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# Maternal Stress and Coping in the Neonatal Intensive Care Unit: A mixed-method study in Northern Malaysia

**Nurul Farhana Mat Nadzir[1], Rusnani Ab Latif[1*], Wan Ismahanisa Ismail[1], Yoyok Bekti Prasetyo[2]**

**Corresponding Author*

[1] Faculty of Health Sciences, Universiti Teknologi MARA Cawangan Pulau Pinang, Bertam Campus, 13200 Kepala Batas, Pulau Pinang, Malaysia

[2] Faculty of Health Sciences, Universitas Muhammadiyah Surabaya, East Java, Indonesia

farhana.arena1990@gmail.com; rusnani@uitm.edu.my; ismahanisa@uitm.edu.my
Tel: +6016-3109094

**Abstract**

Maternal stress in Neonatal Intensive Care Units (NICU) is a significant concern affecting both mothers and infant outcomes. This study examined stress levels and coping strategies among mothers of premature infants in northern Malaysia using a mixed-method explanatory sequential design. A total of 383 mothers were surveyed with the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU) and Brief COPE, followed by interviews with 14 participants. Findings showed moderate stress (M = 2.16, SD = 0.92), highest in parental role alteration. Age and education were significantly associated with stress, and mothers relied mainly on emotional, spiritual, and social coping.

Keywords: Maternal stress; Premature infants; Neonatal intesive care unit (NICU); Coping strategies


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## 1.0 Introduction

Preterm birth, defined as delivery before 37 weeks of gestation, remains a significant global health challenge and one of the primary causes of neonatal morbidity and mortality. According to the World Health Organization (2023), an estimated 13.4 million infants were born preterm in 2020, accounting for more than 10 percent of global live births. In Malaysia, approximately seven percent of infants are delivered prematurely (Jones et al., 2023). These infants are at heightened risk for complications such as respiratory distress, neurological impairment, and feeding difficulties, often necessitating care in the Neonatal Intensive Care Unit (NICU).

Although the NICU is vital for the survival of preterm infants, its highly technical and restrictive environment can be emotionally taxing for mothers. The presence of unfamiliar equipment, structured routines, and limited opportunities for hands-on caregiving contributes to considerable psychological distress. Many mothers report feelings of anxiety, fear, and helplessness, particularly when

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confronted with invasive procedures or when communication with healthcare staff is insufficient. Perinatal complications and previous traumatic experiences may further intensify these stress responses (Hendy et al., 2024).

Maternal stress during NICU hospitalization has been associated with impaired mother–infant bonding, delayed developmental outcomes, and an increased likelihood of postpartum depression. In Malaysia, postpartum depression among mothers of preterm infants has been reported at rates between 9.8 percent and 20.7 percent (Redzuan et al., 2020). Without timely recognition and intervention, postpartum depression may diminish maternal responsiveness and negatively affect both maternal functioning and infant well-being. Despite these risks, psychological support is often underemphasized in routine NICU care.

While numerous studies have examined maternal stress in NICU settings, limited evidence is available from Northern Malaysia, where cultural and socioeconomic differences may influence maternal experiences. Addressing these contextual factors is critical for informing targeted and relevant interventions. Guided by Lazarus and Folkman's (1984) Transactional Model of Stress and Coping, this study examines maternal stressor agents and coping strategies among mothers of preterm infants in the NICUs of Northern Malaysia, to strengthen mother-centered, culturally responsive care practices.

## 2.0 Literature review

*2.1 Overview of Maternal Stress in the NICU*

Maternal stress within NICU settings is well-established, with studies documenting a wide range of stress levels among mothers of preterm infants. High stress is commonly associated with the infant's fragile condition, the highly technical and unfamiliar NICU environment, and the disruption of expected maternal roles (Gomaa et al., 2022; Mulani, 2022). Other investigations describe moderate levels of stress, indicating notable but not overwhelming emotional strain (Pathak et al., 2022; Irene et al., 2022; Mukhtar et al., 2024). These differences across studies suggest that cultural expectations, family involvement, and institutional practices play substantial roles, reinforcing the need for context-specific evidence.

*2.2 Factors Influencing Maternal Stress*

Maternal stress is shaped by clinical, environmental, and personal factors, often assessed using the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU). Parental role alteration consistently emerges as a principal stressor because mothers have limited opportunities to perform routine caregiving tasks (Maharjan et al., 2022; Pathak et al., 2022). The NICU setting, characterized by alarms, medical equipment, and invasive procedures, also contributes to increased anxiety (Apedani et al., 2021). Concerns about infant appearance and medical fragility further heighten emotional distress (Gomaa et al., 2022). Socio-demographic factors such as lower income, limited education, and younger maternal age have been associated with greater levels of stress due to reduced coping resources (Gomaa et al., 2022). Overall, these findings demonstrate the multifaceted nature of maternal stress in NICU environments.

