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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

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DEPARTMENT OF MIDWIFERY

ADVERSE NEONATAL OUTCOMES AND ITS ASSOCIATED FACTORS AMONG MOTHERS WITH SHORT AND RECOMMENDED INTERPREGNANCY INTERVAL, IN AWI ZONE, AMHARA REGION, NORTH WEST ETHIOPIA, A COMPARATIVE CROSS-SECTIONAL STUDY, 2020.

BY: JEMBERU CHANE (BSc, MSc candidate.)

A THESIS REPORT SUBMITTED TO DEPARTMENT OF MIDWIFERY, COLLEGE OF MEDICINE AND HEALTH SCIENCES, BAHIR DAR UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN CLINICAL MIDWIFERY.

JUNE, 2020

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

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FULL TITLE OF THESIS PROJECT	ADVERSE NEONATAL OUTCOMES AND ITS ASSOCIATED FACTORS AMONG MOTHERS WITH SHORT AND RECOMMENDED INTERPREGNANCY INTERVAL IN AWI ZONE PUBLIC HOSPITALS
DURATION OF THE STUDY	FEBRUARY 15TH TO APRIL 15TH, 2020.
STUDY AREA	AWI ZONE PUBLIC HOSPITALS

Approval Letter

Title: Adverse neonatal outcomes and its associated factors among mothers with short and recommended interpregnancy interval at Awi Zone Public Hospitals, Northwest Ethiopia, a comparative cross-sectional study, 2020

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List of Abbreviations

ACOG	American College of Obstetrics and Gynecology
ANC	Antenatal Care
APGAR	Appearance Pulse Grimace Activity Respiration
C/S	Cesarean Section
CI	Confidence Interval
EDHS	Ethiopian Demographic Health Survey
GA	Gestational Age
IPI	Interpregnancy Interval
LBW	Low Birth Weight
NICU	Neonatal Intensive Care Unit
ROM	Rupture of Membrane
USAID	United States Agency for International Development
WHO	World Health Organization

Abstract

Background: Short interpregnancy interval (IPI) is among modifiable risk factors for maternal and neonatal adverse outcomes for planned pregnancies. It is potentially associated with

adverse neonatal outcomes which are known to have considerable public health significance. In Ethiopia neonatal mortality was found to be high according to recent mini Ethiopian Demographic Health Survey Report. More importantly information about adverse neonatal outcomes in relation to interpregnancy interval is poorly described yet in Ethiopia.

Objective: The aim of this study was to compare proportion of adverse neonatal outcomes and its associated factors among short and recommended interpregnancy interval of mothers who gave birth in Awi zone public hospitals, Amhara region, North West Ethiopia, 2020.

Methods: Institution based comparative cross-sectional study was conducted in Awi zone public hospitals. A total of 482 mothers (241 with short and 241 with recommended IPI) were selected. The data was collected by using systematic random sampling technique through pretested structured questionnaire and entered in to Epi data version 3.1 then exported to Statistical Package of Social Science version 23.0 for analysis. Bivariable and multivariable logistic regression analyses was 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.

Result: Among a total of selected mothers with short and recommended Interpregnancy interval (IPI) response rate was 237 (98.3%) and 238 (98.7%) respectively. Proportion of adverse neonatal outcomes were 37.1% and 20.6% among short and recommended IPI groups respectively. Factors such as, rural residence [AOR=6.9, 95%CI (3.32, 14.59)], and Cesarean section (C/S) delivery [AOR=3.4, 95%CI (1.18, 10.09)] were significantly associated with adverse neonatal outcomes in short IPI groups. Factors like rural residence [AOR=6.1, 95%CI (2.11, 17.7)], unintended pregnancy [AOR=5.3, 95%CI (1.11, 25.00)], rupture of membrane [AOR=6.89, 95%CI (2.54, 18.65)] and induction of labor [AOR=13.4, 95%CI (3.17, 21.77)] were significantly associated with adverse neonatal outcomes in recommended IPI groups.

Conclusion: Urban residency and vaginal delivery were significantly associated with less risk of adverse neonatal outcomes in short IPI groups. Whereas urban residency, intended pregnancy status, spontaneous labor initiation and absence of ROM before labor were reported as a protective for adverse neonatal outcomes in recommended IPI mothers. According to this study, provision of proper health service coverage at rural area and minimizing C/S rate to reduce adverse neonatal outcome is highly recommended.

Key words: Adverse neonatal outcomes, short IPI, recommended IPI, Ethiopia.

1. Introduction

1.1. Background

Inter pregnancy period is an opportunity to address complications occurred during pregnancy, to assess a woman's mental and physical wellbeing and to optimize her health along her life time(1). Interpregnancy interval(IPI) is defined as the time elapsed between the woman's last delivery and the date of the last menstrual period for the index pregnancy(1, 2). An IPI of at least 24 months is highly recommended for good maternal and perinatal outcomes(3). This recommended interval was also considered consistent with the WHO/UNICEF recommendation of breastfeeding for at least 24 months(4). Large high quality studies establish short IPI as an independent risk factor for diverse complications after adjusting confounding factors like maternal age, socio economic status, life style and previous pregnancy outcome(5). Short IPI is among modifiable risk factors for maternal and neonatal adverse outcomes for planned pregnancies(6). Short interpregnancy interval is potentially associated with adverse neonatal outcomes including stillbirth, early neonatal mortality, preterm birth, Neonatal Intensive Care Unit (NICU) admission, low APGAR score and low birthweight which are known to have considerable public health significance(7).

Eventhough, mechanism of the changes in fetal development as a result of birth spacing is still not clear, some studies have attributed poor neonatal outcomes to loss of stores of important nutrients, such as folate, which are not replenished adequately in pregnancies with short IPI(8, 9). Other factors that have been suggested to account for an association between short IPI and poor neonatal outcomes include cervical insufficiency, sibling competition for maternal resources, transmission of infection between closely spaced siblings, and incomplete healing of the uterine scar from previous cesarean delivery(10, 11). On the other side due to increased cervical insufficiency or vertical transmission of infections following a short interpregnancy interval, it is reported as possible risk factor for adverse neonatal outcome(7, 10).

Prevention of short interpregnancy intervals is a public health priority in the United States. Specifically the American Healthy People objectives call for a 10% reduction of pregnancies that occur within 18 months of a previous birth by 2020(12). Recent studies supported by USAID have suggested longer pregnancy interval 3-5 years may be more advantageous and using inter birth interval is found to overestimate adverse outcomes, so that using the Inter pregnancy interval is recommended to be the better one(13, 14). In a meeting held by World Health Organization(WHO) to review evidence on relationship between different pregnancy intervals, it

is recommended to have an interpregnancy interval of 24 to 59 months for good perinatal and maternal outcomes(15).

1.2 Statement of the problem

Pregnancy is recognized as a window to future health because complications during pregnancy such as gestational diabetes, gestational hypertension and fetal growth restriction, are associated with long term health problems(1, 16). Even though short IPI leads an adverse neonatal outcomes the effect of IPI on complications during pregnancy has received less attention(7).

Globally, perinatal mortality (stillbirth and early neonatal mortality) accounts for >5 million deaths every year (17, 18). Similarly low birthweight occurs in >20 million newborns worldwide, which is a major contributor to perinatal mortality and up to 80% of neonatal mortality(19). The greatest proportion of perinatal deaths and low birthweight (97%–99%) occur in low-and middle-income countries(20). Preterm birth complications are the leading cause of deaths in the neonatal period(17). A prospective, population-based study from low-middle income countries determined early Neonatal Mortality Rate (NMR) to be 20.6 per 1000 live births and the 28-day NMR was 25.7 per 1000 live births, Out of it preterm birth accounts about 44% and NMR among preterm was 114 per 1000 live births whereas for term birth 15 per 1000 live births(21). A systematic review of still birth estimate from 157 countries shows a reduction in its rate from 24.7 per 1000 live births by 2000 to 18.4 by 2015(22). Approximately 2 million of neonatal death occur in the early neonatal period and the risk is greatest on the first day of birth, approximately 1 million newborns die within the first 24 hours(23).

In Ethiopia the perinatal mortality rate is relatively high among women with a pregnancy interval of less than 15 months (45 deaths per 1,000 pregnancies)(24). Despite; the availability of health facilities and improved health services, Recent report from Ethiopian Demographic Health Survey (EDHS) determined that stagnant prevalence in neonatal mortality as compared to the previous 2016 EDHS report(25). Further, although short periods of time since last birth have been associated with adverse outcomes and eventhough there are evidences about the effect of IPI on adverse neonatal outcomes in Ethiopia, it remains unclear whether these relationships differ among different classifications of interpregnancy intervals. Thus, the aim of this study is to investigate and compare adverse perinatal outcomes among short and recommended IPI at public hospitals of Awi zone, Amhara region North West Ethiopia.

1.3 Significance of the study

IPI has been associated with adverse pregnancy outcomes in the perinatal period, in our country Ethiopia it is described that the rate of neonatal death is raising but still there is a controversy between results on the effect of interpregnancy interval on adverse neonatal outcomes. So that such study investigating the associations between IPI and poor perinatal outcomes is needed.

This study identified adverse neonatal outcomes in relation to short and recommended interpregnancy interval. So that, it will help; First, local and possibly nationwide policy makers to design appropriate strategies to solve the problem and thereby ensuring further declines in neonatal mortality. Secondly, it could help; Regional and district health care planners and program managers in designing site specific and scientifically sound interventions to address the problem. Thirdly, this finding might add an evidence for obstetric health care providers while counselling mothers about the need to birth spacing.

2. Literature review

2.1. Proportion of adverse birth outcomes among short and recommended IPI

Recent studies using maternally linked birth records and employing matched study design have found short interpregnancy interval as an independent risk factor for adverse neonatal outcomes (26, 27), prompting renewed concern that previously observed associations may be due to confounding(28). Study from United States found that the prevalence of adverse neonatal outcomes among mothers with short IPI and recommended to be 17.1% and 10.7% respectively(29). Similarly from a study done in Scotland it was determined that, the proportion of adverse neonatal outcomes among short IPI to be 13.8% and among those with recommended IPI was 4.8%(30). prospective cohort study from the Netherlands reported an incidence of adverse neonatal outcome of 9% among women with short IPI(31). Study from British showed that Rates of all adverse neonatal outcomes were higher (12.1%) among women with short IPI than among women with recommended IPI (4.9%) (10). Another, based on more than 300,000 women in California, found that, short intervals had a modest, but statistically significant, 20% relative increase in risk of preterm birth compared with recommended birth intervals(27). Report from US showed a statistically significant, time-dependent relationship between short interpregnancy intervals and moderately and very preterm birth(32). Similarly; study from Scotland which assessed the risk of preterm birth and neonatal death in relation to interpregnancy interval showed short interpregnancy interval as an independent risk factor for preterm delivery and neonatal death in the next birth(30). A retrospective cohort study in US showed an increased prevalence (5.7%) of neonatal morbidity from short IPI(33). From retrospective cohort study in New York short IPI is found to be associated with preterm birth, low birth weight, 5 minute APGAR score less than 7, NICU admission and neonatal seizures(34). Cohort study from alberta, identified an increased prevalence of congenital anomaly among women's with very short IPI(35). Cross-sectional study from Nepal reported an increased risk of low birth weight, stillbirth and preterm birth in women with short IPI than recommended interpregnancy interval(36). Similarly Study from Finland determined that women with a short interpregnancy interval had the highest incidence of preterm birth than those with recommended birth interval, and showed no significant association for low birth weight and Small for Gestational Age(SGA)(37).

Systematic review and meta-analysis studied in Turkey on perinatal outcomes among women with a pregnancy interval of two years and shorter reported that; 8.2% of women had birth

before 37 weeks and 0.3% resulted in stillbirth, 4.8% of neonates were born with low birth weight(38). Study from kartum found the proportion of adverse neonatal outcomes among mothers with short IPI to be 12.9%(39). Similarly a research from Tanzania reported high prevalence of preterm birth, low birth weight and perinatal death in women with short IPI than those with recommended interval(40).

Study from North West Ethiopia showed that the prevalence of adverse neonatal outcomes to be 31%(41). Several studies from different regions of Ethiopia tried to show the effect of interpregnancy interval on adverse neonatal outcomes. The first, from Tigray region reported that the prevalence of preterm birth among mothers with short inter pregnancy interval to be significantly high(42). Recent study in felegehiwet referral hospital in Bahirdar showed that the prevalence of short IPI to be 28.5% from which one in three pregnancies were unplanned and result in unfavorable delivery outcomes, preterm birth and still birth; to be higher in mothers with short IPI(43).

