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SCH OOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

STRESS LEVEL AND ASSOCIATED FACTORS AMONG MOTHERS WITH BABIES BEING MANAGED FOR NEONATAL JAUNDICE AT THE TETTEH QUARSHIE MEMORIAL HOSPITAL AND THE EASTERN REGIONAL HOSPITAL.

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF A MASTER OF PUBLIC HEALTH DEGREE

INTEGRI PROCEDAMUS

FEBRUARY, 2025

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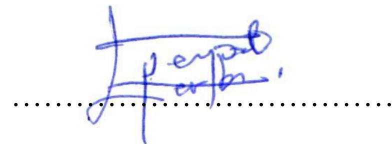
DECLARATION

I, Perpetual Opei-Larbi affirm that this dissertation is the outcome of my individual effort. Proper recognition has been given to other works referenced. Additionally, I confirm that this dissertation has not been presented for the attainment of any degree in this institution or any other educational institution.



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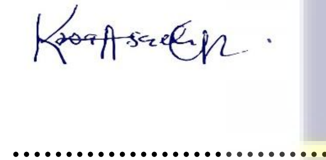

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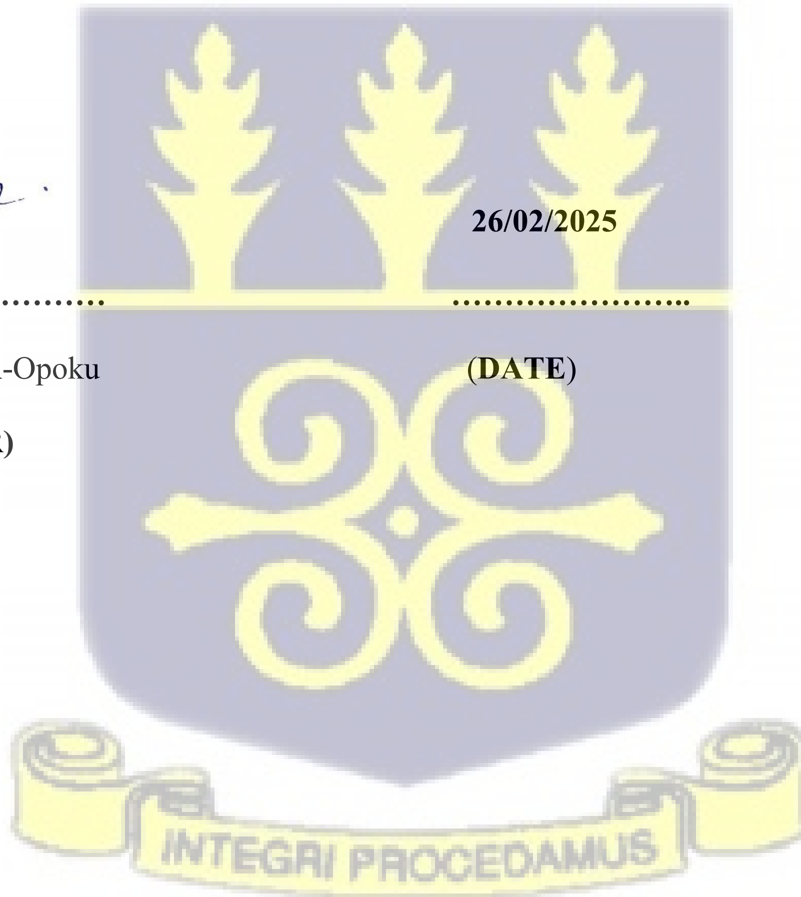

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DEDICATION

I dedicate this write-up, first and foremost, to God for guiding me through this journey successfully. Secondly, to my parents, especially my father, Nai Benjamin Opei-Larbi, whose unwavering support and dedication have been my pillar, ensuring I had every resource I needed. The steadfast encouragement from my family, their faith in God, and their belief in both my strengths and weaknesses have made this achievement possible. To my late mother, whose wisdom, guidance, kindness, discipline, and hard work continue to inspire me, I wholeheartedly dedicate this to you.

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To my family and friends, I am truly grateful for your endless love, motivation and understanding throughout this journey. Your constant support has been my greatest source of strength.

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ABSTRACT

Background

Neonatal jaundice is a common cause of neonatal morbidity and mortality in Ghana, often requiring hospitalization and intensive management. However, limited research has examined the stress levels and associated factors among mothers caring for jaundiced infants in this context. The current study, therefore, assessed maternal stress levels and factors associated with managing neonatal jaundice.

Method

A cross-sectional study was conducted at two major healthcare facilities in the Eastern Region of Ghana: Tetteh Quarshie Memorial Hospital and Eastern Regional Hospital. The study included 103 mothers of neonates diagnosed with NNJ. Data was collected using a structured questionnaire, which included and adapted version of the Perceived Stress Scale (PSS-10) to assess maternal stress levels. Demographic, clinical, and infant-related characteristics were also collected. Data analysis was performed using STATA version 17.0, with Linear Regression used to determine associations between variables.

Results

The mean age of mothers included in the study was 28.45 ± 5.95 years. The study revealed that 62.1% of mothers experienced high stress levels, 27.2% reported moderate stress, and 10.7% had low stress. Results from the linear regression model showed that married mothers experienced significantly lower stress levels compared to single mothers ($\beta = -1.83$, $p = 0.032$). Muslim mothers reported higher stress levels than Christian mothers ($\beta = 3.12$, $p = 0.010$), and mothers who earned above 2000 Ghana cedis had significantly lower stress levels than those earning less than 1000

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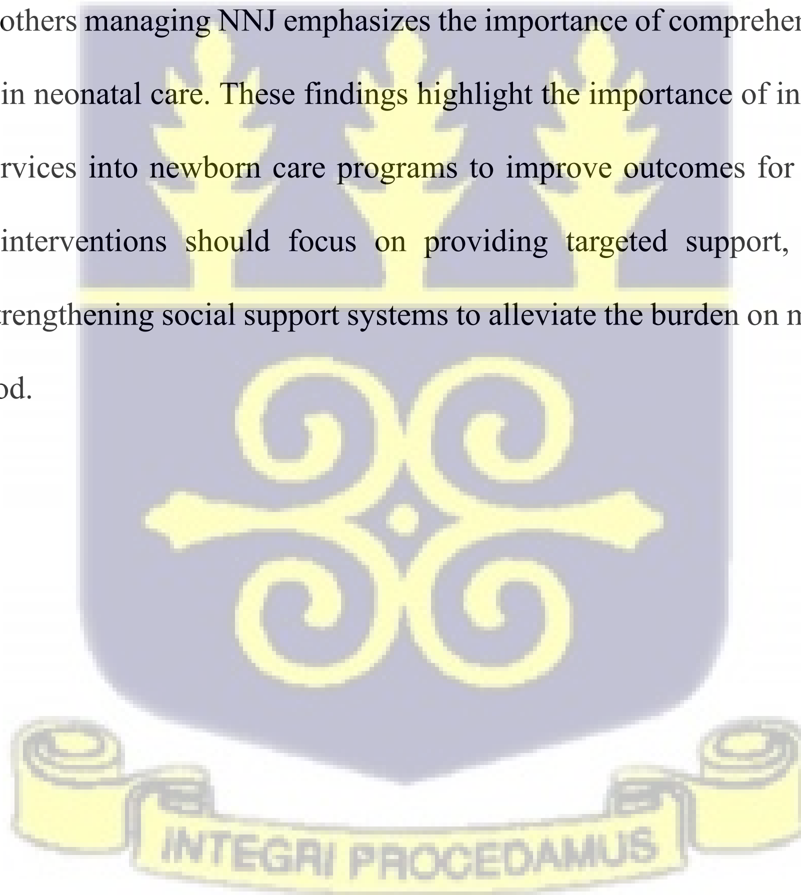
cedis (β = -4.23, p = 0.008). Mothers with 1-2 children reported higher stress levels compared to first-time mothers (β = 2.21, p = 0.025).

Clinical factors also played a role, with mothers who did not experience birth complications reporting significantly lower stress levels (β = -2.49, p = 0.018). Although social support did not show a statistically significant association with stress in the unadjusted model, a trend toward higher stress levels was observed among mothers who did not receive support (β = 2.21, p = 0.073).

Conclusion

The high prevalence of maternal stress and the role of sociodemographic, economic, and clinical factors among mothers managing NNJ emphasizes the importance of comprehensive psychosocial support systems in neonatal care. These findings highlight the importance of integrating maternal mental health services into newborn care programs to improve outcomes for both mothers and infants. Future interventions should focus on providing targeted support, enhancing health education, and strengthening social support systems to alleviate the burden on mothers during this challenging period.



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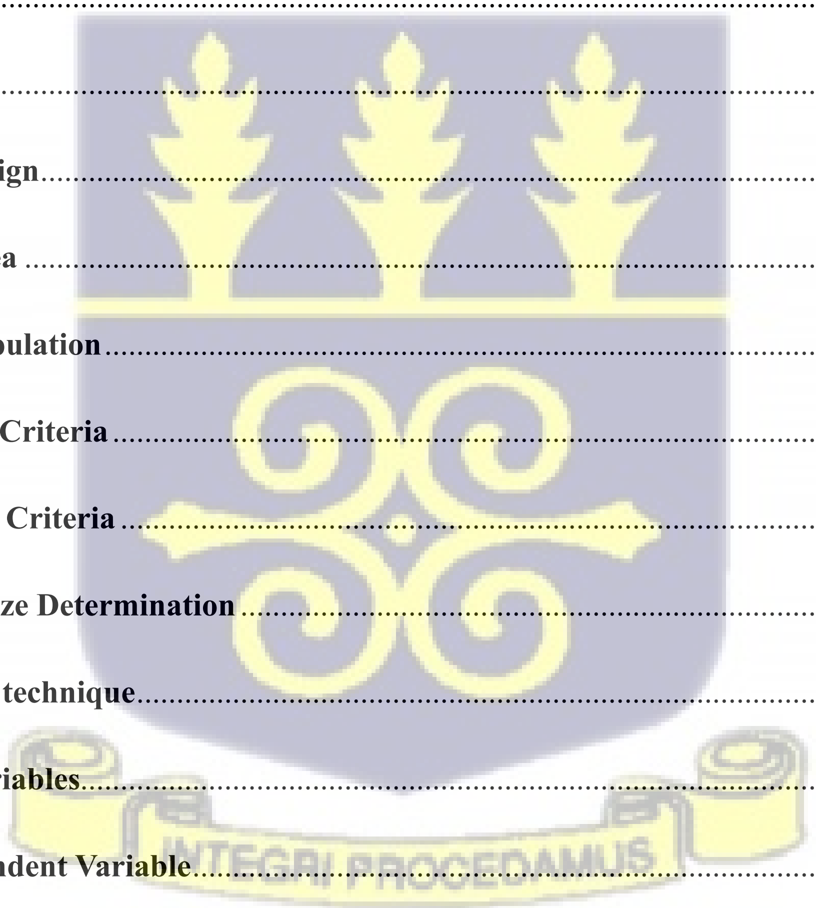

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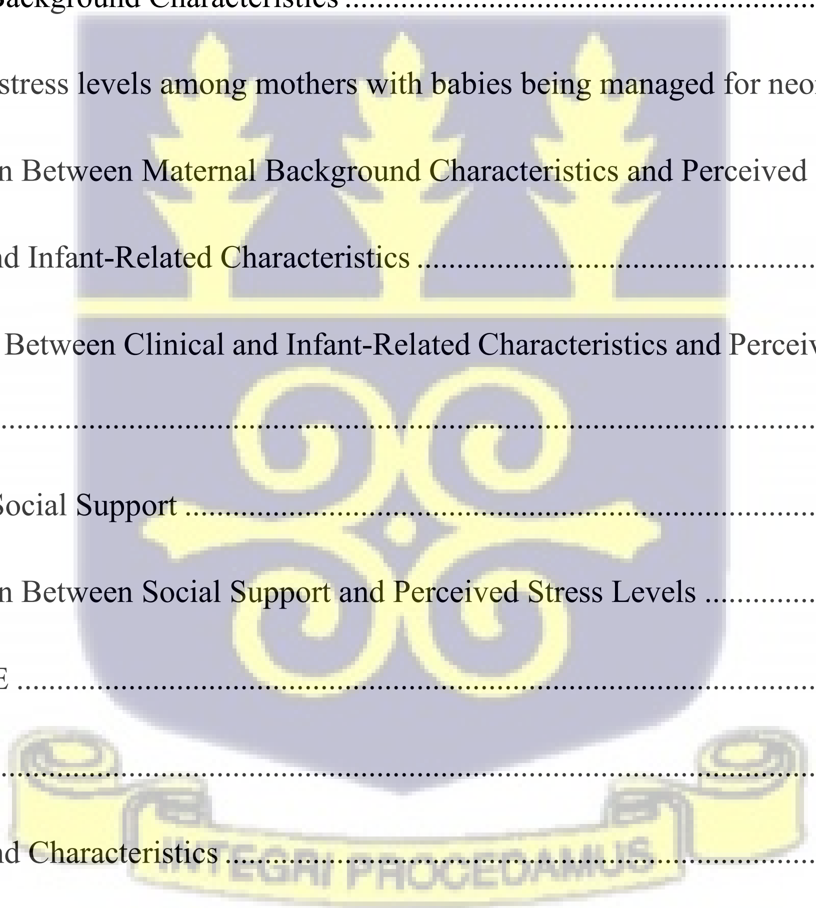