*2.3 Coping Strategies for Maternal Stress in the NICU*

Mothers employ a range of coping strategies shaped by cultural background, social support, and personal beliefs. Religious coping is frequently used, providing emotional comfort and spiritual grounding during uncertainty (Mulani, 2022; Irene et al., 2022). Social coping, particularly through interactions with other NICU parents, reduces isolation and provides shared emotional understanding (Banjade et al., 2023). Support from family members and healthcare providers strengthens psychological resilience (Maharjan et al., 2022). Cognitive strategies, such as reframing and problem-solving, assist mothers in adjusting to the NICU environment (Pathak et al., 2022). Many also rely on instrumental coping, including seeking information and practical assistance, to restore a sense of control (Gomaa et al., 2022). These findings highlight the importance of multifaceted interventions that address emotional, cognitive, social, and spiritual needs.

*2.4 Association Between Socio-Demographic Factors and Maternal Stress*

Socio-demographic factors substantially influence maternal stress in the NICU. Younger and first-time mothers often experience elevated stress due to limited caregiving experience, while older mothers may face strain from balancing work, household duties, and NICU responsibilities (Malouf et al., 2024). Mothers with lower education levels may find medical information difficult to interpret, increasing anxiety, whereas higher education supports more effective coping (Mukhtar et al., 2024). Financial pressure similarly exacerbates stress, particularly among low-income families with fewer resources (Sosnowski et al., 2023). Parity also plays a role, with mothers of multiple children reporting challenges in managing NICU visits alongside domestic roles (Pathak et al., 2022). Unplanned pregnancies may further intensify stress because of reduced readiness for preterm birth (Maharjan et al., 2022). Nonetheless, some studies report no significant associations, suggesting that cultural and institutional contexts may moderate these patterns (Banjade et al., 2023).

*2.5 NICU Support Services and Gaps*

Although awareness of parental psychological needs has increased, substantial gaps persist in available NICU support services. Evidence shows that family-centred care, clear communication, and active parental involvement can meaningfully decrease maternal stress (Loutfy et al., 2024). Despite this, many hospitals provide only basic information, with limited access to mental health screening or specialised psychological support (Sosnowski et al., 2023). Interventions such as kangaroo mother care, parent education, and peer-support programmes are beneficial, yet their implementation remains inconsistent due to resource constraints and inadequate staff training (Mukhtar et al., 2024). Ongoing challenges, including insufficient staffing and limited communication skills, further restrict the

delivery of comprehensive psychosocial care. Enhancing institutional guidelines, expanding psychosocial services, and strengthening staff competencies are essential to improve maternal well-being in the NICU.

## 3.0 Methodology

*3.1 Study Design*
This study adopted an explanatory sequential mixed-methods approach to explore stressor experiences and coping behaviours among mothers of premature infants in NICUs in Northern Malaysia. Data collection occurred in two stages: an initial quantitative survey using validated instruments, followed by a qualitative phase involving semi-structured interviews.

*3.2 Study Setting and Population*
The study was carried out in four tertiary hospitals with NICU services in Northern Malaysia—Hospital Pulau Pinang, Hospital Sultan Abdul Halim, Hospital Sultanah Bahiyah, and Hospital Tuanku Fauziah. These sites were chosen to reflect variation in care settings across Kedah, Perlis, and Penang. In total, 383 mothers of preterm infants participated in the quantitative component, while 13 mothers were purposively recruited for the qualitative interviews until data saturation was met.

*3.3 Sampling and Sample Size.*
Sample size for the quantitative phase was calculated using the Raosoft online calculator with parameters of 5% margin of error, 95% confidence level, and 50% response distribution. This estimation was based on premature infant admissions recorded in 2020 across Northern Malaysian hospitals (MNNR, 2020). The recommended minimum of 319 participants was increased by 20% to 383 to compensate for nonresponse. Convenience sampling was used, and participants were allocated proportionally across hospitals according to their annual preterm admissions: 138 from Hospital Sultan Abdul Halim, 116 from Hospital Sultanah Bahiyah, 70 from Hospital Pulau Pinang, and 59 from Hospital Tuanku Fauziah, representing 1,842 total admissions. For the qualitative phase, 14 mothers were purposively selected, with thematic saturation achieved at this number.