2.2. Factors associated with adverse neonatal outcomes

2.2.1. Sociodemographic factors

A cohort study from southern Australia showed that IPI act in concert with factors such as maternal age and educational status of the mother to affect neonatal outcomes(44, 45). Also report from Bangladesh reported educational status of the mother as a significant factor for adverse neonatal outcomes(46). Whereas systematic review and meta-analysis by WHO showed that advanced age to have a protective role for adverse neonatal outcomes(47).

According to a result from Vietnam(48), it was reported that mothers who participate in farm to be at higher risk of developing adverse neonatal outcomes. Similarly study from Northwest Ethiopia, there was a significant association between occupation of the mother with adverse neonatal outcomes(45).

Study finding from South Nation Nationalities and Peoples of Ethiopia Region showed that mothers of rural residence had 3 times risk of having adverse neonatal outcomes than urban residents(49). Educational status also showed a significant association with adverse pregnancy outcomes in a study from northwest Ethiopia(50).

2.2.2. Obstetric factors

Study done in Sweden identified parity of more than 5 to be significantly associated with neonatal adverse outcomes(51). Additionally report from low and middle income countries showed a significant association between antenatal care follow-up and adverse neonatal outcomes(21). Report from Jimma University specialized teaching hospital (JUSH) also showed that attending antenatal care as protective from having adverse neonatal outcomes(52).

According to a study from Ghana, premature rupture of membrane (ROM) and poor antenatal care were also important determinants of adverse neonatal outcomes(53).

Similarly reports from Northern Ethiopia showed that complications during pregnancy to have significant associations with adverse birth outcome(54). Study from Greece revealed that emergency C/S as a significant factor for adverse neonatal outcomes(55). Moreover study from Mekelle also described that, Emergency cesarean section as potential risk factors for adverse neonatal outcomes(56). It is also reported in another study that poor knowledge on preconception care as significant predictor of adverse neonatal outcomes(57).Studies from Canada and Bangladesh established a significant association between short IPI and subsequent adverse neonatal outcomes(26, 58).

Previous C/S delivery was also reported as a significant risk factor for possible adverse neonatal outcomes from a study conducted in Canada(59). Antepartum hemorrhage was also determined to have a significant effect on adverse neonatal outcomes(60).

2.2.3. Maternal lifestyle

A multi-country based systematic review and meta-analysis study reported that substance abuse during pregnancy to be associated with risk of adverse neonatal outcomes(61). A study from gamo gofa zone determined that not having additional meal during pregnancy to have positive significant association with risk of developing adverse neonatal outcomes(62).

Smoking and alcohol consumption during pregnancy were reported to have a significant association with the risk of developing adverse neonatal outcomes(5). Another study from Sudan showed a statistically significant association between alcohol consuming during pregnancy and adverse neonatal outcomes(63).

2.3. Conceptual framework

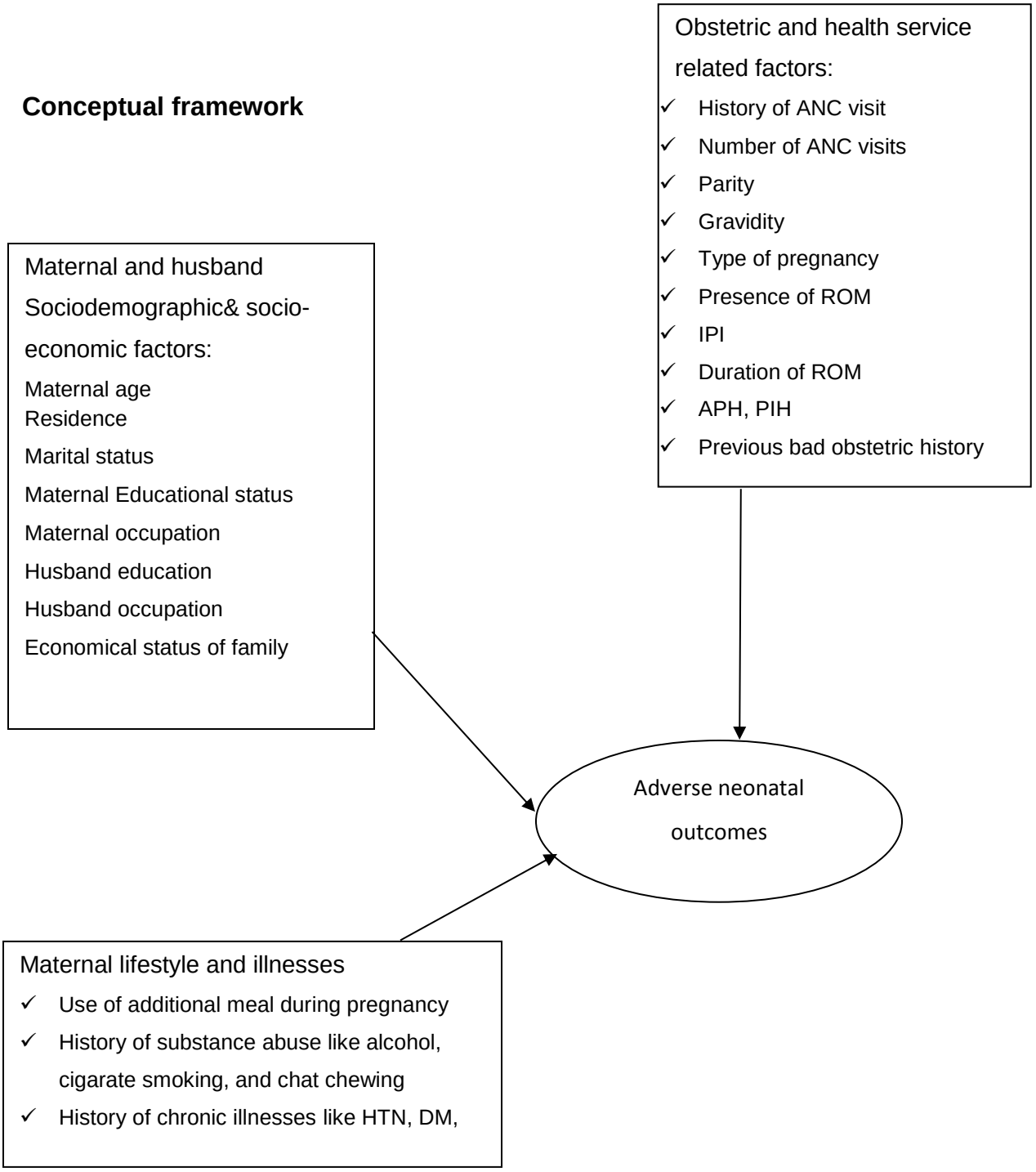

Figure 1: conceptual frame work of factors associated with adverse neonatal outcomes Adapted from different literatures (49, 54, 56).

3. Objective of the study

3.1. General objective:

- To identify and compare adverse neonatal outcomes among mothers with short and recommended IPI, who gave birth at public hospitals, Awi zone, Amhara region, North West Ethiopia, 2020.

3.2. Specific objectives

- To compare immediate adverse neonatal outcomes of mothers of short IPI with recommended IPI at public health hospitals in Awi zone, Amhara region, North West Ethiopia, 2020.
- To identify factors associated with adverse neonatal outcomes among mothers with short and recommended IPI, who gave birth at public hospitals in Awi zone, Amhara Region, North West Ethiopia, 2020.

4. Methods and Subjects

4.1. Study area:

The study was conducted at public hospitals in Awi zone, Amhara region, North West Ethiopia, 2020. Awi zone is one of the 11 Zones in Amhara Region of Ethiopia. It is bordered on the west by Benishangul-Gumuz Region, on the north by Semien Gondar Zone and on the east by Mirab Gojjam. The administrative centre of Awi zone is Injibara; other towns include Chagni, and Dangila. Injibara is found 297 Km from Adis ababa, Ethiopia. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this Zone has a total population of 982,942, of whom 491,865 are men and 491,077 women. With an area of 9,148.43 square km, Agew Awi has a population density of 107.44; 123,014 or 12.51% are urban inhabitants. Amharic was spoken as a first language by 53.38%, and 45.04% spoke Awingi. It has 11 woredas and a total of 5 public hospitals (dangla primary hospital, Injibara general hospital, Jawi primary hospital, and Gmjabet primary hospital and Chagni primary hospitals) and 447 health centers.

4.2. Study design and period:

4.2.1. Study design:

Institution based comparative cross-sectional study was conducted.

4.2.2. Study period:

The study was conducted from February 15th to April 15th, 2020.

4.3. Population:

4.3.1. Source population:

All mothers who had at least one previous live birth and who gave their current birth in Awi zone public hospitals.

4.3.2. Study population

All mothers who had at least one previous live birth and who gave their current birth in Awi zone public hospitals during the study period.

4.4. Inclusion and exclusion criteria:

Inclusion criteria:

All mothers with interpregnancy interval (IPI) of<60 months were included.

Exclusion criteria:

Mothers whose charts are incomplete and whose current delivery is other than singleton as it can influence the neonatal outcomes, were excluded(64).

4.5. Sample size determination:

Sample size was calculated using a double population proportion formula; assuming 22.2% proportion (p_1) for the exposed and proportion (p_2) for un exposed 11.3% based on a previous study which tried to show interpregnancy interval as a risk factor for preterm birth (43), with 95% level of confidence (z) and power of 80%. By applying 10% of non-response rate the final sample size became 200.

$$N=\frac{\left(Z1-\alpha\sqrt{2*P(1-P)}+Z\beta\sqrt{P1(1-P1)+P2(1-P2)}\right)^2}{(P1-P2)^2}$$

Where $Z_{1-\alpha}$= Value of Z for level of significance alpha (at 0.05 level of significance value of Z is 1.96)

Z_β = Power, which indicates that change did not occur by chance. Value of Z for power β (at power level 0.80, value of Z_β is 0.84)

P_1=proportion of adverse neonatal outcomes among women with short IPI

P_2= proportion of adverse neonatal outcomes among women with recommended IPI

P= $(P_1+P_2)/2$

$$N=\frac{[1.96\ (\sqrt{2}\times 0.167(0.833))+0.84(\sqrt{0.222(0.778)+(0.113\times 0.897)}]^2}{(0.222-0.113)^2}$$, N=182

With 10% non-response rate, N=200

Sample size for objective two was determined using double population formula by using Epi info version 7 by considering the following assumptions: confidence interval (CI) 95%, power 80%, ratio 1:1 and non-response rate 10%. The factors were taken from previous study conducted in Suhul Shire hospital, Gamo Gofa zone, North Wollo zone and

Nigst Eleni hospital hosanna town (49, 54, 65, 66). I.e. final sample size was found to be 482 which was the largest.

Table 1: sample size determinants for factors associated with adverse neonatal outcomes among mothers with short and recommended IPI in Awi zone public hospitals, Amhara region, North West Ethiopia, 2020.

Authors	Factor	Prevalence of neonatal adverse outcome P_1 (in exposed), p_2 (in unexposed)	Power	AOR	Sample size with 10% non-response rate
Adhena et al.	residence	P_1=27.7% P_2=16.2%	80%	1.643(0.93-2.8)	482
Feleke et al.	Occupational status	P_1=16.6%, p_2=1.4%	80%	0.074 (0.017, 0.324)	147
Kasahun et al.	Age	P_1=32.8% P_2=20.5%	80%	0.5 (0.20, 1.20)	480
Abdo et al.	Marital status	P_1=36% P_2=20.6%	80%	0.47(0.25, 0.91)	321

4.6. Sampling technique and procedure

From all 5 hospitals in Awi zone, for one month the trend was observed and from out of total deliveries the total count of short vs recommended interpregnancy intervals selectively counted in each hospitals, accordingly for two months the number is estimated based on the one month trend i.e. short vs recommended IPI in dangla (107 vs 135), Injibara (120 vs 170), Chagni (102 vs 122), Jawi (108 vs 130), gmjabet (85 vs 180). Then the sample size was proportionally allocated to each hospital using values of k_1(2) and k_2(3) for mothers with short and recommended IPI respectively and finally all mothers who satisfy the inclusion criteria were recruited in the study using systematic random sampling technique.

