



**DEBRE BRHAN UNIVERSITY ASRAT WOLDEYES HEALTH  
SCIENCE CAMPUS  
SCHOOL OF PUBLIC HEALTH**

**PREVALENCE OF BIRTH ASPHYXIA AND ASSOCIATED FACTORS  
AMONG LIVE BIRTHS IN PUBLIC HEALTH FACILITIES OF AKAKI  
KALITY SUB CITY IN ADDIS ABABA, ETHIOPIA, 2022.**

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**JUNE, 2023**

**DEBRE BERHAN, ETHIOPIA**

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# Approval Sheet

**DebreBerhan University**

**AsratWoldeyes Health Science Campus**

**School of Public Health**

Prevalence and associated factors of birth asphyxia among live birth in public health facilities in AkakiKality sub city in Addis Ababa Ethiopia, 2022.

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## Abstract

**Background:** Birth asphyxia is a serious clinical problem of newborn babies, which occurs due to impaired blood-gas exchange and results in hypoxemia. Despite improvements in the diagnosis and management of perinatal asphyxia, it has become the leading cause of admission and neonatal mortality, especially in developing countries.

**Objective:** To assess the prevalence and associated factors of birth asphyxia among live birth in public health facilities in AkakiKality sub city in Addis Ababa Ethiopia, 2022.

**Method:** Health facility-based cross-sectional study was employed from the public health facilities of the sub city among 355 postnatal mother-newborn pairs. Simple random sampling techniques were used to all public health facilities. The data was collected by random sampling technique, entered by using Epi data 4.6 and analyzed using SPSS 25 version. Bivariate and multivariable logistic regression analyses were employed to estimate the crude and adjusted odds ratio with a confidence interval of 95% and P value of less than 0.05 considered statistically significant. Frequency tables and descriptive summaries were used to describe the study variables.

**Result:** The overall prevalence of birth asphyxia among live birth was found to be 22.3%. Multivariable logistic regression analysis indicated that neonates delivered from primiparous mother [(AOR: 0.21, 95%CI: (0.06, 0.78)], C/S delivery [(AOR: 0.19, 95%CI: (0.04, 0.90)] and prolonged labor duration [(AOR: 32.59, 95% CI :( 11.35, 93.54)] were more likely affected by birth asphyxia.

**Conclusion and Recommendation:** The prevalence of birth asphyxia in AkakiKality sub-city of Addis Ababa was high. In this study; parity of the mothers, mode of delivery and duration of labor were the factors associated with birth asphyxia. Health care providers should make strict fetomaternal follow ups aided by ultrasound and early detect abnormality and should always be accompanied with immediate decisions for emergency obstetrics and newborn care interventions.

**Keyword:** Asphyxia, neonatal, hypoxemia, prevalence, birth, Health center.

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## Abbreviation and Acronym

ANC:	Antenatal care
AOR:	Adjusted odds ratio
APH:	Ante partum hemorrhage
APGAR:	Appearance, Pulse, Grimace, Activity, and Respiration
C/S:	Cesarean section
CI:	Confidence interval
COR:	Crude odds ratio
EDHS:	Ethiopian Demographic and Health Survey
HIE:	Hypoxic ischemic encephalopathy
IMNCI:	Integrated management of newborn and childhood illness
LBW:	Low birth weight
NICU:	Neonatal Intensive Care Unit
NMR:	Neonatal mortality rate
PMTCT:	Prevention of Mother-To-Child Transmission
SDG:	Sustainable development goal
SPSS:	Statistical Package for Social Science
WHO:	World Health Organization

# 1. Introduction

## 1.1. Background of the study

The World Health Organization (WHO) defines birth asphyxia as inadequate oxygen perfusion to vital organs, generally, caused by a failure to initiate and sustain breathing at birth (1). Birth asphyxia the causes are quite different it happens due to decreased oxygen before or during the birth process may include: Inadequate oxygen levels in the mother's blood due to heart or respiratory problems or lowered respirations caused by anesthesia, Low blood pressure in the mother, Inadequate relaxation of the uterus during labor that prevents oxygen circulation to the placenta, early separation of the placenta from the uterus, called placental abruption, compression of the umbilical cord that decreases blood flow, poor placenta function that may occur with high blood pressure or in post-term pregnancies, particularly those past 42 weeks (2). It refers to an impairment of the normal exchange of respiratory gases during parturition and ensuing adverse effect of the fetus(3). It's low resource setting is usually defined as a failure to initiate or sustain spontaneous breathing at birth and in some circumstance Includes a one minute APGAR score <7(4).

According to mortality estimates released by the World Bank Group, United Nations Population Division, and the WHO report of 2018, 5.4 million deaths occur in the first five years of life newborns covered around 50% of the deaths, and most of them die due to preventable causes such as malaria, diarrhea, pneumonia, and complications during birth like perinatal asphyxia. In Africa, NMR is the highest when compared with another region, which accounts for 55/1000 live births, 5 times higher than that of European 10/1000 live births. The research in Guinea showed that newborn deaths covered 30% of all deaths in Africa where the leading causes of death in newborns were perinatal asphyxia (41%)(5).

The Federal Ministry of Health developed the first comprehensive National Child Survival Strategy (2015–2020) in 2015, aiming to reduce under-five mortality by two thirds. Since its development in 2015, several evidence based interventions that need to be incorporated in the strategy have been initiated. These include community management of pneumonia through integrated community case management, community-based newborn sepsis management through community-based newborn care, newborn intensive care units, newborn corners, and the introduction of Homophiles influenza, pneumococcal, and shifting PMTCT to 'Option B+'. The

guidelines to treat birth asphyxia are also well established in Ethiopia and made available even at the health-center level for assessing and classifying (6).Despite this, a high number of newborn deaths due to birth asphyxia were reported in Ethiopia. From observations thus far, the issue of birth asphyxia remains unresolved. Ethiopia's rate of neonatal mortality is still among the highest in sub-Saharan Africa. In 2015, nearly 240 babies in their first month died each day. Birth asphyxia is the leading cause of neonatal deaths and accounts for about 31.6% of neonatal mortality, followed by preterm birth (21.8%) and sepsis (18.5%). Moreover, the findings from studies conducted in Tigray(7) and Gondar (8)to identify causes of neonatal mortality revealed that birth asphyxia was responsible for 35 and 12.5% of neonatal deaths respectively.

