# LABOUR ANALGESIA AND THE PERCEIVED BARRIERS TO ITS PROVISION AMONGST MATERNAL HEALTHCARE PROVIDERS AT MOI TEACHING AND REFERRAL HOSPITAL.

## A CROSS-SECTIONAL SURVEY

**BY**

**ELIAZARO GABRIEL OUMA**

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# DECLARATION

**Student declaration**

I declare that this thesis is my original work and has not been presented to any other university or institution for the award of the degree or any academic credit. Views expressed herein are my own unless otherwise stated and in such a case, the reference has been cited. No part of this thesis may be reproduced without prior written permission of the author and/or Moi University.

**Dr. Gabriel Ouma**, SM/PGRH/11/18

Moi University, School of Medicine

SIGNED…… DATE ……

**Supervisor declaration**

This thesis has been submitted for consideration with our approval as university supervisors.

**Dr. Omenge Orango** MBCHB, MMED (Obs/Gyn), PhD

Department of Reproductive Health, Moi University, School of Medicine.

22 December 2022

SIGNED……

DATE ……

**Prof. Edwin Were** MBCHB, MMED, MPH

Department of Reproductive Health, Moi University, School of M edicine.

22 December 2022

SIGNED…… DATE ……

## DEDICATION

I dedicate this work to my late dad, *Barack*, whose able guidance led me into this noble profession. To my late mum, best friend, and number one cheerleader, *Rose*. Your overwhelming faith in me fueled my journey to success. To my beloved, *Aria-Rose*. To my awesome siblings: *Dominic, Jacky, Steve, Regy, Lule, July, Cheryl* and the extended *Ogada family*. Finally, to all the women who have had to undergo immense pain and suffering just to bring forth life. Hopefully, this work will facilitate the much-needed change.

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## LIST OF ABBREVIATION

| | |
|---|---|
| **ACOG** | American College of Obstetricians and Gynecologists |
| **ASA** | American Society of Anesthesiologists |
| **CI** | Confidence Interval |
| **CSE** | Combined-Spinal-Epidural |
| **IASP** | International Association for the Study of Pain |
| **IREC** | Institutional Research Ethics Committee |
| **JOOTRH** | Jaramogi Oginga Odinga Teaching and Referral Hospital |
| **KAP** | Knowledge, attitude, and practices |
| **KNH** | Kenyatta National Hospital |
| **MHCPs** | Maternal Health Care Providers |
| **MTRH** | Moi Teaching and Referral Hospital |
| **NICE** | National Institute of Clinical Excellence |
| **NSAIDs** | Non-Steroidal Anti-inflammatory Drugs |
| **PCM** | Paracetamol |
| **RCOG** | Royal College of Obstetricians and Gynecologists |

| | |
|---|---|
| **RMBH** | Riley Mother and Baby Hospital |
| **TENS** | Transcutaneous Electrical Nerve Stimulation |
| **UK** | United Kingdom |
| **USA** | United States of America |
| **WHO** | World Health Organization |

## DEFINITION OF KEY TERMS

| | |
|---|---|
| ***Analgesia*** | Diminished sensation to pain without loss of consciousness. |
| ***Analgesic*** | Class of medications designed specifically to relieve pain. |
| ***Anesthesiologist*** | A physician with specialized training in giving drugs or other agents to prevent or relieve pain during surgeries or other procedures. |
| ***Arrhythmia*** | Improper beating of the heart, whether irregular. Too fast or too slow. |
| ***Doula*** | A trained professional who provides emotional, physical and informational support to new and expectant parents before, during and after birth. |
| ***Dystocia*** | Difficult labour or abnormally slow progress of labour. |
| ***Endorphins*** | Chemicals produced by the body to relieve stress and pain. |
| ***Hypoxia*** | Absence of enough oxygen in tissues to sustain bodily functions. |
| ***Labour*** | Regular painful uterine contractions increasing in frequency and intensity leading to progressive cervical dilatation, the descent of presenting part, and ultimate delivery of the fetus and its products of conception. |
| ***Midwife*** | A person trained to assist women in childbirth. |

***Obstetrician*** A doctor who specializes in pregnancy, childbirth, and a woman's reproductive system.

***Parenteral*** Administered elsewhere in the body other than the mouth and alimentary canal.

***Parturition*** The action or process of giving birth to offspring: Childbirth.

***Preeclampsia*** Hypertensive disease in pregnancy presenting with proteinuria and high blood pressure first encountered at or after 20 weeks gestation and relieved within 6 weeks after delivery.

***Primiparas*** Women giving birth for the first time.

***Protocol*** Official procedure or system of rules governing affairs of an institution.

***Provision of labour analgesia*** Routine administration of any form of analgesic to alleviate or relieve labour pain.

***Resident*** A medical graduate engaged in specialized practice under supervision in a hospital.

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## ABSTRACT

**Background:** A majority of women experience moderate to severe pain during labour that eventually affects the parturient, and fetus. Maternal health care providers have an extensive role to play in meeting the analgesic needs of women during childbirth. Although pain relief is a key component of modern obstetric care, it remains a poorly established service in sub-Saharan countries such as Kenya.

**Objectives:** To assess the practice of labour pain management and its related barriers among maternal health care providers working at Moi Teaching and Referral Hospital (MTRH).

**Methods and materials:** This was an institution-based, cross-sectional descriptive survey conducted from 1st January to 31st March 2021. A structured, self-administered, questionnaire was completed by 117 maternal health care providers (obstetricians, anesthesiologists, and midwives) within MTRH. The outcome of interest was the self-reported past practice of provision of any analgesia to a woman in labour. Data were analyzed using IBM SPSS software package version 23.0. Qualitative data were described using numbers and percentages. Descriptive analysis was done, and logistic regression analyses were applied to identify the association between dependent (provision of labour analgesia) and independent variables (healthcare provider factors and health system factors). The odds ratio and 95% confidence interval were computed to determine the strength of association.

**Results:** One hundred and seventeen (117/120) maternal healthcare providers participated in the study representing a response rate of 97.5%. Of the respondents, 61.5% reported providing labour analgesia routinely. Among those reporting routine provision of labour analgesia, 12.5% reported providing opioids, 20.8% reported providing non-opioids, 5.6% reported providing regional methods, and 88.9% reported providing non-pharmacological methods respectively. More than half of the respondents (53%) had poor knowledge of labour analgesia. Almost all (94%) of the respondents reported a positive attitude towards the provision of labour analgesia. Non-availability of drugs and equipment (58.1%), lack of clear protocols and guidelines (56.4%), and absence of adequate skilled personnel (55.6%) were reported as the health system factors that hinder the provision of labour analgesia. Other reasons for reported non-provision of labour analgesia included providers' concerns about foetal distress (55%) and adverse maternal effects (49%). On multivariate logistic regression analysis, practitioners with more than 10 years of practice (AOR: 9.85, 95% CI 1.52, 1.96) were almost ten times (9.82) more likely to report routine provision of labour analgesia.

**Conclusions:** The proportion of maternal health care providers at MTRH reporting routine provision of labour analgesia was above average at 61.5%. Generally, the maternal healthcare providers had poor knowledge of labour analgesia. Practitioners with more than 10 years of practice were 10 times more likely to report routine provision of labour analgesia. Non-availability of drugs and equipment and lack of clear protocols and guidelines were the main health system factors hindering the provision of labour analgesia at MTRH.

**Recommendations:** There is a need for continuous professional training of maternal healthcare providers on labour analgesia. National and institutional labour pain management protocols should be developed and interdisciplinary collaboration and mentorship encouraged to meet the analgesia needs of women during childbirth.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background

"The delivery of the infant into the arms of a conscious and pain-free mother is one of the most exciting and rewarding moments in medicine," said Donald Moir, founding President of the Obstetric Anesthetists association. Many communities in developing countries have for years considered labour pain as inevitable, a brief period of intense suffering that a woman must endure to prove herself as a 'woman' and as a mother (Callister et al., 2003).

Pain management from the time of recorded history had been crude and largely ineffective. On June 15, 1591, Agnes Sampson, of Edinburgh Scotland, was burned at the stake for attempting to relieve the pains of labour. According to her accusers, in Genesis 3, childbirth pain originated when God punished Eve and her descendants for Eve's disobedience in the Garden of Eden. They thus believed that painful delivery was natural, and that painless delivery was unnatural, evil and hence a sign of making a pact with the devil (Benumof et al., 2004).

An obstetrician by the name of James Young Simpson of Edinburgh, Scotland, was the first doctor to administer inhalational chloroform to a woman in labour in 1847. Despite facing heavy criticism from religious groups and medical peers, he stated "it is our duty as well as our privilege to use all legitimate means to mitigate and remove the physical sufferings of the mother during parturition". He, later on, began providing this method of labour analgesia for most deliveries throughout all stages of labour. He vigorously defended his technique against both religious and medical objectors. Those rejecting labour analgesia on religious grounds quoted the book of Genesis 3:16 which states: "I

will make your pains in childbearing very severe; with painful labour, you will give birth to children." They strongly believed that labour pains were a consequence of 'the curse of Eve' and that the descendants of Eve suffered and should continue to do so during childbirth due to her disobedience in the Garden of Eden. Simpson came out strongly to oppose this belief. He published a pamphlet stating- "Medical men may oppose for a time the introduction of anaesthesia in parturition, but they will oppose it in vain; for certainly our patients themselves will force the use of it upon the profession" (Eley et al., 2015; Scientific & Neimme, n.d.).

In 1847, after initial reports of successful pain-free deliveries, an era of conflict began, between the church and the medical profession. The first woman anaesthetized for childbirth in the United States using Ether was Fanny Longfellow in 1847 for her third child. She later wrote, "I am very sorry you all thought me so rash and naughty in trying the Ether. Henry's faith gave me courage...I feel proud to be the pioneer to lessen suffering for poor, weak womankind. This is certainly the greatest blessing of this age, and I am glad to have lived at the time of its coming and in the country which gives it to the world..."(Wright, 2012).

On 15 January 1850, Emma Darwin, the wife of Charles Darwin, the eminent 19$^{th}$-century naturalist had chloroform given to her by her husband for the last 2 of her 8 births. Queen Victoria in 1853, despite opposition by the clergy, convinced her reluctant physicians to have chloroform administered to her by Dr John Snow for her 8th confinement of Prince Leopold II. He administered the chloroform by a handkerchief and Her Majesty inhaled for 53 minutes, expressing herself "much gratified with the effect of the chloroform". Dr Snow stated later on that, "Her Majesty expressed great relief from

the application, the pains being trifling during the uterine contractions, and whilst between the periods of contraction there was complete ease". Queen Victoria's enthusiastic endorsement of chloroform subsequently popularized its use (Wright, 2012; Eley et al., 2015).

What is common among these three women is that all experienced childbirth several times before with no pain relief and when it was offered to them for the first time, they welcomed and endorsed it with open arms. As the acceptance of analgesia for labour grew, other agents were explored for use as pain relief.

In 1902, Dr. Von Steinbuchal of Austria pioneered the use of morphine and scopolamine for labour analgesia. Dr. Gauss of Freiberg did further analysis of this technique, naming it 'twilight sleep'. The introduction and use of twilight sleep elicited a lot of debate within the medical profession and strong opinions were expressed by the public across the world, particularly in the United Kingdom and the USA, concerning "the Freiberg method". Von Steinbuchal's protocol used 0.45 mg scopolamine and 10 mg morphine in the early stages of labour and these doses were readministered two-hourly as required. The main problem encountered was a "condition of stupor in the babies". Gauss correlated the degree of drowsiness in the neonates with the dosage of opioids administered. By using more scopolamine and less of the opioid, he noted less neonatal depression. Before the time of Virginia Apgar (1949), he introduced the term "oligopnea" and discovered that respiratory depression in the child was directly related to the degree of sedation observed in the mother (Eley et al., 2015).

While the medical profession expressed concerns regarding the adverse effects of twilight sleep, caudal anaesthesia had been in use for genito-urinary surgery since the early 1900s.

Unfortunately, it was not until the 1940s, that it was used with enthusiasm for labour analgesia in the USA. The first use of caudal anaesthesia in obstetrics was published in 1909, by Stoeckel of Marburg, Germany. A translation of his series of 141 cases of obstetric caudal epidural analgesia shows an unbiased assessment of the technique. He recommended using 30ml to 35ml of 0.5% Novocain (procaine) with adrenaline. He concluded that his technique allowed effective analgesia without the side effects of morphine and scopolamine, however the method was not advanced at that time (Eley et al., 2015; Doughty., 1990)

Human labour is divided into three stages. The first stage of labour begins with the onset of labour and ends with full cervical dilation to 10 centimeters. This first stage is further subdivided into two phases, all defined by the degree of cervical dilation. The latent phase is commonly defined as cervical dilatation from 0 cm to 5 cm, while the active phase of labour commences from 5 cm to full cervical dilation. The second stage of labour begins with complete cervical dilation to 10 centimeters and ends with the delivery of the neonate. The third stage of labour commences when the fetus is delivered and concludes with the complete delivery of the placenta and membranes. The first one to four hours post-delivery is usually considered the ‘fourth stage of labour’, and it’s the period where physiologic readjustment of the mother occurs (Hutchison et al., 2022).

In the first stage of labour, pain is caused by uterine contractions, associated with dilation of the cervix and stretching of the lower uterine segment. Pain impulses are transmitted by visceral afferent type C fibres accompanying the sympathetic nerves. In the early stages of labour, only the lower thoracic dermatomes (T11 to T12) are affected, but with progressing cervical dilation during the transition phase, adjacent dermatomes may be

involved, and hence pain referred from T10 to L1. In the second stage of labour, additional pain impulses from the distention of the vaginal vault and perineum are transmitted by the pudendal nerves composed of lower sacral nerve fibres (S2 to S4) (Jones., 2012).

Labour pain has two dimensions, a sensory or physical dimension, with the transmission of the painful stimuli, to the brain, and an affective dimension due to the interpretation of these stimuli through the interaction of a wide variety of emotional, social, cultural and cognitive variables unique to the individual. For labour pain management, conventional medicine focuses more on the sensory/physical side, while alternative methods deal mainly focus on the emotional aspects. Therefore, the issue of pain relief during childbirth is a way of promoting a satisfactory birth experience and healthy reproductive outcome in women during childbearing by addressing both the emotional and physical components (Tournaire & Theau-Yonneau., 2007; Jones., 2012).

Severe pain adversely affects the parturient and fetuses. An individual's response to labour pain may be influenced by the circumstances of her labour, her surrounding environment, her cultural background, her prior preparation for labour and the support available to her (McCrea et al., 2000). There are reports on the association between the intensity of labour pain and dystocia. Although these studies do not establish a cause-and-effect relationship, they strongly suggest that greater labour pain may be associated with obstructed labour (Alexander et al., 2001; Panni & Segal., 2003).

Pain-induced stress accelerates the basal metabolism of a parturient and increases cardiac output and ventilation. In extreme cases, reflex hyperventilation leads to respiratory alkalosis manifesting with maternal tetany and fetal cardiac arrhythmia. Maternal

respiratory tetany shifts the haemoglobin dissociation curve to the left, leading to the deterioration of the trans-placental oxygen transport. The sympathetic stimulation and increased endogenous catecholamine concentration cause uterine vasoconstriction, which reduces the uteroplacental flow and is likely to lead to intrauterine fetal hypoxia and acidosis. This could be again dangerous for women with pre-existing cardiopulmonary problems. Released catecholamine impairs uterine contractile function, which prolongs the delivery and secondarily deteriorates the postpartum status of the newborn. Additionally, lipolysis, the release of free fatty acids freely permeating the placenta, and hyperglycemia are observed, which increases fetal hypoxia and acidosis (Lederman et al., 1978). Although severe pain during childbirth is not life-threatening in healthy women, untreated labour pain has been associated with several adverse conditions such as postnatal depression and post-traumatic stress disorder (Hawkins, 2010; Solek-Pastuszka et al., 2015).

### 1.2 Statement of the problem

In a bid to attain the Millennium Development Goals 4 and 5, the United Nations at the beginning of the millennium, focused its sights on the very important area of childbirth (United Nations., 2000). Provision of effective labour analgesia is not only a measure of maternal satisfaction but also an indirect measure of the health system functionality, health institutions organization, and that there are competent maternal health care providers.

According to the American Society of Anesthesiologists (ASA) and American College of Obstetricians and Gynecologists (ACOG), maternal request represents sufficient justification for pain relief (Apfelbaum et al., 2016). ACOG also reaffirmed that ‘labour

results in severe pain for many women and that there is no circumstance where it is considered acceptable for a person to experience untreated severe pain, amenable to safe intervention, while under a physician's care' (ACOG., 2004).

A 2007 joint statement by the Royal College of Obstetricians and Gynecologists, the Royal College of Midwives, the Royal College of Anesthetists, and the Royal College of Pediatrics and Child Health stated: 'When women choose epidural analgesia for pain relief in labour, they should be able to receive it in a reasonable time.' This means that labour and delivery units should be able to always provide regional analgesia on maternal request (RCOG et al., 2007).

In 2014, the World Health Organization (WHO) issued a statement outlining the rights of all women to receive the highest attainable standard of care, regardless of their circumstances. The failure to provide analgesia to this vulnerable population was described as disrespectful, neglectful and abusive, and a violation of their fundamental human rights (WHO., 2014).

The National Institute of Clinical Excellence (NICE) of the United Kingdom recommends the education of women on the options and availability of effective labour analgesia as a means of ensuring that women receive optimal analgesia during childbirth (NICE., 2014).

Unfairly large disparities exist between developed and developing countries in the practice of labour analgesia. Labour analgesia is widely utilized in high-income countries, but this is not the case in Africa (Nabukenya et al., 2015). Regional studies indicate the practice of provision of labour analgesia to be as low as 14% (Wakgari et al.,

2020). However, what is consistent is that authorities in the fields of obstetrics and anaesthesia encourage the use of labour analgesia.

Different professionals have different expectations as regards to the provision of labour analgesia. Obstetricians and anesthesiologists are expected to provide pharmacological therapy, while midwives, nurses and other auxiliaries are expected to assist patients with psychological methods and hence use alternative approaches more often. Successful relief of labour pain is not necessarily associated with high levels of satisfaction on the part of parturient women. Factors such as the woman's involvement in decision-making, social and cultural factors, the woman's relationship with her caregivers, and her expectations regarding labour may be equally, if not more, important (Tournaire & Theau-Yonneau., 2007). In many countries today, the availability of obstetric analgesia for labour and specifically regional analgesia is considered a reflection of standard obstetric care (Pandya., 2010).

In Kenya, the subject of obstetric analgesia as part of routine maternal care remains dormant. Since labour analgesia is an important aspect of the management of pregnant women during childbirth, it is prudent to examine and analyze its provision with the aim of identifying aspects of it that may require improvement.

A retrospective cohort study conducted by Waweru-Siika et al, on 390 women interviewed within 36 hours of an uncomplicated vaginal delivery at the Moi Teaching and Referral Hospital in 2015 found that nearly 74% of them had experienced severe to unbearable pain. Despite this, only 30% reported having received any form of pain relief.

