Comparison Outcomes of Sick Babies Born to Teenage Mothers with Those Born to Adult Mothers

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Background*: Adolescent period is the transitional stage of physical and mental development from childhood to adulthood. Pregnancy in teenage girls is generally classified to have a higher risk than those in adults. In many previous studies reported only the outcome of teenage mothers but no comparative outcome between sick babies born to teen mothers and adult mothers, so the authors conducted the present study.*
Objective: *To compare the outcomes of sick infants born to teenage mothers with those born to adult mothers (age ≥ 20 years).*
Material and Method: *This prospective study was carried out from October 1st, 2006 to September 30th, 2009. The study group consisted of sick babies born to teenage mothers and admitted at Queen Sirikit National Institute of Child Health (QSNICH). These babies were compared to sick babies (control group) born to adult mothers during the same period. The demographic data of mothers and sick babies in both groups were recorded in the designed case record forms. Developmental assessment was done until two years of age.*
Results: *A total of 6,342 deliveries took place in Rajavithi Hospital during the study period of which 697 babies were born to teenage mothers. The incidence of teenage pregnancy was 10.99%. The number of sick babies from teenage mothers and adult mothers were 78 and 147 cases, respectively. There was a significantly higher mortality in the study group (7 cases, 9%) than the control group (4 cases, 2.7%). There was statistically significant difference in most of the demographic characteristics between the teenage and adult mothers except anemia, PROM and MSAF (meconium stain amniotic fluid). Although there was a trend of more cases of anemia and MSAF in teenage mothers than in adult mothers, there was no statistically significant difference. There was a shorter interval time from marriage to pregnancy in teen mothers than in adult mothers and a lower number of antenatal care visits with late antenatal care among the teenage mothers too. On comparing the data in infants, the teenage group had more males and a higher blood pressure than those in the adult group. There were significantly more preterm infants and higher cesarean section in the adult group too. Gastroschisis cases were found only in the teenage group. In follow-up cases, more than seventy percent in both groups were assessed for developmental outcome until two years of age. Divorce was found in teen mothers more than in adult mothers (17.54 vs. 3%) and more cases in teenage infants received care in rural areas by grandparents (36.6 vs. 12.6%). Delayed speech was found in more cases in the teen group than in the adult group (12.28 vs. 6%).*
Conclusion: *The number of antenatal care in teenage mothers was less than in standard pregnancy care. Cesarean section rate was lower in teenage mothers than in the adult mothers. Preterm infants were found in more cases in the adult group but gastroschisis was found only in the teenage group. More cases of infants in the teenage group received care in rural areas by grandparents and divorce occurred more in teen mothers than adult mothers.*

Keywords*: Teenage mother, Adult mother, Sick baby*

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Adolescent period is the transitional stage of physical and mental development from childhood to adulthood. Teenage pregnancy and childbearing have become pressing social concerns in the developed countries such as the United States[1] because pregnancy occurring in teenage are generally classified to have a higher risk than those in adults.

There are many researches showing higher incidences of anemia[2], pregnancy induced hypertension (PIH), premature labor and low birth weight[3,4] in the teenage group than those in pregnant adults. However, others have reported similar results of these incidences when comparing between both groups[5,6]. In Thailand, the incidence of teenage pregnancy was about 12-14% from a single government institute (Rajavithi Hospital) during 2002-2007[7]. Previous studies have reported only the outcome of teenage mothers but there has been no comparative outcome between sick babies born to teenage mothers and adult mothers, so the present study was conducted to do so.

Objective

The present study was conducted to compare the outcomes of sick infants born to teenage mothers with those born to adult mothers (age $\geq$ 20 years). Developmental assessment was done until the age of two years old in survivors, who attended the follow-up clinics.

