OUTCOMES OF INDUCTION OF LABOR VERSUS EXPECTANT MANAGEMENT IN LOW-RISK PREGNANCIES AT 39-41WEEKS IN PUMWANI MATERNITY HOSPITAL, 2020: A PROSPECTIVE COHORT STUDY.

PRINCIPAL INVESTIGATOR:

Dr. Cedric Manyange Oyaro

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Department of Obstetrics and Gynaecology,

A dissertation submitted in partial fulfillment of the requirements for the ward of degree of masters in Medicine Department of Obstetrics and Gynaecology, Faculty of Health Sciences, University of Nairobi.

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DECLARATION AND SUPERVISORS' APPROVALS

This is to declare that this proposal is my original work, carried out with the guidance of my supervisors, and references made to work done by others have been indicated.

Dr. Cedric Manyange Oyaro

Signature:  **Date: 15th May, 2022**

This proposal has been submitted with the approval of my supervisors:

Dr. Alfred Osoti, MBChB (UoN), MMed Obs/Gyn (UoN), MPH, PhD,

Consultant, Obstetrician Gynaecologist, Kenyatta National Hospital,

Senior Lecturer, Faculty of Health Snciences, University of Nairobi.

Signature:  **Date: 22nd May, 2022**

Dr. Allan Ikol, MBChB (UoN), MMed Obs/Gyn (UoN)

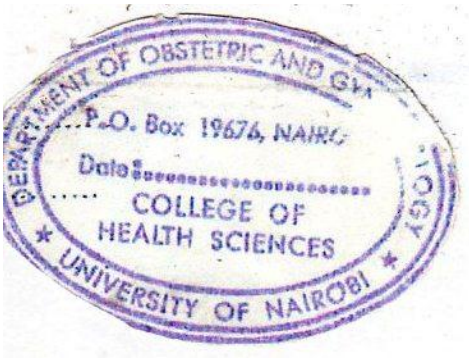
Consultant, Obstetrician Gynaecologist, Kenyatta National Hospital,

Honorary Lecturer, Faculty of Health Sciences, University of Nairobi.

Signature:  **Date: 22nd May, 2022**

CERTIFICATE OF AUTHENTICITY

This is to certify that this dissertation is the original work of Dr. CEDRIC MANYANGE OYARO, registration number H58/6955/2017, who is a masters of medicine student in the department of Obstetrics and Gynecology, School of Medicine, Faculty of Health Sciences, University of Nairobi. The research was carried out in the department of Obstetrics and Gynaecology, University of Nairobi and Kenyatta National Hospital. It was carried out under the supervision of DR. ALFRED OSOTI and DR. ALLAN IKOL. It has not been presented in any other university for award of Diploma or Degree.



Signature:  **Date: 2nd June, 2022**

Professor, Eunice J. Cheserem, MBCHB,Mmed (Obs/Gyn), Gyn/Oncol

Professor Department of Obstetrics and Gynaecology, Faculty of Health Sciences,

Consultant, Obstetrician and Gynaecologist, Kenyatta National Hospital,

Chairperson, Department of Obstetrics and Gynaecology, University of Nairobi.

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DEDICATION

I dedicate this work to the Manyange family: Dr. Lynnette Muthoni Mwangi whose indelible sacrificial care was pertinent to its fruition; to my daughter Hazel Leanora Manyange who is indeed a treasure from the Lord. To my parents, John O Oyaro and Monica B Oyaro and siblings, Herbert and Christine who crafted my path to this noble profession, I am eternally indebted.

LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
CTG	Cardiotocogram
EDD	Estimated Date of Delivery
FSB	Fresh Still Birth
IOL	Induction of Labor
KNH	Kenyatta National Hospital
LMP	Last Normal Menstrual Period
MSB	Macerated Still Birth
NRFS	Non-reassuring Fetal Status
PMH	Pumwani Maternity Hospital
UoN	University of Nairobi
WHO	World Health Organization
WHOMCS	World Health Organization Multi-Country Survey (on maternal and new-born health)

DEFINITION OF TERMS

- Antenatal fetal surveillance- monitoring of fetal wellbeing in utero in order to detect or avert fetal morbidity and mortality
- Early neonatal outcomes- neonatal outcomes within the first 72 hours of life
- Expectant management-continuation of pregnancy to spontaneous delivery, induction of labor or emergency CS at a later date
- Full term pregnancy- Pregnancy between 39 weeks and 40 weeks 6 days gestation from last normal menstrual period
- Induction of labor- iatrogenic stimulation of uterine contractions before the onset of labor so as to achieve vaginal delivery
- Low-risk pregnancy- pregnancy with no known adverse maternal or neonatal risks of comorbidity

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ABSTRACT

Introduction: The Royal College of Obstetrician Gynecologists (RCOG), American College of Obstetrician Gynecologists (ACOG) and the WHO recommend induction of labor for pregnancies at 41 weeks gestation and beyond for improving maternal and neonatal outcomes and not below 39 weeks where there is no clear medical indication. A Randomized trial of Induction of labor (IOL) versus Expectant management (EM) in 2018 in the United States reported reduction in caesarian section (CS) rates and the risk of adverse perinatal outcomes among low-risk nulliparous pregnancies at 39 weeks gestation. There are no comparable local or regional studies to inform the management of low-risk pregnancies between 39-41 weeks gestation in resource constrained settings.

Objective To determine the risk of adverse obstetric and early neonatal outcomes of low-risk pregnancies at 39-41weeks gestation undergoing induction of labor compared to expectant management at PMH.

Methodology: The study design was a prospective cohort study carried out at Pumwani Maternity Hospital, the largest maternity hospital in Sub-Saharan Africa. Low-risk consenting pregnant women at 39-41 weeks gestation were enrolled. The primary outcome was the incidence of operative delivery while the secondary outcomes included composite adverse maternal and neonatal outcomes and were compared between those induced and those expectantly managed. Data was collected using a structured pretested questionnaire from interviews as well as patient files. Data was cleaned and exported in a Statistical Package (SPSS – Version 24.0). Descriptive statistics were used to describe socio-demographic characteristics and differences between the two groups. Cross-tabulations were then be used to identify risk factors. X^2 and Fisher exact tests were used to evaluate the differences in distributions of socio-

demographic and labor-related characteristics of the two groups and their impact on the mode of delivery. Relative Risk were calculated, comparing IOL at 39-41 weeks with EM while utilizing the incidence of operative delivery, adverse maternal and neonatal outcomes. Multivariable logistic regression was done to test association and control for confounders. A P value < 0.05 was considered to be statistically significant.

Results: Between August and November 2020, 252 pregnant women were screened and 224 were enrolled. A total of 107 pregnant women underwent IOL while 117 underwent EM. Sociodemographic and obstetric characteristics were comparable between the two groups.

IOL was also associated with lower incidence of CS (15% vs 16.2% P=0.79) although this was not statistically significant. There was a significantly higher incidence of non-reassuring fetal status among those who underwent EM (12.5% vs 47.4%, P=0.002). The incidence of composite adverse maternal and neonatal outcomes was comparable between IOL and EM (14.9% vs 23.1%, P=0.123 and 23.4%vs 19.6%, P=0.51). The need for resuscitation/respiratory support was significantly higher with IOL compared to EM (8.4%vs 1.7%, P= 0.02)

Conclusion: Among low-risk women undergoing IOL vs EM, the incidence of CS and composite adverse maternal and neonatal outcomes were comparable between the two groups. However, IOL was associated with a higher need for resuscitation or respiratory support

Recommendations: Either IOL or EM is recommended among low-risk pregnant women between 39-41 weeks. In both cases, keen follow up is crucial to achieving good obstetric outcomes. A randomized control trial and further studies assessing the level of satisfaction, quality of intrapartum care of low-risk pregnancies between 39-41 weeks gestation are recommended. Evidence relating to cervical priming and duration from onset of labor to delivery

may provide for plausible explanation for the perineal tears and adverse fetal events found in this study

Key Words: Induction of labor, expectant management, adverse maternal outcomes, adverse neonatal outcomes

1. INTRODUCTION

1.1 Background

The normal duration of a pregnancy in humans is 40weeks from the last normal menstrual period with a variation of up to 5 weeks (1). However, only up to 4% of pregnancies are delivered on their due date (2, 3). While 10% of pregnancies extend beyond this duration (3), a majority are delivered spontaneously or through induction of labor at an earlier date. The reasons for induction of labor may be elective or medically indicated in order to avert adverse maternal and neonatal complications associated with prolongation.

In high income countries, one in every four deliveries at term is carried out through induction of labor (3). The data in Africa in the early 21st century put it at 4.4% (4) but current trends regarding induction of labor regionally and locally are not well documented. The commonest indication for pharmacological induction labor in Kenya is pre-labor rupture of membranes, followed by non-reassuring fetal status and maternal medical conditions (4).

Induction of labor is recommended at gestations beyond 41 weeks and discouraged for gestations below 39 weeks where there is no clear medical indication, while taking into account favorable obstetric and neonatal outcomes (3, 6). However, there are no recent local or regional studies comparing induction of labor and expectant management for term pregnancies both locally and regionally. This study seeks to evaluate the outcomes of low risk pregnancies at 39-41 weeks undergoing induction of labor compared to expectant management in Pumwani Maternity Hospital and inform standards of practice that will improve management of pregnant women at this gestation.

2. LITERATURE REVIEW

2.1 Physiology of Labor

The physiology of normal labor is a complex interaction between the endocrine and paracrine systems of the mother, fetus and the placenta which ultimately results in initiation and sustenance of periodic uterine contractions and alteration in the position, structural integrity, consistency, effacement and dilatation of the cervix to pave way for the expulsion of the fetus(7). There are four phases of parturition, namely, quiescence, activation, stimulation and involution.

During the quiescent phase, the contractility of the myometrium is muted, with infrequent, spasmodic Braxton hicks contractions felt. While the cervix continues to be firm to contain the growing gestation, it has increased compliance due to changes in the extracellular matrix and hyperplasia and hypertrophy of stromal and glandular components. In the activation phase, the uterus prepares for labor with the potentiation of its contractile ability. There is increased expression of gap junctions and contractile associated proteins and the formation of the lower uterine segment to allow for the descent of the fetal head into the pelvic inlet. At the cervical region ripening occurs making it more accommodating for the descent as well as expulsion of the conceptus. The composition of the ground substance changes so as to aid in aligning the collagen fibers in an organized manner. So as to allow for pliability, there is increased collagen fiber diameter with poor cross-linkages, while the mucus secreting columnar and stratified epithelia increase in number.

The stimulation phase is synonymous with active labor, while the involution phase occurs after delivery. Here, the myometrium remains in a state of rigid and persistent contraction and

retraction. There is restitution of ovulation and initiation of preparations for the next pregnancy (7).

In some cases, however, these mechanisms may be delayed, resulting in a post term pregnancy. The pathogenesis of post term pregnancies is not clearly understood (2,3,8) but some of the noted risk factors for prolonged or post term pregnancies include primigravidity, low socio-economic status, maternal weight gain or obesity, smoking, past history of prolonged pregnancy and a male fetus. (2, 9-11).

The occurrence of both maternal and neonatal complications beyond term occurs as a continuum. Such pregnancies are associated with increased perinatal morbidity and mortality rates as compared with delivery at term. They have higher incidence of macrosomia, oligohydramnios and cord compression (2,5,13) . The risk of still birth increases beyond 39 weeks and with increasing gestation thereafter (14). Other neonatal risks include shoulder dystocia, meconium aspiration syndrome, asphyxia, bone fractures, peripheral nerve injury, low APGAR scores, increased need for resuscitation, pneumonia, septicemia, NICU admissions and increased perinatal mortality rates (1,2,5,13,14,24). Such pregnancies are also associated with various stages of post-maturity syndrome as elaborated by Clifford et al (1). In the first stage, the neonate is long and lean with wrinkled peeling skin and minimal subcutaneous fat. In the second stage, there is also associated greenish meconium staining of the fetal skin and placental membranes. The third stage of post-maturity syndrome has a higher incidence of fetal distress with yellowish-brown meconium staining. By 42 weeks, 20% of the fetuses develop post-maturity syndrome (1).