The commonest analgesia given was in the form of an anti-spasmodic injection (Buscopan®) (11%) and back massages (30%) from accompanying family members or friends. The average pain relief was considered to be good in over 80% of the Buscopan group while over half of the back rub group considered their pain relief to be poor (Waweru-Siika., 2015). Over 85% of the women interviewed indicated that they would request some form of analgesia for future deliveries. This is Comparable to 93% of women in a 2014 study done at Shalom community hospital in Athi river and 87% of women in a 2015 study done at Mulago National Referral Hospital in Uganda (Njiru et al., 2014; Nabukenya et al., 2015).

The study concluded that there is a need to establish a formal labour analgesia service at MTRH and to educate rural Kenyan women on the various labour analgesia options, to enable them to make informed choices regarding their use. This is yet to be implemented for reasons unknown.

There is no protocol for labour pain relief at MTRH, and its practice is not known. In addition, the administration of epidural analgesia, which is the gold standard technique for normal labour and delivery by anaesthesia providers, is not established. Although epidural analgesia is provided routinely for women with advanced cardiac disease in labour, there is no clear protocol for its use on request in women with no obvious medical indication.

There have not been any cross-sectional studies to assess the actual provision of labour analgesia and its related barriers amongst maternal health care providers both at MTRH

and nationally. The implications of such a study would be far-reaching as it would enable healthcare workers to evaluate and introspect on the challenges that hinder the rollout of obstetric analgesia, establish formal analgesia protocols, strengthen existing practices, and confidently offer effective analgesic options to women in labour, without impacting negatively on these women or their babies.

### 1.3 Research questions

1. What is the proportion of maternal healthcare providers reporting provision of labour analgesia at MTRH?
2. What is the pattern of use of different types of labour analgesics offered by maternal healthcare providers at MTRH?
3. What healthcare provider factors influence the provision of labour analgesia by maternal healthcare providers at MTRH?
4. What health system factors influence the provision of labour analgesia by maternal healthcare providers at MTRH?
5. What barriers hinder the provision of labour analgesia by maternal healthcare providers at MTRH?

### 1.4 Significance of the study

Evaluation of the provision of labour analgesia at Moi Teaching and Referral Hospital is important to determine the barriers encountered, in order to make recommendations for improvement.

In keeping with MTRH's mission that focuses on the utilization of new technologies and continuous improvement, this study is expected to provide benefits primarily to maternal healthcare providers to appraise the forms and use of labour analgesia and improve on the practice in such a way that it meets the internationally accepted standards. This will lead to better patient care and satisfaction.

It will also act as a reminder to medical educators to emphasize training and retraining of obstetric analgesia as a core competency for their students in their pre-clinical and clinical years. This will elevate the trainees to be at par with current improved practices worldwide.

An overview of the provision of labour analgesia for hospital administrators and policymakers will act as a clue for planning and intervening in areas of deficit thereby organizing and equipping the health institutions in ways to improve the overall quality of care.

In addition, the baseline data in this study will open the gate to further research activities nationally and regionally to identify the appropriate labour analgesia methods in keeping with our unique individual environment and develop appropriate labour analgesia protocols that will be incorporated into the clinical practice.

## 1.5 Objectives of the study

### 1.5.1 Broad objective

To assess the practice of labour pain management and its related barriers among maternal health care providers working at Moi Teaching and Referral Hospital.

### 1.5.2 Specific objectives

1. To determine the proportion of maternal healthcare providers reporting provision of labour analgesia at MTRH.
2. To describe the pattern of use of different types of labour analgesics offered by maternal healthcare providers at MTRH.
3. To describe the healthcare provider factors that influence the provision of labour analgesia by maternal healthcare providers at MTRH.
4. To describe the health system factors that influence the provision of labour analgesia by maternal healthcare providers at MTRH.
5. To determine the barriers to the provision of labour analgesia by maternal healthcare providers at MTRH.

# CHAPTER TWO: LITERATURE REVIEW

Labour pain management is a universal concern. Several studies have been conducted to try and find out the actual practice, and the factors hindering its universal adoption. Despite an overwhelming majority of the parturients interviewed post-delivery in various countries declaring interest in labour analgesia for their next deliveries, the provision rate still remains low, with reported regional figures of 13.3% in Ibadan, Nigeria and 13.8% in Hawassa, Ethiopia (Ohaeri et al., 2019; Wakgari et al., 2020). This starkly contrasts the rates in developed countries such as 76% reported in some Australian institutions (Eley et al., 2015).

There is no local data on the providers reported provision of labour analgesia, and the available literature mainly focuses on the parturients recall of past labour analgesia received. This may be affected by recall bias, and may be inaccurate as not all patients are aware of the diverse labour pain relief methods employed, including the non-pharmacological modalities. This may lead to underreporting and mis information.

It is thus important to be well oriented with the various available labour pain relief modalities and to find out which of these are actually routinely offered in our local set up. This will go a long way in improving the existing options, and availing new and efficient options to women during labour.

The International Association for the Study of Pain (IASP) declared 2007 to 2008 the 'global year against pain in women', with the slogan *"real women, real pain*". The association highlighted the significance of managing pain among the parturient and the substantial public health impact that could occur if this pain is neglected (Leresche.,

2008). Most women experience moderate-to-severe pain during labour. The McGill questionnaire pain rating index illustrated in Figure 1, likens labour pain in primiparas to amputation of a finger or toe (Ramsay., 1994).

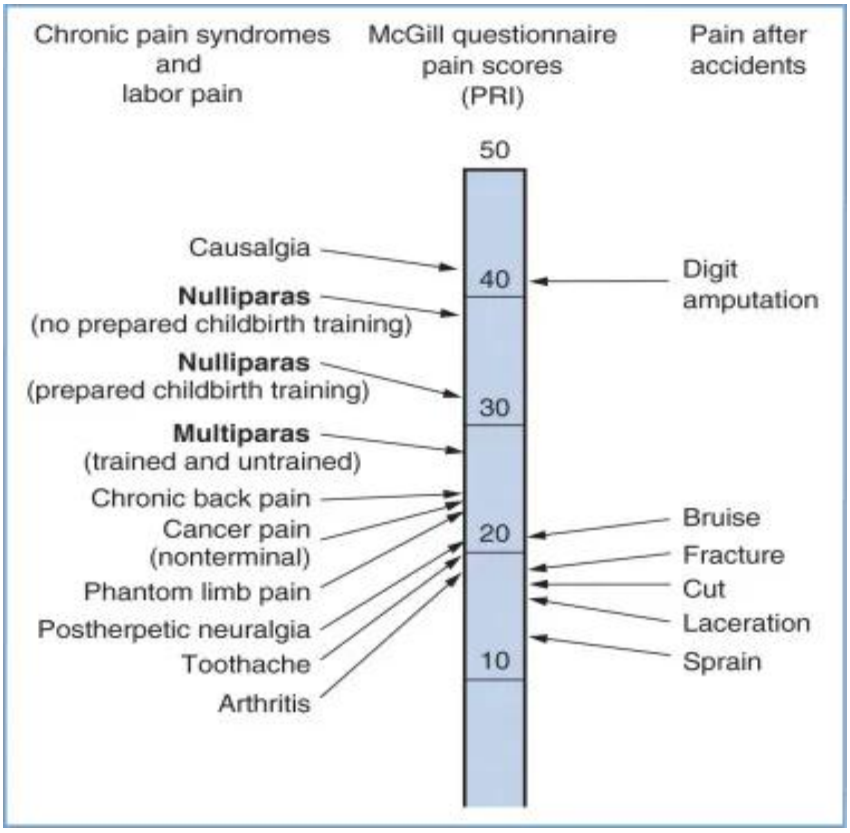



**Figure 1: A comparison of pain scores obtained through the McGill Pain Questionnaire. PRI, Pain rating index: represents the sum of the rank values of all the words chosen from 20 sets of pain descriptors** (*The Pain of Childbirth and Its Effect on the Mother and the Fetus | Anesthesia Key*, n.d.)

In 1986, WHO developed a strategy as illustrated in Figure 2, for the management of pain using a stepladder approach. Multi-agent therapy is required for optimal pain management. Patients with mild pain should be started on a non-opioid analgesic, and those with moderate pain should be started on a step 2 opioid. Many patients can benefit from the addition of a non-opioid to the opioid (e.g., for bone pain) or an adjuvant agent to the opioid (e.g., for neuropathic pain). If this combination does not produce adequate

relief or the patient presents with severe pain, step 3 opioids should be initiated (WHO., 2012).

Most methods of non-pharmacological pain management are non-invasive and appear to be safe for mother and baby, however, their efficacy is unclear, due to limited high-quality evidence. There is more evidence to support the efficacy of pharmacological methods, but these have comparatively more adverse effects (Jones., 2012).

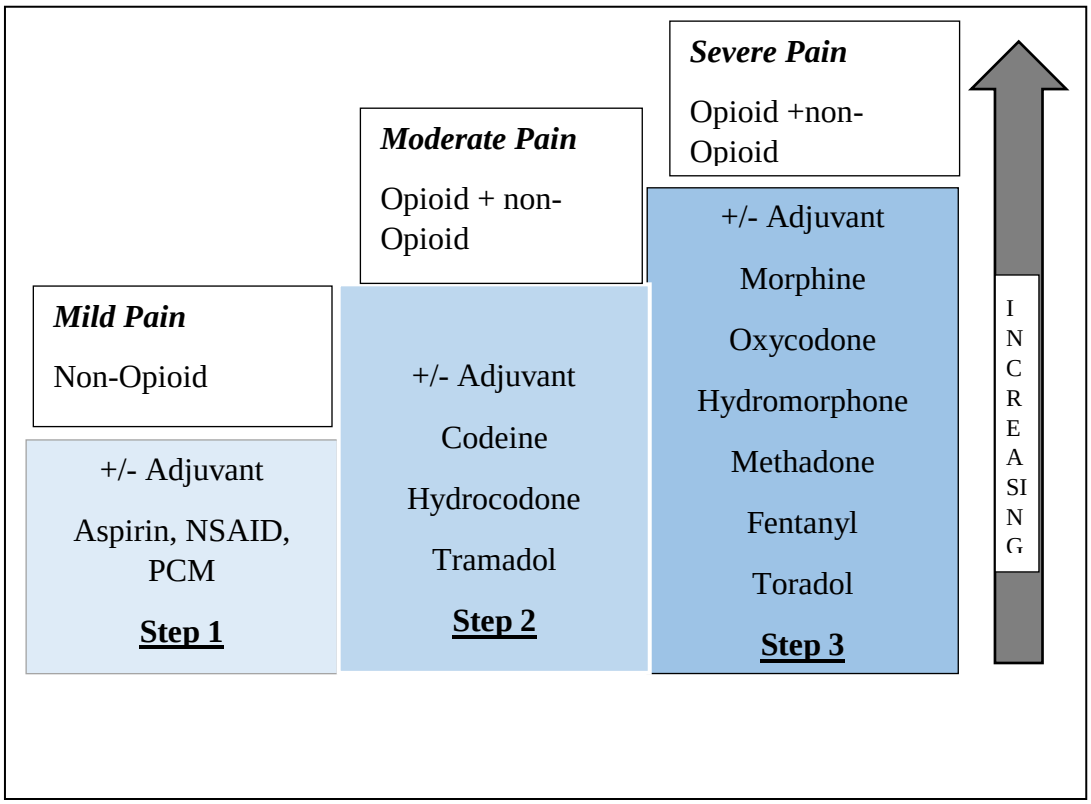



**Figure 2: WHO pain relief ladder (WHO., 2012)**

## 2.1 Conventional Approaches (Pharmacologic Treatments)

### 2.1.1 Regional analgesia techniques (Epidural and combined spinal-epidural analgesia)

Regional analgesia has become the most common method of pain relief used during labour in the United States (Schrock & Harraway-Smith., 2012). Epidural and spinal analgesia are two types of regional analgesia. Epidural analgesia is considered the gold standard for labour analgesia and is recommended by WHO. The estimated use is in the range of 10% - 64% in developed and high-income countries (Halliday et al., 2022). During epidural analgesia provision, an indwelling catheter is placed into the epidural space, and the patient receives a continuous infusion or multiple injections of local anaesthetic. Spinal analgesia is usually in form of single injections into the intrathecal space. A combination of epidural and spinal analgesia, known as a walking epidural, is available and combines the rapid pain relief from the spinal regional block with the constant and consistent effects of the epidural analgesia. Despite its efficient analgesia qualities, it still allows sufficient motor function for patients to ambulate (Schrock & Harraway-Smith., 2012).

Epidural analgesia was first rolled out in obstetric practice in 1946 and its use in labour has steadily increased over the past 20 years, with more than 20% of women in the UK, 60% in the USA and increasing numbers of women in China choosing this form of pain relief (HSCIC., 2012; Grant et al., 2015).

A Cochrane Review was undertaken in 2018 to assess the effectiveness and safety of all types of epidural analgesia, including combined-spinal-epidural (CSE) on the mother and the baby, when compared with non-epidural or no pain relief during labour. It revealed

that pain intensity as measured using pain scores was lower in women who received epidural analgesia when compared to women who received opioids (standardized mean difference -2.64, 95% confidence interval (CI) -4.56 to -0.73;) and a higher proportion was satisfied with their pain relief, reporting it to be "excellent or very good" (Anim-Somuah et al., 2018).

Although overall, patients who received epidural analgesia had an apparent increase in assisted vaginal birth, a post hoc subgroup analysis showed this is not the case in recent studies done after 2005, suggesting that modern approaches to epidural analgesia in labour are generally safe, and do not affect this outcome (P. et al., 2013). Epidural analgesia has been shown to have no impact on the risk of caesarean section or long-term backache and did not appear to have an immediate effect on neonatal status as determined by Apgar scores or in admissions to neonatal intensive care. However, there was a significant risk of malposition, maternal shivers and oxytocin augmentation (Anim-Somuah et al., 2018).

Only 2.2% of women in labour received epidural analgesia according to a study in a tertiary South African hospital in 2014. This was comparable to 3.3% at the Kenyatta National Hospital (KNH) in Nairobi, Kenya. All cases were due to obstetric and medical indications like cardiac disease, preeclampsia and morbid obesity, and none on patient request. Both studies recommended collaboration between the obstetric and anaesthesia departments to improve access to labour epidural services (Apondi., 2012; Jacobs-Martin et al., 2014).

### 2.1.2 Systemic opioids

Opioid drugs work by binding to opioid receptors, which are found principally in the central and peripheral nervous systems and the gastrointestinal tract, thereby inhibiting the transmission of pain signals (El-Kerdawy & Farouk., 2010). They are relatively affordable drugs, and their use during labour is common in midwifery and obstetric practice in some countries. In most parts of the world, parenteral (intravenous or intramuscular) opioids commonly used in labour include morphine, tramadol, fentanyl and more recently remifentanil (Evron et al., 2005).

Parenteral opioids, can reduce awareness of pain and have a calming effect. However, the degree of pain relief with systemic opioids is less reliable than with an epidural. In addition, they have side effects such as nausea and vomiting or a reduced level of concentration on administration. Also, opioids cross the placenta and may have temporary side effects on the foetus or newborns such as changes in foetal heart rate or newborn respiratory depression or drowsiness (Jin & Son., 2021).

The extent of usage of parenteral opioids during labour worldwide is unclear. In the USA, the incidence of parenteral administration of opioids ranges from 30% in hospitals with more than 1500 deliveries annually to 56% in hospitals with 500-1500 annual births. In small hospitals, i.e., those with fewer than 500 deliveries per year, parenteral opioids are used in 50% of the deliveries. In the United Kingdom, this percentage is approximately 38%, on average (Solek-Pastuszka et al., 2015).

A questionnaire-based, cross-sectional study was conducted to assess the practice of labour analgesia by 151 obstetricians in Nigeria by Lawani., et al in 2014. The 7

commonest analgesia provided were opioids (41.1%) followed by psychological support (39.7%), paracetamol (4.6%), epidural (2.0), and Entonox (1.3%) (Lawani et al., 2014).

There are no studies to assess the use of systemic opioids locally; however, the main opioids available in Moi Teaching and Referral Hospital include tramadol, morphine, pethidine and fentanyl. Of these, studies have shown that maternal pain scores in labour were better with pethidine than tramadol, and there was no evidence of a difference in adverse effects on the mother or baby (Smith et al., 2018). The analgesic potency of tramadol is equal to that of meperidine and one-fifth to one-tenth that of morphine. In equianalgesic doses, tramadol causes less respiratory depression than morphine; at usual doses, no clinically significant respiratory depression occurs. The onset of analgesia is within 10 minutes of intramuscular administration, with an effective duration of 2 to 4 hours (*The Pain of Childbirth and Its Effect on the Mother and the Fetus | Anesthesia Key*, n.d.).

### 2.1.3 Non-opioid analgesics

Non-opioid drugs may have antipyretic (drugs that reduce fever), sedative (drugs that induce sedation or reduce irritability) or anti-inflammatory actions (drugs that reduce inflammation), as well as analgesic properties (drugs that relieve pain). They do not bind to opioid receptors and are not classified as 'controlled' substances. They are milder forms of painkillers. They include acetaminophen (paracetamol), non-steroidal anti-inflammatory drugs (NSAIDs) e.g., aspirin, sedatives (barbiturates, benzodiazepines and phenothiazine), antispasmodics (hyoscine) and antihistamines (promethazine) (Othman et al., 2012).

Non-opioids are effective for mild to moderate pain relief. For moderate to severe pain, they can be used in combination with opioid drugs to enhance pain relief. Non-opioid agents differ from opioid analgesics in several ways: non-opioids have a ceiling effect in analgesia (a maximum dose beyond which analgesic effect does not increase), do not produce tolerance or physical dependence and are not associated with abuse or addiction. The primary mechanism of action of non-opioid analgesics is the inhibition of prostaglandin formation (Dadoly., 2007; Evron & Ezri., 2007).

Non-opioids have two serious drawbacks. The first drawback is the ceiling effect. Non-opioids have an upper limit of pain relief that can be achieved. Once that upper limit or ceiling is reached, administering additional medication will not provide any further pain relief. Opioids, on the other hand, tend not to have a ceiling, that is, the more you take, the more pain relief you will get. It is for this reason non-opioids are effective only for mild to moderate pain, whereas opioids are useful for more severe pain intensity (Evron & Ezri., 2007). In the 2015 study done at Moi Teaching and Referral Hospital, 11% of the women received hyoscine (Buscopan), 80% of whom reported that they had experienced good to very good pain relief from it (Waweru-Siika., 2015).

### 2.1.4 Inhalational analgesics

The main inhalational analgesics used in labour are Entonox, isoflurane, desflurane and sevoflurane. Entonox (50% nitrous oxide, 50% oxygen) is the most widely available inhalational analgesia in the USA and UK and is used by 60% of women in labour. Isoflurane 0.2–0.25% has been added to Entonox to improve its analgesic efficacy. Pain relief scores and patient satisfaction were found to be superior (Wee., 2004).

Entonox affects the central nervous system and increases the secretion of endorphins leading to analgesia, relaxation, and euphoria (Sharifian Attar et al., 2016). The outcome is a reduction in labour pain without causing complications for the mother, better neonatal outcomes in terms of 5-minute Apgar scores and more maternal satisfaction (Zare Tazarjani et al., 2010, Sharifian Attar et al., 2016).

Entonox is fast-acting, gives rapid clearance from the body, there is no need for sophisticated and expensive devices, no need for highly skilled personnel, and finally, mothers have greater tolerance. However, it was associated with more incidence of nausea, vomiting, dizziness and drowsiness when compared with placebo or no treatment (Parsa et al., 2017).

