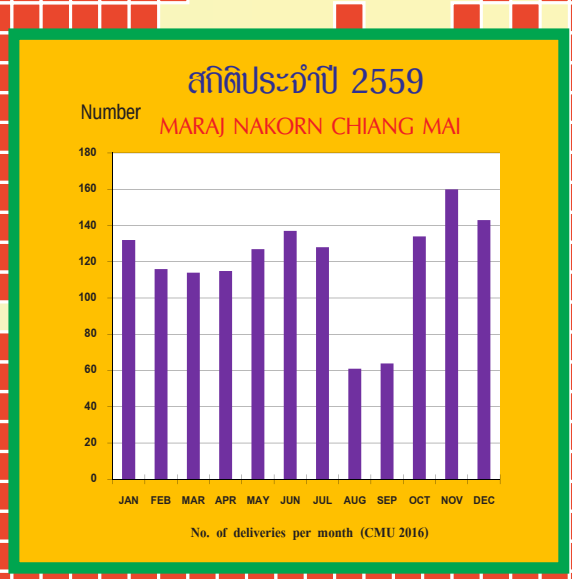
MATERNAL-FETAL MEDICINE 2016

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



หน่วยเวชศาสตร์มารดาและทารก
ภาควิชาสูติศาสตร์และนรีเวชวิทยา
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

ANNUAL REPORT 2016

MATERNAL-FETAL MEDICINE

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

FACULTY OF MEDICINE, CHIANG MAI UNIVERSITY

CHIANG MAI, THAILAND

MATERNAL-FETAL MEDICINE 2016

ASSOCIATE PROFESSOR PANNEE SIRIVATANAPA M.D.

PROFESSOR THEERA TONGSONG M.D.

ASSOCIATE PROFESSOR CHANANE WANAPIRAK M.D.

ASSOCIATE PROFESSOR Dr. WIRAWIT PIYAMONGKOL M.D.

ASSOCIATE PROFESSOR SUPATRA SIRICHOTIYAKUL M.D.

ASSOCIATE PROFESSOR FUANGLADA TONGPRASERT M.D.

ASSOCIATE PROFESSOR KASEMSRI SRISUPUNDIT M.D.

INSTRUCTOR SUCHAYA LUEWAN M.D.

INSTRUCTOR KUNTHAREE TRAISRISILP M.D.

INSTRUCTOR PHUDIT JATAVAN M.D.

RATANAPORN SEKARARITHI BSc.

ACHARAWAN YAMPOCHAI BSc.

APIRADEE TAGGAPICHITTI BSc.

UBOL LEOPREECHA

สถิติประจำปี 2559

อนุสาขาเวชศาสตร์มารดาและทารก

ภาควิชาสูติศาสตร์และนรีเวชวิทยา

คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

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รองศาสตราจารย์ แพทย์หญิง พรรณี ศิริวรรธนาภา
ศาสตราจารย์ นายแพทย์ ธีระ ทองสง
รองศาสตราจารย์ นายแพทย์ ชเนนทร์ วนาภิรักษ์
รองศาสตราจารย์ นายแพทย์ ดร. วีรวิทย์ ปิยะมงคล
รองศาสตราจารย์ แพทย์หญิง สุพัตรา ศิริโชติยะกุล
รองศาสตราจารย์ แพทย์หญิง เฟื่องลดา ทองประเสริฐ
รองศาสตราจารย์ แพทย์หญิง เกษมศรี ศรีสุพรรณดิฐ
อาจารย์แพทย์หญิง สุชยา ลือวรรณ
อาจารย์แพทย์หญิง กุณฑรี ไตรศรีศิลป์
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รัตนาภรณ์ เศขรฤทธิ์
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อภิรดี ตรรกไพจิตร
อุบล เลี่ยวปรีชา

PREFACE

The Department of Obstetrics and Gynaecology was founded in 1958, the same time as the establishment of Faculty of Medicine, Chiang Mai University which is the third medical school in Thailand. The Faculty of Medicine, Chiang Mai University and Maharaj Nakorn Chiangmai Hospital has grown continuously and become the biggest medical school in Northern Thailand. The department consists of 25 academic staff responsible for teaching and training of 742 medical students, 4 interns, 33 residents and 14 clinical fellows. There is also a growing number of visiting residents, clinical fellows, interns and medical students from others institutes.

This annual report shows obstetric data including low risk and high risk patients, obstetric procedures and obstetric complications. Moreover, it also contains prenatal diagnosis procedures and outcomes which were performed by the Maternal-Fetal Medicine (MFM) staff and their colleagues. Interestingly, the number of total delivery deerease continuously. Pregnancies in advanced age mothers increased significantly. The number of HIV positive patients is still the same. There are cases of amniocentesis for prenatal diagnosis of thalassemia.

During the recent years, the MFM unit acquired over 30 million bahts of funding mainly by Professor Theera Tongsong from Thailand Research Fund (TRF) and National Research Council of Thailand (NRCT) into the department, generating hundreds of scientific publications and several textbooks. Associate Professor Chanane Wanapirak is the head of the MFM unit. This report was contributed mainly by Professor Theera Tongsong and his colleagues.

Wirawit Piyamongkol, M.D., PhD
Head of Department, Associate Professor
Department of Obstetrics & Gynecology
Faculty of Medicine, Chiang Mai University
Chiang Mai 50200, Thailand
E mail: wirawit.p@cmu.ac.th

PREFACE

The annual report of maternal fetal medicine unit, Department of Obstetrics and Gynecology, Faculty of Medicine, Chiang Mai University, has been established since 1990 for serving our 3 main missions: education, research and service. During the past 25 years, there are many changes of data that affect our mission especially educational programs for medical students, OB-GYN residency program and maternal-fetal medicine (MFM) fellowship training.

This 2016 annual report has some interesting data that affect educational programs as mentioned above. Firstly, the total number of delivery is lowest since we started our service but close to 70% of cases considered high risk cases. This may show the obstetrics service in this area has been changed from our center to other hospitals which our graduated residents take responsibility. The cesarean section rate in our institution still shows gradually increasing from 15.8% in the year 2000 to 25.9% in the year 2016, again a new record. This increasing rate may be reflected from the combination of parental expectation, legal issue and training program. The rate of elderly pregnancy and other complicated pregnancies are on the rise. Trend of the technique using for prenatal diagnosis also shift to different one. All of these information are the signal for the academic sector of faculty to plan for medical students curriculum, OB-GYN residency program and maternal-fetal medicine (MFM) fellowship training. MFM's ultimate purpose is better maternal and fetal outcome, this goal might not be achieved if our management do not consider the fact which some of them are present in this report.

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

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

CONTENT

Page

Section III High-risk Pregnancies 65

Section IV Perinatal Investigations 91

ANNUAL REPORT

2016

MATERNAL-FETAL MEDICINE

Published : February 2017

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 2016: For gestational age ≥ 22 weeks
: 38 cases of total birth = 1,431 cases)

- ***Gestational age between 22-27 weeks 22 cases (57.89 %)***

	CMU	Referred	Total
Low risk	3	3	6
High risk	8	8	16
Autopsy	1	2	3

Causes of death

Causes of death	CMU	Referred	Total
1. Normally formed macerated stillbirth	0	0	0
2. Congenital malformations	1	1	2
3. Condition associated with immaturity	5	6	11
4. Asphyxia developed in labor	0	0	0
5. Other specific conditions	0	0	0
6. Therapeutic termination related to PND	5	4	9

Stillbirth 2016: For gestational age ≥ 28 weeks
: 10 cases of total birth = 1651 cases)

- ***Gestational age between ≥28 weeks 16 cases (42.11 %)***

	CMU	Referred	Total
Low risk	3	1	4
High risk	4	8	12
Autopsy	2	3	5

Causes of death

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

Stillbirth rate :

Stillbirth rate = 11.18 per 1000 total births
(by old WHO definition: ≥ 28 weeks or birth weight > 1000 grams)

Stillbirth rate = 26.55 per 1000 total births
(by new WHO definition : ≥ 22 weeks or birth weight > 500 grams)

Stillbirth rate = 19.56 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 2016 :

13 cases (GA > 22 weeks) of total 1349 live births

- ***Gestational age between 22-27 weeks 8 cases (61.53 %) (Total livebirth 1349 cases)***

	CMU	Referred	Total
Low risk	0	0	0
High risk	2	6	8
Autopsy	0	0	4

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	2	2	4
4. Asphyxia developed in labor	0	0	0
5.Other specific conditions	0	4	4
6. therapeutic termination related to PND	0	0	0

Neonatal death 2016 :

5 cases (GA > 28 weeks) of total 1551 live births

- ***Gestational age between ≥ 28 weeks 5 cases (38.46%) (Total livebirth 1349 cases)***

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

Causes of death

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

Early neonatal death rate 3.70 per 1,000 live births
(≥ 28 week's gestation or 1000 grams and died within first 7 days of life)

Early neonatal death rate 9.63 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 = 14.67 per 1000 total births
2. Gestational age ≥ 22 weeks (stillbirths + neonatal death)
   perinatal death rate = 35.63 per 1000 total births

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

MATERNAL DEATH

Total 1 cases

Maternal mortality rate 1 per 1349 livebirths

Causes of maternal death: (Referred case)

Postpartum hemorrhage

Summary

DATA	2016
Total birth (neonates)	1431
Stillbirth	38
22-27 weeks	22
≥ 28 weeks	16
Stillbirth rate/1000 births	
> 28 weeks / birthweight >1,000 gm	11.18
> 22 weeks / birthweight >500 gm	26.55
Early neonatal death	
• Early neonatal death rate / 1000 live birth (≥ 28 weeks)	3.70
• Early neonatal death rate / 1000 live birth (≥ 22 weeks)	9.63

Section II

GENERAL OBSTETRICS

TABLE 1 Distribution of Singleton & Multifetal Pregnancies

Type of pregnancy	Number	Percent
Singleton	1392	97.3
Twins	37	2.6
Triplet	2	0.1
Total	**1431**	**100.0**

TABLE 2 Categories of the Pregnant Women

	2015		2016	
	Number	Percent	Number	Percent
General Cases	1464	93.1	1336	93.8
Private Cases	108	6.9	89	6.2
Total	1572	100.0	**1425**	**100.0**

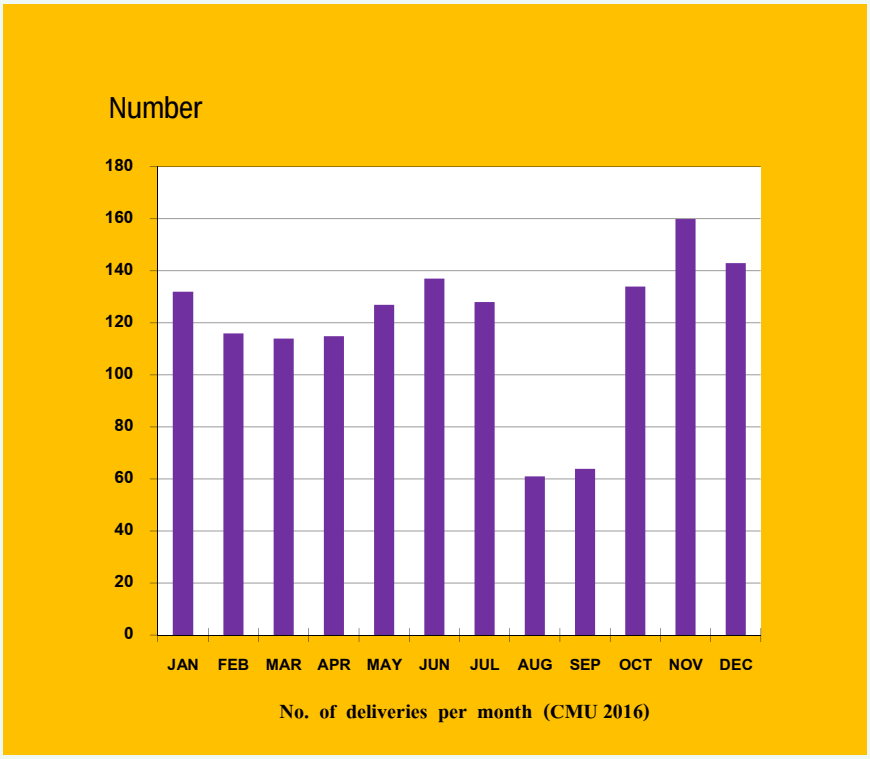
TABLE 3 Categories of the Pregnant Women

	Number	Percent
ANC at Maharaj Nakorn Chiang Mai Hospital	1095	76.8
Private Clinic	89	6.2
ANC at Other Hospitals	212	14.9
No ANC	29	2.0
Total	**1425**	**100.0**

TABLE 4 Number and Percentage of Deliveries per month

Month	Number (Mothers)	Percent
January	132	9.2
February	116	8.1
March	114	8.0
April	115	8.0
May	127	8.9
June	137	9.6
July	128	8.9
August	61	4.3
September	64	4.5
October	134	9.4
November	160	11.2
December	143	10.0
Total	**1431**	**100.0**

FIGURE 1 Histogram : Number of Deliveries from January to December 2016



Total deliveries in 2009 = 2222 cases

Total deliveries in 2010 = 2089 cases

Total deliveries in 2011 = 1900 cases

Total deliveries in 2012 = 2059 cases

Total deliveries in 2013 = 1823 cases

Total deliveries in 2014 = 1686 cases

Total deliveries in 2015 = 1572 cases

Total deliveries in 2016 = 1431 cases

TABLE 5 Number and percentage of parturients by age

Age	Number	Percent	Age	Number	Percent
13	1	0.1	29	76	5.3
14	1	0.1	30	98	6.9
15	5	0.3	31	99	6.9
16	6	0.4	32	96	6.7
17	13	0.9	33	80	5.6
18	25	1.7	34	59	4.1
19	25	1.7	35	76	5.3
20	37	2.6	36	45	3.1
21	43	3	37	38	2.7
22	41	2.9	38	29	2
23	61	4.3	39	17	1.2
24	78	5.5	40	18	1.3
25	70	4.9	41	13	0.9
26	81	5.7	42	8	0.6
27	80	5.6	43	5	0.3
28	104	7.3	46	1	0.1
Total				1429	**100.0**

Average age (Mean±Standard deviation) 28.92±5.7 years

TABLE 6 Number and percentage of parturients by age group

Age Group	Number	Percent
10-14	2	0.1
15-19	74	5.2
20-24	260	18.2
25-29	411	28.8
30-34	432	30.2
35-39	205	14.3
40-44	44	3.1
45-50	1	0.1
Total	**1429**	**100.0**

Summary : Age of parturients

1. Adolescent Pregnancies (11-19 years) 76 (5.3 %)
   Early Adolescent Pregnancies (≤ 16 years) 13 (0.9 %)
   Late Adolescent Pregnancies (17-19 years) 63 (4.4 %)
2. Adult Pregnancies (20-34 years) 1103 (77.1%)
3. Elderly Pregnancies (≥ 35 years) 250 (17.5 %)