Maternal complications of post term pregnancies include labor dysfunction, obstetric trauma, increased risk of operative vaginal delivery as well as psychological disorders such as anxiety

and depression (1). All these risks associated with post term pregnancies have informed recommendations by ACOG, RCOG and WHO that induction of labor is warranted for pregnancies confirmed to be 41 weeks and above (3,6).

The prevalence of labor induction has increased over the years. In America, it has more than doubled from 9.5% in the mid-90s to 23% by 2012 (4). In Africa however, despite the gradual increase in assimilation of induction of labor the rates are lower, but the continent is slowly catching up. According to a secondary analysis of the 2004-2005 WHO global and multi-country survey, the average rate of induction was 4.4% with a range of 1.4-6.8% and the unmet need for induction of labor ranged between 66% and 80.2% (4). It has been a recommendation by ACOG that every department should have well documented protocols regarding the methods of induction and augmentation of labor (5).

2.2 Induction of Labor versus Expectant Management in Full term and Post-term Periods

There is no evidence based absolute limit beyond which a pregnancy should not be allowed to progress. The contentious issue is whether there are more favorable outcomes with induction of labor for term pregnancies between 39 weeks and 40 weeks 6days compared with expectant management. Based on studies conducted in the early 21st century, the norm had been to avoid elective induction. This is because there was minimal evidence that it results in better maternal and perinatal outcomes and most of the published studies seemed to favor expectant management (4, 9, 14-16). It is noteworthy that most of these were retrospective observational studies with a low level of evidence as compared to systematic reviews and randomized control trials. These observational studies also didn't show a statistically significant risk with induction of labor.

In a 2year retrospective analysis by Daskalaskis et al. from 2012- 2014 which compared induction of labor using 3mg dinoprostone 6 hourly versus expectant management for pregnancies beyond 41 weeks, 438 women were included in the study (15); with 211 in the induction group and 227 in the expectant management group. This study showed no significant difference in the perinatal outcomes or rate of caesarean section in both groups (18). These findings were similar to those of a randomized control trial by Helmstad et al. in 2007(14) and Hannah et al (16) in 1992, which compared induction of labor and with expectant management for pregnancies at 41 weeks gestation (11, 19). In 2012, a secondary survey of the WHO global and multi-country survey of 2004-2005, where 4.4% of the deliveries in 7 African countries were as a result of induction of labor, suggested that expectant management seemed to reduce the caesarean section rate. However, it was associated with increased chances of NICU admissions, low apgar scores, low birth weight and fresh still births as compared to induction of labor at term (4). Of note, Kenya was one of the sites included in the multi-country survey.

While the WHO does not recommend induction of labor below 41 weeks gestation, it admits that the level of evidence is low and that further research is warranted (3). However, elective induction below 39 weeks has been shown to have adverse outcomes (6).

Recent research implies that early induction of labor may be beneficial. The ARRIVE trial, a randomized trial of induction of labor versus expectant management Grobman et al sought to assess the maternal and perinatal outcomes of induction of labor for low risk nulliparous women at 39weeks compared to expectant management and delivery beyond 40 weeks 5 days (17). This was a multicenter trial with 3062 women assigned to labor induction and 3044 assigned to expectant management from March 2014 to August 2017. It was noted that perinatal complications were significantly more in the expectant management group i.e. 5.4% as compared

to those who underwent elective induction i.e. 4.3% (RR 0.8; 95% CI , 0.64-1.00) . The frequency of caesarean sections was lower in the induction group i.e. 18.6% as compared to those who were randomized for expectant management i.e. 22.2% (RR 0.84, 95% CI, 0.76-0.93).

These findings were further strengthened by a systematic review of cohort studies that compared elective induction and expectant management in nulliparous women with no medical indication for induction of labor. Grobman et al in 2019, after meta-analysis of 6 cohort studies done in the last decade, concluded that, compared to expectant management, induction of labor reduced the risk of caesarian delivery(26.4% vs 29.1%), peripartum infection(2.8% vs 5.2%), NICU admissions(3.5% vs 5.5%, RR 0.80; 95% confidence interval, 0.72-0.88), respiratory distress, meconium aspiration and perinatal mortality. The risk of PPH and perineal tears was comparable for both groups.

A 2018 Cochrane systematic review which sought to assess the efficacy of a policy of labor induction at or beyond term compared with expectant management in improving obstetric outcomes favors labor induction (18). Having assessed 30 randomized control trials from 14 countries with moderate risk of bias and a report on 12479 women, the systematic review seemed to concur with the findings of the ARRIVE trial. Induction of labor was associated with lesser perinatal deaths (RR 0.33, 95% CI, 0.14-0.78) as evidenced by 20 trials that fulfilled the eligibility criteria. There were also significantly lesser still births (RR 0.33, 95% CI, 0.11-0.96). In the induction group, it was also noted that the caesarean section rate was statistically lower (RR 0.92, 95% CI, 0.85-0.99, 27 trials; 11738 women). There was no difference in perineal trauma, postpartum hemorrhage or length of hospital stay in the two groups. However, it was noted that operative vaginal deliveries were more in the induction group compared to those who were randomized to expectant management. In terms of neonatal outcomes, APGAR scores

below seven and NICU admissions were lower in women who underwent induction of labor. There was no difference in neonatal trauma. The systematic review also concluded that further investigation on the optimal time for offering induction as well as the risk profiles, values and preferences of such women is warranted.

While assessing the outcomes of obese women on induction of labor compared to those expectantly managed between 39and 40 weeks, Gibbs et al. had findings that favored induction (19). Those induced had lower C-section rates, less maternal mortality and lesser NICU admissions regardless of parity. These findings echoed those of Bailit et al. earlier in 2015 (20), save for higher odds for caesarean section in this population.

A previous randomized trial by Walker K et al in the UK from 2012- 2015 compared induction of labor and expectant management for women over 35 years. 304 women underwent induction of labor at 39 weeks, while 314 were expectantly managed up to 41-42 weeks gestation. It showed no statistical difference in the Caesarean section rate or adverse maternal or perinatal outcomes in the short term. This study however did not evaluate the incidence of still births (21).

Miller N et al in 2015 conducted a randomized controlled trial which compared elective induction of labor at 39 weeks to expectant management among nulliparous pregnant women with unfavorable cervix denoted by a bishop's score less than 5 (24). 159 women were enrolled; 80 in the induction group and 79 were expectantly managed.it was noted that the C Section rate was not statistically different between the two groups (30.5 vs 17.7% RR 1.72, 95% CI, 0.96-3.06) and that induction of labor didn't double the risk of Caesarean section as compared to expectant management. Moreover, the length of stay postpartum and indications for the caesarean section were not statistically different between the two groups.

Contrary to the findings of the above studies, the findings of a statewide perinatal data system analysis in 2010 by Glantz JC et al favored expectant management (9). While analyzing live births' records of 38147 women in the Finger lake states of New York City from 2004-2008, it was concluded that there was an increased risk of C-Section with IOL whether using gestations within the same week or week by week analysis while compared with the EM group. However its shortcomings are that it was retrospective in nature and neonatal outcomes were limited to only APGAR scores and admissions to NICU. Fetal deaths and still births were also not analyzed as the database used only information from live birth certificate records

2.3 Achieving Successful Induction of labor and Various Methods Used

Induction of labor can be achieved by pharmacological or mechanical means. In cases where the cervical os is closed and not effaced, this process starts with the process of cervical ripening.

Certain factors have been shown to increase the success rate of labor induction. Among them are: a favorable bishops' score, multi-parity, body mass index less than 30, estimated fetal weight below 3500g and good fetal descent(14,17,24,25).

Common pharmacological methods for induction of labor include the use of oxytocin and the use of prostaglandins such as PGE1 i.e. misoprostol and PGE2 i.e. dinoprostone. Mechanical methods include stripping of membranes, artificial rupture of membranes, trans-cervical catheters, extra-amniotic saline infusion and the use of hygroscopic cervical dilators. Dinoprostone is available as a gel; time-release 10mg vaginal insert and as a suppository of 3mg administered 6hourly. It is usually used as a cervical ripening agent. In a 2014 Cochrane meta-analysis, involving 70 trials and 11487 women, it was shown to reduce the induction to delivery time with no impact on the caesarean section delivery rate. Its impact on obstetric outcomes was

however uncertain (26). Notable adverse effects include uterine tachysystole in 1-5% of cases as well as fetal heart rate abnormalities (10, 26). Misoprostol is often used in induction of labor due to its safety and efficacy. Compared with dinoprostone, when inserted per vaginally or intra-cervically, it has been shown to be of similar or even superior efficacy and also reduces further need for oxytocin to augment labor. The recommend dose is 25mcg 4-6 hourly and higher doses are associated with uterine tachysystole and meconium staining of amniotic fluid (27, 35). Oral administration of 25mcg misoprostol 2-hourly is comparable to intravenous oxytocin. It also has less risk of uterine tachysystole and fetal heart rate abnormalities but no significant change in C-section delivery rates (17). Oxytocin is generally very successful in the induction of labor. However, its clinical use is limited by its prolonged induction time and high risk of prolonged postpartum hemorrhage. Its effect is also muted with its withdrawal due to a short half-life of 3-5 minutes (7).

Mechanical methods may also be employed in induction of labor. Most studies however show no significant impact on C-section rates but others have been shown to shorten the duration of labor and have a higher rate of vaginal delivery in 24hours. Amniotomy alone or in combination with oxytocin, for example, had been shown to be superior to oxytocin alone. Early amniotomy significantly reduces the duration of labor but increases the risk of maternal fever and chorioamnionitis. Membrane stripping has been shown to accelerate spontaneous labor but has no impact on maternal or neonatal outcomes (28). Foley catheters have few systemic adverse events to the mother and do not undesirably affect fetal heart rates. But it is a less effective method in induction of labor compared to misoprostol (26, 36) and has the potential to dislodge an undiagnosed low-lying placenta. Although early studies seemed to suggest that the combination of Foley catheter with either oral or vaginal misoprostol was not superior to

misoprostol alone, recent studies imply that a combination of the two methods may be synergistic in terms of reducing induction to delivery time as well as the risk of caesarean section compared to either method alone (28).

Overall, in the ranking of all these methods of labor induction, higher rate of delivery in 24 hours is achieved with vaginal misoprostol followed by vaginal dinoprostone (6, 17,28-30). It is lowest using intra-cervical dinoprostone. Foley catheter has the lowest risk of uterine tachysystole and fetal heart rate abnormalities, followed by intra-cervical dinoprostone and oral misoprostol. Vaginal misoprostol bears the highest risk. In terms of lower rate of C-section delivery, oral misoprostol ranks highest, followed by vaginal misoprostol then vaginal dinoprostone. Foleys catheter and intra-cervical dinoprostone rank lowest (17, 28).

Locally, Esiromo et al. in 2012 noted that induction of labor at or near term at KNH had a high success rate of 74%, minimal side effects and 94% of the cases had good neonatal outcomes in terms of Apgar score. 6.9% of the cases had NICU admissions and 2 cases of fresh still births were reported (22). These findings were comparable to those of Evalyne J et al. in 2015 (23).

2.4 Antenatal Fetal Assessment for term mothers on expectant management

In the previous studies done comparing labor outcomes of induction of labor compared to expectant management, there had to be strategies to assess fetal wellbeing so as to intervene when any compromise was noted.

As a result, studies have been conducted to assess the most effective method of assessing fetal wellbeing. Such methods of fetal surveillance include twice weekly non-stress tests, fetal kick charts, amniotic fluid index, computerized cardiotocography and a biophysical profile.