### 2.2 Alternative Methods of Labour analgesia (Non-pharmacologic Approaches)

Melzack and Wall's "gate control theory" introduced in 1965, helps to explain the various methods used in non-pharmacological pain relief in labour. Some, as follows, are the revival of traditional methods and some are newly developed (Melzack & Wall., 1965).

1. Techniques that reduce painful stimuli.
2. Techniques that activate peripheral sensory receptors.
3. The use of 'Active birth'.
4. Techniques that enhance descending inhibitory pathways.

A review of 14 studies with large sample sizes (n > 200) on the use of complementary and alternative medicine in pregnancy identified a prevalence rate ranging from 1% to 87% (with nine falling between 20% and 60%) (Adams et al., 2009). Many women

would like to avoid pharmacological or invasive methods of pain relief in labour, and this may contribute to the popularity of alternative methods of pain management.

The most cited complementary medicine and practices associated with providing pain management in labour can be categorized into:

- Mind-body interventions (e.g., yoga, hypnosis, relaxation therapies)
- Alternative medical practice (e.g., homoeopathy, traditional Chinese medicine)
- Manual healing methods (e.g., massage, reflexology)
- Pharmacologic and biological treatments, bioelectromagnetic applications (e.g., magnets) and herbal medicines.

### 2.2.1 Maternal movements and positional changes

When women are left to themselves, they spontaneously adopt different positions in an attempt to reduce pain. Changing position also alters the relationship between gravity, the foetus, the pelvis and uterine contractions which can improve contractions, and labour progress and help to reduce pain (Habanananda., 2004). When in a vertical rather than a horizontal position women experienced significantly less pain, particularly back pain (Melzack et al., 1991). Some sample positions include upright, squatting, side, flat, and hand and knees position.

Recently, birthing balls have been introduced to provide comfort during labour. The mother can sit, rock, bounce, or stretch on the inflatable ball to ease pain or increase the rate of delivery. So far, no studies have reported any position that is harmful to the baby or mother. Women should therefore be encouraged to assume any position that provides comfort during labour, and maintain an upright position if they so wish (Datta et al., 2010).

### 2.2.2 Touch and massage

The use of pressure and massage to encourage relaxation and release tension is one of the oldest, simplest, and most immediate tools available to the midwife/caregiver. Many midwives routinely use gentle back massage as part of their practice. Women may vary in their response to massage. Some prefer to be massaged during contractions, which helps to

'Spread the pain' while some prefer to be massaged after each contraction to relax and soothe tired muscles. Massage is often used in combination with other therapies (Habanananda., 2004).

Therapeutic touch and massage can include a wide variety of hands-on interventions for the mother ranging from therapeutic massage to light caressing and hair stroking. This may include the use of fingertips, hands, or devices to stroke and apply pressure-relieving pain to facilitate relaxation. It has been discovered that women in labour may tolerate the pain with better relaxation and a lower baseline level of anxiety.

Many women feel lower back pain associated with the posterior position of the baby's head. Massage or pressure applied to this area can provide some pain relief. This level of analgesia appears to last approximately 30 minutes when massage or deep pressure is used. Therefore, touch and massage may work optimally when applied in 30-minute intervals with breaks in between (Datta et al., 2010).

The rate of use of touch and massage in Moi Teaching and Referral Hospital is postulated to be at 30%, only second to Hyoscine (Waweru-Siika., 2015).

### 2.2.3 Social support (reassurance)

Social support at birth is defined as the continuous presence of a support person during labour and birth. This has been identified as a key element in the World health organization's vision of quality of care for pregnant women and newborns. The intervention has been recommended by the WHO to improve labour outcomes and women's satisfaction.

Different names have been given to this form of intervention including companion of choice at birth, continuous support during childbirth, labour companion, and emotional support during birth (Tamar Kabakian-Khasholian, Hyam Bashour., 2017). Trained doulas help to reduce the odds of certain medical interventions during labour for low-risk women delivering at term. Studies have also shown that doula support helps in the reduction of postpartum depression rates (J.H. & M., 2015).

The provision of social support during childbirth is associated with lower levels of labour pain, as indicated by reduced pain reports and analgesic use. Women who were accompanied during labour by a supportive attendant used pain medication less frequently than women who were unaccompanied during labour (Brown et al., 2003).

### 2.2.4 Deep breathing and patterned breathing (Lamaze techniques)

This is a form of psychoanalgesia technique that was initiated by Lamaze and has since become very popular among women who would want to avoid medications during labour and delivery. This technique involves education of the parturient regarding "positive" conditioned reflexes. It mainly involves continuous labour support (by the monitrice or doula) and the use of a repertoire of relaxation and breathing strategies.

Lamaze believed that controlled, conditioned breathing exercises were effective in blocking women's perception of the pain of contractions. The advantages of this technique include the avoidance of any medications which disturb maternal physiology, as well as avoidance of foetal depression from medication such as opioids. However, the success rate of this technique has been shown to vary considerably, and the parturient may occasionally request systemic medications or regional analgesia while using this technique (Datta et al., 2010).

### 2.2.5 Water bath

It was introduced in 1960 by Igor Tjarkovsky and popularised by Michel Odent and Janet Balaskas. Recent interest in past decades was due to increased requests by mothers to use it as a form of comfort. It can be used as either: - a shower, tub, whirlpool, or birth pool that the parturient gets into for pain relief. Immersion in warm water gives an immediate feeling of well-being. This has been attributed to *hydrothermic* and *hydrokinetic* effects. ***The Hydrothermic*** effect arises from water being a conductor of heat. The conduction of heat through the skin and mucous membranes release muscle spasms and pain relief.

***The hydrokinetic*** effect is the sensation of the 'abolition of gravity' that is experienced during immersion. The combined effect of the two leads to relaxation and reduced anxiety (Habanananda., 2004).

Water helps to support the weight of the uterus, reducing the pressure felt by the mother, and also helps to relieve tension in the muscles encouraging deeper relaxation. In uncomplicated deliveries, it is thought to reduce the need for analgesia without evidence of increased risk to the mother or newborn (Cluett et al., 2018).

***Who can use the pool?***

- Low-risk mothers
- Previous Caesarean operation
- Mild hypertension
- Twin pregnancy (for pain relief)

Women with severe pre-eclampsia and gestation of fewer than 36 weeks are *not* recommended.

***Safety Rules: -***

- Water temperature 37℃ or less – to reduce the risk of foetal hyperthermia.
- Risk of infection can be minimised by using filters and ultraviolet treatment for both hot and cold water.
- Mother should have free fluids to prevent dehydration.
- Water spills should be mopped up to prevent slipping & accidents.
- Depth of water should be sufficient to cover the mother's abdomen.

***Other points***

- Aromatherapy and massage can be used at the same time. Aromatherapy oil should not be added to the water and oil should be 'towelled off' the mother before she enters the water. It can be used as an inhalation agent.
- Entonox can also be used.
- Intermittent foetal monitoring using a handheld Doppler underwater.
- Vaginal examination can be made underwater or outside the pool

### 2.2.6 Hypnosis and mind medicine

Hypnobirthing was introduced in the nineteenth century utilizing techniques for fear release and relaxation. “Women attempt to relieve all anxiety and reach a loose, limp, ragdoll relaxed state, then the body can do what it was designed to do during birth, without limitation and resulting discomfort.” Hypnobirthing classes often meet once a week for 2 hours a class, beginning at the 30th gestation of pregnancy over a 4 to 5-week period. The hypnotherapist usually does not accompany the mother during the birth.

This method attempts to modify the perception of pain through self-hypnosis and post-hypnotic suggestion. An example is the imagining of being in a safe place often symbolizing the pain as something that can be separated from conscious recognition thereby attempting to recognize less pain.

Some goals of hypnotherapy include – increasing the bond between mother and baby, reducing the need for pharmacological analgesia, less exhaustion from labour, and decreasing hyperventilation. This method also attempts to make the birthing process less scientific through the replacement of conventional birthing terminology with less scientific descriptions. Examples of this include referring to the birthing coach as a birthing companion, catching the baby is called receiving the baby, and uterine contractions are referred to as uterine surges (Datta et al., 2010).

These techniques are also used in conjunction with progressive muscle relaxation and many other forms of relaxation for the mind and body to aid in pain control for women during childbirth. Their risk/benefit profile however demonstrates a need for well-designed trials to confirm efficacy in childbirth (Madden et al., 2016).

### 2.2.7 Acupuncture

Acupuncture techniques have been used in China both for surgery as well as for pain relief. It has been used for thousands of years to assist with pain control, addiction, nausea/vomiting, and many other purported uses. In theory, it is reported that there are more than 365 points along the 12 meridians (energy paths) of the body. Interruptions of energy flow (surgery, labour etc.) along these meridians break up the harmony of the body hence producing feelings of pain or uneasiness.

Very fine needles are placed at specific points to redirect energy to correct paths that have been interrupted by either surgery or labour. Acupuncture is hypothesized to work by interrupting or inhibiting pain impulses sent to the brain or by the stimulation of endorphins in the body. Very fine sterile needles are placed just under the skin at strategic points along the body by a trained acupuncture specialist. These needles are left in place for varying amounts of time and are often connected to a small electrical current to assist in pain control.

Acupuncture may be done for several weeks before delivery in weekly hour-long sessions. Limitations include: needles needing to be placed by an acupuncture professional, the risk of infection at the needle site, and the placement of needles during labour may limit the mobility of the mother (Datta et al., 2010). Medical acupuncture may involve the application of acupuncture based on the principles of neurophysiology and anatomy, rather than traditional principles and philosophy (Devane., 2012).

The commonly used acupuncture points are: -

***1. "Sanyinjiao" or spleen 6*** - located inside the lower leg, on the posterior tibia finger width (3cm) above the malleolus. It regulates Qi (energy) and stimulates the uterus and also relieves anxiety.

***2. "Hegu" or large intestine 4*** - located at the fleshy skin at the base of the thumb and forefinger, 1cm down from the web of the thumb and the forefinger. It is a great mover of energy and is thought to be excellent for relieving pain and encouraging the baby through the birth canal.

***3. Acupuncture points in the ear.*** - Usually, electro-acupuncture is used, needles are inserted in the ear at points, which are related to the uterus and influence analgesia and relaxation of the body.

The electrodes are attached to the needles; the controls are given to the mother so that she can "turn the 'volume' up or down" according to her pain level at that time. The electro-acupuncture machine vibrates the needle, stimulating it more than resting it in the ear. This technique is used at the Plymouth Maternity hospital in the U. K (Habanananda., 2004).

Placebo acupuncture-controlled trials have shown a statistically significant difference in both subjective and objective outcome measures of pain. There were no adverse effects reported in these studies and it was concluded that the evidence for acupuncture as an adjunct to conventional pain control during labour is promising but, because of the paucity of trial data, not convincing (Lee & Ernst., 2004).

### 2.2.8 TENS- Transcutaneous Electrical Nerve Stimulation

TENS is the transmission of electrical energy across the surface of the skin via surface electrodes to the nervous system.

Large diameter nerves can be stimulated at low intensities and have been found to transmit impulses at high frequencies. Therefore, low intensity, high frequency (100-200 Hz) TENS is appropriate and effective and has been shown to stimulate the 'type A'

fibres. stimulation at 40-60 Hz, 40-80m. A stimulated the release of endorphins, which bind to opiate receptors, that eventually increase pain tolerance (Habanananda., 2004).

***Application of electrodes***

Top pair of electrodes at level T10-L1, Lower pair of electrodes at level S2-S4. Different manufacturers have different features e.g., some are set at a fixed frequency, some have a fixed pulse width, and some have variable pulse width and frequency.

***Contraindications***

- Not to be used with any cardiac pacemaker
- Not to be placed over the carotid sinus
- Not to be used in the first trimester

***Precautions***

- Not to use while driving
- Women with epilepsy need a full consultation
- TENS should be discontinued should any skin irritation occur on the electrode sites.

There is only limited evidence that TENS reduces pain in labour, and it does not seem to have any impact (either positive or negative) on other outcomes for mothers or babies (Santana et al., 2016).

### 2.2.9 Aromatherapy

Essential oils are highly concentrated aromatic substances extracted from plants by a process of distillation or cold compression. They contain natural organic chemicals.

They are highly volatile and evaporate quickly if left in an unsealed bottle. They are highly complex in their chemistry and are pharmacologically active substances.

***Mechanism of Essential Oils***

1. ***Olfaction:*** **-** Receptors *stimulate* olfactory cells, *'switch on'* olfactory bulb and *relay the message* via the olfactory tract to the limbic system.

   The limbic system is the emotional centre of the brain, it can influence the pulse rate, blood pressure, respiration and response to stress.

   Stimulation of the limbic system triggers the release of - enkephalins (natural pain killers), endorphins (natural opioids), and serotonin (natural sedatives) which leads to - a restful, balanced mood, awareness of senses, and maintenance of body temperature. In effect -scent can help to relax and reduce anxiety.

2. ***Skin absorption:*** **-** the molecules of essential oils and carrier oils are small enough to permeate through the skin barrier. It will be absorbed through the skin within 20-40 minutes depending on the chemical nature of each oil. Skin absorption can be via - massage, bath, foot bath, hot or cold compresses or neat application to the skin.

   Carrier oils such as almond oil or rapeseed oil can be used to dilute essential oils to reduce skin irritation from chemical constituents in some essential oils.

3. ***Internal method:*** **-** In the U.K., oral and rectal routes are not advocated except under the direction of medical practitioners. Perineal lavage (lavender or chamomile) can be used post-partum.

Lavender and frankincense were most frequently used for their sedative and calming effects (Habanananda., 2004).

Many recommend picking a few different oils to use at different stages of labour. Suggestions include the use of calming oil for the first stage of labour before the baby

begins to descend. As the second stage of labour begins with the descent and delivery of the baby, oil-like peppermint has been found by many to promote a sense of strength. Limitations include the absence of direct effect on pain relief, some women may have allergic reactions to particular oil preparations, and many labouring women are particularly sensitive to certain smells that may enhance nausea and vomiting associated with labour. While there are no good studies demonstrating benefit to the labouring mother, the minimal risks and costs associated with aromatherapy make this a good adjunct for many labouring women. It may be wise for the mother to pick out pleasing oil blends before the onset of labour. This can help prevent using scents that enhance nausea and vomiting (Datta et al., 2010).

### 2.2.10 Leboyer Technique

In 1975 the French obstetrician Leboyer described “birth without violence.” According to the author, the psychological birth trauma of the neonate can be reduced by avoiding noise, bright lights, and other stimulating events in the delivery room. Hence Dr Leboyer believed in delivering the baby in a silent semi-dark room and avoiding stimulation of the newborn immediately after the delivery (Datta et al., 2010).

### 2.2.11 Audio analgesia

Audio analgesia refers to the use of auditory stimulation such as recorded tape ‘sea wave noise’’ or ‘rain on roof tops’ in the first stage of labour with a duration of 15 to 20 minutes and an interval of 1 to 2 hours using headphones.

A randomized control design was performed by Liu Yh et al., in 2010, to find out the relationship between audio analgesia for pain management in labour and maternal morbidity. Trials involving 60 primiparous women expected to have a normal

spontaneous delivery were conducted. The experimental group received routine care and audio analgesia, whereas the control group received routine care only. Results concluded that the experimental group had significantly lower pain and anxiety levels as compared with the control group (Sathyar., 2013).

### 2.2.12 Intermittent local heat and cold therapy

Cold causes pain decreases through various mechanisms including inhibiting pain perception by stimulation of peripheral neural receptors, reciprocal induction of numbness, declining muscle tension, facilitating energy flow in points of acupuncture, alteration of neural transmission velocity, deceleration of transmission of pain signal to the central nervous system, and also a distraction from pain.

Cold has also been shown to decline catecholamine levels and therefore raise endorphin levels and consequently decrease pain severity. Overall, based on gate control theory, cold can effectively block the neural transmission in sensory fibres and elevate the pain threshold in the parturient.

In addition to mentioned mechanisms about the cold, heat may stimulate heat receptors in the dermis and deeper tissues and different impulses neutralize themselves at the level of the spinal cord and lead to the closure of the gate and subsequently impede neural impulses to reach the brain (Marjan & Shirvani., n.d.).

### 2.2.13 Yoga therapy

Exercise during pregnancy is one of the best ways to reduce pregnancy complications such as insomnia, feeling tired, excessive weight gain of mother, back and low back pain, pelvic pain, constipation, urinary incontinence, hypertension, gestational diabetes, depression, and anxiety. In addition, exercise increases individuals' ability to adapt to

activities related to infant care. There are different types of physical activities during pregnancy, such as yoga, pregnancy gymnastics, Pilates, and Kegel exercises.

Yoga is usually a combination of mental exercises, meditation, various types of deep breathing, stretching, and relaxation. Meditation is a specialized exercise that provides deep relaxation to calm the body and focus the mind. The benefits of yoga include better physical growth, stronger and more flexible muscles and joints, reduced risks of preterm delivery, hypertension due to pregnancy, and intrauterine growth restriction. Prenatal yoga has also been shown to significantly reduce labour pain and by extension, pregnancy outcomes (Yekefallah et al., 2021; Riawati et al., 2022).

Despite there being numerous studies trying to identify the most appropriate and acceptable labour pain management options globally, there is paucity of data on the options available locally, and their effectiveness.

Several confounders also limit the routine use of labour analgesia, including cultural beliefs, the attitude of both the maternal healthcare providers and the parturients, and the general public awareness of the labour pain management options available at the various delivery institutions (Yerby M., 2000).

## 2.3 Theoretical framework

Several psychosocial theories have been developed to predict, explain, and change health behaviours. These include the Theory of Reasoned Action, the Theory of Planned Behaviour, the KAP model and the Reciprocal Determinism (Reciprocal Causation) Theory (Bandura., 1988; Alzghoul., 2015).

Reciprocal determinism is a theory that posits that any human behaviour is determined by external environmental factors through social stimulus events and internal personal factors through cognitive processes. These factors affect personal behaviour in an unequal strength. Bandura (1989) defined the environmental factors as social influences which include social persuasion, instruction, and modelling. Also, the personal factors are explained as internal factors which include the thinking, believing, and feeling of people (Brabender., 1977; Alzghoul., 2015).

In this model, the major relations that determine the actual practices are the relationship between the personal factors and the actual behaviour, and the relationship between the environmental factors and the actual behaviour. Pain management practices are affected by personal factors (healthcare professional factors) and environmental factors which include organizational factors and patients related factors (Glajchen., 2001; Eshete et al., 2019).

The Reciprocal Determinism theory covers both the personal factors and the environmental factors and hence is deemed most appropriate for this study (Figure 3).