FIGURE 2 Histogram : Number of Parturients by Age

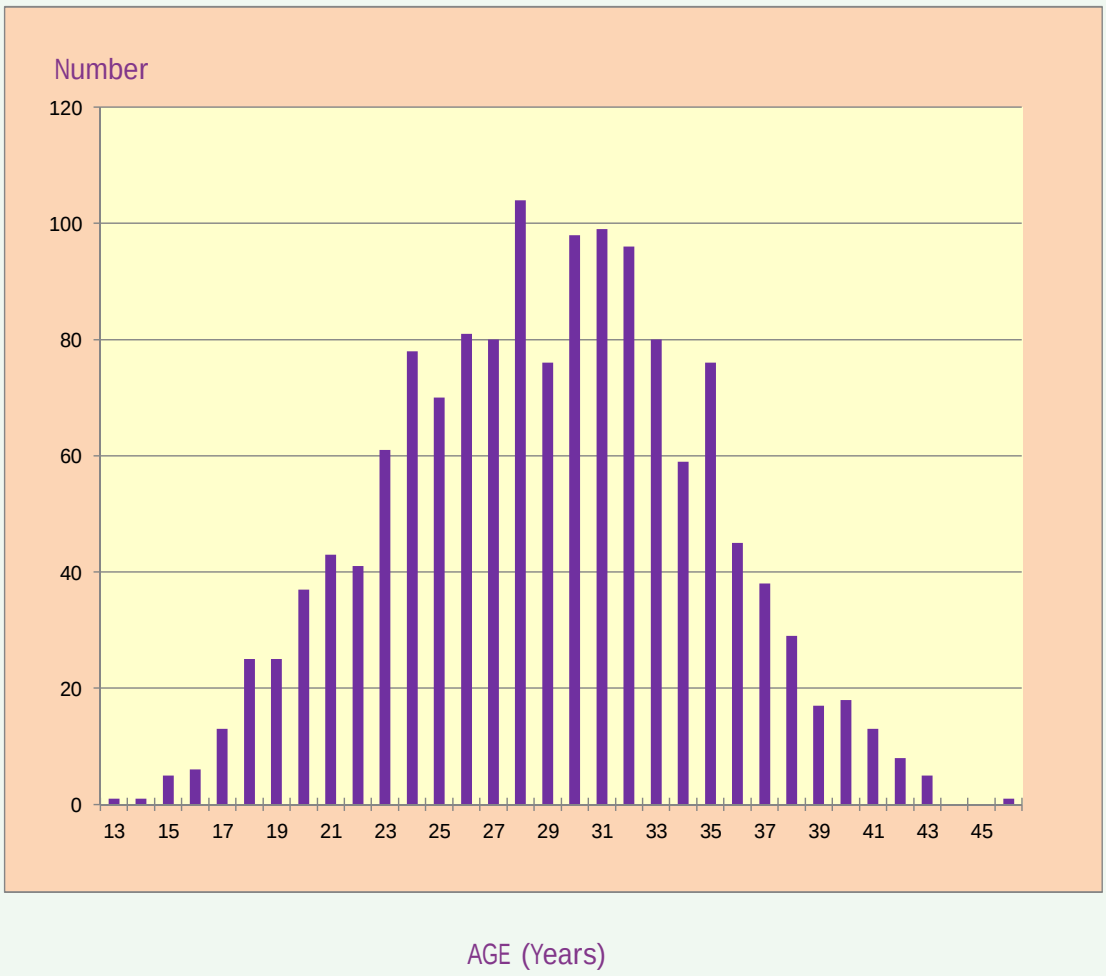


TABLE 7 Parity of parturients

Parity	Number	Percent
0	823	57.6
1	494	34.5
2	92	6.4
3	14	1.0
4	4	0.3
5	3	0.2
Total	**1430**	**100.0**

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

Nulliparous	57.6 %
Multiparous	42.4 %

FIGURE 3 Histogram : Number of parturients by parity

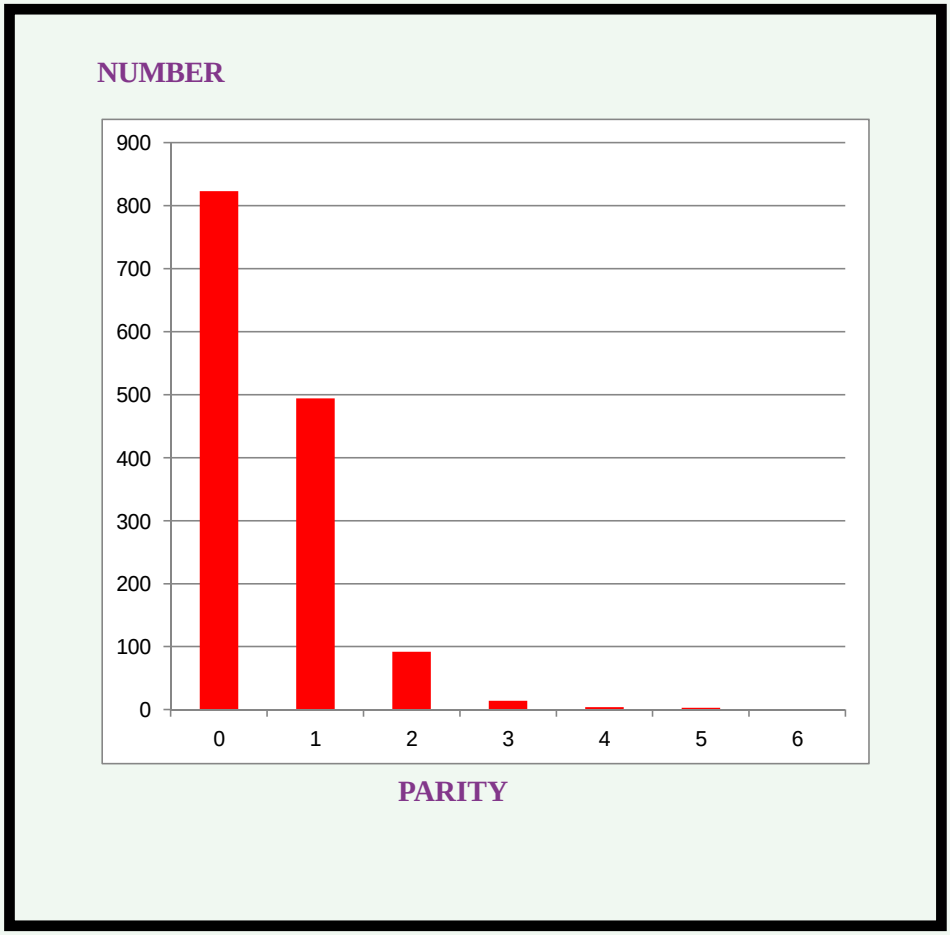
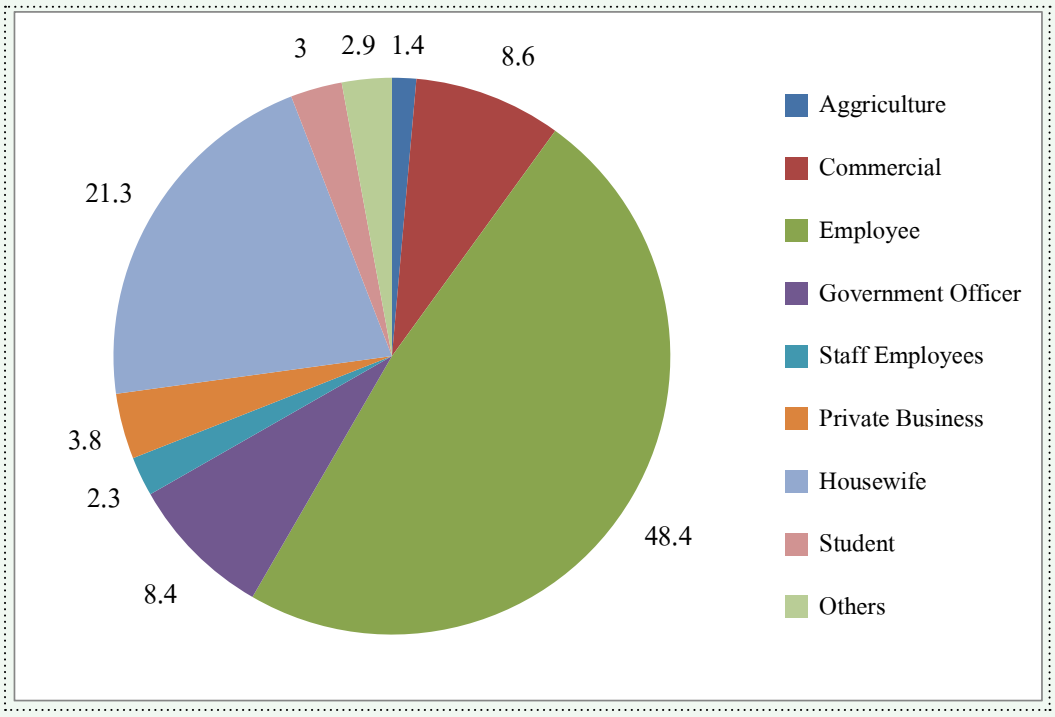


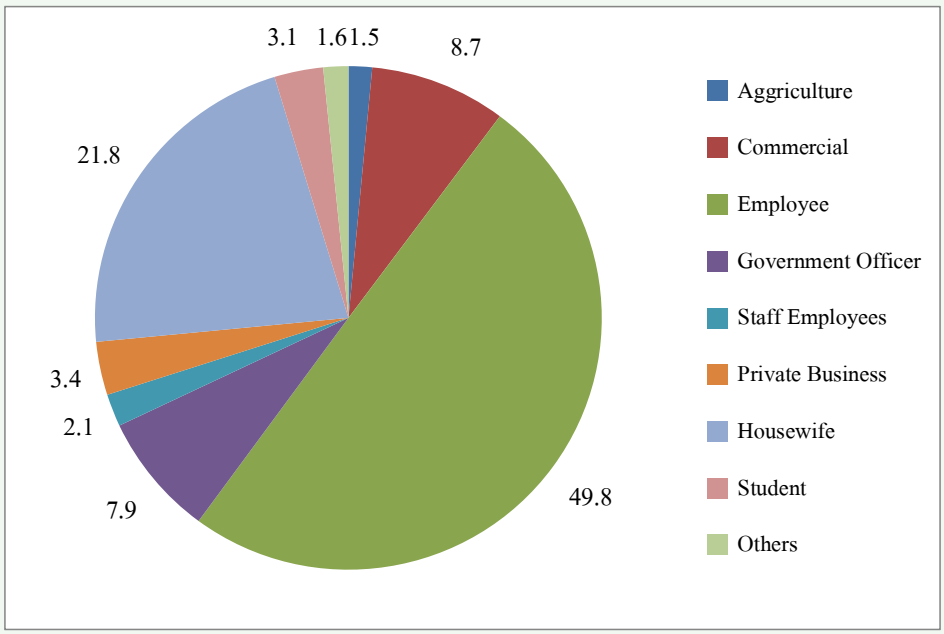
TABLE 8 Distribution of the occupations of the parturients

Occupations	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Aggriculture	20	1.4	20	1.5	0	0
Commercial	121	8.6	115	8.7	6	6.8
Employee	685	48.4	658	49.8	24	27.3
Government Officer	119	8.4	104	7.9	15	17
Private Business	54	3.8	45	3.4	9	10.2
Housewife	301	21.3	288	21.8	11	12.5
Student	43	3	41	3.1	1	1.1
State Enterprise	5	0.4	4	0.3	1	1.1
Staff Employee	32	2.3	28	2.1	4	4.5
Dentist	1	0.1	0	0	1	1.1
Physician	11	0.8	3	0.2	8	9.1
Phamacist	22	1.6	14	1.1	8	9.1
Total	**1414**	**100**	**1320**	**100**	**88**	**100**

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



OCCUPATIONS OF THE GENERAL PATIENTS



OCCUPATIONS OF THE PRIVATE PATIENTS

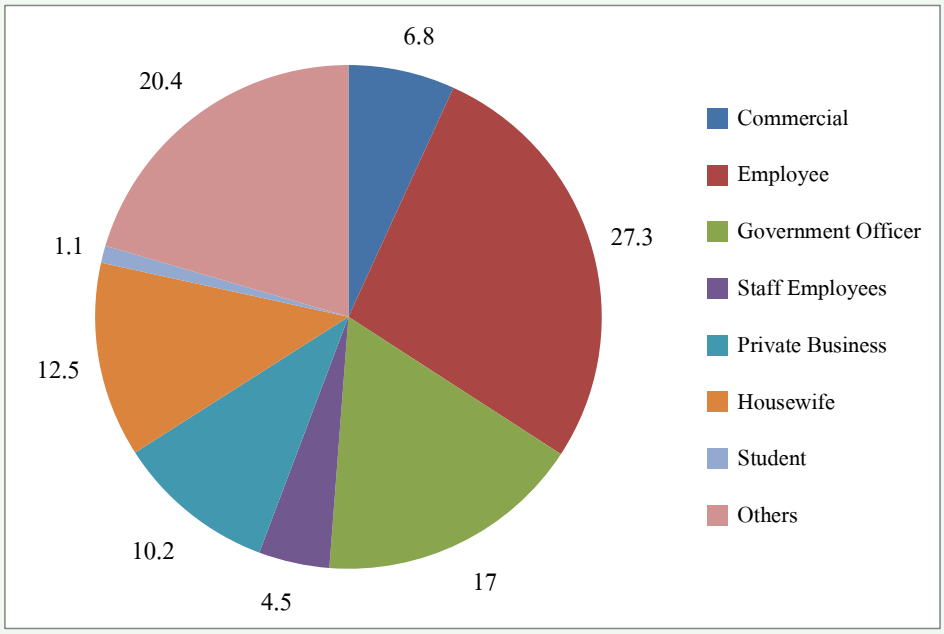
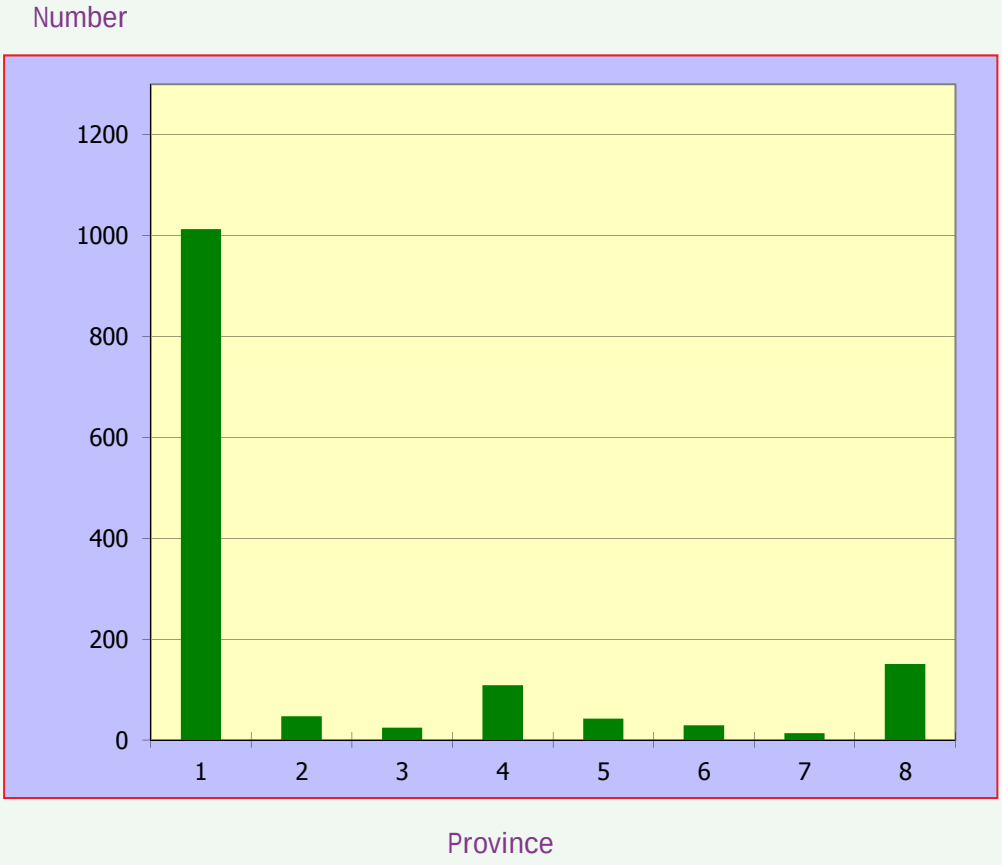