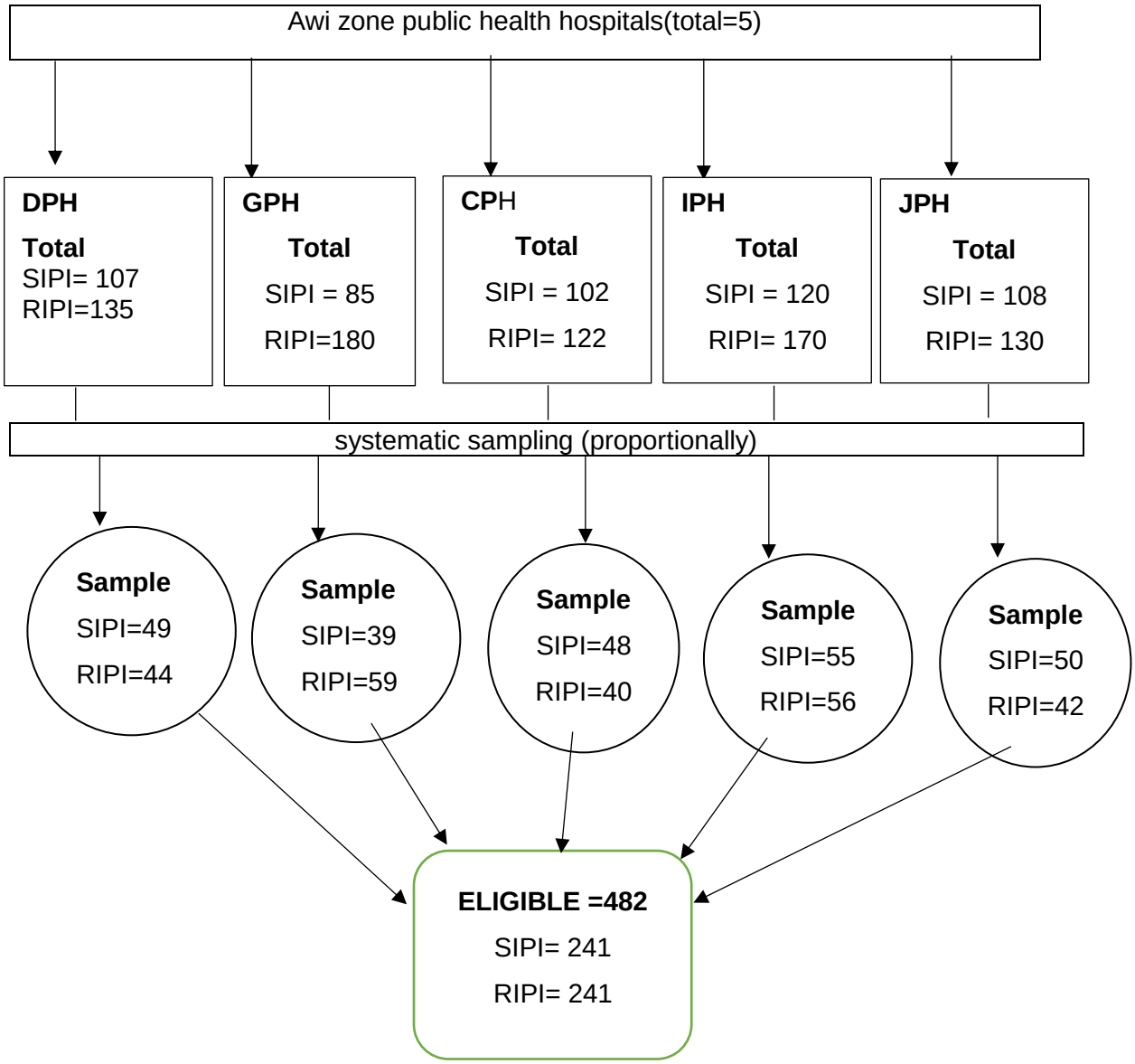

Figure 2: sampling procedure for study population

Where, DPH=Dangla primary hospital, CPH=Chagni primary hospital, GPH= gmjabet primary hospital, IGH= Injibara general hospital and JPH= Jawi primary hospital. Whereas, SIPI= Short interpregnancy interval and RIPI=Recommended interpregnancy interval.

4.7. Study variables:

Independent variables:

Socio-demographic factors; age, marital status, educational status, occupational status of the mother, occupational status of husband, educational status of the husband, ethnicity, religion of the mother.

Obstetric and maternal lifestyle related factors

Interpregnancy interval, Antenatal Care (ANC) follow up, iron and folic acid supplementation, parity, Birth outcomes: age at last delivery, number of living children, sex of the preceding child, delivery place of the preceding child, pregnancy plan, and women's decision-making power.

Outcome variable: Adverse neonatal outcomes

Operational definitions

Interpregnancy interval is defined as the duration of months between the birth of the index child and the subsequent pregnancy (67).

Short interpregnancy interval: denotes to an interpregnancy interval of <24 months between current pregnancy and the preceding live birth to the mother(15).

Index child: is a child who delivered subsequently before the last birth.

Recommended (Optimal) interpregnancy interval: it denotes to 24–60 months pregnancy interval, between the pregnancy of the child under study and the immediately preceding live and surviving birth to the mother(15).

Adverse neonatal outcomes*:* in this study implies the presence of at least one or more of the following conditions in the current pregnancy. These include APGAR score less than 7, still birth, NICU admission, low birth weight, congenital anomaly, and preterm birth. Thus, if the mothers admitted to the labour ward gave birth to a baby with such conditions these were labeled as "mothers with neonatal adverse birth outcome". Those who gave normal live birth, without the above mentioned abnormal birth outcome, were labeled as "mothers with normal pregnancy outcome"(68).

Definition of terms

***Gestational Age (GA)*:** is the best estimate of GA based on last normal menstrual period, obstetric history and examination, prenatal ultrasound or from early postnatal physical examination.

Preterm birth- delivery before 37 completed weeks of gestation.

Low birth weight- birth weight of <2500gm

Macrosomia*:* Macrosomia is defined as birth-weight over 4000 g irrespective of gestational age.

Still birth: death of fetus after initiation of labor with no sign of life at birth after 28 weeks of gestation from Last Normal Menstrual Period (LNMP).

Immediate neonatal death: death of newborn within 24 hours of birth.

Gross congenital anomaly: is a term which include major defects on the newborn in which the neonate gets difficulty to survive.

APGAR*:* A method of determining an infant's condition at birth by screening heart rate, respiratory effort, muscle tone, reflex irritability and color. It is taken as an adverse outcome when it becomes< 7 at first and fifth minutes of life.

4.8. Data collection tool and procedures:

Questionnaire was designed to meet the objective of this study and the study was based on interviewer administered questionnaire and chart review. The questionnaire was pretested on 5% (25) of the calculated sample size in durbete hospital. First, the English version of the questionnaire was prepared. Then it was translated to Amharic and Awingi version (local languages) and then translated back to English to check its consistency. The questionnaire has three parts. The first include socio-demographic information such as age, educational level, and occupation, place of residence (urban and rural), the second part deal with maternal characteristics and the third neonatal outcome. By reviewing their chart sex of their infant, duration of their labor pain, mode of delivery, obstetric U/S estimate of their GA, APGAR score, birth weight of the newborn, were taken from their chart. Then in the postnatal ward just before their discharge mothers were interviewed.

4.9. Data Processing, Analysis and Interpretation

The collected data were entered and cleaned using Epi data version 3.1, then exported to SPSS version 23 for analysis. Descriptive analysis was conducted to summarize the data and the final result of the study was interpreted in the form of text, figures and tables. Binary logistic regression analysis was executed to see the association between independent and dependent variables. All explanatory variables with $p<0.2$ in bivariable logistic regression were entered into multivariable logistic regression analysis and significant association was identified based on $p<0.05$ and odds ratio with 95% CI in multivariable logistic regression. The final model fitness was checked using Hosmer-Lemeshow Goodness of Fit test ($p =0.519$). Separate analysis was also done for mothers with both short and recommended IPI.

4.10 Data quality and control:

Eight diploma midwives and two degree midwives were recruited for data collection and supervisor respectively. Training focusing on understanding the research question, sampling technique, data handling, ethical conduct, and quality of data collection was given for two days. Each questionnaire was reviewed daily by the supervisors and the principal investigator to check for its completeness.

4.11 Ethical Consideration.

After approval, ethical clearance was obtained from Institutional Review Board (IRB) of College of Medicine and Health sciences, Bahir Dar University. Then, official letter was written from College of Medicine and Health Sciences to each Awi zone public hospitals. The aim of the study was informed for each study participant, and the study participants had a right to refuse or discontinue participating in the research without any restriction. Finally informed written consent was obtained from each participant before data collection and confidentiality was assured.

4.12 Dissemination Plan

The findings of this study will be communicated to College of Medicine and Health Sciences, Bahir Dar University, Amhara region Health Bureau and Awi zone Health Office. The findings from this study will also be presented in various seminars/workshops and publication will be considered in scientifically reputable journals.

5. Results

5.1. Socio-demographic characteristics of participants

Among the total of 482 mothers, 475 mothers were participated in the study which makes response rate of 98.5%. Regarding IPI, 237 (49.9%) were mothers with short IPI and 238 (50.1%) were mothers with recommended IPI. The highest proportion, 88(37.1%) short IPI mothers and 100 (42%) recommended IPI mothers were in the age group of 25-29 years. The mean age of the mother was 30.95(SD ±5.46) among mothers with short IPI and 30.75 (SD ±4.6) among those mothers with recommended IPI. Almost all 227(95.8%) of mothers with short IPI and 237(99.6%) mothers with recommended IPI were married. More than half 133(56.1%) of mothers with short IPI and 129(54.2%) recommended IPI mothers were urban residents. Regarding the educational status of mothers, 84(35.4%) of mothers with short IPI and 103(43.3%) of mothers with recommended IPI didn't attended formal education. Concerning educational status of the husbands, 84(36.8%) husbands of mothers with short IPI and 94(39.5%) husbands of mothers with recommended IPI didn't attend formal education (**table 3**).

Table 2: sociodemographic characteristics of mothers with short and recommended IPI in Awi zone public hospitals, Northwest Ethiopia, 2020

Variable	Adverse neonatal outcome		
	Short IPI (n=237)	Recommended IPI (n=238)	Total
Age			
20-24	22 (9.3%)	10 (4.2%)	32 (6.7%)
25-29	88 (37.2%)	100 (42%)	188 (39.5%)
30-34	64 (27%)	71 (29.8%)	135 (28.4%)
35 and above	63 (26.6%)	57 (24%)	120 (25.3%)
Marital status			
Married	227 (95.8%)	237 (100%)	464 (97.7%)
Unmarried*	10 (4.2%)	1 (0.5%)	11 (2.3%)
Religion			
Orthodox	173 (73%)	119 (92.4%)	392 (82.55)
Muslim	54 (22.8%)	16 (6.7%)	70 (14.7%)
Protestant	10 (4.2%)	3 (1.2%)	13 (2.7%)
Educational status of the mother			
No formal education	84 (35.4%)	103 (43.2%)	187 (39.4%)
Primary	81 (34.1%)	75 (31.5%)	156 (32.8%)
Secondary and above	72 (30.4%)	60 (25.1%)	132 (27.8%)
Occupation of the mother			
Farmer	77 (32.4%)	97 (86.1%)	174 (36.6%)
House wife	113 (47.7%)	87 (73.7%)	200 (42.1%)
Governmental employee	37 (15.6%)	36 (27.8%)	73 (15.4%)
Merchant	10 (4%)	18 (7.6%)	28 (5.9%)
Husbands educational status			
No formal education	77 (32.4%)	91 (38.2%)	168 (35.4%)
Primary	58 (24.5%)	62 (26.1%)	120 (25.3%)
Secondary and above	96 (40.1%)	74 (31.1%)	160 (33.7%)
Residence			
Rural	104 (43.9%)	109 (45.8%)	213 (44.8%)
Urban	133 (56.1%)	129 (54.2%)	262 (53.2%)
Husband occupation			
Farmer	102 (43%)	102 (42.8%)	204 (42.9%)
Daily labourer	20 (8.4%)	12 (5%)	32 (6.7%)
Government employee	70 (29.5%)	64 (27%)	134 (28.2%)
Merchant	52 (17.7%)	57 (24.2%)	64 (20.8%)

*single, widowed, divorced

5.2. Obstetric characteristics of women with short and recommended IPI

The current pregnancy was wanted and supported in 196(82.7%) and 217(91.2%) of mothers with short and recommended IPI respectively. In more than three fourth 202(85.2%) and 186(78.2%) of mothers with short and recommended IPI respectively the presentation of the fetus was vertex. In almost all, 225(94.9%) and 225(94.9%) of mothers with short and recommended IPI respectively, the current pregnancy was completed at term GA. Labor started spontaneously in 231(97.1%) of mothers with short IPI and 220(92.4%) of mothers with recommended IPI. Nearly all, 236(99.6%) and 234(98.3%) of mothers with short and recommended IPI respectively had ANC follow up and 29(12.2%) of mothers from short IPI group and 28(11.8%) from short IPI group and 33(13.9%) of those mothers from recommended IPI group started ANC late.

