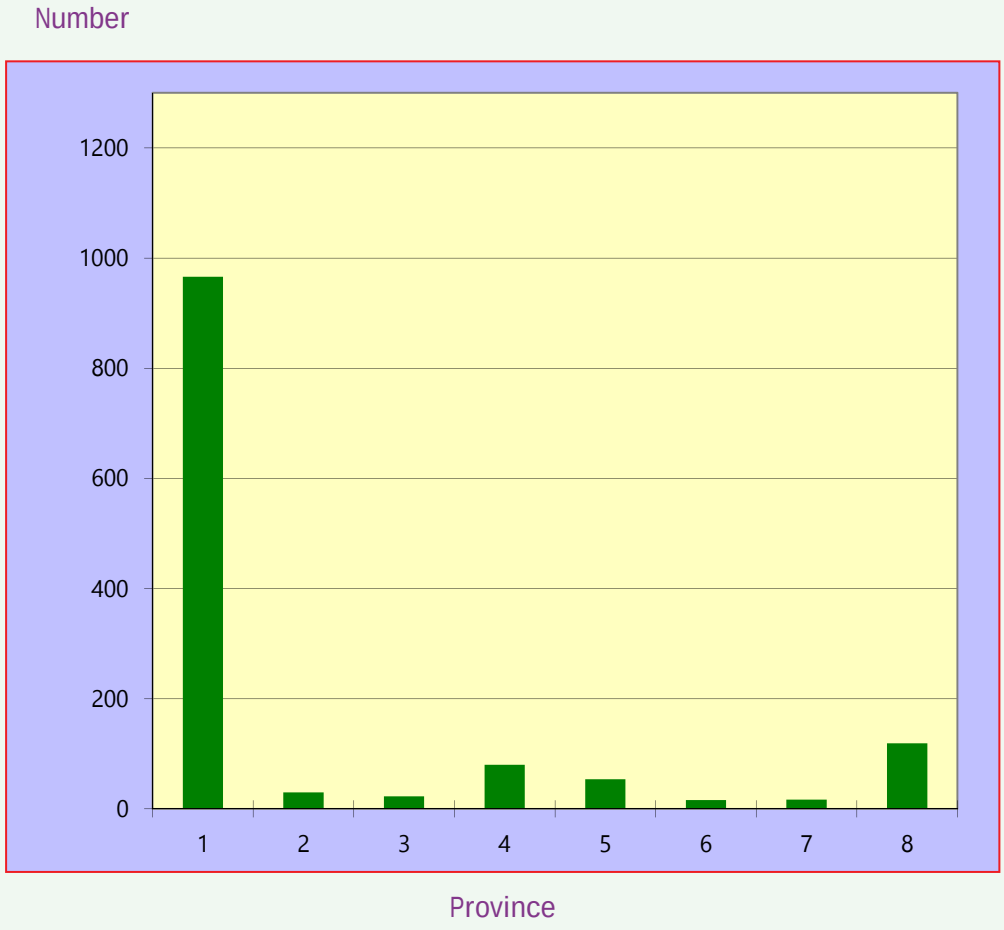


TABLE 9 Distributions of the residence (province) of the parturients

Province	Number	Percent
Chiang Mai (เชียงใหม่)	966	74.0
Chiang Rai (เชียงราย)	30	2.3
Lampang (ลำปาง)	23	1.8
Lamphun (ลำพูน)	80	6.1
Maehongsorn (แม่ฮ่องสอน)	54	4.1
Payao (พะเยา)	16	1.2
Prae (แพร่)	17	1.3
Others (อื่นๆ)	119	9.1
Total	**1305**	**100.0**

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

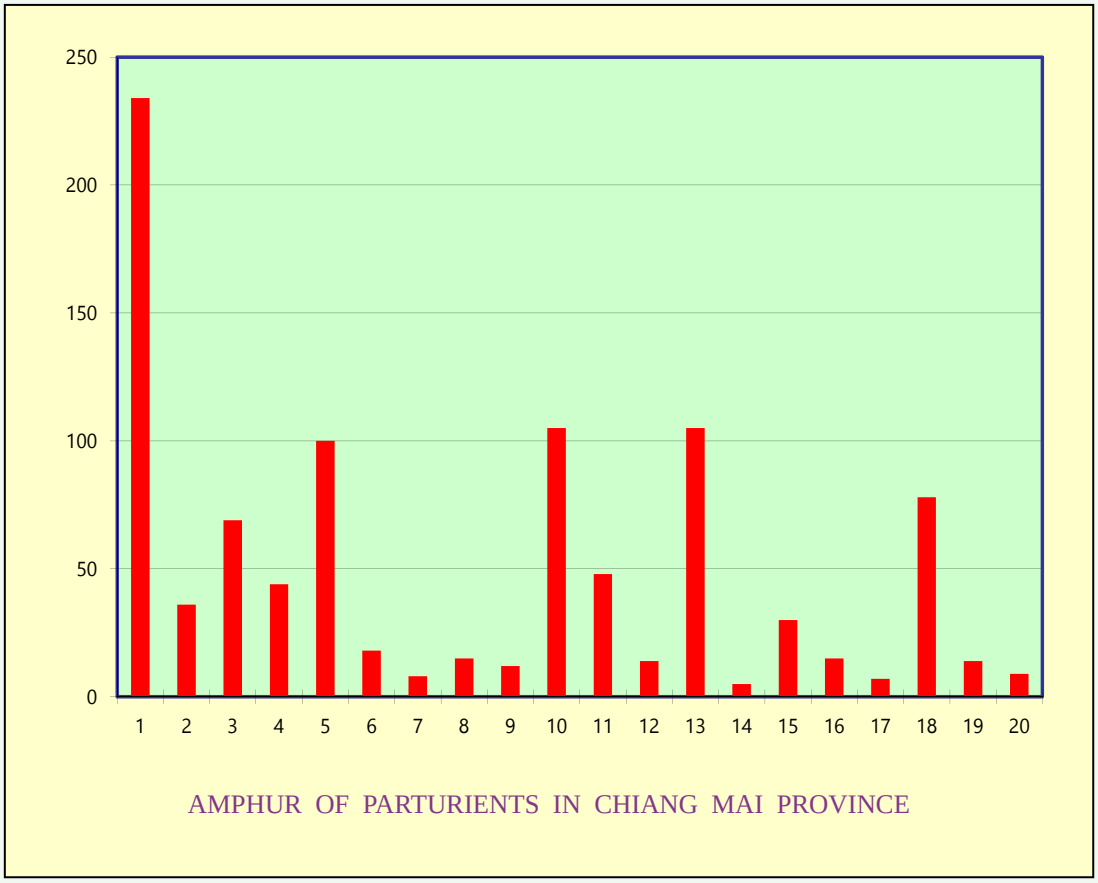


1. Chiang Mai (เชียงใหม่)
2. Chiang Rai (เชียงราย)
3. Lampang (ลำปาง)
4. Lamphun (ลำพูน)
5. Maehongsorn (แม่ฮ่องสอน)
6. Payao (พะเยา)
7. Phrae (แพร่)
8. Others (อื่นๆ)

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

	Amphur	Number	Percent
1.	Meung (เมือง)	234	24.2
2.	Maerim (แม่ริม)	36	3.7
3.	Doisaked (ดอยสะเก็ด)	69	7.1
4.	Sanpatong (สันป่าตอง)	44	4.6
5.	Hangdong (หางดง)	100	10.4
6.	Jomtong (จอมทอง)	18	1.9
7.	Mae-ai (แม่อาย)	8	0.8
8.	Prao (พร้าว)	15	1.6
9.	Hod (ฮอด)	12	1.2
10.	Sarapee (สารภี)	105	10.9
11.	Maetang (แม่แตง)	48	5.0
12.	Omkoi (อมก๋อย)	14	1.4
13.	Sankampang (สันกำแพง)	105	10.9
14.	Samoeng (สะเมิง)	5	0.5
15.	Chiangdao (เชียงดาว)	30	3.1
16.	Phang (ฝาง)	15	1.6
17.	Doitao (ดอยเต่า)	7	0.7
18.	Santrai (สันทราย)	78	8.1
19.	Maejam (แม่แจ่ม)	14	1.4
20.	Chaiprakarn (ไชยปราการ)	9	0.9
	Total	**966**	**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	24	1.8	31	10	0.8
20	5	0.4	32	12	0.9
21	6	0.5	33	16	1.2
22	4	0.3	34	28	2.1
23	9	0.7	35	37	2.8
24	5	0.4	36	50	3.8
25	5	0.4	37	165	12.6
26	4	0.3	38	331	25.4
27	10	0.8	39	371	28.4
28	6	0.5	40	158	12.1
29	5	0.4	41	32	2.5
30	12	0.9	42	0	0.0
Total				**1305**	**100.0**

Average of Gestational Age 36.96±4.5 (11-41) Weeks

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

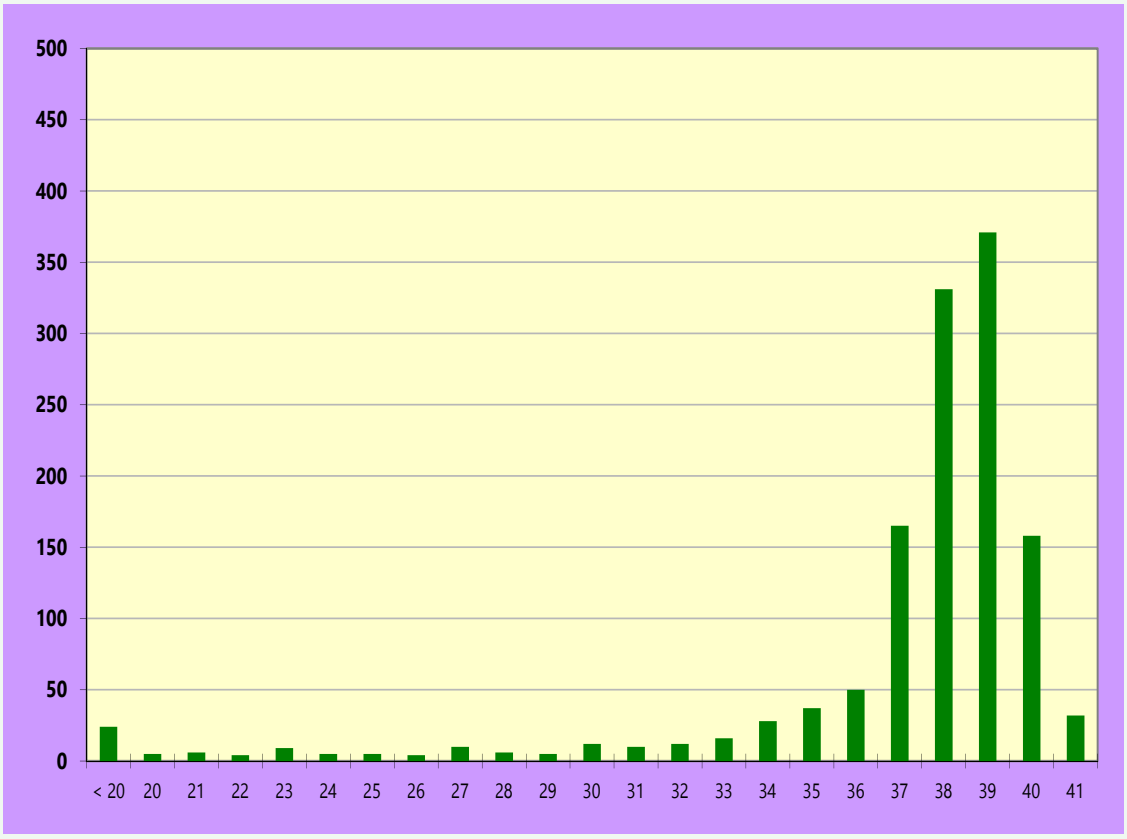


TABLE 12 Number and percentage of parturients by gestational age group in singleton pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 weeks)	23	1.8
Immature (20-27 weeks)	48	3.7
Premature (28-36 weeks)	176	13.5
Term (37-41 weeks)	1057	81.1
Postterm (42 weeks or more)	0	0.0
Total	**1304**	**100.0**