TABLE 9 Distributions of the residence (province) of the parturients

Province	Number	Percent
Chiang Mai (เชียงใหม่)	1013	70.8
Chiang Rai (เชียงราย)	47	3.3
Lampang (ลำปาง)	25	1.7
Lamphun (ลำพูน)	109	7.6
Maehongsorn (แม่ฮ่องสอน)	43	3.0
Payao (พะเยา)	29	2.0
Phrae (แพร่)	14	1.0
Others (อื่นๆ)	151	10.6
Total	**1431**	**100.0**

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

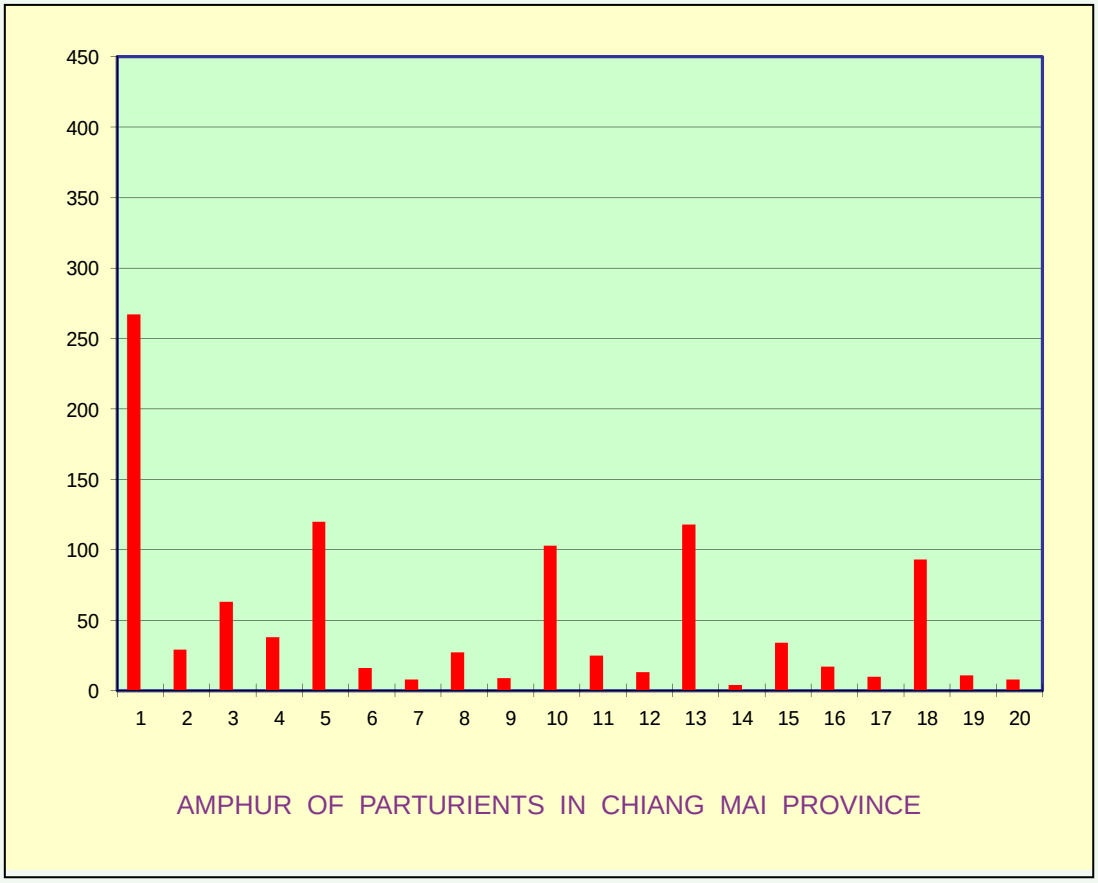


1. Chiang Mai (เชียงใหม่)
2. Chiang Rai (เชียงราย)
3. Lampang (ลำปาง)
4. Lamphun (ลำพูน)
5. Maehongsorn (แม่ฮ่องสอน)
6. Payao (พะเยา)
7. Phrae (แพร่)
8. Others (อื่นๆ)

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

	Amphur	Number	Percent
1.	Meung (เมือง)	267	26.4
2.	Maerim (แม่ริม)	29	2.9
3.	Doisaked (ดอยสะเก็ด)	63	6.2
4.	Sanpatong (สันป่าตอง)	38	3.8
5.	Hangdong (หางดง)	120	11.8
6.	Jomtong (จอมทอง)	16	1.6
7.	Mae-ai (แม่อาย)	8	0.8
8.	Prao (พร้าว)	27	2.7
9.	Hod (ฮอด)	9	0.9
10.	Sarapee (สารภี)	103	10.2
11.	Maetang (แม่แตง)	25	2.5
12.	Omkoi (อมก๋อย)	13	1.3
13.	Sankampang (สันกำแพง)	118	11.6
14.	Samoeng (สะเมิง)	4	0.4
15.	Chiangdao (เชียงดาว)	34	3.4
16.	Phang (ฝาง)	17	1.7
17.	Doitao (ดอยเต่า)	10	1.0
18.	Santrai (สันทราย)	93	9.2
19.	Maejam (แม่แจ่ม)	11	1.1
20.	Chaiprakarn (ไชยปราการ)	8	0.8
	Total	**1013**	**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	27	1.9	32	14	1.0
20	4	0.3	33	26	1.8
21	7	0.5	34	18	1.3
22	6	0.4	35	37	2.6
23	6	0.4	36	63	4.4
24	4	0.3	37	209	14.6
25	6	0.4	38	370	25.9
26	9	0.6	39	344	24.1
27	7	0.5	40	192	13.4
28	6	0.4	41	39	2.7
29	7	0.5	42	1	0.1
30	17	1.2	43	1	0.1
31	9	0.6			
Total				**1429**	**100.0**

Average of Gestational Age 36.96±4.5 Weeks

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

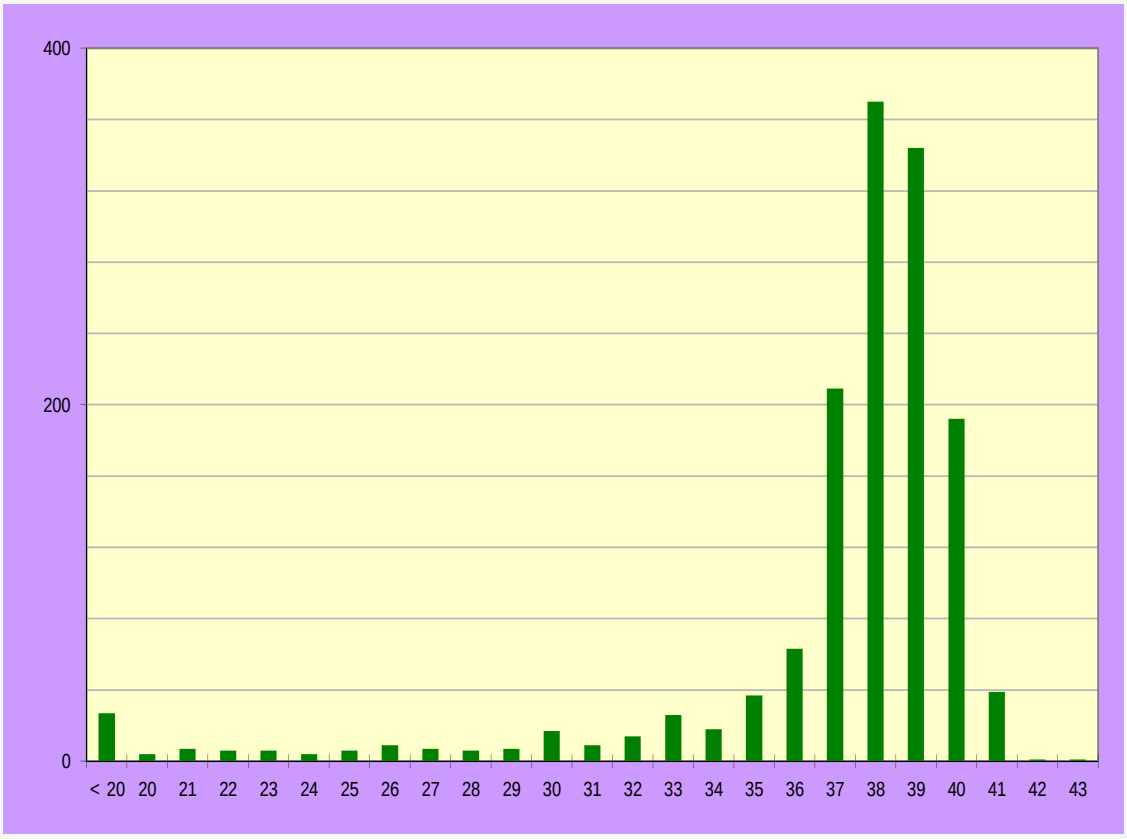


TABLE 12 Number and percentage of parturients by gestational age group in singleton pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 weeks)	27	1.9
Immature (20-27 weeks)	49	3.4
Premature (28-36 weeks)	196	13.7
Term (37-41 weeks)	1154	80.8
Postterm (42 weeks or more)	2	0.1
Total	**1428**	**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
15	1	2.7
22	1	2.7
27	2	5.4
28	1	2.7
31	1	2.7
32	3	8.1
33	6	16.2
35	8	21.6
36	2	5.4
37	9	24.3
39	1	2.7
40	2	5.4
Total	**37**	**100.0**

Average of Gestational Age 33.73±4.9 Weeks

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

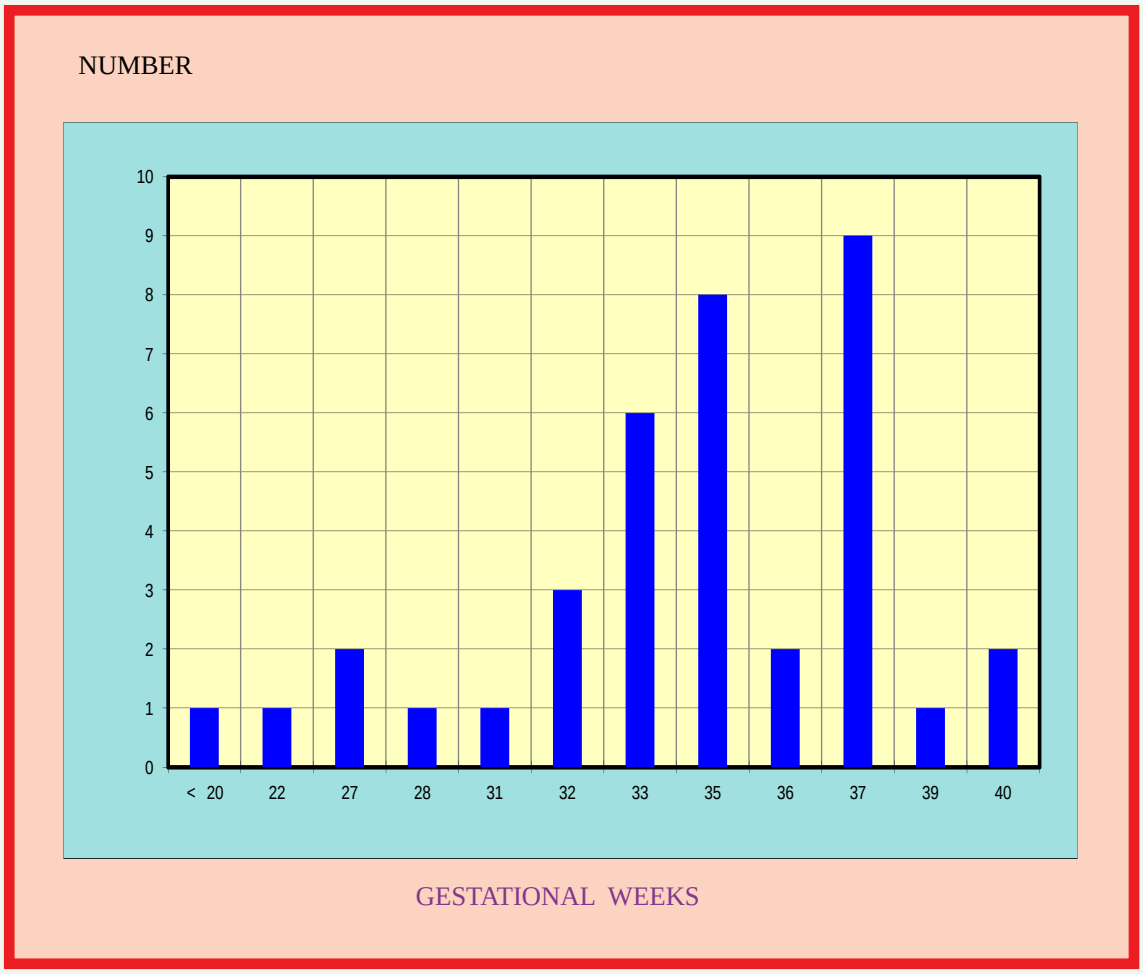


TABLE 14 Number and percentage of parturients by gestational age group in twin pregnancies.

