



ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING POST GRADUATE PROGRAM

ASSESSMENT OF CORD CLAMPING TIME IN NEW BORN AND ITS
ASSOCIATED FACTORS AT BIRTH IN ADDIS ABABA SELECTED PUBLIC
HOSPITALS, ETHIOPIA, 2025

BY:

MULUGETA ABENEH (BSc)

A THESIS SUBMITTED TO POST GRADUATE PROGRAM ADDIS ABABA
UNIVERSITY, COLLEGE HEALTH SCIENCES SCHOOL OF NURSING AND
MIDWIFERY DEPARTEMENT OF NURSING, IN PARTIAL FULFILLMENT
FOR THE REQUIREMENT OF MASTER OF SCIENCE IN NEONATAL
NURSING

JUNE 2025

ADDIS ABABA, ETHIOPA

ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
SCHOOL OF NURSING AND MIDWIFERY
DEPARTMENT OF NURSING

ASSESSMENT OF CORD CLAMPING TIME IN NEW-BORN AND ITS ASSOCIATED FACTORS AT BIRTH IN ADDIS ABABA SELECTED PUBLIC HOSPITALS, ETHIOPIA, 2025

1. Name of investigator	Mulugeta Abeneh
2. Name of Advisor(s)	1. Mr.Yohannes Ayalew (Assistant Professor) yohannes.ayalew@aau.edu.et 2. Dr.Rajalakshmi Murugan (Associate Professor) rajisomanathan@gmail.com
3. Full title of the research proposal	Assessment of timing of umbilical cord clamping in new-borns and its associated factors at birth in Addis Ababa public hospitals, Ethiopia 2025
4. Duration of the study	From March 20/2025-April 200/2025
5. Study area	Addis Ababa , Ethiopia
6. Total cost of the project	61,320 Birr
7. Address of investigator	➤ Tel :0936371355 ➤ Email: mulusewab2010@gmail.com

APPROVAL SHEET

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING POST GRADUATE PROGRAM

This thesis by Mulugeta Abeneh has been accepted in its present form by the broad of examiner as fulfilling the requirement for the degree of Master of Science in neonatal nursing.

NAME OF INVESTIGATOR

Mulugeta Abeneh (BSc Nursing)

Full name

Signature

Date

EXAMINERS:

1. _____

Full name

Signature

Date

2. Internal examiner _____

Full name

Signature

Date

ADVISORS:

1. Mr.Yohannes Ayalew (Assistant Professor)

Full name

Signature

Date

2. Dr. Rajalaksmi Murugan (Associate Professor)

Full name

Signature

Date

ACKNOWLEDGEMENT

First and foremost, I sincerely express my profound gratitude to Almighty God for his infinite, kindness, love, and guidance throughout every steps of this journey, without which this work would not have been possible. I also extend my heartfelt appreciation to Addis Ababa University, college of health sciences, school of nursing and midwifery post graduate program, for granting me the opportunity to pursue this research.

I am deeply indebted to my advisor, Mr.Yohannes Ayalew (Assistant professor) and Dr.Rajalakshmi Murugan (Associate professor), for their invaluable guidance, continuous support, and insightful feedback throughout the entire research process. Their expertise and encouragement greatly contributed to the development of my knowledge and practice in my area of interest. Also, great thanks to my proposal examiner Mr.Tadesse for his constructive comment and support to do this research.

Additionally, I wish to express my sincere thanks to the obstetric department heads and case team leaders working in the labor and delivery unit at Saint Paul's Millennium Medical College, Tikur Anbesa Specialized Hospital, Yekatit hospital, and Tirunesh bejjing hospital for their cooperation and providing essential information for this research project.

Lastly, I gratefully acknowledge Saint Paulo's Millennium Medical College for generously sponsoring my Master of Science studies in Neonatal Nursing.

.

LIST OF ABBREVIATION AND ACRONYM

AOR	Adjusted Odd Ratio
ACOG	American College of Obstetrics and Gynaecology
APGAR	Appearance, Pulse, Grimace, Activity and Respiration
APH	Antepartum Haemorrhage
AMSTL	Active Management of Third Stage of Labour
COR	Crude Odd Ratio
CI	Confidence Interval
DCC	Delayed Cord Clamping
ECC	Early Cord Clamping
GA	Gestational Age
GDM	Gestational Diabetes Mellitus
HCP	Health Care Provider
IDA	Iron Deficiency Anaemia
MCH	Maternal And Child Health
MSAF	Meconium Stained Amniotic Fluid
PPH	Postpartum Haemorrhage
Rh	Rhesus factor
UI	Uncertainty Interval
VD	Vaginal Delivery
WHO	World Health Organization

Table of Contents

ACKNOWLEDGEMENT	IV
LIST OF ABBREVIATION AND ACRONYM	V
Table of Contents	VI
LIST OF FIGURE.....	IX
LIST OF TABLE	X
ABSTRACT.....	1
1. INTRODUCTION	3
1.1 Background	3
1.2 Statement of the problem	4
1.3 Significant of study.....	4
2. LITERATURE.....	6
2.1 Introduction	6
2.2 The time of umbilical cord clamping.....	6
2.3 Factor associated with the time of umbilical cord clamping	7
2.3.1 Labor and delivery- related factors	7
2.3.2 Newborns related factors	8
2.3.3 Professional - related factors.....	8
2.3.4 Maternal and obstetric - related factors.....	9
2.4 Conceptual frameworks.....	9
3. OBJECTIVE	10
3.1 General objective	10
3.2 Specific objective	10
4. METHODS AND MATERIALS.....	11
4.1 Study setting and period.....	11
4.2 Study design and period	12
4.3 Population.....	12
4.3.1 Source population	12
4.3.2 Study population	12
4.4 Eligibility criteria.....	12
4.4.1 Inclusion criteria	12

4.4.2	Exclusion criteria	12
4.5	Sample size determination	13
4.6	Sampling technique and sampling procedure	15
4.7	Data collection methods and procedure	16
4.7.1	Data collection method.....	16
4.7.2	Data collection procedure.....	16
4.8	Variable	17
4.8.1	Dependent variable	17
4.8.2	Independent variable	17
4.9	Operational definition.....	17
4.10	Data Quality Control	17
4.11	Data processing and analysis	18
4.12	Ethical consideration.....	19
4.13	Dissemination of the result.....	19
5.	RESULTS	20
5.1	Neborns' mothers' characteristics.....	20
5.2	Obstetric complication of newborn mothers	21
5.3	Labor - delivery related characteristics of newborn mothers	22
5.4	Newborn characteristics	23
5.5	Professional characteristics who attend the newborns	25
5.6	Umbilical cord clamping time	25
5.7	Factors associated with the time of umbilical cord clamping	25
5.8	Variable Analysis	27
5.8.1	Bivariate Variable analysis	27
5.8.2	Multivariable analysis	28
6.	DISCUSSION	29
6.1	The time of umbilical cord clamping.....	29
6.2	Factors associated with the time of umbilical cord clamping	30
7.	STRENGTH AND LIMITATION.....	33
7.1	Strength of the study	33
7.2	Limitation	33
8.	CONCLUSION AND RECOMMENDATION.....	34

8.1	Conclusion.....	34
8.2	Recommendation.....	34
9.	REFERENCES	36
10.	APPENDIX.....	39
10.1	Annex 1: Information sheet	39
10.2	Annex 2-checklist	40
10.	የህፃን እናት የቃል የስምምነት ቅጽ	41
10.1	የመረጃ ቅጽ	41

LIST OF FIGURE

Figure 1: Conceptual framework for timing of umbilical cord clamping in newborns and its associated factor at birth in Addis Ababa selected public hospitals, Ethiopia 2025(13, 14, 16, 24-27).	9
Figure 2: The schematic presentation of sampling procedure to assess umbilical cord clamping time in newborns and its associated factor at birth in Addis Ababa selected public hospital in 2025.....	15
Figure 4: Mother of newborns obstetrical complication in Addis Ababa selected Public Hospitals, Ethiopia 2025.....	22
Figure5. Obstetrical heath care providers who attend the newborns in Addis Ababa selected public Hospital, Ethiopia 2025.	25

LIST OF TABLE

Table 1: Sample size calculation to assess timing of umbilical cord clamping in newborns and its associated factor at birth in Addis Ababa selected public hospitals 2025	14
Table3: Maternal characteristics of newborns at birth in Addis Ababa selected public health Hospitals, Ethiopia 2025 (N=394)	20
Table4: Labor delivery characteristics of the newborns mother in Addis Ababa selected public hospital at birth, Ethiopia 2024/2025(N=394).	23
Table5. Newborn characteristic at birth in Addis Ababa selected public health Hospitals, Ethiopia 2025 (N=394)	24
Table6: Result of multivariable analysis for assessment of umbilical cord clamping and associated factors among newborns at birth in Addis Ababa selected public Hospitals, Ethiopia 2025.....	26
Table7. Observational checklist tools	42

ABSTRACT

Background: The time of umbilical cord clamping is vital for newborn iron levels, as blood continues to flow between the newborn and placenta shortly after birth. The WHO recommends delaying umbilical cord clamping for at least one minute, as immediate clamping can reduce the infant's blood volume, leading to lower iron stores and potential neurodevelopmental risks.

Objective: To assess the time of umbilical cord clamping in newborns and its associated factors at birth in selected public hospitals, Addis Ababa, Ethiopia 2025.

Method: Institutional- based cross- sectional study design was conducted from March 20, 2025, to April 20, 2025, in Addis Ababa four randomly selected public hospitals. A systematic random sampling technique was used and 423 study participants were selected. Primary and secondary data were collected through direct observation and review of medical records in both cesarean and vaginal delivery rooms, using an adapted checklist tool. Data were collected using the Kobo Toolbox platform and then exported to SPSS version 25 for analysis. Binary logistic regression was used for the analysis. Multivariable logistic regression models were applied and significant variables were identified having p- value less than 0.05 with AOR and 95% CI.

Results: Total respondent were 394 with 94% response rate, the results showed that newborns who receive optimal /delayed cord clamping were 38.3%. The mean and median of cord clamping were 48.33 ± 28.88 and 46 respectively. Multivariate analysis showed that, newborn delivered via caesarian section were 97.4% less likely to receive delayed cord clamping (AOR=0.026, 95% CI: 0.010-0.066), Additionally, newborns of mother who experienced a perennial tear were 85% times less likely to received delayed cord clamping (AOR=0.150, 95%CI:0.066-0.337), Similarly, newborns attended by midwives were 3.078 times more likely to receive delayed cord clamping compared to those delivered by obstetrician (AOR=3.0378, 95% CI: 1.236-7.661), The odd of receiving delayed cord clamping in newborns were 58.5% less likely among mother having Meconium Stained Amniotic Fluid (AOR=0.415, 95% CI: 0.202-0.852). Delivery conducted with team work was 9.538 times more likely to receive delayed cord clamping (AOR=9.538, 95% CI: 3.118-29.172).