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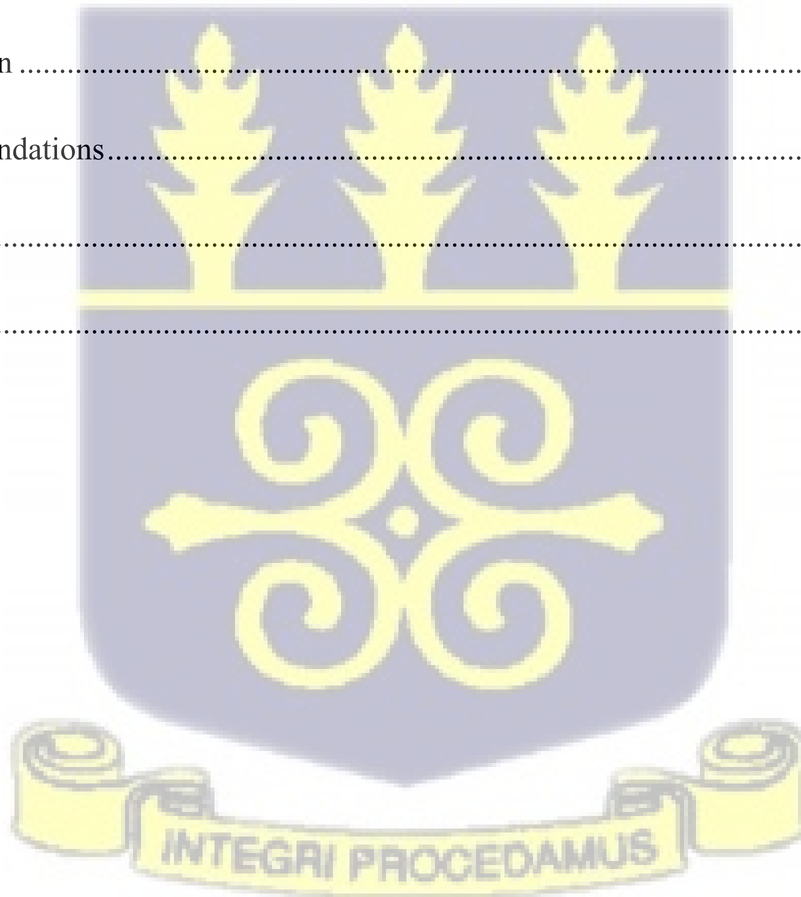

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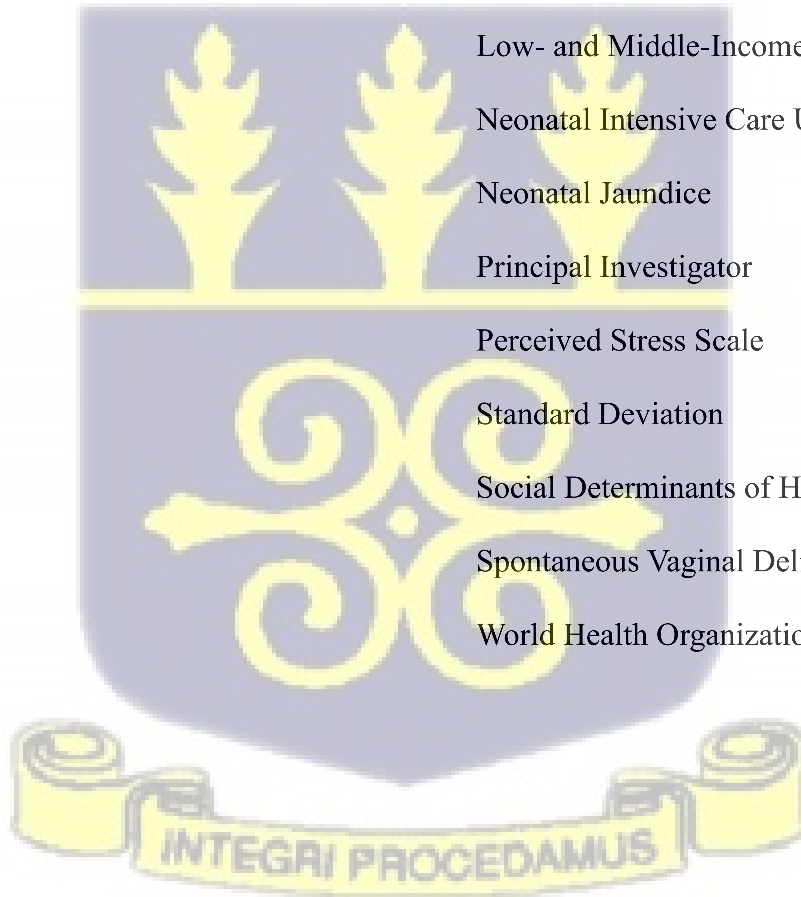
List of abbreviations

ANC	Antenatal Care
CI	Confidence Interval
CPAP	Continuous Positive Airway Pressure
CS	Cesarean section
ET	Exchange Transfusion
G6PD	glucose-6-phosphate dehydrogenase
GHS_ERC	Ghana Health Service Ethics Review Committee
LMICs	Low- and Middle-Income Countries
NICU	Neonatal Intensive Care Unit
NNJ	Neonatal Jaundice
PI	Principal Investigator
PSS	Perceived Stress Scale
SD	Standard Deviation
SDH	Social Determinants of Health
SVD	Spontaneous Vaginal Delivery
WHO	World Health Organization



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CHAPTER ONE

INTRODUCTION

1.1 Background

Neonatal jaundice (NNJ) is a common clinical condition affecting newborns worldwide. It remains a leading cause of neonatal morbidity and mortality, especially in low- and middle-income countries. Neonatal jaundice (NNJ) occurs due to an accumulation of unconjugated bilirubin in the blood, resulting in yellow discoloration of the skin and eyes (Mitra & Rennie, 2017). Although most cases are benign and resolve spontaneously, severe or untreated jaundice can progress to acute bilirubin encephalopathy or kernicterus, leading to irreversible neurological damage, cerebral palsy, or death (Ansong-Assoku et al., 2023; Hansen, 2021; Seneadza et al., 2022). It is estimated that approximately 60% of term newborns and 80% of preterm newborns develop jaundice within the first 2 weeks of life (Ansong-Assoku et al., 2024).

In sub-Saharan Africa, NNJ continues to be a significant public health problem due to challenges such as delayed diagnosis, inadequate treatment facilities, and limited awareness among caregivers (Magai et al., 2020; Mpimbaza et al., 2019; Leke et al., 2023; Poulin et al., 2024). In Ghana, neonatal jaundice is among the leading causes of neonatal admissions. It accounts for between 30% and 66% of cases in some health facilities in Ghana (Adzitey et al., 2024; Nartey, 2024; Adoba et al., 2018).

Poor health seeking behaviour, late presentation, and reliance on traditional remedies often increase its severirrty (Magai et al., 2020; Mpimbaza et al., 2019; Leke et al., 2023; Poulin et al., 2024). Delays in seeking care, inadequate healthcare infrastructure, and limited awareness among

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caregivers make NNJ a significant contributor to neonatal morbidity and mortality (Donkor et al., 2023).

The management of neonatal jaundice often involves prolonged hospital stays, phototherapy, and in some cases, exchange transfusion, which can be stressful for mothers (Anderson et al., 2022). These interventions often require prolonged hospital stays, close maternal involvement, and continuous anxiety about infant survival, making the mother stressed. When a newborn develops NNJ requiring hospitalization, the mother's sense of control and wellbeing may be significantly disrupted.

Mothers whose babies are admitted for NNJ frequently experience heightened stress due to fear of disability or death, guilt or self-blame for the infant's condition (Malouf et al., 2024). Uncertainty about treatment outcomes, and disruption of early bonding experiences further increase the stress. (Malouf et al., 2024). Maternal stress during the neonatal period is a critical public health concern. High stress levels can adversely affect maternal mental health, hinder mother-infant bonding, and impair caregiving capacity (Smith & Agyemang, 2020). According to Ansong-Assoku et al. (2023) and Greco et al. (2016), the management procedures for neonatal jaundice may require modification to accommodate the increased stress levels in mothers, which can affect the results for both the mother and the newborn. Despite the documented prevalence of neonatal jaundice in Ghana, there is limited research on the psychological stress borne by mothers, particularly their stress levels and the factors contributing to this stress. Persistent concerns about jaundice management can lead to distress, separation difficulties, increased healthcare resource use, and premature discontinuation of breastfeeding (Adiiboka et al., 2022). Therefore, addressing maternal stress is vital for improving the overall management of neonatal jaundice, ensuring better health outcomes for both mother and child.

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1.2 Problem Statement

Neonatal jaundice (NNJ) is part of the global burden of disease, being among the top 5-10 causes of neonatal fatalities affecting one in two infants globally (Diala et al., 2023). Data from the DHIMS shows that in 2023 and 2024, 1083 (rate=1.8%) and 1145 (rate=1.80%), respectively of neonatal Jaundice were observed in the Eastern Region (DHIMS 2 Data). A study conducted in the central region indicates a 66.7% prevalence of neonatal jaundice at the Cape Coast Teaching Hospital (Oppong, 2019).

Although medical management of NNJ has improved neonatal survival, the experience of caring for a hospitalized jaundiced infant often exposes mothers to significant emotional and psychological distress. Mothers of newborns diagnosed with neonatal jaundice often experience heightened stress due to concerns about their child's health, unfamiliar medical interventions, and extended hospital stays. This stress can be compounded by financial constraints limited family support, and inadequate knowledge about the condition (Malouf et al., 2024). Literature reveals adequate study on the medical and management aspects of neonatal jaundice, while the associated socioeconomic and psychological dimensions remain relatively unexplored. Although stress among mothers of sick neonates has been documented in several studies, much of the existing research focuses on mothers of preterm or low-birth weight infants in neonatal intensive care units (Daliri et al., 2024; Wuni et al., 2022). Very few studies have specifically examined stress levels among mothers whose babies are being managed for neonatal jaundice. Moreover, the factors that influence maternal stress in this context remain underexplored. The lack of contextual evidence limits the ability of healthcare providers to recognize and address stress related needs among mothers of jaundiced infants in Ghanaian hospital. Addressing this knowledge gap is crucial for developing targeted interventions and support systems to alleviate the burden of stress on affected

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mothers and their families. Therefore, a pressing need to investigate the role of maternal stress in the management of neonatal jaundice in the Eastern Region to develop interventions that can improve neonatal outcomes.

1.3 Significance of the Study

This study is critical for several reasons. First, it addresses a significant gap in the literature on maternal stress associated with neonatal jaundice in Ghana. Findings from this research contribute to the global understanding of maternal psychosocial health in low-resource settings. The findings from this study also provide insights into the specific stressors faced by mothers in the Eastern Region, which informs targeted interventions to alleviate stress and improve maternal mental health. By identifying factors associated with maternal stress, this study will enable providers to develop tailored support mechanisms to enhance the quality of care for both mothers and their neonates. The results will also serve as a basis for policy advocacy, emphasizing the importance of integrating maternal mental health services into neonatal care programs.

1.4 Main Research Question

What are the stress levels of mothers with babies being managed for neonatal jaundice at the Tetteh Quarshie Memorial Hospital, Mampong, and the Eastern Regional Hospital, Koforidua in the Eastern Region of Ghana?

1.4.1 Specific Research Questions

1. What are perceived stress levels among mothers with babies being managed for neonatal jaundice at the two facilities?
2. What are the factors associated with stress among mothers whose babies are being managed for neonatal jaundice at the two facilities?

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1.5 Objectives of the study

1.5.1 General Objectives

To assess the stress levels of mothers with babies being managed for neonatal jaundice at the Tetteh Quarshie Memorial Hospital, Mampong and the Eastern Regional hospital, Koforidua in the Eastern Region of Ghana.

1.5.2 Specific Objectives

1. To assess perceived stress levels among mothers with babies being managed for neonatal jaundice at the Tetteh Quarshie Memorial Hospital and Eastern Regional Hospital
2. To examine the factors associated with stress among mothers whose babies are being managed for neonatal jaundice at the facilities

1.6 Narrative Explanation of Conceptual Framework

The conceptual framework for this study is guided by the Lazarus and Folkman Transactional Model of Stress and Coping (Biggs et al., 2017). It explains stress as a dynamic process arising from the interaction between an individual and their environment. According to the model, stress occurs when a person perceives that the demands of a situation exceed their available resources to cope. In this study, the hospitalization of a baby with neonatal jaundice is conceptualized as a stressful event that triggers both emotional and cognitive responses in mothers. The extent of maternal stress experienced depends on how the mother appraises the situation and the coping resources she possesses.