ACOG asserts that there is no optimal method for antepartum fetal surveillance. There is no Randomized control trial that shows antepartum fetal surveillance actually reduces perinatal morbidity and mortality (6). Moreover, studies conclude that no method is superior to the other. An abnormal antenatal test should be assessed according to the scenario. They have a high negative predictive value but these tests are not effective in assessing acute harmful events such as cord prolapse. The positive predictive value of abnormal antenatal fetal surveillance techniques are hard to establish but are generally lower. However, there hasn't been any harm noted in performing antenatal surveillance for these pregnancies, thus it is worth considering (31).

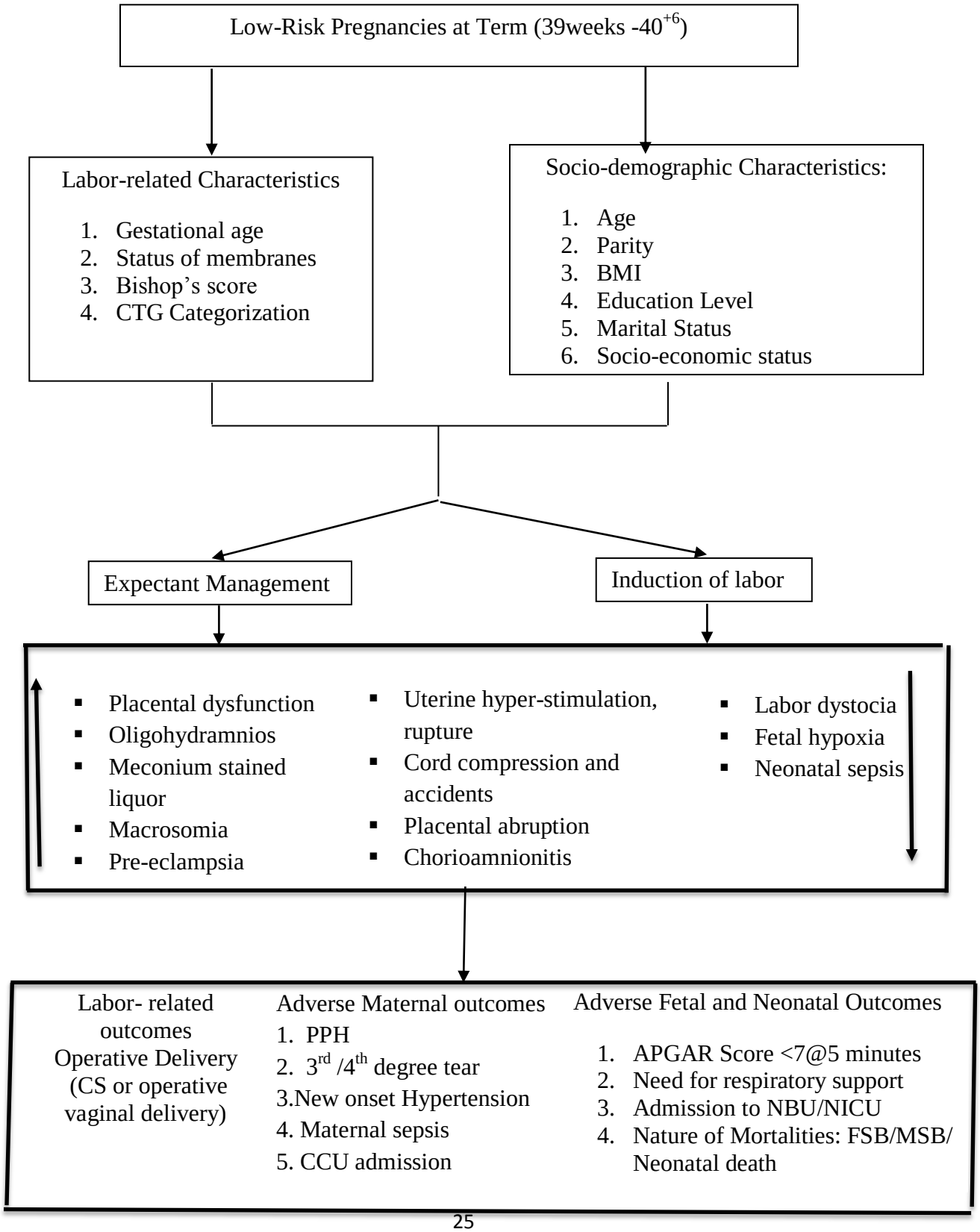
With proper administration and monitoring, pharmacological induction has been shown to have a high success rate in both local and global research (22-24, 32, 33).

2.5 Perceptions and Quality of care of Women undergoing Induction of labor

There has been low investigative effort towards demystifying the perception and experiences of women towards induction of labor. A study in Europe by Annabel et al. revealed a grim picture where women who had undergone pharmacological induction of labor got little knowledge from the health providers and felt a great disparity between their expectations and the actual experience. A sizeable proportion of them revealed they would rather opt for a Caesarean section in future pregnancies as opposed to pharmacological induction (34). Such data regarding the subject matter is yet to be conclusively collected and analyzed regionally and locally in Kenya.

2.6 Conceptual Framework

Figure 1: Conceptual Framework



2.7 Conceptual Framework Narrative

For low-risk pregnancies, labor-related and sociodemographic characteristics have to be taken into consideration while determining the optimum gestational age at which to allow delivery. Based on the literature review, labor-related characteristics to be evaluated in this study include the gestational age, status of membranes, bishop's score as well as the pre-induction CTG categorization. Socio-demographic characteristics including maternal age, parity, BMI, education level and socioeconomic status are also important.

This will influence the clinician's decision on whether to induce labor at that time or expectantly manage the patient. With expectant management, there is the increased risk of placental dysfunction e.g. due to aging, infarction or calcification, which may ultimately result in fetal distress. There is also progressive increase in fetal weight and reduction in amniotic fluid, which may result in labor dysfunction and fetal distress.

Induction of labor also has its risks which include uterine hyper-stimulation and rupture, fetal heart rate anomalies, risk of placental abruption, cord compression and accidents. These factors may ultimately impact on the mode of delivery, maternal and neonatal outcomes.

This study sought to compare the labor related, maternal and neonatal outcomes for low risk pregnancies induced at 39 weeks compared to those that are expectantly managed. This will form a basis for evidence-based policy formulation in Pumwani Maternity Hospital as well as further research regarding the plausibility of assimilation of elective induction if better outcomes are realized.

2.8 Justification

Induction of labor is encouraged for pregnancies above 41 weeks gestation and discouraged for gestations below 39 weeks. However, pregnancies have increasing maternal and neonatal complications with increasing gestation beyond 39 weeks (2). Therefore, a balance between the risks and benefits has to be taken into consideration when choosing between induction of labor and expectant management beyond this gestation.

There is no consensus regarding induction of labor for low-risk pregnancies between 39-41 weeks gestation and the level of evidence against it is low. (3)

Recent studies, like the ARRIVE trial in the US, propose that labor induction compared to expectant management has good obstetric outcomes in the period between 39-41 weeks as it has a low caesarean section rate, better Apgar scores, less NICU admissions and reduced need for respiratory support.

However no local or regional studies have been done to inform management of low-risk pregnancies between 39-41 weeks gestation for our resource constrained setting. The findings of this study will thus play a role in influencing policy formulation and standardizing the management of low-risk pregnancies around term.

2.9 Research Question

What is the risk of adverse obstetric and early neonatal outcomes of low-risk pregnancies at 39-41weeks gestation undergoing induction of labor compared to expectant management at PMH?

Null hypothesis: There is no difference in the risk of adverse obstetric and early neonatal outcomes of induction of labor compared to expectant management low-risk full term pregnancies at 39-41 weeks at PMH

2.10 Objectives

2.10.1 Broad Objective

To determine the risk of adverse obstetric and early neonatal outcomes of low-risk pregnancies at full term (39-41weeks) undergoing induction of labor compared to expectant management at PMH in 2020.

2.10.2 Specific Objectives

Among women with low-risk pregnancies at full term (39-41 weeks) who undergo induction of labor compared to expectant management at PMH in 2020, to compare:

1. The incidence of operative delivery(Cesarean Section and operative vaginal delivery)
2. The risk of adverse maternal outcomes (including postpartum hemorrhage, 3^{rd} /4^{th} degree perineal tear, new onset hypertension, maternal sepsis and admission to CCU)
3. The risk of adverse fetal and early neonatal outcomes within 72 hours (including APGAR score at 5 minutes<7, admission to NBU, need for respiratory support, meconium aspiration, macrosomia, neonatal sepsis and still births)

3. METHODOLOGY

3.1 Study Design

The study design was a prospective cohort study. Pregnant women with low-risk, singleton cephalic pregnancies with no contraindication for vertex delivery were recruited at 39-40^{+6} weeks. This was done in the labor ward, admission area and wards. The exposed group was low risk pregnant mothers offered induction of labour in view of their gestation being between 39-40^{+6} weeks and not due to clearly determined medical/obstetric indications for which induction of labour is indicated. The unexposed group included low-risk pregnant mothers recruited between 39-40^{+6} weeks' gestation who were expectantly managed and followed up until delivery. Based on the study design, it was purely observational and neither the researcher nor the assistants influenced the clinician's decision on whether to induce or expectantly manage the patient.

Once informed consent was sought and approved by the mother, the details of interest were extracted from the mothers' files and through the use of a structured questionnaire during interviews. Details of a pre-induction CTG, status of the membranes and a bishop score done were recorded. The mother was followed up through the induction process up until discharge. Details of the mode of delivery, maternal and neonatal outcomes were then recorded.

For those undergoing expectant management, their biodata and sociodemographic details were entered in the questionnaire, including their contacts. Their files were uniquely labelled and coded. Prior to discharge, they were educated on the danger signs to look out for and to report to Pumwani Maternity Hospital at the onset of labor or when any ominous sign is noted. Contact was maintained through phone calls or weekly clinic attendance at the facility. They were also

educated on antenatal fetal assessment by use of a fetal kick chart or doing an ultrasound. At the onset of labor or when medical intervention was deemed necessary, the trained research assistants followed them up until delivery and discharge. The additional information was then entered in a questionnaire for further analysis.

3.2 Study site and setting

The study was conducted at the Pumwani Maternity Hospital which is the largest maternity hospital in sub-Saharan Africa. It is a government facility within the jurisdiction of the Nairobi City County located in the eastern part of Kenya's capital city, approximately 5 kilometers away from the city center. It serves majority of the people in Nairobi and is also a referral center for patients with obstetric complications in the neighboring counties. The hospital admits pregnant mothers at a confirmed gestation of above 28 weeks with those in term and late term being the majority. Harboring 354 obstetric beds, 44 baby cots and 2 functional theaters, it is able to conduct 50-100 normal deliveries and15-20 C-sections in 24 hours. It has 6 postnatal wards and a High Dependence Unit. It also has a 30 bed antenatal ward where mothers are kept under observation for various medical and obstetric conditions including false labor, urinary tract infection, reduced fetal movement and latent phase of labor. Its antenatal clinic runs from Monday to Friday from 8.00am-1.00pm where consultants run it on Mondays, Wednesdays and Fridays; while midwives in consultation with medical officers run it on Tuesdays and Thursdays. The facility offers comprehensive emergency obstetric and neonatal care, ultrasound and laboratory services. In late 2018, it incorporated the use of a CTG in addition to a partogram in the management of labor. Through multi-sector and international collaboration, it has enhanced its services and now offers training in midwifery and nursing through its college of nursing and

midwifery. The pregnant women are majorly in late term who are usually referred from peripheral clinics where they were initially on follow up. This is in anticipation of delivery at Pumwani Maternity Hospital as majority of the facilities are not well equipped to handle labor related complications as well as operative delivery. On average, with the advent of the novel Corona Virus pandemic, the clinic serves 15-20 patients per day with on average 10 of them being above 39 weeks. With 80-105 pregnant women on average being triaged at the admission desk daily, majority of them being in late term; a good proportion attending the antenatal clinic; and the 30 bed antenatal ward in full capacity despite the effects of the Corona Virus, the hospital forms an ideal site for conducting this study. Despite the pandemic, for example, the hospital registered 1572 deliveries from 1st May to 27th June 2020, with 82% noted to be at term. Induction of labor is mostly done by use of a 25mcg vaginal misoprostol tablet and oxytocin. However, there are no standard operating procedures on whether induction of labor or expectant management should be done for low risk mothers at 39 weeks to 41 weeks gestation.