Material and Method

The present study was approved by Queen Sirikit National Institute of Child Health Ethics Committee and informed consent was obtained from all participants. This prospective study was carried out from October 1st, 2006 to September 30th, 2009. The study group consisted of sick babies born to teenage mothers and admitted at Queen Sirikit National Institute of Child Health. These babies were compared to sick babies (control group) born to adult mothers during the same period. The number of the study group was 72 cases and the control group was 144 cases by calculation from the following formula $n = (Z\alpha + Z\beta)\ 2\ PQ\ (k + 1)\ kd2$ where type I error = 0.05 ($Z\alpha = 1.96$), type II error = 0.2 ($Z\beta = 0.84$), $p = (kP0 + KP1)/(k + 1)$, $Q = 1-P$, $d = P1-P0$, P0 = proportion of patients in the control group (hospital stay > 14 days = 35%) and P1 = proportion of patients in the study group (hospital stay > 14 days = 55%). The number of sick babies from teenage mothers was more than those born to adult mothers (55% vs. 35% from QSNICH records in 2003) who had hospital stay more than two weeks. The demographic characteristics of sick babies born from teenage mothers and those born to adult mothers were recorded in the designed case record forms. The data were analyzed using Chi-square test, Fisher exact test, unpaired t-test, arithmetic mean, median, standard deviation and range. The level of statistical significance was set at $p < 0.05$.

Results

A total of 6,342 deliveries took place in Rajavithi Hospital during the present study period of which 697 babies were born to teenage mothers. The incidence of teenage pregnancy was 10.99%. The number of sick babies from teenage mothers and adult mothers were 78 and 147 cases, respectively. There were 6 pairs of twins in the adult group, making 141 cases of adult mothers in the present study. There was a statistically significant difference in most of the demographic characteristics between the teenage and adult mothers except anemia, PROM and MSAF (meconium stain amniotic fluid). Although there was a trend of more cases of anemia and MSAF in teenage mothers than in adult mothers, it was not a statistically significant difference as shown in Table 1. There was a shorter interval time from marriage to pregnancy in teen mothers than in adult mothers and a lower number of antenatal care visits with late antenatal care among the teenage mothers too. On comparing the data in infants, the teenage group had more males and a higher blood pressure than those in the adult group. However, there were significantly more preterm infants in the adult group as shown in Table 2. In condition of sick babies that were transferred to QSNICH, the authors found no significant difference in diseases between babies in teenage mothers and those in adult mothers as shown in Table 3.

After admission to the hospital, treatment regimen was not significantly different between groups. There was a statistically significant higher number of cases of gastroschisis in the study group compared to the control group but there were no differences in the other anomalies between groups as shown in Table 5. After discharge, parents and grandparents had a greater role in child rearing in rural areas as well as a higher number of divorce cases in teenage mothers than adult mothers with statistically significant differences as shown in Table 6. At follow-up, even though there was a trend of more cases in delayed speech in the study group than the adult group, it was not statistically significant as shown in Table 7. There was a significantly higher mortality in the study group (7 cases) than the control group (4 cases) as shown in

Table 1. Comparison of characteristics between teenage mothers and adult mothers

Characteristic of mother n (%)	Study goup n = 78 (%)	Control group n = 141 (%)	p
Age (year)*	17.97 ± 1.47	28.50 ± 5.33	< 0.01
Income/month (baht)*	7,886.57 ± 6,255.59	18,203.13 ± 14,223.74	< 0.01
Marriage, case	7 (9)	73 (51.8)	< 0.01
Student status	17 (21.8)	5 (3.5)	< 0.01
Time interval to pregnant (year)*	1.62 ± 1.04	5.48 ± 4.01	< 0.01
Gestational age for ANC (week)*	24.95 ± 8.74	15.14 ± 7.58	< 0.01
Number of ANC*	4.06 ± 2.63	6.89 ± 3.01	< 0.01
Vaginal delivery	49 (63.6)	67 (47.5)	0.023
Maternal anti HIV positive	2 (2.6)	0	0.053
Anemia	6 (7.7)	6 (4.0)	0.27
PROM	14 (17.9)	37 (25.2)	0.18
Superimposed preeclampsia	0	10 (6.8)	0.02
MSAF	11 (14.1)	9 (6.1)	0.52
Caesarean section	24 (30.8)	64 (43,5)	0.04

* Mean ± SD, ANC = antenatal care, PROM = premature rupture of membrane, MSAF = meconium stain amniotic fluid

