

Assessment of Proportion of Birth Asphyxia and its Associated Factors among Newborns Delivered in Public Hospitals in Addis Ababa, Ethiopia, 2019/ 2020 .A Cross-Sectional Study

Yohannes Godie^{1*}, Hedija Yenus², Fentahun Ayenew³, Dires Birhanu⁴ and Yitayal Guadie⁵

¹Department of Nursing, Gandhi Memorial hospital, Addis Ababa

²Department of reproductive health, Institute of Public Health, College of Medicine and Health Science, University of Gondar

³Department of Epidemiology, Institute of Public Health, College of Medicine and Health Science, University of Gondar

⁴Department of Nursing, Collage of health Science, Dilla University

⁵Department of Anaesthesia, School of Medicine, Debre Markos University

Abstract

Background: Globally, birth asphyxia is a serious clinical problem that causes neonatal mortality and morbidity. Even if Ethiopia has made considerable achievements in the reduction of the under-five mortality rate, the neonatal mortality burden is not significantly decreased, which is due to birth asphyxia. Therefore, the aim of this study is to address this gap by assessing the prevalence of neonatal asphyxia and its associated factors among newborns in Addis Ababa public hospitals, Ethiopia. Inclusion criteria were Newborns that were delivered at those selected public hospitals in labor and delivery wards regardless of their outcome during the study period and exclusive criteria Mothers are seriously ill. Data was entered into Epi-data version 4.6 and exported to SPSS version 26 for statistical analysis. All variables with a p-value ≤ 0.2 were taken into the multivariable model. A statistically significant level was declared at 95% CI and the adjusted odds ratio at a p-value of <0.05 . face-to-face interviews.

Results: The prevalence of birth asphyxia was 72(10.6%) with 95% CI (8.3-13.0). Accordingly, in this study birth asphyxia was significantly associated with the odds of Newborns whose mothers are not educated (AOR=8.09, 95% CI: 1.63-40.19), Prolonged labor (AOR=3.52, 95% CI:1.47-8.43), Ante-partum hemorrhage (AOR=5.36, 95%CI:1.69-16.99), Preeclampsia (AOR= 5.09, 95% CI:2.09-12.47), Fetal distress (AOR=3.99, 95% CI:1.80-8.83) and Low birth weight (AOR=3.86, 95% CI:1.21-8.72).study,

Conclusion: The prevalence of birth asphyxia was 10.6%.The significant predictors of birth asphyxia were the educational level of the mother, complicated labor, and low birth weight.

Keywords: Addis Ababa; Birth asphyxia; Newborns

Introduction

The World Health Organization (WHO) defines birth asphyxia as failure to initiate and sustain breathing at birth [1]. Placental or pulmonary gas exchange impairment leading to hypercarbia and hypoxemia is called birth asphyxia. The failure of newborns to cry or breathe well after delivery is known to be birth asphyxia [2].

APGAR score of <3 for longer than 5 min; neurological manifestations and multisystem organ dysfunction[3].APGAR score may be depressed not only by hypoxic-ischemic insult but also by other non-asphyxia factors such as maternal analgesia, prematurity, and infection. A prolonged depression of the APGAR score has been related to death or severe neurodevelopment outcome [4]. Any score <7 at 1, 5, and/or in 10 min) is defined as low APGAR scores or birth asphyxia [5]. Birth asphyxia is one of the top three causes of newborn deaths next to infections and complications of preterm birth, which together account for 88% of newborn deaths in Africa, of which birth asphyxia accounts for 24% [3]. Studies show in Zambia, newborns with clinical birth asphyxia were 4.4 times more likely to have an abnormal neurologic examination than non-asphyxiated infants [6]. Babies born in sub-Saharan Africa have a very high risk of birth asphyxia because 280,000 deaths occur due to birth asphyxia during the first day of life [7]. Birth asphyxia is sometimes unexpected, but often there are risk factors including antenatal factors such as hypertensive disorders, infections, or bleeding; fetal causes like fetal growth restriction, breech presentation, or chronic fetal distress; or intrapartum factors such as infections, placenta bleeding, uterine rupture, umbilical cord accidents or prolonged labor[8- 9]. Birth asphyxia accounts for 23% (29/1000) of