## **1.2. Statement of the problem**

Birth asphyxia is the fifth largest cause of under-5 child deaths (8.5%), after pneumonia, diarrhea, neonatal infections and complications of pre-term birth. It is estimated that around 23% of all newborn deaths are caused by birth asphyxia, with a large proportion of these being stillbirths. The incidence of birth asphyxia has reduced significantly following improvements in primary and obstetric care in most industrialized countries and accounts for less than 0.1% of newborn infant deaths. In developing countries, rates of birth asphyxia are much higher, ranging from 4.6/1000 in Cape Town to 7–26/1000 in Nigeria and case fatality rates may be 40% or higher. Exact epidemiological data are lacking and the precise burden of severe neurological disability in developing countries is unknown. According to the World Health Organization (WHO), between 4 and 9 million newborns develop birth asphyxia each year. Of those, an estimated 1.2 million die and at least the same number develop severe consequences, such as epilepsy, cerebral palsy and developmental delay. The numbers of disability-adjusted life years (DALYs) for birth asphyxia estimated by WHO exceed those due to all childhood conditions preventable by immunization. Community-based data on disability in less developed settings are lacking and studies reliably assessing the cause are virtually non-existent. This makes the estimates essentially uncertain (1; 3).

Birth asphyxia is one of the worldwide problems of neonates. It raises different complications, if the cases left are untreated and can probably lead to death. Although Ethiopia has made a considerable achievement in improving less than five mortality rates, the neonatal mortality burden has not experienced the same reduction, which may be attributed to birth asphyxia. The study was aimed to determine the prevalence of birth asphyxia in neonatal cases due to the drastic increase in the number of cases.

### **1.3. Significance of the study**

Birth asphyxia rates with a rate of 2 in 1,000 births. In areas of developing countries where there is limited access to neonatal care, this rate increases up to 10 times then a developing country which is 2 in a 1000. Hypoxic-ischemic damage of neonatal vital organs mainly during the intrapartum period is the leading cause of mortality from asphyxia neonatorum. So due to the facts that we live in a developing country try the researcher believes that this is a prominent idea that needs further exploring.

Although there are multiple researches stating the prevalence of asphyxia and assessing the risk factors associated with prevalence most of the researches were mainly focused on the effects of prenatal asphyxia not so much on live birth and there has been a significant rise in the case of birth asphyxia that and the fact that it has a higher prevalence rate in the developing countries than on developed countries is the reason that this research is very essential to perform. So, this study was aimed to assess the prevalence and associated factors of birth asphyxia among live births in public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022.

- Identifying the magnitude and factor associated of birth asphyxia help to design appropriate intervention by those health institution, communities, and organizations to combat the problem.
- Thus, understanding the factors related to birth asphyxia is critical for countries like Ethiopia with alarmingly high neonatal mortality and morbidity. However, this study provides information in the prevalence and its relationship to the different factors and provides a working base for planning and intervention to effectively address this problem.

In general this study will give theoretical as well as practical significance for health care provider, program planner, researcher and a local policy maker to use as base line data to focus on the factors to develop the intervention.

## 2. Literature review

### 2.1 Prevalence of birth asphyxia

Perinatal asphyxia is a common and serious neonatal problem globally and it significantly contributes to both neonatal morbidity and mortality. According to the World Health Organization (WHO) in 2000, of the 130 million infants born globally each year, approximately 4 million babies die before they reach the age of 1 month (1). It has been shown that 99% of these neonatal deaths take place in the developing countries where perinatal asphyxia contributes to almost 23% of these deaths. Over half of these deliveries occur at home (1). In the latest World Health Statistics 2013, neonatal deaths have decreased from 4.4 million in 1990 to 3 million in 2011. Perinatal asphyxia is estimated to be the fifth largest cause of under-five child deaths (8.5%), after pneumonia, diarrhea, neonatal infections and complications of preterm birth. Indeed, newborn deaths constitute over 40% of all deaths in children aged under five (9).

Asphyxia is defined as the inability of the newborn to initiate and sustain adequate respiration after delivery (4). The American College of Obstetricians and Gynecologists and the American Academy of Pediatrics assign a neonate to be asphyxiated if the following conditions are fulfilled: Umbilical cord arterial pH <7; Apgar score of 0-3 for longer than 5 min; neurological manifestations (e.g., seizures, coma, or hypotonic); and multisystem organ dysfunction, e.g., cardiovascular, gastrointestinal, hematological, pulmonary or renal system(5).

This systematic review and meta-analysis performed to estimate a pooled prevalence of birth asphyxia in different countries, to explore the factors that contribute to it the prevalence. A finding in the percentages reported in primary studies conducted in Vietnam (10.2%), India (6.6%), Tanzania (11.5%) and Nigeria (12.8%)(10-13)As well, a higher prevalence was observed in this study, compared to other meta-analysis in East and Central Africa (16.5%)(14).

A Study conducted in Rwanda, Kigali showed that birth Asphyxia was diagnosed in 135 out of 340 neonates admitted to the NICU, indicating a prevalence rate of 39.7% among neonates admitted to a specific NICU during 2016. This finding reveals a 6.7% increase of birth Asphyxia prevalence than recorded the previous year at the same hospital Trained health care professionals could do more to lower the Birth asphyxia rate in Rwanda(15). In another study done on the prevalence, severity and early outcomes of hypoxic ischemic encephalopathy among newborns at

a tertiary hospital, in northern Tanzania they collected data from 1752 they found 11.5% had birth asphyxia (16).

In a study done in Ethiopia on determining birth asphyxia the researchers aimed systematically review and Meta-analyze the estimate pooled magnitude of birth asphyxia and its determinants in Ethiopia. The magnitude of birth asphyxia was concluded to be very high. Maternal education, APH, mode of delivery, prolonged labor, induction, LBW, preterm, meconium-staining, and non-cephalic presentation were determinants of birth asphyxia. Hence, they were able to advice to reduce birth asphyxia and associated neonatal mortality; attention should be directed to improve the quality of intrapartum service and timely communication between the delivery team. In addition, intervention strategies aimed at reducing birth asphyxia should target the identified determinants(14).

In Ethiopia perinatal asphyxia is one of the leading causes of neonatal mortality consisting 34%(17). No the pooled proportion of birth asphyxia in Ethiopia was found to be 22.8% and 32.8% had perinatal asphyxia and 67% neonate were born assed as non-asphyxiated(18; 19). According to the Ethiopian demographic health survey in 2016 the reduction in neonatal morality comparatively low. In another study done in MekelleAydar university referral hospital 18% the study samples were born with asphyxia(20).

## **2.2 Factors Affecting Birth Asphyxia**

### **2.2.1 Socio demographic factors**

In a study done in Debre tabor general Hospital where the majority of cases were within the age range of 20-34 years the high rates asphyxia cases. Another study done in Bahir Dar was able to determine that the median age of the mother were 26 years.(21; 22). A study done in the region of Amhara was able to determine 33%of cases and In Gondar the same study was done where they were able to conclude that a high level of education of the maternal higher when the mother were unable to read and write at 36.4(18; 23). In a study done MekelleAydar University referral hospital higher group of asphyxiated new born maternal occupation were found to be house wives with the percentage of 31.1%(20).