Table 2. Comparison neonatal characteristics between teenage and adult mothers

Neonatal characteritics n (%)	Study group 78 cases (%)	Control group 147 cases (%)	p
Male	57 (74)	89 (60.5)	0.04
Ballard score GA*	35.46 ± 3.7	34.60 ± 3.2	0.07
HC*	32.25 ± 2.55	31.08 ± 4.13	0.02
Length*	47.27 ± 4.07	44.99 ± 5.08	0.001
Weight*	2,400.68 ± 825.36	2,204.9 ± 840.65	0.1
Weight range (gm)	680-4060	700-4800	
Weight < 2,500 gm	43 (55.1)	94 (66.7)	0.20
Preterm infant	44 (56.4)	105 (71.4)	0.023
Gestational age			0.158
AGA	70 (89.7)	124 (84.4)	
SGA	6 (7.7)	22 (15)	
LGA	2 (2.6)	1 (0.6)	
Systolic blood pressure*	68.28 ± 16.48	63.58 ± 10.7	0.027
Diastolic blood pressure*	40.85 ± 11.95	37.43 ± 8.77	0.03

AGA = Appropriate for gestational age, SGA = small for gestational age, LGA = Large for gestational age, HC = head circumference, ***** = mean ± SD

Table 4. Congenital anomalies were the cause of death in all cases in the adult group but prematurity was the most common cause of death in the study group but they were not statistically significant as shown in Table 8 and 9, respectively.

Discussion

The present study showed that teenage mothers had a statistically significant lower income, single status, lower number of antenatal care visits (less than 4) similar to the other reports from Cameroon and Thailand[8,9]. The lower number of antenatal care visits and late antenatal care among the teenage mothers reflects less responsibility or less concern in this group which has also been shown in studies from Watcharaseranee et al[10] and Thato et al[11]. Teenage mothers have a statistically significant shorter interval time after the marriage to pregnancy than in adult

Table 3. Comparison neonatal condition between teenage and adult mothers

Neonatal Condition, n (%)	Study group 78 cases (%)	Control group 147 cases (%)	p
Prematurity	41 (52.6)	105 (71.4)	0.023
Hyperbilirubinemia	58 (74.4)	121 (82.3)	0.36
Sepsis(clinical)	29 (37.2)	71 (48.3)	0.26
- Hemoculture + ve	4 (5.1)	5 (3.4)	0.50
Respiratory distress	25 (32.1)	60 (40.8)	0.20
Birth asphyxia	16 (20.5)	48 (32.7)	0.06
Congenital anomalies	11 (14.1)	17 (11.6)	0.67
Pneumonia	11 (14.1)	25 (17)	0.57
PDA	11 (14.1)	29 (19.7)	0.29
RDS	9 (11.5)	23 (15.6)	0.40
Anemia on admission	9 (11.5)	26 (17.7)	0.23
MAS	5 (6.4)	6 (4.1)	0.44
Meningitis	4 (5.1)	8 (5.5)	0.91
Seizure	0	7 (4.8)	0.15
TTNB	3 (3.8)	8 (5.4)	0.60
PPHN	1 (1.3)	6 (4.1)	0.25
NEC	3 (3.8)	10 (6.8)	0.55
Pneumothorax	2 (2.6)	2 (1.4)	0.61
NICUadmission*(day)	72.88 (32.34)	69.95 (34.15)	0.53

RDS = Respiratory distress syndrome, TTNB = transient tachypnea of the newborn, MAS = Meconium aspiration syndrome, PPHN= persistent pulmonary hypertension of the newborn, NEC = Necrotizingenterocolitis, PDA = patent ductus arteriosus. * = mean $\pm$ SD

Table 4. Comparison of neonatal complications

Complications	Study group 78 cases (%)	Control group 147 cases (%)	p
IVH	2 (2,6)	11 (7.5)	0.22
Spastic diplegia	2 (2.6)	4 (2.8)	1
Hearing loss	1 (1.3)	9 (6.0)	0.17
Blindness	0	1 (0.7)	1.0
ROP	1 (1.3)	4 (2.8)	0.66
BPD	2 (2.6)	5 (3.5)	1.0
Cholestatic jaundice	4 (5.2)	14 (9.7)	0.30
Hydrocephalus	1 (1.3)	3 (2.1)	1.0
Microcephaly	2 (2.6)	3 (2.1)	1
Death	7 (8.9)	4 (2.7)	0.05