live birth neonate mortality in Ethiopia [3]. Major causes of neonatal death are birth asphyxia (23%), preterm complications (27%), and infections (36%) [10]. Therefore, this study needed the risk factors for neonatal deaths to be a preventable and effective intervention that can prevent many of the deaths and reduce disabilities in survivors of birth asphyxia. Though Ethiopia has made considerable achievements to reduce the under-five mortality rate, the neonatal mortality burden has not experienced the same reduction which may be attributed to birth asphyxia. In Addis Ababa, there is a limited study found to assess issues on the prevalence and associated factors of birth asphyxia. It will also help to improve health care providers and women's knowledge of neonatal birth asphyxia during labor. So the aim of this study is to address this gap by assessing the prevalence of neonatal asphyxia and its associated factors among newborns in Addis Ababa. This study is projected to give strong evidence on the prevalence and associated factors to increase the quality and consistency of data on birth asphyxia.

***Corresponding author:** Yohannes Godie, Department of Nursing, Gandhi Memorial hospital, Addis Ababa, Ethiopia, E-mail: yohannesguadie@gmail.com

Received: 1- Sep-2022, Manuscript No: nnp-22-74601, **Editor assigned:** 3 - Sep-2022, Pre QC No: nnp-22-74601 (PQ), **Reviewed:** 19- Sep-2022, QC No: nnp-22-74601, **Revised:** 24- Sep-2022, Manuscript No: nnp-22-74601 (R), **Published:** 29- Sep-2022, DOI: 10.4172/2572-4983.1000260

Citation: Godie Y, Yenus H, Ayenew F, Birhanu D, Guadie Y (2022) Assessment of Proportion of Birth Asphyxia and its Associated Factors among Newborns Delivered in Public Hospitals in Addis Ababa, Ethiopia, 2019/ 2020 .A Cross-Sectional Study. Neonat Pediatr Med 8: 260.

Copyright: © 2022 Godie Y, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Methods and Materials

Study design and setting

A facility-based cross-sectional study was conducted in Addis Ababa Public Hospitals from November to December, 2019.

This work is reported in line with STROCCS criteria from <http://www.stroccsguideline.com>.

Study area

The study was conducted in three Addis Ababa public hospitals selected by lottery method. These selected hospitals were Gandhi Memorial hospital (GMH), Yekatit 12 hospital medical college (Y12HMC) and Zewditu Memorial Hospital (ZMH).

Source and study population: All newborns delivered in Addis Ababa health facilities and all newborns delivered at public hospitals are in the data collection period

Inclusion Criteria and Exclusion: Criteria for newborns that were delivered at those selected public hospitals in labor and delivery ward regardless of their outcome during the study period and Mothers are seriously ill.

Sample size and sampling procedure

Sample size determination

Single proportion formula $n = (Z \alpha/2 \sqrt{p(1-p)})/d^2$ was used to

Where;

Z = standard normal distribution value at 95% confidence level of $\alpha/2 = 1.96$,

n = sample size,

p = The previous study shows for the prevalence of birth asphyxia among newborns in, Tigray hospitals was 22.1% (7).

d = margin of error = 4% = 0.04 and design effect = 1.5

Then, by adding 10% of non-respondent rate, final desired sample size was 414 + 10% non-response rate, n = 455. Design effects by using 1.5 multi stage sampling the final sample size for the first objective was 683.

Sampling procedures

The study was conducted in Addis Ababa public hospitals having labor and delivery units. Then allocation of the study subjects to each hospital was determined based on the proportion of the number of mothers who gave birth in the one-month period proceeding to the survey. Participants were recruited immediately after delivery, before being discharged at home, and recruitment was continued until the sample size allocated was fulfilled or met. The first participant was selected randomly by default when starting the data collection time. Another participant was selected every two (k=2) intervals.