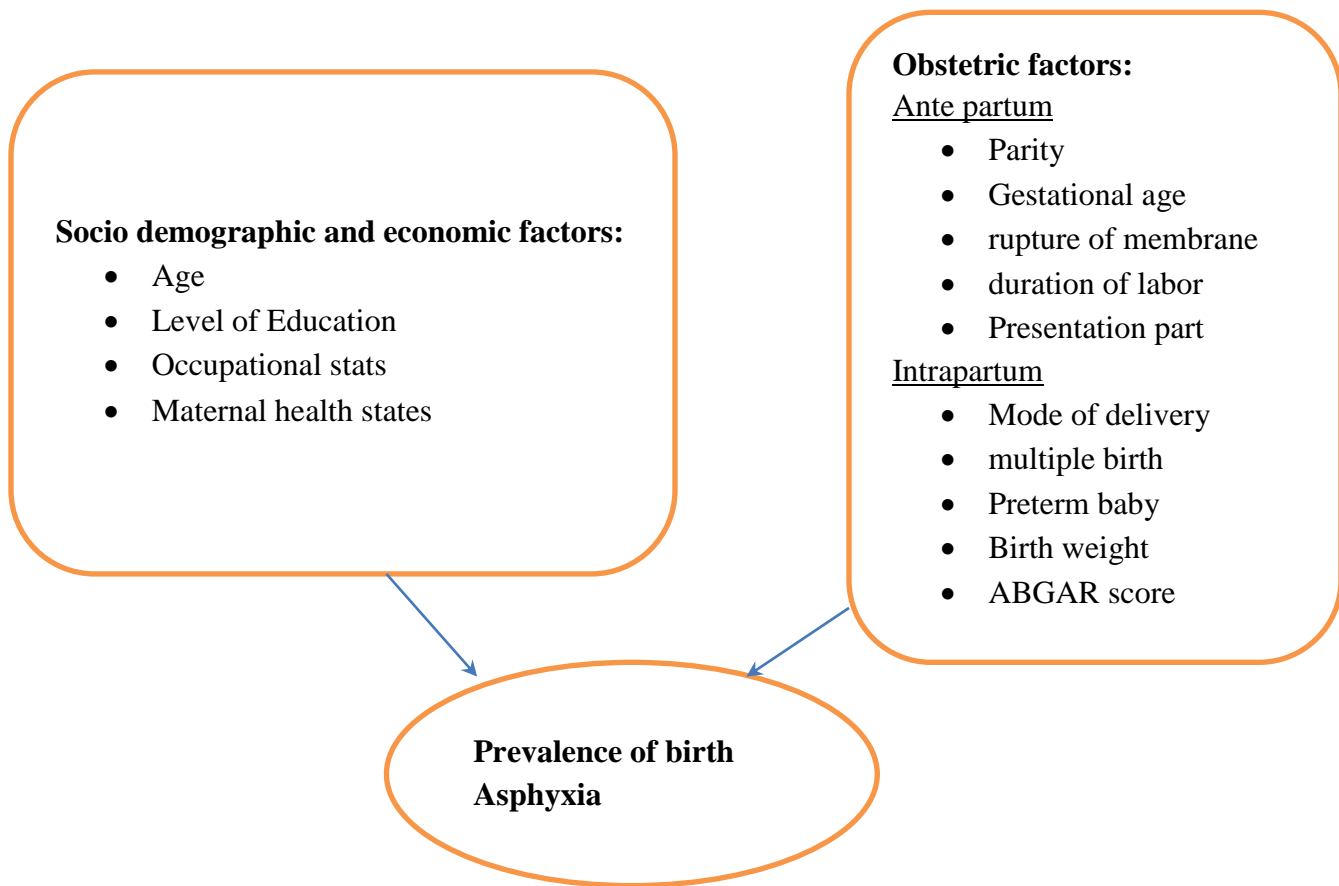
### 2.2.2 Obstetrics factors

The findings of studies done in Pakistan, Kenya, and Zambia (24-26) indicated that premature rupture of fetal membranes was positively associated with birth asphyxia.

In a study done Bahir Dar, 21.7% of the newborns had perinatal asphyxia. Mal presentation, uterotonic drug administration, meconium-stained amniotic fluid, night time delivery and preterm delivery were significantly associated with perinatal asphyxia. To mitigate this problem, there is a need to focus on early identification of the risk factors like fetal mal presentation, preterm labor/delivery, and managing them appropriately. Administering uterotonic drugs should be based on indication with close supervision(22).

In another study done on the prevalence birth asphyxia among live births in north central Ethiopia general hospital of Debre tabor they came up with results that stated that the prevalence of birth asphyxia was 28.35%. From the final model, fetal mal-presentation, premature rupture of fetal membranes, meconium stained amniotic fluid, vacuum delivery), night time delivery and labor attendance by medical interns alone positively associated with birth asphyxia at 95% CI. And from that they were able to conclude that, the existing efforts of emergency obstetric and newborn care should be strengthened to prevent birth asphyxia from the complications of fetal mal-presentation, premature rupture of fetal membranes, meconium stained amniotic fluid and vacuum delivery. Moreover, night time deliveries and professional mixes of labor and/delivery care providers should be given more due emphasis(21) .

## 2.3 Conceptual framework



**Figure 1:**Conceptual framework of the prevalence and associated factors of birth asphyxia among live birth in public health facilities in AkakiKality sub city in Addis Ababa Ethiopia, 2022(19; 21; 22).

### **3. Objectives**

#### **3.1 General objective**

To assess the prevalence and associated factors of birth asphyxia among live births in public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022

#### **3.2 Specific objective**

1. To determine the prevalence of birth asphyxia among live births in public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022.
2. To identify the factors associated with birth asphyxia among live births in public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022.

## **4. METHODS AND MATERIALS**

### **4.1 Study area**

The study conducted at eleven health center and one hospital which found in AkakiKality sub city in southern part of Addis Ababa city. According to the census of 2007(EFY) figures from the Central statistical Agency of Ethiopia, AkakiKality sub city has an estimated total population of 220,740 with 114,095 females and 106,645 males. The residents of the sub city are factory workers and civil servant constitutes the majority population segment.

### **4.2 Study design and Study period**

An institution based cross sectional study was conducted from Aug.30, 2022 to Sep. 29, 2022.

### **4.3 Source population**

The Source of Population was all mothers who gave live birth after 28 weeks of gestational age in all health centers and a hospital of AkakiKality sub city.