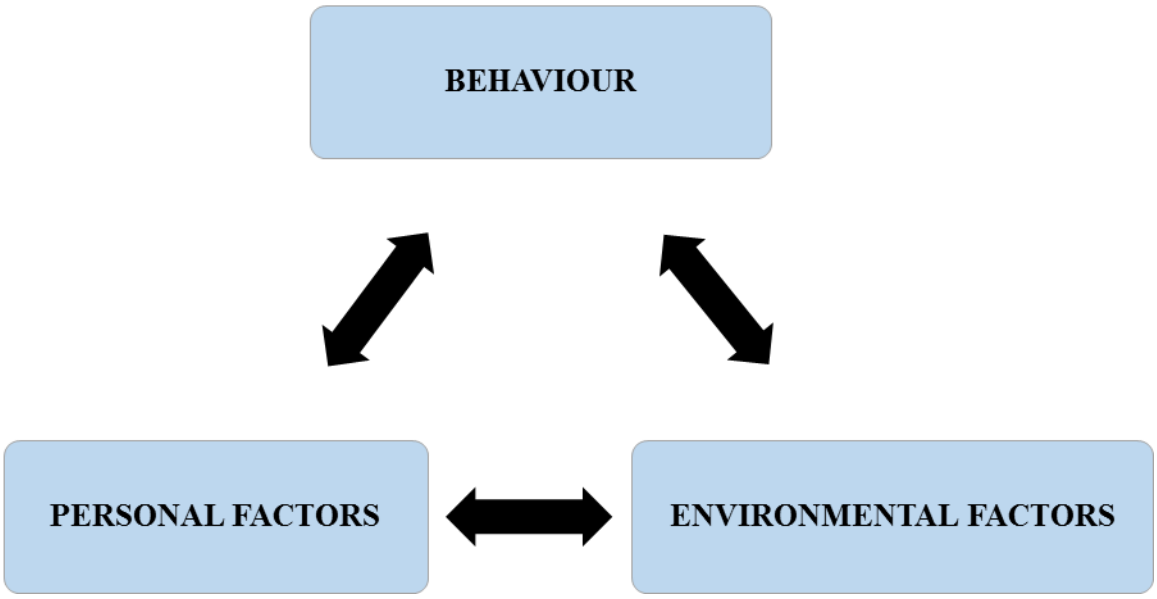



**Figure 3: Reciprocal Determinism Model (Bandura., 1988)**

## 2.4 Conceptual framework

This study adopted the Reciprocal Determinism (Reciprocal Causation) Model, which is superior as compared to other models in assessing pain management practices by healthcare workers. According to reciprocal determinism, any human behaviour is the result of external environmental factors (via social stimulus events) and internal personal factors (through cognitive processes) (Abdullah, 2019; Eshete et al., 2019).

In our study, the internal personal factors included the health care provider factors i.e., Demographic factors (e.g., sex, age, professional cadre, and duration of practice), knowledge, skills, perception, and attitude.

The environmental factors included the social milieu with which maternal health care providers continually interact i.e., Health system factors (e.g., availability of adequate skilled personnel, clear protocols and guidelines, drugs and equipment) as illustrated in Figure 4. Maternal health care providers' provision of labour analgesia was expected to be reciprocally (bi-directionally) affected by these personal and environmental factors.

The barriers were derived from the above factors and were categorised as healthcare provider-related barriers and health system barriers.

The above factors were used to assess the practise of provision of labour analgesia amongst maternal health care providers at Moi Teaching and Referral Hospital and adduce barriers towards the same.

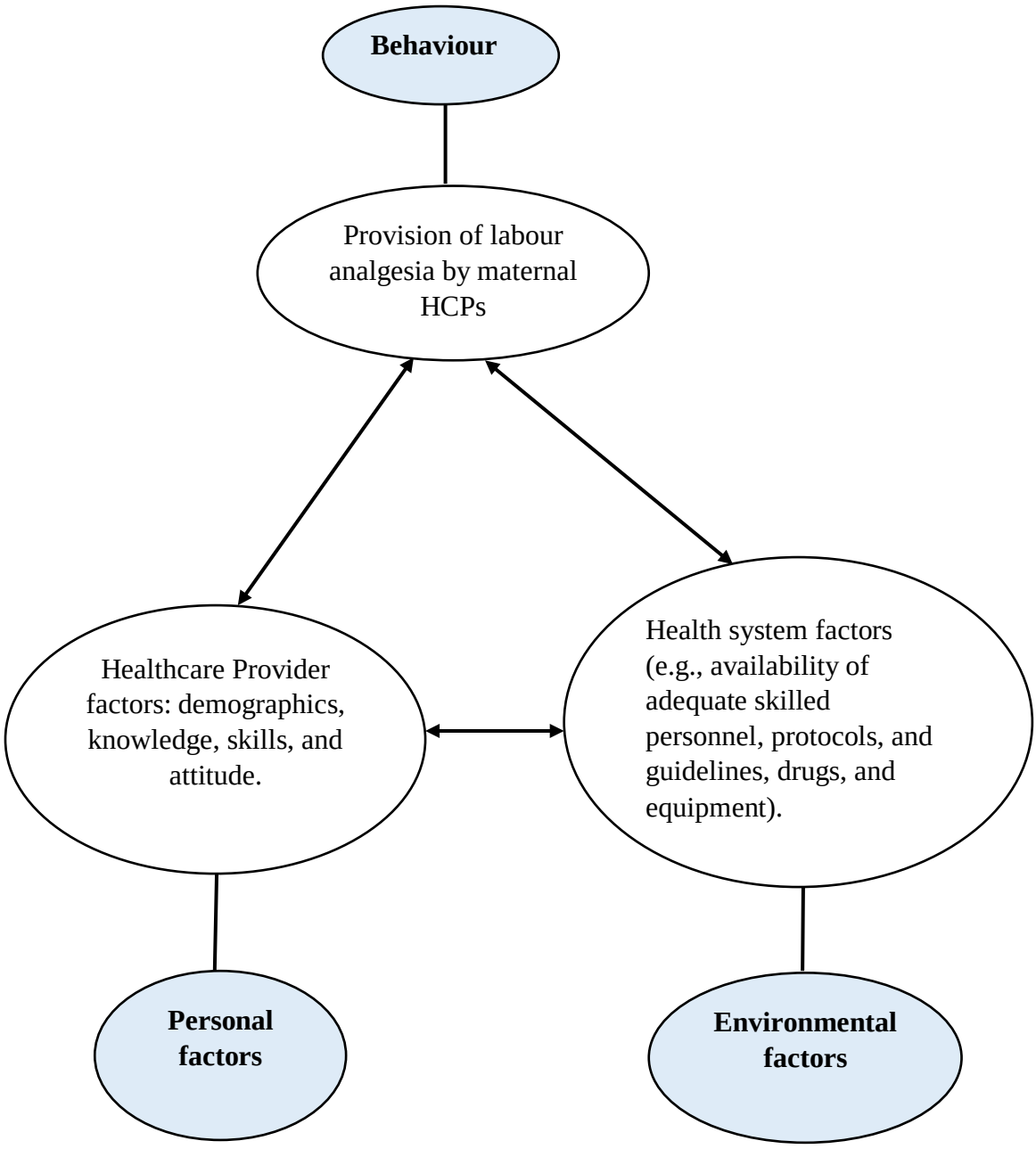



**Figure 4: Summary of the conceptual framework adapted from Wood and Bandura's Triadic Reciprocal Determinism (Bandura., 1989)**

# CHAPTER THREE: METHODOLOGY

## 3.1 Study design

This was an institutional-based, cross-sectional descriptive survey.

## 3.2 Study area and period

The study was conducted in the obstetrics and anaesthesia departments at Moi Teaching and Referral Hospital (MTRH), Eldoret, Kenya.

MTRH is located along Nandi Road in Eldoret Town, Uasin Gishu County (310 kilometres northwest of Nairobi). The hospital serves mostly residents from the Western Kenya region (representing at least 22 Counties), parts of Eastern Uganda and Southern Sudan with a population catchment of approximately 24 million.

It is also the main teaching centre for Moi University School of Medicine that trains midwives, anesthesiologists and obstetricians with an annual turnover of over 50 practitioners involved directly and indirectly in the management of labour and its outcomes. In the year 2019/2020, an average of 800 women per month gave birth vaginally at MTRH.

The study was conducted over three months, between 1st January 2021 and 31st March 2021.

## 3.3 Study Population

The target population comprised midwives, residents in both Anaesthesia and Reproductive health, consultant anesthesiologist and obstetricians present at Moi Teaching and Referral Hospital during the data collection period.

### 3.4 Eligibility Criteria

#### 3.4.1 Inclusion criteria

- Obstetric caregivers (obstetricians, anesthesiologists, residents and midwives) at Moi Teaching and Referral Hospital, who are involved in the provision of labour analgesia and consented to the study.

#### 3.4.2 Exclusion criteria

- Obstetric caregivers (obstetricians, anesthesiologists, residents and midwives) at MTRH who were on leave and away from the study area during the period of the study.
- First-year residents in both Reproductive health and Anesthesia who having just joined their respective programs would not have had sufficient exposure time in the facility at the time of the survey.

### 3.5 Sample size determination

To calculate the sample size, the study used the Cochran formula used by Fisher et al (JW., 1991).

*Formula:*

$$n = \frac{z^2 pq}{d^2}$$

*Where:*

- ***n*** is the desired sample size (when the population is greater than 10,000)
- ***z*** is the standard normal deviation at the required confidence level (95%), in this case, 1.96

- ***p*** is the proportion in the target population estimated to have characteristics being measured. Since there was no estimate available of the proportion in the target population assumed to have the characteristics of interest, 50% (0.5) was used as recommended in the same formula.
- ***q*** is 1.0-p = 0.5
- ***d*** is the statistical significance =0.05

*Therefore:*

$$n = \frac{(1.96)^2 \times (0.5) \times (0.5)}{(0.05)^2}$$

$$=\boldsymbol{384}$$

The study population being < 10000 the sample size is:

$$nf = \frac{\mathbf{n}}{\mathbf{1 + n/N}}$$

*Where:*

$nf$ =the desired sample size (when the population is < 10,000).

***n*** = the desired sample size {when the population is > 10,000 (384)}

***N***= the estimate of the population size (obstetrics: **34** residents ($2^{nd}$, $3^{rd}$ and $4^{th}$ year) and **22** consultants, anaesthesia: **10** residents ($2^{nd}$, $3^{rd}$ and $4^{th}$ year) and **6** consultants and midwives **48**. Total = **120**

*Therefore:*

$$nf = \frac{384}{1 + (\frac{384}{120})}$$

The desired sample size was = **91**

Considering this sample size was small and close to the target population, the study employed a census that included all the **120** health care providers of interest at Moi Teaching and Referral Hospital.

### 3.6 Study Procedure

A consecutive sampling method was used until all eligible participants in the study were enrolled.

The study was explained to the participants by the principal researcher and informed written consent was obtained. The participants who eventually consented to the study were issued the pretested questionnaires.

Data collection for obstetrician doctors was done after the daily ward rounds, major ward rounds on Mondays and Tuesdays and at the antenatal, high risk and postnatal clinics on Mondays, Thursdays, and Fridays respectively. This was repeated weekly until the desired population was achieved. Recruitment of doctors in the Anaesthesia department was done during major theatre days and after classes.

Midwives at the Riley mother and baby Hospital in Moi Teaching and Referral Hospital have 2 consecutive days on duty followed by 2 days off duty. To minimize the chances of encountering the same respondents during the data collection period, the questionnaires were administered to all midwives present during morning shifts on Mondays, Wednesdays, and Fridays until the desired population was achieved (Figure 5).

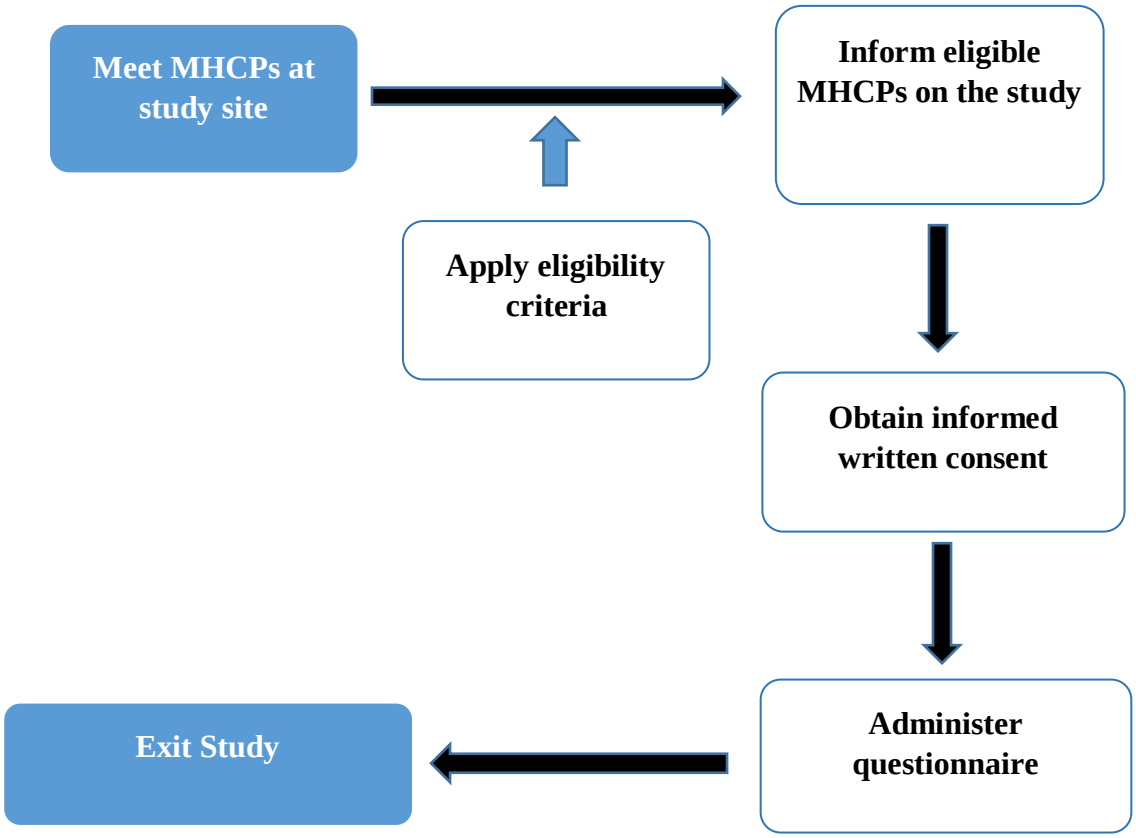



**Figure 5: Study Procedure**

### 3.7 Study Instrument

Data was collected using a structured self-administered questionnaire.

After written informed consent, maternal healthcare providers who met the inclusion criteria were requested to complete the questionnaire.

Previously validated tools in Ethiopia were adapted, piloted and used (Mulugeta., 2016; Endalew., n.d; Indris., 2018).

The questionnaire comprised of the following sections:

Section A assessed participants' sociodemographic characteristics i.e., sex, age, professional cadre, and duration of practice.

Section B assessed the providers' knowledge, skills, perception, and attitude towards the provision of labour analgesia.

The providers' knowledge and skills on labour analgesia were assessed using ten questions that consisted of prior education/information on labour analgesia including the source, awareness and use of the WHO analgesic ladder, awareness and use of universal pain assessment tools, knowledge of the safety profile of various forms of labour analgesia and knowledge on the degree of pain control of various forms of labour analgesics.

The first seven questions had five questions (questions 1, 3, 4, 5 and 6) that were to be answered as Yes, No or Unsure. The answers had a value of 1 or 0 (Each Yes response had a value of `1` and No or Unsure response had a value of `0`). The value of the

remaining two questions (questions 2 and 7) depended on the number of choices selected. Multiple responses were allowed with each selected choice having a value of `1`.

Therefore, the cumulative score of the first seven questions ranged from zero to twelve points for a given participant. The remaining three questions had a value of 1 or 0. Questions 8 and 9 had 'Yes' as the correct response and question 10 had 'No' as the correct response. Each correct response had a value of `1` and the wrong or unsure response had a value of `0`. The aggregate score for all the ten knowledge and skills questions ranged from 0 to 15 points.

Participants' overall knowledge and skills were categorized using modified Blooms cut-off point, as good if the score was between 80 and 100% (12-15 points), moderate if the score was between 50 and 79% (7-11points), and poor if the score was less than 50% (<7 points).

Similarly, the attitude of health care providers towards the provision of labour analgesia was assessed using five questions. Responses to the first three questions related to attitude were graded on a 3-point Likert scale, an agreement scale ranging from `1` for disagree to `3` for agree and for the remaining two questions ranging from `1` for agree to`3` for disagree. The overall level of attitude was categorized using the original Bloom cut–off point, as positive if the score was 80-100% (12-15 points), neutral if the score was 60-79% (9-11 points) and negative if the score was less than 60% (< 9 points). A positive attitude towards the provision of labour analgesia meant having a perception that labour pain is significant enough to warrant intervention and that provision of labour analgesia should be a routine and not an exception.

Section C included questions on the type and frequency of use of the various forms of labour analgesia. Only participants who responded to be providing any form of labour analgesia 'routinely' were considered to be practising the provision of labour analgesia.

Section D assessed the factors influencing the provision of labour analgesia and employed a 5-point Likert scale from strongly agree to strongly disagree. The first three questions assessed the health system factors influencing the provision of labour analgesia while the remaining nine assessed other perceived barriers to the provision of labour analgesia.

The concluding section enquired about the provider's willingness to receive further training on labour analgesia.

### 3.8 Study variables

**3.8.1 Dependent variable:** – Reported provision of labour analgesia.

**3.8.2 Independent variables**

- The healthcare provider factors: Socio-demographic factors (e.g., sex, age, professional cadre and duration of practice), knowledge, skills, and attitude.
- The health system factors (e.g., availability of adequate skilled personnel, clear protocols and guidelines, drugs, and equipment).
- Barriers to the provision of labour analgesia.

### 3.9 Pretesting and Quality control

To assure the reliability and validity of the data, permission was obtained from the administration and the self-administered questionnaire was pretested on 12 healthcare providers i.e., 10% of the study population as per the Lackey and Windgate formula (Berge et al., 2010). The pilot study was conducted at Jaramogi Oginga Odinga Teaching and referral hospital (JOOTRH), a level 5 hospital located in Kisumu County.

A discussion ensued to select the best terms for clarity of the questions, accuracy of the knowledge measured, and interpretability. The healthcare providers completed the questionnaire on two separate occasions that were two weeks apart. The period of two weeks was considered long enough for participants to have forgotten their responses but not long enough for a real change to occur in their knowledge, practice or barriers experienced.

Participants were not informed of the second administration of the questionnaire on the first occasion. The responses in the first administration were used in assessing construct validity and internal consistency reliability. Two sets of responses (i.e., the first and the second administration) were used to measure test-retest reliability.

Cronbach's alpha (via Excel) was used in assessing internal consistency reliability-i.e., the extent to which items in a scale measure the different aspects of the same attribute. Cronbach's alpha with r=0.7 or greater was considered sufficiently reliable. In the reliability analysis, all questions had alpha scores of 0.7 to 0.9, implying respectable to very good reliability.

Training and orientation about the objectives and relevance of the study were done, each item included in the study tools and the whole process of data collection was provided for the data collectors and supervisors.

Informed consent was obtained from maternal health care providers and the proper information was gathered without limitation and frustration. During data collection, regular supervision and follow up were undertaken. Supervisors checked each questionnaire with a further cross-check by the principal investigator for completeness and consistency of data.

### 3.10 Data collection technique and instrument

Training was provided for two residents and two midwives. Data was collected using a pretested self-administered questionnaire with multiple-choice and open-ended questions on respondents' socio-demographic characteristics, provision/non-provision of obstetric analgesia for labour pain, the forms of labour analgesia provided and factors influencing the provision of labour analgesia (Appendix B).