Dependent variable: Birth Asphyxia

Operational definition: Birth asphyxia—neonates born in the studied hospitals and diagnosed as Asphyxia by the attending health professionals using an APGAR score of less than 7 at 5th minute, not able to breathe and not able to cry after birth.

Data Collection Procedure

Data was collected by using a closed-ended structured face-

to-face interviewer administering questionnaire and tools adapted from different literature and by reviewing the mother's profile card. The questionnaire was first developed in English and translated into Amharic versions and re-translated back into English by language experts to assure its consistency. Participants were interviewed in appropriate places by trained data collectors. In each hospital, three BSc midwives were supervised by one senior BSc Midwives recruited. All the necessary training was provided by the principal investigator.

Data Quality Assurance and Data Management

The two-day training was given about data collection procedure for those data collectors and supervisors regarding the study purpose, how to conduct the interview, how to administer the questionnaire, how to take consent, keep confidentiality and respect the right of the participant. The questionnaire was pre-tested on 5% in one of the outside samples to assess its completeness, clarity, length, skip patterns, and correctness of filled questioner.

Statistical Analysis

After data collection, the data were cleaned manually, coded & entered into Epi-Data version 4.6, and exported & analyzed using SPSS Software version 26 used for further analysis. Bi-variable and multivariable logistic regressions were carried out to see associations between dependent and independent variables. All variables with a p-value ≤ 0.2 were taken into the multivariable model to control for all possible confounders. To assess multicollinearity in the regression model the variance inflation factors (VIF) were conducted to identify the correlation between independent variables. Hosmer and Lemeshow's goodness of fit test was done to test the fitness of the model, and it was found good. The cut point to declare the presence of a statistical association between dependent and independent variable were p-value < 0.05 or AOR, 95% CI.

Results

Socio-demographic characteristics of the participants

Out of those, 683 live births were selected for this study; the response rate was 678 (99.3%) newborns/mother pairs involved. About 199 (29.4%) of the mothers were aged 25 – 29 years and the median age of the mother was 27.7 years [11]. The majority of the respondents were secondary and above 463 (68.3%) whereas 205 (30.2%) of them were in a primary education level and 643 (94.8%) mothers were married. The mean income of participants was 5076.53 and (SD 3392.90) per month.

Obstetrics and newborn factors of the birth asphyxia

The prevalence of birth asphyxia was 72 (10.6%). The majority 51 (7.5%) were unable to breathe and 21 (3.1%) were others such as unable to feed, to bluish discoloration, abnormal movement, and others. Among respondents, 671 (99.0%) mothers visited health facilities during their pregnancy time among those mothers 465 (68.6%) had four times and above. The majority of 494 (72.9%) were mothers with newborns 37-42 weeks of gestational age. Regarding membrane about 649 (95.7%) had ruptured members in less than 18 hours. In this study 200 (29.5%) mothers had complicated before giving birth or during the delivery time such as 45 (6.6%) Anemia, 56 (8.3%) Antepartum hemorrhage (APH), 97 (14.3%) Preeclampsia and 39 (5.8%) Eclampsia.

Associated Factors of birth asphyxia among newborns with mothers

In Multivariable analysis, results showed that there was a statistically

significant association found between birth asphyxia, parameters which showed a p-value of below 0.05 the education of the mother, prolonged labor, APH, preeclampsia, fetal distress, and Birth weight.

