Factors Influencing Stress among Mothers of Preterm Infant Hospitalized in Neonatal Intensive Care Unit

ปัจจัยที่มีอิทธิพลต่อความเครียดของมารดาที่มีบุตรคลอดก่อนกำหนด เข้ารับการรักษาในหออภิบาลทารกแรกเกิด

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Abstract

This study aimed to examine level of stress and identify influencing factors of maternal stress which included nursing support, preterm birth weight, delivery type, and experience of having premature birth. A convenience sample of 90 mothers with preterm infant hospitalized in neonatal intensive care unit, Roi-Et regional hospital, was recruited. Data were carried out from March to May 2018. Research instruments included a demographic questionnaire, a medical record form, the Nurse Parent Support tool, and the Parental Stressor Scale. Descriptive statistics and standard multiple regression analysis were employed to analyze the data.

Results showed the mean score of overall maternal stress was 69.12 (*SD* = 11.57), where 68% of the mothers reported high level of stress. All predictors accounted for 44.2% of variance prediction in maternal stress. Only preterm birth weight (β = -0.61) and emergency caesarean section (β = .27) were significantly predicted. NICU nurses can discourse these concerns and emotional state with empathetic information skills and being mindful of the importance of involving the mothers as much as possible in their preterm care.

Key words: maternal stress, preterm, intensive care unit, preterm birth weight, emergency caesarean section

บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อความเครียดของมารดาที่มีบุตรเกิดก่อนกำหนดเข้ารับการรักษาในหออภิบาลทารกแรกเกิด กลุ่มตัวอย่างคัดเลือกแบบสะดวก ได้แก่ มารดาของทารกที่เกิดก่อนกำหนดที่เข้ารับการรักษาในหออภิบาลทารกแรกเกิด จำนวน 90 ราย ของโรงพยาบาลร้อยเอ็ด จังหวัดร้อยเอ็ด เก็บข้อมูลเดือนมีนาคม ถึง พฤษภาคม 2561 เครื่องมือที่ใช้ในการวิจัยประกอบด้วยแบบสอบถามข้อมูลส่วนบุคคล แบบสอบถามประวัติการคลอด แบบประเมินความเครียดของมารดาหลังคลอด และแบบประเมินการสนับสนุนจากพยาบาลของบิดามารดา วิเคราะห์ข้อมูลด้วยสถิติพรรณนาและสถิติถดถอยพหุคูณแบบมาตรฐาน

ผลการวิจัยพบว่ามารดาส่วนใหญ่มีความเครียดระดับสูง คะแนนความเครียดเฉลี่ย 69.12 (*SD* = 11.57) และร้อยละ 68 ของมารดารายงานว่ามีความเครียดในระดับสูง ปัจจัยทำนายทุกตัวรวมกันมีอิทธิพลต่อความเครียดของมารดาร้อยละ 44.2 น้ำหนักตัวทารก (β = -.61) และ

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การผ่าตัดคลอดแบบฉุกเฉิน (β = .27) เท่านั้นที่มีนัยสำคัญทางสถิติ พยาบาลที่ดูแลมารดาขณะตั้งครรภ์ควรส่งเสริมความรู้ ความเข้าใจเกี่ยวกับลักษณะทั่วไปของทารกคลอดก่อนกำหนดและพฤติกรรมที่อาจปรากฏ ตลอดจนส่งเสริมโปรแกรมเพื่อลดความเครียดหลังคลอดทารกก่อนกำหนด
คำสำคัญ: ความเครียดของมารดา คลอดก่อนกำหนด หออภิบาลทารกแรกเกิด น้ำหนักตัวทารกก่อนกำหนด การผ่าตัดคลอดแบบฉุกเฉิน

Significance of the problem

Preterm birth refers to an infant born before 37 weeks of pregnancy. An estimated 15 million babies are born preterm and this number is increasing every year. In Thailand, preterm birth rate is 12 % (World Health Organization [WHO], 2018). Preterm birth adversely affects newborns, economic, and parents, especially their mothers. Parents with preterm infants have higher stress than those of term infants, especially in parents with newborns' hospitalized (Treyvaud, 2014). Newborns' hospitalization and unexpected events from preterm birth can be overwhelming for their parents. Families of these preterm infants may perceive infant's hospitalization as a crisis event (Eutrope et al., 2014). Preterm birth directly affects maternal stress. Mothers with preterm infants might be burdened with admission of their baby to NICU, and uncertainty of outcomes which might impact the mother's capability of coping with the stress (Howe, Sheu, Wang, & Hsu, 2014; Teerarungsikul, 2012).