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At the individual or sociodemographic level, factors such as the mother's age, level of education, marital status, number of children, and socioeconomic status (SES) can influence how she perceives and responds to her baby's illness (Malouf et al., 2024). For instance, a young or first-time mother with limited experience in childcare may perceive the baby's hospitalization as highly threatening, thereby experiencing higher stress levels (Musabirema et al., 2015). Similarly, mothers with low educational attainment or poor socioeconomic conditions may have limited access to information and resources to understand or manage the illness, which can intensify feelings of helplessness and stress (Kaytez et al., 2025; Manzouri et al., 2025). Conversely, married mothers or those with supportive partners may experience reduced stress due to shared caregiving responsibilities and emotional reassurance (Makanjuola & Ngcobo, 2025; Neller et al., 2024)

Clinical factors such as the severity of the baby's jaundice, duration of hospitalization, treatment modalities, and the presence of complications represent external stressors that shape the mother's appraisal of the situation. A mother whose baby requires exchange transfusion or prolonged phototherapy may interpret the condition as severe or life-threatening, leading to heightened anxiety and stress (Sabzehei et al., 2015). In contrast, when a baby responds quickly to treatment or is hospitalized for a short period, the mother's level of perceived stress may be lower. Complications such as poor feeding, convulsions, or recurrent admissions can further intensify maternal stress by increasing uncertainty about the baby's recovery.

At the psychosocial level, factors such as social support, coping mechanisms, and perceived severity of the condition influence the mother's ability to manage stress (Kılıç et al., 2025). Mothers with strong social networks such as emotional or practical support from family, friends, or healthcare providers often report lower stress levels because they feel supported and less isolated in caring for their baby (Machado et al., 2020). Similarly, adaptive coping mechanisms, such as

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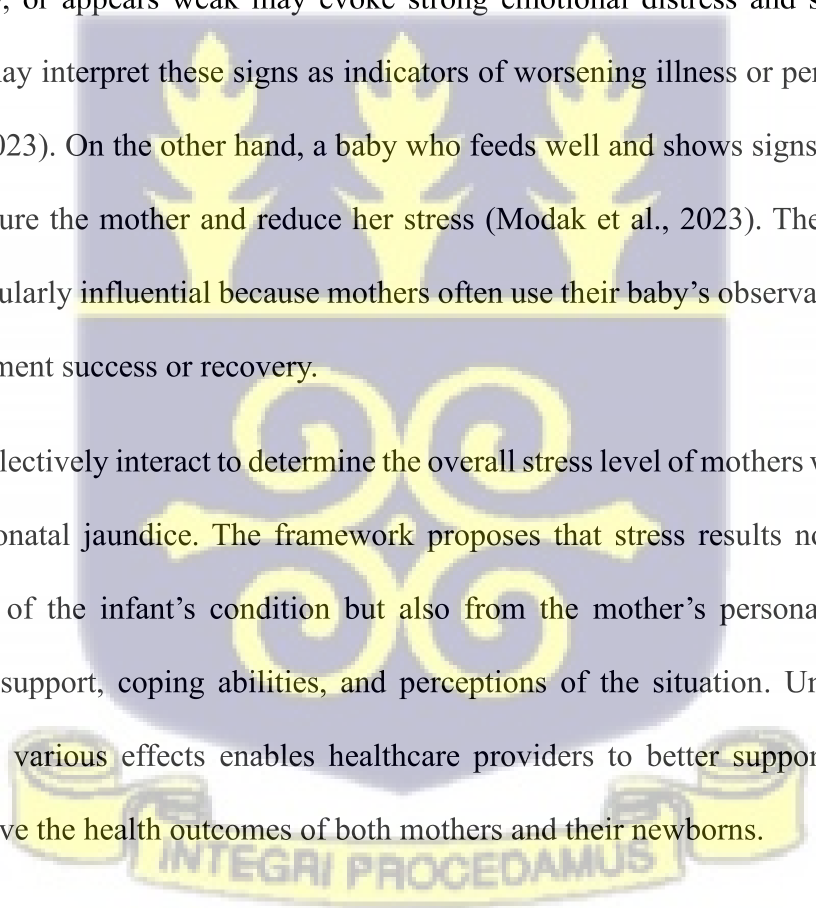
seeking information, prayer, or positive reframing, can help mothers manage anxiety more effectively (Mróz et al., 2024). However, those who perceive the illness as extremely severe or beyond their control may experience greater stress, especially if they rely on maladaptive coping strategies like denial or withdrawal (Chaaya et al., 2025). For example, a mother who believes her baby's condition is a punishment or spiritual attack may feel powerless and overwhelmed, increasing her stress level.

Infant-related characteristics, including feeding difficulties and the baby's general health status, also contribute to maternal stress (Sun et al., 2020; Yang et al., 2025). A baby who refuses to feed, cries persistently, or appears weak may evoke strong emotional distress and self-blame in the mother, as she may interpret these signs as indicators of worsening illness or personal failure (de Barbaro et al., 2023). On the other hand, a baby who feeds well and shows signs of improvement is likely to reassure the mother and reduce her stress (Modak et al., 2023). These infant-related factors are particularly influential because mothers often use their baby's observable behavior as a measure of treatment success or recovery.

These factors collectively interact to determine the overall stress level of mothers with babies being managed for neonatal jaundice. The framework proposes that stress results not only from the clinical severity of the infant's condition but also from the mother's personal characteristics, available social support, coping abilities, and perceptions of the situation. Understanding and addressing these various effects enables healthcare providers to better support mother, which ultimately improve the health outcomes of both mothers and their newborns.



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1.6 Conceptual Framework

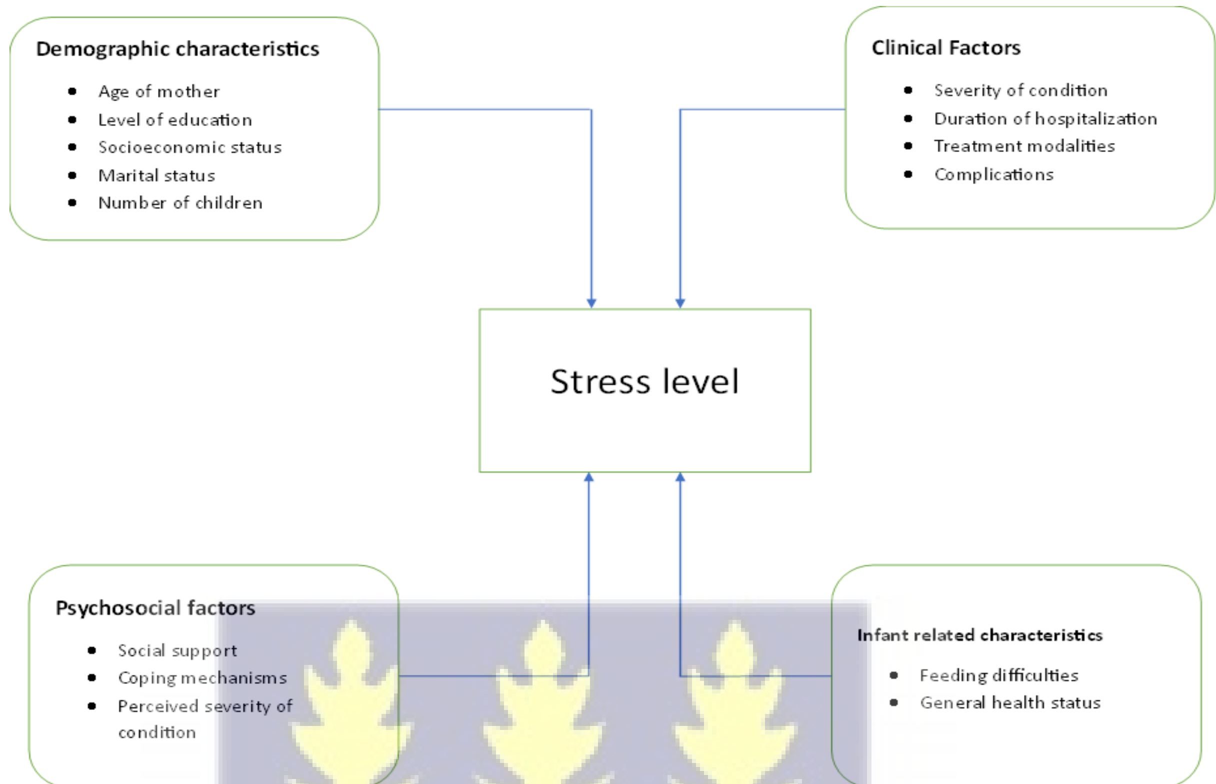

Figure 1. Conceptual framework of the stress levels of mothers with babies being managed for neonatal jaundice based on *Lazarus and Folkman Transactional Model of Stress and Coping (Biggs et al., 2017).*

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature relevant to maternal stress among mothers whose babies are hospitalized for neonatal jaundice. It presents the background on maternal stress, factors that influence stress, and the consequences of stress for both mothers and infants. The chapter also identifies gaps in the current literature that justify the need for this study.

2.2 Definitions

2.2.1 Neonatal Jaundice (NNJ)

Neonatal jaundice refers to the yellowish discoloration of a newborn's skin and sclera resulting from the accumulation of unconjugated bilirubin in the blood (Mitra & Rennie, 2017). It is one of the most common clinical conditions encountered in the neonatal period, affecting nearly 60% of term infants and up to 80% of preterm infants worldwide (Ansong-Assoku et al., 2024). While mild jaundice is often physiological and self-limiting, pathological jaundice can lead to severe complications such as kernicterus, neurological deficits, or death if untreated. In low- and middle-income countries (LMICs), including Ghana, neonatal jaundice remains a major cause of preventable neonatal morbidity and mortality due to delayed recognition and limited access to timely treatment Magai et al., 2020; Mpimbaza et al., 2019; Leke et al., 2023; Poulin et al., 2024).

Management of NNJ often involves phototherapy or, in severe cases, exchange transfusion. These interventions require hospital admission and close monitoring, which can be emotionally taxing

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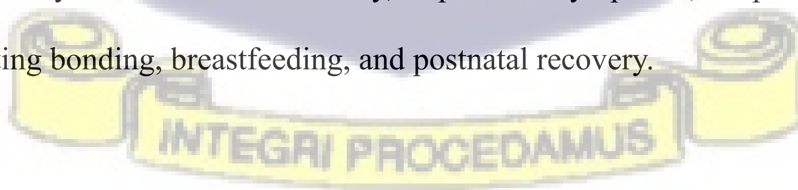
for mothers (Malouf et al., 2024. The hospitalization of an infant, especially in a neonatal unit, disrupts the expected maternal experience and can generate uncertainty, fear, and guilt (Anderson et al., 2022). Consequently, mothers of neonates with jaundice often experience heightened psychological stress due to concerns about their baby's health, prolonged hospitalization, and the unfamiliarity of medical procedures.

2.2.2 Maternal Stress

Stress, in psychological terms is a state of emotional or physical tension arising from situations that are perceived as threatening or beyond one's coping capacity (WHO, 2023). Maternal stress refers to the psychological distress or strain experienced by mothers as they respond to the demands of motherhood, pregnancy, or child illness (Talk to Angel, 2024). It encompasses cognitive, emotional, and physiological reactions to stressors that threaten maternal well-being or the perceived safety of the child (Talk to Angel, 2024)

In the context of neonatal illness, maternal stress can stem from factors such as the baby's fragile health, separation during hospital admission, uncertainty about recovery, and the perceived inability to fulfill maternal roles (Malouf et al., 2024). Studies have shown that mothers of hospitalized neonates, particularly those in neonatal intensive care or undergoing phototherapy for jaundice, report higher levels of stress than mothers of healthy infants (Malouf et al., 2024). Prolonged stress may further lead to anxiety, depressive symptoms, or post-traumatic stress, potentially affecting bonding, breastfeeding, and postnatal recovery.



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2.3 Theoretical Framework

This study is guided by Lazarus and Folkman's Transactional Model of Stress and Coping. The model suggests that stress arises when a person sees a situation as threatening and feels that their coping resources are insufficient (Biggs et al., 2017). Two critical cognitive processes underline this model: primary appraisal and secondary appraisal. In the primary appraisal, an individual evaluates whether an event is irrelevant, benign-positive, or stressful (Biggs et al., 2017). For a mother whose baby is diagnosed with neonatal jaundice, this stage involves perceiving the illness as a potential threat to her child's survival and her sense of maternal competence. In the secondary appraisal, the mother assesses her available resources to cope with the situation such as emotional support from family, information from healthcare providers, or personal resilience. The interaction between these appraisals determines the level of perceived stress and the coping strategies employed.