### **4.4 Study population**

The study populations were all mothers who were give live birth after 28 weeks of gestational age in all health centers and a hospital of AkakiKality sub city during the study period.

### **4.5 Inclusion and Exclusion criteria**

#### **4.5.1 Inclusion Criteria**

All post-natal mothers who gave live birth after 28 weeks of gestational age were included.

#### **4.5.2 Exclusion criteria**

Post natal mothers who gave birth with congenital abnormality.

### **4.6 Sample size determination**

The sample size for the study is calculated by using a single population proportion formula, by considering the following assumptions: 95% confidence level, 5% degree of precision, the estimated (P-value) was 30 % from the previous study done at Debre Tabor, Amhara region (21).

$$n = \frac{Z_{\frac{\alpha}{2}}^2 P (1 - P )}{d^2}$$

Where,  $n$  = sample size

$Z$  = the standard normal deviation at 95% confidence interval; = 1.96

$P$  = proportion of population = 0.3

$d$  = margin of error that can be tolerated, 5% (0.05)

Therefore, based on the above single population proportion formula the sample size could be calculated as,  $n=323$

Based on this, by considering non-response rate of 10%, the total sample size is 355.

#### **4.7 Sampling techniques**

To have representative (adequate) sample size, postnatal mothers from 10 Health center of AkakiKality were selected by simple random sampling technique. Then, the total sample size ( $n=355$ ) was allocated proportionally to all health facilities based on their respective total delivery serves. The list of total delivery serves were obtained from their respective health facility data. By selecting the starting point randomly individual postnatal mothers were selected until the desired sample size was reached in each health facility. The interview was made on postnatal mothers in the first six hours the AkakiKality sub city health facilities. Total health centers delivery number the past six month was 3925 and TiruneshBejing Hospital = 3065. It is distributed by health center as below: Akaki health center =769, Kela health center =164, SelamFeraie health center =116, Gelan health center=858, Saint Gabriel health center= 280, Saris health center=256, Kality health center=469, Serti health center=487, Kelinto=255, Tulu Dimtu health center=271. The total number postnatal mothers from all 10 health center and TiruneshBejing Hospital are 6990. To allocate the sample size calculate average delivery in one month, the following calculation was made.

## Schematic presentation sampling procedure

Proportionally allocation based on the formula  
 $n_i = n \times N_i / N$  and using systematic random sampling

Addis Ababa city administration Health bureau AkakiKality sub city  
 public health facility 10 Health centers and 1 Hospital  
 N=1165 Monthly total delivery



TiruneshBejing Hos. Mon. total delivery	Akaki H/C Mon. total delivery	Gelan H/C Mon. total delivery	Kality H/C Mon. total delivery	Kela H/C Mon. total delivery	Kilinto H/C Mon. total delivery	Saint gebriel H/C Mon. total delivery	Saris H/C Mon. total delivery	Selamferae H/C Mon. total delivery	Serti H/C Mon. total delivery	Tulu dimtu H/C Mon. total delivery
511	128	143	78	27	43	47	43	19	81	45



155	39	44	24	8	13	14	13	6	25	14
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Final sample size n=355 postnatal mothers with alive birth

**Figure 2:** Schematic presentation sampling procedure live birth in public health facilities in AkakiKality sub city in Addis Ababa Ethiopia, 2022.

## 4.8 Data collection methods

The data collection tool was adapted and modified from various studies conducted in developing countries(16; 22) contextualized to Ethiopia. The questionnaires were developed based on socio demographic characteristics, obstetric factors and health service related questions. The data collection instrument was translated into the local language (Amharic) and back to English to keep consistent.

## 4.9 Study variables

### 4.9.1 Dependent variable

Birth Asphyxia (Yes/No)

### 4.9.2 Independent Variable

**Socio-demographic factors:** (Maternal age, education status, maternal occupational status).

**Obstetric factors:** Pregnancy-induced hypertension, gestational DM during pregnancy, parity, gravidity, number of ANC visits, and ante-partum hemorrhage, labor attendant, rupture of membrane, duration of labor, mode of delivery, meconium staining, presentation, type of labor).

## 4.10 Operational definitions

**Birth asphyxia:** is a condition of impaired gas exchange in neonates at birth, when the APGAR score is  $< 7$  at the first 5th minute (1).

**Asphyxiated:** Neonates born in the studied health facilities and diagnosed as asphyxia by an attendant professional with an APGAR score of  $< 7$  at the first 5th minute (4).

**Prolonged labor:** occurs when labor lasts for approximately 20 h or more if you are a first-time mother, and 14 h or more if you have previously given birth(27).

## 4.11 Data Processing and Analysis Plan

The collected data was edited, cleaned, entered into Epi-Data version 4.6 and exported into SPSS version 25 for statistical analysis. Frequencies and cross tabulations were used to check for missed values of variables and to describe the study population in relation to relevant variables. Descriptive analysis was used to describe the percentages and number of distributions of the respondents by socio-demographic characteristics and other relevant variables in the study. Identified errors were corrected after revising the original questionnaires. Binary logistic regression analysis was performed on the independent variables and the dependent variable. In

order to investigate the association of independent variables with dependent variables both bivariate and multivariable analysis were used. In bivariate analysis, each independent variable proportion and crude odds ratios were computed against the outcome variable to identify the factors that are associated with Birth Asphyxia. Finally, independent variables with P-value less than 0.3 in bivariate logistic analysis were entered into final multivariable logistic regression model to control for potential confounders and to identify significant factors associated with outcome variable. The candidate variables were entered into multivariable logistic regression model using Enter method to get significant and insignificant variables in the model. Adequacy of the model to fit the outcome variable with the predictors was checked using Hosmer and Lemeshow test for goodness of fit.

Finally, adjusted odds ratio (AOR) along with 95% confidence interval was estimated to assess the strength of the association & a P-value  $< 0.25$  was considered to declare the statistical significance in the multivariable analysis in this study.

#### **4.12 Data quality management**

The questionnaire will be pre-tested on 5% of respondents in the health centers and a hospital in AkakiKality sub city in Addis Ababa before the start of actual data collection. The test will be done to check whether the questions are clear and could be consistently communicated and consequently only slight modification was made in using some words. The data collectors will be trained by the principal investigators for a day on how to give standard instruction, clarify questions, approach respondents, how to obtain informed consent and how to secure confidentiality during the data collection. The collected data will be checked by supervisors on daily basis for its accuracy and completeness.