Gestational Age Group	Number	Percent
Abortion (< 20 week)	1	2.7
Immature (20-27 weeks)	3	8.1
Preterm (28-36 weeks)	21	56.8
Term (37-41 weeks)	12	32.4
Total	**37**	**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	64	4.5
1	41	2.9
2	46	3.2
3	67	4.7
4	61	4.3
5	75	5.2
6	66	4.6
7	74	5.2
8	103	7.2
9	115	8.0
10	152	10.6
11	206	14.4
12	158	11.0
13	114	8.0
14	50	3.5
15	24	1.7
16	12	.8
17	1	0.1
18	1	0.1
20	1	0.1
Total	**1431**	**100.0**

Attending ANC at other hospitals 20.2 % of total parturients

FIGURE 9 Histogram : Number of ANC attendances of general patients

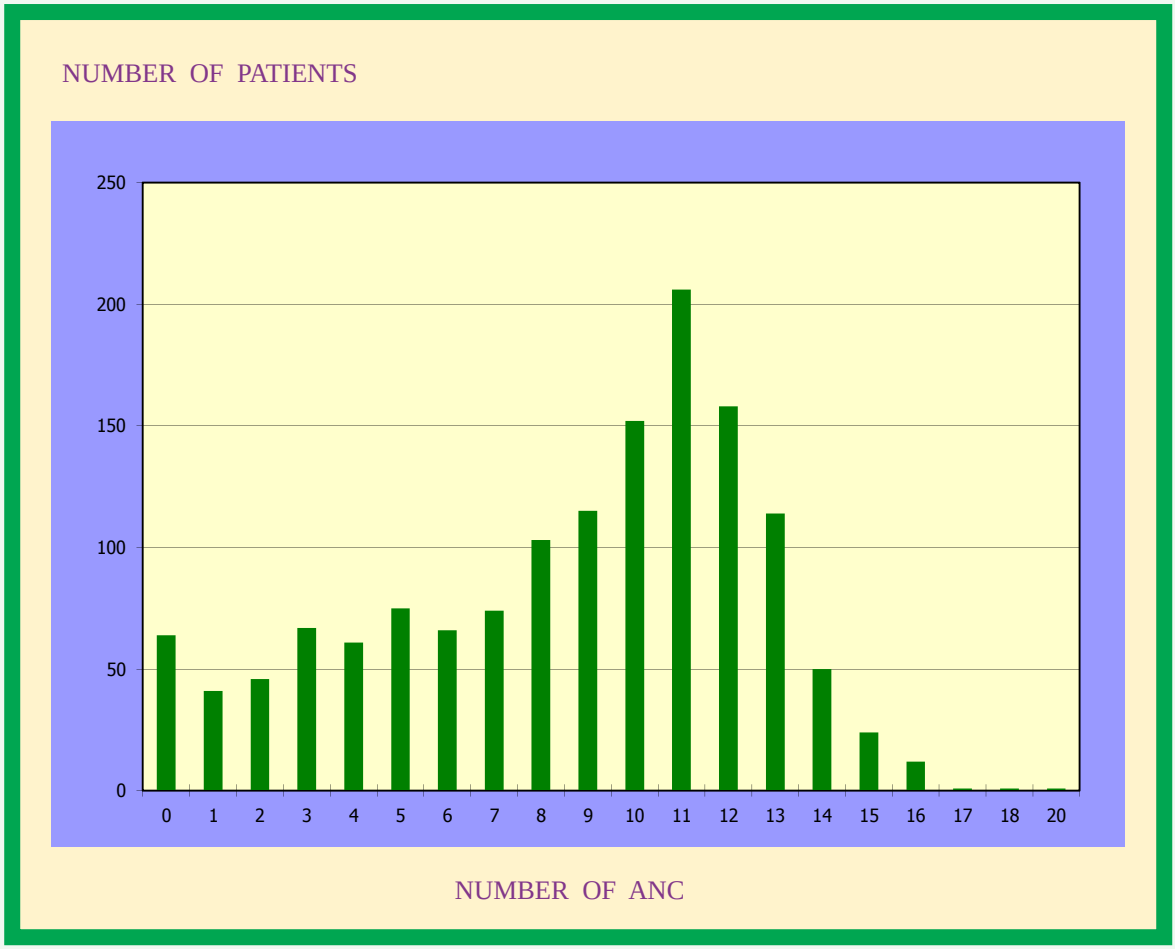


TABLE 16 Number of antenatal care attendance : General patients (not include the patients attending ANC at other hospitals)

Number of ANC	Number of Parturients	Percent
4 or more	1213	84.8
1-3	154	10.8
No ANC	64	4.5
Total	**1431**	**100.0**

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

Inadequate ANC 15.3 %

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

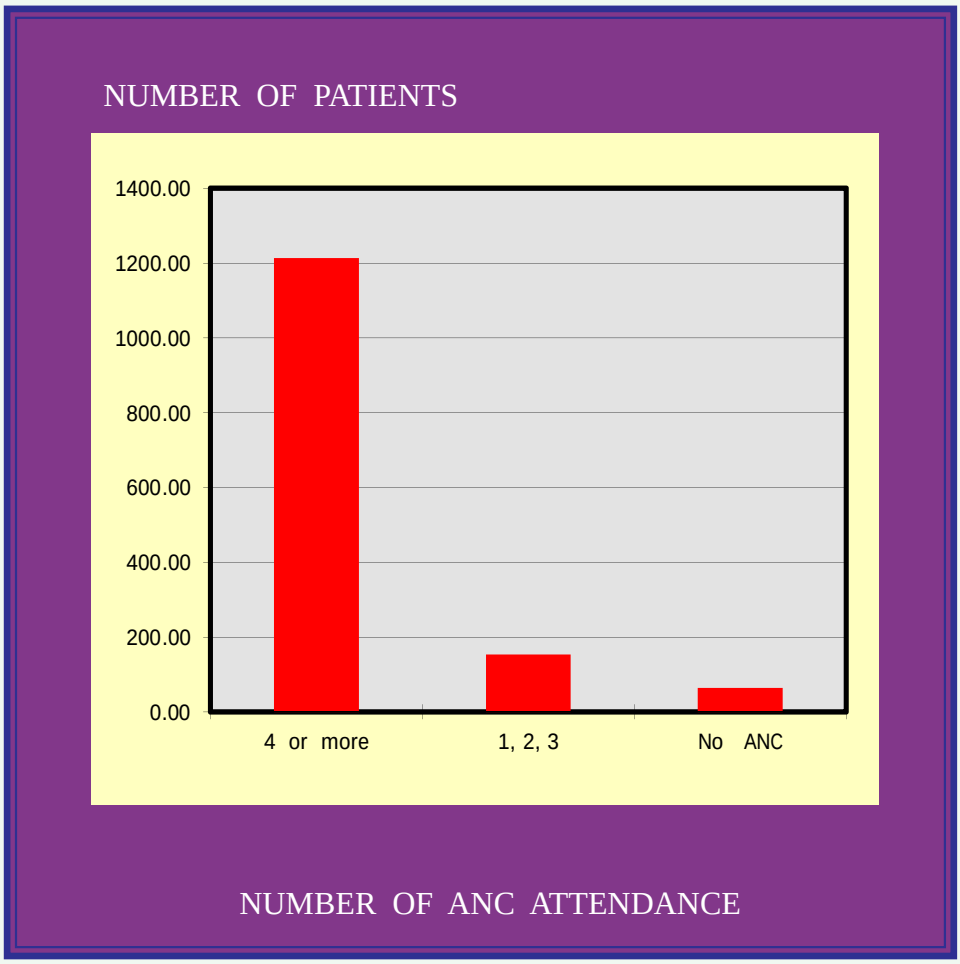
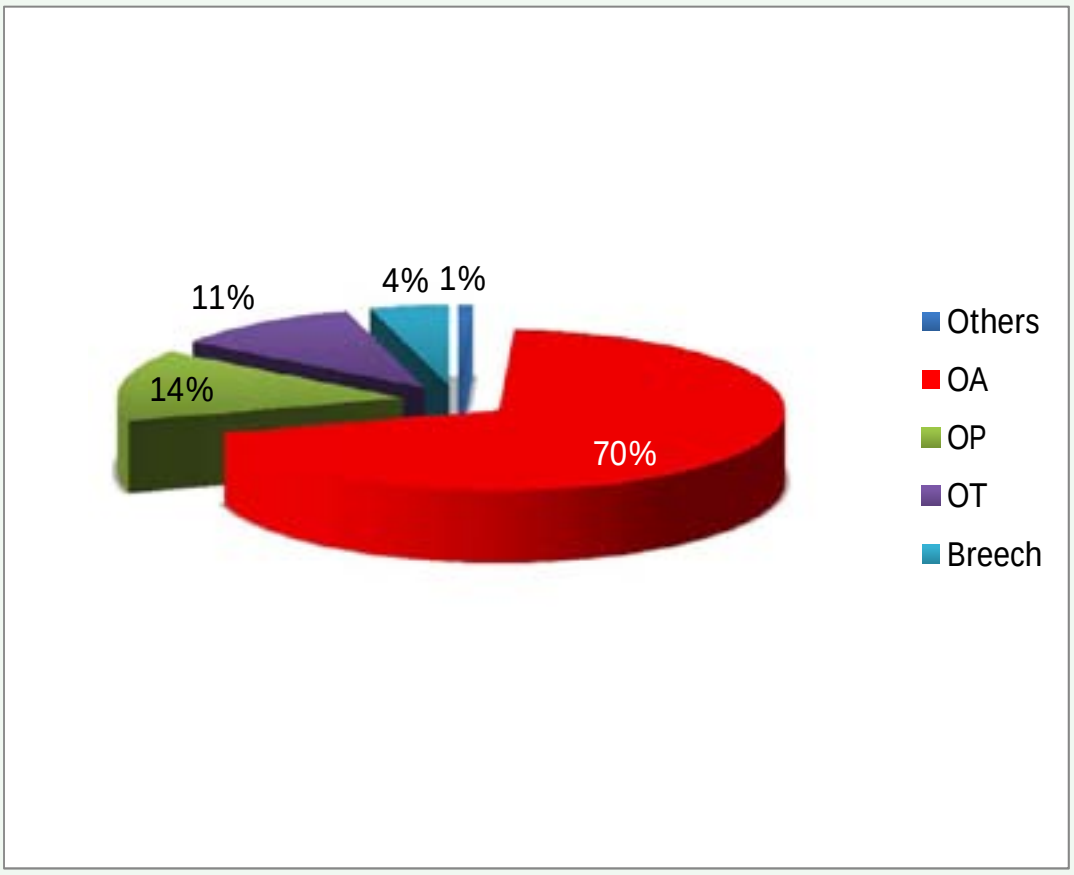


TABLE 17 Distribution of fetal presentations in labor (Singleton)

Fetal Presentation	Percent
Vertex	94.7
Breech	4.2
Transverse lie	0.4
Compound	0.2
Face	0.2
Others	0.3

Breech Presentation was 4.2 % of Total Birth

FIGURE 11 Proportion of fetal presentations during labor



OA = occiput anterior, OP = occiput posterior, OT = occiput transverse

TABLE 18 Mode of delivery: General and private patients

Singleton

Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Normal Delivery	973	68.0	923	68.8	50	56.2
Forceps Delivery	15	1.0	13	1.0	2	2.2
Vacuum Delivery	52	3.6	51	3.8	1	1.1
Cesarean Section	370	25.9	338	25.2	32	36.0
Vaginal Breech Delivery	13	0.9	11	0.8	2	2.2
Other*	8	0.6	6	0.4	2	2.2
Total	**1431**	**100.0**	**1342**	**100.0**	**89**	**100.0**

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

Twins

Mode of Delivery	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	22	59.5	16	53.3	6	85.7
Vaginal Delivery	22	59	14	46.7	1	14.3
Total	**37**	**100.0**	**30**	100.0	**7**	**100.0**

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

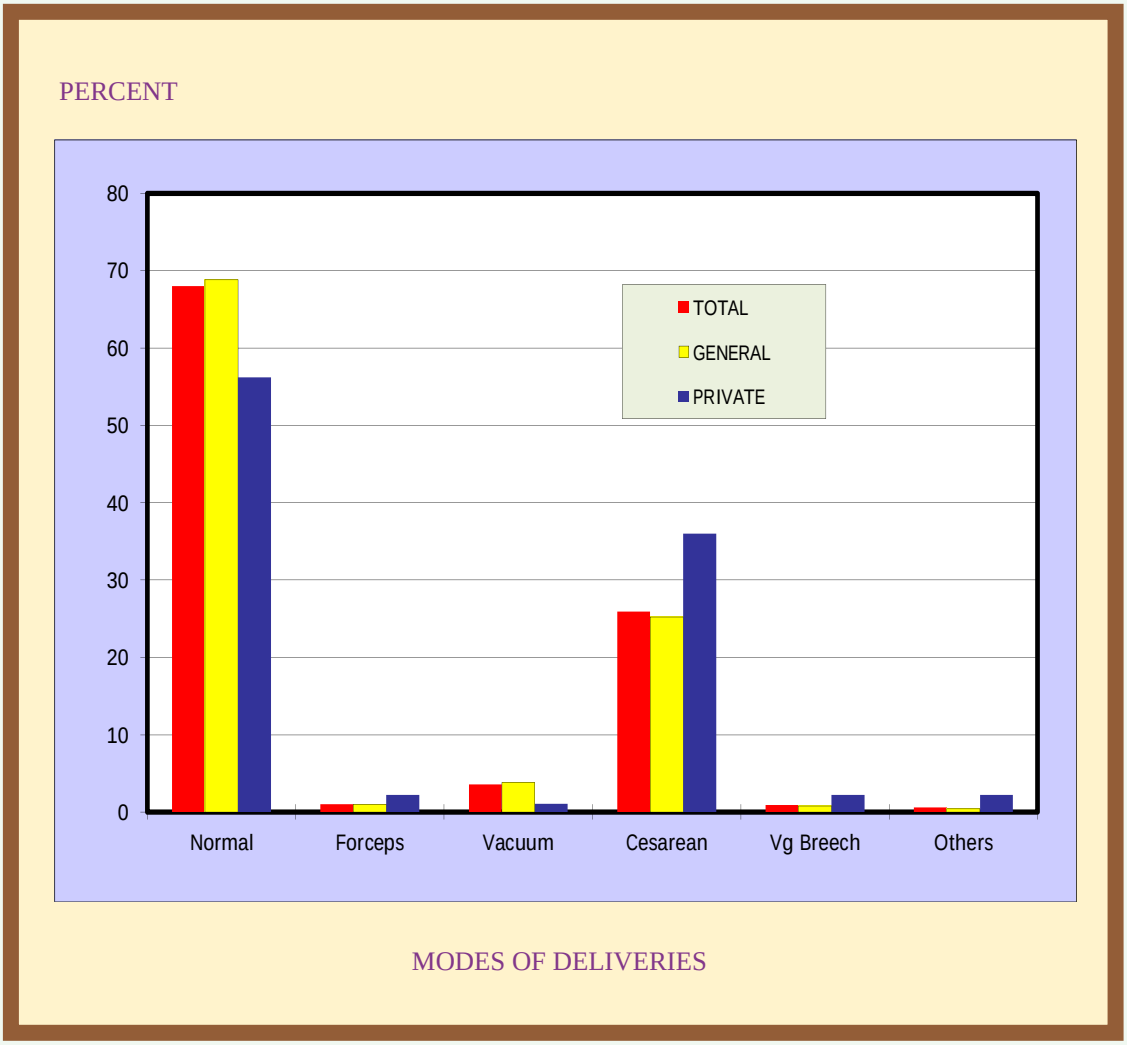


TABLE 19 Modes of delvieries in breech presentation : general and private patients (Singleton)