Conclusion and recommendation: This study revealed that the overall practice of delayed cord clamping was suboptimal as compared to early cord clamping, with only 38.3% of newborns receiving delayed cord clamping. In this study, timing of umbilical cord clamping were significantly associated with Mode of delivery, type of birth attendant, presence of meconium – stained amniotic fluid, perennial tears, presence of a delivery team. The majority of the newborns were received early cord clamping, which was fell below the standards set by the WHO, which advocate that all newborns should receive delayed cord clamping unless immediate intensive care is required. It is recommended that hospitals and other stalk holder will develop standardized protocols for delayed cord clamping and emphasize evidenced based practiced to ensure that health care provider adheres to clinical guideline for optimal newborn care.

Key words: Delaying cord clamping, early cord clamping, new born, term, Preterm

1. INTRODUCTION

1.1 Background

At the time of birth the newborn is still attached to the mother via the umbilical cord and separated from the placenta by clamping the umbilical cord. According to the World Health Organization (WHO), “Early” cord clamping is generally carried out in the first 60 seconds after birth, whereas “delayed” umbilical cord clamping is carried out more than 1 minute after the birth or when cord pulsation has ceased (1).

Delayed umbilical cord clamping increases hemoglobin levels at birth, improves iron stores in the first several months of life, reduces the need for blood transfusion for low blood pressure, and decreases the incidence of intraventricular hemorrhage specially for preterm newborns(2). Blood collected after delayed umbilical cord clamping showed increased hemoglobin and hematocrit values up to 72 h after birth(3). In term newborn, it is estimated approximately of 54 to 160 ml of fetoplacental circulation blood found in the placenta (3). Delayed cord clamping in full-term newborns may encourage increased blood volume of between 25 and 35 mL/kg of body mass, equivalent to 46 to 60 mg of iron from hemoglobin (4).

According to a Randomized control trials done in Australia, United Kingdom, Turkey, and in Benghazi showed that delayed cord clamping, compared with immediate cord clamping, reduced newborn death before discharge, improve iron store and reduce IDA (5-8).

WHO recommendation is based on the understandings that delay cord clamping allows continued passage of blood from the placenta to the baby for an additional 1 to 3 minutes after birth. However, currently, the coverage for this intervention has been limited(9). Studies about the time of umbilical cord clamping were conducted in high resource setting and finding in this study give insight to real practice and will be used as baseline for further studies in resource limited setting.

1.2 Statement of the problem

Despite the WHO recommends delayed cord clamping practice as a safe, beneficial, and feasible intervention, especially in resource limited setting its implementation remain inconsistent (10). DCC has been shown to improve newborn health outcome, yet a 2021 survey among obstetric and pediatric providers concluded that DCC is not universally practiced (11) . The time of cord clamping is often influenced by factors such as provider practice, lack of information, personal preferences, and institutional routine (6, 9, 12).

Global studies conducted in countries like Spain, California, Nepal, Brazil, and India have reported DCC implementation rate ranging from 29%-63%, which falls the recommended guidelines (10, 13-17). Most existing studies on DCC have been conducted in high and middle resource setting, leaving a gap in the literature from resource limited setting such as Ethiopia.

Although a few studies have examined umbilical cord clamping practices in Ethiopia, there is limited data particularly regarding newborns delivered by cesarean section. This evidence gaps hampers the generalizability of findings and hinder efforts to improve neonatal care practice. The current study reveals that DCC is less commonly practiced, with the majority of newborns receiving early cord clamping. Identifying the factors associated with this practice is essential for establishing a base line for future research and improving the implementation of evidence based neonatal care in Ethiopia.

1.3 Significant of study

Identifying the practice and determinant of the time of umbilical cord clamping may assist the Ministry of health (MOH) policymaker and other responsible bodies in emphasizing the importance of practicing delayed cord clamping at birth. Delaying umbilical cord has been shown to have positive effects, particularly in preventing condition such as IDA, necrotizing entero-colitis, intra-ventricular hemorrhage, and sepsis in preterm newborns. DCC enable the continued transfer of blood from the placenta to the neonate, which helps prevent iron - deficient anemia at birth and support better iron store up to six months of life. it also reduce the need of blood transfusion and associated from anemia in both preterm and term newborns. Furthermore, delaying the time of umbilical cord clamping can reduce the economic burden of related to treatment of anemia, benefiting both families and health care institution. Adhering to WHO guideline on cord clamping practice can improve the overall quality of the health care system.

This project will contribute to building a foundation for further research in the area, encouraging future studies on related topics. The finding of this study will also support EBP, promoting better healthcare delivery. By strengthen the implementation of delayed cord clamping, healthcare polices and authority may refer to the results to design, improve, and evaluate current clinical polices.

2. LITERATURE

2.1 Introduction

The purpose of this literature review is to summarize what has already existed about the practice of timing umbilical cord clamping worldwide, to discuss the impact of the research findings on clinical practice, and to identify gaps in the time of umbilical cord clamping in Ethiopia. As a reference, literature will be reviewed and collected on hospital, clinical, and other related factors.

2.2 The time of umbilical cord clamping

Worldwide, multiple governing bodies recommend DCC in preterm and term newborns(1, 2). Despite the recommendations from multiple governing bodies, including the World Health Organization, research on DCC in developing countries remains limited given that iron deficiency is prevalent, and most neonatal deaths occur in low and middle- income countries(18). In sub-Saharan Africa, a region where child mortality rates are the highest in the world, and after birth, the practice of DCC appears to be associated with reduced in-hospital mortality in preterm infants(18, 19). DCC probably reduces the number of babies who die before discharge compared with ECC (average risk ratio (RR) 0.73, 95% confidence interval (CI) 0.54 to 0.98, 20 studies, 2680 babies(7). The first 1000 days after birth have been identified as the period of life with the highest risk of iron deficiency(20)**. Iron deficiency is the most common nutritional deficiency and cause of anemia worldwide, affecting up to 43% of all children younger than 5 years old (21). The first three minutes after birth may arguably be the period of life with the greatest opportunity to reduce the risk of iron deficiency by performing DCC to increase the infant's iron endowment at birth(18).

According to a study conducted in the United States of America from 2045 eligible hospitals 50% of the hospital showed that healthy newborns practice delayed cord clamping and a study conducted in California revealed that from 5332 eligible delivery, only 1555(29%) were received DCC and the rest of 71% were received early cord clamping (ECC)(22).

Another retrospective cohort study conducted in Canada from 680 eligible infants, of whom 1852 (39.6%) were received DCC and 2828 (60.4%) received ECC(23). The practice of delaying cord clamping in Brazil showed around 53.7% while 46.3 %were practice ECC(16)

A Retrospective study held in Lebanon among preterm deliveries less than 35 weeks of gestational age revealed that 62 % of newborns received DCC the rest were ECC(15). A cross-sectional study design conducted in a maternity hospital in Nepal showed 48% of infants received DCC and the mean and median cord clamping times were 61 ± 33 and 57 (38–79) s, respectively(24).

A study conducted in Ethiopia women-newborn pairs found that 53.09% of newborns received delayed umbilical cord clamping, with mean and median clamping times of 67.87 ± 39.86 SD and 60s, respectively(25).

2.3 Factor associated with the time of umbilical cord clamping

Studies on timing of cord clamping practice at the time of birth related to: maternal characteristics such as parity, Rh immunization, position at the time of birth, obstetrical complication, and mode of delivery: newborn characteristics like APGARA score, number of births, weight, and gestational age* : birth care provider and working shift were determine the timing of umbilical cord clamping. Differences in the timing of umbilical cord clamping at birth have been reported across different literature and in different countries.

Some of the literature regarding to the timing of umbilical cord clamping practice in newborns and associated factors at birth are reviewed as follows:

2.3.1 Labor and delivery- related factors

A Study done in the United States of America California women delivered by Cesarean received less likelihood of DCC (odds ratio: 0.68; 95% confidence interval: 0.59, 0.79)(22). Another study conducted in India showed that babies delivered by Caesarean section were less likely to receive DCC (OR 0.03; 95%CI 0.02, 0.05)(26). A Study held in Nepal revealed that infants born after an obstetric complication were 2.5 times more likely to receive DCC (OR 2.5, 95% CI 1.2–5.3)(24). Mode of delivery and position of delivering mother can associated with timing of umbilical cord clamping, an observational study done at Zealand showed there was a longer median cord clamping time in the group who had a spontaneous birth (median 3.71; IQR 2.67 - 6.23) vs. instrumental birth (2.08; IQR 0.55 - 2.30); with maternal side-lying position (6.37; IQR 4.15 - 9.48) vs. lithotomy position (2.24; IQR 1.87 - 3.50)(27). A Study done in Nepal showed

that infants born during the night shift were five times more likely to receive DCC (OR 5.6, 95% CI 1.4–38.0)(24).

2.3.2 Newborns related factors

A Study conducted in Lebanon revealed that Infants not receiving DCC were smaller, of lower gestational age, and more likely to be delivered via cesarean section than those who received DCC ($p < 0.0001$)(15). Another study done in India showed that DCC was less likely among birth weight < 2000 g (OR 0.22; 95%CI 0.12,0.47 and multiple pregnancies** (OR 0.17, 95%CI 0.05,0.63)(26).

Another study done in Brazil *delayed cord clamping in newborns associated with resuscitation in the delivery room ($p = 0.001$)(16). A Similar study conducted in India birth asphyxia requiring resuscitation* were less likely to receive DCC (0.37; 95%CI 0.26, 0.52)(26).and also a study conducted in Nepal revealed that babies requiring ventilation had a 65% lower likelihood of receiving DCC (OR 0.35, 95% CI 0.13–0.88). According to study done in Brazil DCC was associated with skin-to-skin contact in the delivery room ($p = 0.014$), the position of the newborns below the vaginal canal ($p < 0.001$), the position of the newborns at the vaginal level ($p < 0.001$)(16).

2.3.3 Professional - related factors

A Study done in Zealand revealed that delivery attended by Midwives were practicing DCC than obstetricians which is midwife-facilitated birth (4.06; IQR 2.68 – 6.65) vs. obstetric facilitated birth (2.13; IQR 1.48 – 3.28)(27). Similarly a study conducted in Canada showed median ** (5th, 95th percentile) clamping time in seconds for the full sample was 12 (4, 402) with practitioner subgroups as follows: obstetricians (12 [3, 107]), family physicians (19 [6, 325]), and midwives (81 [6, undefined])(28). One study conducted in Spain showed Midwives were more likely to perform delayed clamping than obstetricians, with an OR of 14.05 (95% CI: 8.41–23.49)(14). In Ethiopia delivery attended by medical interns (AOR = 2.47, 95% CI: 1.29-5.41) were significantly associated with delayed umbilical cord clamp(25).