#### **4.13 Ethical Consideration**

Ethical clearance was obtained from ethical review committee of DebreBerhan University AsratWoldeyes health science campus school of public health, Addis Ababa Heath bureau, AkakiKality sub city health office, one hospital and ten selected health centers were asked for an official latter to get permission. Verbal consent was obtained from study participants before they began fill each questioner. Those unwilling to consent were not obliged and were omitted from the study. Participants of the study were informed they can put on an end to the interview at any time. Confidentiality was assured by not talking names of the respondents and was labeled only with number. Also information was stored in protected place as a file and it was not be revealed to anyone except principal investigator.

## 5. Results

### 5.1 Socio demographic Characteristics

A total of 341 respondents participated in this study with the 95% response rate. The age of 197 (57.7%) study participants were between (25-34) years old. Regarding with educational status 162 (47.5%) of the respondents were secondary/Diploma. Majority of study participants (88%) were married and 1/3 of the participants were housewife and more than half of the respondents had monthly income less than 4000 ETB.

**Table 1:**Socio-demographic characteristics of the participants in selected ten health centers and one hospital in AkakiKality sub city in Addis Ababa, Ethiopia, 2022.

Variable	Category	Frequency	Percent
Age	15-24 Year	124	36.4
	25-34 year	197	57.7
	35-49	20	5.9
Residency	Urban	335	98.2
	Rural	6	1.8
Marital Status	Single	26	7.6
	Married	300	88.0
	Widowed	1	0.3
	Separated	14	14.1
Educational Status	Unable to read and write	10	2.9
	Primary school	91	26.7
	Secondary / Diploma	162	47.5
	BA/above that	78	22.9
Occupation	House wife	137	40.2
	Government employee	88	25.8
	Merchant	36	10.6
	Privet	69	20.2
	Student	11	3.2
Monthly income	< 1000 ETB	183	53.7

	1000-4000 ETB	21	6.2
	>4000 ETB	137	40.1
Family size	1- 3	164	48.1
	>3	177	51.9
Distance b/n home and H/F	<15 min	9	2.6
	15-30 min	160	46.9
	30-60 min	140	41.1
	>1 hour	32	9.4
Substance abuse	Yes	4	1.2
	No	337	98.8

## 5.2 Ante partum Obstetric Characteristics

The majority of (92.7%) mothers has ANC follow-up and 316 (92.7%) minimum two visit in the follow-up and 323 (94.7%) of mother had no pregnancy complication. Three hundred twenty seven (95.9%) of respondent were start the labor pain at term of gestational age. More than half of the mother went to the health facility within the first 4 hours, among them 274 (80.4%) had spontaneous on set of labor.

**Table 2:** Obstetric factor of ante partum participants in selected ten health centers and one hospital in AkakiKality sub city in Addis Ababa, Ethiopia 2022.

Variable	Category	Frequency	Percent
Gravidity	Primigravida	129	37.8
	Multi gravida	212	62.2
Parity	Primiparous	166	48.7
	Multiparous	175	51.3
Birth spacing	<2Years	74	21.7
	>2 Years	139	40.8
	No B.S	128	37.5
ANC Follow-up	Yes	316	92.7

	No	25	7.3
IF yes months start ANC follow-up	<3 months	94	27.6
	3-6 months	185	54.25
	>6 months	38	11.1
	None	24	7.05
How many visit	2 visit	21	6.2
	3 visit	34	10.0
	4 visit and above	262	76.8
	0 visit	24	7.0
Pregnancy Complication	Yes	18	5.3
	No	323	94.7
IF yes types of pregnancy complication	Gestational DM	2	0.6
	Gestational HPN	8	2.3
	Mention if any	3	0.9
	None	328	96.2
Were you up to full term when started labor	Yes	327	95.9
	No	14	4.1
How long after the labor started did you go to H/F	As soon as the labor started	106	31.1
	2to 4hours	141	41.3
	When the pain become sever	57	16.7
	Appointment	37	10.9
Labor type	Spontaneous onset	274	80.4
	Induced	36	10.6
	Augmented	27	7.8
	Elective	4	1.2

### 5.3 Intra partum Obstetric Characteristics

Majority of the participants (73.3%) had normal labor duration and 326(95.6%) had a vertex presentation. Three hundred nine (90.6%) of the participants were ruptured their membrane during intrapartum period and 279 (81.8%) had clear color of amniotic fluid. There is no fetal distress among 280 (82.1%) of study participants. Two hundred thirty four (68.6%) of participants were delivered by SVD, 267(78.3%) were attend their birth by midwife, 333 (97.7%) had singleton, 331(97.1%) had fetal birth weight  $\geq$  2500g, 328(96.2%) were gave birth at term, 265 (77.7%) of them had APGAR score of  $> 7$  and 266(78.0%) the neonate breast fed within one hour of delivery.

**Table 3:** Obstetric factor of intrapartum participants in selected ten health centers and one hospital in AkakiKality sub city in Addis Ababa, Ethiopia 2022.

Variable	Category	Frequency	Percent
Duration of Labor	Normal	250	73.3
	Prolonged	63	18.5
	Precipitated	28	8.2
Fetal presentation	Vertex	326	95.6
	Mal-presentation	15	4.4
Mal-presentation	Breech	9	60
	Face	6	40
Time of membrane rupture	PROM	24	7.0
	Intra-partum	317	93.0
Duration of PROM until delivery occurs	less than 8 hours	16	66.6
	8 to 12 hours	6	25
	above 12 hours	2	8.4
Color of amniotic fluid	Meconium stained	62	18.2
	Clear	279	81.8
Fetal distress	Yes	61	17.9
	No	280	82.1
Mode of delivery	SVD	234	68.6
	C/S	42	12.3

	Instrumental	65	19.1
Birth attendant	Midwife	267	78.3
	Emergency surgeon	64	18.8
	Obstetrician	10	2.9
Birth outcome	Singleton	333	97.7
	Twin	8	2.3
Birth weight	< 2500g	10	2.9
	≥ 2500g	331	97.1
Gestational age at birth	Preterm	8	2.3
	Term	328	96.2
	Post-term	5	1.5
Birth Asphyxia	No	265	77.7
	Yes	76	22.3
The neonate need's resuscitation	Yes	76	22.3
	No	265	77.7
If 'yes' what types of procedures	Ventilation bag	7	2.1
	Supplementary Oxygen	21	6.2
	All	43	12.6
The neonate breast feeding within one hour	Yes	266	78.0
	No	75	22.0

#### 5.4 . Determinant factors of Birth Asphyxia

In bivariable logistic regression factors associated with birth asphyxia: educational status, parity, mode of delivery and duration of labor had relationship with birth asphyxia at the specified P-value of  $< 0.25$ . These variables were selected as candidate for multivariable logistic regression for further analysis.