Maternal health care providers were requested to complete the structured questionnaire following written informed consent. The trained data collectors were available to assist participants in completing the questionnaire and clarify any questions that arose. The filled questionnaires and consent forms were packed and well stored under lock and key.

### 3.11 Data analysis and interpretation

The data were entered into Epi-data version 4.2 Software for cleaning and exported to SPSS

version 23.0 for data analysis. Qualitative data were described using numbers and percentages. Kolmogorov-Smirnov test was used to verify the normality of distribution. Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. The significance of the obtained results was judged at the 5% level.

Descriptive statistics – social-demographic characteristics of health workers were summarized by use of frequency analysis. Continuous variables were expressed as mean values with standard deviation (age, duration of service) and nominal variables expressed as numbers and percentages (sex, professional cadre). Provider's knowledge, skills and attitude were presented as narratives with conclusions being drawn using simple percentages or proportions. Frequency charts were used to outline the dependent variables.

Bivariate and multivariate analysis was done by logistic regression and results were reported in Odds ratio and 95% confidence interval. Results were displayed on tables and figures.

### 3.12 Ethical Considerations

The study commenced after getting ethical approval from Moi University Institutional Research Ethics Committee (IREC). Permission from MRTH administration was also obtained. A consent form explaining the rationale, benefits and risks of the study was used to seek informed consent from potential participants (Appendix A). Autonomy was respected by giving all the necessary information and freedom to withdraw from the study at any point throughout the study without the need for justification. Confidentiality and privacy were assured. All data was maintained as confidential, and no individual was identified in the dissemination of findings. Alphanumeric codes were used in the questionnaires to protect the privacy of participants. Computers for data entry and analysis had passwords accessible only to the principal investigator. Participants reserved the right of withdrawal at any time of study without penalty. Printed research data were kept in a locked office with limited access.

### 3.13 Dissemination

Study findings were prepared in a thesis to be presented to Moi University in partial fulfilment for the award of degree in Master of Medicine (Reproductive Health). The study findings will also be shared in peer-reviewed journals for publication.

# CHAPTER FOUR: RESULTS

Between 1st January 2021 to 31st March 2021, a total of 120 maternal health care providers meeting the eligibility criteria were approached and informed about the nature of the study. One participant opted out of the study, while 119 participants consented to be recruited. During the survey, 2 participants did not complete the questionnaires issued. A total of 117 participants eventually responded and were included in the final analysis, representing a 97.5% response rate (Figure 6).

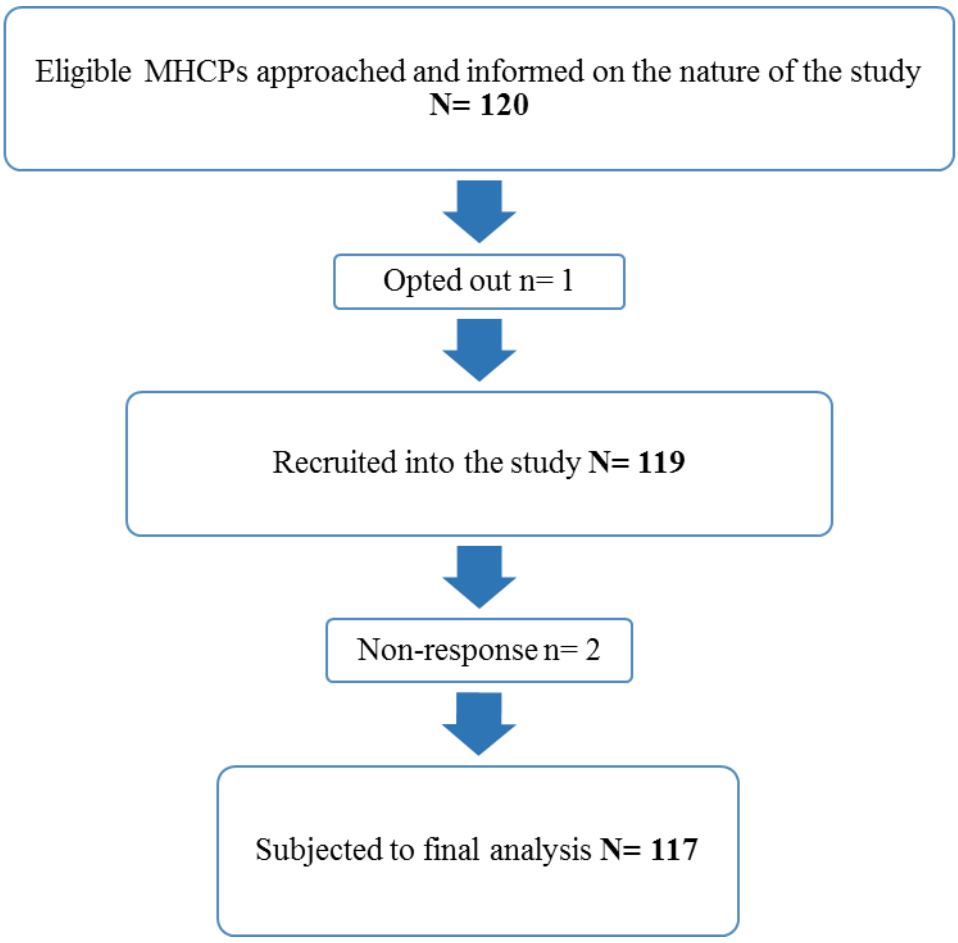



**Figure 6: Participant recruitment process**

### 4.1 Sociodemographic characteristics

Table 1 demonstrates the socio-demographic characteristics of the participants. The participant's ages ranged from 27-60 years, with a mean age (±standard deviation) of 38.44 (± 7.41) years. Most of the participants, 84 (71.8%) were aged between 31 to 40 years. There was an equal distribution in terms of gender. In terms of profession, there were 48 (41.0%) midwives, 53 (45.3%) obstetricians and the remaining 16 (13.7%) were anesthesiologists. The participants' duration of practice ranged from 2-26 years, with a mean duration of practice (±standard deviation) of 9.54 (±4.94) years. A majority of the participants 78 (66.7%) had been in practice for 10 years or less.

**Table 1. Socio-demographic characteristics of the respondents N=117**

| **VARIABLE** | **n (%)** |
|---|---|
| **SEX** | |
| Male | 58 (49.6%) |
| Female | 59 (50.4%) |
| **AGE(Years)** | |
| ≤30 | 7 (6.0%) |
| 31 – 40 | 84 (71.8%) |
| > 40 | 26 (14.5%) |
| **Min. – Max.** | **27.0 – 60.0** |
| **Mean ± SD.** | **38.44 ± 7.41** |
| **PROFESSION** | |
| Anaesthesiologist | 16 (13.7%) |
| Midwife | 48 (41.0%) |
| Obstetrician | 53 (45.3%) |
| **DURATION OF PRACTICE (years)** | |
| ≤10 | 78 (66.7%) |
| 11-20 | 35 (29.9%) |
| > 20 | 4 (3.4%) |
| **Min. – Max.** | **2.0 – 26.0** |
| **Mean ± SD.** | **9.54 ± 4.94** |

### 4.2 Reported provision and pattern of provision of different forms of labour analgesics by maternal healthcare providers at Moi Teaching and Referral Hospital.

Seventy-two respondents (61.5%) reported providing some form of labour analgesia routinely (Figure 7). Among those reporting routine provision of labour analgesia, sixty-four (88.9%) reported providing both pharmacological and non-pharmacological methods, while 8/72 (11.1%) reported providing only pharmacological methods. A majority of the respondents, 64/72 (88.9%) reported routinely providing non-pharmacological methods for labour analgesia. The commonest pharmacological methods provided were non-opioids by 15/72 (20.8%) of the respondents. Nine (12.5 %) participants reported providing opioids and 4/72 (5.6%) reported providing regional analgesics. Respondents from all professions reported having never provided inhalational analgesics for labour pain management.

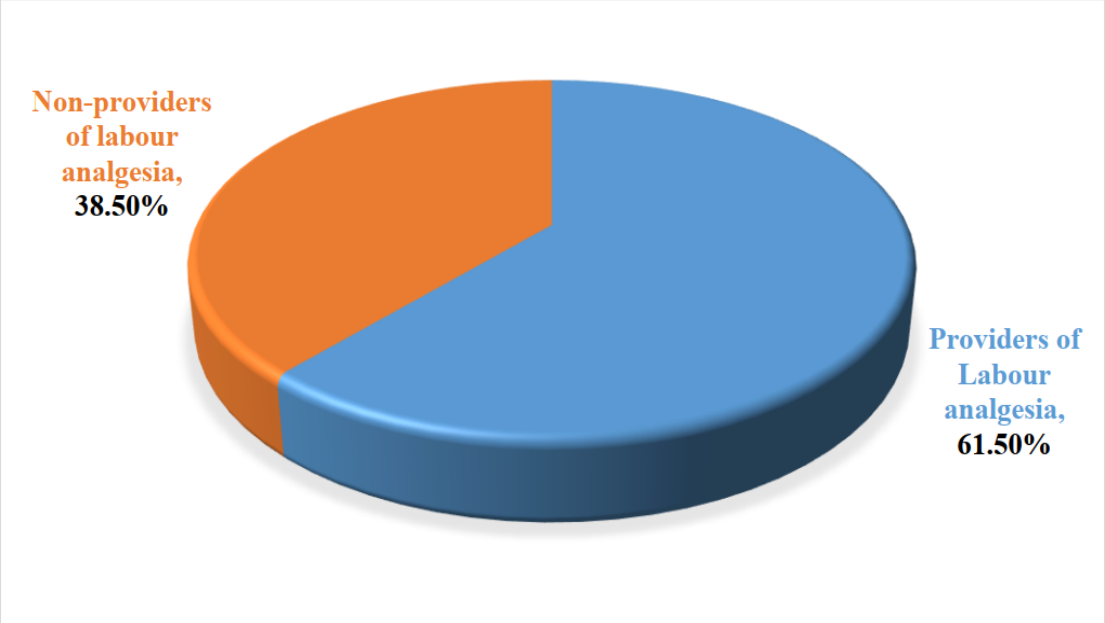



**Figure 7: Percentage distribution of reported provision of any form of labour analgesia by maternal healthcare providers at Moi Teaching and Referral Hospital, Kenya 2022 (N=117)**

Figure 8 illustrates the practice of labour analgesia as reported by anesthesiologists. A majority of 4/13 (30.8%) of the anesthesiologists reported routine provision of non-opioids for labour analgesia. Opioids were reportedly provided by 3/13 (23.1%) of the respondents while regional analgesics and non-pharmacological methods of pain relief were each reportedly provided by 2/13 (15.4%) respondents within this cadre. Inhalational analgesics were not provided by any of the anaesthesiologist respondents.

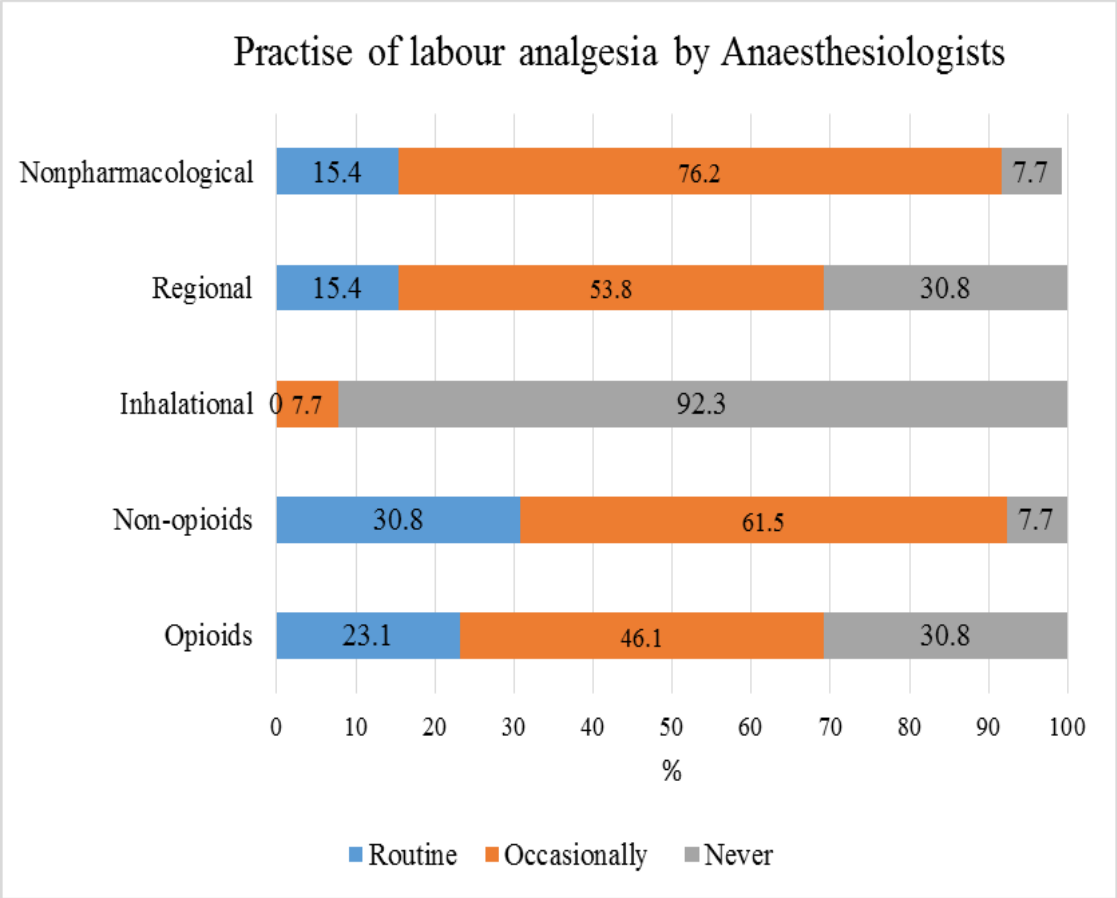



**Figure 8: Practise of labour analgesia as reported by anaesthesiologists at Moi Teaching and Referral Hospital, Kenya 2022 (N=13)**

Of the 48 midwife respondents, a majority, 36/48 (75%) reported providing non-pharmacological methods for labour pain management.

Non-opioids were reported as the most routinely provided pharmacological treatment for labour pain by 3/48 (6.3%) of the midwives, whereas none of the midwife respondents reported providing opioids, regional and inhalational methods for labour analgesia (Figure 9).

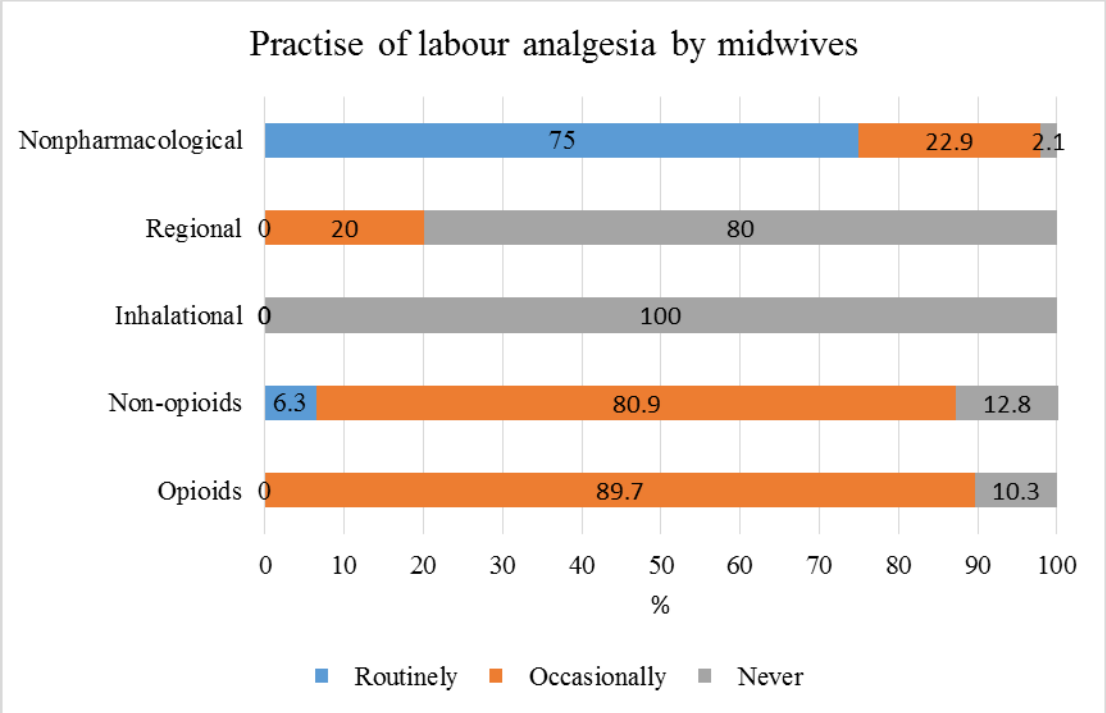



**Figure 9: Practise of labour analgesia as reported by midwives at Moi Teaching and Referral Hospital, Kenya 2022 (N=48)**

Half, 26/52 (50%) of the obstetrician respondents reported providing non-pharmacological modes for labour pain management. Nonopioids were the primary pharmacological agents reportedly provided by the majority 8/52 (15.4%) of respondents followed by 6/52 (11.8%) reporting providing opioids. Regional analgesics were reportedly provided by 2/52 (3.8%) of the respondents while none of the obstetrician respondents reported providing inhalational agents for labour pain management (Figure 10).

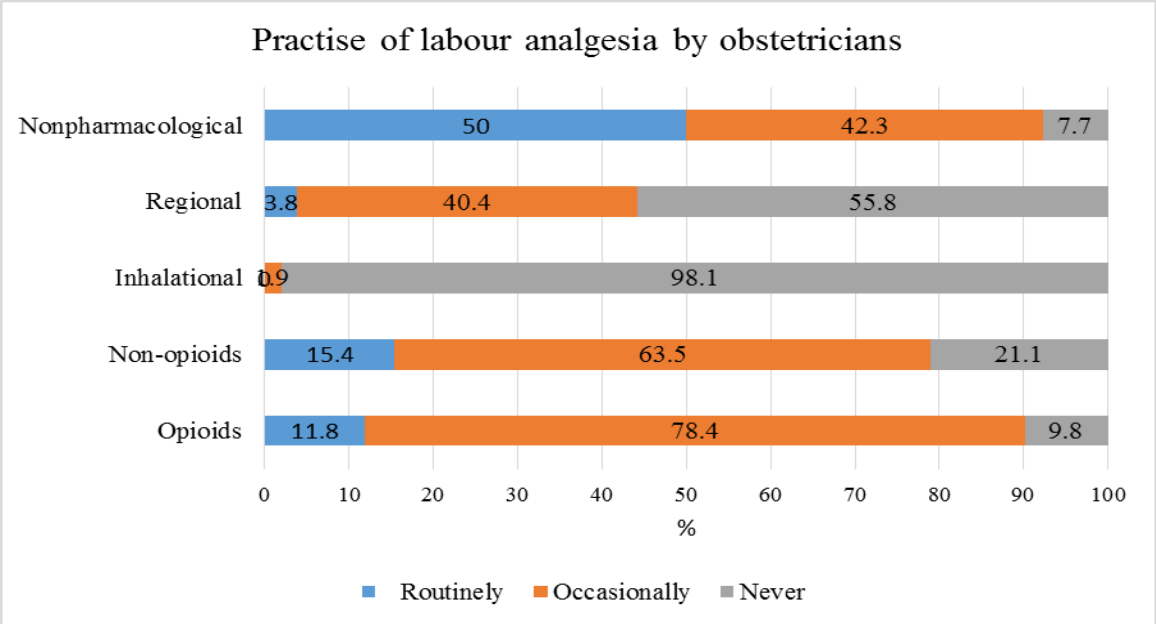



**Figure 10: Practise of labour analgesia as reported by obstetricians at Moi Teaching and Referral Hospital, Kenya 2022 (N=52)**

Tramadol was the most preferred type of opioid analgesic by 8/9 (88.9%) of the maternal healthcare providers, followed by morphine which was provided by 5/9 (55.6%) of the respondents who reported past provision of any opioid during labour. Buscopan and paracetamol were the most routinely prescribed non-opioid analgesics, each provided by 10/15 (66.7%) of the respondents reporting past provision of any non-opioid respectively.