2.3.4 Maternal and obstetric - related factors

A Prospective study showed in Ethiopia Rh-negative mothers (AOR = 3.91, 95% CI: 1.40-10.95), and multiparty (AOR = 0.54, 95% CI: 0.32-0.93) were significantly associated with delayed umbilical cord clamp(25).

2.4 Conceptual frameworks

The conceptual framework shown below is set out from different literature conducted in different countries (13, 14, 16, 24-27).it shows the effect of Independent variables (maternal and obstetrical - related factors, neonatal characteristics, professional and labor delivery related - factors) on the dependent variable (timing of umbilical cord clamping) which modified and adopted from different studies. This study was addressing the timing of umbilical cord clamping practice in newborns and its associated factor at birth.

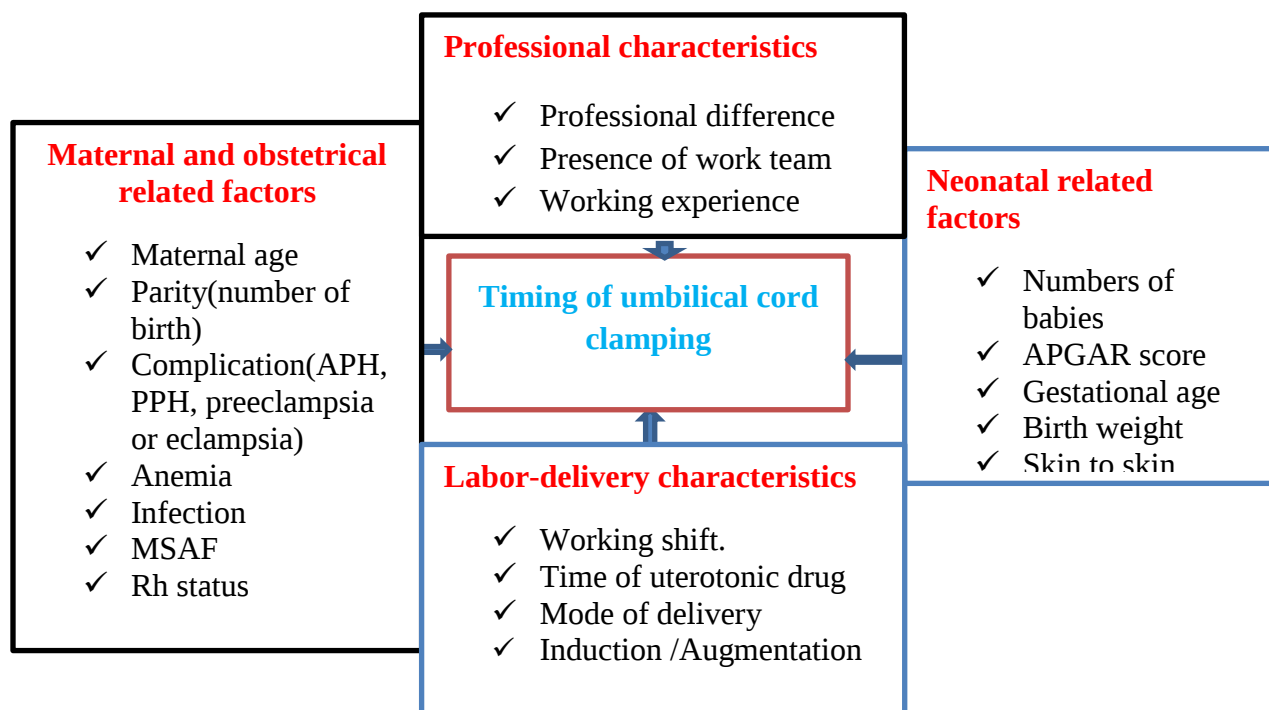


Figure 1: Conceptual framework for timing of umbilical cord clamping in newborns and its associated factor at birth in Addis Ababa selected public hospitals, Ethiopia 2025(13, 14, 16, 24-27).

3. OBJECTIVE

3.1 General objective

- To assess the time of umbilical cord clamping in newborns and its associated factors at birth in Addis Ababa selected public hospitals, Ethiopia 2024/2025.

3.2 Specific objective

- To assess the time of umbilical cord clamping among newborns in Addis Ababa selected public hospitals, Ethiopia 2025.
- To identify factors associated with umbilical cord clamping time in newborns at birth in Addis Ababa public selected hospitals, Ethiopia 2025.

4. METHODS AND MATERIALS

4.1 Study setting and period

The study was carried out in public hospitals of Addis Ababa, which is the capital city of Ethiopia. It is geographically well plateau surrounded by hills and mountains, also the largest city in the country by population, with a total population of 3,384,569 according to the 2007 census. It holds 527 square kilometers of area in Ethiopia (29).

The city had been divided into 11 sub- cities and 99 Keble: As of 2014, the capital of Ethiopia, Addis Ababa, had more than 52 hospitals, 12 of them state- run, and more than 40 private have been providing a-countless efforts in promotion and prevention, treatment and palliative care for the surrounding society and people from a distance(30).

The study was conducted in four randomly selected hospitals (Tikur Anbesa, Saint Paulo's, Yekatit, and Tirunesh Beijing Hospital for one month).

Tikur Anbessa Specialized Hospital is the largest renewed specialized and teaching referral hospital in Ethiopia and it has over 700 beds. It offers diagnoses and treatment for approximately 370,000–400,000 patients per year in all the wards, one of which is the obstetrical department and around 4600 deliveries are attended each year (31) and delivery units have 7 beds, 3 delivery couches, and 3 operation delivery tables as information obtained from case team leaders. Approximately 380 live births have been taking place per month in these hospitals of which 30% of deliveries were by operation.

St. Paul's Hospitals Millennium Medical College * in Addis Ababa, Ethiopia, is one of the largest public hospitals in the country and provides academic, research and medical services. The hospital provides antenatal care and delivery service for more than 8000 women per year(32). Around 10 beds, 8 delivery couches, and 4 operation tables were giving delivery services in this hospital as information obtained from case team leaders. Around 842 deliveries have been recorded in this hospital per month and 535 deliveries were C/S.

Tirunesh Beijing General Hospital is located in Addis Ababa, Ethiopia It has 202 bed capacity, 31 Day Care Beds, a 14 Bed ICU, 18 Bed Neonatal ICU, 10 Operation Rooms, 5 Delivery Suites, 16 Emergency Beds, and a 17 Bed Recovery Room thus making it the largest in Addis Ababa* . The Hospital serves about 2 million people. The hospital renders all MCH, delivery and postnatal care services and more than 3500 annual delivery (33) Approximately 536 delivery has been recorded within a month of which 34% were C/S deliveries as information obtained from case team leaders.

Yekatit 12 General Hospital and Medical College, located in Addis Ababa, Ethiopia, uses Abebech Gobena MCH Memorial Hospital—a tertiary referral center under the Addis Ababa Health Bureau—as one of its teaching hospitals, where this study will be conducted. This hospital gives service to more than 200 000 patients. The Hospital has 33 beds, 68 midwives, 11 gynecologists and obstetricians gave maternal and child health (34) an estimated of 624 live birth has been occurred in this MCH center(340 vaginal delivery and 284 C/S*).

4.2 Study design and period

An institutional- based cross- sectional study was conducted to live birth newborns at Addis Ababa public health hospitals from March 20 to April 20/2025.

4.3 Population

4.3.1 Source population

- All live births newborns regardless of the mode of delivery in Addis Ababa public hospitals.

4.3.2 Study population

- Live birth Newborns delivered in Addis Ababa randomly four selected pubic hospitals and who meet the inclusion criteria.

4.4 Eligibility criteria

4.4.1 Inclusion criteria

- All live birth newborns in Addis Ababa public hospitals either vaginal or caesarian delivery was included in the study.
- Singleton delivery and first-borns in multiple deliveries
- Newborns who not require resuscitation and congenital anomaly

4.4.2 Exclusion criteria

- All newborns who had congenital anomalies
- Newborns who needs resuscitation, nuchal cord tie, and cord prolapse
- All newborns who were delivered from PPH mothers
- Twin B/C in multiple delivery

4.5 Sample size determination

For the first objective (outcome), a single population proportion formula (Stat Calc Epi Info version 7.2.6.0) was used to determine sample size by considering the following statistical Assumption: P=proportion of delayed cord clamping (P-value) is 53.09%(25): Z=standard normal distribution (1.96) with a confidence interval of 95 %, marginal error 5%: Assume the study population is large i.e.

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

For the second objective (associated factors), the sample size was calculated using a double population proportion formula by considering delivery attended by medical interns* , receiving uterotonic drug for AMSTL, Rh negative mother ,and multiparty are the major independent factors associated with delaying cord clamping. The sample size determined by the independent variable gives a smaller size compared to the first objective (Table 1). Indeed, grater size obtained from the first objective was used for the study. The sample size was calculated by Epi Info version 7.2.6.0 package by considering the following assumption, P1: is the proportion of outcome with exposed, P2 proportion of outcome with non-exposed, Z a/2: is taking CI 95%, Zβ: 80% and r is the ratio of exposed to non –exposed 1:1

$$n = \frac{Z\alpha/2 / \pm \sqrt{\left(1 + \frac{1}{r}\right) P(1 - P)} + Z\beta \sqrt{\left(\frac{P1(1 - P1) + P2(1 - P2)}{r}\right)}}{(P1 - P2)^2}$$

Table 1: Sample size calculation to assess timing of umbilical cord clamping in newborns and its associated factor at birth in Addis Ababa selected public hospitals 2025

For the first objective				
Variable	Assumption	Total sample size	After adding 10%	
Delayed cord clamping (DCC)	Proportion of early cord clamping (46.91%) Z a/2=Z score of 95 % CI d= marginal error (5%)	383	422(25)	

For the second objective			
Variable	Assumption	Total sample size	Adding 10 %
Attended medical interns	P1=0.7115 P2=0.5062	186	205(25)
Multiparty	P1=0.4957 P2 =.5833	360	396(25)
Rh negative mother	P1=0.75 P2=0.5261	96	106(25)
Uterotonic drugs for AMSTL >60 sec.	P1=0.8144 P2=0.3167	36	40(25)

4.6 Sampling technique and sampling procedure

In Addis Ababa, there are 12 Public Health Hospitals (except Emanuel hospital which provide obstetric and neonatal care) that the study was carried out by considering their obstetric care. A simple random sampling technique was used to select the Hospital from 11 public Hospital in Addis Ababa. By considering a minimum sample size from study population four public hospitals were selected by lottery method which are Saint Paulo's Millennium Medical College, Tikur Anbesa Specialized Hospital, Yekatit Hospital, and Tirunesh Beijing Hospitals are hospital in which the study samples were recruited . Based on a review of three months of HMIS data from each hospital and calculating the monthly average, an estimated total of 4,851 live births occur each month in Addis Ababa public hospitals. Among these, St. Paul's Millennium Medical College (842), Tikur Anbessa Specialized Hospital (380), Yekatit 12 Hospital (624), and Tirunesh Beijing Hospital (536) together accounted for 2,382 live births, representing more than half of the total monthly deliveries The sample were proportionally allocated for each hospital and the study participants was select by systematic random sampling technique with a K value determined based on the study population in each hospital within a given period..