The model also distinguishes between problem-focused coping (efforts to manage the source of stress, such as seeking medical information or adhering to treatment protocols) and emotion-focused coping (efforts to regulate emotional responses, such as praying, seeking comfort, or avoidance). When coping resources are inadequate, stress levels tend to increase, potentially leading to adverse psychological outcomes. In the context of neonatal jaundice, this theoretical framework helps explain why some mothers experience higher stress than others, even under similar clinical conditions.

2.4.1 Global Evidence

Studies worldwide show that mothers of hospitalized newborns experience high stress. Stress often comes from separation from the baby, fear of complications, long hospital stays, and medical

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procedures (Malouf et al., 2024). Mothers of newborns admitted to neonatal intensive care units (NICUs) commonly report high levels of stress due to separation from the baby, uncertainty about the infant's condition, and exposure to medical equipment and procedures (Malouf et al., 2024; Namnabati et al., 2019). For example, a study in Sweden found that mothers of infants with neonatal jaundice undergoing phototherapy reported significantly higher stress and anxiety levels compared to mothers of healthy newborns (Pettersson et al., 2022). The stress was often related to concerns about the baby's health outcomes, fear of brain damage, and guilt over the illness Malouf et al., 2024).

2.4.2 Evidence from Africa

In African countries, maternal stress is also high among mothers of hospitalized infants. Studies from West and East African countries show that stress comes from worries about the baby's survival, limited understanding of the illness, financial difficulties, and lack of support (Eduku et al., 2024; Yenealem et al., 2024; Yihune Teshale et al., 2025). Mothers often rely on religious faith or community support to cope. Long hospital stays and severe illness increase stress, while good communication from healthcare providers helps reduce it (Malouf et al., 2024).

2.4.3 Evidence from Ghana

In Ghana, research on maternal stress related to neonatal jaundice is limited. Most studies focus on mothers' experiences in relation to low-birth-weight children (Daliri et al., 2024; Wuni et al., 2022). Mothers report anxiety, helplessness, and social stigma. No study has comprehensively

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measured stress levels or examined factors like demographics, clinical conditions, and psychosocial support and maternal stress. There is also little evidence from secondary hospitals in regions like the Eastern Region, where this study is conducted.

2.5 Determinants of Maternal Stress among Mothers with Hospitalized Neonates

Maternal stress during neonatal hospitalization is affected by multiple experiences including personal, clinical, psychosocial, and infant-related circumstances. Understanding these determinants is essential to designing effective interventions to support mothers caring for hospitalized neonates, including those being treated for neonatal jaundice. The following section discusses key categories of determinants identified in the conceptual framework of this study.

2.5.1 Sociodemographic Factors

Sociodemographic characteristics such as maternal age, level of education, marital status, socioeconomic status, and number of children influence maternal stress during neonatal illness. Several studies have demonstrated that younger mothers, especially first-time mothers, tend to experience higher stress levels because of limited experience, heightened anxiety, and lack of confidence in caring for a sick infant (Ikeda & Mitsuishi, 2024; Maluni et al., 2025). In contrast, older or multiparous mothers often report lower stress, possibly due to prior caregiving experience and a better understanding of neonatal conditions (Tilahun, 2024).

Education also influences maternal stress. Mothers with higher educational levels generally demonstrate better understanding of the illness and treatment procedures, which reduces uncertainty and perceived helplessness (Sullivan et al., 2012). Conversely, mothers with little or

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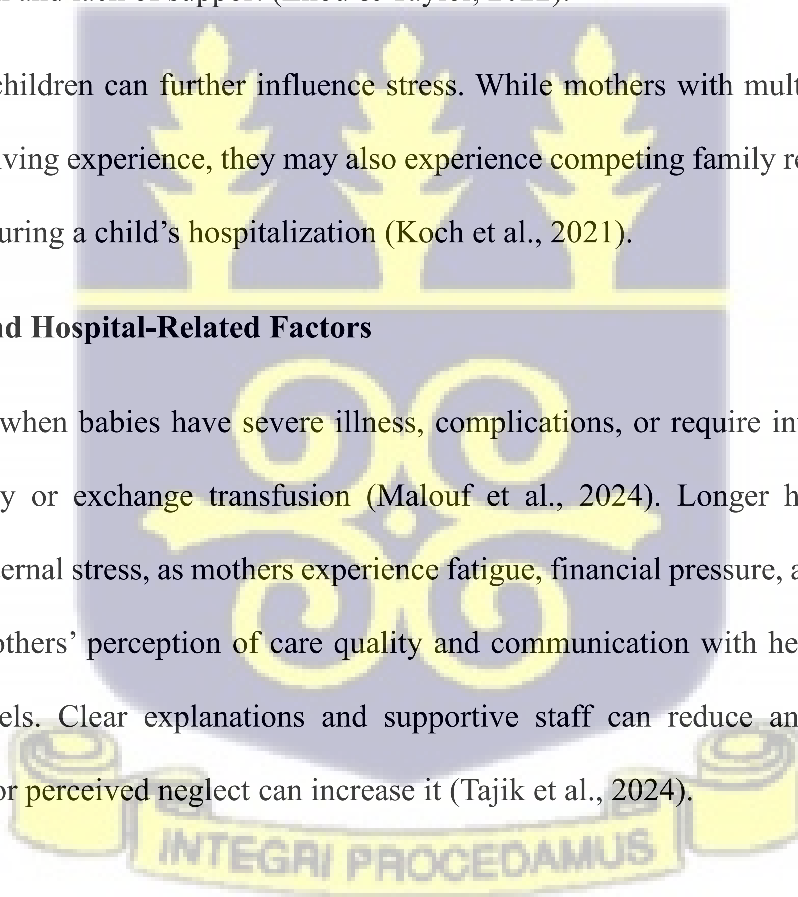
no formal education may misinterpret medical information or rely on misconceptions about neonatal jaundice, leading to greater worry and emotional distress.

Socioeconomic status (SES) is another key determinant. Mothers from low-income households are often unable to meet the financial demands associated with prolonged hospital stays, transportation, and treatment costs. Studies in Nigeria and Kenya have found that low SES is strongly linked to elevated stress and anxiety among mothers of hospitalized neonates (Malouf et al., 2024). Marital status also plays a role married mothers typically benefit from emotional and financial support from partners, whereas single or divorced mothers often report higher stress due to social isolation and lack of support (Zhou & Taylor, 2022).

The number of children can further influence stress. While mothers with multiple children may have more caregiving experience, they may also experience competing family responsibilities that heighten stress during a child's hospitalization (Koch et al., 2021).



2.5.2 Clinical and Hospital-Related Factors

Stress increases when babies have severe illness, complications, or require intensive treatments like phototherapy or exchange transfusion (Malouf et al., 2024). Longer hospital stays also contribute to maternal stress, as mothers experience fatigue, financial pressure, and worry (Malouf et al., 2024). Mothers' perception of care quality and communication with healthcare providers affect stress levels. Clear explanations and supportive staff can reduce anxiety, while poor communication or perceived neglect can increase it (Tajik et al., 2024).

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2.5.3 Psychosocial Factors

Social support from family, friends, and healthcare staff can lower stress. Mothers who have strong emotional or practical support cope better than those who do not (Atkinson et al., 2021, Machado et al., 2020). Coping strategies also matter. Problem-focused coping, such as asking questions or following treatment instructions, reduces stress (Vishkin & Tamir, 2020). Emotion-focused coping, such as avoidance or constant worry, increases stress. Mothers' perception of how serious their baby's illness is also affects stress. If a mother sees the condition as life-threatening, she is likely to feel more anxious (Malouf et al., 2024).

2.5.4 Infant-Related Characteristics

Infant factors like feeding problems, general health status, and responsiveness affect maternal stress. Mothers worry when babies have difficulty feeding, gain weight slowly, or appear unresponsive (Almaatani et al., 2023). Rapid recovery or improvements in the baby's health help reduce maternal stress, while slow progress or complications prolong anxiety. Babies' behaviors can also affect mothers' confidence and emotional well-being, especially for first-time mothers (Şahbudak & Karabulut, 2024).

2.6 Consequences of Maternal Stress in the Context of Neonatal Illness

Maternal stress in the context of neonatal illness such as jaundice has far-reaching consequences for both the mother and the infant. High levels of stress have been linked to adverse psychological outcomes, including depression, anxiety, and emotional exhaustion (Haribalakrishna et al., 2024). Mothers with hospitalized infants often report feelings of helplessness, fear, and guilt, especially

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when their babies undergo invasive treatments or show slow recovery progress (Malouf et al., 2024; Şahbudak & Karabulut, 2024). Persistent stress can lead to fatigue and sleep disturbances, further impairing the mother's ability to cope effectively during hospitalization and post-discharge periods (Walker & Murry, 2022).

Another important consequence of maternal stress is its effect on mother–infant bonding and breastfeeding practices. Studies have shown that high stress levels may interfere with maternal sensitivity and emotional availability, which are essential for the establishment of a secure attachment (Smith & Agyemang, 2020). Stressed mothers may experience reduced confidence in their caregiving abilities, contributing to early cessation of breastfeeding or poor feeding practices. In cases of neonatal jaundice, where feeding is critical to the infant's recovery, maternal stress can indirectly worsen the baby's condition by limiting feeding frequency or duration (Malouf et al., 2024).

Furthermore, maternal stress influences adherence to medical treatment and follow-up care. Mothers experiencing significant stress may misunderstand or forget medical instructions, delay follow-up appointments, or feel too overwhelmed to engage actively in their infant's care plan (Treyvaud et al., 2016). This can lead to suboptimal outcomes for the infant, including delayed recovery or recurrence of complications.

In the long term, unmanaged maternal stress may contribute to chronic psychological distress, poor maternal well-being, and developmental issues in the child. Infants of highly stressed mothers are at greater risk of emotional and behavioral difficulties later in life due to impaired early interactions and reduced maternal responsiveness (Goyal et al., 2019).. These findings highlights the need for

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comprehensive psychosocial support for mothers during neonatal hospitalization to mitigate the short- and long-term consequences of stress on maternal and child health.

2.7 Identified Gaps in the Literature

Despite growing attention to maternal stress in neonatal care, the literature reveals several significant gaps that justify the current study. First, there is a limited focus on mothers of infants with neonatal jaundice (NNJ). Most studies on maternal stress have concentrated on mothers of preterm infants or those admitted to intensive care for severe neonatal conditions (Daliri et al., 2024; Wuni et al., 2022), while NNJ, which is highly prevalent in Ghana and often requires hospitalization, has received comparatively little research attention. Consequently, the specific stressors and experiences of mothers managing NNJ remain underexplored.

Second, there is a scarcity of context-specific evidence in Ghana, particularly from secondary-level hospitals such as the Tetteh Quarshie Memorial Hospital and the Eastern Regional Hospital. Existing Ghanaian studies are largely qualitative, hospital-based, and conducted in tertiary facilities in urban settings (Boateng et al., 2020; Mohammed et al., 2021). These studies may not reflect the experiences of mothers in other regions or healthcare settings, limiting the generalizability of findings.

Third, prior research has rarely examined maternal stress using a comprehensive approach that integrates sociodemographic, clinical, psychosocial, and infant-related factors. Most studies have focused on a narrow set of variables either clinical severity or sociodemographic characteristics without considering how these factors interact to influence stress outcomes (Wuni et al., 2022).

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This fragmented approach limits understanding of the multidimensional nature of maternal stress in neonatal care.

Finally, there is a need for evidence that can inform practical psychosocial support interventions. Without studies that quantify stress levels and identify key determinants in the Ghanaian context, healthcare providers lack data to guide interventions aimed at improving maternal mental health, enhancing mother-infant bonding, and supporting adherence to treatment during neonatal hospitalization.

This study, therefore, sought to assess the stress levels of mothers with babies being managed for neonatal jaundice at the Tetteh Quarshie Memorial Hospital, Mampong and the Eastern Regional hospital, Koforidua in the Eastern Region of Ghana.

2.8 Summary of Literature Review

The evidence shows that maternal stress can be influenced by many factors. Mothers who are younger, have lower education, lower income, or limited support from family and friends tend to feel more stressed. Stress is also higher when the baby's condition is severe, treatments are complicated, hospitalization is long, or complications occur. How mothers cope with stress, their perception of the illness, and the support they receive from healthcare staff also affect their stress levels. In addition, babies' characteristics, such as feeding problems, poor health, or low responsiveness, can increase mothers' worry and anxiety.

Maternal stress can have negative effects. It can cause depression, anxiety, fatigue, and make it harder for mothers to bond with their babies or continue breastfeeding. Stress can also affect how well mothers follow medical advice or attend follow-up appointments, which can influence the baby's recovery and long-term health.

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The review also shows that there are gaps in the research. Few studies focus specifically on mothers of babies with neonatal jaundice, and there is little evidence from the Eastern Region of Ghana. Most studies do not look at all the important factors together, and few use a clear theoretical approach to explain stress and coping.