Mode of Deliv-eries	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Cesarean Section	47	78.3	45	80.4	2	50.0
Assisting Mauricceau-Smelliveit	10	16.7	9	16.1	1	25.0
Total Extrac-tion Mauric-ceau-Smelliveit	2	3.3	1	1.8	1	25.0
Spontaneous Breech	1	1.7	1	1.8	4	100.0
Total	**60**	**100.0**	**56**	**100.0**	**4**	**100.0**

Total Cesarean Section Rate in Breech presentation 78.3 %

(General patients; 80.4 %, Private patients; 50.0%)

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

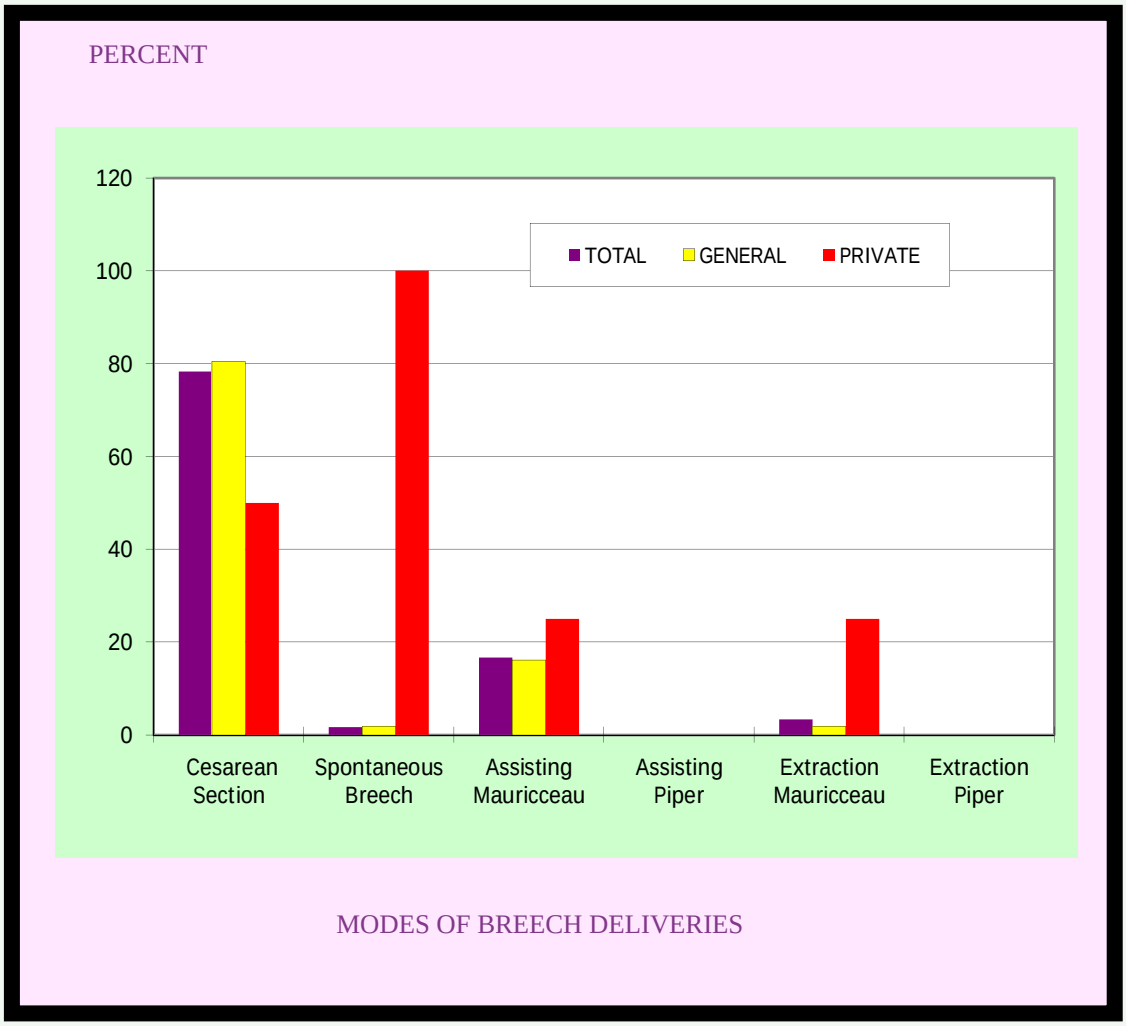


TABLE 20 Frequency of cesarean deliveries according to diagnostic indication (Singleton)

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
CPD	100	28.9	95	29.7	5	19.2
Previous C/S	112	32.4	106	33.1	6	23.1
Breech presentation	46	13.3	44	13.8	2	7.7
Fetal distress	32	9.2	27	8.4	5	19.2
Placenta previa	12	3.5	12	3.8	-	-
PIH	11	3.2	9	2.8	2	7.7
HIV positive	3	.9	3	.9	-	-
Abruptio placentae	5	1.4	5	1.6	-	-
Malpresentation	8	2.3	6	1.9	2	7.7
Others	17	4.9	13	4.1	4	15.4
Total	**346**	**100.0**	**320**	**100.0**	**26**	**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	6.7	1	7.7	1	50.0
Expected prolonged second stage	1	6.7	-	-	-	-
Poor expulsive force & training	11	73.3	10	76.9	1	50.0
Maternal disease	2	13.3	2	15.4	-	-
Others (OPP, failed vaccuum, etc)	-	-	-	-	-	-
Total	**15**	**100.0**	**13**	**100.0**	**2**	**100.0**

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

Indications	Total		General		Private	
	Number	Percent	Number	Percent	Number	Percent
Fetal distress	16	30.8	16	31.4	-	-
Expected prolonged second stage	2	3.8	2	3.9	-	-
Poor expulsive force & training	20	38.5	19	37.3	1	100.0
Maternal disease	12	23.1	12	23.5	-	-
Others	2	3.8	2	3.9	-	-
Total	**52**	**100.0**	**51**	**100.0**	**1**	**100.0**

TABLE 23 Sex of Fetuses (Including Multiple Pregnancies)

Sex	Number	Percent
Male	728	49.6
Female	721	49.1
Unspecified	18	1.2
Total	**1467**	**100.0**

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

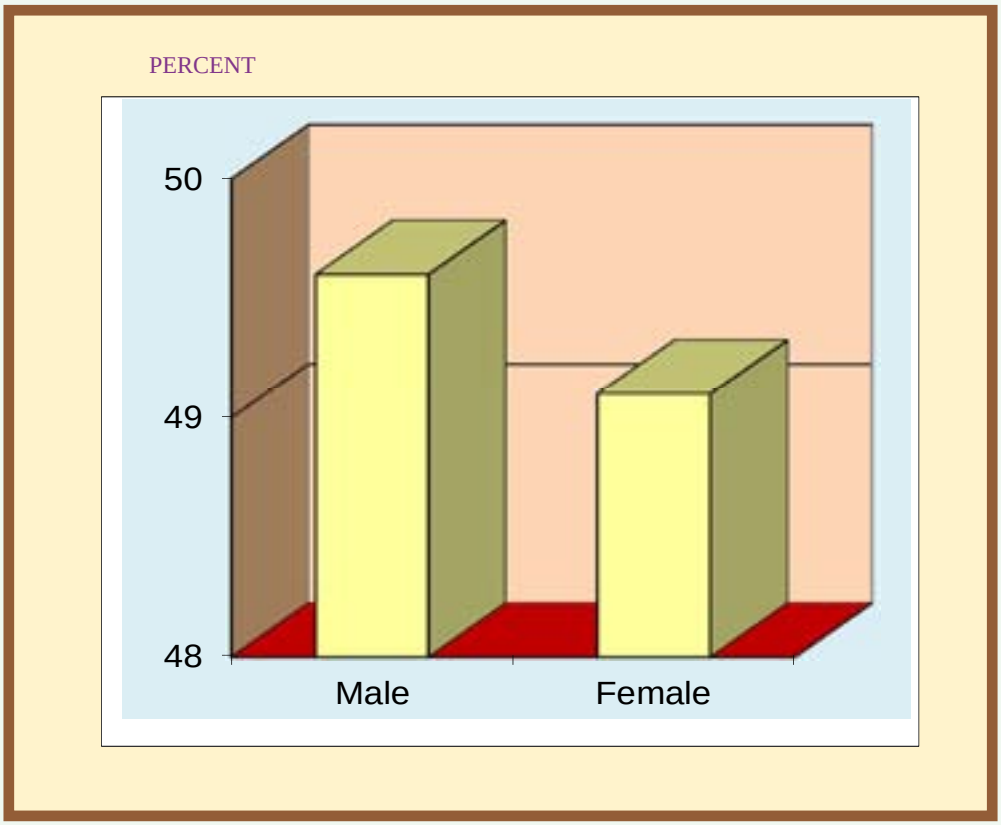


TABLE 24 Apgar score at 1 minute of total neonates

Apgar Scores	Number	Percent
0-3 (severe depression)	112	7.6
4-6 (mild depression)	79	5.4
7-10 (no depression)	1279	87.0
Total	**1470**	**100.0**

TABLE 25 Apgar score at 5 minutes of total neonates

Apgar Score	Number	Percent
0-3 (severe depression)	96	6.5
4-6 (mild depression)	25	1.7
7-10 (no depression)	1348	91.8
Total	**1469**	**100.0**

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

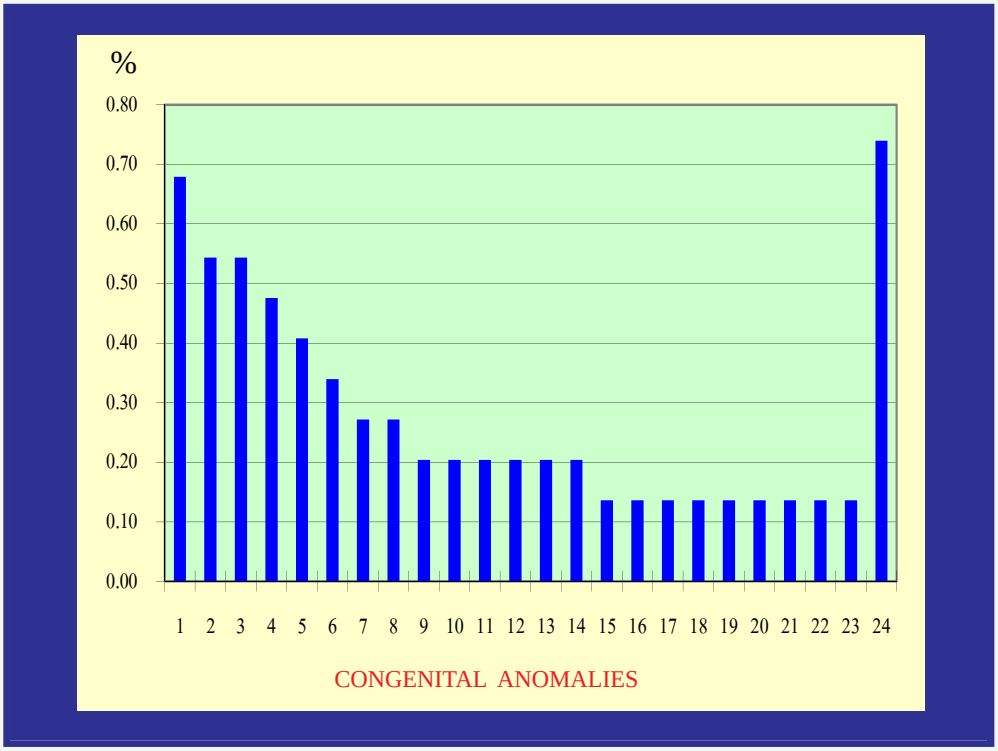
Apgar Score	1-Minute		5-Minute	
	Number	Percent	Number	Percent
0	78	5.3	78	5.3
1	18	1.2	8	0.5
2	9	0.6	5	0.3
3	7	0.5	5	0.3
4	10	0.7	12	0.8
5	30	2.0	13	0.9
6	39	2.7	23	1.6
7	82	5.6	83	5.6
8	218	14.8	397	27.0
9	892	60.7	846	57.6
10	87	5.9	1470	100.0
Total	**1470**	**100.0**	**1470**	**100.0**

TABLE 27 Prenatal sonographic diagnosis of structural anomalies*

	Congenital Anomalies	Number	Percent
1	Cardiac anomaly	10	0.68
2	Multiple anomalies	8	0.54
3	Hydrops fetalis (other causes)	8	0.54
4	Hb Bart's hydrops	7	0.48
5	Trisomy 21	6	0.41
6	Limb abnormalities	5	0.34
7	Hydrocephalus	4	0.27
8	Neural tube defect	4	0.27
9	Cystic hygroma	3	0.20
10	Gastroschisis	3	0.20
11	Cleft lip / palate	3	0.20
12	Omphalocele	3	0.20
13	Bowel obstruction	3	0.20
14	Ear abnormalities	3	0.20
15	Trisomy 18	2	0.14
16	Hydronephrosis	2	0.14
17	Destructive brain lesion	2	0.14
18	Diaphragmatic hernia	2	0.14
19	Renal agenesis	2	0.14
20	Anencephaly	2	0.14
21	Skeleton dysplasia	2	0.14
22	Multicystic kidney	2	0.14
23	Cystic adenomatoid malformation	2	0.14
24	Others	11	0.74
		99	**6.72**

* 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)