Premature delivery included the refered 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
12	1	2.6
26	1	2.6
28	3	7.7
29	1	2.6
31	4	10.3
32	3	7.7
34	6	15.4
35	4	10.3
36	4	10.3
37	9	23.1
38	2	5.1
39	1	2.6
Total	**39**	**100.0**

Average of Gestational Age 33.51±4.8 Weeks

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

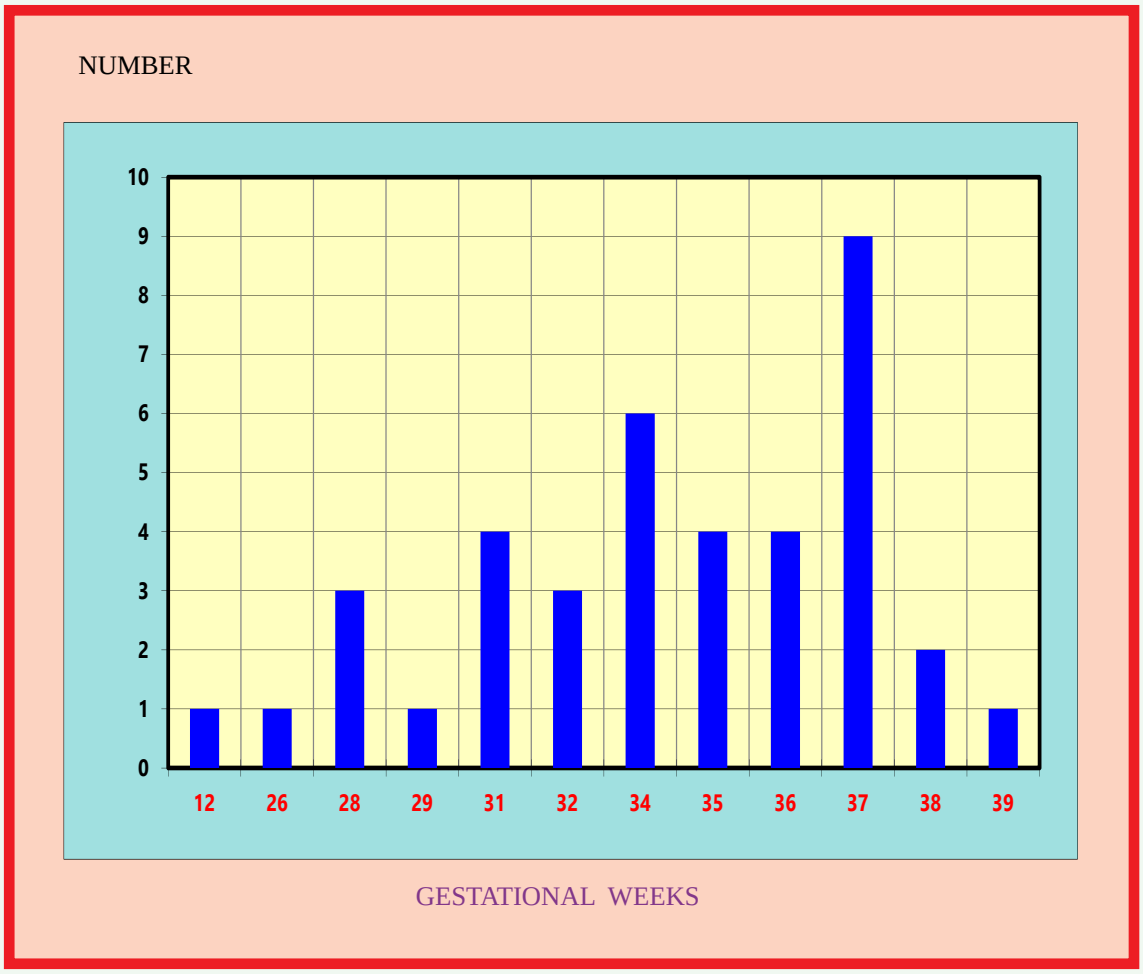


TABLE 14 Number and percentage of parturients by gestational age group in twin pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 week)	1	2.6
Immature (20-27 weeks)	1	2.6
Preterm (28-36 weeks)	25	64.1
Term (37-41 weeks)	12	30.8
Total	**39**	**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	36	2.8
1	36	2.8
2	48	3.7
3	63	4.8
4	53	4.1
5	56	4.3
6	67	5.1
7	70	5.4
8	78	6.0
9	130	10.0
10	147	11.3
11	142	10.9
12	174	13.3
13	94	7.2
14	56	4.3
15	30	2.3
16	12	0.9
17	6	0.5
18	5	0.4
21	1	0.1
28	1	0.1
Total	**1305**	**100.0**

Attending ANC at other hospitals 14.4% of total parturients

FIGURE 9 Histogram : Number of ANC attendances of general patients

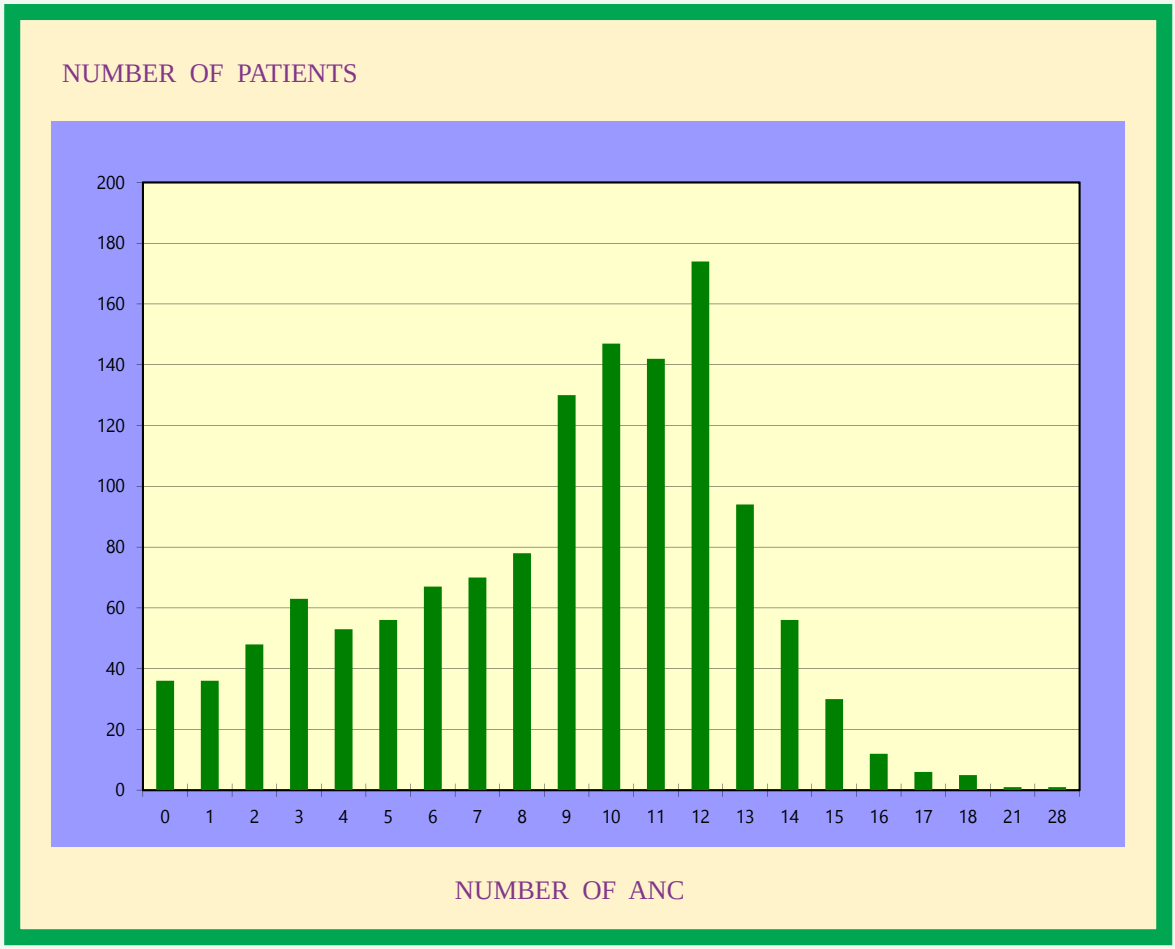


TABLE 16 Number of antenatal care attendance : General patients (not include the patients attending ANC at other hospitals)

Number of ANC	Number of Parturients	Percent
4 or more	1122	86.0
1-3	147	11.3
No ANC	36	2.8
Total	**1305**	**100.0**