This study aims to fill these gaps by measuring stress levels and identifying factors linked to stress among mothers whose babies are being treated for neonatal jaundice at the Tetteh Quarshie Memorial Hospital and Eastern Regional Hospital. The findings will help us understand what affects maternal stress in this context and how mothers can be better supported

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CHAPTER 3

METHOD

3.1 Study design

This study employed a cross-sectional design to assess the stress levels of mothers with babies being managed for neonatal jaundice at the Tetteh Quarshie Memorial Hospital, and the Eastern Regional Hospital all in the Eastern Region of Ghana.

3.2 Study Area

This study was conducted in two facilities in the Eastern region of Ghana, the Tetteh Quarshie Memorial Hospital, and Eastern Regional Hospital. The Tetteh Quarshie Memorial Hospital is a public healthcare facility located in Akuapim-Mampong in the Eastern region of Ghana. It was established in 1929. The hospital accommodates a total of 114 beds, with a dedicated paediatric ward comprising 28 beds. It has a fully equipped Neonatal Intensive Care Unit (NICU) with 14 beds, featuring 4 incubators, 2 radiant warmers, CPAP equipment, phototherapy lights, and infusion pumps. The hospital staff includes a specialist paediatrician, a medical officer, a paediatric nurse specialist, two neonatal nurses, and a paediatric nurse, ensuring comprehensive care for its young patients. On average, the facility manages approximately 30 neonatal jaundice cases per month.

The Eastern Regional Hospital, located in Koforidua, offers comprehensive medical services across various specialties, including paediatrics, surgery, obstetrics and gynaecology, and internal medicine. With a team of over 60 specialized doctors, the hospital has a 600-bed capacity and admits around 1,500 patients monthly. Its paediatric unit includes a specialized Neonatal Intensive

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Care Unit (NICU), which handles about 50 neonatal jaundice cases each month. The unit is well-equipped to provide essential treatments and interventions for newborns, with a particular focus on conditions such as neonatal jaundice. These sites were purposively selected based on their high patient volumes, specialized neonatal care capabilities, and representation of both urban and semi-urban healthcare settings in the Eastern region of Ghana.

3.3 Study Population

The study population included mothers whose babies had been admitted with neonatal jaundice at the selected healthcare facilities.

3.4 Inclusion Criteria

Mothers with their newborns diagnosed with neonatal jaundice during the study period (December to February) were included in the study.

3.5 Exclusion Criteria

Mothers were excluded from the study if they:

1. Were severely ill or physically unable to participate in the interview.
2. Declined to provide informed consent.
3. Had newborns who were referred to another facility before data collection.
4. Had incomplete or missing medical records for their newborns.

3.6 Sample Size Determination

The required sample size was calculated using Cochran's formula (Cochran, 1977). A search through various search engines showed that there were no studies on maternal stress associated with babies on admission with neonatal jaundice. However, a systematic review and meta-analysis by Shetty et al., (2024) reported a pooled prevalence of 94.1% maternal stress among mothers with

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neonates admitted to neonatal intensive care unit. This prevalence was used to calculate the sample size for this study. This particular prevalence was selected due to the low incident of the cases per month and the timeline of the study.

$$n = \frac{z^2 p(1-p)}{e^2}$$

Where,

n= desired sample size;

z = 1.96 which is the corresponding z-score to a 95% confidence interval

p = estimate of proportion (prevalence) for maternal stress level in population = 94.1% (0.941)

e = desired precision/margin of error (5%)

Therefore

$$n = \frac{1.96^2\ x\ 0.941(1-0.941)}{0.05^2} = \frac{3.8416x\ 0.941(0.059)}{0.0025} = \approx 86$$

To account for potential non-responses, incomplete answers, and inconsistent responses during the administration and processing of the questionnaire, the initial sample size was increased by 20%. The adjusted sample size was calculated using the formula: 86 × 1.20 = 103.2, which was rounded up to 103. As a result, the final minimum sample size for the study was determined to be 103 mothers.

3.7 Sampling technique

During the study period, a consecutive sampling technique was employed to recruit mothers. Each day, mothers whose newborns were diagnosed with neonatal jaundice and met the study criteria were approached and informed about the study. Those who consented were immediately enrolled until the required sample size was reached. A total of 103 mothers were recruited 70 from the

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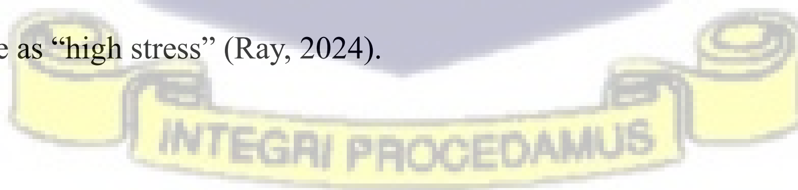
Eastern Regional Hospital and 33 from the Tetteh Quashie Memorial Hospital. This process continued daily across both facilities throughout the study period from December to February, ensuring that every eligible case within the study period was considered and minimizing selection bias.

3.8 Study Variables

3.8.1 Dependent Variable

The dependent variable in this study was "**Perceived Level of Stress**". Perceived stress level was assessed using an adapted version of the Perceived Stress Scale (PSS-10) Cohen (1983). This has been used in previous studies in Ghana to assess maternal stress among women whose children were admitted in NICU (Pellegrino et al., 2024). This scale assesses respondents' feelings and thoughts during the period their children were in NICU. Respondents rated their level of stress on a 5-point Likert scale: 0 = Never, 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, 4 = Very Often. The PSS-10 was scored by reversing the responses for four positively stated items (4, 5, 7, and 8), where higher values were converted to lower values (0=4, 1=3, 2=2, 3=1, and 4=0). All items were summed to obtain a total score for each respondent. The total scores were used in a linear regression model to determine factors associated with stress levels. Individual scores ranged from 0 to 4, with higher scores indicating greater perceived stress. To determine level of perceived (Figure 2) a score of 0-11 was categorized as "low stress level", 12-15 as "moderate stress level" and 16 and above as "high stress" (Ray, 2024).



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3.8.2 Independent Variables

The independent variables in this study were maternal background characteristics (age, education, marital status, religion, occupation, number of children, and level of income). Neonatal characteristics such as sex, birthweight, mode of delivery, type of feeding, and length of stay in the neonatal intensive unit (NICU). Additionally, other maternal characteristics such as social support, the number of antenatal care (ANC) attendance during pregnancy, and blood group were treated as independent variables.

3.9 Data Collection tool

A structured question consisting of four sections was used to collect data from participants. The first part of the questionnaire asked questions about the mother's background characteristics such as her age, level of education, occupation, marital status, religion, number of children, and level of income. The second part of the questionnaire assessed neonatal and maternal characteristics such as sex of the infant, mode of delivery, birthweight, mode of feeding, how long the baby was diagnosed with jaundice, length of stay in NICU, maternal history of G6PD, order of the child, and number of ANC attendance during pregnancy. The third part of the question collected information on the mother's health characteristics and social support. Some of the questions asked were "What is your blood group?"; "Have you received any support from family or friends during this time?" and "How satisfied are you with the support you are receiving?". The last part of the questionnaire assessed perceived stress. The 10-item Perceived Stress Scale (PSS) by Cohen (1983) was adapted. The 10-item Perceived Stress Scale (PSS) developed by Cohen (1983) is a widely used and validated tool for assessing perceived stress. Cohen's original study demonstrated that the scale reliably measures the degree to which individuals perceive their lives as stressful, capturing feelings of unpredictability, uncontrollability, and overload. The tool has been

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successfully adapted in various contexts, including in Ghana, where Pellegrino et al. (2024) used it to assess maternal stress among mothers with infants admitted to the NICU. Its prior use in similar populations supports its appropriateness for the current study.

3.10 Pretesting

Pretesting was conducted among 10 participants whose children had neonatal jaundice or were attending follow-up visits after being discharged from the condition. This took place at both study facilities one week before the official data collection began. Participants were randomly selected for the pretest. The primary objectives of the pretest were to determine the time required to complete an interview, evaluate the clarity and understanding of the questionnaire, and provide research assistants with hands-on experience in the field data collection after training. Based on the feedback obtained from the pretest, modifications were made to the questions and response options to enhance clarity and accuracy.

3.11 Data Collection Technique

A structured questionnaire was used to collect primary data from participants who consented to take part in the study. Data collection was conducted in person, with each session lasting approximately 20 minutes per participant. The questionnaire was administered using a digital version, hosted on the KoBoCollect app, by the researcher and six research assistants who were nurses working at the study sites (3 from each facility). The digital questionnaire was loaded onto smartphones and administered by the Principal Investigator and the six research assistants. To minimize misunderstandings and misinterpretations, all questions were thoroughly explained to participants. Additionally, relevant information was extracted from the maternal record book.

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3.12 Quality Assurance

The research team received thorough training to ensure they were well-equipped for their assigned roles. Before data collection, research assistants were taken through topics such as proper questionnaire administration, and ethical considerations. Another way quality control was ensured before the data collection was by configuring KoBoCollect app with restrictions to ensure that key questions were answered before research assistants could proceed to the next section of the questionnaire. During data collection, continuous supervision was conducted to ensure accuracy and minimize the possibility of omissions. After data collection, completed questionnaires were reviewed for consistency and completeness before syncing to the server. Each participant was assigned a unique numeric code with access to the data restricted to exclusively to the Principal Investigator.

3.13 Data Processing and Analysis

Data collected through the KoboCollect App were exported in Excel format, cleaned, and imported into STATA version 17.0 (StataCorp, 2021) for coding and analysis. During cleaning, responses were checked for completeness, consistency, and accuracy. Categorical variables, including sex, marital status, religion, occupation, and income level, were summarized using frequencies and percentages, while continuous variables, such as maternal age and infant birthweight, were summarized using means and standard deviations. The perceived level of stress among mothers with children diagnosed with neonatal jaundice was presented using a pie chart to show the distribution of low, moderate, and high stress levels.

To determine factors associated with maternal stress, simple and multiple linear regression models were used. The selection of factors included in the multiple linear regression model was guided by

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a systematic review by Malouf et al. (2024), which identified key sociodemographic, clinical, and psychosocial determinants of maternal stress. The variables considered were grouped as follows: sociodemographic factors (maternal age, education, income, occupation, and marital status), clinical factors (length of hospital stay, prematurity, birth complications, and severity of neonatal jaundice), and psychosocial factors, specifically perceived social support from family or friends. This approach allowed the analysis to estimate the independent effect of each factor on maternal stress while accounting for potential confounding. Regression assumptions, including linearity, homoscedasticity, normality of residuals, and absence of multicollinearity, were checked and satisfied before interpreting results. All statistical tests were two-sided, and a p-value less than 0.05 at a 95% confidence interval was considered statistically significant. Results from the multiple linear regression were reported as regression coefficients (β), standard errors, and 95% confidence intervals to indicate the direction and strength of association.

3.14 Ethical consideration

Ethical approval was obtained from the Ghana Health Service Ethics Review Committee (**GHS-ERC-032/10/24**). Permission was sought through the Eastern Regional Health Directorate for the two facilities (Tetteh Quarshie Memorial Hospital and Eastern Regional Hospital) before the commencement of the study.

3.14.1 Informed Consent Process

The objectives, purpose, and procedures of the study, as well as potential risks and benefits, were clearly explained to all participants in a language they understood. Participation was voluntary, and mothers were informed that they could withdraw at any time without any consequences on their infant's treatment or hospital care. Written informed consent was obtained from each

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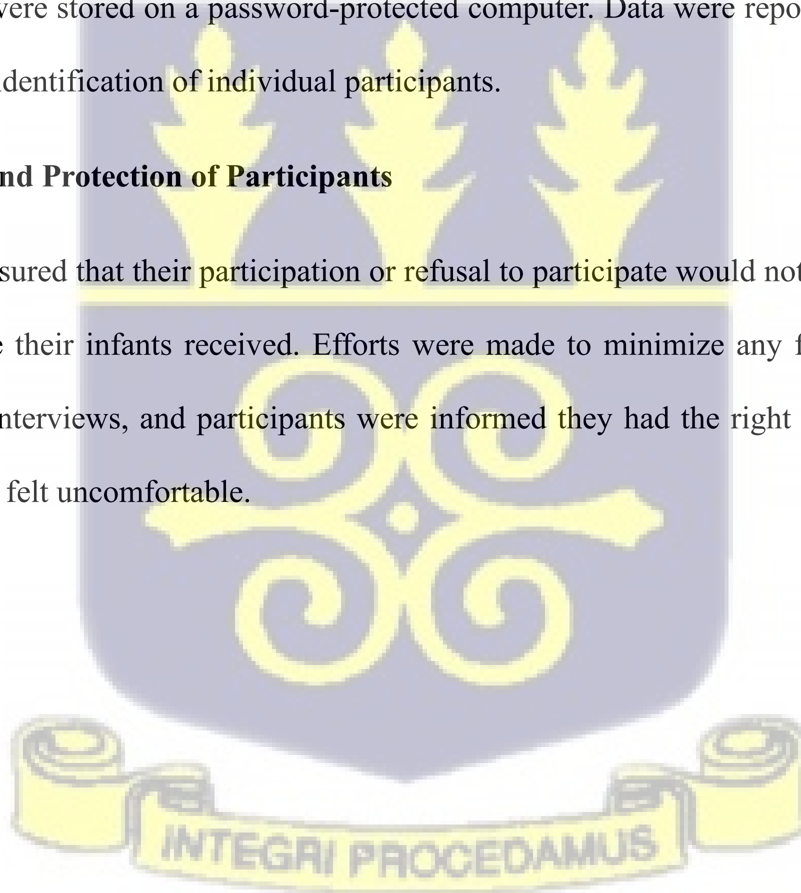
participant prior to data collection. For mothers who could not read or write, the consent form was read aloud to them, and a thumbprint was taken in the presence of an independent witness to confirm consent.