3.3 Study Population

The study population included low-risk pregnant mothers presenting at the PMH labor ward admission desk, ANC clinic and antenatal ward at a confirmed gestation of 39-41 weeks. Gestation was determined by use of last normal menstrual period and/or a first or second trimester ultrasound. This study included low- risk pregnancies having no contraindication to vaginal delivery and no known adverse fetal congenital anomaly.

3.4 Inclusion and exclusion Criteria

3.4.1 Inclusion criteria

Pregnant women at 39-41weeks gestation confirmed by estimation from last menstrual period if with a regular cycle and/or ultrasound in the first and second trimester

Singleton uncomplicated pregnancies in cephalic presentation

Intent to deliver at PMH

Reachable through phone call/ clinic attendance

3.4.2 Exclusion Criteria

Multiple gestations

Previous caesarean section or myomectomy

Documented intrauterine fetal demise or congenital anomaly

Documented fetal growth restriction, breech presentation, transverse lie cord prolapse or presentation, Premature/pre-labor rupture of membranes

Severe maternal medical illness: Pre-eclampsia with severe features, Diabetes, Anaemia, renal or pulmonary disease; hypertensive disorders of pregnancy, chorioamnionitis.

HIV positive patients with unknown viral load

Grand multiparity

Those in Active phase of labor

Placenta abruption, placenta previa or vasa previa

3.5 Sample Size and Sampling Procedure

Figure 2: Sample Size Calculation

$$N_{Kelsey} = \frac{\left(z_{\alpha/2} + z_{\beta}\right)^2 p(1-p)(r+1)}{r(p_0 - p_1)^2}$$

$$p = \frac{p_0 + rp_1}{r+1}$$

Using the above Kelsey formula for sample size calculation where

α -The probability of type I error (significance level) is the probability of rejecting the true null hypothesis

β -The probability of type II error (1 - power of the test) is the probability of failing to reject the false null hypothesis.

P_0 -The proportion of the unexposed group

P_1 -The proportion of the exposed group

r -The ration between the exposed and unexposed groups=1

Z_{β} =standard normal variation for level of power=80% power is 0.84

Z $\alpha/2$= standard normal variation for level of significance= 1.96

In a similar study done by Gibson et al. (37), using caesarean section rate for induction of labor at 39 weeks and expectant management which were 23.6% in the exposed group and 42.3% in the unexposed group.

$$n = \frac{(1.96+0.84)^2 * 0.22 * 2}{(0.236-0.423)^2} \qquad n=100.$$

Assuming a 10% attrition rate then n was 110 for each group making a total sample population of 220. Consecutive sampling was done until the required sample size was achieved.

3.6 Study Instruments and Procedures

Based on the selection criteria, potential participants were recruited from labor ward admission desk, antenatal clinics and antenatal wards at a confirmed gestational age of 39-41weeks with no medical or obstetric complications. After successful recruitment of a participant and informed consent was acquired. A questionnaire was administered by the principle investigator and three trained research assistants who were registered nurses and midwives working in the facility's admission desk, antenatal and labor wards. Participants were then assigned to the induction group or expectant management group based on the clinician's decision at time of contact. Labelling of files was done for easy identification and follow up. Those on induction of labor were then admitted into the labor ward/ antenatal ward where their sociodemographic data will be recorded in the structured questionnaire. Pre-induction CTG or ultrasound findings done to ensure fetal were also documented. The research assistant then followed up the participant during labor and delivery up until discharge and the outcomes of interest recorded. This included the mode of delivery as well as the maternal and neonatal outcomes previously described. Data was acquired and recorded by use of a structured questionnaire.

For those on expectant management, prior to discharge, they were informed about antenatal fetal surveillance techniques after which the desired option will be agreed upon. This was either by use of a fetal kick chart or weekly ultrasound. Their sociodemographic data and contacts were recorded on the questionnaire, which was kept in a secured cupboard accessible only to the primary researcher and his assistants. Weekly ANC visits or phone calls were used for follow up until delivery. Their files were coded and they were encouraged to come to PMH in case of any emergency or onset of labor. This was in an effort to minimize loss to follow-up. The questionnaires were retrieved when they come to the hospital for delivery and the remaining

sections filled in appropriately. Data of patients initially on expectant management who eventually got induction of labor due to obstetric indication was analyzed under the expectant management group. This is because recruitment into either groups was based on the initial clinical decision. To achieve the desired sample size, sequential sampling was done. Since the mode of delivery couldn't be known during participant recruitment, this study aimed to compare the incidence of operative delivery between the two groups i.e. Caesarean sections and ventouse extraction and determine the relative risk between the two groups.

Prior to the initiation of the study, the questionnaire was pretested in the facility to ensure it was easy to understand and administer and also to assess its suitability in retrieving all the information relevant to the study. Three research assistants were interviewed and given astute training on seeking informed consent, data collection and recording, data safety as well as communication skills. Training of research assistants took place over the duration of one week; initially they observed the process of obtaining informed consent and filling of the questionnaires. Thereafter they worked under supervision until the principal investigator was satisfied. The principal investigator regularly reviewed the questionnaires for completion.

Data extraction techniques included the use of assistant administered structured questionnaire, patient files with intrapartum and postpartum records as well as antenatal records in the ANC booklet.

3.7 Data variables

The independent variables included induction of labor and expectant management. Dependent variables included the incidence operative delivery, adverse maternal and neonatal outcomes. The adverse maternal outcomes included the incidence of postpartum hemorrhage, perineal tears, new onset hypertension, maternal sepsis and CCU admission. The adverse neonatal outcomes

included Apgar score <7 at 5 minutes, admission to NBU, need for respiratory support, meconium aspiration, macrosomia, birth trauma, neonatal sepsis and still births or early neonatal deaths within 72 hours. Composite variables for adverse maternal and neonatal outcomes were also used.

Potential confounders were classified as sociodemographic or obstetric related. Socio-demographic characteristics of interest included maternal age, parity, level of education, marital and socioeconomic status. Obstetric-related variables included the number of antenatal clinic visits, gestational age at delivery, state of membranes and CTG categorization.

3.8 Data Collection and Management

After ethical clearance and administrative approval was sought obtained, data extraction techniques included the use of interviews, patient files with intrapartum and postpartum records as well as antenatal records in the ANC booklet.

Data collection was done using a structured questionnaire (Appendix 1). The questionnaires were coded to make the data entry easy. It was pretested in the facility to ensure it is easy to understand and administer and also suitable in retrieving relevant information. The filled questionnaires were kept in a safe and confidential cabinet that was accessible only to the principal investigator and research assistants, ready for the data entry.

Three research assistants were recruited, trained for 1 week and worked under supervision until the principal investigator was satisfied. This included certified midwives and nurses. The principal investigator regularly reviewed all questionnaires for completion. Any clarifications to be made were sought out immediately. On completion of the data entry exercise the data was

exported in into a database, after which a Statistical Package (SPSS – Version 24.0) was used for analysis.

3.9 Data Analysis

Descriptive statistics were used to describe demographic characteristics and differences between the two groups i.e. frequency distribution, means, standard deviations, proportions and cross tabulations. Regarding adverse maternal neonatal outcomes, multivariable logistic regression models were used to compare the outcomes of the two groups and adjust for potential confounders. Cross-tabulations were then be used to identify risk factors associated with adverse maternal and neonatal outcomes.

Relative Risk were calculated, comparing elective induction at 39-41 weeks with expectant management while utilizing the incidence of operative delivery, adverse maternal and neonatal outcomes.

X^2 and Fisher exact tests were used to evaluate the differences in distributions of socio-demographic and labor-related characteristics of the two groups and their impact on the mode of delivery. Statistical significance was set at 95% and used to test the strength of association between the two groups. $p<0.05$ was considered statistically significant. Data presentation was in form of tables and graphs.

3.10 Ethical Consideration

The principal investigator instituted all measures to ensure that the ethical rights of the study participants were safeguarded. The following measures were put into place:

1. Ethical approval was obtained from the KNH-UON Ethics and Research Committee and administrative approval sought from Pumwani Maternity Hospital.
2. Informed comprehensive and voluntary consent from the participants prior to recruitment by qualified investigators. Only willing participants were included in the study. Women who were not willing to participate in the study weren't be victimized or denied care.
3. Data collected remained confidential, accessed only by the PI and the statistician to achieve set objectives.
4. The study design chosen had a favorable risk benefit ratio and favorable procedures to minimize harm to the participants.

3.11 Study Strengths

The strength of this study is that it had a prospective cohort study design thus minimizing selection, information and recall bias. It was also a novel study both locally and regionally. The setting is in a busy referral maternity unit thus the sample size was effectively achieved and some of the results may be generalizable. The hospital still remained functional with large patient numbers despite the effects of the Coronavirus pandemic. The follow up period was short hence reducing the chances of attrition of the participants. Those pregnancies which were expectantly managed underwent antenatal fetal surveillance to avert overtly adverse outcomes as well as reduce the fall-out rate. From the findings of the study, we were able to analyze multiple outcome variables from a single exposure. We were also able to measure incidences and evaluate

the relationship between the exposure and the outcome. It also enabled the researcher to measure incidences and demonstrate causality.

3.12 Study Limitations and Limitation Minimization

One of the limitations of this study was that due to its short follow up period, it was not be able to analyze long term adverse effects. Moreover, the outcomes of patients on follow-up who eventually deliver in other hospitals were not be accounted for. The researcher was not be able to influence the mode of induction. Moreover, the pharmacological agents used for induction of labor were at times unavailable thus delaying patient management. Some of the inductions were undocumented due to fear of victimization in the event that a bad outcome was realized

This study was expensive, time consuming and also prone to confounding. The hospital had limited medical staff i.e. midwives and doctors which may have affected patient care as well as the obstetric and neonatal outcomes. The duration of the study was also prolonged by industrial strikes by various cadres at different times which affected the rate of recruitment. As a result, some of the patients initially on follow up ended up being referred to other facilities hence their outcomes were not included in the analysis.

The COVID-19 pandemic posed a challenge due to limitation of patient admissions to those with dire emergencies initially and later on quarantine of a majority of staff which lead to a temporary shutdown of the facility for two weeks. Extra precautionary measures had to be taken to ensure that the research assistants were protected while interacting with patients.

In terms of cost and time implications, the setting of PMH helped ensure the sample size was achieved within a reasonable duration possible as it was a busy maternity unit with a large patient flow. An adequate number of research assistants was also be recruited to ensure the

objectives were achieved within a reasonable timeframe. Alternative staffing was also sought during the industrial strikes to ensure the facility remained open to attend to incoming patients.

Patients on follow up were regularly contacted through phone calls and clinics so as to encourage them to deliver at PMH. Regarding the mode and process of induction, the methods used in PMH are few in variety due to resource limitation, safe and successful. Misoprostol and syntocinon were the most commonly used modes of induction of labor. This reduced the level of confounding and bias. To deal with confounders, careful patient selection based on the strict inclusion and exclusion criteria was done while other confounders were identified and handled at the point of analysis. In order to assess for long term adverse effects, future studies are recommended and encouraged based on the short term findings of this study.