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

Inadequate ANC 14.1 %

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

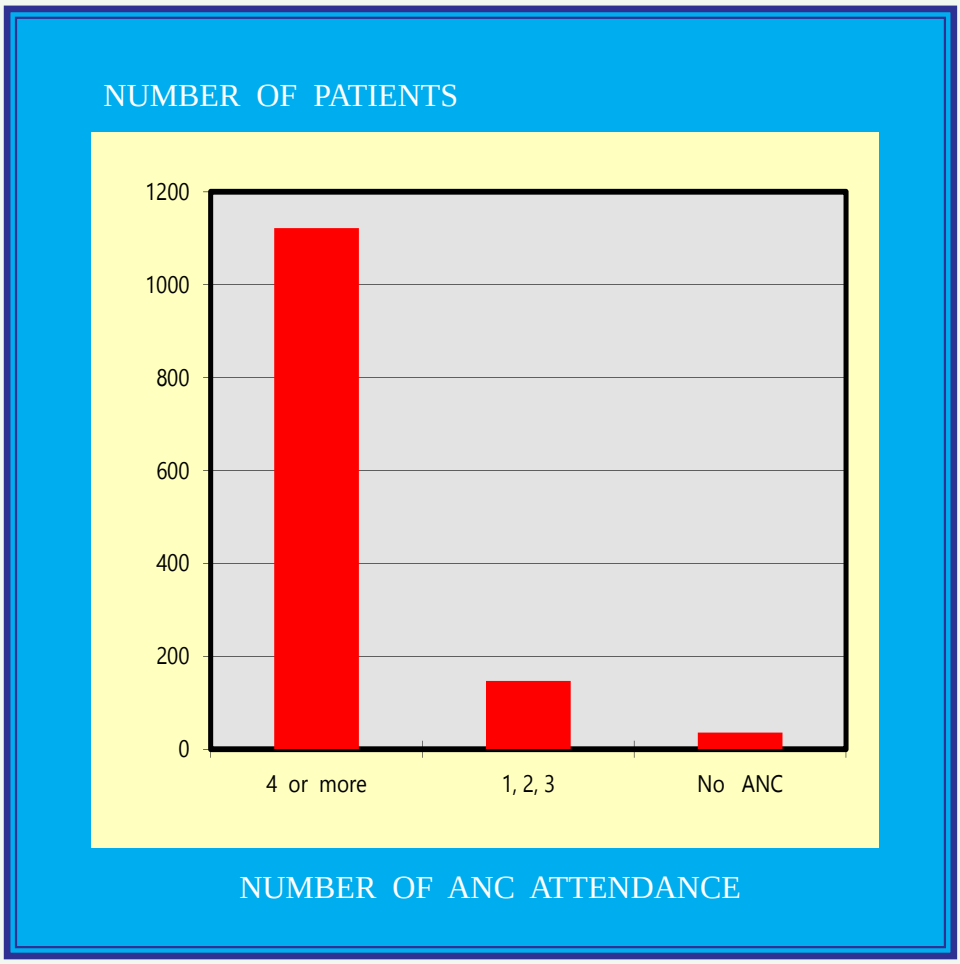
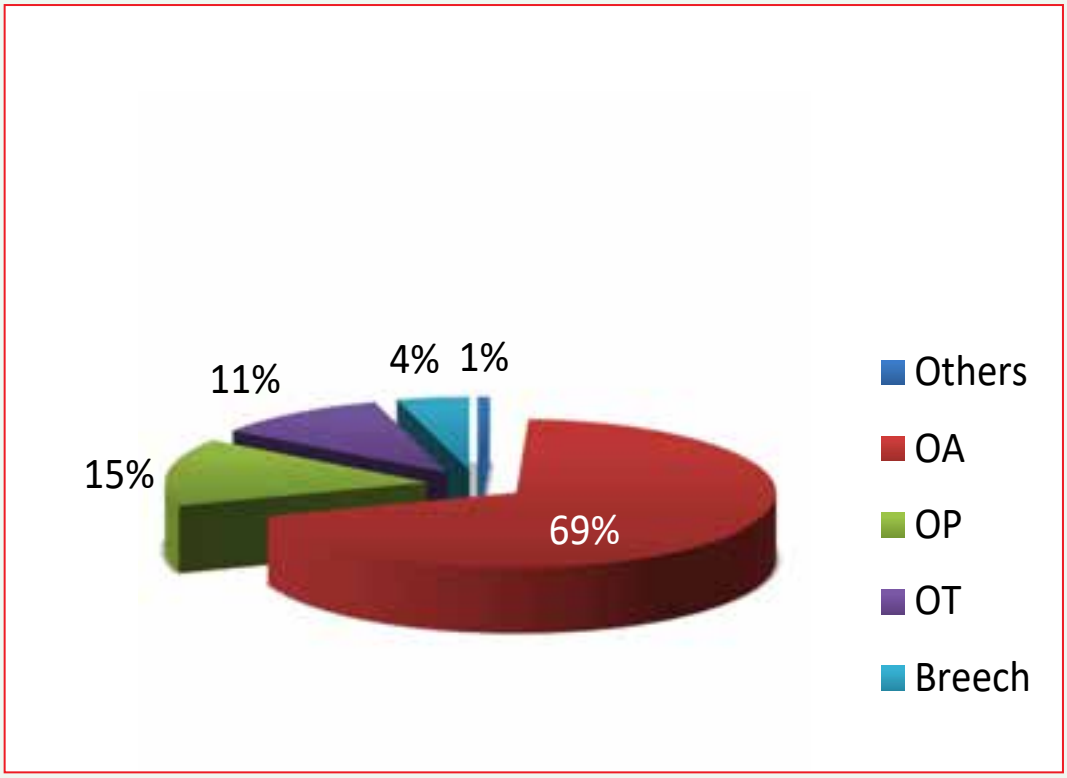


TABLE 17 Distribution of fetal presentations in labor (Singleton)

Fetal Presentation	Percent
Vertex	94.9
Breech	4.4
Transverse lie	0.2
Compound	0.1
Face	0.1
Others	0.3

Breech Presentation was 4.4% of Total 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	814	64.4	783	64.4	29	61.7
Forceps Delivery	13	1.0	13	1.1	0	0.0
Vacuum Delivery	50	4.0	46	3.8	4	8.5
Cesarean Section	374	29.6	362	29.8	12	25.5
Vaginal Breech Delivery	10	0.8	8	0.7	2	4.3
Other*	3	0.2	3	0.2	0	0.0
Total	**1264**	**100.0**	**1215**	**100.0**	**47**	**100.0**

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

Twins

Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Vaginal Delivery	12	33.3	12	22.9	0	0.0
Cesarean Section	27	66.7	24	77.1	3	100.0
Total	**39**	**100.0**	**36**	**100.0**	**3**	**100.0**

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

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

Mode of Deliv-eries	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	46	82.1	46	85.2	-	-
Assisting Mauricceau-Smelliveit	7	12.5	5	9.3	2	100.0
Total Extrac-tion Mauric-ceau-Smelliveit	3	5.4	3	5.6	-	-
Spontaneous Breech	-	-	-	-	-	-
Total	**56**	**100.0**	**54**	**100.0**	**2**	**100.0**

Total Cesarean Section Rate in Breech presentation 82.1 %

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

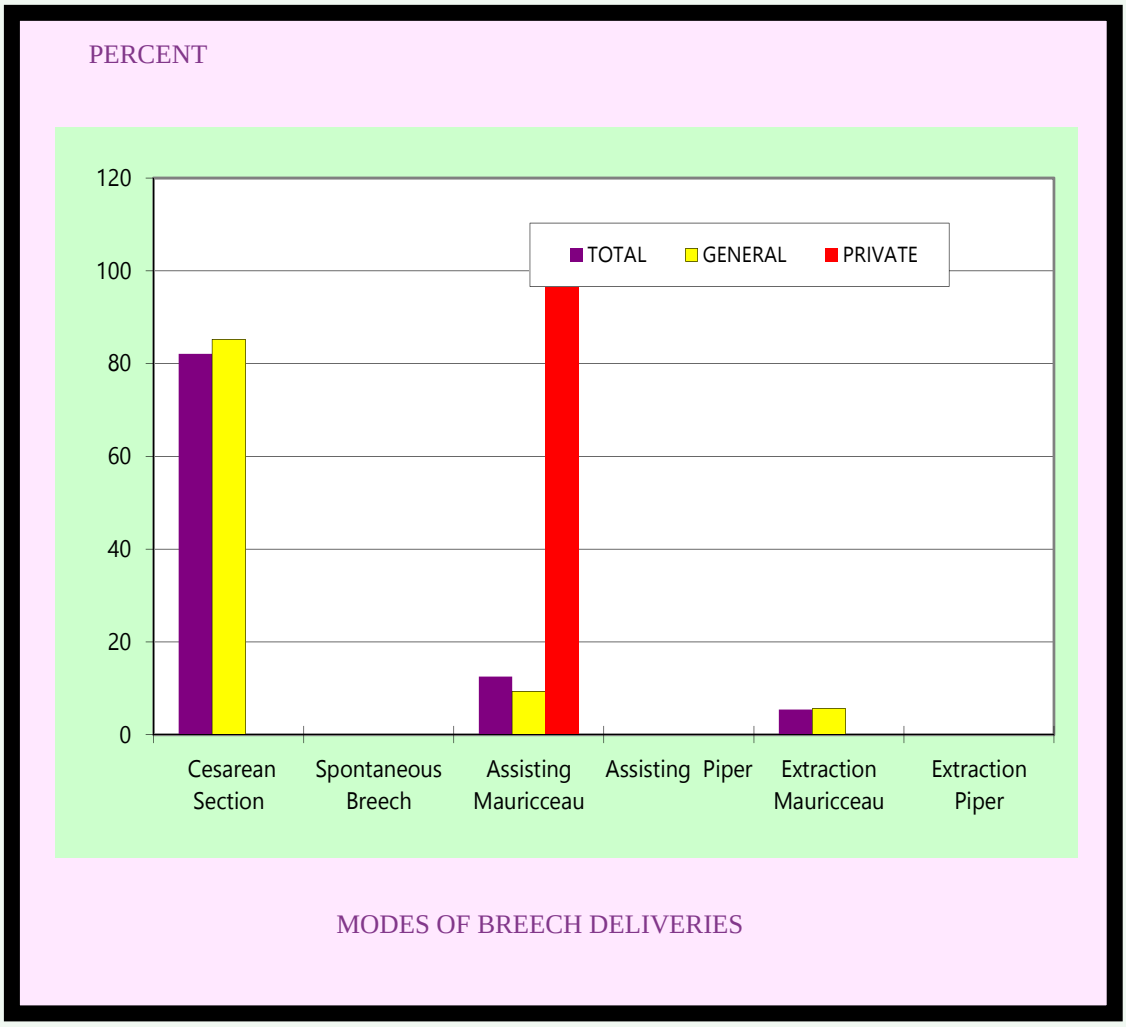


TABLE 20 Frequency of cesarean deliveries according to diagnostic indication (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
CPD	115	30.5	114	31.2	1	8.3
Previous C/S	120	31.8	116	31.8	4	33.3
Breech presentation	46	12.2	46	12.6		
Fetal distress	33	8.8	32	8.8	1	8.3
Placenta previa	8	2.1	8	2.2		
PIH	12	3.2	10	2.7	2	16.7
HIV positive	1	0.3	1	0.3		
Abruptio placentae	3	0.8	3	0.8		
Malpresentation	8	2.1	7	1.9	1	8.3
Others	6	1.6	6	1.6		
Not recorded	25	6.6	22	6.0	3	25.0
Total	**377**	**100.0**	**365**	**100.0**	**12**	**100.0**

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

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

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Fetal distress	1	7.7	1	7.7	-	-
Poor expulsive force	1	7.7	1	7.7	-	-
Prophylactic, training	9	69.2	9	69.2	-	-
Shortened second stage of labour	1	7.7	1	7.7	-	-
Failed vacuum extraction	1	7.7	1	7.7	-	-
Total	**13**	**100.0**	**13**	**100.0**	**-**	**-**