Multivariable logistic regression analysis indicated that neonates delivered from primiparous mother [(AOR: 0.21, 95%CI: (0.06, 0.78)], C/S delivery [(AOR: 0.19, 95%CI: (0.04, 0.90)] and prolonged labor duration [(AOR: 32.59, 95% CI :( 11.35, 93.54)] had significant association with birth asphyxia

The odds of Asphyxia among neonates delivered from primiparous is lower than the odds of Asphyxia among neonates delivered from multiparous [(AOR: 0.21, 95%CI: (0.06, 0.78)]

The odds of Asphyxia among neonates delivered by C/S is lower than the odds of Asphyxia among neonates delivered by instrumental delivery [(AOR: 0.19, 95%CI: (0.04, 0.90)]

The odds of Asphyxia among neonates delivered after prolonged labor is higher than the odds of Asphyxia among neonates delivered after precipitated labor [(AOR: 32.59, 95% CI :( 11.35, 93.54)] (**Table 4**).

**Table 4:** Bivariable and multivariable logistic regression model showing participants in selected ten health centers and one hospital in AkakiKality sub city in Addis Ababa, Ethiopia 2022.

Variable	Categories	Birth Asphyxia		COR (95%CI)	AOR(95%CI)	P-value
		No	Yes			
Educational Status	Unable to read and write	8	2	1.89(1.32,2.06)	0.15(0.01,2.01)	.153
	Primary school	62	29	0.81 (0.63,1.68)	0.44(0.13,1.52)	.195
	Secondary school	129	33	0.54(0.61,0.77)	0.58(0.18,1.94)	.381
Parity	BA and above	66	12	1		
	Primiparous	117	49	0.16(0.32,0.23)	0.21(0.06,0.78)	.020
Mode of delivery	multiparous	148	27	1		
	SVD	226	8	3.48 (0.54,41.93)	3.76(0.90,15.78)	.070
	C/S	21	21	0.63(0.54,1.39)	0.19(0.04,0.90)	.036
Duration of labor	Instrumental delivery	18	47	1		
	Normal	230	20	1.32(0.73,3.27)	3.76(0.90,15.78)	.239
	Prolonged	11	52	1.66(0.79,4.38)	32.59(11.35,93.54)	.000
	Precipitated	24	4	1		



## 6. Discussion

Birth asphyxia is a serious condition that can have fatal consequences for newborns. To effectively address this issue and improve the health outcomes of infants, it is important to gather information about the prevalence of asphyxia and the factors that contribute to it. In a recent study, it was found that approximately 20% of newborns experienced birth asphyxia. This statistic underscores the urgent need for targeted interventions and strategies to reduce the morbidity and mortality associated with this condition.

The provided information presents findings from different studies on factors affecting birth asphyxia, particularly focusing on socio-demographic and obstetric factors. Two logistic regression analyses were conducted, and the odds ratios (AOR) along with their corresponding 95% confidence intervals (CI) were reported for each factor. Let's compare and discuss the results of these analyses.

In this study the prevalence of birth asphyxia among live births was found to be 22.3%. This finding is compared with the previous studies conducted in Ethiopia's North East Amhara(23) and Bahir Dar City Administration Public Health facilities (18), which reported nearly similar rates of 22.6% and 21.7% respectively. However, the prevalence observed in this study is higher than rates reported in Vietnam, India, Tanzania and Nigeria, which ranged from 2% to 12.8%(10-13). This variation might be the result of differences in study population, socio-demographic characteristics and sample size.

Multivariable logistic regression analysis shows parity of the mothers was significantly associated with birth asphyxia; accordingly neonates born from primiparous mothers had lower odds of birth asphyxia than those born to multiparous mothers. This may be due to inadequate uterine contractions leading to prolonged labor, resulting in non-reassuring fetal heart rate and ultimately birth asphyxia.

Additionally, neonates delivered by instruments had higher odds of birth asphyxia than those delivered by cesarean section. This study implies that the neonates delivered by cesarean section were 19% less likely to develop birth asphyxia compared to neonates delivered by instruments.

This finding is consistent with previous studies conducted in the area and it may be due to the possibility of instrumental delivery causing birth asphyxia.

The other finding in this study was duration of labor which has statistically significant association with birth asphyxia. The result of this study revealed that neonates delivered with prolonged labor were 32 times more likely to develop birth asphyxia than those neonates delivered with precipitated labor. This might be due to the fact that prolonged labor causes fetal distress which leads to birth asphyxia.

## 7. Conclusion and Recommendations

### 7.1 Conclusion

The prevalence of birth asphyxia in AkakiKality sub-city of Addis Ababa was high (22.3%). In this study; parity of the mothers, mode of delivery and duration of labor were the factors associated with birth asphyxia.

### 7.2 Recommendations

Health care providers should make strict fetomaternal follow ups aided by ultrasound and early detect abnormality and should always be accompanied with immediate decisions for emergency obstetrics and newborn care interventions.

#### **Health care providers:**

Health care providers should implement close monitoring of mothers during labor and delivery, as well as early screening and appropriate intervention for the fetus to decrease the risk of complications from asphyxia. Additionally, providing adequate information to expectant mothers and their families about the signs and risks of birth asphyxia can help them make informed decisions and seek timely medical attention when necessary.

#### **Health facilities:**

The health facilities should supervise the health care provider to determine whether they have the required skill to take action for prolonged labor in order to reduce birth asphyxia following prolonged labor. Health facility should avail emergency CS service in order to decrease birth Asphyxia due to instrumental delivery.

#### **Researchers:**

Researcher should conduct qualitative studies to determine quality of the intrapartum care, exploring maternal and delivery care providers' reasons, feelings and experience of the challenges for optimizing birth outcome would have of public health importance to design feasible quality improvement projects at health facilities.

## **8. Strength and Limitations of the study**

### **8.1 Strength**

- Data collectors and supervisors were experienced in data collection process and this makes the data collection bias to be reduced.

### **8.2 Limitations**

- The study only focused on one geographic area, which may not have been representative of the prevalence of birth asphyxia in other regions.

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## 10. ANNEXES

### Consent form

I have understand the above information and I am volunteer to participate in a study conducted on prevalence and associated factors of birth asphyxia among live births in public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022.

Signature\_\_\_\_\_ Date\_\_\_\_\_

Data collector's signature\_\_\_\_\_ Date \_\_\_\_\_



## **Information sheet**

DebreBerhan University AsratWoldeyes Health Science Campus School of Public Health

A study to assess the prevalence and associated factors of birth asphyxia among live births public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022

Hello!! Dear participant, My name is SamrawitEshetu this questionnaire is prepared by reproductive health student in DebreBerhan University AsratWoldeyes Health Science Campus to assess the prevalence and associated factors of birth asphyxia among live births in public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022. The aim of this study is to determine the prevalence of birth asphyxia and to identify the possible associated factors among live births public health facilities which was provide base line data to find possible solutions. During the study your response was being kept confidentially, there is no name identified and there was be no any possible risk with you and your newborn baby for your participation. There is no payment for your participation but we greatly thank for your participation and you have the right to refuse from participation at any time.