Discussion

In this study, the prevalence of birth asphyxia among newborns delivered in public hospitals in Addis Ababa was 10.6% with 95% CI (8.3-13.0). This finding is lower compared to a study conducted in Debre Tabor hospital, Ethiopia (29.9%) [11], in Jimma hospital Southwest, Ethiopia (32.9%) in the first minute and (12.5%) in the fifth minute and in Nigeria (21.1%) [12]. In addition, this finding is lower when compared to a systematic review which was conducted at Debre Markos University, Ethiopia (21.0% [13]. This variation is might be due to this study including more than 98.8% of newborns with mothers are visiting ante natal care. In addition, in Addis Ababa good infrastructure, health facilities easily available, and a good awareness of the family may have a positive influence on the lower prevalence of birth asphyxia in our study. But it was higher compared to a retrospective study which was conducted in Dil-Chora referral hospital in Dire-Dawa, Ethiopia (3.1%) [14]. From this, we can explain that the institutional deliveries might be self-referred obstetric complications and it may be delays in health centers with high neonatal complications.

In this study maternal education was one of the factors associated with birth asphyxia. Being non-educated mothers were 8.09 times higher risk to develop birth asphyxia when compared with education levels of secondary plus. This finding is consistent with studies conducted in Tigray (15), Dire-dawa, Kenya (16), Tanzania (17), Nepal (18), and Sweden (19). This is justified by non-educated mothers are a very broad indicator of poor socio-economic conditions associated with consequent malnutrition and frequent pregnancies and also influence care-seeking during the Ante-partum period. According to this study being non-educated mothers has a negative relationship with antenatal care follow-up and this result again has a negative impact on birth asphyxia.

Antepartum hemorrhage had a significant association with birth asphyxia. Mothers who had antepartum hemorrhage had a 5.36 times higher risk than those who hadn't antepartum hemorrhage of the outcome of birth asphyxia. This study is in line with studies reported previously in Tigray (15), Dire-Dawa, Ethiopia (14), and Pakistan (20). This could be due to the fact in antepartum bleeding; there is decreased blood flow from the mother to the placenta, so hypoxemia can occur in the fetus. This condition can lead to perinatal asphyxia if the transfusion to the mother or delivery is delayed [15-16].

Newborns whose mothers had Preeclampsia were 5.09 times higher to develop Birth Asphyxia compared to non-asphyxiated newborns. Moreover, this finding is consistent with a study conducted in Dire-dawa referral hospital, Eastern Ethiopia (14), in Jimma zone public hospitals, Southwest Ethiopia (10), in Nigeria Public Hospital, Nigeria (12), and in Karachi Hospital in Pakistan (20). Preeclampsia has been associated with an increased risk of birth asphyxia in multiple hospital-based studies in Nepal (18). Births that result after complicated labor like Preeclampsia may be affected in several ways, which may increase their risk and, result in vulnerable babies that are prone to asphyxia, as compared to uncomplicated labor. This can be due to the fact that labor complications such as pre-eclampsia-related problems, may decrease the blood and oxygen supply to the infant and, in turn, lead to birth asphyxia [17-19].

In this study, prolonged labor was a statistically significant factor

for birth asphyxia. The odds of Birth Asphyxia were 3.52 times greater in newborns who were delivered from prolonged labor. This finding agrees with findings in Tigray (7), Gondar (9), Dire-dawa (14), and Pakistan (20), This may be due to prolonged labor makes the baby to be involved in labor for a prolonged time that carries a higher risk of birth trauma; In addition, many conditions associated with prolonged labor make newborns more likely that the baby will be exposed to Pitocin and instrumental assisted deliveries [20]. All of these issues can cause the baby to have birth asphyxia. Another explanation, if the labor does not progress normally, the woman may experience serious complications, such as dehydration, exhaustion, or rupture of the uterus. It is also clear that when labor is prolonged, there is a high probability for the fetus to become distressed. Another neonatal factor found to have significantly been associated with birth asphyxia was intra-partum fetal distress. Neonates with intrapartum fetal distress had a higher risk of birth asphyxia than those born with normal fetal heart rates [21-22]. A similar result was obtained in a previous study done in Gondar, Ethiopia (9). The possible explanation is that fetal distress is the main indication of emergency CS which is a known risk factor for birth asphyxia.