3.14.2 Privacy and Confidentiality

Interviews were conducted in a quiet and private area within the hospital to ensure privacy and comfort. Participants' names, hospital numbers, or other personal identifiers were not recorded on the questionnaires. Instead, each respondent was assigned a unique code number for data entry and analysis. All hardcopy data were kept in a locked cabinet accessible only to the researcher, while electronic files were stored on a password-protected computer. Data were reported in aggregated form to prevent identification of individual participants.

Voluntariness and Protection of Participants

Mothers were assured that their participation or refusal to participate would not in any way affect the medical care their infants received. Efforts were made to minimize any form of emotional distress during interviews, and participants were informed they had the right to discontinue the interview if they felt uncomfortable.



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CHAPTER FOUR

RESULTS

4.1 Mothers' Background Characteristics

Table 1 presents the results of 103 mothers included in the study with a mean age of 28.45 ± 5.95 years. Most mothers (57.3%) were aged 25-34 and were married (55.3%). Regarding education, 31.1% had tertiary education, 30.1% had secondary education, 34.9% had basic education, and 3.9% had no formal education. Most of the mothers identified as Christian (87.4%), and more than half were self-employed (55.3%). In terms of income, 51.5% earned less than 1000 cedis, 24.3% earned between 1000-1500 cedis, 7.8% earned between 1600-2000 cedis, and 16.5% earned above 2000 cedis. About fifty-four percent of the mothers had three or more children (53.6%), while 46.4% had one or two children. Less than half of the mothers (45.6%) reported that the child with neonatal jaundice was their first child. More than three-fifths (61.2%) of mothers attended less than 8 sessions of antenatal care (ANC), while 38.8% attended 8 or more sessions. The majority of the mothers (68.0%) received care at Eastern Regional Hospital.

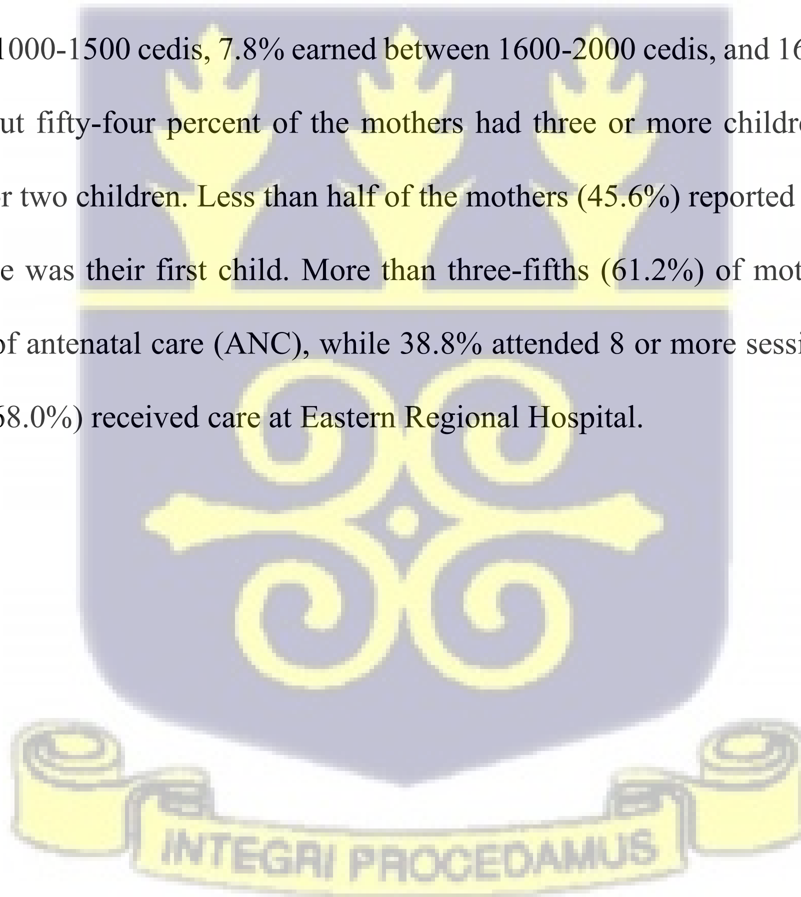

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Table 1. Background Characteristics of Mothers of Children with neonatal jaundice

Characteristic	Frequency	Percentage
Mean age in years (Mean ±SD)	28.45 ±5.95	
Age		
<25	28	27.2
25-34	59	57.3
35-44	16	15.5
Marital status		
Single	46	44.7
Married	57	55.3
Education		
No formal education	4	3.9
Basic education	36	34.9
Secondary education	31	30.1
Tertiary	32	31.1
Religious		
Christian	90	87.4
Muslim	13	12.6
Occupation		
None	14	13.6
Formal (Government worker)	23	22.3
Formal (Private Company)	9	8.7
Informal (Self-employed)	57	55.3
Level of Income (cedis)		
Less 1000	53	51.5
1000-1500	25	24.3
1600-2000	8	7.8
Above 2000	17	16.5
Number of children		
First child	47	45.6

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Characteristic	**Frequency**	**Percentage**
1-2	26	25.2
3 or more	30	29.1
First child		
Yes	47	45.6
No	56	54.4
Number of ANC attendance		
Less than 8	63	61.2
8 and above	40	38.8
Facility		
Tetteh Quarshie Memorial Hospital	33	32.0
Eastern Regional Hospital	70	68.0

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4.2 Perceived stress levels among mothers with babies being managed for neonatal jaundice

Figure 1 shows the distribution of perceived stress levels among mothers with babies being managed for neonatal jaundice. Out of 103 mothers, 64 (62.1%) reported high stress levels, 28 (27.2%) reported moderate stress levels, and 11 (10.7%) reported low stress levels.

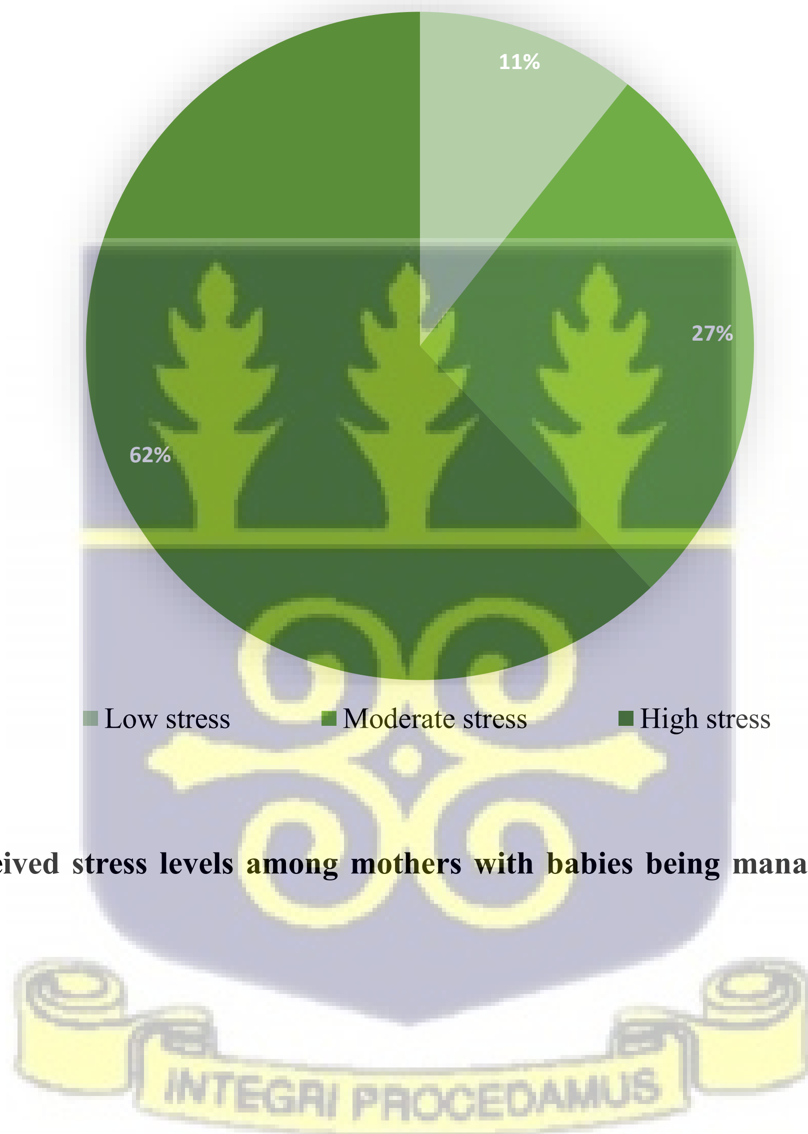

Figure 2. Perceived stress levels among mothers with babies being managed for neonatal jaundice

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4.3 Association Between Maternal Background Characteristics and Perceived Stress Levels

Table 2 presents the association between mothers' background characteristics and their perceived stress levels. In the adjusted model, marital status, religious affiliation, income level, and number of children were significantly associated with maternal stress. Married mothers experienced lower stress levels compared to single mothers. The results show that on average, married mothers scored 1.83 points lower on the stress scale than single mothers. (β = -1.83, p = 0.032). Mothers who identified as Muslim reported higher stress levels than Christian mothers (β = 3.12, p = 0.010). Also mothers earning more than 2000 Ghana cedis had lower stress levels compared to those earning less than 1000 Ghana cedis (β = -4.23, p = 0.008). Additionally, mothers with 1–2 children experienced higher stress compared to first-time mothers (β = 2.21, p = 0.025). Other factors, including education, occupation, number of antenatal care visits, and facility type, were not significantly associated with perceived stress in the adjusted model

Table 2. Association between Mothers' Background Characteristics and Perceived stress levels.

Characteristic	Unadjusted				Adjusted			
	B	SE	p-value	95% CI	β	SE	p-value	95% CI
Age								
<25	Ref				Ref			
25-34	-1.39	0.93	0.137	-3.24, 0.45	-0.06	1.04	0.958	0.58, 5.25
35-44	-2.78	1.27	**0.031***	-5.30, -0.26	-0.42	1.47	0.777	-3.35, 2.51
Marital status								
Single	Ref				Ref			
Married	-1.46	0.81	0.072	-2.06, -0.13	-1.83	0.84	**0.032***	-3.49, -0.16
Education								
No formal education	Ref				Ref			
Basic education	0.67	2.19	0.761	-3.68, 5.01	2.68	2.16	0.217	-1.61, 6.97
Secondary education	1.38	2.21	0.545	-3.03, 5.72	2.82	2.12	0.188	-1.40, 7.04
Tertiary	0.31	2.20	0.887	-4.06, 4.68	3.60	2.36	0.130	-1.08, 8,29
Religious affiliation								
Christian	Ref				Ref			
Muslim	2.73	1.20	**0.025***	0.35, 5.10	3.12	1.19	**0.010***	0.76, 5.49
Occupation								

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None	Ref				Ref			
Formal (Government worker)	-1.51	1.39	0.280	-4.26	2.69	2.05	0.192	-1.37, 6.76
Formal (Private Company)	1.48	1.75	0.401	-1.99	1.59	1.95	o.418	-2.28, 5.46
Informal (Self-employed)	-0.75	1.22	0.540	-3.18	0.67	1.25	0.591	0.67, -1.81
Level of Income (cedis)								
Less 1000	Ref				Ref			
1000-1500	-0.78	0.95	0.417	-2.66, 1.11	-1.22	1.04	0.242	-3.30, 0.84
1600-2000	2.51	1.49	0.094	-0.44, 5.47	0.45	1.72	0.792	-2.96, 3.87
Above 2000	-3.09	1.09	**0.006***	-5.26, -0.92	-4.23	1.55	**0.008***	-7.32, -1.15
Number of children								
First child	Ref				Ref			
1-2	1.21	0.98	0.220	-3.49, 0.22	2.21	0.97	**0.025***	0.29, 4.15
3 or more	-1.64	0.94	0.084	-3.49, 0.22	-0.06	1.02	0.955	-2.09, 1.97
Number of ANC attendance								
Less than 8	Ref				Ref			
8 and above	-0.46	0.83	0.581	-2.12, 1.19	-0.70	0.83	0.399	-2.35, 0.94
Facility								
Tetteh Quarshie Memorial Hospital	Ref				Ref			
Eastern Regional Hospital	-0.68	0.87	0.435	-0.24, 1.04	-0.66	0.89	0.459	-2.44, 1.11