During their current pregnancy 6(2.5%) mothers with short IPI and 14(5.9%) of those mothers with recommended IPI faced obstetric complication. It was hypertensive disorder which accounts more 5(83.3%) and 12(85.7%) among short and recommended IPI mothers respectively. The overall proportion of ROM was 67(14.1%) and was prolonged in 26(38.8%) of cases. The mean duration of ROM was 7.66 (SD±5.09). In 31(6.5%) of cases duration of labor took 12hr and above, while the mean duration of labor was 6.48(SD±2.48) (**table 4**).

Table 3: obstetric characteristics of mothers with short and recommended IPI in Awi zone public hospitals, Northwest Ethiopia, 2020.

Variable	Adverse neonatal outcome				
	Short IPI (n=237)		Recommended IPI (n=238)		Total
	Yes (%)	No (%)	Yes (%)	No (%)	
Gravidity					
2-5	54 (22.8%)	102 (43.0%)	38 (16%)	133 (55.9%)	327 (68.8%)
5 and above	34 (14.3%)	47 (19.8%)	11 (4.6%)	56 (23.5%)	148 (31.2%)
Parity					
2-5	55 (23.2%)	112 (47.3%)	37 (15.5%)	142 (59.4%)	346 (72.8%)
5 and above	33 (13.9%)	37 (15.6%)	12 (5%)	47 (19.7%)	129 (27.2%)
Pregnancy status					
Intended	67 (28.3%)	129 (54.4%)	41 (17.2%)	184 (77.3%)	421 (88.6%)
Unintended	21 (8.95)	20 (8.4%)	8 (3.4%)	5 (2.1%)	54 (11.4%)
Number of ANC visit					
Four and above	68 (28.7%)	105 (44.3%)	30 (12.6%)	140 (58.8%)	343 (72.2%)
Less than four	20 (8.4%)	44 (18.6%)	19 (8%)	49 (20.6%)	112 (27.8%)
Tetanus Toxoid (TT) vaccinated					
Yes	85 (35.9%)	147(62%)	14 (5.9%)	220 (92.4%)	466 (98.2%)
No	3 (1.3%)	2 (0.8%)	0 (0 %)	4 (1.7%)	9 (1.8%)
RH status					
Positive	77 (32.5%)	138 (58.2%)	40 (16.8%)	169 (71.0%)	424 (89.2%)
Negative	11 (4.6%)	11 (4.6%)	9 (3.8%)	20 (8.4%)	51 (10.8%)
Complication during pregnancy					
No	84 (35.4%)	147 (62%)	40 (16.8%)	184 (77.3%)	455 (95.8%)
Yes	4 (1.75%)	2 (0.8%)	9 (3.8%)	5 (2.1%)	20 (4.2%)
ROM					
Yes	21 (8.9%)	12 (5.1%)	18 (7.6%)	16 (6.7%)	67 (14.2%)
No	67 (28.3%)	137 (57.8%)	31 (13.0%)	173 (72.7%)	408 (85.8%)
Duration of ROM					
Less than 8hr	1 (3%)	19 (57.5%)	10 (29.4%)	12 (35.3%)	42 (62.6%)
8hr and above	2 (6%)	11 (33.33%)	5 (14.7%)	7 (20.6%)	25 (37.3%)
Mode of delivery					
Vaginal	75 (31.6)	140 (59.1%)	41(17.2%)	175 (73.9%)	431 (90.7%)
C/S	13 (5.5%)	9 (3.7%)	8 (3.4%)	13 (5.5%)	43 (9.3%)

5.3. Maternal lifestyle and infant related factors

According to this study 75% of mothers with short IPI and 68.1% of mothers with recommended IPI were reported to have meal four or more times per day. All mothers were free from substance abuse like chat chewing or cigarate smoking. From this study it is also found that 142 (59.9%) of mothers with short IPI and 131 (55%) of recommended IPI gave birth of a female neonate.

5.4. Overall proportion of adverse neonatal outcomes

The overall proportion of adverse neonatal outcome was 137 (28.8%), (95% CI, 24.84-32.84,). The overall proportion of stillbirth was found to be 20 (4.2%). Whereas the overall proportion of LBW was 50(10.5%). Similarly the overall proportion of APGAR score less than 7 was 110 (23.1%) and 24(5.1%) at 1st and 5th minute respectively. Regarding the prematurity status, overall there were 19 (4%). Lastly, the overall proportion of lethal congenital anomaly was 6(1.3%).

5.5. Proportion of adverse neonatal outcomes in mothers with short IPI

The overall proportion of adverse neonatal outcomes among mothers with short IPI was 88 (37%), (95%CI= 30.9, 43.3) (**fig-3).**

5.6. Proportion of adverse neonatal outcome among mothers with recommended IPI

The overall proportion of adverse neonatal outcomes among recommended IPI groups was 49(20.6%), (95%CI=15.6, 26.03) **(fig-3).**

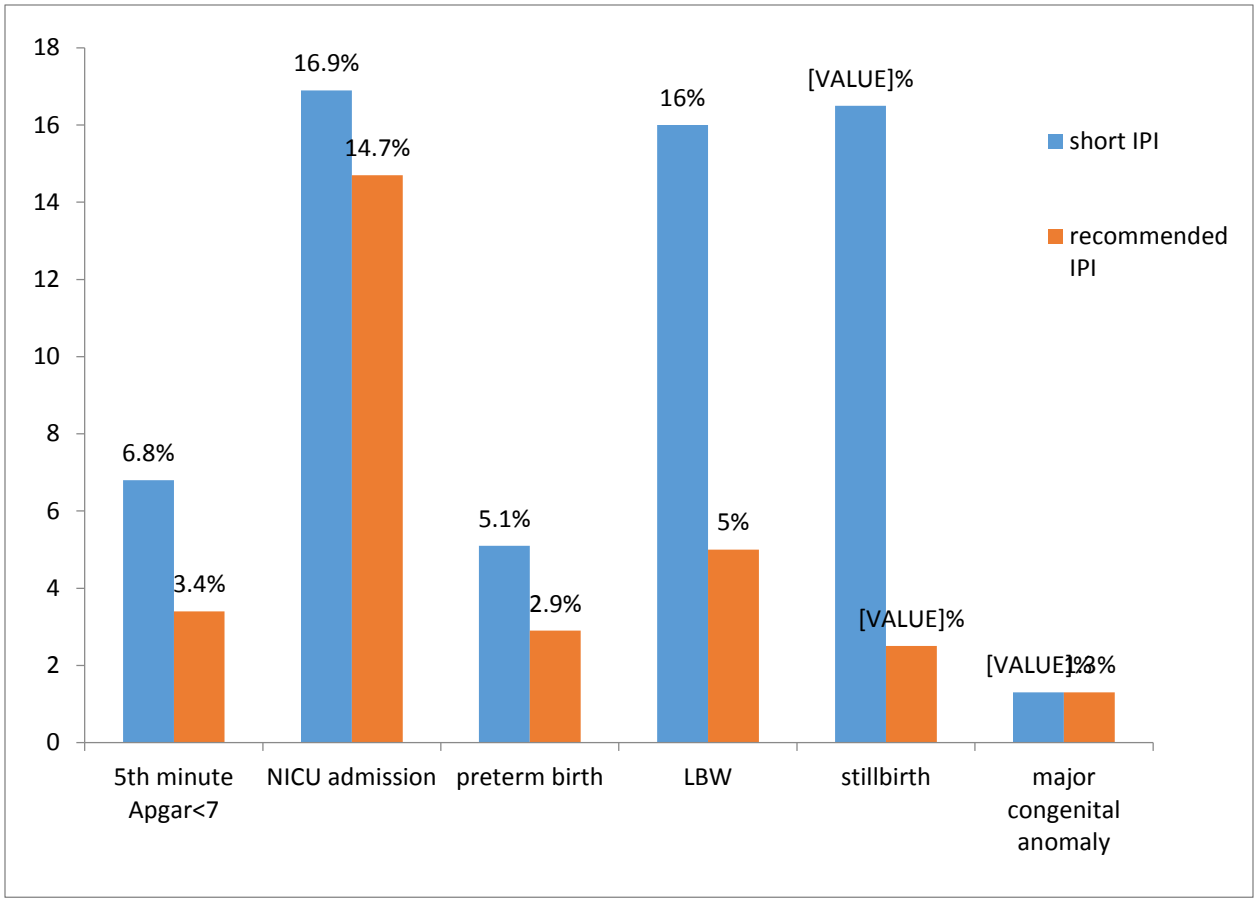

Figure 3: distribution of adverse neonatal outcomes among mothers with short and recommended IPI in Awi zone public hospitals, Northwest Ethiopia, 2020.

5.7. Factors associated with adverse neonatal outcomes among mothers with short IPI

Three models were fitted to assess factors in relation to adverse neonatal outcomes. The first model was fitted to identify factors associated with adverse neonatal outcomes among mothers with short IPI. Variables such as residence and mode of delivery were found to have significant association with adverse neonatal outcomes. The odds of Mothers from rural area to develop adverse neonatal outcomes were 6.9 times (AOR=6.9, 95%CI=3.32, 14.59) higher than those mothers from urban area. Mothers who deliver through C/S were 3.21 times (AOR=3.21, 95%CI=1.08, 9.50) more likely to have babies with adverse neonatal outcomes than their counterparts (**table 6**).

Table 4: multivariable analysis of adverse neonatal outcomes among mothers with short IPI in Awi zone public hospitals, Northwest Ethiopia, 2020

Variables	Adverse neonatal outcomes				
	Yes	No	COR95%CI	AOR95%CI	p-value
Age group					
20-24	8 (3.4%)	14 (5.9%)	0.7 (0.27, 2.02)	1.53 (0.41,5.71)	0.525
25-29	31 (13.1%)	56 (23.6)	0.72 (0.37,1.39)	2.02 (0.8,5.07)	0.132
30-34	20 (8.4%)	41 (17.3%)	0.64 (0.3,1.31)	1.0 (0.41,2.44)	0.988
35 and above	29 (12.2%)	38 (16.0%)	1	1	
Residence					
Rural	**61 (25.7%)**	**45 (19%)**	**5.22 (3.01,13.6)**	**6.9 (3.32,14.59)**	**<0.001**
Urban	**27 (11.4%)**	**104 (43.9%)**	**1**	**1**	
Educational status of the mother					
No formal education	42 (17.7%)	42 (17.7%)	1.25 (0.53,1.93)		0.965
Primary	29 (12.2%)	52 (21.9%)	0.69 (0.45, 1.70)		0.700
Secondary and above	32 (12.7%)	40 (16.5%)	1		
Sex of new born					
Male	64 (13.5%)	138 (29.1%)	1.27 (0.5, 1.18)	1.18 (0.62,1.26)	0.598
female	73 (15.4%)	200 (42.1%)	1	1	
ANC					
Less than 4	20 (8.4%)	44 (18.6%)	0.7 (0.63,2.13)	1.2 (0.55,2.90)	0.563
4 and above	68 (28.7%)	105 (44.3%)	1	1	
RH status of the mother					
negative	11 (4.6%)	11 (4.6%)	1.79 (0.7, 4.3)	2.84 (0.94,8.58)	0.064
Positive	77 (32.5%)	138 (58.2%)	1	1	
Complication during pregnancy					
Yes	5 (1.1%)	15 (3.2%)	0.76 (0.51,9.9)	1.98 (0.24,14.01)	0.520
No	139 (29.3%)	316 (66.5%)	1	1	
ROM					
Yes	21 (8.9%)	12 (5.1%)	3.5 (1.61,7.70)	2.22 (0.89,5.56)	0.087
No	67 (28.35)	137 (57.8%)	1	1	
Mode of delivery					
C/S	**9 (3.8%)**	**13 (5.5%)**	**1.29 (1.13,5.42)**	**3.21 (1.08,9.50)**	**0.035**
Vaginal delivery	**75 (31.6%)**	**140 (59.1%)**	**1**	**1**	
Pregnancy status					
Un intended	21 (8.9%)	20 (8.4%)	2.02 (1.13,4.48)	1.68 (0.75,3.78)	0.206
Intended	67 (28.3%))	129 (54.4%)	1	1	