Mothers with preterm babies are at risk of negative feelings more than mothers with term newborn (Howe, et al., 2014). They may experience higher stress and depression, difficulty to sleep, and decreased sense of competence. Long term stress in postpartum period might also affect mother-newborn attachment, and mothers' psychiatrics morbidity (Wu & Hung, 2016). Due to presence of stress, throughout the period of hospitalization mothers may experience interruption in developing their capability of taking care of their baby. Additionally, mothers with preterm in NICU care also experience stress and anxiety about treatment team in term of relationship. Mothers need to be involved in decisions and care for their preterm child (Malakouti, Jabraeeli, Valizadeh, & Babapour, 2013). Several factors influences maternal stress level when their preterm infants are admitted in NICU, such as nursing support, preterm birth weight, delivery type, and experience of having premature birth (Sikorova & Kucova, 2012; Tandberg, Sandtro, Vardal, & Ronnestad, 2013; Wormald, et al., 2015).

Nurses have an important role in helping mothers as they provide care to the sick infant. Nursing support is thought to improve coping strategies, and it is believed that availability of support from nursing staff might lead to perception of situations as less stressful. Thus, interpersonal role of the nursing staff is considered their direct and indirect support (Miles, Carlson, & Brunssen, 1999). Mothers might expect support from nursing staff regarding information on their infants requiring special care, empowerment in decision making, a pleasant environment, and emotional support when their infants are admitted in NICU (Sikorova & Kucova, 2012). Previous study found that during their infant's admission in NICU, mothers experienced higher stress comparable with fathers. Mothers of preterm infants might need support from nursing staff in NICU, especially the information and nursing care. The investigators found that parents indicating a high perception of support from

nursing staff experienced low level of stress (Tandberg, et al., 2013).

Preterm birth weight additionally impacts maternal stress. Preterm birth with very low birth weight infants or infants born before 32 week gestation usually have higher medical complications and need to stay in NICU for longer period of time (Bender, et al., 2013). Moreover, preterm with extremely low birth weight are related to neonatal death within 24 hours after birth three times higher than VLBW infants. During hospitalization of their VLBW babies, mothers may face situations that activate their stress including preterm health impairment, length of stay at hospital, and uncertainty conditions. (De Castro, Leite, Guinsburg, 2016).

Delivery type influenced maternal stress after birth. The results found that mode of delivery have strong relation with women's psychological and physical outcomes after birth. Especially, women who had forceps-assisted vaginal births and unplanned caesareans section seemed to have poor psychological wellbeing after birth. Those women might experience lack of control, worry and have intense period of uncertainty during labor and birth (Rowlands & Redshaw, 2012). The most common indications of emergency caesarean section were dystocia, fetal distress, and mal-presentation. During labor, women who have induced labor, oxytocin for augmentation, and epidural as pain relief are more likely to have emergency caesarean section. Moreover, their infants were three-times more likely to be admitted in the NICU after birth (Costa-Ramon, Rodriguez-Gonzalez, Serra-Burriel, & Campillo-Artero, 2018).

Mothers' experience having preterm birth might impact their stress. Posttraumatic stress response characteristics have been identified in mothers who have experienced the birth of a preterm infant and NICU admitted. Mothers might described their experience including stress, perceived their life has change, taking in maternal role, and concerned more about baby health at least 6 month following preterm birth. In addition stress experienced by mothers may lead to increased risk of emotional illness, and impact to mothers' ability to cope with their stress (Teerarungsikul, 2012).

Previous study in Thailand examined stress level in mothers with preterm infants and coping of adolescent mothers having premature infants admitted in NICU (Singsuwan, 2015). Another results revealed that mothers whose infants were hospitalized in NICU experienced uncertainty and stressful unexpected situation. Mothers described those experiences as stressful, and perceived their life has changed taking in maternal role and were more concerned about baby health at least 6 month following preterm birth (Teerarungsikul, 2012). Suggestion about stress level, and identifying factors influencing stress in mothers with preterm infants hospitalized in NICU have limited classification. This study aimed to examine the level of stress and influencing factors including nursing support, preterm birth weight, experience of having premature birth, and delivery type among mothers with preterm infants hospitalized in NICU. The results of this study may increase nurses' understanding factors related to mothers' stress level and nurse could identify mother's needs.