Low birth weight was also an important determinant of birth asphyxia in this study. Neonates who had low birth weight were 3.86 times higher to have birth asphyxia than those who had normal birth weight. This finding was in a line-up with those studies conducted in Jimma zone public hospitals (10), Tigray (7), Dilla (21), University of Gondar Referral Hospital (22), and Pakistan (20). This could be explained by the fact that a high proportion of low birth weight babies might be pre-term which may make them don't have enough surfactant resulting to suffer difficulty of breathing and subsequent birth asphyxia. In this study multivariable logistic regression not associated with the adjusted odds ratios (AOR) for Birth asphyxia such as age group of the mother, Income _quartile, parity, Mode of delivery, received maternal analgesics, ROM, Anemia, Eclampsia, MAS, and Chorioamnionitis, Conclusions and Recommendations[23].

Birth asphyxia is one of the common causes of neonatal morbidity and mortality in the labor and delivery ward. Therefore, efforts should be made to improve the quality of intrapartum care service in order to prevent prolonged labor and fetal complications and to identify and make a strict follow-up of mothers with fetal distress. We recommend that proper emphasis should be given to neonatal mortality by addressing and providing adequate information because the prevalence of birth asphyxia was 10.6% in this study area.

Abbreviations

AAP : American Academy of Pediatrics

ACOG: American College of Obstetricians and Gynaecologists'

ANC : Antenatal care

AOR: Adjusted Odds Ratio

APGAR : Appearance, Pulse Rate, Grimace, Activity, Respiration Rate

APH : Ante-partum hemorrhage

BA: Birth Asphyxia

CI: Confidence Interval

COR: Crude Odds Ratio,

FMOH: Federal Ministry of Health

IUGR: Intra uterine growth restriction

MDGs : Millennium Development Goals

WHO: World Health Organization

Data Availability

All data analyzed during this study are included within the article.

Ethical Approval

Ethical clearance was obtained from the institutional review board (IRB) of University of Gondar.

Ethics Approval and Consent to Participate

Ethical clearance for the study was obtained from the institutional review board (IRB) of University of Gondar. Informed written consent was obtained from each respondent after explaining the purpose and procedure of the study. No name or other identifying information was included in the instrument. Formal letter was submitted to GMH, Y12HMC and ZMH in order to get permission to carry out the study. The eligible study participants were enrolled in the study only after they give written informed consent and were not forced to participate

Disclosure

The publisher to recommend that the preprint version of the previous study was cited (23, 24).

Conflict of Interest

The authors declare no conflict of interest.

STROCSS guideline

This work is reported at line with STROCSS criteria at www.strocssguideline.com.

Authors' contributions

All authors should have made substantial contributions to all the following: the conception and design of the study, or acquisition of data, or analysis and interpretation of data, drafting article or revising it critically for important intellectual content, final approval of the version to be submitted.

Acknowledgement

We would like to acknowledge University of Gondar, the study participants, data collectors and supervisors for their contribution and commitment throughout the study period.