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

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Fetal distress	5	10.0	5	10.9	-	-
Persistent occiput posterior	1	2.0	1	2.2	-	-
Poor expulsive force	25	50.0	23	50.0	2	50.0
Previous C/S	1	2.0	1	2.2	-	-
Prophylactic, training	3	6.0	3	6.5	-	50.0
Shortened 2nd stage of labour	14	28.0	12	26.1	2	
Others	1	2.0	1	2.2	-	-
Total	**50**	**100.0**	**46**	**100.0**	**4**	**100.0**

TABLE 23 Sex of Fetuses (Including Multiple Pregnancies)

Sex	Number	Percent
Male	670	50.1
Female	654	48.9
Unspecified	14	1.0
Total	**1338**	**100.0**

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

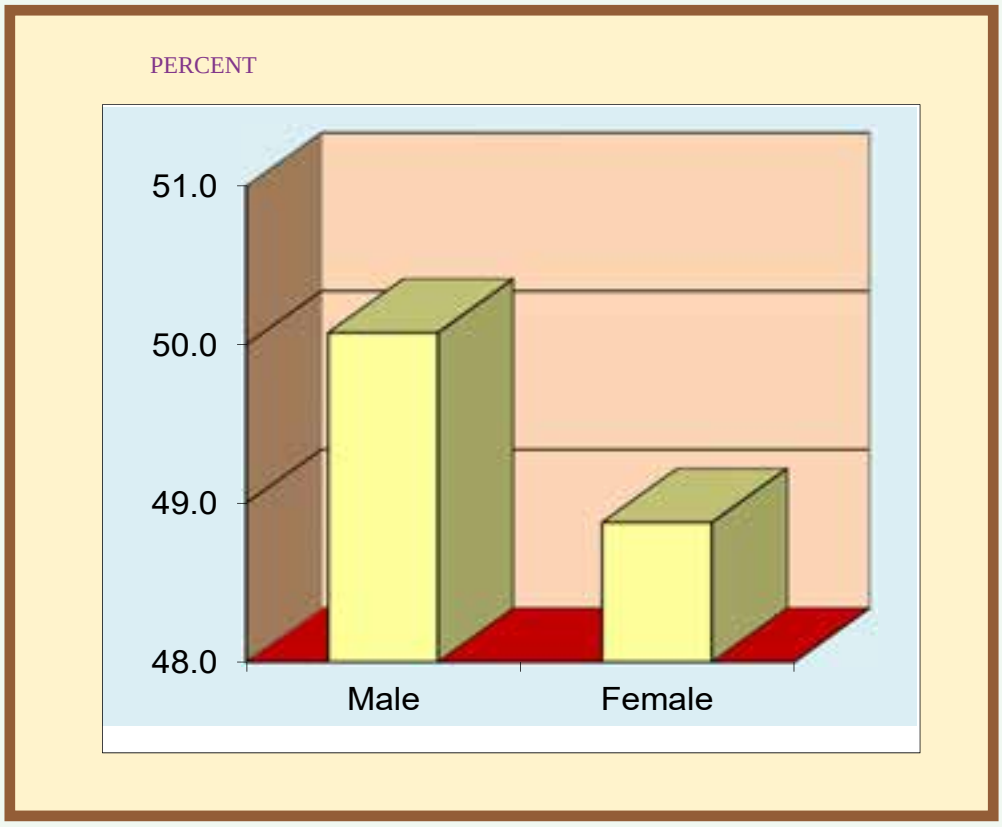


TABLE 24 Apgar score at 1 minute of total neonates

Apgar Scores	Number	Percent
0-3 (severe depression)	83	6.2
4-6 (mild depression)	81	6.0
7-10 (no depression)	1180	87.8
Total	**1344**	**100.0**

TABLE 25 Apgar score at 5 minutes of total neonates

Apgar Score	Number	Percent
0-3 (severe depression)	60	4.5
4-6 (mild depression)	23	1.7
7-10 (no depression)	1261	93.8
Total	**1344**	**100.0**

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

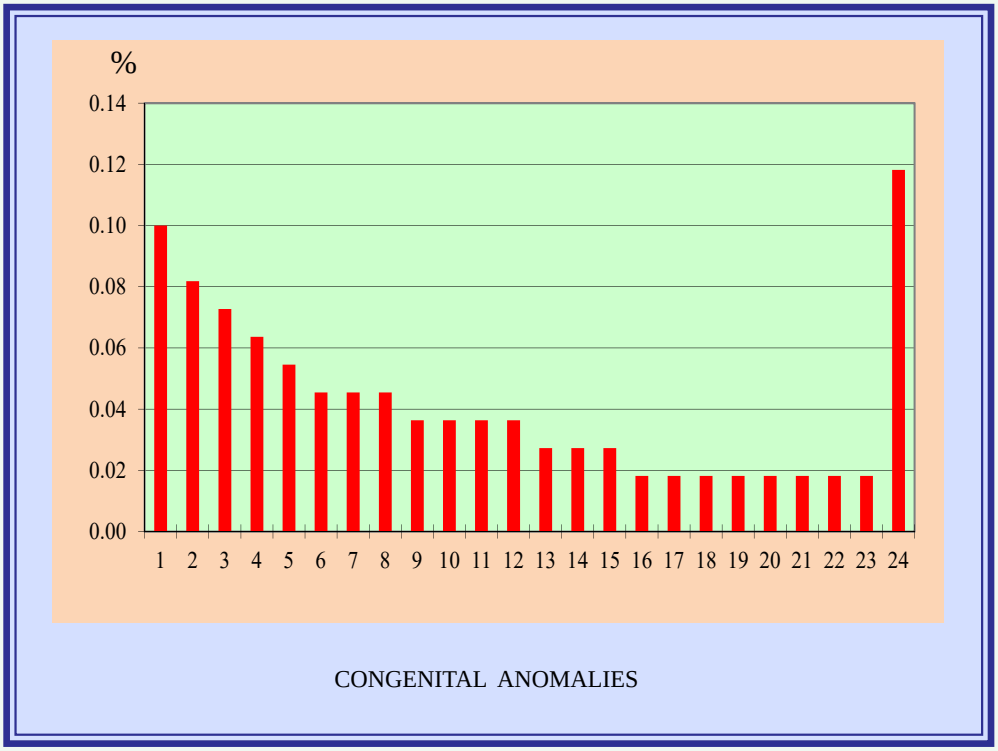
Apgar Score	1-Minute		5-Minute	
	Number	Percent	Number	Percent
0	56	4.2	55	4.1
1	11	0.8	1	0.1
2	11	0.8	2	0.1
3	9	0.7	1	0.1
4	18	1.3	3	0.2
5	16	1.2	5	0.4
6	42	3.1	17	1.3
7	79	5.9	22	1.6
8	309	23.1	108	8.1
9	738	55.1	432	32.2
10	51	3.8	694	51.8
Total	**1340**	**100.0**	**1340**	**100.0**

TABLE 27 Prenatal sonographic diagnosis of structural anomalies*

	Congenital Anomalies	Number	Percent
1	Trisomy 21	10	0.65
2	Cardiac defect	9	0.58
3	Thal.Hb Bart's	8	0.52
4	Cleft lips	5	0.32
5	Gastroschisis	4	0.26
6	Multiple anomalies	4	0.26
7	Thal.Beta major	4	0.26
8	Hydrops fetalis	4	0.26
9	Cystic hygroma	4	0.26
10	Diapragmatic hernia	3	0.19
11	Omphalocele	3	0.19
12	Trisomy 18	3	0.19
13	Skeletal dysplasia	3	0.19
14	Hydrocephalus	3	0.19
15	Cleft palates	2	0.13
16	CCAM	2	0.13
17	Anen-/exencephaly	2	0.13
18	Duodenal atresia	2	0.13
19	Holoprocencephaly	2	0.13
20	Acardiac Twins	2	0.13
21	Ambiguous genitalia	2	0.13
22	Hydranencephaly	2	0.13
23	Hydronephrosis	2	0.13
24	Others	14	0.91
	Total	**99**	**6.42**

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

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



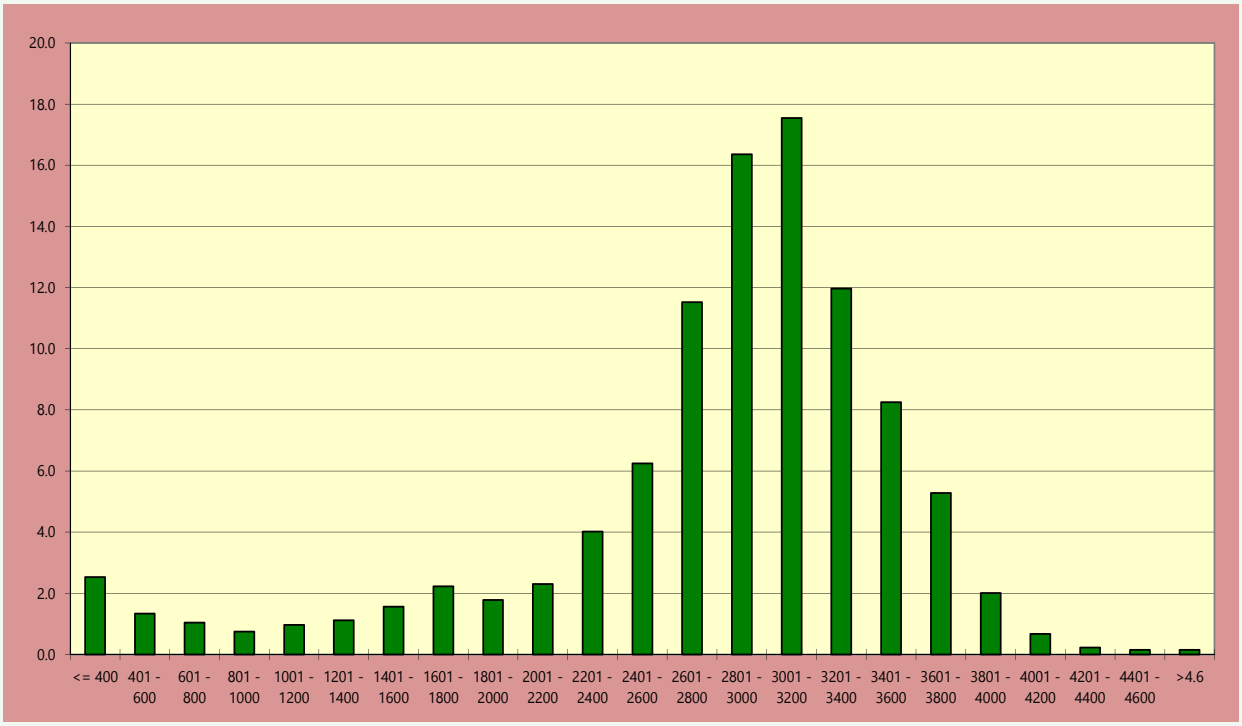
1	Cardiac defect	13	Skeletal dysplasia
2	Trisomy 21	14	Anen-/exencephaly
3	Trisomy 18	15	Hydronephrosis
4	Thal.Hb Bart's	16	Beckwith-Wiederman syndrome
5	Hydrops fetalis (not Bart's)	17	Diapragmatic hernia
6	Multiple anomalies	18	CCAM
7	Ventriculomegaly	19	Duodenal atresia
8	Cleft lips / palates	20	Holoprocencephaly
9	Gastroschisis	21	Acardiac Twins
10	Trisomy 13	22	Ambiguous genitalia
11	Cystic hygroma	23	Hydranencephaly
12	Omphalocele	24	Others