*3.4 Instruments*
The quantitative survey consisted of four sections: (A) maternal socio-demographic information; (B) infant background details; (C) the 26-item PSS: NICU (Miles et al., 1993), assessing sights and sounds, infant appearance, and parental role alteration (Malay version by Lim et al., 2017; $\alpha = 0.90$); and (D) the Brief COPE (Carver, 1997), covering 14 coping subscales (Malay version by Yusoff, 2011; $\alpha = 0.51–0.99$). The qualitative component used a semi-structured interview guide adapted from Apedani et al. (2021). Reliability analysis indicated Cronbach's alpha values exceeding 0.80 for both major instruments.

*3.5 Data Collection*
Quantitative data were gathered online from June to September 2025 through Google Forms accessible via QR codes placed in each NICU. Mothers provided digital informed consent and completed the survey within approximately 10–15 minutes. For the qualitative phase, face-to-face interviews were conducted with selected participants at Hospital Sultanah Bahiyah and Hospital Sultan Abdul Halim. Interviews lasted 15–20 minutes and were audio-recorded with permission.

*3.6 Data Analysis*
Descriptive statistics were used to summarize socio-demographic variables, stress levels, and coping patterns. One-way ANOVA tested associations between age, education, income, and maternal stress. Quantitative analysis was conducted using IBM SPSS Statistics Version 29. Qualitative data were analyzed using Clarke and Braun's (2013) six-step thematic analysis framework, supported by Atlas.ti 24 for coding and organization.

*3.7 Ethical Considerations*
Ethical approval was granted by the Medical Research Ethics Committee (MREC) (NMRR ID-25-00315-X3T) and the Universiti Teknologi MARA Research Ethics Committee (REC/07/2025 [PG/FB/38]). Participants were informed of the confidentiality and voluntary nature of their participation, as well as their right to withdraw at any stage.

## 4.0 Results and Discussion

*4.1 Socio-demographic characteristics of participants*
A total of 383 mothers (n = 383) participated in this study. Their socio-demographic and infant characteristics are summarized in Table 1. Most mothers were between 25 and 34 years old (n = 266, 69.5%), married (n = 378, 98.7%), and Malay (n = 369, 96.3%). The majority had secondary education (n = 300, 78.3%) and belonged to the less than RM4,850 (B40) income group (n = 257, 67.1%). In terms of occupation, housewives (n = 121, 31.6%) formed the largest group, followed by private sector employees (n = 103, 26.9%), public sector employees (n = 79, 20.6%), and self-employed mothers (n = 80, 20.9%). Regarding infant characteristics, slightly more than half were male (n = 213, 55.6%), with most born late preterm, 34 to 36 weeks of gestational age (n = 300, 78.3%), and having low

birth weight, 1500 gram to 2499 gram (n = 292, 76.2%). Caesarean section was the most common mode of delivery (n = 245, 64.0%). The high Caesarean rate may reflect clinical management of preterm labor (Maharjan et al., 2022).

Table 1. Socio-demographic Characteristics of Participants

| Variable | Category | n | % |
|---|---|---|---|
| Maternal Characteristics | | | |
| Age (years) | < 25 | 40 | 10.4 |
| | 25–29 | 137 | 35.8 |
| | 30–34 | 129 | 33.7 |
| | 35–39 | 61 | 15.9 |
| | ≥ 40 | 16 | 4.2 |
| Marital status | Married | 378 | 98.7 |
| | Single | 4 | 1.0 |
| | Divorced | 1 | 0.3 |
| Ethnicity | Malay | 369 | 96.3 |
| | Indian | 12 | 3.1 |
| | Chinese | 2 | 0.5 |
| Education level | Primary or none | 7 | 1.9 |
| | Secondary | 300 | 78.3 |
| | Tertiary | 76 | 19.8 |
| Occupation | Housewife | 121 | 31.6 |
| | Private sector | 103 | 26.9 |
| | Public sector | 79 | 20.6 |
| | Self-employed | 80 | 20.9 |
| Monthly family income (RM) | < 4,850 | 257 | 67.1 |
| | 4,851–10,970 | 121 | 31.6 |
| | ≥ 10,971 | 5 | 1.3 |
| Number of children | One | 64 | 16.7 |
| | Two | 126 | 32.9 |
| | Three | 144 | 37.6 |
| | Four or more | 49 | 12.8 |
| Infant Characteristics | | | |
| Sex | Male | 213 | 55.6 |
| | Female | 170 | 44.4 |
| Birth weight (g) | < 1,000 | 5 | 1.3 |
| | 1,000–1,499 | 54 | 14.1 |
| | 1,500–2,499 | 292 | 76.2 |
| | ≥ 2,500 | 32 | 8.4 |
| Gestational age (weeks) | < 28 | 2 | 0.5 |
| | 28–<32 | 17 | 4.4 |
| | 32–<34 | 64 | 16.7 |
| | 34–<36 | 300 | 78.3 |
| Mode of delivery | Vaginal | 129 | 33.7 |
| | Caesarean section | 245 | 64.0 |
| | Assisted vaginal | 9 | 2.3 |
| Hospital | Hospital Sultan Abdul Halim | 138 | 36.0 |
| | Hospital Sultanah Bahiyah | 116 | 30.3 |
| | Hospital Pulau Pinang | 70 | 18.3 |
| | Hospital Tuanku Fauziah | 59 | 15.4 |