References

1. Federal Minster of Health (FMOH) (2014) Neonatal Intensive Care Unit (NICU) Nurses Training Participants Manual .
2. WHO (2012)Newborn Care Manual Contents Perinatal education program.
3. Haider A, Bhutta Z (2014) Birth asphyxia in developing countries: Current status and public health implications Nigeria. *Curr Probl Pediatr Adolesc Health Care* 36: 178-188.
4. Roberto Antonucci, Annalisa Porcella, Pilloni MD, Annalisa Porcella, (2014) Perinatal asphyxia in the term newborn. *Jour Pedia Neon Indivi Med* 3:1-14.
5. Mukhtar-Yola M, Audu LI, Olaniyan O, Akinbi HT, Dawodu A, et al. (2018) Decreasing birth asphyxia: utility of statistical process control in a low-resource setting. *BMJ* 7: 000231.
6. Halloran D, McClure E, Chakraborty H, Chomba E, Wright LL, et al. (2013) Birth asphyxia developing country. *RTI* 29: 1-12.
7. Gebreheat G, Tsegay T, Kiros D, Teame H (2018) Prevalence and Associated Factors of Perinatal Asphyxia among Neonates in General Hospitals of Tigray. *BioMed Res Inter* 5: 16-26.
8. Kumar S, Paterson-Brown S (2015) Obstetric aspects of hypoxic ischemic encephalopathy. *Early Hum Dev* 86: 339-344.
9. Wosenu L, Worku AG, Teshome DF, Gelagay AA (2018) Determinants of birth asphyxia among live birth newborns in University of Gondar referral hospital, northwest Ethiopia: A case-control study. *PloS one* 13: 1-12.
10. Wayessa Z, Belachew T, Joseph J (2018) Birth asphyxia and associated factors among newborns delivered in Jimma zone public hospitals, Southwest Ethiopia. *Jou ManSystem* 6:1289-1295.
11. Asfere W, Yesua A (2018) Neonatal asphyxia and associated factors among neonates on labour ward at Debre Tabor Town, South Gonder, North Central Ethiopia. *Preg Child Birth* 6: 208-212.
12. Ajae AE, Adeoye IA (2019) Prevalence, risk factors and outcome of congenital anomalies among neonatal admissions, Nigeria. *BMC Pediatrics* 19: 88-89.
13. Assemie M, Tizazu G (2019) Prevalence of perinatal asphyxia and its associated factors in Ethiopia; A systematic review and meta-Analysis. *BMC preg child birth* 2: 1-25.
14. Ibrahim NA, Muhye A, Abdulie S, Muhye A, Abdulie S (2017) Prevalence-of-birth-asphyxia-and-associated-factors-among neonates in dire-dawa eastern, ethiopia. *Clin Mother Child Hea* 14: 27-29.
15. Tasew H, Zemichael M, Teklay G, Mariye T, Ayele E (2018) Risk factors of birth asphyxia among newborns in public hospitals of Central Zone, Tigray, Ethiopia. *BMC* 11: 496.
16. Kibai, Kiptui E(2017) Perinatal factors associated with birth asphyxia among neonates in maternity ward kakamega county referral hospital, kenya. *Midw Param Scien* 11: 50-54.
- 17.
18. Schmiegelow C, Minja D, Oesterholt M, Pehrson C, Suhrs HE, et al.(2014) Factors associated with and causes of perinatal mortality in northeaster Tanzania. *US National Library of Medicine* 91: 1061-1068.
19. Anne CC, Lee CL, Mullany MJ, Tielsch K(2019)Risk Factors for neonatal mortality due to Birth Asphyxia in Southern Nepal. *Inter Cen for Adva Neon Hea* 121: 1-12.
20. Milsom I, Ladfors L, Thiringer K, Niklasson A, Odeback A, et al. (2004) Birth asphyxia: incidence, clinical course and outcome in a Swedish population. *Actap nur the chil* 84: 909-917.
21. Nauman Kiyani, Khushdil A (2014) Perinatal Factors Leading to Birth Asphyxia among Term Newborns in a Tertiary Care Hospital. *Iran Jour Pedia* 24: 637-642.
22. Alemu A (2017) Prevalence and associated factors of perinatal asphyxia among newborns in Dilla University referral hospital. *Pedi Health Med Ther* 10: 69-74.
23. Worku Gudayu T(2017) Proportion and factors associated with low fifth minute Apgar score among singleton newborn babies in Gondar University referral hospital; North West Ethiopia. *Afr Health Sci* 17: 1-6.
24. Asalf endazanaw (2021) Treatment outcome of neonatal sepsis and associated factors among neonates admitted To Neonatal intensive care unit in public hospitals. *Pediatric Health Med Ther* 12:467-479.