Purpose the study

1. To determine level of stress among mothers with preterm infants hospitalized in

neonatal intensive care unit.

2. To identify influencing factors of maternal stress included nursing support, preterm birth weight, delivery type, and experience of having premature birth.

Conceptual Framework

This study is guided by evidences from literature review and the Parental Stress Intensive Care Unit Model, developed by Miles and Carter (1983). It is commonly used in nursing profession as it provides a comprehensive approach for understanding, describing, and assessing sources of potential parent stress in NICU. Those conditions might include the severity of their infant's diagnosis, infant's appearance and level of functioning, and the duration of their infant's length of stay. Environmental factors that may influence the mothers' unique response to having an infant in the NICU might consist of difficulty fulfilling their maternal role, the medical tools used for intervention, and the communication patterns and activities of the staff. Miles and Carter clarified that as a result of the several factors that can influence the mothers, and each mother develops her own method of cognitively evaluating, or making decisions about the NICU experience. All of these factors result in the mothers having a unique perception of their infant's situation, status, and condition (Miles & Carter).

This study was included three subscales that identified maternal stress sources: the NICU environment (Sights and Sounds), parental roles, and infants' appearance and behavior. Miles, Funk, and Kasper (1991) revealed the most stressful feature of the NICU for 122 parents to be change in the parent-infant relationship, and the infants' appearance. The sights and sounds of the NICU caused lesser stress, and few parents reported stress in the area of staff communication and interactions. To define the stress that mothers experience, this study focuses on the relationship between factors like nursing support, preterm birth weight, experience of having premature birth, and delivery type that can influences maternal stress during their infant admitted in NICU.

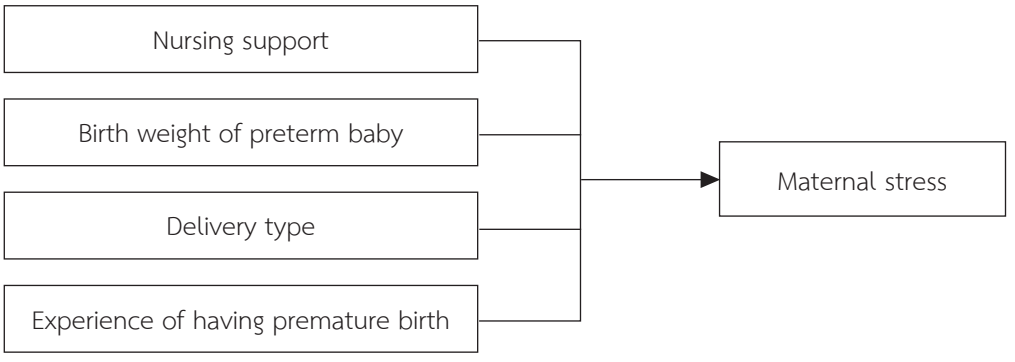

Figure 1 The study framework

Methods

A predictive correlational design was used in this study.

Target population was mothers with preterm infant hospitalized in NICU at Roi-Et Regional hospital.

A convenience sampling was used to recruit a sample of 90 mothers through the target population. The inclusion criteria for these participants were: 1) age 18 years or older, 2) delivered a baby at less than 37 week gestation, 3) no severe complications after delivery, 4) had visited their infant three to five time, and 5) able to read and write Thai.

Sample size was calculated by using Tabachnick and Fidell (2007) and yield a minimum sample size was 82. However, the researcher added 10% to compensate for missing data. Therefore, sample size in this study was 90.

Research instruments

There were 4 questionnaires included:

A demographic questionnaire developed by the researcher. It consisted of questions for age, educational level, occupation, monthly income, marital status. The information was recorded at the time of the interview.

A medical record form developed by the researcher. It contained parity, previous preterm birth, delivery type, infant birth weight, gestation at birth, and infant gender.

The Nurse Parent Support Tool (NPST) was developed by Miles et al. (1999). It designed to measure mothers' perception of nursing support during their infant's admission. It contained 21 items identify four dimensions of support including, information, appraisal, emotional support, and nursing care. The participants were asked to rate the amount of nursing support they received from nursing staff on a Likert-type as 1 = almost never to 5 = almost always. It is scored by summing all rated items with its possible r ange score of 21 - 105. The higher score reflects greater amounts of perceived support from nursing staff. The NPST is also available in Thai version (Kantahong, Niyomkar, Lamchang, 2015). In this study, its Cronbach's alpha reliability was .89.

Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU) was developed by Miles and Carter (1993). It was designed to determine maternal perception of stress arising from the physical and psychological environment in the NICU. There were 21 items of 3 subscales of the NICU environment (Sights and Sounds), parental roles, and infants' appearance and behavior. The participants were asked to rate on a scale from 1 (not at all stressful) to 5 (extremely stressful). Maternal stress level was classified into low (1.00 - 2.59), moderate (2.60 - 3.59), and high (3.60-5). Score 0 meant no experience with the described situation. The PSS: NSS was also available in Thai version (Utasongkawat, 2010). Its Cronbach's alpha reliability in this study was .92.

Ethical consideration

The study proposal and all research instruments were approved by the IRB committee of Faculty of Nursing, Burapha University Thailand (IRB code 01-02-2561). All the participants were informed regarding the purpose of the study and the procedure. Their participation in the study was on voluntary basis and their decision to withdraw from the study was respected. Informed consent was obtained from each participant prior to data collection. Confidentiality was maintained and no names were disclosed in the research report. All

data was stored in a specific file using specific password and only researcher had access to it. The data will be destroyed after publication of this research.

Data collection procedures

After obtained IRB approval, data collection procedure was discussed with head nurse of NICU. The researcher presented at the NICU to collect the data from 8:30 a.m. to 4:00 p.m., then explained to the participants about the purpose, method and confidentiality of this study as well as how to respond to the questionnaires and let them fill the questionnaire in the private room provided. Each participant took approximately 30 minutes to complete all questionnaires. The researcher checked for completeness of the questionnaire before the participant left.

Data analysis

Data were analyzed by using a statistical software program. An alpha level of .05 was set as a level of significance. Descriptive statistics including frequency, percent, mean and standard deviation was used to describe the demographic characteristics of the sample. Multiple regression analysis was performed to examine the influence factors nursing support, preterm birth weight, delivery type, experience of having premature birth to maternal stress.

Results

The participants had a mean age of 28.98 years (*SD* = 6.31). Most of them (76 %) were married. Almost all participants had completed general education. Additionally, 44.44% of the participants were housewife and majority of them had family income more than 10,000-20,000 Baht/ month. There were 36.67 % participants who were first time mother. Half of them had normal vaginal delivery (55.56 %), and more than a half had no experience of premature birth (68.89 %).

Infants were boys 51.11%. Mean birth weight was 1,784.56 grams (SD = 511.85; range 700-2,750). Mean of gestation at birth was 31.57 weeks (SD = 2.64; range 24-36). About 72.22% of them required mechanical ventilation or continuous positive airway pressure, 67.78 % were on incubator, and 45.56 % were on phototherapy. The mean age of infants was 3.68 days (SD = 1.80, Range = 2-10).

The mean score of overall maternal stress was 69.12 (*SD* = 11.57) (Table 1). Most of mothers (67.78 %) were high stress, 21.11% were moderate, and 11.11% were low.

The mean score of overall nursing support received was 89.68 (SD = 8.25), with a range of 69 to 105 which indicated that women in this study perceived high level of support from nurses.

Table 1 Descriptive statistics of maternal stress (*n*=90)

maternal stress	Possible range	Actual range	Mean	SD
Overall	0-90	35-85	69.12	11.57
Subscales				
Sights and sounds	0-30	10-27	22.01	3.64
Behavior and appearance	0-30	5-30	23.01	6.24
Parental role alteration	0-30	11-30	23.68	4.09

Results of A standard multiple regression analysis showed that all five predictors accounted for 44.2% of the variance prediction in maternal stress (Adjusted R^2 = .408, $F_{(5, 84)}$ = 13.29, p < .001). The significant predictors were preterm birthweight (β = -.61 and emergency caesarean section (β = .27. (Table 2)

Table 2 Predictors of maternal stress analysed by standard multiple regression (n = 90)

Predictors	*B*	*Beta*	*t*
Nursing support	.06	.04	.53
Preterm birth weight	-.01	-.61	-6.90***
Normal vaginal delivery	-6.08	-.02	-1.25
Emergency caesarean section	6.47	.27	3.08**
Experience of having premature birth	2.82	.14	1.62
Constant = 80.33, R = .665, R^2 = .442, Adjusted R^2 = .408, $F_{(5,84)}$ = 13.29***			