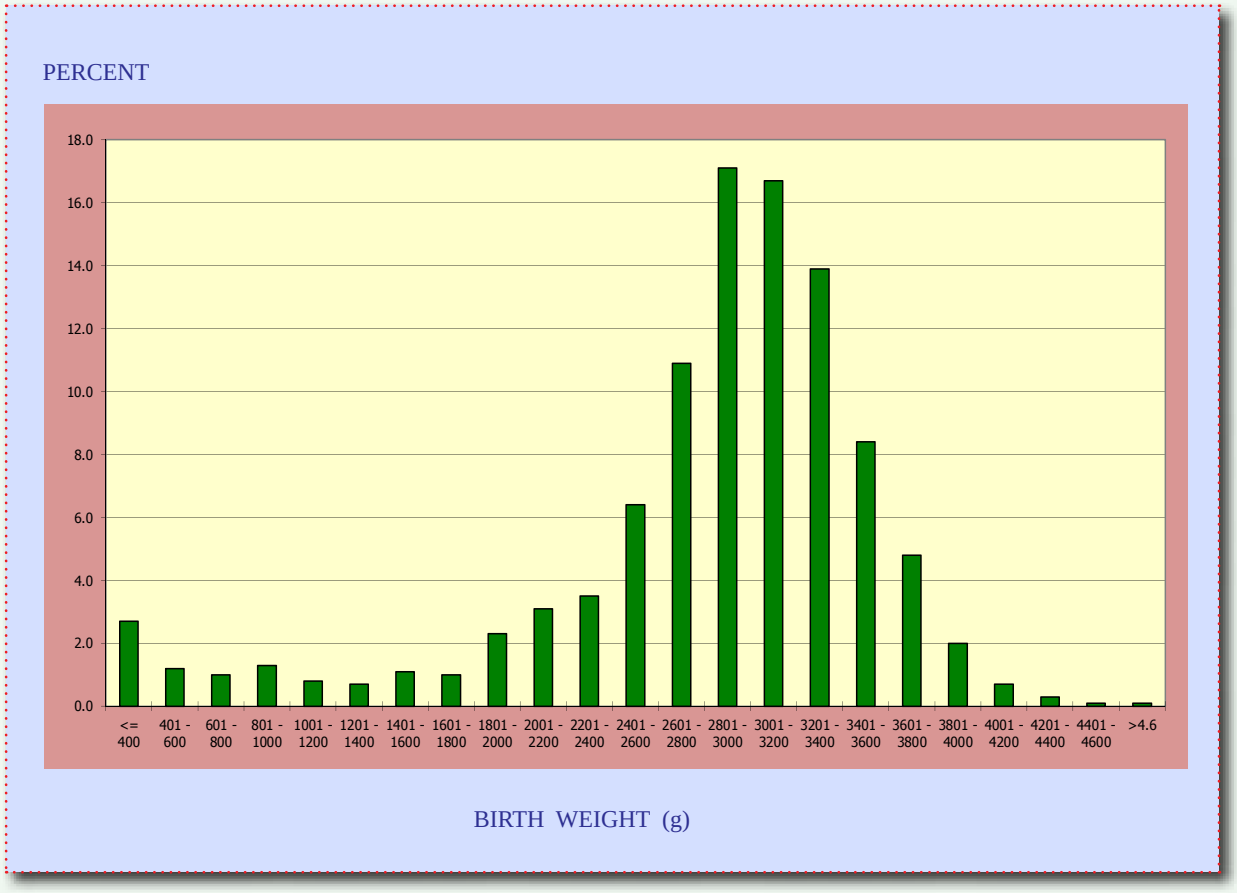
1	Cardiac anomaly	13	Bowel obstruction
2	Multiple anomalies	14	Ear abnormalities
3	Hydrops fetalis (other causes)	15	Trisomy 18
4	Hb Bart's hydrops	16	Hydronephrosis
5	Trisomy 21	17	Destructive brain lesion
6	Limb abnormalities	18	Diaphragmatic hernia
7	Hydrocephalus	19	Renal agenesis
8	Neural tube defect	20	Anencephaly
9	Cystic hygroma	21	Skeleton dysplasia
10	Gastroschisis	22	Multicystic kidney
11	Cleft lip / palate	23	Cystic adenomatoid malformation
12	Omphalocele	24	Others

TABLE 28 Number and percentage of neonates by birth weight*

Birth Weight (grams)	Number	Percent
≤ 400	39	2.7
401-600	18	1.2
601-800	15	1.0
801-1000	19	1.3
1001-1200	12	0.8
1201-1400	11	0.7
1401-1600	16	1.1
1601-1800	15	1.0
1801-2000	34	2.3
2001-2200	45	3.1
2201-2400	52	3.5
2401-2600	94	6.4
2601-2800	160	10.9
2801-3000	251	17.1
3001-3200	246	16.7
3201-3400	204	13.9
3401-3600	123	8.4
3601-3800	70	4.8
3801-4000	29	2.0
4001-4200	10	0.7
4201-4400	5	0.3
4401-4600	1	0.1
> 4600	1	0.1
Total	**1470**	**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)	47	3.3
Very low birth weight (1000-1499)	32	2.2
Low birth weight (1500-2499)	192	13.5
Average birth weight (2500-3999)	1138	79.8
Macrosomia (> 4000)	17	1.2
Total	**1426**	**100.0**

** Including therapeutic termination of pregnancy*

Average Birth Weight of Total Infants 2794 ± 794 grams

range 140-4635 grams

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

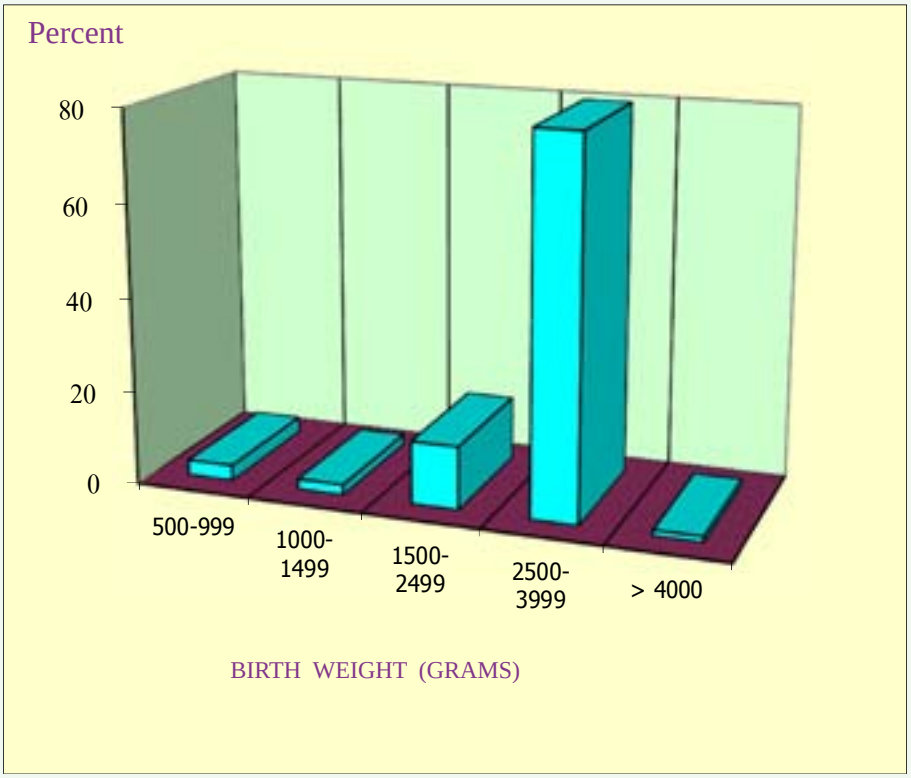


TABLE 30 Fetal weight (grams): the 10th, 50th, 90th percentile at various gestational age (singleton)

Gestational Age (weeks)	Weight (grams) 10th Percentile	Weight (grams) 50th Percentile	Weight (grams) 90th Percentile
20	270.00	315.00	.
21	320.00	400.00	.
22	300.00	480.00	.
23	320.00	575.00	.
24	500.00	590.00	.
25	465.00	695.00	.
26	560.00	815.00	.
27	350.00	600.00	.
28	750.00	1120.00	.
29	660.00	1080.00	.
30	884.00	1445.00	1916.00
31	1280.00	1510.00	.
32	962.00	1975.00	2876.00
33	1500.00	2110.00	2440.00
34	1882.00	2262.50	2729.00
35	2045.00	2470.00	2790.00
36	2066.00	2695.00	3204.00
37	2272.00	2850.00	3300.00
38	2580.00	3030.00	3530.00
39	2760.00	3170.00	3648.00
40	2871.00	3290.00	3695.00
41	2900.00	3285.00	3720.00

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

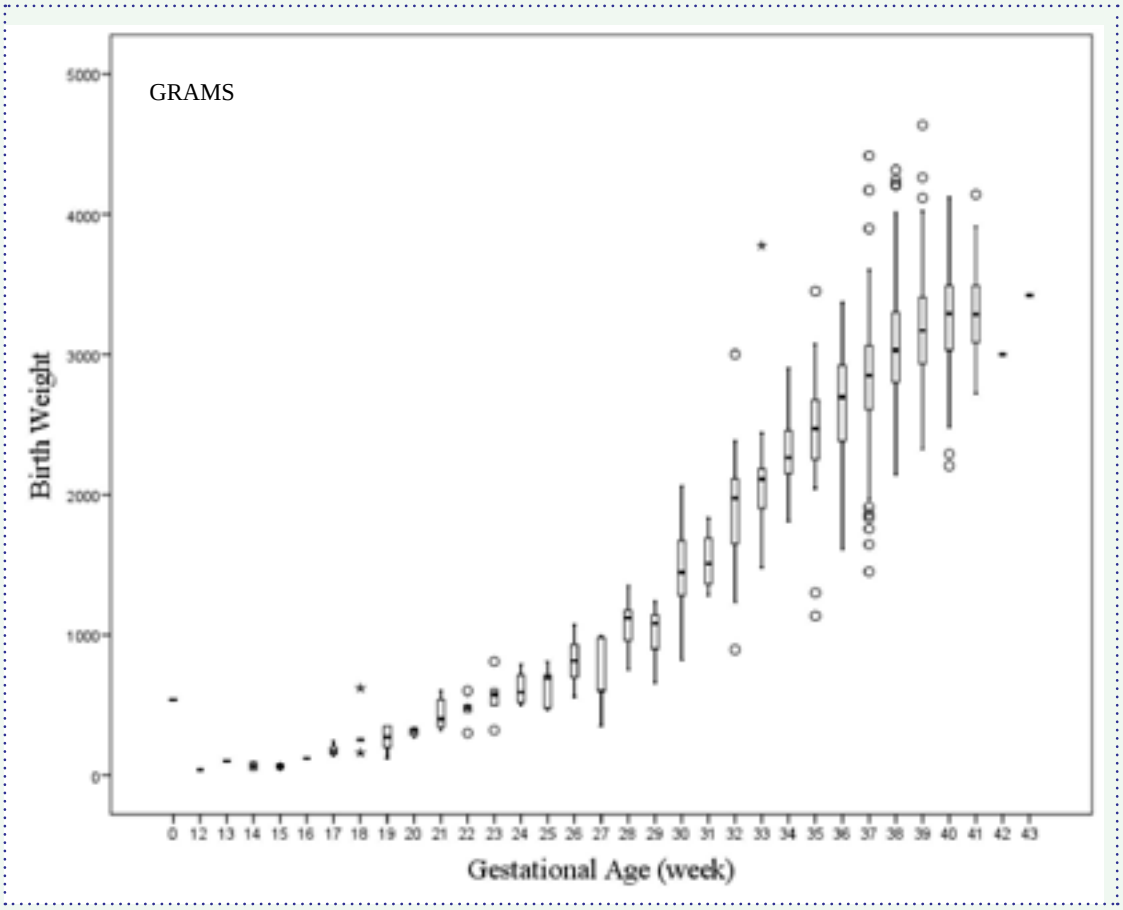


TABLE 31 Means and standard deviation of birth weight at various gestational age (singleton)

Gestational Age (weeks)	Number of Neonates	Means (grams)	Standard Deviation
20	4	310.0	31.6
21	7	441.4	120.3
22	5	466.0	108.5
23	6	565.0	160.6
24	4	617.5	129.2
25	6	643.3	139.4
26	8	815.0	171.5
27	5	705.0	277.4
28	5	1071.0	227.2
29	7	1008.6	205.2
30	17	1442.5	350.9
31	8	1531.3	204.0
32	11	1900.5	561.0
33	19	2121.6	473.0
34	18	2290.0	276.4
35	29	2422.8	448.4
36	61	2641.5	412.1
37	200	2819.7	417.1
38	370	3047.5	377.3
39	343	3181.2	348.1
40	190	3283.9	339.9
41	39	3285.1	314.0
42	1	3000.0	.
Total	**1390**	2845.8	765.4

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
15	2	45.0	7.1
22	2	435.0	120.2
27	4	826.3	57.9
28	2	1170.0	14.1
31	2	1722.5	194.5
32	6	1309.2	300.0
33	12	1929.2	201.9
35	16	2144.7	353.5
36	4	2453.8	471.2
37	17	2506.5	324.6
39	2	1852.5	81.3
40	3	2401.7	999.9
Total	**72**	**1926.5**	**763.2**

TABLE 33 Comparison of birth weight (singleton & twins)

Type	Means Birth Weight	Standard Deviation	Range
Singleton	2845.9	765	40-4635
Twins	1926.5	763	45-3715

TABLE 34 Comparison of gestational age (singleton & twins)

Type	Means Gestational Age	Standard Deviation	Range
Singleton	37.05	4.4	12-43
Twins	33.73	4.8	15-40

TABLE 35 Early postpartum morbidity

Cause	Number	Percent
Uterine Atony	24	1.68
Lacerations	5	0.35
Retained Pieces of Placenta	8	0.56
Placenta Adherens	3	0.21
Uterine infection	6	0.42
Total	**46**	**3.21**

Section III

HIGH RISK PREGNANCIES

TABLE 36 Major complications during pregnancy

Complications	Numbers	Prevalence (%)
Diabetes mellitus	222	15.51
Previous cesarean section	133	9.29
Intrauterine growth restriction	102	6.93
Pregnancy-induced hypertension	78	5.45
HBsAg positive	61	4.26
Breech presentation	60	4.19
Prolonged PROM (> 18 hours)	58	4.05
Iron deficiency anemia	35	2.45
Chronic hypertension	32	2.24
Marked obesity	28	1.78
HIV positive	24	1.68
Chorioamnionitis	22	1.54
Severe oligohydramnios	16	1.12
Asthma	15	1.05
Placenta previa	15	1.05
Systemic lupus erythematosus	15	1.05
Myoma uteri	14	0.98
Urinary tract infection	13	0.91
Thyrotoxicosis	13	0.91
Transverse lie	12	0.84
Polyhydramnios	10	0.7
Heart disease	9	0.63
Thalassemia	8	0.56
Epilepsy	7	0.49
Condyloma accuminata	4	0.28

Pregnancy with Heart Disease

Total 9 cases (0.63 percent of total parturients)
singleton : 8, twins : 1
(not included 1 case of therapeutic abortion)

Age range 21-36 years
average 28.0±4.5 years
age of 35 years or more 1 cases (11.1 %)

Functional Class (At delivery 9 cases)

Class I	6	cases
Class II	3	cases
Class III	-	cases
Class IV	-	case

Gestational Age at Birth
range 16-41 weeks (not included therapeutic abortion)
average 35.4±7.8 weeks
premature delivery (before completed 37 weeks)
3 cases (33.3 %)