Epidural analgesics were preferred by a majority 3/4 (75%) of the respondents who reported providing regional analgesics. The four most routinely provided non-pharmacological methods for labour analgesia as reported by maternal healthcare providers at MTRH were: Touch and massage 60/64 (93.8%), deep breathing /patterned breathing (Lamaze techniques) 52/64 (81.3%), maternal movements and positional changes 52/64 (81.3%) and social support (Reassurance) 51/64 (79.7%) (Table 2).

**Table 2: Types of labour analgesia reportedly provided by maternal healthcare providers who routinely offer labour analgesia at MTRH, Kenya 2022 (n=72)**

| Agent | Frequency | %* |
|---|---|---|
| **Opioids** | | |
| Tramadol | 8 | 88.9 |
| Morphine | 5 | 55.6 |
| Pethidine | 3 | 33.3 |
| Fentanyl | 3 | 33.3 |
| **Reported provision of any opioid** | **9** | **12.5** |
| **Non-Opioids** | | |
| Buscopan | 10 | 66.7 |
| Paracetamol | 10 | 66.7 |
| Diclofenac | 2 | 13.3 |
| **Reported provision of any non-opioid** | **15** | **20.8** |
| **Regional** | | |
| Epidural | 3 | 75.0 |
| Spinal | 2 | 50.0 |
| **Reported provision of any regional** | **4** | **5.6** |
| **Non-pharmacological** | | |
| Touch and massage | 60 | 93.8 |
| Deep breathing /patterned breathing (Lamaze) | 52 | 81.3 |
| Maternal movements and positional changes | 52 | 81.3 |
| Social support (Reassurance) | 51 | 79.7 |
| Audio analgesia | 24 | 37.5 |
| Yoga | 3 | 4.7 |
| Intermittent local heat and cold therapy | 1 | 1.6 |
| Acupuncture | 1 | 1.6 |
| **Reported provision of any non-pharmacological** | **64** | **88.9** |

***** Percentages do not add to 100% because some respondents reported providing multiple methods for labour analgesia.

### 4.3 Health care provider factors influencing the provision of labour analgesia

#### 4.3.1 Providers' Knowledge

Only 5 (4.3%) of the maternal health care providers rated as having good knowledge of labour analgesia practises. All the consultant anaesthesiologists, 70% of the resident anesthesiologists and 52.6% of the consultant obstetricians rated moderately in terms of overall knowledge of labour analgesia. The proportion of those who rated as having poor knowledge of labour analgesia was higher among resident obstetricians (70.6%) followed by midwives (60.4%). Based on the composite score of 6.7/15 (44.7%), maternal health care providers at MTRH generally had poor knowledge of labour analgesia, as assessed using the modified Blooms cut-off points (Table 3).

**Table 3: Providers' Knowledge towards the provision of Labour analgesia, Moi Teaching and Referral Hospital, Kenya 2022 (N=117)**

| CADRE | GOOD | MODERATE | POOR | AVERAGE SCORE* | % SCORE |
|---|---|---|---|---|---|
| Anesthesiologist (N=6) | 0(0.0%) | 6(100%) | 0(0.0%) | 9.5 | **63.3** |
| Resident anesthesiologist (N=10) | 0(0.0%) | 7(70.0%) | 3(30.0%) | 7.4 | **49.3** |
| Midwife (N=48) | 1(2.1%) | 18(37.5%) | 29(60.4%) | 6.2 | **41.3** |
| Obstetrician (N=19) | 3(15.8%) | 10(52.6%) | 6(31.6%) | 7.7 | **51.3** |
| Resident obstetrician (N=34) | 1(2.9%) | 9(26.5%) | 24(70.6%) | 6.1 | **40.7** |
| **TOTAL N=117** | **5(4.3%)** | **50(42.7%)** | **62(53.0%)** | **6.7** | **44.7** |

*****Average score per cadre
The Maximum score being 15

In the self-assessment of having had previous education concerning labour analgesia, 95 (81.2%) of the participants responded in the affirmative. The reported sources of the labour analgesia knowledge were; as part of the curriculum in previous education (60.8%), during in-service education (C.M.E, seminars etc.) (52.6%), from literature / the internet (39.2%), and from fellow colleagues (27.8%) (Table 4).

**Table 4: Providers' prior education on Labour analgesia, Moi Teaching and Referral Hospital, Kenya 2022**

| Sources of maternal health care providers ' Knowledge of Labour analgesia by percentage | | | | |
|---|---|---|---|---|
| **Cadre** | **As part of the curriculum in previous education** | **During in-service education (C.M.E, Seminars etc.)** | **literature / the internet** | **From colleagues** |
| Anesthesiologist (N=13) | 76.9 | 69.2 | 30.8 | 7.7 |
| Midwife (N=38) | 55.3 | 42.1 | 34.2 | 23.7 |
| Obstetrician (N=46) | 60.9 | 56.5 | 45.7 | 36.9 |
| **Total (N=97)** | **60.8** | **52.6** | **39.2** | **27.8** |

A majority, 77/117 (65.8%) of the respondents reported awareness of the WHO analgesic ladder whereas 85/117 (72.6%) of them reported being aware of the universal pain assessment tool. Generally, anesthesiologists had better knowledge of the pain assessment tools compared to the rest of the cadres (Table 5).

**Table 5: Provider's knowledge of pain assessment tools, Moi Teaching and Referral Hospital, Kenya 2022**

| Percentage of maternal health care providers with awareness of pain assessment tools | | |
|---|---|---|
| **Cadre** | **WHO analgesic ladder** | **Universal pain assessment tool** |
| Anesthesiologist (N=16) | 93.8 | 100 |
| Midwife (N=48) | 47.9 | 66.7 |
| Obstetrician (N=53) | 73.6 | 69.8 |
| **Total (N=117)** | **65.8** | **72.6** |

A majority of the respondents, 55/77 (71.4%) with awareness of the WHO analgesic ladder reported using it during the management of labour pain. The WHO analgesic ladder was reportedly used by a majority of the anesthesiologists (86.7%), obstetricians (69.2%) and midwives (65.2%) respectively (Table 6).

**Table 6: Provider's reported use of the WHO analgesic ladder, Moi Teaching and Referral Hospital, Kenya 2022**

| Percentage of maternal health care providers with awareness of the WHO analgesic ladder, who reportedly use it in managing labour pain | |
|---|---|
| **Cadre** | **Use of the WHO analgesic ladder** |
| Anesthesiologist (N=15) | 86.7 |
| Midwife (N=23) | 65.2 |
| Obstetrician (N=39) | 69.2 |
| **Total (N=77)** | **71.4** |

Slightly over half 44/85 (51.8%) of all the maternal healthcare providers reporting awareness of the universal pain assessment tool reported using it during the management of labour pain. The usage rate was higher amongst midwives 24/44 (75%) and least among obstetricians 13/44 (35.1%). A Majority of 24/44 (54.5%) of the respondents reported using the verbal component, while only 12/44 (27.3%) reported using the numerical component. A Majority 5/7 (71.4%) of the anesthesiologists reported using the Visual component, whereas a greater number of the midwives 17/24 (70.8%) reported using the verbal component. The obstetricians reported mainly using both the visual and the verbal components in equal measure 5/13 (38.5%) (Table 7).

**Table 7: Provider's reported use of the universal pain assessment tool, Moi Teaching and Referral Hospital, Kenya 2022**

Maternal health care providers with awareness of the Universal pain assessment tool, who use it in managing labour pain

| Cadre | | Numerical | Visual | Verbal | Total using UPAT* n (%) |
|---|---|---|---|---|---|
| Anesthesiologist (N=16) | | 3(42.9) | 5(71.4) | 2(28.6) | **7(43.6)** |
| Midwife (N=32) | | 5(20.8) | 8(33.3) | 17(70.8) | **24(75.0)** |
| Obstetrician (N=37) | | 4(30.8) | 5(38.5) | 5(38.5) | **13(35.1)** |
| | **Total†** | **12(27.3)** | **18(40.9)** | **24(54.5)** | **44(51.8)** |
| **Total¥ (N=85)** | | | | | |

† Values do not add up to 100% because some respondents reported using more than one tool

¥ Maternal health care providers aware of UPAT

UPAT*: Universal pain assessment tool

There was overall poor knowledge of opioid dose properties, with only 27 (23.1%) of all the respondents being aware that opioids do not have a ceiling effect. More than half (58.1%) of the maternal health care providers were aware that non-pharmacological pain relief methods are safer compared to pharmacological analgesics and a majority (76.1%) were also aware that pharmacological pain relief methods increase the comfort of women in labour as compared to non-pharmacological analgesics (Table 8).

**Table 8: Providers' knowledge of properties of Labour analgesics, Moi Teaching and Referral Hospital, Kenya 2022**

Percentage of maternal health care providers ' who know that non-pharmacological pain relief methods are safer, pharmacological pain relief methods increase the comfort of women in Labour and that opioids do not have a ceiling effect

| Cadre | Nonpharmacological analgesics are safer compared to pharmacological analgesics | Pharmacological analgesics increase the comfort of women compared to non-pharmacological analgesics | Opioids do not have a ceiling effect |
|---|---|---|---|
| Anesthesiologist (N=16) | 37.5 | 87.5 | 25 |
| Midwife (N=48) | 68.8 | 66.7 | 20.8 |
| Obstetrician (N=53) | 54.7 | 81.1 | 24.5 |
| **Total (N=117)** | **58.1** | **76.1** | **23.1** |

### 4.3.2 Providers' Attitude

Based on the composite score of 13.3/15 (88.7%), maternal health care providers at MTRH generally had a positive attitude towards the provision of labour analgesia, as assessed using the original Blooms cut-off points (Table 9).

**Table 9: Providers' attitude towards the provision of Labour analgesia, Moi Teaching and Referral Hospital, Kenya 2022 (N=116)**

| CADRE | POSITIVE | NEUTRAL | NEGATIVE | AVERAGE SCORE† | % SCORE |
|---|---|---|---|---|---|
| Anesthesiologist (N=6) | 6(100.0%) | 0(0.0%) | 0(0.0%) | 13.2 | **88** |
| Resident anesthesiologist (N=10) | 9(90.0%) | 1(10.0%) | 0(0.0%) | 13 | **86.7** |
| Midwife (N=48) | 45(93.8%) | 3(6.3%) | 0(0.0%) | 13.2 | **89.3** |
| Obstetrician (N=19) | 18(94.7%) | 1(5.3%) | 0(0.0%) | 13.4 | **89.5** |
| Resident obstetrician (N=33) | 31(93.9%) | 2(6.1%) | 0(0.0%) | 13.5 | **90** |
| **TOTAL N=116** | **109(94.0%)** | **7(6.0%)** | **0(0.0%)** | **13.3** | **88.7** |

†Average score per cadre
The Maximum score being 15

Forty-three (36.8%) of the respondents expected women to feel pain during labour. A majority of 96 (82.1%) of the respondents agreed that labour pain should be relieved with an equal number also agreeing that relief of labour pain improves the overall maternal experience. Ten (8.5%) of the study subjects however believed that labour is a natural process that does not require any analgesia, 20 (17.1%) were unsure, while the remaining 87 (74.4%) disagreed (Table 10).

**Table 10: Providers' attitude toward the provision of Labour analgesia, Moi Teaching and Referral Hospital, Kenya 2022**

Percentage of maternal health care providers expressing specific attitudes towards provision of Labour analgesia

| | Percentage of maternal health care providers ' who agree that: | | | Percentage of maternal health care providers ' who disagree that: | |
|---|---|---|---|---|---|
| **Cadre** | **Women are expected to feel pain during Labour** | **Pain in Labour should be relieved** | **Relief of Labour pain improves the overall maternal experience** | **Labour is a natural process that does not require analgesia** | **Patients complaining of pain during Labour may be seeking attention** |
| Anesthesiologist (N=16) | 18.8 | 100 | 87.5 | 93.8 | 100 |
| Midwife (N=48) | 50 | 66.7 | 70.8 | 50 | 77.1 |
| Obstetrician (N=53) | 30.2 | 90.6 | 90.6 | 90.6 | 86.8 |
| **Total (N=117)** | **36.8** | **82.1** | **82.1** | **74.4** | **84.6** |

### 4.4 Health system factors influencing the provision of labour analgesia

A majority (91.67%) of maternal healthcare providers at MTRH reported experiencing health system factors that hindered their provision of labour analgesia. These included: the non-availability of drugs and equipment (58.10%), lack of clear protocols and guidelines (56.4%) and absence of adequate skilled personnel (55.60%) (Figure 11).

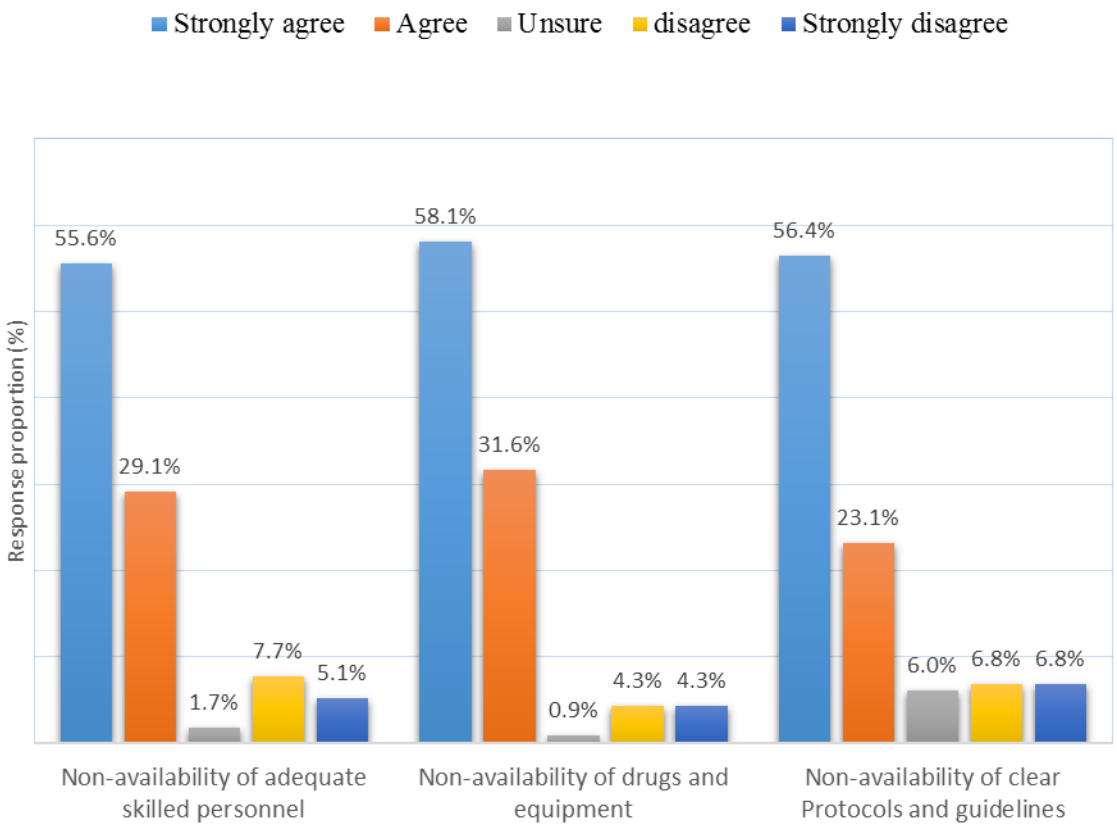



**Figure 11: Response distribution of health system factors that influence the provision of labour analgesia as reported by maternal healthcare providers at Moi Teaching and Referral Hospital, Kenya 2022 (N=117)**

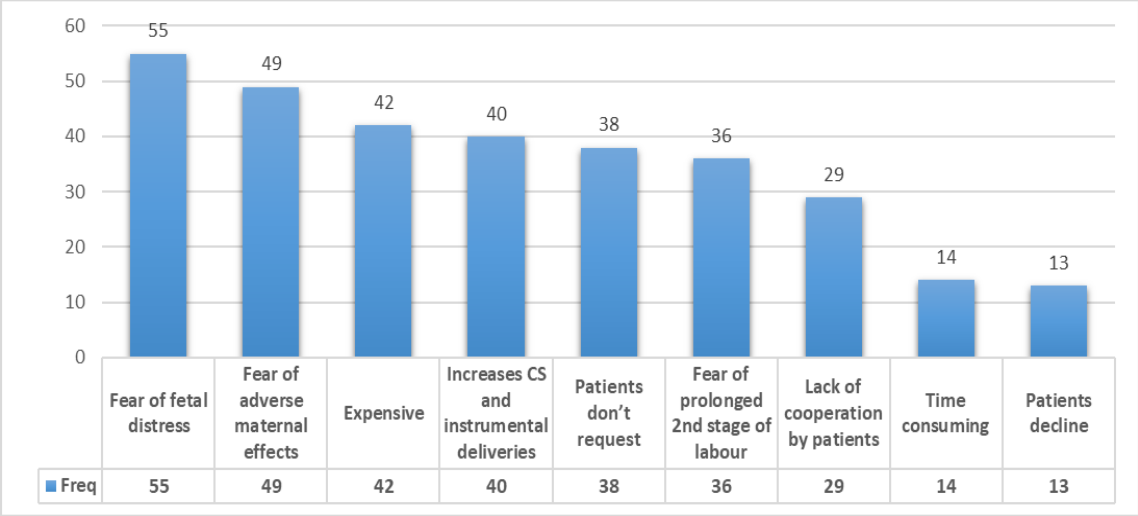
### 4.5 Barriers to the provision of labour analgesia

Figure 12 represents the barriers/factors hindering the provision of labour analgesia as reported by maternal healthcare providers at MTRH (N=117). The main factors included:

i. Fear of foetal distress 55 (47.1%)

ii. Fear of adverse maternal effects 49 (41.8%)

iii. Cost implications (perceived as expensive) 43 (36.7 %)




Note: Responses were not mutually exclusive.

**Figure 12: Perceived barriers to the provision of labour analgesia as reported by maternal healthcare providers at Moi Teaching and Referral Hospital, Kenya 2022 (N=117)**

Almost all the participants 110 (94%) reported that the introduction of labour analgesia guidelines would improve the management of labour at MTRH while 112 (95.7%) indicated that regular courses on effective labour analgesia would be useful in their practice of labour analgesia.