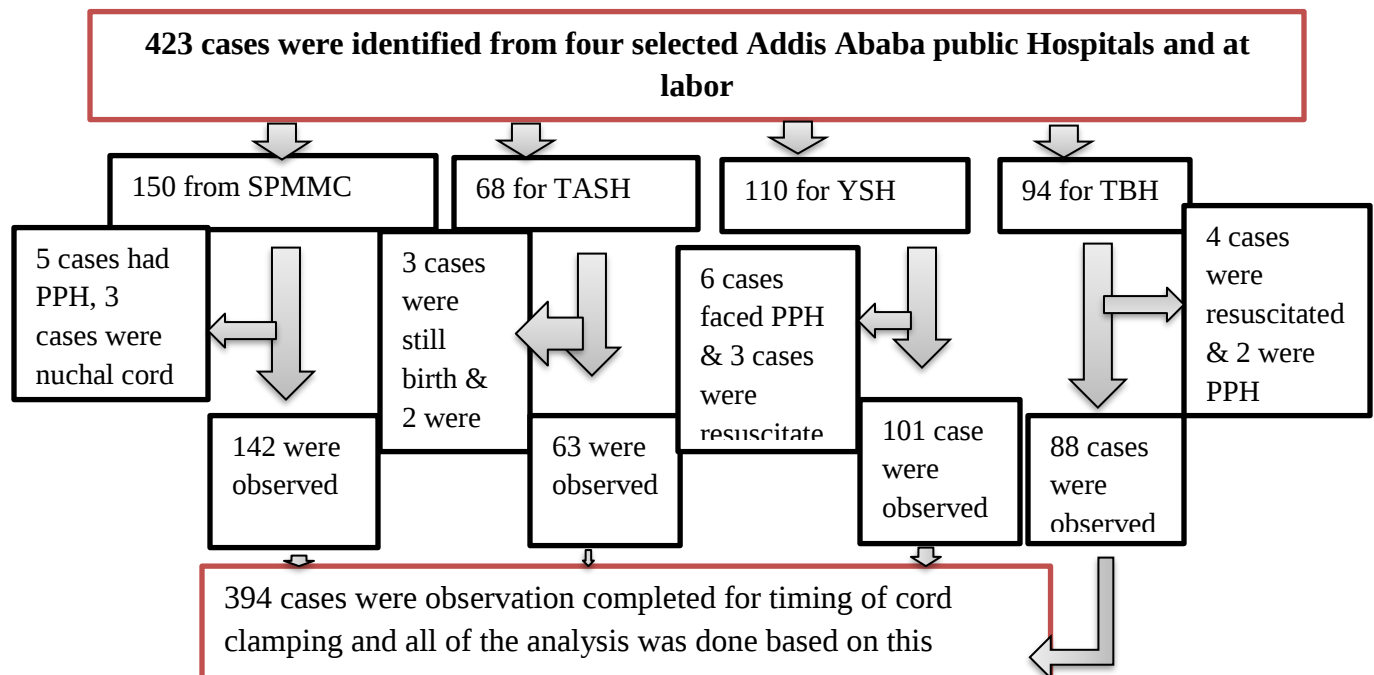


Figure 2: The schematic presentation of sampling procedure to assess umbilical cord clamping time in newborns and its associated factor at birth in Addis Ababa selected public hospital in 2025.

4.7 Data collection methods and procedure

4.7.1 Data collection method

An observational data collection method was used to carry out the studies, which are document records and observation of labor delivery. Necessary information was taken from mothers and their newborn document. When data was collected, initially data was taken under direct observation of labor – delivery process and the remained data had taken from the charts to ensure comprehensive information on the time of umbilical cord clamping and associated factors. Data was collected through participant observation using a checklist adapted from studies done in different literature to capture the variable of interest (13, 16, 24-26, 35, 36). Observation of cases for this study was performed both in the caesarian delivery unit and the vaginal delivery unit.

Data related to the timing of umbilical cord clamping and AMSTL, labor and delivery characteristics*, obstetric complications and newborns characteristics* were collected by reviewing medical records and observation. The stopwatch was pressed / started immediately at the time of birth and stop when the first clamp is applied. The observer had been hidden and was not interfere with healthcare delivery. The relevance of all items in the checklists was checked and it was translated into local language by experts and translated back to English.

4.7.2 Data collection procedure

Data was collected by eight BSc midwives for SVD, eight BSc circular Nurses for C/S, and one supervisor for each study setting. For each hospital, four data collectors were assigned from respective ward, but newborns who delivered by the data collector didn't include for the study, two for C/S ward and two for VD ward. They worked on day and night shifts. A total of 16 BSc midwives and Nurses and 4 Supervisor were recruited and trained before conducting the actual research. Observation was started from the second stage of labor for vaginal delivery and from the time of incision for caesarian section delivery, which is completed 1 hour after delivery (25). And to complete observations, the researchers used printed checklists to record data and a stopwatch, which were used to record the time duration of cord clamping. To prevent bias the birth attendants did not informed, but case team leaders and department heads did informed. Based on checklist study tools, all data collectors was captured the time of umbilical cord clamping using clock's and documented relevant information from medical charts.

4.8 Variable

4.8.1 Dependent variable

- The time of umbilical cord clamping

4.8.2 Independent variable

- Maternal and obstetrical factors includes: Age, parity, RH status, infection* , anemia, induction or augmentation, antepartum hemorrhage(APH), Prolonged rupture of membrane* , preeclampsia or eclampsia, women having PPH, perennial tear , and MSAF during labor and delivery
- Newborn related factors includes:, gestational age, birth weight, presentation at birth, APGAR score, and skin to skin contact
- Labor delivery characteristics: Mode of delivery (VD, C/S and instrumental delivery), timing of uterotonic drugs for AMSTL
- Professional factors: Like type of professionals, teamwork and number of HCPs in the team, health care providers dedicated to giving essential newborn care.

4.9 Operational definition

- **Early cord clamping** is a cord clamping practice carried out in the delivery room when mothers gives birth within the first 60 seconds after birth(1).
- **Delayed umbilical cord clamping** is a proven obstetrical intervention in the delivery room carried out more than 1 minute after the birth or when cord pulsation has ceased(1).
- **Newborns** : A baby from a time birth to 28 completed days regardless of gestational age and mode of delivery((37).

4.10 Data Quality Control

To maintained the quality of the data, a pretest was conducted using and observational checklist on 5% of the sample (22 newborns) a Zewuditu Memorial hospitals, two weeks prior the actual data collection period. Based on the findings from the pretest study, necessary modifications were made to the measurement tools to improve their clarity and enhance the internal consistency of the collected data. The tools were adapted from previous literature and reviewed

by experts. Close supervision was undertaken during data collection and a Kobo tool box system was designed to check and monitor checklist response.

A cross-checking mechanism was used to ensure a uniform understanding of all questions among data collectors. Checklists were coded during data collection, and the principal investigator randomly verified a sample of questionnaires each day. The purpose of the study was explained to the relevant bodies, and confidentiality and the need for honest responses were emphasized. Incomplete or inconsistent data were corrected as needed to maintain data integrity.

4.11 Data processing and analysis

Initially, all the collected data was checked for completeness and consistency before enter to the software using kobo tool box. The data were then exported to excel subsequently imported into SPSS version 25 for analysis. After coding and preparing the data in SPSS, analysis was conducted using Binary logistic regression to evaluate the effect of independent variable on the dependent variable. In this study, the dependent variable was dichotomized into Early Cord Clamping (**ECC = 0**) and Delayed Cord Clamping (**DCC = 1**). Based on previous research, ECC was selected as the reference category, and all associations were interpreted with respect to the likelihood of practicing DCC. Collinearity diagnostics were conducted to assess multicollnearity among the independent variables. The variance inflation factor (VIF) value for all predictors was found to be less than 10. And the tolerance value was greater than 0.1, indicating that multicollnearity was not a concern in the model. Model of fitness was evaluated, and the Hosmer-Lemeshow goodness of fit test was conducted.

The Analysis assessed the association between predictor variable and dependent variable. Variable with a p- value less than or equal to 0.25 in bivariate regression were entered into Multivariate regression. Independent variables with p-value less than or equal to 0.05 in multivariate regression were considered statistically significant in relation to dependent variable. The degree of association between dependent and independent variable will be described using crude odd ratio (COR) and adjusted odd ratio (AOR) with a 95 % confidence interval (CI). The result of this study was presented in terms of frequency and percentage using tables, pie charts, and bar graphs.

4.12 Ethical consideration

The study was approved by Addis Ababa University College of Health Science School of Nursing and Midwifery Department of Nursing Institutional Review Board (IRB). Permission and supportive letter are requested from the respective chief executive director, clinical services director, and head of the departments before data collection. Newborns are under vulnerable population who are unable to provide consent themselves. Therefore verbal informed consent was obtained from the newborns mother before delivery in accordance with the declaration of Helsinki and necessary permission were secured to ensure confidentiality. Also she was informed thoroughly about the benefit of the study and have right to refuse not participating any time during the study. Each data collection procedure would follow the national and international code of ethics. Permission and a supportive letter were also obtained from the Addis Ababa Health Bureau to access the necessary information from the selected hospitals.

4.13 Dissemination of the result

The final findings will be submitted to AAU college health science and AAU College of Health Science Department of Nursing and Midwifery post graduate program. Also I will disseminate the finding to each public Hospital in Addis Ababa as well to the Administrative Office of Addis Ababa Health Bureau through seminars, and presenting the report in the journal club. I will also disseminate the report with printed copy or website platforms in Addis Ababa University and public hospitals library. Finally, efforts will be made to publish the findings in national and international peer-reviewed journals.