3.13 Dissemination of Research Findings

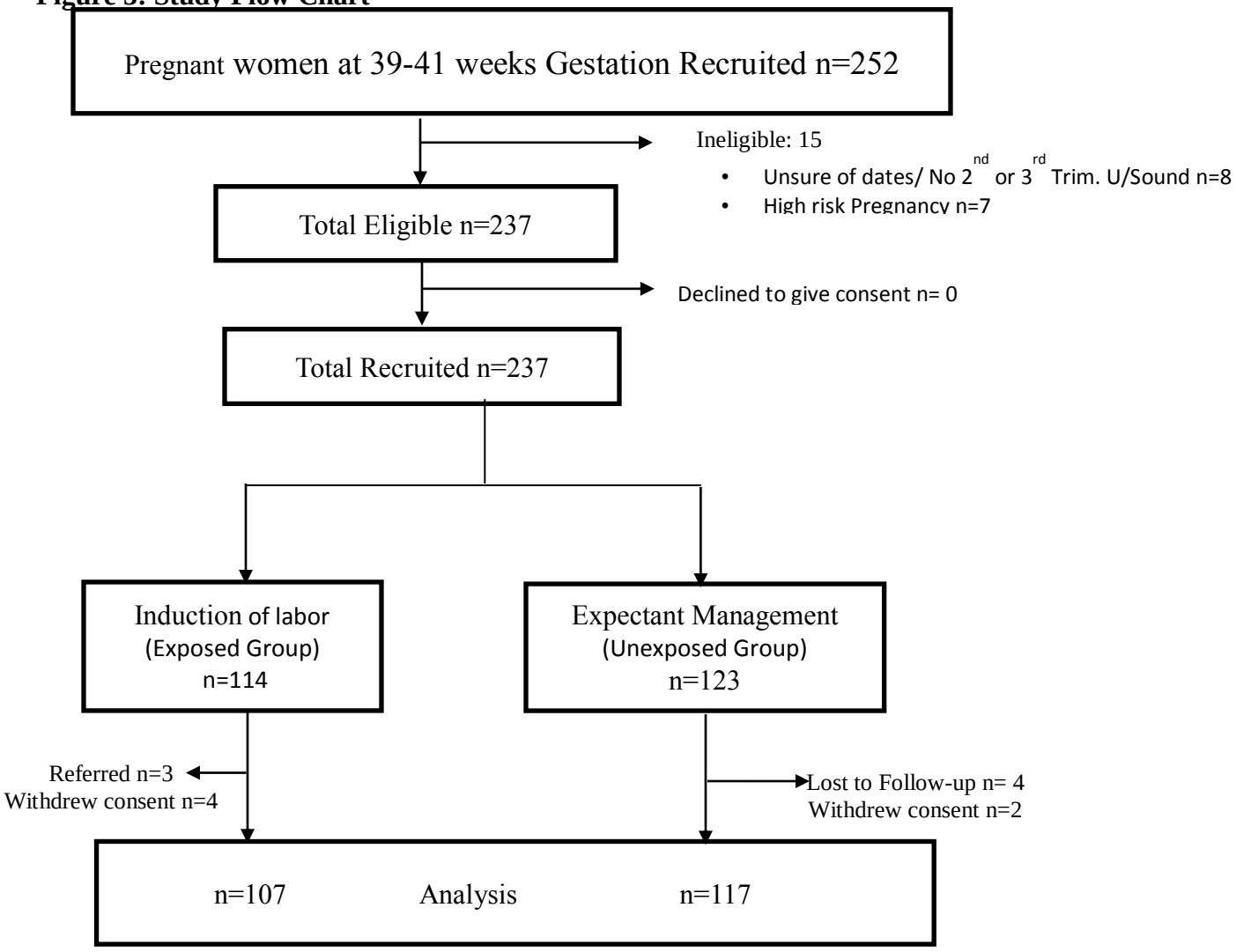
Dissemination of the results will take place by three methods:

- Production of a report that will be sent to the department of obstetrics and gynaecology in Pumwani Maternity Hospital and Kenyatta National Hospital
- Publishing papers in specialist and general, national and international journals.
- Presentation of papers at both national and international conferences.

CHAPTER FOUR: RESULTS

Between the months of August and November 2020, a total of 224 participants were included. Of this, 107 participants underwent induction of labor while 117 underwent expectant management. The results from analysis of the data collected from them are described below.

Figure 3: Study Flow Chart



STUDY FLOW CHART NARRATIVE

Between the months of August and November 2020, a total of 252 participants were recruited for the study. A ratio of 1:1 was used. Of these, 15 were deemed ineligible for the study. Eight of them were unsure of their dates and had no earlier ultrasound done while seven of the participant had high risk pregnancies with concomitant medical or obstetric conditions. The total eligible participants were 237, all of whom gave written informed consent to participate in the study. Of these, 114 were in the cohort of induction of labor while 123 were in the expectant management cohort. Among those on induction of labor, 3 were referred to other facilities due to health care workers strike and the impact of COVID 19 that hampered service delivery, while 4 withdrew consent. Among those on expectant management, 4 were lost to follow up while 2 withdrew consent. Eventually, a total of 107 pregnant women undergoing induction of labor and 117 pregnant undergoing induction of labor were included into the study, data collected from them and their patient files and data analysis done.

Table 1: Sociodemographic Characteristics of Women on IOL vs EM in PMH (n=224)

Variable	IOL (n=107)	EM (n=117)	RR (95% CI)	p-value
Age				
Median, [IQR]	26 [22-32]	27 [22-31]		0.653[1]
Mean, [SD]	27.1 [6]	26.6 [6]		0.497
< 20	7 (6.5)	11 (9.4)	Ref.	
20-29	61 (57.0)	71 (60.7)	0.8 (0.5-1.5)	0.342
30-39	37 (34.6)	34 (29.1)	0.7 (0.4-1.4)	0.316
40+	2 (1.9)	1 (0.9)	0.6 (0.2-1.7)	0.368
Education				
Primary & Below	23 (21.5)	37 (31.6)	Ref.	
Secondary	55 (51.4)	66 (56.4)	0.8 (0.6-1.2)	0.105
College/University	29 (27.1)	14 (12.0)	0.6 (0.4-0.8)	0.672
Occupation				
Unemployed/Student	47 (43.9)	85 (72.6)	Ref.	
Formal Employment/Casual	12 (11.2)	7 (6.0)	0.6 (0.4-0.9)	0.021
Self-Employed	48 (44.9)	29 (24.8)	0.6 (0.4-0.8)	<0.001
Marital Status				
Married	79 (73.8)	103 (88.0)	Ref.	
Not Married	28 (26.2)	14 (12.0)	0.7 (0.5-0.9)	0.006
Monthly Income				
Yes	53 (49.5)	31 (26.5)	0.4 (0.2-0.6)	<0.001
No	54 (50.5)	86 (73.5)	Ref.	
Monthly Income (Kshs)				
Median, [IQR]	30,000[25,000-35,000]	27,000[25,000-29,000]		0.599
Mean , [SD]	33,222 [13,746]	26,500 [2,449]		0.895
< 20,000	13 (24.5)	9 (29.0)	Ref.	
20,000+	40 (75.5)	22 (71.0)	0.9 (0.6-1.4)	0.651

Table one shows the sociodemographic characteristics of the participants for this study. The mean age for those on IOL was 27 years (Standard Deviation ±6) while that of those undergoing EM was 26 years (Standard Deviation ±6). Majority of the women were between the ages of 20-29 years in both cohorts with 57% in the IOL cohort and 60.7% in the EM cohort. In both cohorts, majority of the women had attained a maximum educational level of secondary education (56.4% vs 51.4%). Majority of the women were self-employed in the IOL cohort (44.9%), while majority of those on EM were unemployed (72.6%). With regards to marital status, majority of the women were married (73.8% vs 88%). However, the proportion of single women was significantly higher in IOL compared to the EM group (26.2% vs 12%; RR, 0.7,

[1] Non-parametric test about median

95% CI, 0.5-0.9; P, 0.006). The proportion of participants in the IOL group with a monthly income was significantly higher than that of participants on EM (49.5% vs 26.5%; RR, 0.4, 95% CI, 0.2-0.6; P<0.001). Majority of the respondents in both groups with a monthly income earned more than 20,000 Kenya Shillings.

Table 2: Obstetric Characteristics of Women on IOL vs EM in PMH (n=224)

Variable	IOL (n=107)	EM (n=117)	RR(95% CI)	p-value
Parity				
Median, [IQR]	1.0 [0-2]	1.0 [0-2]		-
Mean, [SD]	1.0 [1.0]	1.0 [1.0]		-
Nulliparous	46 (43.0)	54 (46.2)	Ref.	
Multiparous	61 (57.0)	63 (53.8)	0.9 (0.7-1.2)	0.634
ANC Visits				
Median, [IQR]	4 [3-4]	4 [3-4]		-
Mean, [SD]	4 [1.0]	4 [1.0]		-
< 4	44 (41.1)	39 (33.3)	Ref.	
4+	63 (58.9)	78 (66.7)	1.2 (0.9-1.6)	0.228
Ultra Sound				
Done	76 (71.0)	46 (39.3)	0.3 (0.2-0.4)	**<0.001**
Not Done	31 (29.0)	71 (60.7)	Ref.	
Cycles				
Not Regular	25 (23.4)	29 (24.6)	1.1 (0.6-1.9)	0.804
Regular	82 (76.6)	88 (75.2)	Ref.	
Gestation at First ANC Visit				
Median, [IQR]	20.0 [18-28]	20.0 [16-28]		0.940
Mean, [SD]	22.9 [5.7]	21.8 [7.0]		0.181
< 20	29 (27.1)	42 (35.9)	Ref.	
20 - 28	43 (40.2)	45 (38.5)	0.7 (0.4-1.6)	0.313
28 +	35 (32.7)	30 (25.6)	0.9 (0.3-1.2)	0.129
Gestation at Delivery				
Median , [IQR]	40 [40-41]	40 [40-41]		-
Mean, [SD]	40 [1.0]	40 [1.0]		-
39	4 (3.7)	18 (15.4)	Ref.	
40	65 (60.7)	62 (53.0)	0.4 (0.1-0.9)	0.004
41	38 (35.5)	15 (12.8)	0.4 (0.1-0.9)	0.007
42	-	22 (18.8)	-	-

Table 2 describes the obstetric characteristics of the study participants. The mean parity for both groups was 1 (Standard Deviation ±1) and majority of the women in both cohorts were multiparous, 57% vs 53.8%; RR 0.9, 95% CI 0.7-1.2; P, 0.634). Majority of the women had more than 4 ANC visits with a higher proportion in those expectantly managed although this was not statistically significant (58.9% vs 66.7%, RR, 1.2, 95% CI 0.9-1.6; P, 0.228). The mean

gestation at first ANC visit was 23 (Standard Deviation ±5.9) weeks for the IOL group and 22weeks (Standard Deviation ±7) for those on EM. Majority of the participants attended ANC between 28-32 weeks (40.2%vs 38.5%; RR 0.7, 95% CI 0.4-1.6; P, 0.313). For both IOL and EM groups, the mean gestation at delivery was 40 weeks (standard deviation ±1). However, the proportion of deliveries made at 40 weeks (60.7% vs 53%; RR 0.4, 95% CI 0.1-0.9; P, <0.01) and 41weeks gestation (35.2% vs 12.8%; RR 0.4, 95% CI 0.1-0.9; P, <0.01) was significantly higher in the IOL group.