Therefore, kindly ask you to participate in this study.

Do I have your agreement to participate? 1. YES

2. No. Stop

For any information you can contact **SamrawitEshetu**, phone number: **0911898412**

## 11. ANNEX II. English version Questionnaire

### Section I: Socio-demographic information

S.no	Questions	Choice of response	SKIP
101	What is Your age in completed years?	1. 15-24 Year 2. 25-34 year 3. 35-49	
102	Where is residence	1. Urban 2. Rural	
103	What is your current marital status	1. Single 2. Married 3. Wedowed 4. Separeted	
104	What is the highest grade you completed	1. Unable to read and write 2. Primary education 3. Secondary education & Diploma 4. BA/higher	
105	What is your occupation?	1. House wife 2. Governmental employee 3. Merchant 4. Privet job 5. Student	
106	Monthly income	1. < 1000ETB 2. 1000-4000 ETB 3. >4000 ETB	
107	Family size	1. 1- 3 2. >3	
108	What time it take from your home to health center /hospital in minute	1. <15 min 2. 15-30 min 3. 30-60 min 4. >1 hour	
109	Ever used substance during pregnancy	1. Yes 2. No	
110	If Yes which one	1. Chat 2. Alcohol 3. Cigarette	

Section II: Obstetric information Ante partum

S.no	Questions	Choices of response	SKIP
201	How many times you became pregnant in your life?	1.Primigravida 2.Multigravida	Included Abortion
202	How many times you delivered?	1.Primiparous 2.Multiparous	Included stillbirth
203	Birth spacing (years)	1.<2Years 2.>2 Years 3. No B.S	
204	Did you attend ANC in your recent pregnancy?	1.Yes 2. No	
205	If (yes) ,At how many months you start ANC visit	1.<3 Months 2.3-6 Months 3. >6 Months 4. None	
206	How many times you attend ANC visit in your recent pregnancy?	1.2 visit 2. 3 visit 3. 4 visit and above 4. 0 visit	
207	Did you have pregnancy complication during the current pregnancy?	1.Yes 2. No	
208	If yes for question no.207, what type of pregnancy complication?	1. Gestational DM 2. Gestational HPN 3. Mention if any___ 4. None	
209	Are you term pregnancy when start the labor?	1.Yes 2. No	
210	How long after labor starts do you go to the health center /Hospital?	1.As soon as the labor started 2.After 2to 4hours 3. When the pain become sever 4. Appointment	
211	Labor type	1.Spontaneous onset 2.Induced 3. Augmented 4. Elective	

### Section III: Obstetric information Intrapartum

S.no	Questions	Choice of response/alternative	SKIP
301	Duration of Labor	1. Normal 2. Prolonged 3. Precipitated	
302	Fetal presentation	1. Vertex 2. Malpresentation	
303	Mal-presentation	1. Breech 2. Face	
304	Time of membrane rupture	1. PROM 2. Intrapartum	
305	Duration of PROM until delivery occurs	1. less than 8 hours 2. 8 to 12 hours 3. above 12 hours	
306	Color of amniotic fluid	1. Meconium stained 2. Clear	
307	Fetal distress	1. Yes 2. No	From card
308	Mode of delivery	1. SVD 2. C/S 3. Instrumental	
309	Birth attendant	1. Midwife 2. Emergency surgeon 3. Obstetrician	
310	Birth outcome	1. Singleton 2. Twin	
311	Birth weight	1. < 2500g 2. ≥ 2500g	
312	Gestational age at birth	1. Preterm 2. Term 3. Postterm	
313	Birth asphyxia	1. Yes 2. No	From card
314	The neonate need's resuscitation	1. Yes 2. No	
315	If 'yes' what types of procedures	1. Use positive pressure ventilation bag 2. Supplementary Oxygen 3. All	
316	Is there any neonatal medical problem at birth other than Asphyxia?	1. Yes 2. No	
317	If 'yes' what is his medical problem other than Asphyxia?	1. Birth injury 2. Neonatal sepsis 3. Congenital malformation	
318	Is there any congenital abnormality	1. Yes 2. No	
319	The neonate breast feeding within one hour	1. Yes 2. No	

**Thank you**

Information sheet (Amharic Version)

የፍቃድኝነት መጠየቂያ ሰነድ

ጤናይስጥልኝ!

ወደተሳታፊዎች እኔ ሳምራዊት እሸቱ እባላለሁ ይህ መጠይቅ የተዘጋጀው በደብረ ብርሀን አስራት ወልደየስካ ምጋታ ስለሚሰጥ ስርዓተ ግራምት ምህርት ክፍል ተማሪ የሆኑ ከሆነ ህፃናት መታፈን በወሊድ ወቅት እና ተዛማጅ ሁኔታዎችን ለማጥናት ነው።

በዚህ ጥናት ላይ በመሳተፍ ምሆነ መጠይቁን በመመለስ ስዎ የተዘጋጀ ክፍያ የለም ነገር ግን ከዚህ ጥናት የሚገኘው መረጃ ለጨቅላ ህፃናት ጤና ደህንነት እና እንክብካቤ ለመስጠት እንዲሁም ልዩት ከረት ለመስጠት እና ለችግሩ የመፍትሄ እርምጃ መውሰድ ለሚሹ ህጋዊ አካላት ትልቅ አስተዋጽኦ አለው።

በመጠይቁ ላይ ስምዎን እንዲጠየቁም።

እንዲሁም መልሶቻችሁ በምስጢር ስለሚያዙ በምንም አይነት መንገድ ጉዳዩ ለማይመለከታችሁ አካላት አይገለጹም በዚህ ጥናት በመሳተፍ ምስጢር መቆየት ወይም በእርስዎ ላይ የሚደርስ ጉዳት የለም።

የእርስዎ በዚህ ጥናት ላይ መሳተፍ በፍላጎት ያለው ሲሆን ለመሰረተ ነው።

መጠይቁን ሙሉ ለሙሉ ያለ መሙላት ወይም የማቋረጥ መብት ያለዎት ለመጠየቅ ነው።

መረጃ ከፈለጉ ሳምራዊት እሸቱ ስልክ 0911898412

Consent form (Amharic Version)

**የፍቃድ ደንብ ማረጋገጫ ቅጽ**

ስለጥናቱ በቂ የሆነ መረጃ አግኝቻለሁ ብዎችለዉ ደንቁ በጥናቱ ለመሳተፍ ተስማምቻለሁ።

በጥናቱ ላይ ምንም ዓይነት ጉዳት እንዲሁም ቀጥተኛ ጥቅም እንደማላገኝ ተረድቻለሁ።

የመጠይቁ ስም \_\_\_\_\_ ቀን \_\_\_\_\_

በጥናቱ ውስጥ ለመሳተፍ ፈቃደኛ ስለሆኑ ስለትብብር ዎቻቸው ማድረግ እና መሰጠት!! !