5. RESULTS

5.1 Newborns' mothers' characteristics

The mean age of the mother were 29.2 (SD of 5.76) and majority (68%) of them were multiparous. Rh negative mother were found (21.3%) and mother who had an infection (HIV/AIDS, Hepatitis virus and syphilis were founded in (15.5%)) of the cases. Mother who had anemia were (10.9%) and 23.1% mother were received antenatal steroid.

Table3: Maternal characteristics of newborns at birth in Addis Ababa selected public health Hospitals, Ethiopia 2025 (N=394)

Variable	Frequency	Percentage
Parity of the mother		
Prim parity	126	32.0
Multiparty	268	68.0
Rh status of the mother		
Negative	84	21.3
positive	307	77.9
Unknown	3	.8
Infection status(HIV/AIDS, hepatitis & syphilis)		
Yes	61	15.5
No	333	84.5
Mother has anemia during birth		

Yes	351	88.7
No	43	11.3
Antenatal steroid had given		
Yes	91	23.1
No	303	76.9

5.2 Obstetric complication of newborn mothers

In relation to obstetric complications and interventions, 38.8% of the mothers underwent labor induction, while 7.9% required labor augmentation. Antepartum hemorrhage was reported in 8.1% of the cases. Gestational diabetes mellitus (GDM) occurred in 17.5% of the mothers. Preeclampsia was diagnosed in 38.1% of cases, and among these, 3.8% progressed to eclampsia. Perennial tears were observed in 31% of the mothers during delivery. Additionally, 28.9% of the mothers had meconium-stained amniotic fluid.

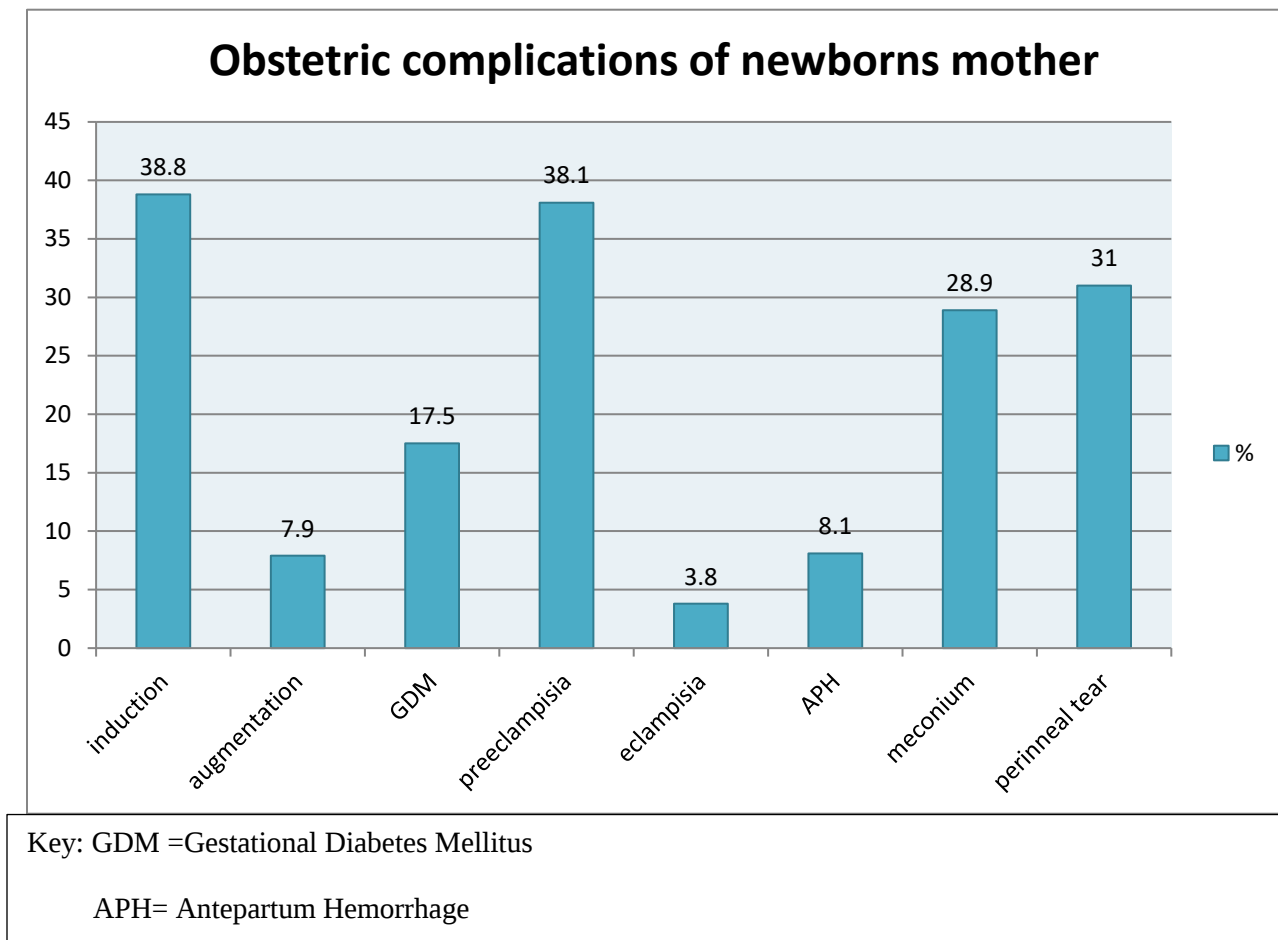


Figure 4: Mother of newborns obstetrical complication in Addis Ababa selected Public Hospitals, Ethiopia 2025

5.3 Labor - delivery related characteristics of newborn mothers

The newborn delivered by caesarean section and vaginal delivery was having different proportion, at 53.6% and 45.4% respectively. Half of the caesarean deliveries were elective, and 92.2% of all deliveries were performed under spinal anesthesia. Instrumental delivery was used in 1% of vaginal births. The majority of deliveries (74.6%) occurred during the day shift.

Table4: Labor delivery characteristics of the newborns mother in Addis Ababa selected public hospital at birth, Ethiopia 2024/2025(N=394).

Variable	Percent	frequency
Mode of delivery		
Vaginal	179	45.4
instrumental	4	1.0
Caesarian	211	53.6
Working shift		
Day shift	294	74.6
Night shift	100	25.4
For caesarian delivery mother		
Type of anesthesia		
General	16	4.1
Spinal	195	49.5
Indication of caesarian delivery		
Emergency	106	26.9
Elective	105	26.6
Carrier of surgeon		
Senior obstetrician	27	6.9
Resident	184	46.7

5.4 Newborn characteristics

The mean gestational age of study population were 37.4(SD2.5) and majority 72.6% were term newborns. The mean birth weights of the newborns were 2881.7±636.8 gram. Most of them were cephalic presentation (85.3%). Skin to skin contact were done in 37.3 % of vaginal delivery and the first minute APGAR score were 55.8%,40.4%,and3.8% normal, moderate and low APGAR score respectively.

Table5. Newborn characteristic at birth in Addis Ababa selected public health Hospitals, Ethiopia 2025 (N=394)

Variable	Frequency	Percentage
Gestational age of the newborn at birth		
Post term	21	5.3
Term	286	72.6
preterm	87	22.1
Birth weight of the newborn		
HBW(>4000)	25	6.3
NBW(2500-3999)	290	73.6
LBW(1499-2499)	70	17.8
VLBW(<1500)	9	2.3
Presentation of the newborn during delivery		
Breech	51	12.9
Cephalic	336	85.3
Cord	2	.5
Face	4	1.0
Others...	1	.3
APGAR score of newborn within one minute		
Normal APGAR score	220	55.8
Moderate APGAR score	159	40.4
Lowe APGAR score	15	3.8
Skin to skin contact after delivery		
yes	61	37.3
No	122	66.6

5.5 Professional characteristics who attend the newborns

Out of birth attendant 69%, 24.4%, 4.6% were obstetrician, midwives and medical interns respectively. The majority (81%) of health care professional were less than 5 years of experience level while 3.3% of HCPs were above 10 years' experience in attending birth. In this study 74.6 % of HCPs attending birth during day shift and 89.6 % of birth were conducted with team work.

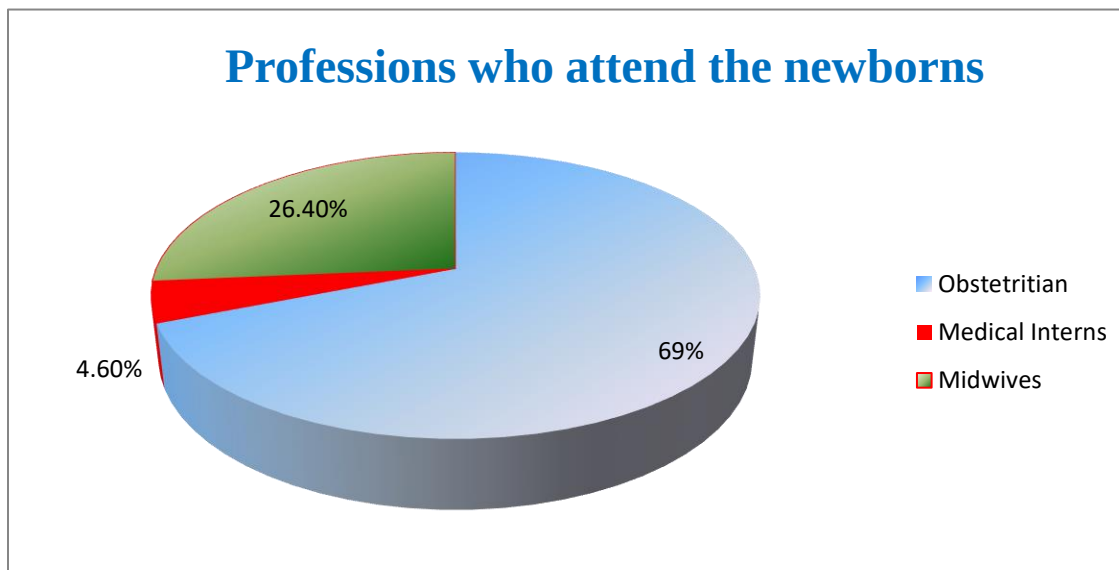


Figure5. Obstetrical health care providers who attend the newborns in Addis Ababa selected public Hospital, Ethiopia 2025.

5.6 Umbilical cord clamping time

Overall, 38.3% of the newborns were received DCC (≥ 60 seconds) while 67.7% of them were received ECC in this study. The ranges of umbilical cord clamping in this observational data were measured from 7 to 124 seconds. Mean and median of cord clamping was measured 48.33 ± 28.88 and 46 respectively.