*4.2 Levels of Maternal Stress*

The overall mean stress score (M = 2.16, SD = 0.92) indicated a moderate level of parental stress (Table 2). The Parental Role Alteration subscale scored the highest (M = 2.67, SD = 1.14), followed by Infant Behaviour and Appearance (M = 2.09, SD = 1.05) and Sights and Sounds (M = 1.65, SD = 0.71).

Table 2. Level of Stress among Mothers with Premature Infants in the NICU

| Subscale | Minimum | Maximum | Mean | SD | Level of Stress |
|---|---|---|---|---|---|
| Sights and Sounds in NICU | 1.00 | 5.00 | 1.65 | 0.71 | Low |
| Infant Behaviour and Appearance | 1.00 | 5.00 | 2.09 | 1.05 | Low–Moderate |
| Parental Role Alteration | 1.00 | 5.00 | 2.67 | 1.14 | Moderate |
| Overall Stress (Total) | 1.00 | 4.73 | 2.16 | 0.92 | Moderate |

These findings echo prior studies showing that NICU mothers often report moderate to high stress due to the inability to perform caregiving roles (Gomaa et al., 2022; Pathak et al., 2022). The highest stress from role alteration suggests emotional strain when mothers are unable to perform core aspects of maternal identity, such as touching, feeding, and comforting their infants (Mulani, 2022).

*4.3 Coping Strategies Utilized by Mothers*

Mothers applied a variety of coping mechanisms, as summarized in Table 3. The most frequently used strategies were religion (M = 2.89, SD = 0.83), instrumental support (M = 2.77, SD = 0.85), and emotional support (M = 2.73, SD = 0.82). Least used were substance use (M = 1.01, SD = 0.15), humor (M = 1.08, SD = 0.29), and self-blame (M = 1.28, SD = 0.60).

Table 3. Descriptive Statistics of Coping Strategies Utilized by Mothers of Premature Infants in the NICU

| Coping Strategy | M | SD | Min | Max | Interpretation |
|---|---|---|---|---|---|
| Self-distraction | 2.67 | 0.91 | 1.00 | 4.00 | Moderate |
| Active coping | 2.49 | 0.91 | 1.00 | 4.00 | Moderate |
| Denial | 1.34 | 0.64 | 1.00 | 4.00 | Low |
| Substance use | 1.01 | 0.15 | 1.00 | 3.00 | Low |
| Use of emotional support | 2.73 | 0.82 | 1.00 | 4.00 | Moderate–High |
| Use of instrumental support | 2.77 | 0.85 | 1.00 | 4.00 | Moderate–High |
| Behavioral disengagement | 1.48 | 0.68 | 1.00 | 4.00 | Low |
| Venting | 2.38 | 0.88 | 1.00 | 4.00 | Moderate |
| Positive reinterpretation | 2.60 | 0.97 | 1.00 | 4.00 | Moderate |
| Planning | 2.36 | 0.98 | 1.00 | 4.00 | Moderate |
| Humor | 1.08 | 0.29 | 1.00 | 3.00 | Low |
| Acceptance | 2.67 | 0.89 | 1.00 | 4.00 | Moderate |
| Religion | 2.89 | 0.83 | 1.00 | 4.00 | High |
| Self-blame | 1.28 | 0.60 | 1.00 | 4.00 | Low |

The dominance of religious coping is consistent with Malaysian cultural norms emphasizing faith-based resilience (Irene et al., 2022). Religious beliefs provide meaning and hope, enabling mothers to cope with uncertainty (Mulani, 2022). Likewise, emotional and instrumental supports reflect the collective coping culture typical of Southeast Asia, where family, peers, and nurses provide vital reassurance (Banjade et al., 2023).

*4.4 Relationship between Socio-Demographic Factors and Maternal Stress*

Significant differences in maternal stress were observed across age and education, but not income (Table 4). Mothers aged ≥40 years reported the highest stress (M = 2.92), significantly higher than those aged below 25 years (M = 1.98) and 25–34 years ($p < .01$). Mothers with tertiary education also exhibited higher stress (M = 2.43) compared to those with secondary education (M = 2.10). No significant differences were found by income (p = 0.230).