**p<.01, ***p<.001

Discussion

The findings revealed that most of mothers (68 %) reported high stress level. The greatest level of stress was found in the areas of parental role alteration, followed by infant behaviour and appearance, and sights and sounds in the NICU. It could be explained that mother's age ranged from 19-48 years old, with a mean age of 28.98 years. Older mothers might feel more responsible for their maternal role as compared to young or teenage mothers. Unfortunately, mothers with preterm infant admitted in NICU expressed that they could not perform mother's role properly due to the environmental factor such as medical equipment, tubing, etc., and this increased their stress level. This finding was consistent to previous study that used the PSS: NICU. Mothers' perceived highest stress level with maternal role alteration (Alkozei1, 2014). Moreover, a study in Thailand that examined stress level in adolescent mothers with preterm infants admitted in NICU reported moderate stress level in both subscales (Mean = 3.07). The highest score of stress was found in subscale infant behavior and appearance (Mean = 3.48) (Singsuwan, 2015).

The finding showed that preterm birth weight had significantly moderate negative association with maternal stress (β = -.61, p < .001) with a mean preterm birth weight as 1,784.56 gram (*SD* = 511.85; range 700-2,750). After giving birth to preterm infant, mothers might face a numbers of tension, worries, and concerns. Infants about 70% requiring respiratory support, and 67.78 % were on incubator. The health status of the infant might differ on a day-to-day basis and might affect maternal stress. Infant with respirator support seem to increase maternal stress level. Mothers might experience critical crisis such as deciding about withdrawal or withholding of life-sustaining therapy for their preterm infant. This study also revealed similar findings to previous study where very sick preterm including the infant being on respirator support significantly increased maternal stress (Wormald et al., 2015).

The results showed that emergency caesarean section had significantly positive association with maternal stress ($\beta = .27$, $p < .05$). An unplanned emergency cesarean delivery can especially be very stressful because mothers whose emergency caesarean section confront with uncertainty outcome of NICU admitted. The unexpected and uncertainty about their infants conditions have negative affect to stress level. In addition, mothers with unfamiliar and invasive procedures occurring in rapid process, tension to ability of mothers to adjust their experience. Therefore, they develop tension in order to cope with their unpleasant experience and its increase their stress. On the other hand, mothers whose normal vaginal delivery was not significantly predicted. In this study, 55.56 % mothers were normal vaginal delivery. Though most mothers with normal vaginal delivery were less pain and easier to visit their infant in NICU comparable with mothers whose emergency caesarean section. These findings revealed similar findings with the previous studies. Mothers with emergency cesarean section statistically significant associated with infants' lower birth weight and admission in NICU (Benzouina et al., 2016).

Nursing support was not significant. It could be explained that 53.33% of infants were born moderate preterm, 41.11% were born very preterm, while 5.56 % of them were born with extremely preterm. Infant born extremely preterm usually have higher medical complications and need to stay in NICU for longer period of time (Bender & Koestler, 2013). Mothers in this study seem satisfied with nursing support provided by nurses during their infant hospitalized. In additions, 75% mothers were married it could be explained mothers possible perceived support from husband during their preterm admission.

Experience of having premature birth was not significant. In this study, 31% of mothers experienced premature birth, while 68.89% had no experience of preterm birth. Mothers having preterm birth is another stressful life events and its unplanned situations. Previous study discovered long term stress in mothers after their premature infant out of the hospital between 15 months and 8 years old. The stress of mothers is modified, in part by social norms for emotional and psychological responses to the challenges of preterm birth. Mothers feared that the new born would die as importance. Moreover, mothers describe their stress as isolation, difficult relationship, and difficult mother (Kantrowitz-Gordon, Altman, & Vandermause, 2016).

Implications for nursing practice and future study

Antenatal care nurses should provide antenatal care guidelines including preterm births educations about normal appearance of premature babies and their common physical behaviours, and ensuring a positive pregnancy experience for all women. Nursing interventions to reduce emergency of caesarean section rate and maternal stress should be design. Future research should include participants more than one settings and a larger sample size should be considered.

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References

Bender, G. J., Koestler, D., Ombao, H., McCourt, M., Alskinis, B., Rubin, L. P., & Padbury, J. F. (2013). Neonatal intensive care unit: Predictive models for length of stay. *Journal of Perinatology, 33*(2), 147-153.