IVH = Intraventricular hemorrhage, BPD = bronchopulmonary dysplasia, ROP = Retinopathy of prematurity

mothers (1.62 vs. 5.48) like reports by Trussell J[12] and Ketterinus et al[13]. The higher incidence of anemia and vaginal delivery in the teenage mothers group was similar to the result from other reports[10,11,14,15]. The higher frequency of anemia might be explained from the low number of antenatal care and improper nutrition. Neonatal morbidities were similar in both groups except for gastroschisis and higher blood pressure in the study group. Mental and physical stress in teen mothers can affect fetal outcome. Gastroschisis was found only in babies from teenage mothers like reports from other countries *e.g.* England, Australia, Japan and United States[16-19]. Although the cause of gastroschisis is unknown, poor weight gain during the first trimester of pregnancy, exposure to smoking and high fat diet are reported risk factors for this anomaly[20-22]. Food contamination with nitrosamine or some drugs might be other explanations for this anomaly

Table 5. Comparison congenital anomalies in babies from teenage group and adult group

Data	Study group 78 cases (%)	Control group 147 cases (%)	p
Gastroschisis	4 (5.1)	0	0.01
Omphaloceole	0	2 (1.4)	0.54
Hirschprung	1 (1.3)	1 (0.7)	1
CDH	1 (1.3)	0	0.34
Dextrocardia	1 (1.3)	1 (0.7)	1
VSD,TGA	1 (1.3)	0	0.34
Amniotic band	1 (1.3)	0	0.34
Hydrancephaly	1 (1.3)	0	0.34
Imperforated anus	1 (1.3)	0	0.34
Absence septum	0	1 (0.7)	1
ASD	0	1 (0.7)	1
Cardiomyopathy	0	2 (1.4)	0.54
CHD (multiple anomalies)	0	2 (1.4)	0.54
CCAM	0	1 (0.7)	1
Congenital icthyosis	0	1 (0.7)	1
Down syndrome with duodenal atresia	0	1 (0.7)	1
Cri du Chat	0	1 (0.7)	1
Esotopia	0	1 (0.7)	1
Spondylodysplasia	0	1 (0.7)	1
TOF, limb defect	0	1 (0.7)	1

ASD = Atrial septum defect, CHD = congenital heart disease, CCAM = Congenital cystic adenomatoid malformation, CDH = congenital diaphragmatic hernia, VSD = ventricular septum defect, TGA = transposition of great artery, TOF = tetralogy of Fallot

Table 6. Status of parents and infant after discharge

Data after discharge	Study group n = 71 (%)	Control group n = 143 (%)	p
Follow-up $\geq$ 6 months	57 (80.28)	100 (69.93)	0.13
Divorce, n (%)	10/57 (17.54)	3 (3)	< 0.01
Living in rural area, n (%)	26 (36.6)	18 (12.6)	< 0.01

Table 7. Developmental outcome of infants

Data of development	Study group n = 57 (%)	Control group n = 100 (%)	p
Global delayed development	2 (3.5)	10 (10)	0.21
Delayed speech	7 (12.28)	6 (6)	0.17
Poor weight, Length,HC(< P10)	7 (12.28)	16 (16)	0.53
ADHD	1	0	0.36

because the incidence has progressively increased from 1997 to 2000 (1.96 to 4.49 per 10,000 cases)[19]. Length of stay in the neonatal intensive unit was longer in the study group similar to the report from Jordan by Al Ramahi and Saleh[23]. There were no significant differences in complication after treatment between the groups except for the significantly higher number of deaths in the study group. The majority of deaths in this group occurred from prematurity. In the study group, grandparents were the major care takers after discharge because there were significantly more divorces and moving to rural areas in teen mothers than adult

Table 8. Cause of death in babies born to adult mother

Data of case	Diagnosis	age at death (day)
Case 1, GA 36 weeks 2,500 gm	- Omphaloceol - Extrophy cloaca - ASD, E. coli sepsis	10
Case 2 preterm GA 31 weeks 1,670 gm	- Complex CHD - Abnormal spine	143
Case 3 Term 3,595 gm	- CCAM - Tracheobronchomalacia S/P Lobectomy Tracheostomy	26
Case 4 preterm GA 33 weeks 1,400 gm	- Omphaloceol - BPD, severe GER - Fungal sepsis - Cholestatic jaundice	187

CCAM = Congenital cystic adenomatoid malformation, CDH = Congenital diaphragmatic hernia, BPD = Bronchopumonary dysplasia, GER = Gastroesophageal reflux, GA= Gestational age