Table 3: Incidence and indications for C-Section in Women on IOL vs EM in PMH (n=224)

Variable	IOL (n=107)	EM (n=117)	RR (95% CI)	p-value
Mode of Delivery				
Vaginal	91 (85)	98 (83.8)	Ref.	
CS	16 (15)	19 (16.2)	0.9 (0.4-1.8)	0.862
Indication for CS (n=35)				
Failed Induction	10 (62.5)	2 (10.5)	Ref.	
NRFS	2 (12.5)	9 (47.4)	0.4 (0.1-1.6)	**0.002**
Cervical Dystocia	1 (6.3)	3 (15.8)	0.5 (0.1-2.9)	**0.029**
CPD	-	1 (5.3)	-	-
Other	3 (18.8)	4 (21.1)	0.9 (0.4-2.4)	0.067

With regards to the incidence of operative delivery among the participants of this study, the C-Section rate was lower in the IOL group compared to the EM group, although this was not statistically significant (16.2% vs 15%; RR, 0.9, 95% CI 0.4-1.8; P, 0.862). While evaluating the indication for C-Section, there was a significantly higher incidence of non-reassuring fetal status (12.5% vs 47.4%; RR, 0.4, 95% CI0.1-1.6; P, 0.002) in the EM group. The incidence of cervical dystocia was also significantly higher in the EM group compared to the IOL group (6.3%vs 15.8%; RR, 0.5, 95% CI 0.1-2.9; P, 0.029). Assisted vaginal delivery was not practiced in the facility at the time this study was conducted.

Table 4: Adverse Maternal Outcomes in Women on IOL vs EM in PMH (n=224)

Variable	IOL (n=107)	EM (n=117)	RR (95% CI)	p-value
Labor Related Events				
PPH	3 (2.8)[2]	6 (5.1)	0.7 (0.3-1.8)	0.376
Perineal Tear	9 (8.4)[2]	13 (11.1)	0.8 (0.5-1.4)	0.498
New onset Hypertension	4 (3.7)[2]	8 (6.8)	0.7 (0.3-1.5)	0.303
Adverse Maternal Outcome				
Yes	13 (12.1)	21 (17.9)	1.6 (0.7-3.3)	0.227
No	94 (87.9)	96 (82.1)	Ref.	

Table four elucidates the incidence of adverse maternal outcomes comparing women undergoing IOL to those on EM. It was noted that there was a lower incidence of adverse maternal outcomes in the IOL compared the EM group, although this was not statistically significant (12.1% VS 17.9%; RR, 1.6, 95% CI, 0.7-3.3; P, 0.227). These adverse maternal outcomes included PPH, perineal tears, new onset hypertension, maternal infection and admission/referral to CCU. Compared to the EM cohort, IOL had a lower incidence of PPH (2.8% vs 5.1%; RR 0.7, 95%CI, 0.3-1.8, P, 0.376), perineal tears (11.1% vs 8.4%, RR 0.8, 95%CI, 0.5-1.4; P,0.498) and new onset hypertension (6.8% vs 3.7%, RR 0.7, 95%CI, 0.3-1.5; P,0.303). No CCU admission, maternal infection or mortality was recorded in either group.

[2] No=Ref.

Table 5: Adverse Fetal and Early Neonatal Outcomes in Women on IOL vs EM in PMH (n=224)

Variable	IOL (n=107)	EM (n=117)	RR (95% CI)	p-value
Fetal Outcome				
Live Birth	105 (98.1)	116 (99.1)	Ref.	
FSB	1 (0.9)	2 (1.8)	1.4 (0.6-3.2)	0.944
Early neonatal death	-	-	-	
Birth Weight	3,200 [3,000-3,600]	3,250 [3,000-3,600]		0.482
Median, [IQR]				
Mean, [SD]	3,606 [3,769.7]	3,696 [3,126.7]		0.847
≥ 4,000 g	7 (6.5)	9 (7.7)	Ref.	
< 4,000 g	100 (93.5)	108 (92.3)	0.9 (0.5-1.6)	0.738
Apgar Score at 5 Minute				
≥ 7	98 (91.6)	114 (97.4)	1.6 (1.1-2.3)	0.052
< 7	9 (8.4)	3 (2.6)	Ref.	
Meconium Stained Liquor	14 (13.1)	16 (13.7)	1.0 (0.6-1.5)	0.897
Resuscitation/Respiratory Support	9 (8.4)	2 (1.7)	1.8 (1.3-2.4)	**0.020**
Birth Trauma	1 (0.9)	2 (1.7)	0.7 (0.1-3.5)	0.614
NBU Admission				
Yes	18 (16.8)	13 (11.1)	0.6 (0.3-1.3)	0.216
No	89 (83.2)	104 (88.9)	Ref.	
Indications				
Birth Asphyxia	13 (12.1)	6 (5.1)	1.6 (0.8-3.4)	0.059
NNS/NNJ	-	2 (1.7)	-	-
Meconium Aspiration	7 (6.5)	4 (3.4)	1.1 (0.6-2.1)	0.279
Respiratory Distress	-	1 (0.9)	-	-
Adverse Fetal Outcome				
Yes	25 (23.4)	23 (19.6)	1.2(0.72-1.96)	0.51
No	82 (76.6)	94(80.3)	Ref	

Table 5 shows fetal and early neonatal outcomes for the participants of this study. Majority of the deliveries were live births in both the IOL and EM groups (98.1% vs 99.1%). The need for resuscitation/respiratory support was significantly higher with IOL compared to EM (8.4%vs 1.7%; RR, 1.8, 95%CI 1.3-2.4; P, 0.020). The mean birth weight was 90g lower in the IOL group, compared to the EM group (3606g vs 3696g).Fresh still births had a lower incidence in the IOL group compared to the EM group (1.8% vs 0.9%; RR1.4, 95%CI 0.6-3.2; P, 0.944), while the incidence of birth weight more than 4000g was lower in the IOL group compared to the EM group. (7.7% vs 6.5%). However, this was not statistically significant. There was a high incidence of an apgar score of <7 at 5 minutes in the IOL group compared to the EM group

although this was not statistically significant. (8.4% vs 2.6%; RR 0.6, 95%CI 0.3-1.3P, 0.020P=0.052). It was also noted that there was a higher incidence of NBU admissions in the IOL group compared to the EM group. However, this was not statistically significant (16.8% vs 11.1%; RR 0.6, 95%CI 0.3-1.3; P, 0.216). The incidence of meconium stained liquor (13.7% vs 13.1%; RR 1, 95%CI 0.6-1.5; P, 0.897) and birth trauma (1.7% vs 0.9%; RR 0.7, 95%CI 0.1-3.5; P, 0.614) was lower in the IOL group although this was not statistically significant. With regards to the various indications for admission to NBU, The incidence of birth asphyxia (12.1% vs 5.1%, RR 1.6, 95%CI 0.8-3.4; P;0.059) and meconium aspiration (6.5% vs 3.4%, RR 1.1, 95%CI 0.6-2.1; P,0.279) was noted to be higher in IOL group compared to EM group although this was not statistically significant. 2 cases of neonatal sepsis/ neonatal jaundice and 1 case of respiratory distress were noted among pregnant women undergoing expectant management.

Table 6: Logistic Regression-Adverse Fetal and Adverse Maternal Outcomes

Adverse Fetal Outcome

	n	Yes	No	COR (95% CI)	P Value	AOR (95% CI)	P Value
IOL							
Yes	107	25(23.4)	82 (76.6)	1.2(0.7-2.4)	0.5	1.1(0.5-2.3)	0.846
No	117	23(19.7)	94 (80.3)	Reference			

Adverse Maternal Outcome

	n	Yes	No	COR (95% CI)	P Value	AOR (95% CI)	P Value
IOL							
Yes	107	13(12.1)	94(87.9)	0.6(0.3-1.3)	0.229	0.9(0.4-2.3)	0.866
No	117	21(17.9)	96 (82.1)	Reference			

Logistic regression was done for induction of labor and adverse fetal and adverse maternal outcomes. The crude odds ratios revealed that although IOL had higher odds for adverse fetal outcomes (cOR 1.2; 95%CI, 0.7-2.4) and lower odds for adverse maternal outcomes (cOR 0.6; 95%CI, 0.3-1.3) these odds were not statistically significant. This finding was sustained when adjustment was made for potential confounders for both adverse fetal outcomes (aOR 1.1; 95%CI, 0.5-2.3) and maternal outcomes (aOR0.9; 95%CI, 0.4-2.3). The identified potential confounders included age, parity, gestational age, marital status, education, income, ANC visits.

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5. 1 Discussion

In this prospective cohort study, the cesarean section rate, incidence of adverse maternal and adverse fetal and early neonatal outcomes were comparable in the induction of labor group and expectant management group for gestations between 39 and 41 weeks. There was no difference in the primary outcome -caesarean section rate- between induction of labor and expectant management. However, the incidence of cesarean section was lower with induction of labor compared to expectant management (15% vs 16.2%). This finding was similar to that of Gibson et al. in 2014(32.3% vs 42.3%) (37) and the ARRIVE trial (18.6% vs 22.2%)(17) in the US, but however, the difference was statistically significant in both cases. This may be attributed to a larger sample size in both cases with the ARRIVE trial having 6106 participants and Gibbs et al. study having 131,243 participants. The ARRIVE trial also had the advantage of influencing patient care as per the preset protocol, which may have impacted the results. The findings of this study were contrary to the findings of Glantz JC in 2010. In view of Glantz's, study however, it was retrospective in nature using data from the New York State birth-certificate database, thus subject to significant bias in choosing the appropriate exposed group and comparison group as well as information bias. Moreover, confounders could not be controlled, temporal relationships were not able to be assessed and it was prone to missing information.

Thus the success rate of vaginal delivery with induction of labor was found to be 85%, which was comparable to the arrive trial by Grobman et al. higher than reported in previous local studies by Esiromo and Evalyne et al. which put it at 74% and 62% respectively (22,23) in 2012 and 2015 respectively. It is important to note that only low risk women were used in this study as opposed to previous studies. Moreover, multiple methods of induction were used for comparison purposes in the previous studies. Regarding the indications for C Section, expectantly managed

women were at a significantly higher risk of non-reassuring fetal status. This could be attributed to the antecedent placental dysfunction with increasing gestational age beyond 40 weeks. Failed induction was the commonest indication for CS among the IOL group, a finding that was similarly found in Esiromo et al.(22) study in KNH in 2012.

Taking into consideration the maternal outcomes, the incidence of postpartum hemorrhage, perineal tears, and new onset hypertension was lower in the induction group as compared to those undergoing expectant management. These findings were similar to those of Gibson et al. and the ARRIVE trial by Grobman et al (17, 37).this may be attributed to a lower mean birth weight with IOL compared to EM (3606gvs 3696g). Deliveries with induction of labor also help in ameliorating the increased risk of new onset hypertension that is experienced potentially with expectant management due to placental aging and dysfunction. The commonest adverse maternal outcome in the IOL group was noted to be perineal tears (8.4%). This was similar to the findings by Esiromo et al. (22) but the rate was lower at 2.7% probably because the inclusion of deliveries in late preterm and early term in their study population. Perineal tears were not common in the Grobman et al. and Gibson et al findings. This seems to imply that the quality of intrapartum care and delivery may have contributed to the high rates of perineal tears due to human and financial resource limitations while this study was being conducted. This was perpetuated by industrial strikes and the COVID 19 pandemic.

With regards to adverse fetal and early neonatal outcomes within 72 hours of delivery between IOL and EM, the need for respiratory support was significantly higher among those undergoing IOL compared to those on EM. These findings were contrary to those of Bukola F et al., Grobman et al, Gibbs et al. and Middleton P et al (4, 18, 19, 38) which recommend induction of labor for improving neonatal outcomes at term. A possible reason for this could be due to

variations in quality of intrapartum care and fetal monitoring that may have affected the outcomes. This aspect was not evaluated while the study was conducted but important gaps were noted, such as lack of pre induction CTGs, regular fetal heart rate monitoring and in assisting women in second stage to deliver.