TABLE 28 Number and percentage of neonates by birth weight*

Birth Weight (grams)	Number	Percent
≤ 400	34	2.5
401-600	18	1.3
601-800	14	1.0
801-1000	10	0.7
1001-1200	13	1.0
1201-1400	15	1.1
1401-1600	21	1.6
1601-1800	30	2.2
1801-2000	24	1.8
2001-2200	31	2.3
2201-2400	54	4.0
2401-2600	84	6.2
2601-2800	155	11.5
2801-3000	220	16.4
3001-3200	236	17.5
3201-3400	161	12.0
3401-3600	111	8.3
3601-3800	71	5.3
3801-4000	27	2.0
4001-4200	9	0.7
4201-4400	3	0.2
4401-4600	2	0.1
4601-4800	2	0.1
Total	**1345**	**100.0**

** Including therapeutic termination of pregnancy*

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



** Including therapeutic termination of pregnancy*

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

Birth Weight (grams)	Number	Percent
Extremely low birth weight (500-999)	32	2.5
Very low birth weight (1000-1499)	37	2.8
Low birth weight (1500-2499)	181	13.9
Average birth weight (2500-3999)	1035	79.6
Macrosomia (> 4000)	16	1.2
Total	**1301**	**100.0**

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

Average Birth Weight of Total Infants 2785± 799 grams

range 200-4725 grams

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

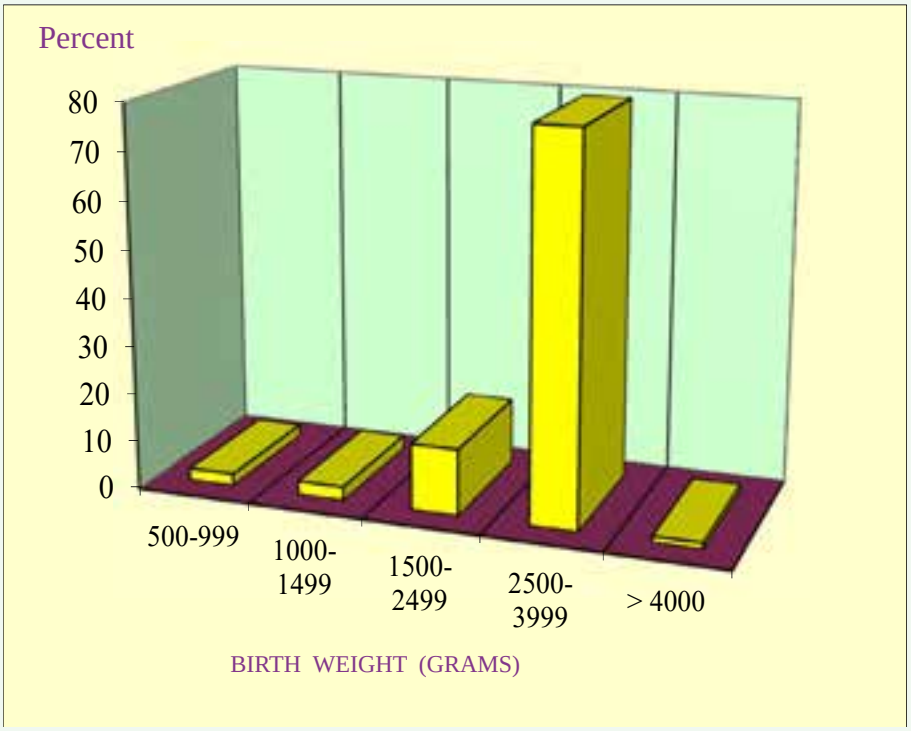


TABLE 30 Fetal weight (grams): the 10th, 50th, 90th percentile at various gestational age (singleton)

Gestational Age (weeks)	Weight (grams) 10th Percentile	Weight (grams) 50th Percentile	Weight (grams) 90th Percentile
20	250.00	320.00	.
21	370.00	390.00	.
22	195.00	425.00	.
23	420.00	585.00	.
24	460.00	590.00	.
25	630.00	700.00	.
26	300.00	760.00	.
27	527.50	1015.00	1193.50
28	490.00	1225.00	.
29	1130.00	1162.50	.
30	820.50	1337.50	1690.50
31	935.00	1631.50	.
32	960.00	1685.00	.
33	1564.50	1962.50	2646.50
34	1279.00	1915.00	2575.50
35	1680.00	2400.00	3002.00
36	2047.50	2682.50	3099.50
37	2303.50	2850.00	3286.50
38	2570.00	3002.50	3525.50
39	2761.00	3150.00	3679.00
40	2839.00	3230.00	3750.00
41	2732.50	3200.00	3557.00

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

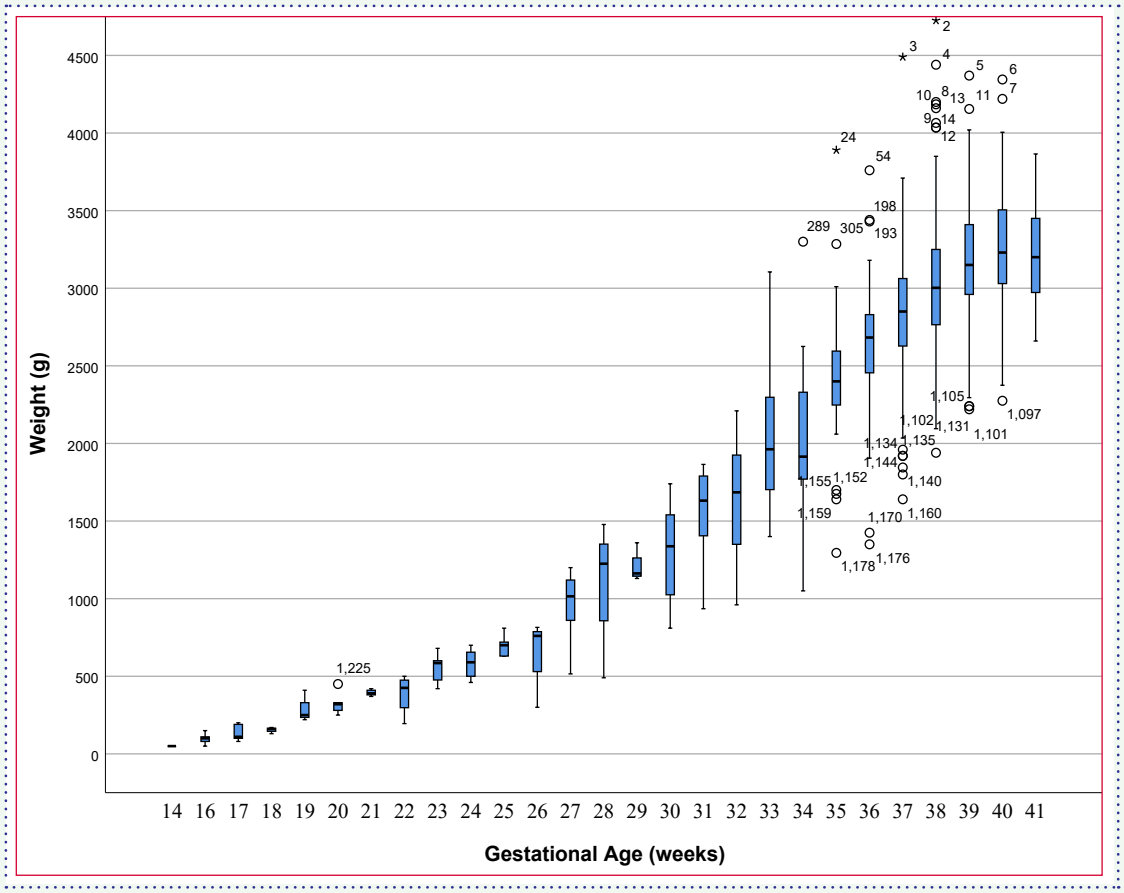


TABLE 31 Means and standard deviation of birth weight at various gestational age (singleton)

Gestational Age (weeks)	Number of Neonates	Means (grams)	Standard Deviation
20	5	326.00	76.354
21	6	393.33	19.664
22	3	450.00	50.000
23	9	556.78	87.954
24	5	581.00	101.143
25	5	698.00	74.632
26	5	684.00	244.372
27	10	947.50	227.624
28	9	1084.33	313.828
29	6	1224.17	148.641
30	12	1281.67	306.107
31	14	1473.07	271.490
32	13	1645.38	343.077
33	16	2031.87	419.491
34	34	1942.35	431.752
35	42	2333.02	490.841
36	54	2564.63	453.358
37	174	2781.75	419.100
38	332	3028.01	398.014
39	371	3177.79	351.526
40	158	3269.30	361.127
41	32	3193.44	310.038
Total	**1320**	2826.10	733.619

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
12	1	20.00	.
26	2	772.50	229.810
28	6	1094.33	227.734
29	2	1265.00	268.701
31	8	1420.63	219.308
32	4	1720.00	166.633
34	12	1887.50	294.229
35	8	2209.00	340.398
36	8	2192.50	252.374
37	18	2409.44	352.036
38	3	2648.33	203.981
39	1	2510.00	.
Total	**73**	**1925.93**	**601.783**

TABLE 33 Comparison of birth weight (singleton & twins)

Type	Means Birth Weight	Standard Deviation	Range
Singleton	2836.65	780.559	90-4,725
Twins	1925.93	601.783	100-2,960

TABLE 34 Comparison of gestational age (singleton & twins)

Type	Means Gestational Age	Standard Deviation	Range
Singleton	37.07	4.502	13-41
Twins	33.51	4.775	12-39

TABLE 35 Early postpartum morbidity

Cause	Number	Percent
Uterine Atony	17	1.30
Lacerations	2	0.15
Retained Pieces of Placenta	4	0.31
Placenta Adherens	2	0.15
Wound / Uterine infection	8	0.61
Total	**33**	**2.53**

Section III

HIGH RISK PREGNANCIES

TABLE 36 Major complications during pregnancy

Complications	Numbers	Prevalence (%)
Diabetes Mellitus	355	27.20
Previous cesarean section	163	12.49
Pregnancy-induced hypertension	106	8.12
Intrauterine growth restriction	94	7.20
Iron deficiency	60	4.60
Breech presentation	59	4.52
Prolonged PROM	51	3.91
HBsAg positive	48	3.68
Chronic hypertension	32	2.45
Myoma uteri	27	2.07
Thyrotoxicosis	17	1.30
Placenta previa	17	1.30
Upper urinary tract infection	17	1.30
Thalassemia	16	1.23
Polyhydramnios	15	1.15
Oligohydramnios	14	1.07
HIV infection	14	1.07
Heart disease	13	1.00
Asthma	12	0.92
Systemic Lupus Erythematosus	9	0.69
Transverse lie	7	0.54
VDRL positive	7	0.54
Incompetent cervix	5	0.38
Condyloma accuminata	4	0.31
Chorioamnionitis	3	0.23