### 4.6 Factors associated with the provision of labour analgesia

In the bivariate logistic regression analysis, there was no significant association between reported provision of labour analgesia and the age, duration of practice, knowledge, and attitude of the maternal healthcare providers. However, male maternal healthcare providers were 67% less likely to provide labour analgesia as compared to their female counterparts (COR=0.33; 95% CI:0.14, 0.71). Midwives were also four times more likely to provide labour analgesia compared to anaesthesiologists (COR=4.32; 95% CI: 1.33, 14.9).

**Table 11: Factors associated with the provision of labour analgesia by maternal healthcare providers at Moi Teaching and Referral Hospital, Kenya 2022 (N=117)**

| Variable | Provide labour analgesia | | COR | 95%CI | AOR | 95%CI |
|---|---|---|---|---|---|---|
| | No (N=45) | Yes (N=72) | | | | |
| **Age (years)** | | | | | | |
| <=40 | 34 (37.4%) | 57 (62.6%) | 1 | | 1 | |
| >40 | 11 (42.3%) | 15 (57.7%) | 0.81 | 0.34, 2.01 | 0.1 | 0.00, 1.82 |
| **Sex** | | | | | | |
| Female | 15 (27.3%) | 40 (72.7%) | 1 | | 1 | |
| Male | 30 (53.6%) | 26 (46.4%) | 0.33 | 0.14, 0.71 | 0.87 | 0.24, 3.28 |
| **Profession** | | | | | | |
| Anesthesiologist | 9 (56.2%) | 7 (43.8%) | 1 | | 1 | |
| Midwife | 11 (22.9%) | 37 (77.1%) | 4.32 | 1.33, 14.9 | 1.94 | 0.44, 8.79 |
| Obstetrician | 25 (47.2%) | 28 (52.8%) | 1.44 | 0.47, 4.58 | 0.7 | 0.18, 2.67 |
| **Duration of practice** | | | | | | |
| <=10 | 32 (41.6%) | 45 (58.4%) | 1 | | 1 | |
| >10 | 12 (31.6%) | 26 (68.4%) | 1.54 | 0.69, 3.58 | 9.82 | 1.52, 1.96 |
| **Knowledge** | | | | | | |
| Moderate/Good | 24 (44.4%) | 30 (55.6%) | 1 | | 1 | |
| Poor | 16 (44.4%) | 20 (55.6%) | 1 | 0.43, 2.35 | 1.03 | 0.38, 2.75 |
| **Attitude** | | | | | | |
| Neutral | 2 (28.6%) | 5 (71.4%) | 1 | | 1 | |
| Positive | 41 (38.0%) | 67 (62.0%) | 0.65 | 0.09, 3.19 | 0.94 | 0.10, 8.81 |

*1=reference*

Abbreviations: AOR, adjusted odds ratio; COR, crude odds ratio; CI, confidence interval

At multivariate logistic regression analysis, adjusting for age, sex, profession, knowledge, and attitude, maternal health care providers having more than 10 years of working experience were almost ten times more likely to provide labour analgesia compared to those with less than 10 years of experience (AOR: 9.82, 95% CI 1.52, 1.96) (Table 11).

# CHAPTER FIVE: DISCUSSION

## 5.1 Reported provision of labour analgesia

A majority of 72/117(61.5%) maternal health care providers reported providing some form of labour analgesia routinely. This is quite encouraging considering that the provision of effective labour analgesia is not only a measure of maternal satisfaction but also is indirect evidence that the health system is functioning, health institutions are well organized and equipped, and there are competent maternal health care providers. These findings are comparatively higher than in other studies conducted in Ibadan, Nigeria (13.3%) and Hawassa, Ethiopia (13.8%) where different tier healthcare facilities were included and this may have contributed to the low figures (Ohaeri et al., 2019; Wakgari et al., 2020). The reported provision of labour analgesia in this study is still lower than in some developed nations such as Australia (76%) where new techniques are continuously being adopted in addition to the already existing variety, and are strongly influenced by the positive attitude of the public toward the same (Eley et al., 2015).

## 5.2 Pattern of provision of different forms of labour analgesics

### 5.2.1Non-Pharmacological methods

Non-pharmacological methods were mostly preferred by maternal healthcare providers reporting routine provision of labour analgesia with a majority of the respondents 64/72(88.9%) reporting provision. This is almost in conformity with a study in Japan, where only 6.1% of women received pharmacological analgesics with the majority (93.9%) preferring alternative methods. Japan's unique healthcare system whereby traditional medicine is fully integrated with modern medicine in daily practice and covered by health insurance may also have an impact (Maeda et al., 2019). Findings

however contrast those in a study done in India where regional analgesics were the most prescribed by 61.69% of the respondents, whereas only 3.39% reported provision of non-pharmacological methods (Narayanappa et al., 2018). The study population in the latter comprised only anesthesiologists who almost exclusively provide pharmacological analgesics for labour pain relief.

Non-pharmacological methods were the main mode routinely provided by the majority of 36/48 (75%) midwives, probably because they are considered safer and non-invasive by both the practitioner and the parturient. Pharmacological methods also require a doctor's prescription, hence making alternative modalities convenient and preferred by midwives. There is however limited data to support their efficacy in alleviating labour pain (Jones., 2012).

The four most routinely provided non-pharmacological methods for labour analgesia as reported by MHCPs at MTRH were: Touch and massage 60/64 (93.8%), deep breathing /patterned breathing (Lamaze techniques) 52/64 (81.3%), maternal movements and positional changes 52(81.3%) and social support (Reassurance) 51/64 (79.7%). This contrast with the findings in studies done in Egypt and Nigeria where the commonest non-pharmacological method provided was in form of- giving reassurance by 19.2 % and 90.3% respectively (Mousa et al., 2018; Ohaeri et al., 2019). The provider experience gained with the routine provision of specific methods in the respective study centres may explain the disparities. Providers would prefer to apply what is commonly used in their working environment.

### 5.2.2 Pharmacological methods

#### 5.2.2.1Non-opioids

The commonest pharmacological methods reportedly provided by routine providers of labour analgesia were non-opioids by 15/72 (20.8 %) of the respondents. This contrasts with the findings from a study in Nigeria where Opioids (41.1%) were the most commonly provided pharmacological method for labour analgesia (Lawani et al., 2014). The most preferred non-opioids were Buscopan and paracetamol, each routinely provided by 10/15 (66.7%) of the respondents. This correlates with the findings of Waweru-Siika et al in a previous study done in the same facility in 2015 and can be attributed to their availability and perceived safety in pregnancy. The findings, however, contrast those of a study done in Ethiopia where diclofenac was found to be the most routinely provided non-opioid analgesic (Mulugeta, 2016; Geltore et al., 2018). This can be attributed to a difference in regional preferences and protocols on analgesics for use in labour.

#### 5.2.2.2 Opioids

Opioids were reportedly provided by only 9/72 (12.5%) of the respondents reporting routine provision of labour analgesia. This is comparatively lower than 39% reported in studies done in Durban, South Africa and 59.4% in Ethiopia (Rocke et al., 1993; Bishaw et al., 2020). Poor pain scoring, concerns about possible adverse side effects and overreliance on non-pharmacological methods of pain relief may explain the low opioid usage rate by respondents in this study.

The most preferred opioid was tramadol by 8/9 (88.9%) of the respondents. This may be due to its availability, perceived safety profile and effectiveness in alleviating labour pain. This finding is consistent with a study done in India (Narayanappa et al., 2018).

However, in other similar studies done in Ethiopia and South Africa, pethidine injection was offered by the majority of the respondents (Wakgari et al., 2020; Rocke et al., 1993). This difference may be due to the availability of respective drugs within the respective study centers and the perceived safety profile. The studies comparing the efficacy between tramadol and pethidine have yielded contrasting results. However, the most recent studies indicate that tramadol is almost as effective as pethidine injections with a superior side effect profile (Narayanappa et al., 2018).

#### 5.2.2.3 Regional analgesics

WHO recommends epidural analgesia for healthy pregnant women requesting pain relief during labour, depending on a woman's preferences (WHO., 2018). However, its use is still quite low in the developing world, and only moderately established in some developed countries. In this study, only 4/72 (5.6%) of the respondents reporting routine provision of labour analgesia, reported offering regional analgesia and out of these, 3/4 (75%) reported providing epidural analgesia.

These low figures are comparable to similar findings at Kenyatta National Hospital (3.3%) by Apondi et al, South Africa (5%) and Ethiopia (4.5%) ((Van Zyl et al., 2017; Mulugeta., 2016) but strikingly lower than findings in most developed countries like the UK (24% to 49.3%), Canada (58.3%), USA (62%) and France (83%) (Jacobs-Martin et al., 2014). In Australia, the epidural for labour analgesia rate is between 32 and 47%. These higher figures are mainly due to dedicated epidural services available in the majority of the hospitals (Eley et al., 2015).

The low percentage of mothers who reportedly received epidural analgesia at MTRH reflects the present extent of the epidural service provided by the departments of

Obstetrics and Anesthesia, which is limited primarily to medical conditions that need amelioration of the neuroendocrine stress response during labour and not merely as a routine or on maternal request. Despite this, not all mothers with indicative medical conditions end up receiving the epidural service.

MTRH is unique in that it has the benefit of having an established residency program in Obstetrics and Anesthesia. This ideally should be able to supplement the existing staff numbers by readily offering labour analgesia and more specifically epidural service as part of the residents' competency training as is the case in other similar-tier hospitals (Rocke et al., 1993; Statistics South Africa., 2019).

### 5.3 Health care provider factors influencing the provision of labour analgesia

#### 5.3.1Providers' Knowledge

Based on the composite score of 6.7/15 (44.7%), maternal health care providers at Moi Teaching and Referral Hospital generally had poor knowledge of labour analgesia, as assessed using the modified Blooms cut-off points. Only 5(4.3%) were rated as having good knowledge. This contrasts with studies done in Ethiopia and Nigeria where a majority of 88.9% and 56.8% respectively had good knowledge of labour analgesia (Wakgari et al., 2020; Ohaeri et al., 2019). Different assessment tools were applied in both studies which may explain the disparity in outcome. These low knowledge level may influence the ability of maternal health care providers at MTRH to accurately assess, identify, recommend and consult on the timely and proper analgesic provision.

Despite a majority (81.2%) of all the respondents reporting to have had prior education on labour analgesia, only 77/117 (65.8%) reported awareness about the WHO analgesic ladder, comparable to 51.8% in studies done in Amhara, Ethiopia (Bishaw et al., 2020).

The findings are however higher than in a similar study done in Addis Ababa where only 37.9% reported awareness. The difference may have been because the latter study was done in all-tier hospitals within the region, both public and private with a larger target population. A majority of the respondents, 55/77 (71.4%) with awareness of the WHO analgesic ladder reported using it while managing labour pain. The proportion reporting awareness of the universal pain assessment tools was significantly higher at 85/117 (72.6%), however, slightly over half 44/85 (51.8%) reported having used it in managing labour pain. This correlates with the low composite knowledge scores and signifies a major barrier to assessment and actual provision of labour analgesia. Indeed, an overwhelming majority of 110/117 (94%) and 112/117 (95.7%) reported that the introduction of labour analgesia guidelines and regular courses on effective labour analgesia would be useful in enhancing their practice of labour analgesia.

### 5.3.2 Providers' Attitude

In terms of composite attitude, almost all (93.9%) of the respondents indicated having a positive attitude towards the provision of labour analgesia. This compares with findings of 90.8% in a study done in Hawassa, Ethiopia (Wakgari et al., 2020). It however contrasts with similar studies in Amhara, Ethiopia where only 57.2% indicated having a positive attitude (Bishaw et al., 2020). This may signify a cultural disparity between the study populations and not merely a knowledge gap.

Eleven (9.4%) of the respondents did not expect women to feel pain while in labour. This is comparable to 10.3% in a study done in Egypt (Mousa et al., 2018). A significant majority, 63(53.8%) were unsure. This may reflect a genuine lack of knowledge or

inherent personal bias. However, almost all the respondents (82.1%) agreed that labour pain should be relieved, comparable to the 78.2 % finding by Mousa et al in 2018.

Some 10(8.5%) of the participants believed that labour is a natural process that does not require any analgesia. This contrasts 46.6% reported in an Ethiopian study (Wakgari et al., 2020). The difference may be due to contrasting cultural beliefs between the two study populations. This personal bias may negatively influence the eventual patient counselling, assessment, and actual management. It may also hinder the actualization of the WHO goal of attaining a positive birth experience for all women.

### 5.4 Health system factors influencing the provision of labour analgesia

A majority (91.67%) of maternal healthcare providers at Moi Teaching and Referral Hospital reported experiencing health system factors that hindered their provision of labour analgesia. This is comparable to 98.7% reported in a study done in Minia, Egypt (Mousa et al., 2018). Non-availability of drugs and equipment (58.1%) was reported as the main health system factor hindering the provision of labour analgesia by maternal health care providers at MTRH. This is comparable to studies conducted in Addis Ababa and Kembata, Ethiopia of which it accounted for 59.9% and 70.9% of the total response respectively (Mulugeta, 2016; Geltore et al., 2018). Other factors reported were: lack of clear protocols and guidelines (56.4%) and absence of adequate skilled personnel (55.60%). Limited staff numbers also hinder interdisciplinary consultations and collaboration.

### 5.5 Barriers to provision of labour analgesia

In this study, providers concern about fetal distress 55(47.1%) and adverse maternal effects 49 (41.8%) were identified as the main healthcare providers' barriers hindering the provision of labour analgesia. This is similar to related studies done in Ibadan, Nigeria (Ohaeri et al., 2019). This eventually negatively impacts the provision of pharmacological methods and encourages over-reliance on alternative methods of pain relief as has been acknowledged in this study. Most of the perceived fears are based on past under information and limited knowledge of the pharmacokinetics and pharmacodynamics of most medications. This can be adequately addressed by regular training and sensitization programs, coupled with updated protocols to guide usage.

Interestingly, 13(11.1%) of the respondents reported that patients usually decline labour analgesia provided. This finding is almost similar to 9% reported in a study done at the same institution by Waweru-Siika, et al in 2015. The results are likely to have multi-causal explanations and may be influenced by real differences in women's wishes and needs, cultural norms and perceptions of labour pain as well as knowledge of side effects of pain relief. This study was conducted in a centre whose greatest catchment is a majorly rural population that may be influenced by traditional beliefs and practices and where successful labour experience is also measured by the ability to confidently withstand the associated pain. Some of the parturients may also not want to appear 'weak' in front of the in-laws who are mostly the birth companions.

Michael C. Roberson, et al established that fear of side effects 58.3%, naturalism 53% and family influence 25% were the main factors driving women to decline provided epidural analgesia in labour (Roberson., 2019). The main reasons for refusal according to

other studies done in Uganda were: wanting a natural childbirth experience (45%), it's against the will of God (8%), it would harm the baby (8%), the pain would help love their baby more (5%) and the pain was a form of birth control (1%). Some studies have revealed that multiparity has a positive correlation with the acceptability of labour analgesia (0.52 CI 0.32–0.85, p-value 0.009) (Nabukenya et al., 2015).

Despite personal preference playing a key role in the choice of whether to have pain relief in labour or not, most of the conceptions are merely based on myths that can be debunked by adequate preconception patient counselling, reinforced during antenatal visits and revisited during labour. When offered relevant information on pain relief options, most patients would be certainly interested in these options (Mung'Ayi et al., 2008).

### 5.6 Factors associated with provision of labour analgesia

In this study, male maternal healthcare providers were 67% less likely to provide labour analgesia as compared to their female counterparts (COR=0.33; 95%CI:0.14,0.71). This contrasts with similar studies done in Nigeria where males were twice as likely to counsel women on obstetric analgesia as compared to their female counterparts (OR=2.074) (Child et al., 2016). This may reflect a patriarchal element influencing the actual practice of labour analgesia by male MHCPs at the study site, or just the inability to relate with the actual painful experience the parturient undergoes.

Midwives were four times more likely to provide labour analgesia compared to anaesthesiologists (COR=4.32; 95%CI: 1.33, 14.9). This is mainly because midwives are the primary maternal health care providers in constant touch with the parturient and

hence have a more likely chance of providing an assorted array of analgesia as labour progresses, as compared to anaesthesiologists who currently only participate on a consultation basis.

Adjusting for all other covariates, maternal health care providers having more than 10 years of experience were almost ten (9.82) times more likely to provide labour analgesia than those with less than 10 years of experience (AOR: 9.82, 95% CI: 1.52, 1.96). This is similar to studies done in Addis Ababa and Amhara region, Ethiopia (Gido et al., 2021; Bishaw et al., 2020). This may be attributed to years of acquired experience, confidence and exposure that make this cohort comfortable prescribing and administering labour analgesia routinely. Most perceived fears are also alleviated with years of experience; hence this cohort can confidently recommend and administer various forms of analgesia as compared to those with limited experience who may be more comfortable providing non-pharmacological modes. However, studies done by Apondi et al., and Geltore et al., in 2012 and 2018 respectively revealed that years of experience did not significantly influence the provision of labour analgesia by maternal health care providers in the study sites. A great percentage of the respondents in this study were residents in training with less than 10 years of work experience. Majority (70.6%) of these residents rated poorly in terms of overall knowledge on labour analgesia. This knowledge deficit compounded by the relative inexperience may negatively impact on their eventual provision of labour analgesia.

## 5.7 Limitations and Strength of Study

### 5.7.1 Limitation of study

This was an institutional-based study; hence the conclusions can only be generalized to other similar tier hospitals with equal capacity.

Self-administered questionnaires eliminated the opportunity for clarifications and further probing, limiting the scope of information that could be elicited. It also likely introduced response bias. Future qualitative research methods should be applied to further explore the quantitative responses and provide complementary data to fully understand the results.

### 5.7.2 Strengths of study

This is the first local study looking to establish the maternal health care providers ' personal and institutional related factors that influence the provision of labour analgesia.

In this study, a census was employed to recruit study participants, which eliminated sampling errors.

# CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusions

This study established that the proportion of maternal healthcare providers reporting provision of labour analgesia at Moi Teaching and Referral Hospital is above average at 61.5%.

Majority 64/72(88.9%) of the maternal healthcare providers reporting routine provision of labour analgesia reported providing non-pharmacological methods for labour pain relief. Epidural analgesia which is the gold standard for labour analgesia is underutilized at MTRH. Regional analgesia is reportedly provided by only 4/72 (5.6%) of the maternal health care providers' reporting routine provision of labour analgesia, with only 3/4 (75%) of these offering routine epidural analgesia.

Maternal healthcare providers' years of working experience was significantly associated with reported routine provision of labour analgesia.

The healthcare provider factors hindering provision of labour analgesia at MTRH were: providers poor knowledge of labour analgesia practises, and providers personal concerns such as- fear of foetal distress and fear of adverse maternal effects.

The health system factors hindering the provision of labour analgesia at MTRH include: non-availability of drugs and equipment, lack of clear protocols and guidelines and absence of adequate skilled personnel.

### 6.2 Recommendations

The Ministry of health and health policymakers in Kenya should develop a national protocol on labour analgesia for all level facilities with obstetric units. The WHO labour care guide 2018 that incorporates labour analgesia as a core component should also be nationally adopted, replacing the traditional partograph.

