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LINEAR GROWTH FAILURE AT BIRTH AND ASSOCIATED FACTORS AMONG NEWBORNS DELIVERED AT PUBLIC HOSPITALS OF WEST HARERGHE ZONE, OROMIA REGION, ETHIOPIA

MPH THESIS

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July 2025

HARAR, ETHIOPIA

HARAMAYA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

Linear Growth Failure at Birth and Associated Factors Among Newborns Delivered at Public Hospitals of West Harerghe Zone, Oromia Region Ethiopia

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A Thesis Submitted to The School of Public Health, School of Graduate Studies, Haramaya University, In Partial Fulfillment of The Requirement for The Degree of Master in Public Health Human Nutrition

July, 2025

Harar, Ethiopia

APPROVAL SHEET

HARAMAYA UNIVERSITY

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I hereby certify that I have read and evaluated this Thesis entitled 'Linear Growth Failure at Birth and Associated Factors Among Newborns Delivered at Public Hospitals of West Harerghe Zone, Oromia Region Ethiopia' prepared under my guidance by Habtamu Tesfaye. I recommend that it will be submitted as fulfilling the thesis requirement.

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As a member of the Board of Examiners of the MPH Thesis Open Defense Examination, I certify that I have read and evaluated the Thesis prepared by Habtamu Tesfaye and examined the candidate. I recommend that the thesis be accepted as fulfilling the Thesis requirements for the degree of Master's in public health in human nutrition.

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BIOGRAPHICAL SKECH

My name is Habtamu Tesfaye Erko. I was born on December 4, 1985 E.C. in Kersa Malima, South West Shawa, Ethiopia. I am an Ethiopian citizen and married. I am currently a Master of Science candidate in Public Health Human Nutrition. My educational journey began at Lemen Elementary School, where I studied from 1992 to 1999 E.C., followed by my secondary education at Lemen Preparatory and Secondary School from 2000 to 2003 E.C. I earned my BSc degree from Jimma University between 2004 and 2007 E.C.

Professionally, I have gained valuable experience in the healthcare sector. From 2015 to 2020, I worked at Meta Robi Health Center, where I was involved in clinical services such as delivery, outpatient care, maternal and child health, and also served as the PHCU Director. Since 2021, I have been working at Gelemso General Hospital under the CDC program, focusing on HIV/AIDS control and prevention. I am passionate about improving public health and committed to making a meaningful impact in my community.

ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere gratitude to Haramaya University, School of Public Health, for granting me the opportunity to conduct this student research. I am deeply thankful to my advisors, Dr. Anteneh Berihane and Dr. Maleda Tefera, for their invaluable guidance, insightful feedback, and unwavering support throughout the process from topic selection to the development of this research thesis. Their scholarly advice and encouragement have been instrumental in shaping this work. Lastly, I extend my heartfelt appreciation to the hospital administrators, data collectors, and study participants, whose cooperation and contributions were essential in accessing the data required for this research.

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ACRONYMS and ABBREVIATIONS

ANC	Antenatal Care
CI	Confidence Interval
EMONC	Emergency management of obstetric and neonatal care
FAO	The food and agriculture organization
HAZ	Height for Age Z-score
LBW	Low birth weight
LMICs	Low- and Middle-Income Countries
MCH	Maternal and Child Health
MUAC	Mid-upper arm circumference
MDD-W	minimum dietary diversity for women of reproductive age
SGA	Small for gestational age
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

ABSTRACT

Introduction: Growth failure at birth, shown by low birth weight and small size for gestational age, is a serious public health problem that increases the risk of newborn illness, death, and long-term developmental issues. However, there have been few studies addressing this issue in the West Harerghe Zone, Oromia.

Objectives: This study aimed to assess the prevalence of growth failure at birth and to identify associated factors among newborns delivered at public hospitals in West Harerghe, Oromia, Ethiopia, from February 5 to March 30, 2025.

Methods and Materials: A facility-based cross-sectional study was conducted among 387 neonates born at randomly selected public hospitals in West Harerghe Zone, Oromia region, from February 5 to March 30, 2025. Participants were selected using systematic random sampling technique. Data were collected using the KoBoTool mobile application and data analysis was performed using SPSS version 26. Descriptive statistics was employed to summarize the data, and multivariable logistic regression was used to identify factors associated with growth failure at birth, by estimating AOR with 95% confidence intervals (CI) calculated and statistical significance set at $p < 0.05$.

Results: The prevalence of growth failure at birth was 28.2 % (95% CI: 23.8, 33.1). Newborns from food-insecure households (AOR = 4.5; 95% CI: 1.7–11.7), mothers who had a mid-upper arm circumference (MUAC) less than 23 cm (AOR = 3.2; 95% CI: 1.1–9.5), and maternal age 20-34 (AOR = 6.5; 95% CI: 2.3-18.8) were significant associated factors with growth failure at birth

Conclusion and recommendation: More than one in four newborns in the study area experienced growth failure at birth, highlighting it as a significant public health issue. Maternal nutritional status and household food security were identified as key contributing factors. Therefore, targeted nutritional support for pregnant women and improved food security are essential to mitigate this problem.