4.4 Clinical and Infant-Related Characteristics

Table 3 presents results on the clinical and infant-related characteristics. The mode of delivery was evenly split between spontaneous vaginal delivery (SVD) (47.6%) and cesarean section (CS) (50.5%), with only 1.9% undergoing assisted vaginal delivery. The mean birth weight of the infants was 2.49 ± 0.70 kg, with 43.7% classified as low birth weight and 56.3% as normal birth weight. All infants (100%) received phototherapy for jaundice. Most of the jaundiced neonates (84.5%) were breastfed, and 64.1% were fed via cup or bottle. The length of stay in the neonatal intensive care unit (NICU) varied, with 44.7% staying for 3-5 days, 34.9% staying for more than 5 days, and 20.4% staying for 1-2 days. Other conditions diagnosed in the infants included sepsis (17.3%), birth trauma (1.9%), G6PD deficiency (1.0%), and other conditions (14.6%). Nearly half of the infants (49.5%) had no additional conditions. Premature birth was reported in 43.7% of cases, and

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26.0% of mothers reported complications during birth or delivery. Delayed initiation of feeding after birth was reported by 61.5% of mother

Table 3. Clinical and Infant-related characteristics

Characteristic	Frequency	Percentage
Mode delivery		
SVD	49	47.6
Assisted vaginal delivery (Forceps or vacuum)	1	1.9
Caesarian section (CS)	52	50.5
Mean Birthweight (Mean ± SD)	2.49 ±0.70	
Birthweight		
Low	45	43.7
Normal	58	56.3
Type of treatment for jaundice		
Phototherapy	103	100.0
Current mode of feeding (multiple responses)		
Breastfeeding (lactating)	87	84.5
Tube feeding	12	11.5
Cup or bottle feeding	67	64.1
Oral feeding	8	7.8
Length of stay in NICU		
1-2 days	21	20.4
3-5 days	46	44.7
More than 5 days	36	34.9
Other conditions diagnosed (multiple response)		
Sepsis	18	17.3
G6PD deficiency	1	1.0

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Birth trauma (e.g., cephalohematoma)	2	1.9
Other	15	14.6
None	51	49.5
Baby born prematurely		
Yes	45	43.7
No	58	56.3
Complications during birth or delivery		
Yes	27	26.0
No	76	73.8
Delayed initiation of feeding after birth		
Yes	64	61.5
No	40	38.5

.5 Association Between Clinical and Infant-Related Characteristics and Perceived Stress Levels

Table 4 presents the association between clinical and infant-related characteristics. In the unadjusted analysis, complication during birth or delivery was significantly associated with perceived stress levels. Mothers who did not experience any complications reported lower stress levels ($\beta = -2.39$, $p = 0.009$). This association remained significant in the adjusted model ($\beta = -2.49$, $p = 0.018$). Mode of delivery, length of stay in the NICU, premature birth, and birthweight did not show significant associations with perceived stress levels in either the unadjusted or adjusted models.

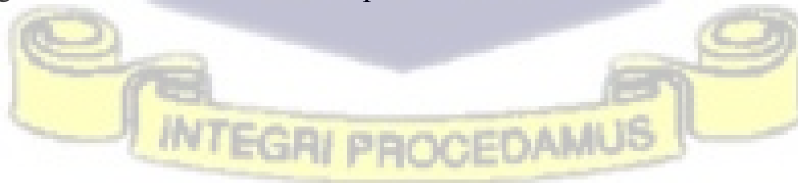

Table 4. Association between Clinical, Infant related Characteristics and Perceived stress levels

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Characteristic	Unadjusted				Adjusted			
	β	SE	p-value	95% CI	B	SE	p-value	95% CI
Mode delivery								
SVD	Ref				Ref			
Assisted vaginal delivery	-3.27	2.95	0.269	-9.13, 2.57	-5.02	2.90	0.087	-10.79, 0.74
Caesarian section (CS)	1.03	0.81	0.208	-0.58, 2.65	0.30	0.90	0.736	-1.48, 2.09
Length of stay in NICU								
1-2 days	Ref				Ref			
3-5 days	-0.98	1.09	0.371	-3.14, 1.18	-0.56	1.09	0.609	-2.73, 1.61
More than 5 days	-0.94	1.13	0.408	-3.19, 1.31	-0.52	1.25	0.679	-3.00, 1.97
Baby born prematurely								
Yes	Ref				Ref			
No	1.00	0.81	0.220	-0.61, 2.62	1.34	1.14	0.243	-0.92, 3.59
Complication during birth								
Yes	Ref				Ref			
No	-2.39	0.89	**0.009***	-4.17, -0.62	-2.49	1.04	**0.018***	-4.56, -0.43
Birthweight								
Low	Ref				Ref			
Normal	0.57	0.82	0.487	-1.05, 2.19	0.41	1.28	0.752	-2.14, 2.95

β= coefficient, SE =standard error; CI = confidence interval

4.6 Maternal Social Support

Table 5 shows the support received by mothers with babies who are being managed for jaundice. The majority of mothers (89.3%) reported receiving support from family or friends. The types of support received included financial support (81.5%), emotional support (69.6%), and physical assistance (69.6%). Most mothers (82.6%) were satisfied or very satisfied with the support they received, while 13.0% were neutral, and 4.4% were dissatisfied or very dissatisfied.

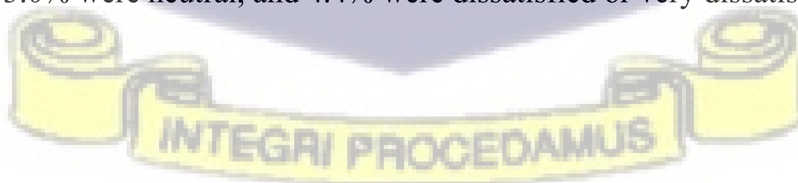

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Table 5. Maternal Social support

Characteristics	Frequency	Percentage
Received support from families or friends		
Yes	92	89.3
No	11	10.7
Kind of support received (multiple responses)		
Emotional support	64	69.6
Financial support	75	81.5
Physical Assistance	64	69.6
Satisfaction with support received		
Satisfied/Very Satisfied	76	82.6
Neutral	12	13.0
Dissatisfied/Very dissatisfied	4	4.4

4.7 Association Between Social Support and Perceived Stress Levels

Table 6 presents the analysis of associations between maternal social support and perceived stress levels. The unadjusted analysis did not show a significant association between receiving social support and perceived stress levels ($\beta = 1.37$, $p = 0.30$). However, in the adjusted model, there was a trend towards significance, with mothers who did not receive support reporting higher stress levels ($\beta = 2.21$, $p = 0.073$).

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Table 6. Association between social support and perceived stress among mothers with children with jaundice

Characteristic	Unadjusted				Adjusted			
	B	SE	p-value	95% CI	B	SE	p-value	95% CI
Received support								
Yes	Ref				Ref			
No	1.37	1.31	0.30	-1.23, 3.97	2.21	1.22	0.073	-0.21, 4.63

β= coefficient, SE =standard error; CI = confidence interval

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CHAPTER FIVE

DISCUSSION

5.1 Background Characteristics

The study assessed the stress levels of mothers with babies being managed for neonatal jaundice and also maternal demographic and socioeconomic factors associated with stress levels. The predominant age group (25-34 years) observed in this study is consistent with other studies in sub-Saharan Africa, where maternal age tends to cluster in the late 20s to early 30s, reflecting the typical childbearing age in the region (Owusu, 2021; Negash & Asmamaw, 2022). The proportion of married mothers in this study aligns with findings from similar studies in Ghana, where marriage is a common social structure that provides emotional and financial support during childbearing (Addai et al., 2015; Sarfo et al., 2024). Single mothers often face additional social and financial challenges. The proportion of tertiary education observed in this study is relatively low which may reflect limited access to higher education. Lower education levels are often associated with poorer healthcare-seeking behaviors and stress perception due to reduced health literacy (Akakpo & Neuerer, 2024; Shahid et al., 2022). The study also found a high proportion of mothers had antenatal care (ANC) attendance below the recommended minimum, indicating possible barriers such as financial constraints or cultural beliefs. Also, the proportion of primiparous mothers in this study was notable, which may be a relevant factor in stress levels. Studies have shown that first-time mothers often experience heightened anxiety due to inexperience in caring for a newborn, particularly when managing neonatal health conditions (Schobinger et al., 2022). This inexperience can contribute to increased stress, as they may feel less confident in navigating the challenges of neonatal care compared to multiparous mothers.

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5.2 Perceived Stress Levels Among Mothers with Babies Being Managed for Neonatal Jaundice

This study revealed a high prevalence of stress (62%) among mothers whose infants were being treated for neonatal jaundice. This finding is consistent with global literature that has shown psychological distress associated with neonatal hospitalization (Malouf et al., 2024). Studies in both high-income and low-resource settings confirm that maternal stress is exacerbated by prolonged hospital stays (Dressler, 2024; van Wyk et al., 2024). For example, a study by Das and Krishna (2020) found a prevalence of 60% in the Assam region of India.

The high stress levels observed in this study could be due to a variety of factors, including uncertainty about their infants' health outcomes, the financial burden of treatment, and the emotional toll of watching their newborns undergo medical treatments such as phototherapy (Shetty et al., 2024). Cultural beliefs surrounding neonatal jaundice also contribute to maternal anxiety, with some studies in Ghana highlighting misconceptions about its causes (Salia et al., 2021). These misconceptions can lead to increased psychological distress, especially when combined with limited access to reliable information.

This prevalence of perceived stress in the current study is however, higher than the 43.5% observed by Pellegrino et al. (2024), and 41% by Shetty et al (2023), and lower than the 85% reported by Gurgani and Jogi (2018), among mothers whose children were admitted to the NICU.

The differences in prevalence may be attributed to variations in study populations, measurement tools, and hospital settings. For instance, studies involving NICU admissions for critical conditions typically report higher stress levels due to greater illness severity and prolonged hospital stays (Shetty et al., 2023). Conversely, lower prevalence figures may reflect better psychosocial support

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systems, shorter admissions, or differences in cultural perceptions and coping mechanisms across setting (Malouf et al., 2024; Shetty et al., 2023).

The implications of these findings are significant. High maternal stress not only affects mothers' emotional well-being but can also interfere with bonding, breastfeeding, and long-term maternal mental health (Malouf et al., 2024; Smith & Agyemang, 2020). Elevated stress has been linked to poorer coping strategies and delayed maternal recovery postpartum (Goyal et al., 2019; Malouf et al. 2024; Shetty et al., 2023). Therefore, the findings emphasize the need for targeted psychosocial interventions such as structured counseling, peer support groups, and parent education programs within neonatal care units. Integrating stress management into neonatal care could improve both maternal well-being and infant outcomes.

5.3 Factors Associated with Perceived Stress Among Mothers with Babies Being Managed for Neonatal Jaundice

5.3.1 Sociodemographic and Economic Factors

This study found an association between several sociodemographic and economic factors and perceived stress among mothers whose babies were receiving treatment for neonatal jaundice.

Maternal age initially emerged as a significant factor in the unadjusted model, with mothers aged 35-44 reporting lower stress levels compared to younger mothers under 25 years. However, this association lost significance after adjusting for other variables. This suggests that age alone may not be a robust predictor of stress when other factors are considered. The association between maternal age and perceived stress aligns with previous studies which have shown that younger mothers may be more vulnerable to stress due to limited social and financial support (Stack & Meredith, 2017). This study's finding however contrasts the finding of Wuni et al., (2022) in the

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Northern region of Ghana, which found mothers aged 35 and above who had infants at the NICU to have an increased stress compared to those aged 20-24 years.

Marital status emerged as a significant determinant, with married mothers reporting lower stress levels than single mothers. This finding is consistent with evidence from systematic reviews and meta-analyses, where marital or partner support was shown to buffer against psychological distress during neonatal hospitalization (Malouf et al., 2024; Shetty et al., 2024). Married mothers often benefit from both emotional and instrumental support, such as assistance with decision-making, financial contributions, or help with other children at home (Dharani & Balamurugan, 2024). In contrast, single mothers may lack these support networks, increasing their vulnerability to stress. Moreover, in some African settings, single motherhood carries social stigma, which may further compound emotional distress when a child falls ill (Shitindi & Zhang, 2025). The findings show the importance of involving partners and extended family members in neonatal counseling and care processes to foster shared responsibility and reduce maternal stress.