Pregnancy with Heart Disease

Total 13 cases (1.00 percent of total parturients)
Singleton: 13; Twin: 0

Age range 18-37 years
average 30.1±5.6 years
age of 35 years or more 5 cases (38.5 %)

Functional Class (At delivery 13 cases)

Class I	8	cases
Class II	4	cases
Class III	1	cases
Class IV	-	case

Gestational Age at Birth
range 20-39 weeks (including therapeutic abortion)
average 36.6±5.1 weeks
premature delivery (before completed 37 weeks)
2 cases (15.4 %)

Birth Weight
range 280-4725 grams
average 2925±970 grams
number of low birth weight fetus (less than 2,500 grams)
2 cases (15.4 %)

Apgar Scores at 1 minute (less than 7) 1 case (7.7%)

Apgar Scores at 5 minutes (less than 7) 1 case (7.7%)

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

Perinatal death 1 (7.7%)

Congenital Anomalies -

Other complications (No maternal death)

Previous cesarean section	*5*
DM	*4*
Breech presentation	*1*
DFU	*1*
Chronic HT	*1*
Pre-eclampsia	*1*

Pregnancy with Diabetes Mellitus

Total 355 cases (27.20 percent of total parturients)
(Singleton: 344, Twins: 14, Triplet: 0)

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

Age range 20-45 years
average 32.0±4.9 years
age of 35 years or more 112 cases (31.5%)

Gestational Age at Birth
range 13-41 weeks
average 37.6±2.8 weeks
premature delivery (before completed 37 weeks)
51 cases (14.4%)

Birth Weight
range 40-4490 grams
average 2950±650 grams
number of low birth weight fetus (less than 2,500 grams)
56 cases (15.8 %)

Apgar Scores at 1 minute (less than 7) 26 cases (7.3 %)

Apgar Scores at 5 minutes (less than 7) 8 cases (2.3 %)

Small-for-gestational-age (less than 10th percentile) 23 cases (6.5 %)

Perinatal Death 5 cases (1.4%) (anomaly 1)

Congenital Anomalies 9 cases (2.5 %) *(TOF 2; Cleft lip 2; Down 2; multiple anomaly 1; omphalocele 1; porencephaly 1)*

Other complications

Previous cesarean section	*56*	*15.77%*	
Pre-eclampsia	*23*	*6.48*	*%*
Iron deficiency	*19*	*5.35*	*%*
HBsAg positive	*17*	*4.79*	*%*
Breech presentation	*16*	*4.51*	*%*
Chronic HT	*16*	*4.51*	*%*
Marked Obesity	*16*	*4.51*	*%*
Prolonged PROM	*9*	*2.54*	*%*
Gestational hypertension	*8*	*2.25*	*%*
Oligohydramnios	*8*	*2.25*	*%*
Asthma	*5*	*1.41*	*%*
Myoma uteri	*5*	*1.41*	*%*
Heart disease	*4*	*1.13*	*%*
Polyhydramnios	*4*	*1.13*	*%*
Placenta previa	*4*	*1.13*	*%*
UTI	*4*	*1.13*	*%*
Short stature	*4*	*1.13*	*%*
Thyrotoxicosis	*3*	*0.85*	*%*
Transverse lie	*3*	*0.85*	*%*
Ovarian tumor	*3*	*0.85*	*%*
VDRL +ve	*2*	*0.56*	*%*
SLE	*1*	*0.28*	*%*
Epilepsy	*1*	*0.28*	*%*
HIV positive	*1*	*0.28*	*%*
Thalassemia	*1*	*0.28*	*%*
Condyloma	*1*	*0.28*	*%*
Candidiasis, fungus, leukorrhea	*1*	*0.28*	*%*

Classifications

Pregestational DM (diagnosed before pregnancy) 42 cases (11.8 %)

Poorly controlled before pregnancy	*12 cases*
Overt DM with renal involvement	*5 cases*

Gestational DM (diagnosed during pregnancy) 313 cases (88.2 %)
GDM (Class A1) *282 cases*
Overt DM (Class A2) *31 cases*

Method of Glucose Control

Insulin	49 cases
Diet Control only	306 cases

Pregnancy with Systemic Lupus Erythomatosus

Total 9 cases (0.69 percent of total parturients)
(Singleton : 9)

Activity of the disease

Remission before pregnancies	6 cases
Active disease during pregnancies	3 cases
Hypertension	2 cases
Lupus nephritis	4 cases

Age range 20-36 years
average 29.5±5.4 years
age of 35 years or more 1 cases (11.1 %)

Gestational Age at Birth
range 22-40 weeks
average 34.2±6.5 weeks
premature delivery (before completed 37 weeks)
4 cases (44.4 %)

Birth Weight
range 300-3095 grams
average 1749±1026 grams
number of low birth weight fetus (less than 2,500 grams)
7 cases (77.8 %)

Apgar Scores at 1 minute (less than 7) 3 cases (33.3 %)

Apgar Scores at 5 minutes (less than 7) 3 cases (33.3 %)

Small-for-gestational-age (less than 10th percentile) 4 cases (44.4 %)

Perinatal death 2 cases (22.2 %)

Congenital Anomalies 0 case

Other complications

Iron deficiency	*3*
Chronic HT	*2*
Pre-eclampsia	*2*
Breech presentation	*1*
DM	*1*
Prolonged PROM	*1*

Pregnancy with Thyrotoxicosis

Total 17 cases (1.30 percent of total parturients)
All were singleton
Diagnosed before pregnancy 10 cases
Diagnosed during pregnancy 7 cases

Age range 21-41 years
average 30.71±5.7 years
age of 35 years or more 4 cases (23.5 %)

Gestational Age at Birth

range 24-40 weeks

average 38.1±3.7 weeks

premature delivery (before completed 37 weeks)

1 cases (5.9 %)

Birth Weight

range 500-3760 grams

average 3052±733 grams

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

1 cases (5.9 %)

Apgar Scores at 1 minute (less than 7) 1 case (5.9 %)

Apgar Scores at 5 minutes (less than 7) 1 case (5.9 %)

Small-for-gestational-age (less than 10th percentile) 1 cases (5.9 %)

Perinatal death 1 case (5.9 %)

Congenital Anomalies - case

Other complications

DM	*3*
Previous cesarean section	*2*
HBsAg positive	*2*
UTI	*1*
Iron deficiency	*1*

Pregnancy with Hepatitis B Antigen Positive

Total 48 cases (3.68 percent of total parturients)

Singleton: 47 (97.9 %); twins: 1 (2.1 %)

Age range 20-43 years
average 32.6±5.2 years
age of 35 years or more 13 cases (27.1 %)

Gestational Age at Birth
range 17-41 weeks
average 37.7±3.6 weeks
premature delivery (before completed 37 weeks)
6 cases (12.5 %)

Birth Weight
range 200-4220 grams
average 3044±697 grams
number of low birth weight fetus (less than 2,500 grams)
6 cases (12.5 %)

Apgar Scores at 1 minute (less than 7) 4 cases (8.3 %)

Apgar Scores at 5 minutes (less than 7) 3 cases (6.3 %)

Small-for-gestational-age (less than 10th percentile) 1 cases (2.1 %)

Perinatal Death 1 case (2.1 %) (renal agenesis *1; hydrops fetalis 1*)

Congenital Anomalies 1 case (cleft lip)

Other complications

Diabetes mellitus	*17*	*cases*
Previous cesarean section	*10*	*cases*
Iron deficiency	*3*	*cases*
Breech presentation	*2*	*cases*
Pre-eclampsia	*2*	*cases*
Thyrotoxicosis	*2*	*cases*
Asthma	*1*	*case*
Chronic hypertension	*1*	*case*
Marked Obesity	*1*	*case*
Ovarian tumor	*1*	*case*
Prolonged PROM	*1*	*case*
Thalassemia	*1*	*case*
Urinary tract infection	*1*	*case*
VDRL +ve	*1*	*case*

Pregnancy with Asthma

Total 12 cases (0.92 percent of total parturients)
(Singleton : 12)

Activity of Disease

Well-controlled	11 cases
Poorly-controlled	1 cases

Age range 18-39 years
average 28.2±7.1 years
age of 35 years or more 3 cases (25.0 %)

Gestational Age at Birth
range 23-39 weeks
average 35.7±4.7 weeks
premature delivery (before completed 37 weeks)
4 cases (33.3 %)

Birth Weight (not included abortion)
range 600-3550 grams
average 2499±861 grams
number of low birth weight fetus (less than 2,500 grams)
5 cases (41.7 %)

Apgar Scores at 1 minute (less than 7) 2 cases (16.7 %)

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

Small-for-gestational-age (less than 10th percentile) 1 case (8.3 %)

Perinatal death 1 (8.3 %)
Congenital Anomalies 1 case (cleft lip)

Other complications

Diabetes mellitus	*5*	*cases*
Breech presentation	*1*	*case*
HBsAg positive	*1*	*case*
Iron deficiency	*1*	*case*
Gestational hypertension	*1*	*case*
Oligohydramnios	*1*	*case*
Pre-eclampsia	*1*	*case*
Thalassemia	*1*	*case*

Pregnancy with Chronic Hypertension

Total 32 cases (2.45 percent of total parturients)
(Singleton : 32)

Severity of Hypertension

Severe (start treatment during pregnancy)	4	cases
Severe (controlled prior to pregnancy)	4	cases
Mild (no medication BP less than 160/90)	8	cases
Mild (BP less than 160/90 but treated with antihypertensive drug)	16	cases

Age range 23-43 years
average 33.1±5.2 years
age of 35 years or more 11 cases (34.4 %)

Gestational Age at Birth

range 16-40 weeks
average 35.0±5.9 weeks
premature delivery (before completed 37 weeks)
13 cases (40.6 %)

Birth Weight

range 50-3890 grams
average 2573±1079 grams
number of low birth weight fetus (less than 2,500 grams)
10 cases (31.3 %)

Apgar Scores at 1 minute (less than 7) 9 cases (28.1 %)

Apgar Scores at 5 minutes (less than 7) 4 cases (12.5 %)

Small-for-gestational-age (less than 10th percentile) 5 cases (15.8 %)

Perinatal death 3 cases (9.4 %)

Congenital Anomalies 1 case (trisomy 21)

Other complications

Diabetes mellitus	*16*	*cases*
Pre-eclampsia	*7*	*cases*
Marked Obesity	*5*	*cases*
Previous cesarean section	*3*	*cases*
Iron deficiency	*2*	*cases*
Urinary tract infection	*2*	*cases*
HBsAg positive	*1*	*case*
Heart disease	*1*	*case*
Oligohydramnios	*1*	*case*
SLE	*1*	*case*