5.8. Factors associated with adverse neonatal outcomes among mothers with recommended IPI

The second model was fitted to assess factors associated with adverse neonatal outcomes among mothers with recommended IPI. Variables like residence, pregnancy status, presence of ROM before labor and labor status were found to have a significant association with adverse neonatal outcomes among mothers with recommended IPI. The odds of delivering babies with adverse neonatal outcome among rural mothers was 6.1 times (AOR=6.1, 95%CI=2.11, 17.7) higher than their counterparts. The odds of delivering babies with adverse outcome among mothers whose pregnancy was unintended was found to be 5.3 times (AOR=5.3, 95%CI=1.11, 25.00) higher than their counterparts. Similarly mothers who had induction of labor were 13.4 times (AOR=13.4, 95%CI=3.17, 21.77**)** more likely to deliver babies with adverse neonatal outcomes than those whose labor start spontanously. The odds of having babies with adverse neonatal outcomes in mothers who had ROM before labor was 6.89 times (AOR=6.89, 95%CI=2.54) higher than their counterparts (**table 7**).

Table 5: distribution of adverse neonatal outcomes among women with recommended IPI in Awi zone public hospitals, Northwest Ethiopia, 2020.

Variables	Adverse neonatal outcomes				
	Yes	No	COR 95%CI	AOR 95%CI	p-value
Age group					
20-24	4 (1.7%)	6 (2.5%)	1.76 (0.44,7.03)	1.02 (0.13,8.09)	0.980
25-29	21 (8.8%)	77 (32.4%)	0.72 (0.34,1.51)	0.61 (0.18,1.99)	0.607
30-34	7 (2.9%)	61 (18.9%)	0.3 (0.11,0.99)	0.32 (0.08,1.20)	0.093
35 and above	17 (7.1%)	45 (18.9%)	1	1	
Residence					
Rural	**33 (13.9%)**	**75 (31.5%)**	**3.13 (1.68,16.2)**	**6.1 (2.11,17.7)**	**<0.001**
Urban	**16 (6.7%)**	**114 (47.9%)**	**1**	**1**	
Educational status of the mother					
No formal education	42 (17.7%)	42 (17.7%)	1.25 (0.73,3.93)		0.217
Primary	29 (12.2%)	52 (21.9%)	0.69 (0.18,4.05)		0.262
Secondary and above	32 (13.5%)	40 (16.5%)	1		
Occupational status of participant					
House wife	19 (8%)	71 (29.8%)	1		
Farmer	22 (9.2%)	73 (30.7%)	1.12 (0.56,2.25)		0.738
Governmental employee	6 (2.5%)	29 (12.2%)	0.77 (0.28,2.13)		0.619
Merchant	2 (0.8%)	16 (6.7%)	0.46 (0.09,2.21)		0.337
Sex of new born					
Male	24 (10.1%)	83 (34.9%)	1.22 (0.43,2.39)	1.14 (0.50,2.57)	0.75
Female	25 (10.5%)	106 (44.5%)	1	1	
ANC					
Less than 4	19 (8.0%)	49 (20.6%)	1.81 (0.71,4.2)	1.53 (0.63,3.70)	0.592
4 and above	30 (12.6%)	140 (58.8%)	1	1	
RH status of the mother					
Negative	9 (3.8%)	20 (8.4%)	1.8 (0.81,4.48)	1.43 (0.47,4.39)	0.904
Positive	40 (16.8%)	169 (71%)	1	1	
ROM					
Yes	**18 (7.6%)**	**16 (6.7%)**	**6.27 (2.3,17.8)**	**6.89 (2.54,18.6)**	**<0.001**
No	**31 (13.0%)**	**173 (72.7%)**	**1**	**1**	
Labor status					
Induced	**12 (5%)**	**6 (2.5%)**	**10 (3.4,22.0)**	**13.4 (3.17,21.77)**	**<0.001**
Spontaneous	**37 (15.5%)**	**183 (76.9%)**	**1**	**1**	
Mode of delivery					
C/S	8 (3.4%)	13 (5.5%)	2.6 (0.78,8.89)	2.96 (0.917,9.56)	0.070
Vaginal delivery	41 (17.2%)	176 (73.9%)	1	1	
Pregnancy status					
Un intended	**8 (3.4%)**	**5 (2.1%)**	**7.1 (1.02,24.1)**	**5.3 (1.11,25.00)**	**0.032**
Intended	**41 (17.2%))**	**184 (77.3%)**	**1**	**1**	

5.9. Factors associated adverse neonatal outcomes among mothers with short and recommended IPI

A full model was developed to assess factors associated with adverse neonatal outcomes among mothers with short and recommended IPI. In this model variables like residence, IPI, presence of ROM, labor status and mode of delivery were found to be significantly associated with adverse neonatal outcomes regardless of the IPI. Mothers with IPI of less than 24 month were 3.39 times **(**AOR= 3.39, 95%CI=2.02, 5.7**)** more likely to develop adverse neonatal outcome than their counter parts. Rural resident mothers were 6.3 times (AOR=6.3, 95%CI=3.52) more likely to gave birth of newborn with adverse neonatal outcome compared to mothers from the urban residency. Similarly mothers with ROM were also found to be 6.2 times (AOR=6.2, 95%CI=3.01, 12.8) more likely to deliver newborn with adverse neonatal outcomes than their counterparts. In this study, Mothers who had induction of labor were 3.88 times (AOR=3.88, 95%CI=1.14, 10.71) more likely to deliver newborn with adverse neonatal outcome as compared to their counterparts. Mothers who gave birth through C/S were 2.4 times (AOR=2.4, 95%CI=1.17, 5.2) more likely to have adverse neonatal outcomes than those with vaginal deliveries (**table 8**).

Table 6: multivariable analysis of adverse neonatal outcomes for mothers with both short and recommended IPI, in Awi zone public hospitals, Northwest Ethiopia, 2020.

Variables	Adverse neonatal outcomes				
	Yes	No	COR95%CI	AOR95%CI	p-value
Age group					
20-24	12 (2.5%)	20 (4.2%)	1.08 (0.2,3.02)	1.1 (0.37,3.2)	0.324
25-29	52 (10.9%)	133 (28.0)	0.7 (0.30,2.18)	1.05 (0.52,2.13)	0.89
30-34	27 (5.7%)	102 (21.3%)	0.47 (0.15,1.13)	0.6 (0.29,1.21)	0.399
35 and above	46 (9.7%)	83 (17.5%)	1	1	
Residence					
Rural	**94 (25.3%)**	**120 (25.3%)**	**4 (3.3,10.72)**	**6.3 (3.52,11.6)**	**<0.001**
Urban	**43 (9.1%)**	**218 (45.9%)**	**1**	**1**	
IPI					
Short IPI	**88 (18.5%)**	**149 (31.4%)**	**2.27 (1.8,4.01)**	**3.39 (2.02,5.7)**	**<0.001**
Recommended IPI	**49 (10.3%)**	**189 (39.8%)**	**1**	**1**	
Sex of new born					
Male	64 (13.5%)	138 (29.1%)	1.27 (0.15,1.88)	1.01 (0.59,1.53)	0.948
Female	73 (15.4%)	200 (42.1%)	1	1	
Parity					
5 and above	98 (20.6%)	84 (17.7%)	3.2 (0.59,5.8)	2.1 (0.75,6.06)	0.74
2-5	92 (19.4%)	254 (53.5%)	1	1	
ANC					
Less than 4	39 (8.2%)	93 (19.6%)	1.04 (0.37,1.36)		0.968
4 and above	98 (20.6%)	245 (51.6%)	1		
ROM					
Yes	**45 (9.5%)**	**22 (4.6%)**	**5.60 (3.22,9.77)**	**6.2(3.01, 12.8)**	**<0.001**
No	**109 (22.9%)**	**299 (62.9%)**	**1**	**1**	
Mode of delivery					
C/S	**21 (4.4%)**	**22 (4.6%)**	**2.6 (1.13,5.42)**	**2.4 (1.17,5.2)**	**0.025**
Vaginal delivery	**116 (24.4%)**	**316 (66.5%)**	**1**	**1**	
Labor status					
Induced	**14 (2.9%)**	**10 (2.1%)**	**3.72 (1.61,8.62)**	**3.88 (1.14,10.71)**	**0.009**
Spontaneous	**123 (25.9%)**	**328 (69.1%)**	**1**	**1**	
Pregnancy status					
Un intended	29 (6.1%)	25 (5.3%)	3.3 (1.8,5.58)	1.93(0.93,3.89)	0.078
Intended	108 (22.7%)	313 (65.9%)	1	1	
RH status of the mother					
Positive	20 (4.2%)	31 (6.5%)	1.69 (0.92,3.088)	1.86 (0.88,3.95)	0.103
Negative	117 (24.6%)	307 (64.6%)	1	1	

6. Discussion

The overall proportion of adverse neonatal outcome in this study was 28.8%. This result was found to be consistent with studies done in East Gojjam (41) and North Wollo (54), 31.7% and 31.8% respectively. Whereas the overall prevalence in this study was found to be higher than a study from Gondar specialized teaching hospital, 23%(69). It is also found to be higher than 19.0% report by study from Ghana(70). This might be because the study of Gondar specialized teaching hospital estimate proportions only for stillbirth, preterm birth and LBW, they didn't include other adverse outcomes like APGAR score <7, NICU admission nor major congenital anomalies.

Similarly for each comparative groups the proportion of adverse neonatal outcomes was found to be 37% and 20.6% among short and recommended IPI respectively. This result was higher for short IPI groups and lower for recommended IPI than a report from southern Ethiopia hospitals 46.2% and 5.8% respectively(71). This difference might be due to difference in study design or population. Whereas this finding was consistent with a study done in Dharan(36).

Waiting at least 24 months before trying to become pregnant after a live birth is highly recommended as it helps to avoid the risk of developing poor neonatal and infant health outcome(15). The finding of this study also supports this recommendation, rates of adverse neonatal outcomes were found to have a significant association with short IPI.

This result is also supported by a case-control study from northwest Ethiopia(45) and another cohort study from southern Ethiopia(72). This finding was also consistent with a case control study from Sudan(39) and Qatar (73), which showed short IPI to have significantly higher association with adverse neonatal outcomes than recommended IPI groups. This is primarily related to micro-nutrient depletion and in adequate recovery from the previous pregnancy complications that might lead to maternal and neonatal complications in the subsequent pregnancy. Whereas this result was found to be inconsistent with a retrospective cohort study from turkey(38) which showed short IPI to have no significant association with adverse neonatal outcomes. This might be due to difference in study population.

This study also revealed that, unintended pregnancy status was significantly associated with adverse neonatal outcomes among mothers with short IPI. This result was consistent with a study done in southern Ethiopia that showed unintended pregnancy status to be associated with risk of adverse neonatal outcomes(57). This is because those mothers with unintended

pregnancy status are less likely to seek care from health institutions(74, 75), which might alter maternal use of antenatal care services, subsequent poor labor and delivery care and in adequate neonatal care.

Maternal residence was found significantly associated with adverse neonatal outcomes. In this study rural residents were found more likely to have adverse neonatal outcome than urban residents. This finding was consistent with a report from NigstEeleni hospital in hosanna(49), North Wollo(76), Gamo Gofa(65) and Mekelle(56) which also showed rural residents to have significantly higher risk of developing adverse neonatal outcomes. This might be due to distance naturally prevents mothers from doing so even if they are knowledgeable of the benefits of antenatal care services but deprives them the opportunity for early identification and management of pregnancy related problems and may further influence their choice of place of delivery and also lack some health services on time.