Religious affiliation also showed a significant association with stress levels. Muslim mothers reported higher stress levels than Christian mothers. This finding may reflect cultural or community-specific stressors, such as differing levels of social support or coping mechanisms within religious groups (Brewer et al., 2014). Further research is needed to explore the underlying reasons for this association, as few studies have examined the role of religion in maternal stress related to neonatal jaundice.

Income level was a strong predictor of stress, with mothers earning above 2000 Ghana cedis experiencing significantly lower stress than those earning below 1000 Ghana cedis. This finding aligns with evidence from Ethiopia, and Nigeria, where economic hardship has been shown to

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intensify psychological distress among mothers of hospitalized infants (Jidong et al., 2021; Mekuriaw et al., 2025; Yenealem et al., 2024). Financial strain increases worry about medical bills, transportation, and sustenance during hospital stays costs that are often not fully covered by health insurance in Ghana (Keats et al., 2018). Moreover, low-income mothers may experience social exclusion or guilt if unable to contribute to treatment decisions or purchase recommended supplies for their infants (Malouf et al., 2024; Yenealem et al., 2024). Thus, economic empowerment interventions and expanded neonatal coverage under the National Health Insurance Scheme (NHIS) could serve as indirect strategies for mitigating maternal stress.

The number of children a woman has was also associated with perceived stress levels. Mothers who had 1-2 children reported higher stress levels compared to first-time mothers. This could be due to the added responsibilities of caring for multiple children while managing the health needs of a newborn with jaundice (Qian et al., 2021).

5.3.2 Clinical and Infant-Related Characteristics

Among clinical and infant-related factors, birth complication was significantly associated with perceived stress levels. Mothers who experienced complications during delivery reported higher stress. This finding is consistent with previous studies that have highlighted the psychological impact of birth complications on mothers, particularly when the infant requires specialized care such as neonatal jaundice management (Jalal et al., 2024). The experience of complications may exacerbate feelings of helplessness and anxiety, contributing to elevated stress levels. Surprisingly, factors such as mode of delivery, length of NICU stay, premature birth, and birth weight, did not show significant associations with maternal stress. This contrasts with prior studies where prolonged NICU stays and preterm births were identified as major stressors for mothers (Akbar et

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al., 2024; Mutua et al., 2020). The finding in this study also contrasts the findings of Kaluvala and his colleagues, who found mothers who delivered through natural or normal vaginal delivery had reduced levels of perceived stress compared to those who delivered through Caesarean section. The discrepancy might be due to differences in hospital policies, family involvement in neonatal care, or mothers' expectations regarding neonatal jaundice management in the studied population.

5.3.3 Maternal Social Support

The study found no significant association between receiving support and perceived stress levels. This contrasts with other studies that have highlighted the protective role of social support in reducing maternal stress (Bedaso et al., 2021; Negi & Sattler, 2024). Support however, showed a trend toward significance in the adjusted model, with mothers who did not receive support tending to report higher stress levels. While this association did not reach statistical significance, it aligns with the broader literature, which consistently highlights the protective role of social support in reducing maternal stress (Bedaso et al., 2021; Negi & Sattler, 2024). The lack of statistical significance might be attributed to variations in the type, frequency, and quality of social support received by the mothers. The lack of association in this study could also be due to the high prevalence of support reported, which could have minimized the observable differences in stress levels between those who received support and those who did not.

5.3.4 Strengths and limitations of the study

One of the main strengths of this study is its focus on maternal stress associated with neonatal jaundice, a critical area that is often overlooked. The study sites were major healthcare facilities with well-equipped neonatal care units, which ensured that findings were reflective of structured hospital environments in Ghana. The use of the Perceived Stress Scale (PSS-10), a validated tool

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also strengthens the reliability of the stress assessment. This study however had a few limitations. One is the cross-sectional design used which limits causal inferences because data was collected at a single point in time. Longitudinal studies would be needed to assess how maternal stress evolves and its long-term impacts. Another limitation is the reliance on self-reported data, which may be subject to recall or social desirability biases. Furthermore, the study did not assess potential coping mechanisms employed by mothers, which could provide deeper insights into their stress management during the period.

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CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study assessed the level of stress experienced by mothers of neonates with jaundice in Ghana. The study revealed high stress levels among mothers. The findings of this study highlight the significant role of sociodemographic and economic factors such as marital status, religious affiliation, income level, and the number of children in influencing maternal stress levels. Clinical factors, particularly birth complications were found to exacerbate stress. However, known characteristics such as mode of delivery, length of NICU stay, and prematurity of the infant did not show any associations. Although maternal social support did not show a statistically significant association with stress levels, a trend toward higher stress levels was observed among others who did not receive any form of social support during the period. This further complements the existing literature on the protective role of social support in reducing maternal stress.

The findings contribute to the growing body of evidence on maternal stress in low-resource settings and emphasize the importance of holistic support systems for mothers during neonatal care. The study also underscores the complex link between socioeconomic, clinical, and societal factors in shaping maternal stress during neonatal jaundice management. Future studies should explore other potential stressors, such as cultural beliefs, healthcare system factors, and the quality of communication between healthcare providers and mothers, which may play a role in shaping maternal stress levels. Also, future studies should explore qualitative insights to understand maternal coping mechanisms.

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6.2 Recommendations

1. Healthcare providers should prioritize support for single mothers and those with lower income levels, as these groups are at higher risk of experiencing elevated stress. Interventions could include financial assistance programs, counseling services, and community-based support networks to alleviate the burden of neonatal care.

2. Healthcare providers should engage with religious and community leaders to develop culturally sensitive support programs. This could include educational workshops within religious communities to address misconceptions about neonatal jaundice and promote coping strategies.

3. Mothers who experienced birth complications reported significantly higher stress levels. Healthcare providers should prioritize psychological support for these mothers, including postpartum counseling and follow-up care. Hospitals should also ensure that mothers are well-informed about the nature of the complications and the expected recovery process to reduce anxiety and feelings of helplessness.

4. Healthcare facilities should integrate social support programs into neonatal care, such as peer support groups, family involvement in care processes, and access to mental health professionals. Efforts should also be made to assess the quality and type of support received by mothers to ensure it is effective in reducing stress.

5. Since maternal stress levels remained high despite social support, future research should look into effective stress-management strategies used by mothers. A qualitative approach may yield more in-depth insights into culturally relevant stress-reduction therapies.

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6. This study was conducted in two well-equipped hospitals, which may not reflect the situation in rural areas where healthcare resources are limited. Future research should assess maternal stress levels in rural healthcare settings to provide a broader understanding of stress disparities based on healthcare access.

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Appendix

QUESTIONNAIRE

STRESS LEVELS AND ASSOCIATED FACTORS AMONG MOTHERS WITH BABIES BEING MANAGED FOR NEONATAL JAUNDICE

Questions	Responses
A: General Information	
Participant Code	……………… (alphanumeric)
Name of Interviewer	
Date of interview (yyyy-mm-dd)	
Place of Interview (select one)	TETTEH QUARSHIE MEMORIAL HOSPITAL KOFORIDUA REGIONAL HOSPITAL
B. Background Information	
How old are you?	…………….. (age in years at last birth)
What is your marital status	Single Married Widowed Divorced
What is your highest level of education?	No formal education Basic Education Secondary Education Tertiary Education
What is your religious affiliation?	Christian Muslim Traditionalist Other (Specify other religion)

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What is your occupation?	None Formal (Government Workers) Formal (Private Company) Informal (Self-employed)
What is your level of income in a month?	less than 1000 cedis 1000-1500 cedis 1600-2000 cedis Above 2600 cedis
C. Neonatal and Maternal characteristics	
What is the sex of your baby?	Male Female
What is the mode of delivery?	SVD Assisted Vaginal Delivery (Forceps or Vacuum) Caesarian Section (CS)
What is the birth weight of the neonate?	…………kg
What type of treatment is your baby on for jaundice	Phototherapy Intravenous immune globulin (IVIG) Exchange transfusion
What is the current mode of feeding of the neonate? (select all that apply)	Breastfeeding (Lactating) Tube feeding. Cup or bottle feeding Oral feeding
How long has your baby been diagnosed with neonatal jaundice	…………..days
How long have you been in the Neonatal Intensive Care unit?	……………days
Was your baby diagnosed with any of the following conditions? (Check all that apply)	Sepsis G6PD deficiency

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	Birth trauma (e.g., cephalohematoma) Polycythemia Prematurity Other (specify) None
How many times did you attend ANC while pregnant? (from maternal records book)	……………..times
Is this your first child?	Yes No
If no, how many children do you have?	…………………..
Was your baby born prematurely?	Yes No
Did you experience any complications during pregnancy or delivery?	Yes No
If yes, specify complications	
Do you have a history of NNJ in any of your previous births?	Yes No
Do you have a history of G6PD?	Yes No
Did your baby experience delayed initiation of feeding after birth?	Yes No
D. MATERNAL HEALTH AND SOCIAL FACTORS	
Is there a history of blood group incompatibility (e.g., ABO or Rh) between you and your baby?	Yes No
Have you received any support from family or friends during this time?	Yes NO
If yes, what type of support are you receiving? (Check all that apply):	Emotional support Financial support Physical Assistance

INTEGRI PROCEDAMUS

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	Other (specify)
How satisfed are you with the support you are receiving?	Very Satisfed Satisfed Neutral Dissatisfed Very Dissatifed
PERCEIVED STRESS	
Since your child has been admitted to the NICU, how often have you been upset because of something that happened unexpectedly?	Never Almost never Sometimes Fairly often Very Often
Since your child has been admitted to the NICU, how often have you felt that you were unable to control the important things in your life?	Never Almost never Sometimes Fairly often Very Often
Since your child has been admitted to the NICU, how often have you felt nervous and stressed?	Never Almost never Sometimes Fairly often Very Often
Since your child has been admitted to the NICU, how often have you felt confdent about your ability to handle your personal problems?	Never Almost never Sometimes Fairly often

INTEGRI PROCEDAMUS

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	Very Often
Since your child has been admitted to the NICU, , how often have you felt that things were going your way?	Never Almost never Sometimes Fairly often Very Often
Since your child has been admitted to the NICU, how often have you found that you could not cope with all the things that you had to do?	Never Almost never Sometimes Fairly often Very Often
Since your child has been admitted to the NICU, how often have you been able to control irritations in your life?	Never Almost never Sometimes Fairly often Very Often
Since your child has been admitted to the NICU, how often have you felt that you were on top of things?	Never Almost never Sometimes Fairly often Very Often
Since your child has been admitted to the NICU, , how often have you been angered because of things that happened that were outside of your control?	Never Almost never Sometimes

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	Fairly often Very Often
Since your child has been admitted to the NICU, how often have you felt difficulties were piling up so high that you could not overcome them?	Never Almost never Sometimes Fairly often Very Often

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Ethical Approval Letter

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-960628
Email: ethics.research@ghs.gov.gh
9th December 2024

My Ref. GHS/RDD/ERC/Admin/App/24/1605
Your Ref. No.

Perpetual Opei Larbi
University of Ghana
P. O. Box LG 25
Legon-Accra

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC: 032/10/24**
Study Title	Stress Levels and Associated Factors among Mothers with Babies being Managed for Neonatal Jaundice at the Tetteh Quarshie Memorial Hospital and the Koforidua Regional Hospital in the Eastern Region of Ghana
Approval Date	9th December 2024
Expiry Date	8th December 2025
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a yearly progress reports of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED...
Mr. Kofi Wellington
(GHS ERC Chairperson)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

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Introductory Letter to Study Site

UNIVERSITY OF GHANA
DEPARTMENT OF POPULATION, FAMILY AND REPRODUCTIVE HEALTH
SCHOOL OF PUBLIC HEALTH

Ref No.: ....

15th July, 2024

The Health Director
Tetteh Quarshie Memorial Hospital
Accra.

Dear Sir/Madam,

LETTER OF INTRODUCTION
PERPETUAL OPEI-LARBI – 11366685

I write to introduce to you **Perpetual Opei-Larbi,** an MPH Student with the Department of Population, Family and Reproductive Health, School of Public Health, University of Ghana, Legon.

As part of her academic requirement, she is undertaking a research on the topic **"Stress And Associated Factors Among Mothers With Babies Being Managed For Neonatal Jaundice At The Tettheh Quarshie Memorial Hospital And The Koforidua Regional Hospital In The Eastern Region Of Ghana ".**

She would need assistance to carry out her research work successfully.

We would be grateful if she is accorded all the necessary assistance.

Thank you.

Yours faithfully,

Prof Richmond Aryeetey
(Head of Department)

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Introductory Letter to study site

UNIVERSITY OF GHANA
DEPARTMENT OF POPULATION, FAMILY
AND REPRODUCTIVE HEALTH
SCHOOL OF PUBLIC HEALTH

Ref No.: ....

15th July, 2024

The Health Director
Koforidua Regional Hospital
Koforidua.

Dear Sir/Madam,

LETTER OF INTRODUCTION
PERPETUAL OPEI-LARBI – 11366685

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