Birth Weight
range 120-3610 grams
average 2480±927 grams
number of low birth weight fetus (less than 2,500 grams)
3 cases (33.3 %)

Apgar Scores at 1 minute (less than 7) 2 cases (22.2%)

Apgar Scores at 5 minutes (less than 7) 2 cases (22.2 %)

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

Perinatal death 2 (22.2%; 1 abortion, 1 dead in utero)

Congenital Anomalies -

Other complications (No maternal death)

Previous cesarean section	*1*	*case*
Prolonged PROM	*1*	*case*
Short stature	*1*	*case*
Dead fetus in utero	*1*	*case*

Pregnancy with Diabetes Mellitus

Total 222 cases (15.51 percent of total parturients)
(Singleton : 217, Twins : 5)

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

Age range 15-46 years
average 31.6±5.1 years
age of 35 years or more 65 cases (29.3%)

Gestational Age at Birth
range 17-41 weeks
average 37.7±2.6 weeks
premature delivery (before completed 37 weeks)
29 cases (13.1%)

Birth Weight
range 180-4415 grams
average 3001±621 grams
number of low birth weight fetus (less than 2,500 grams)
31 cases (14.0 %)

Apgar Scores at 1 minute (less than 7) 31 cases (14.0 %)

Apgar Scores at 5 minutes (less than 7) 10 cases (4.5 %)

Small-for-gestational-age (less than 10th percentile) 13 cases (5.9 %)

Perinatal Death 4 cases (1.8%) (immature 2; hydrops fetalis 2)

Congenital Anomalies 2 cases (1.7 %) (hydrops fetalis)

Other complications

Previous cesarean section	*24*	*(10.8%)*
PIH	*20*	*(9.0%)*
Chronic HT	*10*	*(4.5%)*
Polyhydramnios	*8*	*(3.6%)*
HBsAg positive	*7*	*(3.2%)*
Breech presentation	*5*	*(2.3%)*
Iron deficiency	*5*	*(2.3%)*
Prolonged PROM	*5*	*(2.3%)*
Marked Obesity	*5*	*(2.3%)*
Fever	*5*	*(2.3%)*
Myoma uteri	*4*	*(1.8%)*
Placenta previa	*3*	*(1.4%)*
SLE	*3*	*(1.4%)*
Asthma	*3*	*(1.4%)*
Short stature	*3*	*(1.4%)*
Oligohydramnios	*3*	*(1.4%)*
Thyrotoxicosis	*2*	*(0.9%)*
Transverse lie	*2*	*(0.9%)*
Rheumatoid arthritis	*1*	*(0.5%)*
Acute pyelonephritis	*1*	*(0.5%)*
Incompetent cervix	*1*	*(0.5%)*

Classifications

Pregestational DM (diagnosed before pregnancy) 39 cases (17.6 %)

Poorly controlled before pregnancy	*12 cases*
Overt DM with renal involvement	*10 cases*

Gestational DM (diagnosed during pregnancy) 183 cases (82.4 %)

GDM (Class A1)	*145 cases*
Overt DM (Class A2)	*38 cases*

Method of Glucose Control

Insulin	77 cases
Oral hypoglycemic drugs	15 cases
Oral hypoglycemic drugs & Insulin	28 cases
Diet Control only	102 cases

Pregnancy with Systemic Lupus Erythomatosus

Total 15 cases (1.05 percent of total parturients)
(Singleton : 14, Twins : 1)

Activity of the disease

Remission before pregnancies	8 cases
Active disease during pregnancies	7 cases
Hypertension	3 cases
Lupus nephritis	6 cases

Age range 18-34 years
average 26.3±5.5 years
age of 35 years or more 0 cases (0 %)

Gestational Age at Birth
range 19-40 weeks
average 36.7±5.0 weeks
premature delivery (before completed 37 weeks)
3 cases (20.0 %)

Birth Weight
range 120-3390 grams
average 2530±796 grams

number of low birth weight fetus (less than 2,500 grams) 6 cases (40.0 %)

Apgar Scores at 1 minute (less than 7) 4 cases (26.7%)

Apgar Scores at 5 minutes (less than 7) 3 cases (20.0 %)

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

Perinatal death 1 case (6.7 %; immaturity)

Congenital Anomalies -

Other complications

DM	*3*	*cases*
Iron deficiency	*2*	*cases*
Previous cesarean section	*1*	*case*
Chronic HT	*1*	*case*
pre-eclampsia	*1*	*case*
Fever	*1*	*case*
Oligohydramnios	*1*	*case*
Breech presentation	*1*	*case*

Pregnancy with Thyrotoxicosis

Total 13 cases (0.91 percent of total parturients)

All were singleton

Diagnosed before pregnancy 8 cases

Diagnosed during pregnancy 5 cases

Age range 21-39 years
average 29.8±5.5 years
age of 35 years or more 3 cases (23.1 %)

Gestational Age at Birth
range 21-40 weeks
average 36.5±4.8 weeks
premature delivery (before completed 37 weeks)
2 cases (15.4 %)

Birth Weight
range 600-4010 grams
average 2818±834 grams
number of low birth weight fetus (less than 2,500 grams)
3 cases (23.1 %)

Apgar Scores at 1 minute (less than 7) 2 cases (15.4 %)

Apgar Scores at 5 minutes (less than 7) 2 case (15.4 %)

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

Perinatal death 2 cases (15.4%; Immaturity 1; multiple anomalies 1)

Congenital Anomalies 1 case (multiple anomalies)

Other complications

Diabetes mellitus	*2 cases*
Previous cesarean section	*2 cases*
HIV positive	*1 case*
Nephrotic syndrome	*1 case*
Transverse lie	*1 case*

Pregnancy with Hepatitis B Antigen Positive

Total 61 cases (4.26 percent of total parturients)
Singleton : 59 (96.7 %); twins : 2 (3.3 %)

Age range 21-40 years
average 31.3±4.2 years
age of 35 years or more 15 cases (24.6 %)

Gestational Age at Birth
range 15-41 weeks
average 37.2±3.4 weeks
premature delivery (before completed 37 weeks)
14 cases (23.0 %)

Birth Weight
range 140-4205 grams
average 2849±589 grams
number of low birth weight fetus (less than 2,500 grams)
10 cases (16.4 %)

Apgar Scores at 1 minute (less than 7) 5 cases (8.2 %)

Apgar Scores at 5 minutes (less than 7) 4 cases (6.6 %)

Small-for-gestational-age (less than 10th percentile) 2 cases (3.3 %)

Perinatal Death 2 cases (3.3 %) (*immaturity 1; dead in utero 1*)

Congenital Anomalies 3 cases
(diaphragmatic hernia, gastroschisis, VSD)

Other complications

PDiabetes mellitus	*10*	*cases*
Previous cesarean section	*7*	*cases*
Prolonged PROM (> 18 hours)	*4*	*cases*
Pregnancy-induced hypertension	*2*	*cases*
Breech presentation	*2*	*cases*
Chronic HT	*1*	*case*
Iron deficiency	*1*	*case*
VDRL positive	*1*	*case*
Oligohydramnios	*1*	*case*

Pregnancy with Asthma

Total 15 cases (1.05 percent of total parturients)
(All were singleton; 15)

Activity of Disease

Well-controlled	12	cases
Poorly-controlled	3	cases

Age range 19-43 years
average 29.3±7.2 years
age of 35 years or more 2 cases (13.3 %)

Gestational Age at Birth
range 21-40 weeks
average 36.2±4.9 weeks
premature delivery (before completed 37 weeks)
5 cases (33.3 %)

Birth Weight (not included abortion)

range 400-4080 grams

average 2785±911 grams

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

3 cases (20.0 %)

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

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

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

Perinatal death 1 (6.7 %)

Congenital Anomalies 1 case (Trisomy 21)

Other complications

Diabetes Mellitus	*3*	*cases*
Previous cesarean section	*1*	*case*
Chronic HT	*1*	*case*
Iron deficiency	*1*	*case*
Pregnancy-induced hypertension	*1*	*case*
Acute pyelonephritis	*1*	*case*
Prolonged PROM	*1*	*case*
Birth before admission	*1*	*case*

Pregnancy with Chronic Hypertension

Total 32 cases (2.24 percent of total parturients)
Singleton : 32

Severity of Hypertension

Severe (start treatment during pregnancy)	6	cases
Severe (controlled prior to pregnancy)	9	cases
Mild (no medication BP less than 160/90)	9	cases
Mild (BP less than 160/90 but treated with antihypertensive drug)	8	cases

Age range 21-40 years
average 31.0±4.9 years
age of 35 years or more 7 cases (21.9 %)

Gestational Age at Birth
range 17-40 weeks
average 35.8±4.7 weeks
premature delivery (before completed 37 weeks)
7 cases (21.9 %)

Birth Weight
range 180-4245 grams
average 2597±920 grams
number of low birth weight fetus (less than 2,500 grams)
9 cases (28.1 %)

Apgar Scores at 1 minute (less than 7) 8 cases (25.0 %)

Apgar Scores at 5 minutes (less than 7) 5 cases (15.6 %)

Small-for-gestational-age (less than 10th percentile) 4 cases (12.5 %)

Perinatal death 2 cases (6.3%; immaturity 1, hydrops fetalis 1)

Congenital Anomalies 1 case (hydrops fetalis)

Other complications

Diabetes Mellitus	*10*	*cases*
Pregnancy-induced hypertension	*5*	*cases*
Previous cesarean section	*4*	*cases*
Marked Obesity	*2*	*cases*
Oligohydramnios	*2*	*cases*
Breech presentation	*2*	*cases*
HBsAg positive	*1*	*case*
HIV positive	*1*	*case*
Systemic lupus erythematosus	*1*	*case*
Myoma uteri	*1*	*case*
Asthma	*1*	*case*
Prolonged PROM > 18 hours	*1*	*case*
Birth before admission	*1*	*case*

Pregnancy-induced Hypertension

Total 78 (5.48 percent of total parturients)
Singleton : 76; Twins : 2

Age range 19-42 years
average 29.4±6.0 years
age of 35 years or more 17 cases (21.8 %)

Gestational Age at Birth

range 25-41 weeks
average 36.3±3.0 weeks
premature delivery (before completed 37 weeks)
30 cases (38.5 %)

Classification of PIH

Gestational hypertension (without proteinuria)	16	cases (20.5 %)
Mild Preeclampsia	38	cases (48.7 %)
Severe Preeclampsia	18	cases (23.1 %)
Pregnancy-aggravated hypertension	5	cases (6.4 %)
Eclampsia	1	cases (1.3 %)
First eclamptic attack before admission		*1 case*
First eclamptic attack after admission		*0 case*
No ANC at Maharaj Nakorn Chiang Mai		*0 case*
ANC at Maharaj Nakorn Chiang Mai		*0 case*

Birth Weight range 465-4115 grams
average 2625±805 grams
number of low birth weight fetus (less than 2,500 grams)
27 cases (34.6 %)

Apgar Scores at 1 minute (less than 7) 15 cases (19.2 %)

Apgar Scores at 5 minutes (less than 7) 6 cases (7.7 %)

Small-for-gestational-age (less than 10th percentile) 14 cases (17.9 %)

Perinatal death 2 cases (2.6 %, immaturity 2)

Congenital Anomalies 0 case (0.0 %)

Other complications

Diabetes Mellitus	*20*	*cases*
Previous cesarean section	*10*	*cases*

Chronic HT	*5*	*cases*
Acute pyelonephritis	*3*	*cases*
Iron deficiency	*3*	*cases*
HBsAg positive	*3*	*cases*
Breech presentation	*3*	*cases*
Marked Obesity	*2*	*cases*
SLE	*1*	*case*
Asthma	*1*	*case*
Epilepsy	*1*	*case*
HIV positive	*1*	*case*
Iron deficiency	*1*	*case*
Thalassemia	*1*	*case*
Prolonged PROM > 18 hours	*1*	*case*
Polyhydramnios	*1*	*case*

Pregnancy with Thalassemia

Total 8 cases (0.56 percent of total parturients)
Singleton : 8 (100.0%)

Type of thalassemia

beta-thalassemia / HbE disease	3 cases
alpha-thalassemia (Hb H disease)	5 cases

Age range 24-33 years
average 27.6±2.7 years
age of 35 years or more 0 cases (0.0 %)

Gestational Age at Birth
range 33-41 weeks
average 38.0±2.8 weeks

premature delivery (before completed 37 weeks)
2 cases (25.0 %)

Birth Weight range 2130-3510 grams
average 2742±493 grams
number of low birth weight fetus (less than 2,500 grams)
3 cases (37.5 %)

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 cases (12.5%; dead fetus in utero)

Congenital Anomalies 0 cases (0.0 %)

Other complications

Previous cesarean section	*2*	*cases*
Breech presentation	*2*	*cases*
Minor blood group incompatibility	*1*	*case*
Transverse lie	*1*	*case*
Pregnancy-induced hypertension	*1*	*case*
Iron deficiency	*1*	*case*

Placenta Previa

Total 15 cases (1.05 percent of total parturients)
Singleton : 15 (100.0%)

Age range 23-42 years
average 32.0±5.6 years
age of 35 years or more 5 cases (33.3 %)

Gestational Age at Birth
range 21-38 weeks
average 34.8±4.3 weeks
premature delivery (before completed 37 weeks)
7 cases (46.7 %)

Birth Weight range 340-3135 grams
average 2470±744 grams
number of low birth weight fetus (less than 2,500 grams)
6 cases (40.0 %)

Apgar Scores at 1 minute (less than 7) 4 cases (26.7 %)

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

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

Perinatal death 1 cass (6.7 %)

Congenital Anomalies - cass (0.0 %)

Other complications

Previous cesarean section	*4 cases*
Didabetes mellitus	*3 cases*
Transverse lie	*2 cases*
Iron deficiency	*1 case*

Pregnancy with Acute Pyelonephritis

Total 13 cases (0.91 percent of total parturients)
(All were singleton; 13)

Age range 19-39 years
average 28.9±6.1 years
age of more than 35 years 2 cases (15.4 %)

Gestational Age at Birth
range 18-41 weeks
average 35.5±5.9 weeks
premature delivery (before completed 37 weeks)
7 cases (53.8 %)

Onset

First trimester	-	case
Second trimester	7	cases
Third trimester	4	cases
Postpartum	2	cases

Number of Episodes

1	10	cases
2	2	case
3	1	case

Birth Weight range 160-3340 grams
average 2730±935 grams
number of low birth weight fetus (less than 2,500 grams)
3 cases (23.1 %)

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

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

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

Perinatal death 1 case (7.7 %; abortion at 18 weeks)

Congenital Anomalies -

Other complications

Pregnancy-induced hypertension	*3*	*cases*
Iron deficiency	*2*	*cases*
Diabetes mellitus	*1*	*case*
Asthma	*1*	*case*
Epilepsy	*1*	*case*
Previous cesarean section	*1*	*case*
Prolonged PROM > 18 hours	*1*	*case*
Chorioamnionitis	*1*	*case*