Table 9. Cause of death in babies born to teenage mother

Data of case	Diagnosis	age at death
Case 1 preterm GA 26 weeks, BW 825 gm	-NEC stage III - Klebsiella septic shock	9 days
Case 2 preterm GA 25 weeks, BW 680 gm	-Extremely low birth weight	2 hours
Case 3 preterm GA 32 weeeks BW 1486 gm	-Multiple anomaly (microcephaly, dextrocardia, lordoscoliosis, ambiguious genitalia)	2 hours
Case 4 preterm GA 28weeks, BW840 gm	-severe birth asphyxia -pulmonary hemorrhage -IVH gr III-IV	2 days
Case 5 preterm GA 32 weeks, BW 1,920 gm	-IVH gr III-IV -Hemoperitoneum	2 days
Case 6 Term BW 3,060 gm	-CDH with pulmonary hypoplasia -PDA,MR,TR	3 hours
Case 7 Term BW 2,780 gm	-Hydrocephalus and Hydranencephaly	4 months

IVH = Intraventricular hemorrhage, PDA = Patent ductus arteriosus, MR = Mitral regurgitation, TR = Tricuspid regurgitation, NEC = Necrotizing enterocolitis, GA = Gestational age

mothers. More than seventy percent of the survivors from both groups were followed-up for developmental assessment. Even though there were more cases of delayed speech in survivors in the study group than the control group but it was not statistically significant. The poorer outcomes observed among teenagers are explained by the adverse socioeconomic circumstances that these mothers face.

Conclusion

The numbers of antenatal care visits in teenage mothers were less than optimum for standard pregnancy. Cesarean section rate was lower in teenage mothers than in adult mothers. Preterm found more

cases in the adult group but gastroschisis was found only in the teenage group. Most of the cases of infants born to teenage mothers were raised by grandparents upcountry.

Potential conflicts of interest

None.

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การศึกษาเปรียบเทียบทารกที่ป่วยเกิดจากมารดาวัยรุ่นกับทารกป่วยเกิดจากมารดาผู้ใหญ่

อุไรวรรณ โชติเกียรติ, ศิราภรณ์ สวัสดิวร

ภูมิหลัง: *วัยรุ่นเป็นวัยที่มีการเปลี่ยนแปลงค่อนข้างมาก ดังนั้นการที่วัยรุ่นเกิดการตั้งครรภ์ขึ้น จึงทำให้มีโอกาสมีปัญหาจากการปรับตัวเองในการเข้าสู่วัยรุ่นแล้วยังต้องปรับตัวเองเข้าสู่การตั้งครรภ์อีก ซึ่งนับว่ามีความเสี่ยงในการตั้งครรภ์ในวัยรุ่น ทางทีมแพทย์ผู้นิพนธ์จึงมีความสนใจในการติดตามผลการรักษาเด็กทารกเหล่านี้เพราะยังไม่มีการศึกษาในลักษณะนี้ในประเทศไทย และจากรายงานที่อื่น ๆ*

วัตถุประสงค์: *ทราบผลการเจ็บป่วยและการพัฒนาการที่เกิดกับทารกจากมารดาวัยรุ่นเปรียบเทียบกับมารดากลุ่มผู้ใหญ่ (มารดาอายุ ≥ 20 ปี)*

วัสดุและวิธีการ: *เป็นการศึกษาแบบไปข้างหน้าตั้งแต่ 1 ตุลาคม พ.ศ. 2549 ถึง กันยายน พ.ศ. 2552 โดยกลุ่มประชากรที่ศึกษาเป็นทารกที่เกิดป่วยที่เกิดจากมารดาอายุน้อยกว่า 20 ปี และทารกจากมารดากลุ่มผู้ใหญ่ที่เกิดที่โรงพยาบาลราชวิถี และรับเข้ารักษาที่สถาบันสุขภาพเด็กแห่งชาติมหาราชินีติดตามดูผลการรักษา และความพิการและติดตามเมื่อให้ทารกกลับบ้านจนถึงอายุ 2 ปี โดยมีการบันทึกข้อมูลของมารดา และทารก, การเจ็บป่วย ความพิการพัฒนาการจนถึงอายุ 2 ปี*