According to this study, presence of premature ROM was also significantly associated with risk of having babies with adverse neonatal outcome. This study was found to be consistent with a study from Gambia, which reported higher risk of developing adverse neonatal outcomes among women who had premature ROM(77). Similarly this result was also consistent with a study from southern Ethiopia, which reported premature ROM to have a significant effect on adverse neonatal outcomes(78). This may be because of the risk of developing infection when the duration of rupture prolongs and a subsequent neonatal sepsis that may alter neonates APGAR score and may also need NICU admission.

Induction of labor was found to have a statistically significant effect on adverse neonatal outcomes in both short and recommended IPI mothers. This result was consistent with a study from suhul shire(66). This might be due to the risk of subsequent fetal distress after labor establishment through induction.

This study also showed that, C/S delivery was associated with higher risk of having adverse neonatal outcomes than vaginal delivery. This result was consistent with study from low and middle income countries(79) and Brazil (80), that showed delivery through C/S to be associated with adverse neonatal outcomes. This might be due to the fact that mothers for whom C/S done would have fetal distress during labor as an indication for C/S and this subsequently affects the neonatal condition.

7. Limitation of the study

As far as our knowledge, this is the first comparative study done on adverse neonatal outcomes of short and recommended pregnancy outcomes in Ethiopia, which could be taken as strength of this study.

Cross-sectional nature of this study limits to set a causal-effect relationship between dependent and independent variables. Selection bias might be also the limitation of the study.

Mothers who deliver in health centers in Awi zone were not included, due to the lack of some relevant activities such as obstetric ultrasound, to estimate the GA and absence of NICU.

8. Conclusion

There was significant difference in proportion of adverse neonatal outcomes among short and recommended IPI mothers, 37.1% and 20.6% respectively. Urban residency and vaginal delivery were significantly associated with less risk of adverse neonatal outcomes among mothers in the short IPI groups. Whereas urban residency, intended pregnancy status, spontaneous labor initiation and absence of ROM before labor were reported as a protective for adverse neonatal outcomes in recommended IPI mothers. Provision of proper health service coverage at rural area and minimizing C/S rate to reduce adverse neonatal outcome is highly recommended.

9. Recommendation

For health professionals

Special Focus to neonates born through C/S to reduce adverse neonatal outcomes is needed. Further efforts needed in counseling mothers on danger signs of pregnancy including Premature ROM.

For Awi zone health bureau

Community based strategies to promote and improve neonatal health should targeting on enhancing intended pregnancy status and so that creating awareness especially to those who reside in rural area.

For researchers

Other longitudinal and observational study approach is recommended for further investigations to evaluate the effect of Interpregnancy Interval on adverse neonatal outcomes.

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Annexes

Annex I: Participants Information sheet (English version)

Good morning/ afternoon?

My name is----------. Currently I am a post graduate student at Bahirdar University, College of medicine and Health Sciences, School of health sciences, Department of midwifery. And now I am conducting a research to assess adverse neonatal outcomes and its associated factors among mothers with short and recommended interpregnancy interval in Awi zone public hospitals.

Objective: to identify and compare adverse neonatal outcomes of short and recommended interpregnancy intervals.

Period: the research is conducted from February 1

5th to April 15th.

Advantage: there is no payment for your participation on the research. It only relies on your willingness to participate and this research helps to reduce neonatal morbidity and mortality by identifying problems related to interpregnancy intervals and by recommending appropriate measures to be taken.

Confidentiality: 1st your name will not be mentioned and also your response for this interview will be kept confidential.

Annex II: Consent form (English version)

Bahir Dar University

College of medicine and Health Sciences

School of Public Health

Department of Reproductive Health

I here with declare that:

- ✓ The objectives of this study are explained to me and are clear.
- ✓ The contents of the consent are verified to me to participate in the study.

I understand that participation in this study is completely voluntary and that I may withdraw at any time without supplying reasons. I agree to participate in this study to be interviewed, provided my privacy is guaranteed. When signing this consent form to participate in the study, I promise to answer honestly to all reasonable questions and not provide any false information or in any other way purposely mislead the researcher.

Signature of the participant _____ date _____

Signature of the investigator _____ date _____

Annex III: English version questionnaire

Part-I socio demographic data collection questionnaire

Ser. No	Questions	Answers	Code	Skip to
1	How old are you?			
2	Marital status?	Married single widowed divorced	1 2 3 4	
3	What is your religion?	Orthodox Muslim Others	1 2 3	
4	Ethnicity	Amhara Oromo Tigre Others	1 2 3 4	
5	Educational status	Not attending formal education Primary (1-8) Secondary (9-12) College and above	1 2 3 4	
6	What is your occupation?	Farmer Employ House wife Merchant	1 2 3 4	
7	Residence	Rural Urban	1 0	
8	Husband's educational level?	Not attending formal education Primary (1-8) Secondary (9-12) College and above	1 2 3 4	
9	What is your husband's occupation?	Farmer Daily laborer Employ Merchant	1 2 3 4	
Part-II obstetric and pregnancy interval data collection questionnaire				
101.	How many times you get pregnant?	Once More than once	1… 2	Skip to-107
102.	Do you have any history of abortion?	Yes No	1 0	
103.	Do you have any live born?	Yes No	1 0…	Skip to-108
104.	How many live births you had?			
105.	Was your index child born alive?	Yes No	1 0…	Skip to 109
106.	What was mode of delivery for the index?	C/s SVD instrumental	1 2 3	
107.	What was Your age when u gave birth of the index child?			
108.	Was your index child born preterm?	Yes No	1 0	
109.	Was it low birth weight?	Yes No	1 0	
110.	How long did you breast feed?			
111.	Have you ever used family	Yes	1....	

	planning method after your index child?	No	0	
112.	Was the current pregnancy planned?	Yes No	1…. 0	Skip to 114
113.	Why not you use birth control method?	Thought I don't get pregnant Husband don't allow to use Side effect of the method Method failure	1 2 3 4	
114.	Do you know your LNMP?	Yes No	1 0	
115.	What is your GA?			
116.	How old is your index child?			
117.	How long is the interpregnancy interval?			
118.	Did you have ANC follow up?	Yes No	1 0….	Skip to-120
119.	At what month did you start?			
120.	Did you take TT vaccine?	Yes No	1 0…	Skip to-117
121.	How many times?			
122.	Were you supplemented with Fefol?	Yes No	1 0	
123.	Had you taken it all?	Yes No	1…. 0	12
124.	Why not?	Not comfortable I thought has no benefit	1 0	
125.	How many meals per day you used to eat?			
126.	How many ANC visits?			
127.	Any complication during this pregnancy?	Yes No	1 0	
128.	What complication?	PIH Anemia Gestational DM APH Others	1 2 3 4 5	
129.	Did you smoke cigarate while pregnant?	Yes No	1 0	
130.	How many packet per day?			
131.	Did you chew khat?	Yes No	1 0	
132.	Does labor start spontaneously?	Yes No	1 0	
133.	How long the labor stays?			
134.	Was the membrane rupture before labor?	Yes No	1 0	
135.	For how long membrane ruptures?			
136.	Was there meconium?	Yes No	1 0	
137.	Meconium grade?	Grade 1 Grade 2 Grade 3	1 2 3	
138.	Fetal presentation?	Vertex Face Brow shoulder Breech	1 2 3 4 5	

139.	Mode of delivery?	SVD C/S	1.... 2	147
140.	What was the indication for c/s?	Obstructed labor NRFHRP Malpresentation Previous c/s scar Others	1 2 3 4 5	
141.	Professional who conduct delivery	Midwife Nurse HO and above	1 2 3	
Part III: Questions related to neonatal outcome				
201.	Sex of newborn.	Male Female	1 0	
202.	Was it born alive?	Yes No	1 0	Skip to 204
203.	What was the APGAR @ 1st mint?			
204.	APGAR at 5th minute?			
205.	Condition of baby at discharge?	Health Dead	1 0	
206.	If dead what was the cause?	Asphyxia sepsis prematurity others	1 2 3 4	
207.	Any gross anomaly?	Yes No	1 0	
208.	Which one?	Spinal bifida Hydrocephalus Anencephaly	1 2 3	
209.	What was the weight?	….		
210.	NICU admitted?	Yes No	1 0	
211.	Reason for admission?	Asphyxia Sepsis Prematurity Others	1 2 3 4	

Annex IV: የተሳታፊዎች መረጃ መስጫ ቅጽ-በአማርኛ

እንደምን ዋሉ/አደሩ?

መግቢያ : እኔ መ/ር ጀምበሩ ጫኔ በአዊ ዞን በሚገኙ ሆስፒታሎች ላይ አጭር የርግዝና መራራቅና በጨቅላ ህጻን ላይ የሚያስከትለው ጉዳት በሚል ርዕስ የሚያሰራው ጥናት መረጃ አሰባሳቢ ነኝ። የባለፈው ርግዝናቸው በሃምት በተ ለደ ልጅ የተጠናቀቀ እናቶች እና የርግዝና መራራቁ ከ 5 አመት በታች የሆኑ እናቶች በጥናቱ ይሳተፋሉ ።

ርዕስ : አጭር የርግዝና መራራቅና በጨቅላ ህጻን ላይ የሚያስከትላቸው ችግሮች

ዓላማ : በአጭርና ጥሩ በሚባለው የርግዝና መራራቅ መካከል በጨቅላ ህጻናት ላይ የሚከሰቱ ችግሮችን መለየትና ማወዳደር

ጠቀሜታ : በዚህ ጥናት ላይ በመሳተፍዎ የሚያገኙት የተለየ ጥቅም አይኖርም።

ጉዳት : እንዲሁም የሚደርስብዎት ምንም አይነት ጉዳት አይኖርም።

ሚስጥራዊነት : በመጀመርያ ደረጃ ስምዎት አይጠቀስም በተጨማሪም ምላሽዎት በምስጢር የሚያዝ ይሆናል።

በሙሉ ፈቃደኝነት እንዲሳተፉ እየጠየቅሁ ያለ መሳተፍ ወይም በማንኛውም ጊዜ ስራዎትን ከጥናቱ የማግለል ሙሉ መብት አለዎት።ማንኛውም ጥያቄ ካለዎት በሚከተለው አድራሻዬ ማግኘት ይችላሉ።

ጀምበሩ ጫኔ ስ.ቁ.0922146159ኢ..ሜይል፡chanejemberu@gmail.com

Annex V: የስምምነት መግለጫ ፎርም - በአማርኛ

ባህርዳር ዩኒቨርሲቲ

ህክምናና ጤና ሳይንስ ኮሌጅ

ጤና ሳይንስ ትምህርት ክፍል

ድህረ- ምረቃ ፕሮግራም

እኔ ስሜ ከዚህ በታች የተገለጸው፤የዚህ ጥናት ዓላማ በደንብ የተብራራልኝ ሲሆን የጥናቱንም ዓላማ ተረድቻለሁ።

በዚሁ ጥናት ላይ መሳተፍ በሙሉ ፈቃደኝነት ላይ የተመሰረተ መሆኑን በሚገባ የተረዳሁ ሲሆን በማንኛውም ጊዜ ከጥናቱ ራሴን የማግለል መብት እንዳለኝ አውቄአለሁ።ስለሆነም የምሰጠው መረጃ በምስጢር እስከተጠበቀ ድረስ በዚህ ጥናት ለመሳተፍ ተስማምቻለሁ።በዚህ ጥናት ለመሳተፍ ስምምነቴን ስገልፅ ለምጠየቀው ጥያቄ በእውነት ላይ የተመሰረተ መልስ ለመስጠት የተስማማሁ መሆኔን አረጋግጣለሁ።