Small-for-Gestational-Age Fetuses

Birthweight less than 10th percentile

Total 102 (6.93 percent of total babies; 1472 fetuses)
Singleton : 89 fetuses, Multifetal pregnancies : 13 fetuses

Age range 17-42 years
average 29.9±5.1 years
age of 35 years or more 15 cases (14.7 %)

Gestational Age at Birth
range 22-40 weeks
average 34.5±4.9 weeks
premature delivery (before completed 37 weeks)
50 cases (49.0 %)

Birth Weight range 300-2610 grams
average 1678±734 grams
number of low birth weight fetus (less than 2,500 grams)
95 cases (93.1 %)

Apgar Scores at 1 minute (less than 7) 42 cases (41.2 %)

Apgar Scores at 5 minutes (less than 7) 36 cases (35.3 %)

Perinatal Death 17 cases (16.7 %)

Congenital Anomalies 8 cases (7.8 %)

Meningocele (spina bifida)	*2*	*cases*
Multiple anomalies	*2*	*cases*
Cardiac diseases	*2*	*cases*
Gastroschisis	*1*	*cases*
Hydrops fetalis	*1*	*case*

Other complications

Medical diseases	*18*	*cases*
Pregnancy-induced hypertension	*14*	*cases*
Poor maternal weight gain	*25*	*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 (2006-2016)

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
No. of Deliveries	2013	2212	2144	2222	2089	1900	2059	1847	1686	1572	1431
No. of women with positive HIV	41	37	19	24	41	36	42	46	37	43	16
Deliveries	39	37	19	27	37	35	38	36	30	33	24*
Therapeutic abortion	2	-	-	1	4	-	-	-	-	2	1
Spontaneous abortion	-	-	-	1	-	1	2	1	2	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 (1989-2016) (no screening program during 1989 -1996)

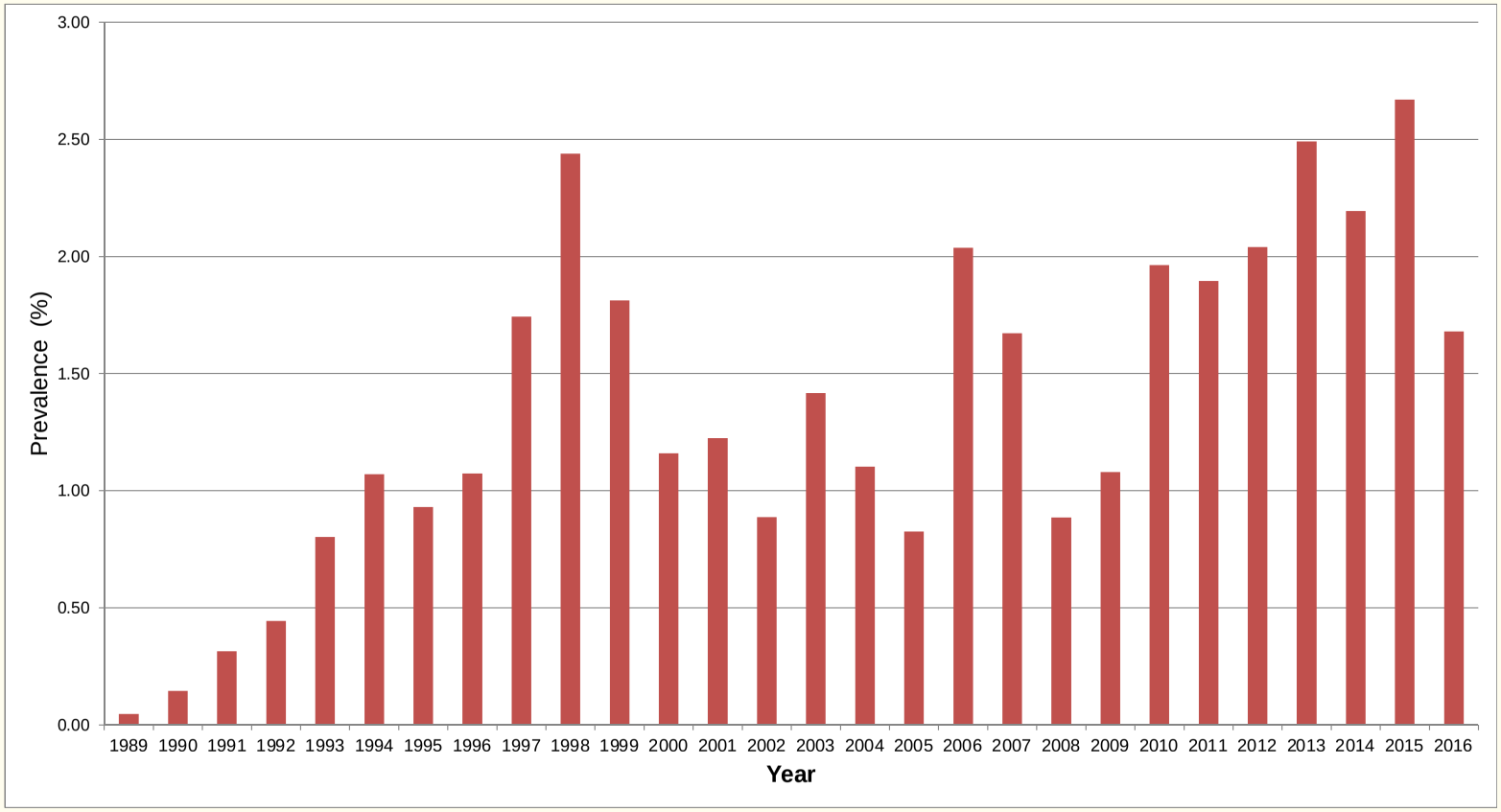


TABLE 38 Voluntary screening (2016) among pregnant women for anti-HIV antibody

Pregnant women (Counselling)	1691	cases
Voluntary screening	1691	cases
+ve anti-HIV antibody	16	cases
% positive case	0.9	%

TABLE 39 Age of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

Age (years)	No. of cases	Percent
15-19	1	4.4
20-24	7	30.4
25-29	6	26.1
30-34	7	30.4
35-39	2	8.7
40-44	-	-
45-49	-	-
Total	**23**	**100**

Mean age (years) 27.39
Standard deviation 5.358
Range 19-36 years

TABLE 40 Parity of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

Parity	No. of cases	Percent
0	14	60.9
1	7	30.4
2	2	8.7
3	-	-
≥ 4	-	-
Total	**23**	**100**

TABLE 41 Age at first marriage of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

Age (years)	No. of cases	Percent
10-14	-	-
15-19	12	52.1
20-24	7	30.4
25-29	1	4.4
30-34	1	4.4
Unknown	2	8.7
Total	**23**	**100**

Mean age (years)	*20.10*	
Standard deviation	*4.085*	
Range	*15-33*	*years*

TABLE 42 Number of marriages of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

Number	No. of cases	Percent
1	7	30.4
2	8	34.8
3	5	21.7
4	1	4.4
Unknown	2	8.7
Total	**23**	**100**

TABLE 43 Occupations of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

Occupations	No. of cases	Percent
Employee	9	39.1
Housewife	12	52.2
Commercial	2	8.7
Business	-	-
Government officer	-	-
Agriculture	-	-
Total	**23**	**100**

TABLE 44 Residence (province) of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

Province	Number	Percent
Chiang Mai (เชียงใหม่)	21	91.3
Lamphun (ลำพูน)	-	-
Chiang Rai (เชียงราย)	-	-
Lampang (ลำปาง)	-	-
Maehongson (แม่ฮ่องสอน)	2	8.7
Total	**23**	**100**

TABLE 45 Complications of the pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

	Cases	Percent
Without complicaiton	9	39.1
With complication	15	60.9
● Antepartum	9	
● Intrapartum	5	
● Postpartum	-	
Total	**23**	**100**

TABLE 46 Birth weight in the pregnant women with posi-tive HIV at Maharaj Nakorn Chiang Mai (2016)

Birth weight (grams)	Number	Percent
< 1,500	1	4.4
1,500 - 1,999	-	-
2,000 - 2,499	3	13.0
2,500 - 2,999	9	39.1
3,000 - 3,499	9	39.1
3,500 - 3,999	1	4.4
Total	**23**	**100**

Mean birthweight (grams)	*2,772.17*
Standard deviation (grams)	*586.232*
Range (grams)	*750-3,680*

TABLE 47 Postpartum contraception of pregnant women with positive HIV at Maharaj Nakorn Chiang Mai (2016)

Method	No. of cases	Percent
Female sterilization	7	30.4
DMPA	7	30.4
Oral contraception	5	21.7
Condom	1	4.4
Norplant	2	8.7
Unknown	1	4.4
Total	**23**	**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 2540 tests
(OPD4 = 2033; LR= 475; OB = 32)

Secondary Surveillance

Contraction stress test
or Nipple stimulation test 4 tests
Biophysical profile/ultrasonography 150 tests
Doppler velocimetry 300 tests

Prenatal Diagnosis

1. **Ultrasonography** 8,187 examinations
   (~ 25 % for gynecologic and infertile examinations)
2. **Amniocentesis** 1,021 cases
3. **Cordocentesis** 251 cases
4. **Chorionic villous sampling** 143 procedures

OBSTETRIC ULTRASOUND SERVICE

Number of Patients undergoing sonographic examinations (OB&GYN) in 2,016 ***8,187 cases***

Several examinations invovled in the researches without specific indications

Indications for sonographic examination	
■ Obstetric ultrasound (anomaly screening)	71.2 %
■ Obstetric ultrasound (perinatal research)	*21.5 %*
■ Obstetric ultrasound (others)	*78.5 %*
■ Gestational age estimation	
■ Obstetric hemorrhage	
■ Follow-up fetal anomalies	
■ Fetal growth surveillance	
■ etc.	
■ Gynecologic ultrasound	28.8 %
■ General gynecology	*70.3 %*
■ Gynecologic oncology	*9.3 %*
■ Reproductive medicine	*20.4 %*

Cordocentesis (2016)

Total 251 cases

Indications	No.	%
1. Previous child with Hb bart's	1	0.4
2.Previous child with β thal / HbE	2	0.8
3. Pregnancy at risk for Hb Bart's	36	14.3
4. Early sign of hydrops fetalis	3	1.2
5. Pregnancy at risk for β thal major	35	13.9
6 Pregnancy at risk for β thal / HbE	80	31.7
7. Pregnancy at risk for β thal major and β thal / HbE	2	0.8
8. Pregnancy at risk for Hb Bart's and β thal / HbE	2	0.8
9. Pregnancy at risk for uncertain OFT	1	0.4
10. Chromosome analysis	49	19.4
11. Combined chromosome and risk for Hb bart's	10	4
12.Combined chromosome and risk for β thal major	5	2
13.Combined chromosome and risk for β thal Hb/E	18	7.1
14 . Combined chromosome and previous child with Hb Bart's	1	0.4
15. Combined chromosome analysis and uncertain OFT	3	1.2
16.Repeat for HPLC	2	0.8
17. Other	1	0.4
Total	251	100

Amniocentesis (2016)

Total 1,021 cases

Indications for amniocentesis	
Elderly gravida (age of more than 35 years)	**755**
■ *with no other obvious risk*	*568*
■ *with previous child with Down syndrome*	*3*
■ *with high risk for Down syndrome screening*	*183*
■ *with fetal anomaly and sonomarkers*	*1*
Genetic diagnosis for thalassemia	**9**
■ *Pregnancy at risk for Hb Bart's disease*	*1*
■ *Pregnancy at risk for beta-thalassemia / Hb Edisease*	*4*
■ *Pregnancy at risk for Hb Bart's & beta-thal / Hb Edisease*	*1*
■ *Combined chromosome & risk for Hb bart's disease*	*2*
■ *Combined chromosome analysis and uncertain OFT*	*1*
Pregnancy with high risk for Down syndrome screening	**235**
■ *Pregnancy with Down syndrome in previous child*	*1*
■ *Pregnancy with fetal anomaly in previous child*	*5*
■ *Pregnancy with fetal anomaly and sonomarkers*	*19*
■ *Pregnancy with previous child with mental retardation*	*2*
■ *Others (Polyhydramnios, Maternal request)*	*4*

Chorionic Villous Sampling (2016)

Total 143 Procedures

Indications	Number
1. Fetal chromosome study	**13**
■ Elderly gravida	4
■ Thickened nuchal translucency	6
■ Fetal cystic hygroma	1
■ Elderly gravida and thickening translucency	1
■ Fetal astronaut sign	1
2. Risk for fetal severe thalassemia	**114**
■ Risk for Hb Bart's disease	46
■ Risk for beta thalassemia major	18
■ Risk for beta thalassemia/Hb E disease	48
■ Risk for beta thalassemia/Hb E disease and Hb Bart's disease	1
■ Risk for homozygous betathalassemia and beta thalassemia/Hb E and Hb bart's hydrops fetalis	1
3. Fetal chromosome study and thalassemia diagnosis	**16**
■ Elderly gravida with fetal risk for Hb Bart's disease	4
■ Elderly gravida with fetal risk for homozygous beta-thalassemia	4
■ Elderly gravida with beta thalassemia/Hb E disease	8

Prevention and Control Thalassemia Program

Chiang Mai strategy

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)
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 2016

	Number
Total number of pregnant screened	1,396
Positive MCV or Hb E	233
Number of couple at risk for thalassemia	30
■ Risk for Hb Bart's	10
■ Risk for Beta-thalassemia major	4
■ Risk for Beta thalassemia/Hb E	16
The choice which selected by couples	
■ Cordocentesis	15
■ Chorionic villus samplings	8
■ Ultrasonography	3
■ Dead Fetus Inutero	1
■ Advanced gestational age for PND	1
■ Not PND [risk for minor thalassemia]	1
■ Refused PND	1
Result of PND	
■ Hb bart's	3
■ Beta thalassemia major	1
■ Beta thalassemia/Hb E	3

Down Syndrome Screening (2016)

Total 5,004 tests (NHSO : Feb - Dec 2016)

Trimester	Risk			Total
	Low	Intermediate	High	
Second	45,80 (91.5%)	-	424 (8.5%)	5,004

Total 1,690 tests (Service cases)

Trimester	Risk		Total
	Low	High	
First	1,385 (97.81%)	31 (2.19%)	1,416
Second	245 (89.42%)	29 (10.58%)	274
Summary	1,630	60	1,690

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 2016

1.	Elderly Gravida (age of 35 years or more)	17.5 %
2	Teenage Pregnancy (age of less than 20 years)	5.3 %
	Early adolescence (age of less than 17 years)	*0.9 %*
	Late adolescence (age of 17-19 years)	*4.4 %*
3.	Pregnancy complicated with medical or obstetrical diseases	8.9 %

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