Pregnancy-induced Hypertension

Total 106 (8.12 percent of total parturients)
Singleton: 99; Twins: 7

Age range 19-44 years
average 32.0±6.0 years
age of 35 years or more 39 cases (36.8 %)

Gestational Age at Birth
range 27-41 weeks
average 36.4±3.2 weeks
premature delivery (before completed 37 weeks)
40 cases (37.7 %)

Classification of PIH

Gestational hypertension (without proteinuria)	16	cases (15.1 %)
Mild Preeclampsia	51	cases (48.1 %)
Severe Preeclampsia	31	cases (29.2 %)
Pregnancy-aggravated hypertension	7	cases (6.6 %)
Eclampsia	1	case (0.9 %)
First eclamptic attack before admission		*0 case*
First eclamptic attack after admission		*1 case*
No ANC at Maharaj Nakorn Chiang Mai		*0 case*
ANC at Maharaj Nakorn Chiang Mai		*0 case*

Birth Weight range 490-3995 grams
average 2509±801 grams
number of low birth weight fetus (less than 2,500 grams)
40 cases (37.7 %)

Apgar Scores at 1 minute (less than 7) 23 cases (21.7 %)

Apgar Scores at 5 minutes (less than 7) 5 cases (4.7 %)

Small-for-gestational-age (less than 10th percentile) 19 cases (17.9 %)

Perinatal death 2 case (1.9 %; immaturity)

Congenital Anomalies - case

Other complications

Diabetes mellitus	*31*	*cases*
Previous cesarean section	*13*	*cases*
Marked Obesity	*12*	*cases*
Chronic HT	*7*	*cases*
Prolonged PROM	*5*	*cases*
UTI	*5*	*cases*
Breech presentation	*4*	*cases*
Asthma	*2*	*cases*
HBsAg positive	*2*	*cases*
HIV positive	*2*	*cases*
Iron deficiency	*2*	*cases*
Myoma uteri	*2*	*cases*
Oligohydramnios	*2*	*cases*
SLE	*2*	*cases*
Chorioamnionitis	*1*	*case*
Heart disease	*1*	*case*
Incompetent cervix	*1*	*case*
Ovarian tumor	*1*	*case*
Placenta previa	*1*	*case*
Prolonged PROM	*1*	*case*
Thalassemia	*1*	*case*
Thalassemia	*1*	*case*

Pregnancy with Thalassemia

Total 16 cases (1.23 percent of total parturients)
Singleton: 16; Twins: -

Type of thalassemia

beta-thalassemia / HbE disease	3 cases
alpha-thalassemia (Hb H/variant disease)	13 cases

Age range 24-39 years
average 30.9±4.8 years
age of 35 years or more 4 cases (25.0 %)

Gestational Age at Birth
range 17-40 weeks
average 35.6±5.6 weeks
premature delivery (before completed 37 weeks)
6 cases (37.5 %)

Birth Weight
range 110-3510 grams
average 2326±876 grams
number of low birth weight fetus (less than 2,500 grams)
7 cases (43.8 %)

Apgar Scores at 1 minute (less than 7) 4 cases (25.0 %)

Apgar Scores at 5 minutes (less than 7) 4 cases (25.0 %)

Small-for-gestational-age (less than 10th percentile) 5 cases (31.3 %)

Perinatal death 2 cases (12.5 %)

Congenital Anomalies 3 cases *(gastroschisis 2; hydrocephalus 1)*

Other complications

Asthma	*1*	*case*
Diabetes mellitus	*1*	*case*
Gestational hypertension	*1*	*case*
HBsAg positive	*1*	*case*
Iron deficiency	*1*	*case*
IUGR	*1*	*case*
Myoma uteri	*1*	*case*
PIH	*1*	*case*
Placenta previa	*1*	*case*
Transverse lie	*1*	*case*
Urinary tract infection	*1*	*case*

Placenta Previa

Total 17 cases (1.30 percent of total parturients)
Singleton : 15; Twins : 2

Age range 21-40 years
average 33.3±5.3 years
age of 35 years or more 8 cases (47.1 %)

Gestational Age at Birth
range 25-39 weeks
average 34.6±3.5 weeks
premature delivery (before completed 37 weeks)
11 cases (64.7 %)

Birth Weight
range 630-3535 grams
average 2269±789 grams
number of low birth weight fetus (less than 2,500 grams)
10 cases (58.8 %)

Apgar Scores at 1 minute (less than 7) 7 cases (41.2 %)

Apgar Scores at 5 minutes (less than 7) 3 cases (17.6 %)

Small-for-gestational-age (less than 10th percentile) 3 cases (17.6 %)

Perinatal death 2 cases (11.8 %)

Congenital Anomalies 2 cases *(hydrocephalus, meningocele)*

Other complications

Diabetes mellitus	*4*	*cases*
Previous cesarean section	*4*	*cases*
Placenta acreta	*1*	*case*
Polyhydramnios	*1*	*case*
Preeclampsia	*1*	*case*
Thalassemia	*1*	*case*

Pregnancy with Acute Pyelonephritis

Total 17 cases (1.30 percent of total parturients)
(All were singleton; 17)

Age range 22-38 years
average 30.3±4.9 years
age of more than 35 years 4 cases (23.5 %)

Gestational Age at Birth

range 17-40 weeks
average 34.0±5.9 weeks
premature delivery (before completed 37 weeks)
8 cases (47.1 %)

Onset

First trimester	2	case
Second trimester	5	cases
Third trimester	7	cases
Postpartum	3	cases

Number of Episodes

1	13	cases
2	3	cases
3	1	case

Birth Weight

range 110-3300 grams
average 2296±987 grams
number of low birth weight fetus (less than 2,500 grams)
7 cases (41.2 %)

Apgar Scores at 1 minute (less than 7) 3 cases (17.6 %)

Apgar Scores at 5 minutes (less than 7) 2 cases (11.8 %)

Small-for-gestational-age (less than 10th percentile) 2 cases (11.8%)

Perinatal death 1 case (5.9 %)

Congenital Anomalies 1 case (hydrocephalus)

Other complications

Diabetes mellitus	*3*	*cases*
Preeclampsia	*3*	*cases*
Breech presentation	*1*	*case*
Chronic HT	*1*	*case*
DM	*1*	*case*
Gestational hypertension	*1*	*case*
HBsAg positive	*1*	*case*
Marked Obesity	*1*	*case*
Polyhydramnios	*1*	*case*
Thalassemia	*1*	*case*
Thyrotoxicosis	*1*	*case*

Small-for-Gestational-Age Fetuses

Birthweight less than 10th percentile

Total 94 (7.20 percent)
Singleton : 84 cases, Twins: 10 cases

Age range 13-43 years
average 29.6±6.3 years
age of 35 years or more 20 cases (21.3 %)

Gestational Age at Birth
range 22-41 weeks
average 35.4±4.5 weeks
premature delivery (before completed 37 weeks)
40 cases (42.6 %)

Birth Weight

range 195-2660 grams
average 1814±676 grams
number of low birth weight fetus (less than 2,500 grams)
81 cases (86.2 %)

Apgar Scores at 1 minute (less than 7) 22 cases (23.4 %)

Apgar Scores at 5 minutes (less than 7) 11 cases (11.7 %)

Perinatal Death 9 cases (9.6 %)

Congenital Anomalies 11 cases (11.7 %)

Gastroschisis	*4*	*cases*
Multiple anomalies	*2*	*case*
Cleft lips	*1*	*case*
Porencephaly	*1*	*case*
Trisomy 18	*1*	*case*
Trisomy 21	*1*	*case*
Turner syndrome	*1*	*case*

Other complications

Poor maternal weight gain	*24*	*cases*
Medical diseases	*10*	*cases*
Pregnancy-induced hypertension	*8*	*cases*
Fetal anomalies	*5*	*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 (2010-2020)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
No. of Deliveries	2089	1900	2059	1847	1686	1572	1431	1545	1518	1522	1300
No. of women with positive HIV	41	36	42	46	37	43	16	20	18	9	17
Deliveries	37	35	38	36	30	33	24*	14	12	13	13
Therapeutic abortion	4	-	-	-	-	2	1	1	-	-	1
Spontaneous abortion	-	1	2	1	2	1	-	-	1	1	1
Illegal abortion	-	-	-	-	-	-	-	-	-	-	-

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

FIGURE 19 Pregnant women with positive HIV antibody at Maharaj Nakorn Chiang Mai (1989-2020) (no screening program during 1989 -1996)

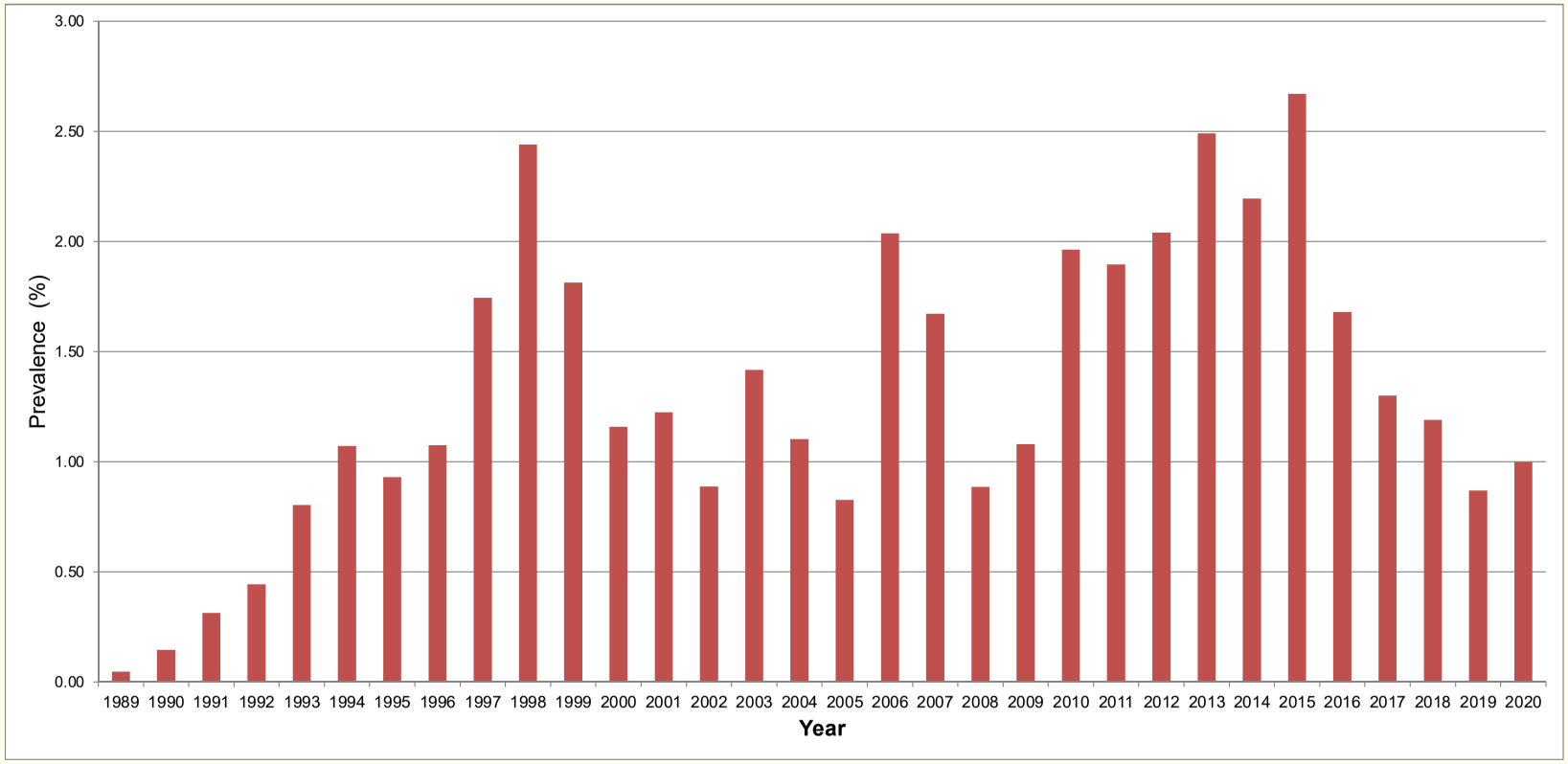


TABLE 38 Voluntary screening (2020) among pregnant women for anti-HIV antibody

Pregnant women (Counselling)	1297	cases
Voluntary screening	1297	cases
+ve anti-HIV antibody	17	cases
% positive case	1.31	%