የመረጃ ሰጪው ፊርማ _____ ቀን _____

የአጥኚው ፊርማ _____ቀን _____

Annex VI: ቃለ መጠይቅ አማረኛ ቅጅ

ክፍል 1 : ማህበረሰባዊመጠይቆች

ተ.ቁ				እለፍ ወደ...
001.	እድሜ			
002.	የጋብቻ ሁኔታ	ያገባ ያላገባ በህይወት የሌለ የተፋታ	1 2 3 4	
003.	ሃይማኖት	ኦርቶዶክስ ሙስሊም ፕሮቴስታንት ሌላ	1 2 3 4	
004.	ብሄር	አምሀራ ኦሮሞ ትግሬ ሌላ	1 2 3 4	
005.	የትምህርት ደረጃ	መደበኛ ትምህርት ያልተማረች የመጀመርያ ድረጃ የተማረች ሁለ ተ ኛ ደረጃ ተማረች ከሁለተኛ ደረጃ በላይ የተማረች	1 2 3 4	
006.	ስራ	ገበሬ የቤት እመቤት መንግስት ሰራተኛ ነጋደ ሌላ	1 2 3 4 5	
007.	መኖርያዎ የት ነዉ	ገጠር ከተማ	1 2	
008.	የባለቤትዎ የትምህርት ደረጃ	መደበኛ ትምህርት ያልተማረ የመጀመርያ ድረጃ የተማረ ሁለተኛ ደረጃ የተማረ ከሁለተኛ ደረጃ በላይ የተማረ	1 2 3 4	
009.	የባለቤትዎ ስራ ምንድን ነዉ?	ገበሬ ቀን ሰራተኛ መንግስት ሰራተኛ ነጋደ ሌላ	1 2 3 4 5	

ክፍል 2 ወሊድን የተመለከቱ መጠይቆች				
101.	ምን ያክል ጊዜ አርግዘዋል	..... ጊዜ		
102.	ዉርጃ አጋጥሞ ያዉቃል?	አዎ (——ጊዜ) አይደለም	0 1	
103.	ከ 7 ወር በኋላ ስንት ጊዜ ወልደዋል?	—— ጊዜ		
104.	በሂወት የተወለዱ ልጆች አሉዎት?	አዎ የለም	0 1	
105.	የመጨረሻ ልጅዎት በሂዎት አለ?	አዎ የለም	0 1	
106.	የመጨረሻ ልጅዎ በምን ወለዱት?	በማህጸን በር (በራሱ) በማህጸን በር (በመሳርያ ታግዞ) በኦፕሬሽን (ዲንገተኛ) በኦፕሬሽን (ታቅዶ)	1 2 3 4 5	
107.	ከዚህ በፊት የተወለደው ልጅ ሲወለድ የርስዎ እድሜ ስንት ነበር?	.....አመት		
108.	ከዚህ በፊት የተወለደው ልጅ ሲወለድ ቀኑ ሳይደርስ ነበር?	አዎ አይደለም	0 1	
109.	ከዚህ በፊት የተወለደው ልጅ ሲወለድ ክብደቱ ምን ያክል ነበር?	≥2500 ግራም <2500 ግራም	0 1	
110.	ለምን ያክል ጊዜ ጡት ጠባ?	.....አመት..... ወር		
111.	ከመጨረሻው ልጅ በኋላ መከላከያ ተጠቅመው ነበር?	አዎ አይደለም	0 1	
112.	ከእርግዝና በፊት ለረጅም ጊዜ የሚቆይ ህመም ነበረብዎት?	አዎ አይደለም	0 1	
113.	ከነበረ ምን?	ደም ግፊት የስኳር በሽታ የኩላሊት በሽታ የደም ማነስ	1 2 3 4	
114.	ያሁኑ እርግዝና ሁኔታ?	የታቀደ የተፈለገ ያልታቀደ ግን የተፈለገ ያልታቀደ ያልተፈለገ	1 … 2 3	116
115.	የታቀደ የተፈለገ ካልሆነ ስለምን መከላከያ አልተጠቀሙም?	የማረግዝ ስላልመሰለኝ ባለቤቴ ስላልፈቀደልኝ የመከላከያው አለመመቸት የመከላከያው አለመስራት	1 2 3 4	
116.	ያሁኑ እርግዝና በስንት ሳምንት ተጠናቀቀ?	..... ወር .....ሳምንት		
117.	የመጨረሻዉ ልጅ ስንት አመቱ ነው?	.....ዓመት .....ወር		
118.	ርግዝናው ምን ያክል ይራራቃል?	.....ዓመት .....ወር		
119.	የርግዝና ክትትል ነበሮት?	አዎ አይደለም	0 1.....	 125
120.	ስንተኛ ወር ላይ ነበር የጀመሩት?	..... ወር .....ሳምንት		
121.	ባጠቃላይ ስንት ጊዜ ክትትል አደረጉ?	.....ጊዜ		

122.	ቴታነስ ክትባት ወስደዋል?	አዎ አይደለም	0 1.....	 124
123.	የተከተቡ ከሆነ ስንት ጊዜ?	..... ጊዜ		
124.	የደም ማነስ ኪኒን ወስደዋል?	አዎ አይደለም	0 1	
125.	በርግዝና ወራት በቀን ስንቴ ይመገቡ ነበር?	.....ጊዜ		
126.	የላይኛው ክንድ ዙርያ ልኬት	<23ሴሜ ≥23 ሴሜ	0 1	
127.	በርግዝና ወቅት ከበድ ያለ ችግር ገጥሞ ነበር?	አዎ አይደለም	0 1	
128.	አጋጥሞ ከሆነ ምን ነበር?	በርግዝና ዎቅት የመጣ ግፊት ደም ማነስ በርግዝና ዎቅት የመጣ ስኳር ከ 7 ወር በኋላ ደም መፍሰስ ለሎች	1 2 3 4 5	
129.	በርግዝና ወቅት ሆስፒታል ተኝተዉ ነበር?	አዎ አይደለም	0 1	
130.	በርግዝና ወቅት ሲጋራ ያጨሱ ነበር?	አዎ አይደለም	0 1	
131.	በቀን ስንት ፓኬት	..... ፓኬት		
132.	ጫትስ ይቅሙ ነበር?	አዎ አይደለም	0 1	
133.	ምን ያክል?	..... ግራም/በቀን		
134.	የደምዎ አይነት	ፖዝቲቭ ኔጋቲቭ	0 1	
135.	የልጁ አቀማመጥ እንደት ነበር?	በጭንቅላቱ (ቨርቴክስ) በትከሻው በቂጡ ሌላ	1 2 3 4	
136.	የምጥ አጀማመር ሁኔታ?	በራሱ ጀመረ በምጥ ማስጀመርያ	0 1	
137.	የሽርት ዉሃ ቀድሞ ፈሶ ነበር?	አዎ አይደለም	0 1	
138.	እስከሚዎልዱ ምን ያክል ፈሶ ቆየ?	..... ሰዓት		
139.	ጨቅላው ሲወለድ የሽርት ዉሃ የደፈረሰ ነበር?	አዎ አይደለም	1 0	
140.	ምን ያክል?	G 1 (ደረጃ1) G 2 (ደረጃ2) G 3 (ደረጃ3)	1 2 3	
141.	ምጥስ ስንት ሰዓት ቆየ?	..... ሰዓት		
142.	እንደት ተወለደ?	በማህጸን በር (በራሱ) በማህጸን በር (በመሳርያ ታግዞ) በኦፕሬሽን (ዲንገተኛ) በኦፕሬሽን (ታቅዶ)	1 2 3 4	
143.	በ ኦፕሬሽን ከሆነ ምክንያቱ ምንነበር?	የጽንስ መታፈን	1	

		የተቀረቀረ ምጥ ትክክል ያልሆነ አመጣጥ ያልተሳካ ምጥ ማስጀመርያ የበፊት ኦፕሬሽን	2 3 4 5	
144.	ያዋለደው	ሚድዋይፍ IESO የማህጸን ስፔሻሊስት ሌላ	1 2 3 4	
ክፍል ///: የጨቅላውንሁኔታየያዙመጠይቆች				
201.	የጨቅላው ጾታ?	ወንድ ሴት	0 1	
202.	በሂወት ተወልዷል?	አዎ አይደለም	0 1	
203.	የ 1 ደቂቃ APGAR?			
204.	የ 5 ደቂቃ APGAR?			
205.	ክብደቱ ስንት ነበር?			
206.	የጨቅላው ሁኔታ በመውጫ ሰዓት	ጤነኛ በ 24 ሰዓት ዉስጥ የሞተ	0 1	
207.	ለሞቱ ምክንያት ምንነበር	መታፈን (ኦክስጂን እጥረት) ብክለት ያለ ቀኑ መወለድ ሌላ ካለ ይጠቀስ	1 2 3 4	
208.	ወደ ጨቅላ ክፍል ተልኮ ነበር?	አዎ አይደለም	0 1	
209.	በምን ምክንያት ተላከ?	መታፈን ያለቀኑ ተወልዶ ብክለት ሌላ ካለ ይጠቀስ (——)	1 2 3 4	
210.	ከፍ ያለ ያፈጣጠር ችግር ነበረበት?	አዎ አይደለም	0 1	
211.	ካለ ምን አይነት?	በጭንቅላት ዉስጥ ዉሃ መብዛት የጭንቅላት አለመፈጠር የአከርካሪአጥንት በሽታ ሌላ ካለ ይጠቀስ...(	1 2 3 4	

Annex VII ዙርቻንትካዉ ንባር- አዊኺዉ

ማራማርስታንቲ

- እን ምርመሪው ጁዊ አሰብ ይው፡ ክችክቺ እንዕቪ እስታ እሊውዳ ቦቲዳ ለኃንቱ ዲግሬ አግዕግስአቩኪ እሊውስ አለሚስ ዲጋያሱ አብኾ ኦምንሻዊ፡፡

ጀምበሩ ፊርሚ ..... ጌርክ .....

<u>ድምክኒ ሜሬጂ 1 ሜሬጂው ክዕሸጻ እስምምኒው ካሲ</u>

ባህርዳር ዩኒቨርስቲ ፡- እክምኒው ቲኑ ሳይንስ ኮሌጅ ሚድዋይፈሪ ክንተው ቤን

ቱዊ፡- ደኪጽካማ ; ይው ስም .....እስቱ

አቶ ጀምበሩ ጫኔ አዊ ዞንዕ እንዓክስታው ዕናቱ ሳሜሬጂ ኩፕዓንጺክ፡፡ ዕናትኪ ቲኑ ሳይንስ ኮሌጅ ፡ ሜድዋይፈሪ ክንተ ቤኑ አጊዘኘው ድጋፍ ሸርቱ እችት ካሜንስታንኩ ስራሰሪዳ ታምባንኩ ችግርካ አዊ ዞን መንግስቱ ሆስፒታል ካዳ ካስሻኜ፡፡ እንቱ እንስ ዕናጽሽ አሴቱፍግታንታ ጋቢዚስቲካ ፡፡ እስታ እንስ ዕናጽሽ ኒኩክሽ ጼሻጽፎ ዔዋንታ ኬቤርዕሻስ ካስቱ፡፡

ዔውትካየታንውስ አጊዝሺስ ወሌቱ ሼዶሽ አሜሴጌኔ ፡፡

<u>ዕናቱ ኃሪ፡-</u> ሸርቱ እችት ካሜንስታንኩ ስራሰሪዳ ታምባው ችግር አዊ ዞን መንግስቱ ሆስፒታልዳ፡፡

<u>ዕናቱ አሊሚ፡-</u> አዊ ዞን ሜንግስቱ ሆስፒታልካዳ ሸርቱ እችትኮሜንስታንኩ ስራሰሪዳ ታመባውሳ ችግሮ ሺሸግስ፡፡

<u>ዕናቱ ጊዝ፡-</u> ይካታት 1/2020 ዶስ ምጋብት 30/2020

<u>ዕናቱ ካሰኚ፡-</u> እንስ ፀናትስ ኬትንቩ ታምትኝ ገዙክ ሊሊት ኘርንኩ ካስግሻካ ዲግካ፡፡

ዲግሰኩሰ ካስካስ ድምክኔ ገሊዔ ፈቱኒጊ ፋታነውስ ጊገዘስ ካሳገስ ካሌና ፡፡

አሲቲፍጊ እንቱውጌስ ፈቃድዶስ ሜሴፈትስቱክ ኦክግስ ዋሺንሰኪ ገዘዕ ቲሪዕግስ ካሌና፡፡

ካስታውስ ካሲስ አምናኑሰስታ ክችክቺ እያንታ ካስቱ፡፡

እሳ ካሴ ዊድግስ ሚንቹኒ 20-25 ዶኪካ አብርቶ እጀኔ

<u>ዕናቱ ትክምስራ ጉዳት፡-</u> እንሰዕናትስ አሲቲስጊስ ኬይስታው አቩኪ ኩትኩቱ ትክም አግዓላኪያክ፡፡ አቩኒላ እንቱው ውኒቲ ዙርዊ እንሰ ዕናቱውስ አሊሚስ አይሎ ፋይስታንቲያክ፡፡ ድምክኒስ ኪላ ዕናትዳ አሲትፍኝስ ዋታኪ ከዋስ ችግሮ አቩኪ ጉዳቶ ታምዓቲውስታ አሬጌጌትግዔ፡፡ ዙርዕጉ ፋታቲኑውሳ ካሴ ባይግስ ካሌና፡፡ እስታ ካሶግጌ ፋቱኑውስ ጊገዘስ አሜቻየሱ ዲብ ገዙኒ ቲሪዕግስ ካሌና፡፡