5.7 Factors associated with the time of umbilical cord clamping

Newborns mother did have meconium stained amniotic fluid ($p=0.017$), having perennial tear ($p=0.000$), caesarian delivery ($p=0.00.$) and who delivered by obstetrician were received ECC as compared to those who received DCC. Significance difference also observed in the time of umbilical cord clamping across obstetrical HCPs ($p=0.000$), new born delivered by medical interns did receive DCC compared to obstetricians ($p=0.030$) and newborns who delivered by

midwives did receive DCC compared to obstetrician ($p=0.017$) and also there was significant difference between obstetrician and midwives on the time of umbilical cord clamping practice.

There is no any significance difference in birth weight, gestational age, obstetrical complication, working shift, presentation of the baby, parity of the mother, Apgar score of the newborn, Rh status of the mother and number of delivered baby on the time of umbilical cord clamping (DCC vs. ECC).

Table6: Result of multivariable analysis for assessment of umbilical cord clamping and associated factors among newborns at birth in Addis Ababa selected public Hospitals, Ethiopia 2025

Variables	Time of cord clamping		Bivariate analysis	Multivariate analysis
	DCC N=151/38.3%	ECC N=243/61.7%	COR (CI 95%)	AOR (CI 95%)
Mode of delivery				
Vaginal	124 (82.1%)	55 (22.6%)		1
Instrumental	0	4 (1.6%)		-
Caesarian	27 (17.9%)	184 (75.7%)	0.065(0.039-0.109)	0.026 (0..010-0.066)**
Mother had perennial tear				
Yes	39 /25.8%	83 /34.2%	0.671(0.428-1.053)	0.150 (0.066-0.337)**
No	112 /74.2%	160 /65.8%		1
Birth attendant professions				

Medical interns	5 /3.3%	13 /5.3%		-
Midwives	88 /58.3%	16 /6.6%		3.078 (1.236-7.661)*
Obstetricians	58 /38.4%	214 /88.1%		1
Work team available				
Yes	145 /96%	208/85.6%	5.039(3.289-7.723)	9.538 (3.118-29.172)**
No	6 /4%	35 /14.4%		1
Meconium stained Amniotic fluid				
Yes	30 /19.9%	159 /65.4%	0.469(0.291-758)	0.415 (0.202-0.852)*
No	121 /80.1%	84 /34.6%		1
	Keys: 1 reference,* significant at p- value .> 0.01 and highly significant at p value < 0.001			

5.8 Variable Analysis

5.8.1 Bivariate Variable analysis

Bi-variable logistic regression analysis was performed to identify candidate variable for the multivariable model. Variable with a p-value less than or equal to 0.25 in the bi-variable analysis were considered for inclusion in the multivariable logistic regression. The variable that met this criteria in this study were: induction of labor, maternal infection status, use of antenatal steroids, maternal anemia, perennial tear, meconium-stained amniotic fluid, availability of working team, mode of delivery, maternal Rh status, APGAR score, newborn weight, working experience health care providers (HCPs), and type of attending professional were subsequently entered into the multivariable logistic regression model to identify independent predictors of the timing of cord clamping.

5.8.2 Multivariable analysis

Variables that qualified for inclusion in the multivariable analysis included mode of delivery, Meconium-stained amniotic fluid (MSAF), perennial tear, type of profession, and the availability of a delivery team. These variables were significantly associated with the timing of umbilical cord clamping, each with a p-value ≤ 0.05 .

Newborn delivered via caesarian section were 97.4% less likely to receive (DCC) compared to those delivered by vaginal delivery (AOR=0.026, 95% CI: 0.010-0.066). Additionally, newborns of mothers who experienced a perennial tear were 85% times less likely to received DCC compared to those whose mother did not have perennial tear (AOR=0.150, 95%CI:0.066-0.337). Similarly, newborns attended by midwives were 3.078 times more likely to receive DCC compared to those delivered by obstetrician (AOR=3.0378, 95% CI: 1.236-7.661). The odd of receiving DCC in newborns were 58.5% less likely among mother having MSAF compared to newborns delivered without MSAF mother (AOR=0.415, 95% CI: 0.202-0.852). Delivery conducted with team work was 9.538 times more likely to receive DCC compared to without teamwork (AOR=9.538, 95% CI: 3.118-29.172).

6. DISCUSSION

6.1 The time of umbilical cord clamping

This study found that the majority of newborns underwent early cord clamping (ECC), while only 38.3% received optimal or delayed cord clamping (DCC). This result is comparable to findings from a study conducted in the United States, which reported DCC rates of 44% in government hospitals and 43.4% in private hospitals(22). The similarity between the two studies might be due to comparable characteristics of methodological usage, similar levels of healthcare provider awareness, training, or adherence to guidelines regarding DCC. Additionally, institutional protocols, availability of resources, and overall healthcare delivery systems may have shared similarities, contributing to consistent practice patterns across the two settings

The percentage of DCC observed in this study (38.3%) was lower than that reported in a study conducted in Debreworkos, Ethiopia (53.09%)(25). The possible explanation for this discrepancy might be the inclusion criteria study done in Debreworkos excluded newborns delivered via caesarean section, whereas the present study included all newborns regardless of the mode of delivery. Since, the inclusion of such cases in this study may have contributed to the lower overall rate of DCC. The percentage of DCC in this study finding also lower than study conducted in Nepal (48%)(24), the observed difference might be the number of study sample which was used is small compared to this study finding, which may have influenced the reported prevalence due to reduced representativeness. Similarly, the percentage of DCC observed in this study (38.3%) was lower than that reported in a study conducted in Lebanon, where 62% of newborns received DCC(15). This difference might be explained by the target population in the Lebanese study, which focused on preterm infants with a gestational age below 35 weeks. Scientifically, preterm newborns are known to benefit more significantly from delayed cord clamping compared to term infants, as it can improve circulatory stability. Another study conducted in Brazil (53.7%) the percentage of DCC were higher than this study, the observed difference might be due to number of study sample they were used is small as compared to this study. Similarly, the percentage of DCC in this study (38.3%) was lower than that reported in a study conducted in Spain, where 92.2% of newborns received DCC. This considerable difference might be attributed to variations in the source population, the data collection tools used, and the number of sample size. The percentage of DCC observed in this study (38.3%) was higher

compared to a study conducted in California, which reported a DCC rate of 29%. This difference might be attributed to the inclusion criteria of the California study, which encompassed preterm and ill infants groups less likely to receive delayed cord clamping due to clinical instability but, the current study excluded such cases.

6.2 Factors associated with the time of umbilical cord clamping

Regarding to mode of delivery, newborns delivered via caesarian section were significantly associated with delayed cord clamping. The Odds of receiving DCC in newborns were 97.4% less likely among caesarian delivery compared to vaginal delivery (AOR=0.026, 95% CI: 0.010-0.066). Similarly, study conducted in California showed that cesarean delivery was associated with less likelihood of DCC (odds ratio: 0.68; 95% confidence interval: 0.59, 0.79)(13) and another study conducted in Brazil showed that Infants receiving ECC were delivered via cesarean section than those who received DCC ($p < 0.0001$) (16). Study conducted in India also showed that babies delivered by Caesarean section (OR 0.03; 95%CI 0.02,0.05)(26). This might be explained that, when the newborns delivered via caesarian delivery the surgeon may be concerned that waiting the cord for one minute could increase maternal bleeding risk due to the open surgical field and the need for quick uterine repair due to this reason newborns were received early cord clamping. During a caesarian, the newborns is often lifted above the level of the placenta, reducing the effectiveness of placental transfusion compared to vaginal, which discourage surgeons from waiting optimal time ≥ 60 seconds. This practice limit the newborns benefit from DCC and guidelines safely recommends to delayed cord clamping during operative deliveries (38) .

Newborns who are attended by midwives were receiving DCC 3.078 times compared to newborns delivered by obstetrician (AOR=3.078, 95% CI: 1.236-7.661). This finding also significantly associated in study done in Spain, midwives were more likely to perform delayed cord clamping than obstetricians, with an OR of 14.05 (95% CI: 8.41–23.49)(14) . This difference might be explained that midwives often receive continuous training in evidence-based practices, including DCC, and may be more encouraged to follow these guidelines. Additionally, midwives typically attend only vaginal deliveries, where DCC is more feasible. In contrast, obstetricians attend both vaginal and caesarean deliveries, and newborns delivered via caesarean section—often attended by obstetricians—are less likely to receive DCC due to surgical constraints and

clinical priorities during the procedure. This difference needs target intervention like interdisciplinary training to promote consistent DCC practice regardless of who attend the birth.

Similarly, newborns of mothers with meconium-stained amniotic fluid (MSAF) were significantly less likely to receive (DCC). In this study, the odds of receiving DCC were 58.5% lower among newborns of mothers with MSAF compared to those without MSAF (AOR = 0.415; 95% CI: 0.202–0.852). This finding contrasts with studies conducted in Debreworkos, Ethiopia(25), and in Brazil(16), where no significant association was reported. The discrepancy might be attributed to differences in sample size, study setting or the type of healthcare professionals attending the deliveries. In this study, the observed association might be due to newborns having MSAF would inhale or aspirate meconium particles into the lungs, which lead to respiratory complications. As a result, healthcare provider may give priority for airway resuscitation and suctioning. Due to this reason, health care professionals might be practice early cord clamping, thereby reducing the likelihood of DCC in this condition. This finding suggests about having clear and evidenced based protocol that balance this type of complication and benefits of DCC, in the presence of MSAF when clinically appropriate.

This study found that newborns of mothers who experienced perineal tears were significantly less likely to receive (DCC). Specifically, the odds of receiving DCC were 85% lower among newborns of mothers with perineal tears compared to those without (AOR = 0.150; 95% CI: 0.066–0.337). This association was not observed in a similar study conducted in Debreworkos, Ethiopia(25), which might be due to differences in healthcare settings and the present study was conducted in a referral facility where obstetric complications, such as perineal tears, are more frequently encountered. This negative association might be explained by newborns of mother with perineal tear needs immediate maternal care and repair of the tear, and consequently healthcare provider might clamp the umbilical cord before 60 seconds to shift focus to repairing the tear. Thus, to control bleeding and perform suturing likely contributes to the reduced likelihood of practicing DCC. This finding highlights the important of integrated team work having secondary provider manage the mother while another give care to the newborns.