The risk of adverse fetal and early neonatal outcomes was not statistically significant when IOL was compared to the EM group. This findings concur with those of Middleton P et al. (38). Although not statistically significant, the NBU/NICU admissions were high with IOL compared to EM. Vogel J et al. in 2013(39), in a secondary analysis of the Bukola F et al. led WHO Multi-country survey (4), also concurred with these findings. It revealed that elective induction was associated with an increase in the adjusted odds of NICU admission in Africa (Adj OR 1.51 95% CI 1.01–2.27) and Asia (Adj OR 1.74 95% CI 1.11–2.74). However, this findings were different from those of the ARRIVE trial (4.3% vs. 5.4, RR 0.80; 95% CI, 0.64- 1.00) (18) and the study by Gibson et al. (37) in the US. It is important to note that the incidences were lower in the ARRIVE trial as compared to the incidences of this study and also were not statistically significant. Moreover, the trial had a larger sample size, able to manipulate patient management as per preset protocol since it was an RCT and had a longer study duration. These factors however were limitations associated with conduction of the study. The Gibson et al study also had its limitations. It was a cross-sectional study looking in retrospect at records in 12 US institutions thus the level of evidence was low. It was prone to confounders, selection and information bias and also missing data. Although it had a larger sample size, only 10% of the participants had undergone induction of labor in the study as compares to 48% in our study.

Some previous studies have attempted to establish a racial/ethnic difference in biochemical responses and pharmacologic variations based upon subtle molecular differences among

race/ethnicities (39). Literature citing differing cytokine and inflammatory factor concentrations between races also strengthens the possibility that genetic variation may be a more significant modifier on the ability to successfully and safely induce women. One study by Stephenson et al. (40) was a secondary analysis of misoprostol vaginal insert (MVI) trial- a double-blind, randomized, control trial of 1,308 patients comparing sustained release vaginal inserts containing dinoprostone 10 mg and misoprostol 50 mcg (MVI 50) or 100 mcg (MVI 100)-assessing variations in outcomes between whites, blacks and Hispanics. When compared to blacks, whites were less likely to undergo cesarean for non-reassuring fetal heart rate tracing (aOR 0.41, 95 % CI 0.25–0.66, $p = 0.0003$), as were Hispanics (aOR 0.38, 95 % CI 0.22–0.65, $p = 0.0004$). These studies present a possible avenue for further research on whether there is a basis for similar findings based on race/ethnicity. On logistic regression, it was noted that induction of labor did not increase the odds of adverse maternal and neonatal outcomes.

These findings were supportive of the WHO recommendations (3) that induction of labor can be considered for low risk pregnancies between 39-41 weeks.

5.2 Conclusions

In conclusion, the incidence of C Section, adverse maternal and neonatal outcomes was comparable with induction of labor compared or expectant management. There was a significantly higher need for resuscitation/ respiratory support with induction of labor compared to expectant management. Non-reassuring fetal status as an indication for CS was significantly higher with EM compared to IOL.

5.3 Recommendations

1. Either induction of labor or expectant management is recommended for low-risk pregnancies at gestations between 39-41 weeks.
2. Despite no significantly increased risk of adverse maternal outcomes in low-risk women on expectant management, follow up is critical. During labor and delivery they should be monitored closely due to the increased risk of new onset hypertension, postpartum hemorrhage and perineal tears
3. Where induction of labor is offered for low-risk pregnancies between 39-41 weeks gestation, appropriate fetal and maternal assessment is critical to achieving good outcomes. This includes non-stress testing, ultrasonography and fetal monitoring during labor and delivery.
4. Further studies with larger sample sizes and higher levels of evidence are recommended to evaluate the quality of intrapartum care and compare the level of satisfaction. A randomized control trial comparing induction of labor and expectant management for low-risk pregnancies at 39-41 weeks gestation in low resource setting is highly recommended. Evidence relating to cervical priming and duration from onset of labor to delivery may provide for plausible explanation for the perineal tears and adverse fetal events found in this study

TIMELINES

	Sept 2019	Oct 2019-April 2020	May-Jul 2020	Jul-Nov 2020	Nov-Dec 2020
Concept development					
Proposal development					
Ethical approval					
Data collection					
Data analysis					
Result presentation, dissemination and close out					

BUDGET

	Item	Amount (Ksh)
Proposal Development	Proposal: 6 copies(initial +corrected): 400 pages @10 Kshs per page Binding @100Ksh per book	4,600
	Opaque envelopes	2,500
	Printing: 300 Questionnaires+ Consent forms: each 15 pages @10 Kshs per page	45,000
	KNH-UoN ERC Application costs	2,000
Data Collection	Training 4 research assistants: Each @ Ksh. 500/day for 5days + Hospital research fee @ 6000	16,000
	Research Assistants wages @ Ksh.15000 x 4 persons	60,000
	Stationary: Pens, diaries, file tags, note books, counter books, posters.	1,500
	Internet: Zuku 5MBPS @ Ksh. 2000/month for 3 months	6,000
	Airtime: 300 per person per month	3,000
	Transport/Meetings	5,000
Data Analysis	Statistician	50,000
Thesis write up	Printing drafts	5,000
	Printing thesis	6,000
	Contingency	30,000
	TOTAL	**236,600**

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

S/ NO…… Date of admission/recruitment……Time…….

A. Socio-demographic data:

1. Age……

2. Nutrition status: Weight……..Height……. BMI…….

3. Marital status: (a) single [ ] (b) married [ ] (c) divorced/separated [ ] (d) widowed [ ]

4. Level of education: (a) None [ ] (b) primary [ ] (c) secondary [ ] (d) college [ ]

5. Occupation: (a) student [ ] (b) unemployed [ ] (c) formal employment [ ]

(d) Self-employed/ business [ ] (e) casual worker [ ]

6. Monthly income: _____ Kshs.

B. Obstetric Data

1. LMP_____EDD_____ GA(Weeks)_____Parity_____

2. (a) Number of Antenatal visits: _____

(b)Gestation at first ANC visit: _____

3. (a) Any Antenatal ultrasound done? (a) Yes (b) No

(b) If Yes:-

(i) Trimester: [ ] 1 [ ] 2 [ ] 3

(ii) Does it correlate with gestational age? (a) Yes (b) No

(c) If NO, is the cycle regular? (a) Yes (b) No

C: Labor Related Data

C1: Labor- related data: Expectant Management Group

1. Mode of antenatal fetal assessment: (a) Fetal Kick Chart (b) Ultrasound
2. Gestation at date of delivery: _____
3. Mechanism of delivery: a) Spontaneous labor b)Induction of labor c) Emergency C Section

If induction of labor, please fill section C3, else move to D

C2. Labor- related data: Induction Group

1. Diagnosis/ indication for induction of labor (if any) _____

2. Pre-induction Bishop Score_____

3. Pre-induction CTG category: 1(Reassuring) 2(Non-reassuring) 3. (Abnormal) 4. Not done

4. (a) Status of membranes: Intact [ ] Ruptured [ ]

(b) If ruptured, color of liquor: Clear [ ] MSL1 [ ] MSL 2[ ] MSL3 [ ]

Proceed to section C3

C3. Details on induction

(a)Method used (Tick appropriately)

(i) Prostaglandin E1 (Misoprostol) [ ] (ii) PGE1 + ARM [ ]

(iii) Oxytocin [ ] (iv) PGE1 + ARM + Oxytocin [ ]

(b) If prostaglandin is used

(i) Route: Oral [ ] PV [ ] Sublingual [ ]

(iii) Number of doses administered: _____

D. Delivery details

1. Mode of delivery (a) vaginal [ ] (b) caesarian section [ ] (c) Assisted vaginal delivery

2. In a case of Caesarian section, what was the indication?

Failed induction [ ]

Non-reassuring fetal status [ ]

CPD [ ]

Cervical dystocia [ ] Other [ ] (specify)……..……

E. Maternal outcomes

1. Any of the following adverse effects noted? Tick appropriately

[ ] PPH due to:-

(a) Ruptured uterus [ ] (b) Uterine atony [ ]

(c)Tears [ ] (d) Retained placenta/ tissues [ ]

(e) Thrombopathy [ ]

[ ] Perineal tear (a) First degree (b) Second degree (c) Third degree (d) Fourth Degree

[ ] Maternal infection

[ ] New onset hypertension

[ ] Admission/ referral to Critical Care Unit……

[ ] none of the above

2. Final maternal outcome

(a) Delivery without complications [ ]

(b) Delivery with complications [ ]

(c) Maternal death [ ] Cause of maternal death……..

F. Fetal and Early Neonatal Outcomes

1. Fetal outcome (a) Live birth [ ] (b) Fresh stillbirth [ ]

(c) Macerated stillbirth [ ] (d) Early neonatal death

2. Birth weight (grams)……

3. Apgar score in 1 minute……..5minutes……10 minutes……

5. Birth trauma (a) Yes [ ] (b) No [ ]

6. Meconium Stained Liquor: (a) Yes [ ] (b) No [ ]

7. Need for resuscitation/respiratory support (a) Yes [ ] (b) No [ ]

8. Admitted to NBU/NICU (a) Yes [ ] (b) No [ ]

9. Reason for NBU/NICU admission

(a) Birth asphyxia [ ] (b) Meconium aspiration [ ]

(c) Neonatal sepsis [ ] (d) Neonatal jaundice [ ]

(e) Other (Specify): _____

APPENDIX II: CONSENT FORM IN ENGLISH

Date (date/month/year): _____

STUDY TITLE: OBSTETRIC AND EARLY NEONATAL OUTCOMES OF INDUCTION OF LABOR VERSUS EXPECTANT MANAGEMENT IN LOW RISK PREGNANCIES AT FULL TERM AT PUMWANI MATERNITY HOSPITAL

Principal Investigator:

Dr. Cédric Oyaro (MBChB)

Department of Obstetrics and Gynaecology, University of Nairobi.

Telephone Number: 0721-309906

Lead Supervisor:

Dr. Alfred Osoti,

Senior Lecturer of the department of Obstetrics and Gynaecology, University of Nairobi.

Telephone number: 0733886664.

Email: alfosoti@gmail.com

2nd Supervisor:

Dr. Allan Ikol,

Senior Lecturer of the department of Obstetrics and Gynaecology, University of Nairobi.

Telephone number: 0722960817

Email: ikolke9082@gmail.com

Investigator's Statement:

We are requesting you and your new-born to kindly participate in this research study. The purpose of this consent form is to provide you with the information you will need to help you decide whether to participate in the study. This process is called 'Informed Consent'. Please read this consent information carefully and ask any questions or seek clarification on any matter concerning the study with which you are uncertain. You are free to ask any questions about the study. The investigator will be available to answer any questions that arise during the study and afterwards.

Introduction:

There are various approaches to managing pregnant mothers who present at a medical facility with pregnancies that are uneventful, the mother and baby are clinically stable and the due date is less than a week away. Some clinicians opt to induce labor for such mothers, while others expectantly manage them by giving them more time and delivering them at a later date when labor spontaneously starts or medical intervention is deemed inevitable to safeguard the life of the mother or the baby. This study seeks to compare the outcomes of both approaches.

Benefits:

As a participant you will benefit from the study by receiving close monitoring. You will also receive health education and advice on neonatal care. You will be able to access the principal investigator at any time during the study period. Your participation in the study may benefit others in future from the information we find in this study.

Risks:

No major risks are associated with this study as it takes an observational approach

Voluntariness:

The study will be fully voluntary. There will be no financial rewards to you for participating in the study. One is free to participate or withdraw from the study at any point. Refusal to participate will not compromise you or your child's care in any way.

Confidentiality:

All the information obtained from you will be held in strict confidentiality. Any information that may identify you or your child will not be published or discussed with any unauthorized persons. No specific information regarding you, your child or your family will be released to any person without your written permission. Your research number will be used in place of your names.

Access of health records

You may apply for access to your own records, or may authorize third parties such as lawyers, employers, or insurance companies to do so on your behalf. The Principal Investigator can be contacted if access to health records is required.