Benzouina, S., et al. (2016). Fetal outcome in emergency versus elective cesarean sections at Souissi Maternity Hospital, Rabat, Morocco. *The Pan African Medical Journal, 23*: 197. doi:10.11604/pamj.2016.23.197.7401

Costa-Ramon, A. M., Rodriguez-Gonzalez, A., Serra-Burriel, M., & Campillo-Artero, C. (2018). It's about time: Cesarean sections and neonatal health. *Journal of Health Economics, 59*, 46-59.

De Castro, E. C. M., Leite, A. J. M., & Guinsburg, R. (2016). Mortality in the first 24 hours of very low birth weight preterm infants in the Northeast of Brazil. *Revista Paulista de Pediatria, 34*(1), 106-113.

Eutrope, J., Thierry, A., Lempp, F., Aupetit, L., Saad, S., Dodane, C., ... Rolland, A. C. (2014). Emotional reactions of mothers facing premature births: Study of 100 mother-infant dyads 32 gestational weeks. *Public Library of Science One, 9*(8), 1-7. doi:10.1371/journal.pone.0104093

Howe, T.H., Sheu, C. F., Wang, T. N., & Hsu, Y. W. (2014). Parenting stress in families with very low birth weight preterm infants in early infancy. *Research in Developmental Disabilities, 35*(7), 1748-1756.

Kantahong, K., Niyomkar, S., & Lamchang, S. (2015). Factors predicting parent participation in caring for hospitalized children with acute illness. *Nursing Journal, 42*(3), 1-12. [In Thai]

Kantrowitz-Gordon, I., Altman, M. R., & Vandermause, R. (2016). Prolonged distress of parents after early preterm birth. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 45*(2), 196-209. doi:10.1016/j.jogn.2015.12.004

Malakouti, J., Jabraeeli, M., Valizadeh, S., & Babapour, J. (2013). Mothers' experience of having a preterm infant in the neonatal intensive care unit: A phenomenological study. *Critical Care Nursing, 5*(4), 172-181.

Miles, M. S., & Carter, M. C. (1983). Assessing parental stress in intensive care units. *American Journal of Maternal Child Nursing, 8*, 354–359.

Miles, M. S., Funk, S. G., & Kasper, M. A. (1991). *The neonatal intensive care unit environment: Sources of stress for parents*. AACN Clinical Issues in Critical Nursing, 2(2), 346-354.

Miles, M.S., Carlson, J., & Brunssen, S. (1999). The nurse parent support tool. *Journal of Pediatric Nursing, 14*(1), 44-50.

Rowlands, I. J., & Redshaw, M. (2012). Mode of birth and women's psychological and physical well-being in the postnatal period. *BioMed Central Pregnancy & Childbirth, 12*(1), 138 -148.

Sikorova, L., & Kucova, J. (2012). The needs of mothers to newborn hospitalized in intensive care unit. *Biomed Pap Med, 156*(4), 330-336.

Singsuwan, C. (2015). *Relationship between stress and coping of Muslim adolescent mothers having premature infants admitted in neonatal intensive care units in the three southern border provinces*. Master of Nursing Science (Pediatric Nursing). Prince of Songkla University. [In Thai]

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed). Boston, MA: Allyn and Bacon.

Teerarungsikul, N. (2012). The lived experience of mothers with premature babies. *Journal of Nursing Education, 5*(1), 25-38. [In Thai]

Tandberg, B. S., Sandtro, H. P., Vardal, M., & Ronnestad, A. (2013). Parents of preterm evaluation of stress and nursing support. *Journal of Neonatal Nursing, 19*(6), 317-326.

Treyvaud, K. (2014). Parent and family outcomes following very preterm or very low birth weight birth: A review. *Seminars in Fetal & Neonatal Medicine, 19*(2), 131-135.

Utasongkawat, S. (2010). *The effect of maternal mutual participation program of premature baby mothers on maternal stress at Sawanpracharak Hospital*. Education Program in Health Promotion (Master's thesis). Nakhon Sawan Rajabhat University. [In Thai]

Wormald, F., Tapia, J. L., Torres, G., Canepa, P., Gonzalez, A., Rodriguez, D.,... Dominguez, A. (2015). Stress in parents of very low birth weight preterm infants hospitalized in neonatal intensive care unit: A multicenter study. *Arch Argent Pediatric, 133*(4), 303-309.

World Health Organization. (2018). Preterm birth. Retrieved from: http://www.who.int/news-room/fact-sheets/detail/preterm-birth

Wu, W. R., & Hung, C. H. (2016). First-time mothers psychiatric health status during the transition to motherhood. *Community Mental Health Journal, 52*(8), 937-943.