The presence of a delivery team at the time of birth was significantly associated with the practice of (DCC). In this study, newborns delivered with the support of a coordinated delivery team were 9.538 times more likely to receive DCC compared to those delivered without such

teamwork (AOR = 9.538; 95% CI: 3.118–29.172). This finding differs from a study conducted in Debreworkos, Ethiopia(25), where no significant association was observed. The discrepancy may be due to methodological differences, particularly the inclusion of caesarean deliveries in the present study. The involvement of a team during both vaginal and caesarean births might facilitate better adherence to evidence-based practices such as DCC through improved task-sharing, communication, and efficiency during delivery. In this study, the observed association might be due to newborns delivered in the presence of effective teamwork and role delegation during childbirth, responsibilities can be clearly divided allowing one member to focus on neonatal care while others manage the mother's care. These shared responsibilities reduce time pressure and enable adherence to recommended practice like DCC, but in the absence of teamwork understaffed setting may prioritize tasks, often leading to early cord clamping. Therefore having integrated team work should be continued and considered as a routine habit not only limit in labor- delivery unit, but also other working environment well.

7. STRENGTH AND LIMITATION

7.1 Strength of the study

- ✓ To the best of my knowledge, there have been very few studies conducted on this topic in Ethiopia, and those that do exist did not include newborns delivered via caesarean section.
- ✓ This study assesses the time of umbilical cord clamping and its associated factors at birth, regardless of the mode of delivery.
- ✓ Most of existing study in this topic was done in high and moderate resource setting; this finding will be used as a framework about real practice in resource limited setting.

7.2 Limitation

This study was conducted only in selected public hospital in Addis Ababa; therefore, the practice observed may differ from those in public health center and private institution within the city, potentially limiting the external validity of the findings. This finding did not explore provider perception, beliefs; institutional barriers that may influence the cord clamping practice. Due to observational nature of the study, there may have been potential bias or variability during the observation of deliveries. Additionally, some independent variable had a small number of cases within certain subgroups, making statistical comparisons between these subgroups challenging.

8. CONCLUSION AND RECOMMENDATION

8.1 Conclusion

This study revealed that the overall practice of DCC were suboptimal, with only 38.3% of newborns receiving DCC. Since, the majority of the newborns were received early cord clamping, which was fell below the standards set by the WHO guidelines, which advocate that all newborns should receive delayed cord clamping unless immediate intensive care is required. In this study, Mode of delivery, type of birth attendant, presence of meconium –stained amniotic fluid (MSAF), perennial tears, presence of a delivery team, and professional experience were significantly associated with timing of umbilical cord clamping.

Newborns delivered via caesarian section, attended by obstetricians, or born under condition such as MSAF or maternal perennial tears were significantly less likely to receive DCC.

8.2 Recommendation

Based on the study finding, tailored recommendations for key stakeholders should be necessary to enhance the practice of DCC in alignment with WHO guidelines:

To professionals who attend birth:

- Participating training program about skill and procedure of DCC and adhere to WHO recommendation.
- Having consistent inters and intra disciplinary team work to share responsibility.

For hospitals health care managers

- Develop standardized protocols about the time cord clamping
- Create conducive environment in which HCPs take training to DCC and address necessary equipment for training

Health policy maker

- Design health care students curriculum having DCC protocol and practice of the time of umbilical cord clamping in align with WHO recommendation

- Support training program to build the capacity of HCPs in DCC practice

Researchers

- Conduct comprehensive studies including public and private health center to improve the validity of finding related to DCC practice.
- Incorporate HCPs perception, and institutional factors that may influence the time of umbilical cord clamping

9. REFERENCES

1. Organization WH. Guideline: Delayed umbilical cord clamping for improved maternal and infant health and nutrition outcomes. Geneva World Health Organization. 2014.
2. Obstetricians ACo, Gynecologists, Practice CoO. Delayed umbilical cord clamping after birth: ACOG Committee Opinion, Number 814. Obstetrics and gynecology. 2020;136(6):e100-e6.
3. Zemouri C, Mestdagh E, Stiers M, Torfs K, Kuipers Y. Deferred cord clamping to improve neonatal blood values. A systematic review and meta-analysis. International Journal of Nursing Studies. 2024;104718.
4. Oliveira FdCC, Assis KF, Martins MC, Prado MRMCD, Ribeiro AQ, Sant'Ana LFdR, et al. Timing of clamping and factors associated with iron stores in full-term newborns. Revista de Saúde Pública. 2014;48:10-8.
5. Seidler AL, Aberoumand M, Hunter KE, Barba A, Libesman S, Williams JG, et al. Deferred cord clamping, cord milking, and immediate cord clamping at preterm birth: a systematic review and individual participant data meta-analysis. The Lancet. 2023;402(10418):2209-22.
6. Güner S, Saydam BK. The impact of umbilical cord clamping time on the infant anemia: A randomized controlled trial. Iranian Journal of Public Health. 2021;50(5):990.
7. Rabe H, Gyte GM, Díaz-Rossello JL, Duley L. Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes. Cochrane Database of Systematic Reviews. 2019(9).
8. Busarira MO, Alasbaly E, Mbark MS. Effect of delayed versus early cord clamping on neonatal outcomes and iron status at 4 months. Open Journal of Obstetrics and Gynecology. 2019;9(02):229.
9. Organization WH. Delayed clamping of the umbilical cord to reduce infant anaemia. World Health Organization; 2014.
10. Mwakawanga DL, Mselle LT. Early or delayed umbilical cord clamping? Experiences and perceptions of nurse-midwives and obstetricians at a regional referral hospital in Tanzania. Plos one. 2020;15(6):e0234854.
11. Qian Y, Ying X, Wang P, Lu Z, Hua Y. Early versus delayed umbilical cord clamping on maternal and neonatal outcomes. Archives of gynecology and obstetrics. 2019;300:531-43.
12. Uduwana S, Nemerofsky S, editors. Umbilical cord management-the first opportunity to improve healthcare disparities. Seminars in Perinatology; 2023: Elsevier.
13. Tran CL, Parucha JM, Jegatheesan P, Lee HC. Delayed cord clamping and umbilical cord milking among infants in California neonatal intensive care units. American journal of perinatology. 2020;37(02):151-7.
14. Ortiz-Esquinas I, Gómez-Salgado J, Pascual-Pedreño AI, Rodríguez-Almagro J, Ballesta-Castillejos A, Hernández-Martínez A. Variability and associated factors in the management of cord clamping and the milking practice among Spanish obstetric professionals. Scientific Reports. 2020;10(1):1738.
15. Singh N, Brammer D. Delayed cord clamping in infants born less than 35 weeks: A retrospective study. Journal of Neonatal-Perinatal Medicine. 2021;14(3):391-5.
16. Strada JKR, Vieira LB, Gouveia HG, Betti T, Wegner W, Pedron CD. Factors associated with umbilical cord clamping in term newborns. Revista da Escola de Enfermagem da USP. 2022;56:e20210423.

17. Mwamba B. Delayed cord clamping practice at birth: A narrative review of literature. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2022;277:116-21.
18. McAdams RM, editor A global perspective of delayed cord clamping in infants. *Seminars in Perinatology*; 2023: Elsevier.
19. Murray C, Newby H. Data resource profile: United Nations children's fund (UNICEF). *International journal of epidemiology*. 2012;41(6):1595-601.
20. McCarthy EK, Murray DM, Kiely ME. Iron deficiency during the first 1000 days of life: are we doing enough to protect the developing brain? *Proceedings of the Nutrition Society*. 2022;81(1):108-18.
21. Paulley LM, Duff E. Iron Deficiency in Infants—What Nurse Practitioners Need to Know. *The Journal for Nurse Practitioners*. 2022;18(6):614-7.
22. Nakayama JY, Perrine CG, Hamner HC, Boundy EO. Prevalence of delayed cord clamping among US hospitals by facility characteristics. *Obstetrics & Gynecology*. 2021;138(5):802-4.
23. Lodha A, Shah PS, Soraisham AS, Rabi Y, Abou Mehrem A, Singhal N, et al. Association of deferred vs immediate cord clamping with severe neurological injury and survival in extremely low-gestational-age neonates. *JAMA network open*. 2019;2(3):e191286-e.
24. Nelin V, Kc A, Andersson O, Rana N, Målvik M. Factors associated with timing of umbilical cord clamping in tertiary hospital of Nepal. *BMC Research Notes*. 2018;11:1-6.
25. Workineh BB, Cherkose EA, Kassie BA. Factors associated with delayed umbilical cord clamping in public health facilities in Debreworkos town, northwest Ethiopia. *medRxiv*. 2023:2023.09. 20.23295821.
26. Chowdhury A, Bandyopadhyay Neogi S, Prakash V, Patel N, Pawar K, Koparde VK, et al. Implementation of Delayed Cord Clamping in public health facilities: a case study from India. *BMC Pregnancy and Childbirth*. 2022;22(1):457.
27. MMid TH, Tchng D. Timing of cord clamping: An observational study of cord clamping practice in a maternity hospital in Aotearoa New Zealand. *New Zealand College of Midwives Journal*. 2022(58):19-26.
28. Hutton EK, Stoll K, Taha N. An observational study of umbilical cord clamping practices of maternity care providers in a tertiary care center. *Birth*. 2013;40(1):39-45.
29. Weldeghebrael EH. Addis Ababa: City Scoping Study. African Cities Research Consortium, The University of Manchester: Manchester, UK. 2021.
30. Lloyd RB, Haussman M, James P. Ethiopia. Religion and Health Care in East Africa: Policy Press; 2019. p. 117-66.
31. Eshetu B, Sintayehu Y, Mekonnen B, Daba W. Birth outcomes among diabetic mothers who delivered in Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia. *Advances in Medicine*. 2019;2019(1):6942617.
32. Demas T, Getinet T, Bekele D, Gishu T, Birara M, Abeje Y. Women's satisfaction with intrapartum care in St Paul's Hospital Millennium Medical College Addis Ababa Ethiopia: a cross sectional study. *BMC pregnancy and childbirth*. 2017;17:1-8.
33. Mingude AB, Dejene TM, Habtegiorgis SD, Sahle F. Magnitude and associated factors of respectful maternity care in Tirunesh Beijing Hospital, Addis Ababa, Ethiopia, 2021. *SAGE Open Medicine*. 2022;10:20503121221137015.
34. Tadese M, Damesa WA, Solomon GS, Wakie GE, Tessema SD, Endale A. Maternal outcomes of pre-eclampsia with severe features and its determinants at Abebech Gobena

Mothers and Childrens Health and Saint Peter's Specialized Hospital, Addis Ababa, Ethiopia: a cross-sectional study. *BMJ open*. 2024;14(3):e081901.

35. Guideline W. Delayed umbilical cord clamping for improved maternal and infant health and nutrition outcomes. Geneva: World Health Organization. 2014.

36. Lalonde A. Prevention and treatment of postpartum hemorrhage in low-resource settings. *International Journal of Gynecology & Obstetrics*. 2012;117(2):108-18.