Sharing of results

Study staff will protect your personal information closely so no one will be able to connect your responses and any other information that identifies you. Federal or state laws may require us to show information to university or government officials (or sponsors), who are responsible for monitoring the safety of this study. Directly identifying information (e.g. names, addresses) will

be safeguarded and maintained under controlled conditions. You will not be identified in any publication from this study.

Intervention

A structured survey questionnaire will be used to gather your obstetrical and medical details. This study will be only observational and the decision whether to induce at that gestation or do expectant management will be based on the clinician's judgement. For those on expectant management, information will be given regarding antenatal surveillance and danger signs and regular check up by phone or through clinics will be done to ensure both mother and baby are fine up until the baby is born. Those who will be induced will be followed up on the progress of the labor and eventual maternal and neonatal outcomes. In both cases, progress of labor as well as clinical indicators of maternal and neonatal outcomes will be analyzed. You will be able to reach the principal investigator at any time in-between the follow up period.

Problems or Questions:

If you ever have any questions about the study or about the use of the results you can contact the principal investigator, Dr. Cedric Oyaro by calling 0721-30996. If you have any questions on your rights as a research participant you can contact the Kenyatta National Hospital Ethics and Research Committee (KNH- ERC) by calling 2726300 Ext. 44355.

Consent Form: Participant's Statement:

I _____having received adequate information regarding the study research, risks, benefits hereby AGREE / DISAGREE (Cross out as appropriate) to participate in the study with my child. I understand that our participation is fully voluntary and that I am free to withdraw at any time. I have been given adequate opportunity to ask questions and seek clarification on the study and these have been addressed satisfactorily.

Signature/thumb print: _____ Date _____

I _____ declare that I have adequately explained to the above participant, the study procedure, risks and benefits and given him /her time to ask questions and seek clarification regarding the study. I have answered all the questions raised to the best of my ability.

Interviewer's Signature: _____ Date: _____

Problems or Questions:

If you ever have any questions about the study or about the use of the results you can contact the principal investigator, Dr. Cedric Oyaro by calling 0721-309906. If you have any questions on your rights as a research participant you can contact the Kenyatta National Hospital Ethics and Research Committee (KNH- ERC) by calling 2726300 Ext. 44355.

APPENDIX III: CONSENT FORM IN KISWAHILI

FOMU YA RIDHAA

Tarehe (siku/mwezi/mwaka): _____

STUDY TITLE: OBSTETRIC AND EARLY NEONATAL OUTCOMES OF INDUCTION OF LABOR VERSUS EXPECTANT MANAGEMENT IN LOW RISK PREGNANCIES AT FULL TERM AT PUMWANI MATERNITY HOSPITAL

Mtafiti Mkuu:

Dkt. Cedric Oyaro (MBChB)

Idara ya Uzazi na Afya ya kina mama, Chuo kikuu cha Nairobi.

Nambari ya simu: 0721-309906

Msimamizi Mkuu:

Dkt. Alfred Osoti,

Mhadhiri Mkubwa katika idara ya Uzazi na Afya ya kina mama, Chuo kikuu cha Nairobi.

Nambari ya simu: 0733886664.

Barua pepe: alfosoti@gmail.com.

Msimamizi wa Pili:

Dkt. Allan Ikol,

Mhadhiri Mkubwa katika idara ya Uzazi na Afya ya kina mama, Chuo kikuu cha Nairobi

Nambari ya simu: 0722960817

Barua pepe: ikolke9082@gmail.com.

Taarifa ya mtafiti:

Tunakuomba wewe na mwanao mchanga kushiriki kwenyeutafiti huu. Lengo la fomu hii ya idhini ni kukupa habari utakayohitaji iliikusaidie kuamua ikiwa utashiriki kwenye utafiti. Utaratibu huu unaitwa ‘Idhini ya kujulishwa’. Tafadhali soma ujumbe wa idhini hii kwa uangalifu na uulize ma swali yoyote au ufafanuzikwa mambo yoyote yanayohusisha utafiti ambayo hauna uhakika nayo. Uko huru kuuliza maswali yoyote kuhusu utafiti. Mtafiti atakuwe kukujibu maswali yatakayotokea wakati wa utafiti na baadaye.

Utangulizi:

Kuna njia mbalimbali za kuwamudu kina mama wajawazito ambao tarehe ya kujifungua imebakisha siku saba au chache na afya yao pamoja na mimba yao haijadhurika vyovyote. Kuna wale wahudumu wa afya ambao hupendelea kuwapa kina mama hawa dawa ya kufungua njia ya uzazi na kuidhinisha ule uchungu wa kujifungua ili mtoto azaliwe. Aidha, kuna wale ambao huamua kuwapa kina mama hawa muda hadi pindi uchungu huu utakapoanza kwa hiari au matibabu yatalazimika ili kunusuru maisha ya mama au mtoto. Utafiti huu unatumai kulinganisha matokeo ya njia hizi mbili.

Faida:

Kama mshiriki utafaidika kutokana na utafiti kwa kupata malezi ya kufwatiliwa kwa karibu. Utafaidika kwa kupata masomo ya kiafya na ushauri wa malezi ya mtoto mchanga. Utaweza kumufikia mtafiti mkuu wakati wowote kwa wakati wa utafiti. Kushiriki kwako kwenye utafiti kwaweza wafaidi wengine wakati wa usoni kutokana na habari tutakoyopata kwenye utafiti huu.

Hatari:

Hakuna madhara yoyote makuu yanayohusiana na utafiti huu. Hii ni kwa sababu utafiti huu utafanywa kwa mtazamo tu bali si kwa kuingili kati ya uamuzi wa mhudumu wa afya.

Kujitolea:

Utafiti utakua wa kujitolea. Hakuta kuwa na malipo ya kifedha kwa kushiriki kwenye utafiti huu. Mtu ako huru kushiriki au kujiondoa kwenye uta fiti kwa wakati wowote. Kukataa kushiriki hakutaathiri malezi yako au ya mwanao hata.

Usiri:

Habari yoyote itakayotolewa kwako itawekwa kwa usiri wa hali ya juu. Habari yoyote ya kukutambulisha wewe au mwanao haitachapishwa au kujadiliwa na watu wasiona kibali. Hakuna habari maalum kukuhusu, kuhusu mwanao au mtu wa familia yako itapeanwa kwa mtu mwingine bila ruhusa yako iliyoandikwa. Nambari yako ya utafiti itatumika badala ya jina lako.

Kupata rekodi za kimatibabu

Unaweza kuomba ku weza kufikia rekodi zako au kuruhusu watu wengine kama vile mawakili, waajiri au kampuni za fidia kufunya hivyo kwa niaba yako. Mtafiti mkuu anaweza fikiwa ikiwa rekodi zako zahitaji kufikiwa.

Kujulisha wengine matokeo

Wafanyakazi wa utafiti watalinda habari sana habari yako ya kibinafsi ilimtu yeyote asije akajua akaunganisha majibu yako na habari inayoweza kukutambulisha. Sheria za serikali zatuhitaji kuonyesha habari kwa wawakilikilishi wa serikali (wafadhili) au chuo kikuu ambao wana

jukumu la kufuatilia usalama wa utafiti huu. Habari inayotambulisha moja kwa moja (majina, anwani) zitalindwa na kuwekwa katika hali salama. Hautatambulishwa na chapisho lolote kutoka na utafiti huu.

Tutakachofanya

Utafiti huu utafanywa kwa mtazamo tu bali si kwa kushawishi uamuzi wa mhudumu wa afya kwa njia yoyote ile. Fomu ya maswali yaliyo na mpangilio ita tumika kuchukua habari yako ya uzazi na matibabu. Kwa wale watakopewa dawa ya kuidhinisha uchungu, watafuatiliwa kikamilifu hadi watakaojifungua na matokeo yao kurekodiwa kwenye fomu. Wale watakaopewa muda hadi uchungu utakapoanza kwa hiari watafahamishwa kinaga ubaga kuhusu mikakati ya kuhahakikisha mimba iko sawa na ishara zozote za hatari zitakazowalazimisha kufika hospitalini kwa dharura. Kutokana na ripoti za makundi haya mawili, tutaweza kudadisi matokeo ya mama na mtoto kikamilifu.

Utakutana na mtafiti mkuu wakati wowote wakati wa kufuatiliwa.

Shida au Maswali:

Ikiwa una maswali kuhusu utafiti au matumizi ya majibu waweza asiliana na mtafiti, Dkt. Cedric Oyaro kwa kupiga 0721-309906. Ikiwa una maswali kuhusu haki yako kam mshiriki waweza wasiliana na kamati ya maadili na tafiti ya hospitali kuu ya (KNH- ERC) kwa kupiga 2726300 Ext. 44355.

Fomu ya Idhini: Taarifa ya Mshiriki:

Mimi_____Nimepewa habari ya kutosha kuhusiana na utafiti , hatari, faida, NINAKUBALI/SIKUBALI (weka alama inavyostahili). Kushiriki kwenye utafiti na mwanangu. Ninaelewa kwamba kushiriki kwangu ni kwa kujitolea na niko huru kujiondoa wakati wowote. Nimepewa nafasi ya kutosha ya kuuliza ma swali na kuuliza ufafanuzi wa utafiti na nimeelezewa haya nikatosheka.

Sahihi/alamayakidole:_____ Tarehe _____

Mimi_____Natangaza yakwamba nimemwelezea mshiriki aliye hapo juu yakutosha, taratibu za utafiti, hatari na faida na nimempa wakati wakuuliza naswali nakuuliza ufafanuzi kuhusu utafiti. Nimejibu maswali yake yote kwa uwezo wangu wote.

Jina la anayeuliza ma swali na sahihi: _____Tarehe: _____

Shida au Maswali:

Ikiwa una maswali kuhusu utafiti au matumizi ya majibu waweza asiliana na mtafiti, Dkt. Cedric Oyaro kwa kupiga 0721- 309906. Kwa maswali kuhusu haki yako kama mshiriki, wasiliana na kamati ya maadili na utafiti ya hospitali kuu ya (KNH- ERC) kwakupiga2726300 Ext. 44355.

APPENDIX IV: THE BISHOP'S SCORE

CERVIX	Score				
	0	1	2	3	TOTAL
Position	Posterior	Mid-Position	Anterior	----------	
Consistency	Firm	Medium	Soft	----------	
Effacement	0 - 30%	30 – 50%	60 – 70%	>80%	
Dilation	Closed	1 – 2 cm	3 – 4 cm	>5 cm	
Station	-3	-2	-1	+1 , +2	
Modifiers	----------	----------	----------	----------	
TOTAL	----------	----------	----------	----------	

APPENDIX IV: ETHICAL APPROVAL

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/240

23rd July 2020

Dr. Cedric Manyange Oyaro
Reg. No.H58/6955/2017
Dept.of Obstetrics and Gynaecology
School of Medicine
College of Health Sciences
University of Nairobi

KENYATTA NATIONAL HOSPITAL
APPROVED
23 JUL 2020
KNH/UoN-ERC

Dear Dr. Oyaro

RESEARCH PROPOSAL – OUTCOMES OF INDUCTION OF LABOUR VERSUS EXPECTANT MANAGEMENT IN LOW RISK PREGNANCIES AT 39-41 WEEKS IN PUMWANI MATERNITY HOSPITAL; A PROSPECTIVE COHORT STUDY (P256/05/2020)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 23rd July 2020 – 22nd July 2021.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
f. 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*).
g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

Protect to discover

For more details consult the KNH- UoN ERC website**http://www.erc.uonbi.ac.ke**

Yours sincerely,

PROF. M. L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Dean, School of Medicine, UoN
The Chair, Dept. of Obstetrics and Gynaecology, UoN
Supervisors: Dr. Alfred Osoti, Dept.of Obs/Gynae, UoN
Dr. Allan Ikol, Dept. of Obs/Gynae, UoN