There should be regular institutional continuous professional training for obstetric caregivers at Moi Teaching and Referral Hospital, to improve their acceptance and proficiency in the available forms of labour analgesia. The post graduate curriculum for both Reproductive health and Anesthesia should place more emphasis on the topic of labour analgesia to improve on the competency of the trainees to be at par with the expected standards. Mentorship amongst the staff should also be encouraged to bridge the knowledge and practise gap at the facility.

The anesthesia department needs to be actively incorporated into labour pain management practices within the hospital. This should include actual rotations within the labouring units to provide interdisciplinary support on pain management, including epidural analgesia on request.

Administrative support by provision of adequate drugs and equipment, employment of adequate skilled personnel and development of institutional-based protocols will help overcome the reported health system barriers. A dedicated epidural analgesia service should also be established for the labour units at MTRH, where all women indicated or preferring the service can access it without difficulty or delay.

Finally, more research is still needed to identify the optimal analgesia modalities unique to our region in terms of preferences, availability, and effectiveness.

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# APPENDICES

## Appendix A: Consent form

**MOI UNIVERSITY COLLEGE OF HEALTH SCIENCES / MOI TEACHING AND REFERRAL HOSPITAL**

**INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC) INFORMED CONSENT FORM (ICF)**

**Study Title: "LABOUR ANALGESIA AND THE PERCEIVED BARRIERS TO ITS PROVISION AMONGST MATERNAL HEALTHCARE PROVIDERS AT MOI TEACHING AND REFERRAL HOSPITAL. A CROSS SECTIONAL SURVEY**"

**Name of Principal Investigator:** Dr Gabriel Ouma (Moi University).

**Name of Organization**: Moi University. P.O Box 4606-030100, Eldoret, Kenya.
Telephone 254 53 2061562, 254 53 2060958/9

**Name of Sponsor:** None.

**Informed Consent Form for**: Maternal healthcare providers at MOI TEACHING AND REFERRAL HOSPITAL (Midwives, Residents in both Reproductive health and anaesthesia, Anesthesiologists and Obstetricians).

**This Informed Consent Form has two parts:**

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the signed Informed Consent Form.

**Part I: Information Sheet**

**Introduction:**

You are being asked to take part in a research study. This information is provided to tell you about the study. Please read this form carefully. You will be given a chance to ask questions. If you decide to be in the study, you will be given a copy of this consent form for your records.

Taking part in this research study is voluntary. You may choose not to take part in the study. You are also free to withdraw from this study at any time. If after data collection you choose to quit, you can request that the information provided by you be destroyed under supervision-

and thus not used in the research study. You will be notified if new information becomes available about the risks or benefits of this research. Then you can decide if you want to stay in the study

**Purpose of the study:**

The purpose of this study is to evaluate the provision of labour analgesia and its related barriers amongst maternal healthcare providers at Moi Teaching and Referral Hospital, with the eventual aim of improving the practice hence overall care for mothers in labour.

**Type of Research Project/Intervention:**

This research is a cross-sectional descriptive survey involving self-administered questionnaires.

You will be issued a questionnaire containing five sections that will include multiple-choice and open-ended questions.

The main themes that will be assessed will include: health care provider factors (e.g., sociodemographic characteristics, knowledge, skills, perception and attitude), type and pattern of use of labour analgesia, enablers and barriers to the provision of labour analgesia and your perceived need for provision of labour analgesia.

**Why have I been identified to Participate in this study?**

The study population includes all practitioners who are involved in maternal healthcare provision during labour.

You have been randomly enrolled as part of the 120 practitioners to participate in the survey based on your job description and unique role in maternal healthcare provision.

**How long will the study last?**

The study duration shall be 3 months starting from 1st January 2021 to 31st March 2021.

Your participation in the filling of this questionnaire will take approximately 15 minutes of your time.

**What will happen to me during the study?**

A. If you agree to take part in this survey, you will be asked to fill in a five-section questionnaire that will assess the provision of labour analgesia and its related barriers at Moi Teaching and Referral Hospital Any information that you share will be confidential and secure.

B. The questionnaire will contain five sections that will include multiple-choice and open-ended questions

The main themes that will be assessed will include sociodemographic characteristics (sex, age, professional cadre and duration of practice), your knowledge, perception and attitude towards provision of labour analgesia, type and pattern of use of labour analgesia, enablers and barriers to the provision of labour analgesia and your perceived need for provision of labour analgesia.

**What side effects or risks can I expect from being in the study?**

There are no risks associated with your participation in this study.

**Are there benefits to taking part in the study?**

a) The outcome of this study will help improve your practice to be at par with the current international standards. The feedback will also help in shaping policies that will ultimately guide the enhancement of your knowledge in labour analgesia.
b) The outcomes of the study will also improve the overall maternal healthcare services and eventually maternal satisfaction through a better birth experience.

**Reimbursements:**

You will not be reimbursed or paid for participation in this study

**Whom do I call if I have questions about the study?**

If you have any questions about the study, please contact the principal investigator: Dr Gabriel Ouma.
Mobile no: 0721307040
If you have questions about your rights as a research subject: You may contact Institutional Review Ethics Committee (IREC) at 053 33471 Ext.3008. IREC is a group of people that reviews studies for safety and to protect the rights of study subjects.

**Will the information I provide be kept private?**

All reasonable efforts will be made to keep your protected information (private and confidential. Protected Information is information that is, or has been, collected or maintained and can be linked back to you. Using or sharing ("disclosure") of such information must follow National privacy guidelines. By signing the consent document for this study, you are giving permission ("authorization") for the uses and disclosures of your personal information.

A decision to take part in this research means that you agree to let the research team use and share your Protected Information as described below.

As part of the study, Dr Gabriel Ouma and his study team may share the results of your sociodemographic characteristics, and relevant feedback. These may be study or non-study related. They may also share the study findings with:

- The National Bioethics. Committee,
- The Institutional Review and Ethics Committee,

National privacy regulations may not apply to these groups; however, they have their policies and guidelines to assure that all reasonable efforts will be made to keep your personal information private and confidential.

Unless otherwise indicated, this permission to use or share your Personal Information does not have an expiration date. If you decide to withdraw your permission, we ask that you contact Dr Gabriel Ouma in writing and let him know that you are withdrawing your permission. The mailing address is Moi University. P.O Box 4606-030100, Eldoret, Kenya.

At that time, we will stop further collection of any information about you. However, the health information collected before this withdrawal may continue to be used for reporting and research quality.

You have the right to see and copy your personal information related to the research study for as long as the study doctor or research institution holds this information. However, to ensure the scientific quality of the research study, you will not be able to review some of your research information until after the research study has been completed.

Your treatment, payment or enrollment in any health plans or eligibility for benefits will not be affected if you decide not to take part. You will receive a copy of this form after it is signed.

**Part II: Consent of Subject:**

I have read or have had read to me the description of the research study. The investigator or his/her representative has explained the study to me and has answered all of the questions I have at this time. I have been told of the potential risks, discomforts and side effects as well as the possible benefits (if any) of the study. I freely volunteer to take part in this study.

| _____ | _____ | _____ |
|---|---|---|
| Name of Participant (Witness to print if the The subject is unable to write | Signature of subject/thumbprint | Date & Time |

| _____ | _____ |
|---|---|
| Name of Representative/Witness | Relationship to Subject |

| _____ | _____ | _____ |
|---|---|---|
| Name of person Obtaining Consent | Signature of person Obtaining Consent | Date |

| _____ | _____ | _____ |
|---|---|---|
| The printed name of Investigator | Signature of Investigator | Date |

**Appendix B: Questionnaire**
**(Mark √ in the boxes provided in front of your answer)**

**SECTION A**: **Socio-demographic characteristics.**

1. Sex: male □ female □

2. Age (years): ≤30 □ 31-40 □ 41-50 □ 51-60 □ ≥61 □

3. Profession: Obstetrician □ Midwife □ Anaesthesiologist □ Resident □

4. Duration of practice (years): ≤5 □ 6-10 □ 11-15 □ 16-20 □ ≥21□

**SECTION B: Knowledge, skills, perception and attitude.**
**Knowledge and skills:**

1. Have you had any previous education on labour analgesia?

   Yes□ No □ Unsure □

2. If yes, from which source?

- As part of the curriculum in previous education □
- During in-service education (CME, seminar, workshops etc.) □
- From literature and the internet □
- From colleagues □

3. Are you aware of the WHO analgesic ladder? Yes □ No □ Unsure □
4. If yes to the above question, have you ever used it to treat pain?

   Yes □ No □ Unsure □

5. Are you aware of the Universal pain assessment tools?

   Yes □ No □ Unsure □

6. If yes, have you ever used them to assess labour pain?

   Yes □ No □ Unsure □

7. If yes to the above questions, which assessment tools do you use frequently?

   Numerical □ visual□ verbal□

8. The use of non-pharmacological methods for pain relief during normal labour is safer as compared to pharmacological methods.

   Yes □ No □ Unsure □

9. The use of pharmacological pain-relief methods will increase the comfort of women as compared to non-pharmacological.

   Yes □ No □ Unsure □

10. Opioids have a ceiling effect in analgesia that once achieved, additional medication will not provide further pain relief.

    Yes □ No □ Unsure □

**Attitude**

11. Women are expected to feel pain during labour.

    a) Agree □ c) Unsure □ d) Disagree □

12. Pain in labour should be relieved.

    a) Agree □ c) Unsure □ d) Disagree □

13. Relief of labour pain improves the overall maternal experience.

    a) Agree □ c) Unsure □ d) Disagree □

14. Labour is a natural process that does not require analgesia

    a) Agree □ c) Unsure □ d) Disagree □

15. Patients complaining of pain during labour may be seeking attention.

    a) Agree □ c) Unsure □ d) Disagree □

**SECTION C: Type and pattern of use of labour analgesia.**

1. How often do you provide opioids for labour analgesia while on duty?

   Routinely □ occasionally □ on maternal request □ never □

1.1. Which types of opioids do you provide for labour analgesia? (Tick all that apply)

- Pethidine □
- Morphine □
- Tramadol □
- Fentanyl □
- Remifentanil □
- Others (specify_____)

2. How often do you provide non-opioids for labour analgesia while on duty?

   Routinely □ occasionally □ on maternal request □ never □

2.1. Which types of non-opioids do you provide for labour analgesia? (Tick all that apply)

- Paracetamol □
- Aspirin □
- Diclofenac □
- Buscopan □
- Others (specify_____)

3. How often do you provide inhalational agents for labour analgesia while on duty?

   Routinely □ occasionally □ on maternal request □ never □

3.1. Which types of inhalational agents do you provide for labour analgesia? (Tick all that apply)

- Enflurane □
- Isoflurane □
- Methoxyflurane □
- Entonox (nitrous oxide, N2O inhalation) □
- Others (specify_____)

4. How often do you provide regional agents for labour analgesia while on duty?

Routinely □ occasionally □ on maternal request □ never □

4.1. Which types of regional agents do you provide for labour analgesia? (Tick all that apply)

- Spinal □
- Epidural □
- Combined spinal-epidural □
- Other nerve block technique used (specify: _____)

5. How often do you provide non-pharmacological agents for labour analgesia while on duty?

Routinely □ occasionally □ on maternal request □ never □

5.1. Which types of non-pharmacological agents do you provide for labour analgesia? (Tick all that apply)

- Audio analgesia (Music, conversation) □
- Intermittent local heat and cold therapy □
- Yoga □
- Deep breathing/patterned breathing □

- Acupuncture/pressure □
- Touch and massage □
- Water immersion □
- Maternal movements and positional changes □
- Psychological support (Giving assurance, explaining the labour process) □
- Others (specify: _____)

**SECTION D: Factors influencing the provision of labour analgesia.**

**The following factors hinder your provision of labour analgesia at Moi Teaching and Referral Hospital: (Choose the most appropriate answer)**

- **Health system factors:**

i. Non-availability of adequate skilled personnel

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

ii. Non-availability of drugs and equipment

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

iii. Non-availability of clear protocols and guidelines

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

- **Other factors:**

iv. Patients don't request analgesia.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

v. Patients decline analgesia provided.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

vi. Lack of cooperation by patient.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

vii. It is time-consuming.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

viii. Fear of fetal distress.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

ix. Fear of adverse maternal effects.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

x. Fear of prolonged 2nd stage of labour.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

xi. Increases incidence of instrumental delivery and Caesarian section.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

xii. It is expensive.

Strongly agree □ Agree □ Unsure □ Disagree □ strongly disagree □

xiii. Others (specify:

_____)

**SECTION** E: Respondent's opinion on the need for labour analgesia. (Tick the most appropriate response)

In your opinion,

1. Would the introduction of labour analgesia guidelines improve the management of labour?

   Agree □ strongly Agree □ Disagree □ strongly disagree □

2. Do you feel that regular courses on effective labour analgesia would be useful in your practice of labour analgesia?

   Agree □ strongly Agree □ Disagree □ strongly disagree □

Name of data collector _____signature _____date _____

Name of supervisor _____signature _____date _____

Thank you

**Appendix C: Budget**

| **Items** | **Quantity** | **Unit Price (Kshs)** | **Total (Kshs)** |
|---|---|---|---|
| ***Stationery & Equipment*** | | | |
| Printing Papers | 5 reams | 500.00 | 2,500.00 |
| Black Cartridges | 2 | 2,000.00 | 4,000.00 |
| Writing Pens | 1 packet | 500.00 | 500.00 |
| Flash Discs | 1 | 2,000.00 | 2,000.00 |
| Box Files | 2 | 200.00 | 400.00 |
| Document Wallets | 2 | 50.00 | 100.00 |
| **Subtotal** | | | **9,500.00** |

| | | | |
|---|---|---|---|
| ***Research Proposal Development*** | | | |
| Printing drafts & final proposal | 10 copies | 500.00 | 5,000.00 |
| Photocopies of the final proposal | 6 copies | 100.00 | 600.00 |
| Binding of copies of Proposal | 5 copies | 100.00 | 500.00 |
| **Subtotal** | | | **6,100.00** |
| ***Personnel*** | | | |
| Biostatistician | 1 | 20,000.00 | 20,000.00 |
| Research assistants | 4 | 18,000 | 16,000.00 |
| **Subtotal** | | | **26,000.00** |
| ***Thesis Development*** | | | |
| Printing of drafts and final thesis | 10 copies | 800.00 | 8,000.00 |
| Photocopy of the final thesis | 6 copies | 200.00 | 1,200.00 |
| Binding of thesis | 6 copies | 300.00 | 1,800.00 |
| Publication | 1 | 20,000 | 20,000.00 |
| **Subtotal** | | | **31,000.00** |
| **Total** | | | |
| **Miscellaneous Expenditure** | | | **30,000.00** |
| **Grand Total** | | | **102,600.00** |

## Appendix D: IREC Approval

**INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)**

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471//2/3

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/2/3

Reference: IREC/2020/144
***Approval Number: 0003733***
10th December, 2020

Dr. Gabriel Ouma,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
**ELDORET-KENYA.**

Dear Dr. Ouma,

**HUMANIZATION OF CHILDBIRTH: PROVISION OF LABOUR ANALGESIA AND ITS RELATED BARRIERS AMONGST MATERNAL HEALTHCARE PROVIDERS AT MOI TEACHING AND REFERRAL HOSPITAL**

This is to inform you that ***MU/MTRH-IREC*** has reviewed and approved your above research proposal. Your application approval number is ***FAN: 0003733.*** The approval period is **10th December, *2020 - 9th December, 2021.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MU/MTRH-IREC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MU/MTRH-IREC*** within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MU/MTRH-IREC*** within 72 hours.
v. Clearance for export of biological specimens must be obtained from ***MU/MTRH-IREC*** for each batch of shipment.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MU/MTRH-IREC.***

Prior to commencing your study; you will be required to obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and other relevant clearances. Further, a written approval from the CEO-MTRH is mandatory for studies to be undertaken within the jurisdiction of Moi Teaching & Referral Hospital (MTRH), which includes 22 Counties in the Western half of Kenya.

Sincerely,

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
10 DEC 2020
APPROVED
P. O. Box 4606-30100 ELDORET

**PROF. E. WERE**
**CHAIRMAN**
**INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| cc | CEO | - | MTRH | Dean | - | SOP | Dean | - | SOM |
| | Principal | - | CHS | Dean | - | SON | Dean | - | SOD |

## Appendix E: MTRH Approval

An ISO 9001:2015 Certified Hospital

# MOI TEACHING AND REFERRAL HOSPITAL

Telephone :( +254)053-2033471/2/3/4
Mobile: 722-201277/0722-209795/0734-600461/0734-683361
Fax: 053-2061749
Email: ceo@mtrh.go.ke/directorsofficemtrh@gmail.com

Nandi Road
P.O. Box 3 – 30100
ELDORET, KENYA

**Ref:** ELD/MTRH/R&P/10/2/V.2/2010

7th January, 2021

Dr. Gabriel Ouma
Moi University
School of Medicine
P.O. Box 4606-30100
**ELDORET- KENYA**

**HUMANIZATION OF CHILDBIRTH: PROVISION OF LABOUR ANALGESIA AND ITS RELATED BARRIERS AMONGST MATERNAL HEALTHCARE PROVIDERS AT MOI TEACHING AND REFERRAL HOSPITAL**

In order to conduct research within the jurisdiction of Moi Teaching and Referral Hospital (MTRH) which includes 22 counties in the Western half of Kenya. You are required to strictly adhere to the regulations stated below in order to safeguard the safety and well-being of staff and patients seen at MTRH involved research studies.

1. The study shall be under Moi Teaching and Referral Hospital regulation.
2. A copy of MU/MTRH-IREC approval shall be provided.
3. Studies dealing with collection, storage and transportation of Human Biological Material (HBM) will not be allowed to export the HBM outside the jurisdiction of **MTRH.**
4. For those tests which are unavailable locally the PI is tasked to ensure sourcing of equipment and subsequent training of staff to build their capacity.
5. No data collection will be allowed without an approved consent form(s) to participants to sign.
6. Take note that **data** collected must be treated with due confidentiality and anonymity.

Permission to conduct research shall only be provided once all the requirements stated above have been met.

MOI TEACHING AND REFERRAL HOSPITAL
CEO
APPROVED
07 JAN 2021
SIGN
P.O. Box 3 - 30100, ELDORET

07/01/2021
**DR. WILSON K. ARUASA, *MBS, EBS***
**CHIEF EXECUTIVE OFFICER**
**MOI TEACHING AND REFERRAL HOSPITAL**

c.c. - Senior Director, Clinical Services
- Director of Nursing Services
- HOD, HRISM

## Appendix F: Work Plan

| | 2020 | | 2021 | | 2022 | | | |
|---|---|---|---|---|---|---|---|---|
| **Activity** | **JAN-MAY** | **JUN-DEC** | **JAN-MAR** | **APR-DEC** | **JAN-APR** | **MAY-AUG** | **SEP** | **OCT-DEC** |
| Proposal writing | | | | | | | | |
| Ethical approval | | | | | | | | |
| Data collection | | | | | | | | |
| Data analysis | | | | | | | | |
| Report writing | | | | | | | | |
| Submission of thesis | | | | | | | | |
| Presentation of thesis | | | | | | | | |
| Publication of thesis | | | | | | | | |