37. Organization WH. WHO recommendations on maternal and newborn care for a positive postnatal experience. 2020.

38. Organization WH. Guideline: delayed umbilical cord clamping for improved maternal and infant health and nutrition outcomes. Guideline: delayed umbilical cord clamping for improved maternal and infant health and nutrition outcomes 2014.

10. APPENDIX

10.1 Annex 1: Information sheet

Addis Ababa University College of Health Science School of Nursing and Midwifery
Department of Nursing Post Graduate Program

Hospital administration information sheet

Addis Ababa University College of Health Science School of Nursing and Midwifery
Department of Nursing Post Graduate Program

Here, I am the undersigned a master's student at Addis Ababa University Health Science College, currently I undertaking research entitled "Timing of umbilical cord clamping practice in newborns and its associated factors at birth in Addis Ababa selected public hospitals." For this study your institutional permission are necessary. I kindly request you to lend me your attention to explain to you about the study and your institution being selected as the study participant and the information will be detailed as:

Objective: To assess the time of Umbilical cord clamping and associated factors among newborns at birth in Addis Ababa selected public hospitals.

Significance of the study: There are a-paramount important to conduct this study which enable to identify the gaps in the time of umbilical cord clamping in the study population to maintain optimal cord clamping practice. Significances for different stakeholders includes for policy maker to give emphasis on how to approach it, for the newborns it increases the levels of Iron stored for 6 months which prevents iron deficiency anemia and significantly reduces the incidence of necrotizing enter colitis, Intraventricular hemorrhage and sepsis especially for preterm birth. For the family it reduces costs related to managing complications like blood transfusion and other treatment cost.

Participants: Newborns both delivered by VD or C/S

Confidentiality: All the information obtained kept in confidential and won't accessible to any third bodies.

Risk: The procedure does not bear any physical or psychological trauma to any bodies.

Benefit: The study will have greater input in the effort to examine the time of umbilical cord clamping practice and it benefits both clinical practice and newborns health.

Consent: Because of vulnerability consent was taken from mother before giving birth. You have the right stop from the beginning or at any time after observation.

Name: Mulugeta Abeneh

Signature

Address: Phone; +251936371355 // Email: muluseab2010@gmail.com

10.2 Annex 2-checklist

Addis Ababa University College of Health Science School of Nursing and Midwifery
Department of Nursing Post Graduate Program

Consent statement for newborn mother (oral consent)

Dear pregnant mother; my name is Mulugeta Abeneh and I am a graduate e student at Addis Ababa University Health Science College Department of Nursing and Midwifery Post Graduate Program. Now I am conducting research to assess the time of umbilical cord clamping and associated factors among newborns at birth in Addis Ababa selected public hospitals. Since your baby is a newborn, I requesting your permission to observe and record relevant information related to the cord clamping time. The main purpose of the study is to gather information necessary to examine timing of umbilical cord clamping management practice for newborns at birth and to identify the gaps to recommend possible solutions. This study does not involve any risks or addition procedure for you or you baby. Therefore, kindly request you to keep your patience till the observation taking place till the end. Please be assured that all the information gathered will be kept strictly confidential and study participant names do not need to be taken. Only the researcher accesses the information and uses it for the study purpose. You have a full right to stop observation

Are you willing to permission? Yes ☐

No ☐

If yes:

Witness code (independent of research team).....I. the undersigned,
witnessed the oral informed consent

Signature

Date

Code of institution (1-4)	
Code of data collector	
Date of collection	

Thank you for your cooperation!!

10. የህፃን እናት የቃል ስምምነት ቅጽ

10.1 የመረጃ ቅጽ

**አዲስ አበባ ዩኒቨርሲቲ፣ የጤና ሳይንስ ኮሌጅ፣ የነርቪንግና ሚድዊሬሪ ትምህርት ቤት፣
የማስተርስ ትምህርት ፕሮግራም**

ክቡር እናት፣

ስሜ ሙሉጌታ አበነህ ነው። አሁን በአዲስ አበባ ዩኒቨርሲቲ፣ የጤና ሳይንስ ኮሌጅ፣ የነርቪንግና ሚድዊሬሪ ዲፓርትመንት ውስጥ የማስተርስ ትምህርት ፕሮግራም ነች። በአሁኑ ጊዜ በአዲስ አበባ ውስጥ ባሉ በተመረጡ የህዝብ የጤና ሆስፒታሎች ላይ፣ የእርስዎ ህፃን እየተወለደ ስለሆነ እና እሱ መወለዱን ስለማይቻል፣ የትብት አንፈት መቆረጥ ጊዜ እንዲታየና ተግዳሮቶችን ስለመለየት የእርስዎን ፍቃድ እጠይቃለሁ።

የዚህ ጥናት ዋና አላማ የተወለዱ ህፃናት አንፈት መቆረጥ ጊዜና ከእሱ ጋር የተያያዙ አማራጮችን ማስተዋልና የተገኙ ችግሮችን ማስረጃ በመሰብሰብ የተሻለ መፍትሔ ለመስጠት ነው። እርስዎና ህፃኑ በጥናቱ ምንም ዓይነት አደጋ አይኖረውም። ከተሰበሰበው መረጃ ሁሉ ግል መረጃ አይጠየቅም፣ የተሳተፉ የመረጃ አካላት ስም አይወሰድም፣ በማንኛውም ጊዜ ከተሳትፎ ሂደት የመውጣት መብት አለዎት።

ይፈቅዱ?

☐ አዎ

☐ አይ

አዎ ከሆነ :

የእምነት ምስክር ኮድ (ከመርምረው ቡድን አልባ ሰው): _____

እኔ ከታች በፊርማ በማሳየት የጥናቱ ፈቃድን መስከረከርኩ።

ፊርማ:

ቀን:

Table7. Observational checklist tools

1. Maternal and obstetric characteristics

Serial No	Question	observation response	Skip
001	Mother age (document review)	years	
002	Current Parity of the mother (document review)	1. Prim parity 2. Multiparty	
003	Rh status of the mother (document review)	1. Negative 2. Positive 3. Unknown	
004	Mother took steroid during pregnancy (document review)	1. Yes 2. No	
005	Infection status of the mother (document review)	1. Yes 2. No 3. Unknown	
0.06	If question no 005 were yes, type of infection mother has(view)	1.HIV/ADS 2.Hepatitis 3.Syphils	
007	Mother had on induction while giving birth (initiation of labour using uterotonic drugs (document review)	1. Yes 2. No	

008	Mother had on Augmentation while delivery (facilitating of labour using uterotonic drugs (document review)	1. Yes 2. No	
009	Mother had history of antepartum haemorrhage while delivery (document review)	1. Yes 2. No	
010	Mother has faced perennial tear during delivery (observation)	1. Yes 2. No	
011	Mother has gestational diabetes mellitus (GDM) (document review)	1. Yes 2. No	
012	Mother has meconium stained amniotic fluid (document review)	1. Yes 2. No	
013	Mother has pre-eclampsia (document review)	1. Yes 2. No	
014	Mother has eclampsia (document review)	1. Yes 2. No	
015	History of anaemia during this pregnancy (document review)	1. Yes 2. No	

2.Newborn characteristics

Serial No	Question	Observation	Skip
016	Gestational age of the baby (document review)	1. <37 weeks 2. 37-42 weeks 3. >42weeks	
017	Number of delivered babies at birth (document	1. Single 2. Multiple (Twin A)	

	review/observation)		
018	Birth weight of the baby (document review)	Write in Grams.....	
019	Presentation of the baby at second stage of labour (document review or observation)	1. Cephalic 2. Breech 3. Face 4. Cord 5. Others	
020	The first minute APGAR score of the baby (document review or observation)	Write	
021	After delivery baby kept to skin to skins /for vaginal delivery	1. Yes 2. No	

3.Labor - delivery characteristics

Seria l No	Question	Observational response	Skip
022	Mode of delivery? (observation)	1. Vaginal delivery 2. Instrumental delivery 3. C/S delivery	
023	Timing of cord clamping from delivery to first umbilical cord clamping (observation)	Write in seconds...	
024	Time of intramuscular uterotonic drugs after delivery / vaginal	1. <60 sec 2. ≥60 sec	If c/s skip to 026

	delivery (observation)		
025	If the above Q 022 answer was instrumental delivery, type of instrument? Observation/document review	1. Vacuum 2. Forceps	
026	Type of anaesthesia has been given (Document review)	1. General 2. Epidural 3. Others	If vaginal skip to next 029
027	Qualification of Surgeon who done C/S delivery (Document review)	1. Resident 2. Senior 3. Others	
028	Type of C/S delivery, the mother had (Document review)	1. Emergency 2. Elective	

4. Professional related characteristics

Seria l No	Question	Observational response	skip
029	level of obstetrical health care provider(Document review/observation)	1. Midwife 2. Medical interns 3. Obstetrician	
030	Conducting provider year of experience/document review/observation	Write in years.....	
031	Delivery and new born care conducted by the team (include obstetrician, midwives, and nurse for SVD and anaesthesia for C/S)	1. Yes 2. No	
032	Working shift of health care provider at the time of delivery	1. Day shift 2. Night shift	

TURNITIN REPORT

ASSESSMENT OF CORDCLAMPING TIME IN NEWBORNS AND ITS
ASSOCIATEDFACTORS AT BIRTH IN ADDISABABA SELECTED
PUBLICHOSPITALS, ETHIOPIA, 2025

By: Mulugeta Abeneh

ORIGINALITY REPORT

0% SIMILARITY INDEX

0% INTERNET SOURCES

0% PUBLICATIONS

0% STUDENT PAPERS

Exclude quotes off

Exclude bibliography on

Exclude assignment template on

Exclude matches off

0% detected as AI

The percentage indicates the combined amount of likely AI-generated text as well as likely AI-generated text that was also likely AI-paraphrased.

Caution: Review required.

It is essential to understand the limitations of AI detection before making decisions about a student's work. We encourage you to learn more about Turnitin's AI detection capabilities before using the tool.

Detection Groups

0 AI-generated only 0%

Likely AI-generated text from a large-language model.

0 AI-generated text that was AI-paraphrased 0%

Likely AI-generated text that was likely revised using an AI-paraphrase tool or word spinner.

Disclaimer

Our AI writing assessment is designed to help educators identify text that might be prepared by a generative AI tool. Our AI writing assessment may not always be accurate (it may misidentify writing that is likely AI generated as AI generated and AI paraphrased or likely AI generated and AI paraphrased writing as only AI generated) so it should not be used as the sole basis for adverse actions against a student. It takes further scrutiny and human judgment in conjunction with an organization's application of its specific academic policies to determine whether any academic misconduct has occurred.