Annex VIII: አስሚምኘዉ ግሊጽ- አዊኺዉ

ሰርኩኒ = ካሳግጊዳ ½ እንቱስታ ኪራሱ ስም ሜዜቱውብስታላክ፡፡ እነንቶጂ ይቱኑ ሜሬጂ ዕናትስ ጊኩቺስ አጌላጌሌ፡፡ ዕናቶ ዊኒሰንቲዶስ ይጉ እሊውሳ ፌያማ እይስታላክ፡፡

ዕናቶ ካንቱክስ ካሲ ገዙኩኒጊ 0922146159 ስልኪ ቼፋስ ዶዌልግስካሌና፡፡

ድምክኒሳ ኪላ ባህርዳር ዩንቨርስቲው ዕናቱ ምግባረ ዕንታው ከሚቲስ እንሳ

ስልኪ ቼፋስ ዶዌልግስ ካሌና፡፡

ካስገግጌ ዋክትግዕግስ አስሜምግታናማ ☐ አስሜሞኃላ ☐

አሴቱፍኃንትካ ካሉሳ ሰምምኔቶ ዔውቱኑስ አሪጊጊትግዔ ሜሬጂ

ሳባሳባንታው ፊሪሚ .....

ካስግኚው ሺሸዊ ቼፍ .....

ካሴንቲው ስም ..... ፊሪሚ .....

ካሳግኚ ዋክትጉክ ጌርክ .....አሮጌጌትሻውክ ሱፐርቫይዘሩ ስም

Annex IX: ካሉ ካሲ -አዊኚዉ

ድምክኒ ሜሬጂ 4 አማካሪጊውድወጊውካሳካ እስታ ሜዝጌብዴስ ካፅስታንኩ ሜሬጃካውክፅ

ተ.ቁ				እለፍ ወደ...
001.	እድሚ			
002.	ጋብቺዉአይኔት	ሜጽኹ መጻያሱ ክርኹ ትፍስትኹ	1 2 3 4	
003.	አይማኖት	ኦርቶዶክስ ማኅሊም ፕሮቴስታንት ሌላ	1 2 3 4	
004.	ጎሲ	አምሀራ ኦሮሞ ትግሬ ሌላ	1 2 3 4	
005.	ትምህርት ደሬጂ	ክንታያሱ 1-8 ክንትኹ 9-12 ክንትኹ ኮሌጅስታ ዓንደስጃላ ክንትኹ	1 2 3 4	
006.	እንጽኪዉአይኔት	አሬሳ ቻንቲ ንኜቲ እማቤት መንግስት ስራቴና ጊጺኒ አሊሁ	1 2 3 4 5	
007.	ዝኩቲ ብቲ	ጌጼር ኬቴም	1 2	
008.	ሻን ዌነ ሹ ትምህርቱ ደሬጂ	ክንታያሱ 1-8 ክንትኹ 9-12 ክንትኹ ኮሌጅስታ ዓንደስጃላ ክንትኹ	1 2 3 4	
009.	ኬያራሱ እንጽኺ垸ንዳሪ ?	አሬሳ ቻንቲ ጌርኩ አንጻዉስታንቱ መንግስቱ አንጻዉስታንቱ ጊጺኒ እሊኹ	1 2 3 4 5	

ቤን 2 ካሜን ሻሊ ታምትኑን ኩ ካስካ				
101.	ወሸንቲ ሸርቲ?	..... ጊዜ		
102.	ደኹቴ ታቋኻማ?	ይጋ (———ጊዜ) እለ	1 2	
103.	7 አርፋ ወኹኸሰ ዝሮ ወኸኒ ከሜን ታሽቲኹ?	——— ጊዜ		
104.	እንከሊ ከሜን ስትኩ □ርካ ዝኩና ማ?	ይጋ እለ	1 2	
105.	ቸሬስኸ □ርካ ዝኩነ ማ?	ይጋ እሉ	1 2	
106.	ችርሴ □ሮ ድማስ ከሜን ትኹ?	ማጼንስ ማሴርሲስ አጌዚስታማ ድንጊቲኒ ኦፕሬሽኒስ አኬድስትኹስ	1 2 3 4 5	
107.	□ሜሬ □ሮ ከሜን ቱስ እድሚዉኻይ እሽኩ?	.....አመትስ		
108.	□ሜሬ ከሜን ሥትኹ□ር ጌርክስማ ከሜን ስትኸዊ?	ይጋ ጋቲዉ	1 2	
109.	□ሜሬ ከሜን ሥትኸሱ □ር ይዝኩት ዉኻይ እሽኹ?	≥2500 ግራም <2500 ግራም	1 2	
110.	ወሰለካሰ ጌዘይ አንጉዋ ጻኸጺኹ?	.....አሜት..... አርፊ		
111.	ቺርሲውጀርድስ ፋሌንጋ ካለከልሻጼ ቲከምስቲኸዋ ማ?	ይጋ እለ	1 2	
112.	ሸርቲየ ስ ፋኖ ሜንቶ እጂኹቋንዚ እሽኸዋማ?	ይጋ እለ	1 2	
113.	እሽንዮስኺደሚ ?	ብር ሽንኻ ሽኳሩ ቋንዚ ኸለሊቲውቋንዚ ብር አንጺሻ	1 2 3 4	
114.	ሻሽ ሸርቱ ሁኔቲ ?	ቃሊትስ ቃሊታ ጋቲታ ፋይስታያሱ	1 ... 2 3	116
115.	ፋይስታያሱ ይኸንዮስ ደሜይ ኸለ ኸልሻጺ ?	ሼሬወሳ ጼጌሬያላ ሻንዌና ፈኬደልናማ ከልከልሻጺ አሜቻል ናማ ከልከልሻጺ ሲራወላ ይጉዋማ	1 2 3 4	
116.	ሻሽሱ ሼርቲ ዉኸ አርፈስ አሌድስትኹ?	..... አርፊ .....ሶኼት		
117.	ቺርሲ □ር ዉኸ አሜትይ ?	.....ዓሜት .....አርፊ		
118.	ሼርት ወስለከስ እቺትኄ ?	.....ዓሜት .....አርፊ		
119.	ሼርት ክትትል ጼወታስቲኸዋማ?	ይጋ እለ	1 2.....	125

120.	ወሃንቲ እርፊደይ ጇሜር ኸዊ?	..... አርፊ .....ሰኼት		
121.	ትክለሊስ ወኸኒ ክትትሎጲወትኹ?	.....ጊዞ		
122.	ቴታነ ሱ ክንትባቴ ካጲማ?	ይጋ አለ	1 2.....	 124
123.	ካጲስኪኒ ኪ ወኸኒ ?	..... ጊዞ		
124.	ብር እንጂጋዉስ እጆ ካጲሸቲኸዋማ?	ይጋ አለ	1 2	
125.	ብር እንጲጋዉለ እጆ ከጲሸቲዘዋማ?	.....ጊዞ		
126.	ክርኺደስ ጀላ ዝኩኹታፋ ልኪቲ	<23ሴሜ ≥23 ሴሜ	1 2	
127.	ሸርት ጉዝማይዝኩዊ ችግር እሸዘዋማ	ይጋ አለ	1 2	
128.	እሰስኩኒ ኪደማሂይ?	ሸርት የጉኽ ብር ሸንካ ብር እንጂጋ ሸርት የጉኽ ሸኳፉ ቑንዚ 7 አርፋደስ ፋሌንጋ ብር ክቢጋ እሊኩ	1 2 3 4 5	
129.	ሸርት ጉዝማሆስፒታልደ ኼፊታ እኪማስቴቲኸዋማ?	ይጋ አለ	1 2	
130.	ሸርት ጉዝማሲጋራ ትሲጽከ ያቑኻማ	ይጋ አለ	1 2	
131.	ጌርክስ ወኻ ፓኬት	..... ፓኬት		
132.	ቻቶ ከማዘቑኻ ማ?	ይጋ አለ	1 2	
133.	ወሳ ለክስ ?	..... ግራም/ጌርክስ		
134.	ብርውአይኔት	ፖዝቲቭ ኔጋቲቭ	1 2	
135.	ጀሩ እንጂኸዊ ዋትኔይ እሸኹ?	ቻርስ ማቑሰ ትኾስ እሊው	1 2 3 4	
136.	ምጵ ጇሜጱሰ ዋትኻይ እሸኼይ?	ኺ ሰዶ ምጵ ጇሜርጳወስ እጃሰ	1 2	
137.	ሼርቱ አኹኬደሞማከቤሸኸዋማ?	ይጋ አለ	1 2	
138.	ከሜትማኼስታ ወለለካ ስትይየ ኼ	..... ሰት		
139.	ስር ከሜስቱስ አኹጽንኩት እሸኸዋማ?	ይጋ አለ	1 2	
140.	ወለለኻይ?	G 1 (ደረጂ1) G 2 （ደረጂ2） G 3 （ደረጂ3）	1 2 3	
141.	ምጵ ወለለካ ሰቆይ እጂኹ?	..... ሰት		

142.	ችርሴ □ሮ ድማስ ከማንትኸ?	ማጼንስ ማሴርሲስ አጌዚስታማ ድንጊቲኒ ኦፕሬሽኒስ አኬድስትኸስ ኦፕሬሽንስ	1 2 3 4	
143.	ኦፕሬሽንስ ይኸንዮስ ምክንየት ደማይ እሽኹ?	□ር አፊንስታማ ካራከ ርስስትኹምጽ ክችክች ያኻያሱ ምጽ ክምንት ጂማርጺ እጁ ሲራወለ ይጉዋኒ ፋንቲኒ ኦፕሬሽን ዝኩዋኒ	1 2 3 4 5	
144.	ካማንጽኹእምይቲኒ	ማድዋይፍ IESO ማጸኑ ስፔሻሊስት ሌላ	1 2 3 4	
		ክፍል III : ስሩሊ ሁኔቲሌ እምትኾን ኹካስኻ1		
201.	ስሩ ጾታ?	ሻርጂ ኸን	1 2	
202.	ይወትሊማ ከማንስትኸዊ ?	ይጋ እለ	1 2	
203.	1 ደኪካዉ APGAR ?			
204.	5 ደኪካዉ APGAR ?			
205.	ይዝኩዉት ዉኻይ እሽኹ?			
206.	ስሩ ኸኔቲ ፋጊስ ?	ቲን ዌና 24 ስትኸደ ክርኹ	1 2	
207.	ክርኾ ምክንየት ደማይ እሽኹ?	አፌንስታማ (ኦክስጂን እንጻማ) ክሌት ጌርስ ጋቲታ ከማንስታማ እሊዉያኸኒ ኪ ቲኪስ	1 2 3 4	
208.	ስራስሪ ኸርኬማ አኬምስታኑስ ቶሽኸዋማ?	ይጋ እለ	1 2	
209.	ቶሸስኩኒ ኪ ምክነየት ደማይ እሽኹ?	አፌንስታማ ጌርስ ጋቲታ ከማንስታማ ብክሌት እሊዉያኸኒ ኪ ቲኪስ (———)	1 2 3 4	
210.	ኬፍኹ ካማንትሻ ችግር እሽኸማ?	ይጋ እለ	1 2	
211.	ዝኩኒ ኪ ዋታኸዊ ?	ችንክለታኻደ አኹማንችሻ ችንክላቲ ፌቴርስታወለ ይጉሻ እንዙ ቋንዚ እሊዉያኸኒ ኪ ቲኪስ	1 2 3 4	

Declaration form

I the undersigned, declared that this is my original work, has never been presented in this or other university, and hat all the resources and materials used for the research, have been fully acknowledged.

Principal investigator

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1. Mr. Amlaku Mulat Signature: _____Date: _____
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