ผลการศึกษา: *ในช่วงเวลาที่ศึกษามีทารกที่เกิดจากมารดาวัยรุ่นจำนวน 697 ราย จากจำนวนทารกที่เกิดทั้งหมด 6,342 ราย (10.99%) และรับย้ายมารับการรักษาที่สถาบันฯ นี้ และเข้าร่วมในโครงการได้จำนวน 78 ราย และทารกที่เกิดจากมารดากลุ่มผู้ใหญ่ (มารดาที่อายุตั้งแต่ 20 ปีขึ้นไป) ได้จำนวน 147 ราย สถานภาพแต่งงานของ มารดาวัยรุ่นมีจำนวนการแต่งงานน้อยกว่า และระยะเวลาตั้งแต่แต่งงานจนตั้งครรภ์จะมีระยะเวลาสั้นกว่าแต่จะมาฝากครรภ์เมื่ออายุครรภ์มากกว่ารวมทั้งจำนวนครั้งการฝากครรภ์เฉลี่ยจะน้อยในกลุ่มมารดาวัยรุ่น และจำนวนการคลอดทางการผ่าตัดจะน้อยในมารดาวัยรุ่นอย่างมีความสำคัญทางสถิติแต่มีภาวะซีดในมารดาวัยรุ่น และมีภาวะน้ำคร่ำปนขี้เทาสูงกว่าโดยไม่มีความสำคัญทางสถิติทารกที่ป่วย และรับย้ายมาที่สถาบันสุขภาพเด็กฯ นั้นพบว่าเป็นทารกเพศชายมากจากมารดาวัยรุ่นซึ่งมีความแตกต่างทางสถิติแต่ด้านทารกที่เกิดก่อนกำหนดพบมากที่เกิดจากมารดากลุ่มผู้ใหญ่อย่างมีนัยทางสถิติ สำหรับภาวะความเจ็บป่วยที่ต้องย้ายทารกมารับการรักษา ในหอผู้ป่วยทารกแรกเกิดพบไม่แตกต่างกันแต่พบว่ามีความพิการแต่กำเนิดที่แตกต่างกันโดยพบมีภาวะความผิดปกติ เกี่ยวกับทางเดินอาหารโดยเฉพาะผนังหน้าท้องที่ไม่ปิด (Gastroschisis) พบ 4 ราย พบเฉพาะในทารกที่เกิดจากมารดาวัยรุ่น และภาวะโรคแทรกซ้อนหรือความพิการที่เกิดหลังได้ให้การรักษาพบว่าการเสียชีวิตในทารกที่เกิดจากมารดาวัยรุ่นมากกว่าคือเสียชีวิต 7 ราย (8.97%) เปรียบเทียบกับบุตรจากมารดากลุ่มผู้ใหญ่ที่เสียชีวิตเพียง 4 ราย (2.7%) มีความสำคัญทางสถิติสำหรับการติดตามทารกหลังจากให้กลับบ้านพบว่ามีทารกกลับมารับการติดตามด้านพัฒนาการ ตั้งแต่ 6 เดือน จนถึง 2 ปีกลุ่มละ 70% และพบว่ามีการหย่าร้างสูงในมารดากลุ่มวัยรุ่น (17.54%) และในกลุ่มนี้ ได้มีการย้ายภูมิลำเนาไปอยู่ต่างจังหวัด (36.6%) สูงกว่า และมีความสำคัญทางสถิติส่วนในด้านพัฒนาการพบว่ามี delayed speech สูงในกลุ่มจากมารดาวันรุ่น (12.28%) แต่ไม่มีความสำคัญทางสถิติ*

สรุป: *การตั้งครรภ์ในมารดาวัยรุ่นพบว่ามีการฝากครรภ์จำนวนครั้งน้อยกว่ามาตรฐานแต่อัตราการคลอดต่ำ โดยการผ่าคลอดแต่มีทารกคลอดก่อนกำหนดมากจากมารดากลุ่มผู้ใหญ่ และมีความพิการที่ผนังหน้าท้องมากจากมารดากลุ่มวัยรุ่นและการดูแลหลังให้กลับบ้านต้องมีการย้ายไปต่างจังหวัดสูง เพราะต้องอาศัยตายายหรือ ปู่และย่าช่วยดูแลทารกและมีการหย่าร้างสูง ถึง 17.54% เปรียบเทียบกับ 3% ในมารดากลุ่มมารดาวัยรุ่น*