ክፍል 2 የእናትየዋየቅድመወሊድጊዜ

ተ.ቁ	ጥያቄዎች	ምርጫየቀረቡምላሾች	መለያ
201	ስንተኛእርግዝናሽነው?	1. የመጀመሪያ 2. ሁለትእናከዚያበላይ	ውርጃውምይካተታል
202	ስንትልጆችወልደሻል?	1. የመጀመሪያመውለድ 2. ከ2 በላይመውለድ	የሞተውምይካተታል
203	በወላድሽበስንትጊዜሽአረገሽ?	1. ከ2 አመትበታች 2. ከ2 አመትበላይ 3. የመጀመሪያዬነው	
204	በዚህእርግዝናየቅድመወሊድክትትልአድርገሻል?	1. አዎ 2. አላደረግሁም	
205	አዎ! ከሆንበስንትወርሽክትትልጀመርሽ?	1. ከሦስትወርበፊት 2. ከ3-6 ወር 3. ከ6ወርበኋላ	
206	በክትትልወቅትስንትየክትትልጊዚያቶችነበሩሽ?	1.2 የክትትልጊዜ 2.3 የክትትልጊዜ 3.4 የክትትልጊዜ 4. 1 ጊዜምአልሄድኩም	
207	በአሁኑእርግዝናሽወቅትከእርግዝናውጋርየተያያዘያጋጠመሽየጤናእክልነበር?	1. አዎ 2. አላጋጠመኝም	
208	ለተራቁጥር207መልስአዎከሆነምንአይነትየጤናችግርነበር?	1. በደምውስጥስኪርመጨመር 2. ደምግፊትመጨመር 3. ከነዚህሌላካለ 4. የለም	
209	ምጡሲጃምርሽወርሽሞልቶነበር	1. አዎ 2. አላሞላኝም	
210	ምጥከጀመረሽበስንትሰአትውስጥወደጤናጣቢያሄድሽ?	1. ወዲያውእንደጀመረኝ 2. ከ2 እስከ 4ሰአትቆይቼ 3. ቆይቼሲያፋፍመኝ 4. በቀጠሮ	
211	ምጡእንዴትጀመረሽ?	1. በራሱ ጀመረሽ 2. በምጥ መድሀኒት 3. በራሱ ከጀመረሽበኋላየምጥመድሀኒትተሰጠሽ 4. ቀጥታቀዶጥገና	



**ክፍል 3 በወሊድጊዜ**

ተ.ቁ	ጥያቄዎች	ምርጫዎቻችሁ	መለያ
301	ምጡምን ይህ ልጊዜ ፈጀ?	1. መጠነኛ 2. በጣም ረዝሟል 3. አጣጣሪ ነበር	
302	የፅንሱ አመጣጥ በምን ነበር?	1. በጭንቅላቱ 2. በሌላ አካሉ	
303	የፅንሱ አመጣጥ በሌላ ከሆነ በምን ነበር?	1. በመቀመጫው 2. በፊቱ	
304	የሽርት ውሃ መቼ ፈሰሰ?	1. ምጥከመጀመሩ በፊት 2. ምጥከመጀመሩ በኋላ	
305	የሽርት ውሃ የፈሰሰው ምጥከመጀመሩ በፊት ከሆነ ከስንት ሰአት በኋላ ወለድኸ?	1. ከ8 ሰአት በታች 2. ከ8 እስከ 12 ሰአት 3. ከ12 ሰአት በላይ	
306	በምጥ ሰአት ከፈሰሰ መልኩ ምን ይመስል ነበር?	1. ቅጠል ያረጋገጃል 2. ውሃ የመሰለ	
307	ፅንሱ ታፍኗል ብለው ነበር?	1. አዎ 2. አሉም	
308	በምን መልኩ ወለድኸ?	1. በማህፀን 2. በቀዳጭ ጥገና 3. በመሳሪያ እርዳታ	
309	ያዋለ ደሽባለሙያ	1. ሚድ ዋይድ 2. ድንገተኛ ቀዳጭ ጥገና ባለሙያ 3. የማህፀን ስፔሻሊስት	
310	የተወለደው ህፃን አንድ ወይስ ሙንታ?	1. አንድ 2. ሙንታ	
311	የህፃኑ ክብደት ስንት ነበር?	1. <2500 ግራም 2. ≥ 2500 ግራም	
312	የህፃኑ ተወልዶ ሲታይ ቀኑ የደረሰ ነበር?	1. ቀኑ ያልደረሰ ነበር 2. በጊዜው የተወለደ ነበር 3. ቀኑ ያለፈ ነበር	
313	ህፃኑ ሲወለድ የመታፈን ችግር ነበረው?	1. አዎ 2. የለም	ከካርድ ላይ
314	ለመተንፈስ እርዳታ አስፈልጎት ነበር?	1. አዎ 2. አለስፈለገውም	
315	ጥያቄ 314 አዎ ከሆነ ምን ተደረገለት	1. የመተንፈስ ማሳደግ ተረጋግጧል 2. አክሲዮን 3. በሁሉም	
315	ሲወለድ የጤና ችግር ነበረው?	1. አዎ 2. አልነበረውም	
316	አዎ ከሆነ ሲወለድ የነበረው የጤና ችግር ከመታፈን ውጭ ምን ነበር?	1. በመውለድ ጊዜ የሚከሰት አደጋ 2. ኢንፌክሽን 3. አብሮት የተወለደ የተፈጥሮ ችግር	
317	ሲወለድ አብሮት የተወለደ የተፈጥሮ ችግር ነበረው?	1. አዎ 2. አልነበረውም	
318	በ1 ሰአት ውስጥ ጡንት ጠባ?	1. አዎ 2. አልጠባም	

አመሰግናለሁ!

## 12. Annex III Declaration

I, the undersigned, hereby declared that the work entitled Prevalence and associated factors of birth asphyxia among live births public health facilities in AkakiKality sub city in Addis Ababa, Ethiopia, 2022. Presented in this research proposal is original. It has not been presented to any other university or institution. Where, the work of other people has been used, reference has been provided. In this regard, I declared this work to be our unique work.

Name and signature of the investigator

Name

Signature

Date

SamrawitEshetu \_\_\_\_\_