Table 4. One-Way ANOVA Results for Socio-Demographic Factors and Maternal Stress Levels

| Variable | Group | *n* | *M* | *SD* | *F*(df) | *p* | η² | Interpretation |
|---|---|---|---|---|---|---|---|---|
| Age Group | <25 years | 40 | 1.98 | 0.69 | 4.38 (4, 378) | .002 | .044 | Significant |
| | 25–29 years | 137 | 2.07 | 0.86 | | | | |
| | 30–34 years | 129 | 2.12 | 0.89 | | | | |
| | 35–39 years | 61 | 2.36 | 1.07 | | | | |
| | ≥40 years | 16 | 2.92 | 1.04 | | | | |
| Education Level | Illiterate | 1 | 1.19 | — | 3.28 (3, 379) | .021 | .025 | Significant |
| | Primary | 6 | 1.87 | 0.74 | | | | |
| | Secondary | 300 | 2.10 | 0.87 | | | | |
| | Tertiary | 76 | 2.43 | 1.07 | | | | |
| Family Income | < RM 4,850 (B40) | 257 | 2.22 | 0.94 | 1.48 (2, 380) | .230 | .008 | Not Significant |
| | RM 4,851–10,970 (M40) | 121 | 2.04 | 0.86 | | | | |

| Variable | Group | *n* | *M* | *SD* | *F*(df) | *p* | η² | Interpretation |
|---|---|---|---|---|---|---|---|---|
| | > RM 10,971 (T20) | 5 | 2.16 | 1.14 | | | | |

Older mothers may experience greater stress due to higher perceived risks or caregiving burdens (Malouf et al., 2024). Conversely, tertiary-educated mothers' heightened awareness of medical issues might contribute to anxiety (Mukhtar et al., 2024). The absence of income effects suggests that emotional stress is more universally driven by maternal role disruption than by socioeconomic status.

*4.5 Support Services Available for Mothers with Premature Infants*

Qualitative findings revealed four key dimensions of support experienced by mothers: environmental, psychosocial, educational, and interprofessional. Environmental support from a clean, organized, and well-equipped unit provided reassurance regarding infant safety, consistent with evidence that a stable NICU environment reduces parental anxiety (Loutfy et al., 2024). Psychosocial support, especially through empathetic communication from nurses, helped mothers manage emotional distress, reflecting previous findings on the critical role of nurse–parent interactions in reducing maternal stress (Sosnowski et al., 2023). Educational support, such as breastfeeding guidance and Kangaroo Mother Care instruction, enhanced maternal confidence, although mothers noted variability in the information provided; this mirrors literature emphasizing the need for consistent, structured parental education to strengthen maternal preparedness (Mukhtar et al., 2024). Interprofessional support, including coordinated communication among nurses, physicians, and lactation staff, improved mothers' understanding of their infants' conditions and care plans, aligning with studies showing that collaborative team approaches improve parental satisfaction and reduce confusion (Loutfy et al., 2024). Overall, while multiple supportive elements were present, the inconsistencies highlighted by mothers indicate a continued need for standardized psychosocial and educational protocols within NICU practice.

## 5.0 Conclusion & Recommendation

This study concludes that mothers of premature infants admitted to NICUs experience moderate levels of stress, with the most prominent stressors stemming from limitations in fulfilling expected maternal roles. Despite these challenges, many mothers employed adaptive coping strategies, particularly through religious practices and social support networks. Interestingly, higher stress levels were reported among older mothers and those with greater educational attainment. A major limitation of this study is the use of convenience sampling from selected hospitals, which may restrict the broader applicability of the results. Future research should consider longitudinal or multi-center approaches to better understand temporal changes in maternal stress and variations across different regions.

It is recommended that hospitals provide continuous psychosocial support, improve communication training for healthcare staff, and reinforce family-centered care practices to reduce maternal stress and enhance emotional well-being. Further, more targeted recommendations for NICU policies and practices are needed, such as incorporating mental health professionals into NICU teams, strengthening family-centered care protocols, and implementing systematic parental mental health screening.

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## Paper Contribution to the Related Field of Study

This paper contributes to the field of maternal and neonatal health by providing empirical evidence on the specific stressor agents and coping strategies among Malaysian mothers with premature infants in NICUs. The mixed-method approach strengthens the understanding of both measurable stress patterns and lived maternal experiences. It offers culturally contextualized insights that support the development of targeted, mother-centered support interventions in NICU settings.

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