TABLE 39 Age of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Age (years)	No. of cases	Percent
15-19	-	-
20-24	3	23.1
25-29	3	23.4
30-34	4	30.7
35-39	2	15.4
40-44	1	7.7
45-49	-	-
Total	**13**	**100**

Mean age (years) 30.08
Standard deviation 5.722
Range 20-41 years

TABLE 40 Parity of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Parity	No. of cases	Percent
0	7	53.8
1	5	38.5
2	1	7.7
≥ 3	-	-
Total	**13**	**100**

TABLE 41 Age at first marriage of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Age (years)	No. of cases	Percent
10-14	-	-
15-19	3	23.1
20-24	3	23.1
25-29	4	30.7
Unknown	3	23.1
Total	**13**	**100**

Mean age (years)	*21.90*	
Standard deviation	*3.956*	
Range	*16-27*	*years*

TABLE 42 Number of marriages of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Number	No. of cases	Percent
1	5	38.5
2	5	38.5
3	1	7.7
4	-	-
Unknown	2	15.3
Total	**13**	**100**

TABLE 43 Occupations of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Occupations	No. of cases	Percent
Employee	5	38.5
Housewife	4	30.7
Business	1	7.7
Government officer	1	7.7
Commercial	2	15.4
Total	**13**	**100**

TABLE 44 Residence (province) of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Province	Number	Percent
Chiang Mai (เชียงใหม่)	11	84.6
Lamphun (ลำพูน)	-	-
Chiang Rai (เชียงราย)	-	-
Lampang (ลำปาง)	1	7.7
Maehongson (แม่ฮ่องสอน)	1	7.7
Total	**13**	**100**

TABLE 45 Complications of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

	Cases	Percent
Without complicaiton	5	38.4
With complication	8	61.5
● Antepartum	6	
● Intrapartum	1	
● Postpartum	1	
Total	**13**	**100**

TABLE 46 Birth weight in the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Birth weight (grams)	Number	Percent
< 1,000	1	7.7
1,000 - 1,499	-	-
2,000 - 2,499	-	-
2,500 - 2,999	6	46.1
3,000 - 3,499	3	23.1
3,500 - 3,999	3	23.1
Total	**13**	**100**

Mean birthweight (grams)	*2903.46*
Standard deviation (grams)	*769.903*
Range (grams)	*700-3,860*

TABLE 47 Postpartum contraception of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2020)

Method	No. of cases	Percent
Female sterilization	3	23.0
Male sterilization	1	7.7
Condom	1	7.7
Oral contraception	4	30.8
Unknown	4	30.8
Total	**13**	**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 2647 tests
(OPD4 = 2003; LR= 540; OB = 104)

Secondary Surveillance

Contraction stress test
or Nipple stimulation test 4 tests
Biophysical profile/ultrasonography 120 tests
Doppler velocimetry 320 tests

Prenatal Diagnosis

1. **Ultrasonography** 8,130 examinations
   (~ 20 % for gynecologic and infertile examinations)
2. **Amniocentesis** 595 cases
3. **Cordocentesis** 177 cases
4. **Chorionic villous sampling** 83 cases

OBSTETRIC ULTRASOUND SERVICE

Number of Patients undergoing sonographic examinations (OB&GYN) in 2020 ***8,130 cases***

Several examinations invovled in the researches without specific indications

Indications for sonographic examination	
■ Obstetric ultrasound	82.3 %
■ Perinatal research	*28.3 %*
■ Down screening research	*21.9 %*
■ Obstetric ultrasound (others)	*49.8 %*
■ Gestational age estimation	
■ Obstetric hemorrhage	
■ Follow-up fetal anomalies	
■ Fetal growth surveillance	
■ etc.	
■ Gynecologic ultrasound	17.7 %
■ General gynecology	*78.4 %*
■ Gynecologic oncology	*13.5 %*
■ Reproductive medicine	*8.1 %*

Cordocentesis (2020)

Total 177 cases

Indications	No.	%
1. Previous child with Hb bart's	3	1.69
2.Previous child with β thal / Hb.E	8	4.52
3. Previous child with β thal major	1	0.56
4. Pregnancy at risk for Hb Bart' hydrops fetalis	16	9.04
5. Pregnancy at risk for β thal major	22	12.43
6. Pregnancy at risk for β thal / HbE	52	29.38
7. Chromosome analysis	29	16.38
8. Combined chromosome and risk for Hb bart's	6	3.39
9.Combined chromosome and risk for β thal major	9	5.08
10.Combined chromosome and risk for β thal Hb/E	25	14.12
11. Combined chromosome and previous child β thal/ Hb E	2	1.13
12. Combined chromosome and previous child with Hb bart's	3	1.69
13. Repeat Chromosome analysis	1	0.56
Total	**177**	**100**

Amniocentesis (2020)

Total 595 cases

Indications for amniocentesis	
Elderly gravida (age of more than 35 years)	**357**
■ *with no other obvious risk*	*161*
■ *with R/O chromosome abnormality*	*6*
■ *with high risk for Down syndrome screening*	*186*
■ *with Hight risk Trisomy 18 or Trisomy 13*	*3*
■ *with previous child abnormal chromosome*	*1*
Pregnancy with high risk for Down syndrome screening	**191**
■ *Pregnancy with high risk for Trisomy 18*	*3*
■ *Pregnancy with fetal anomaly and sonomarkers*	*30*
■ *Pregnancy with Down syndrome in previous child*	*6*
■ *Pregnancy with Previous child abnormal chromosome*	*2*
■ *Maternal request*	*4*
■ *Confirm CVS / NIPT results (abnormal chromosomes)*	*2*
Amniocentesis for diagnosis of thalassemia	**25**
■ *Pregnancy at risk for Hb Bart's*	*2*
■ *Pregnancy at risk for β thal major*	*3*
■ *Combined chromosome and risk for Hb bart's*	*3*
■ *Combined chromosome and risk for β thal major*	*2*
■ *Combined chromosome and previous child β thal major*	*1*
■ *Pregnancy at risk for β thal / HbE*	*11*
■ *Combined chromosome and risk for β thal Hb/E*	*2*
■ *Chromosome analysis*	*1*

Chorionic Villous Sampling (2020)

Total 83 procedures

Indications	Number
1. Fetal chromosome study	**10**
■ Elderly gravida	1
■ Thickening nuchal translucency	3
■ Cystic hygroma	4
■ Previous child with trisomy 13	1
■ Elderly gravida and thickening translucency	1
2. Risk for fetal severe thalassemia	**58**
■ Risk for Hb Bart' s hydrops fetalis	16
■ Risk for Homozygous beta thalassemia	14
■ Risk for Beta thalassemia/Hb E disease	28
3. Fetal chromosome study and thalassemia diagnosis	**15**
■ Elderly gravida with fetal risk for Hb Bart's disease	6
■ Elderly gravida with fetal risk for homozygous beta thalassemia	2
■ Elderly gravida with fetal risk for beta thalassemia/Hb E	5
■ Previous trisomy 21 with fetal risk for beta thalassemia/Hb E	1
■ Thickening nuchal translucency	1

Prevention and Control Thalassemia Program

1) Genetic counseling
2) Identificaion of pregnancy at risk
   - 2.1 Retrospective screening (history review for known risk)
   - 2.2 Prospective screening
     - Screening test
       - MCV or 2 min OF (2-minute osmotic fragility test)
       - HbE screening test (only if MCV or 2 min OF is negative)
     - Diagnostic test (if both of the couple are positive screening test)
       - HbA_2 level & PCR for α-thal1 if MCV (2 min OF) is positive
       - HbA_2 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 = ≤ 78 fl +ve % HbA2 = HbA2 > 4%

PROSPECTIVE SCREENING FOR THALASSEMIA PROGRAM 2020

	Number
Total number of pregnant screened	913
Positive MCV or Hb E	147
Number of couple at risk for thalassemia	22
■ Risk for Hb Bart's	8
■ Risk for Beta-thalassemia major	5
■ Risk for Beta thalassemia/Hb E	9
The choice which selected by couples	
■ Cordocentesis	11
■ Chorionic villus sampling	4
■ Amniocentesis	1
■ Ultrasonography	3
■ Not PND [risk for mild thassemia]	2
■ No data	1
Result of PND	
■ Hb bart's	0
■ Beta thalassemia major	1
■ Beta thalassemia/Hb E	0

Down Syndrome Screening (2020)

Total 12,040 cases (NHSO)

Trimester	Risk			Total
	Low	Intermediate	High	
Second	11,211 (93.11%)	-	829 (6.89 %)	12,040

Total 452 cases (Service cases)

Trimester	Risk		Total
	Low	High	
First	323 (96.13%)	13 (3.87%)	336
Second	106 (91.38%)	10 (8.62%)	116
Summary	429	23	452

High Risk Pregnancy

Number of patients approximately 400 cases

Management Guideline

Screening high risk patients at ANC

↓

High-risk Clinic

↓

Indicated for Antepartum surveillance

Prenatal diagnosis

Admission

↓

Closed monitoring both fetus and mother

High-risk patients at Maharaj Nakorn Chiang Mai Hospital in 2020

1.	Elderly Gravida (age of 35 years or more)	25.3 %
2	Teenage Pregnancy (age of less than 20 years)	2.3 %
	Early adolescence (age of less than 17 years)	*0.8 %*
	Late adolescence (age of 17-19 years)	*1.8 %*
3.	Pregnancy complicated with medical or obstetrical diseases	11.4 %

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