Key Words: - Growth failure at birth, Stunting at birth, Newborns growth failure, West Harerghe

1. INTRODUCTION

1.1 Background

Growth failure at birth in another term stunting refers to a condition where a newborn's growth is significantly below the expected standard for their age. The indicator can also be defined as, a child's height being significantly below the expected level for their age, based on a reference population. It is most commonly identified using a height/length-for-age z-score (HAZ) less than -2 from the World Health Organization (WHO) child growth standards median for the same age and sex (de Onis, 2017). In resource-constrained settings, the first 1000 days of life beginning at conception are regarded as a crucial window not only for the potential onset of growth failure at birth but also for delivering timely intervention to prevent stunting(Martorell, 2017).

Growth faltering typically starts before birth and persists for at least the first 2 years after birth. (De Onis and Branca, 2016). Additional, the greatest frequency of stunting onset was observed between birth and three months of age, with South Asia showing markedly elevated rates of stunting at birth (Benjamin-Chung *et al.*, 2023)

A common pattern seen in low- and middle-income countries is that the average height-for-age z-score (HAZ) is already below zero at birth and continues to decline steadily from early infancy through the first two years of life. Numerous epidemiological studies have explored the reasons behind this low average HAZ and the high rates of stunting in these settings, with most research concentrating on risk factors at the individual or household level factors that differ from one person or family to another within the population (Roth *et al.*, 2017).

Between birth and 15 months of age, recovery from stunting was uncommon, and even when children did improve, many quickly became stunted again. Relapses were especially frequent among those who were stunted at birth. The early emergence of stunting and the low likelihood of reversal indicate that effective improvements in linear growth must begin with life-course interventions targeting women of reproductive age, along with stronger focus on programs for infants younger than six months (Benjamin-Chung *et al.*, 2023).

1.2 Statement of Problem

Growth failure at birth is a significant public health problem globally, with serious consequences on physical, cognitive, and economic loss of children in their lifetime. The distribution of growth failure at birth is vary from country to countries. Growth failure at birth/stunting is the most common type of child undernutrition, with current global estimates reaching 156 million. Growth failure is characterized by a significant public health concern among newborns globally, particularly in low- and middle-income countries (De Onis and Branca, 2016). In Sub-Saharan African only, the magnitude of growth failure among children reaches 41%. If stunting persists into adulthood, it can lead to reduced optimal growth potential and economic productivity (Campisi *et al.*, 2017;Quamme and Iversen, 2022). In Ethiopia, studies from Hawassa and Gondar reported high rates of growth failure at birth, with stunting affecting 35.6% and 30.5% of newborns, respectively (Ejigu and Tafese, 2023;Gonete *et al.*, 2021). According to UNICEF reports, in 2022, more than 144 million children under the age of 5 worldwide had stunted growth. Globally, estimates of growth failure rates determined that 22% of children were stunted in 2020, with 85% of growth failure occurring in Low and Middle Income countries (LMICs) (Unicef, 2023).

Growth failure at birth can have a serious consequences on a child's health and development come with problem of increasing the probability of illness and mortality, cognitive dysfunction and loss of productivity at individual, family and society level (Lim *et al.*, 2021;Ejigu and Tafese, 2023). The severe and irreversible physical and neurocognitive damage associated with stunted growth presents a significant threat to human development. Heightened awareness of the extent and serious consequences of stunting has led to its recognition as a major global health priority, garnering international attention at the highest levels and setting global targets for 2025 and beyond. The challenge lies in preventing linear growth failure while simultaneously addressing child overweight and obesity (De Onis and Branca, 2016).

There are a multiple factors like individual-level factors and health system factors which contribute to linear growth failure these are, short maternal stature, maternal under nutrition, preterm birth, and large-for-gestational age (Martorell and Young, 2012).

Additionally, low maternal educational status, poor household, <2 years birth interval, low birth weight, and food insecurity are some of other factors which significantly associated with growth failure at birth according to studies (Ejigu and Tafese, 2023;Tahangnacca *et al.*, 2020).

In Ethiopia, there is a high prevalence of stunting among children who are less than 24 months of age (Kassaw *et al.*, 2023). To tackle undernutrition, the Ethiopian government is rolling out various initiatives to combat childhood malnutrition, such as the National Nutritional Plans I and II and the Seqota Declaration. The recent Seqota Declaration aims to eradicate stunting in Ethiopian children under two years old by promoting effective coordination and collaboration across sectors, with the broader vision of ending stunting in children under two years in Ethiopia by 2030 (Sahiledengle *et al.*, 2022).

Despite the fact that in Ethiopia, the general risk factors for growth failure has been established from a few studies (Gonete *et al.*, 2021;Ejigu and Tafese, 2023), the specific context of West Harerghe, Oromia Region, is unstudied. The area's unique socio-economic, cultural, and environmental characteristics may differently impact pregnancy outcomes compared to other regions. There is limited empirical data on how local nutritional, and maternal health practices contribute to newborn growth failure. Furthermore, variability in antenatal care, maternal education, and dietary habits may play a role, yet remain unstudied. This lack of localized data in the current study area hinders targeted interventions, highlighting the need for research in West Harerghe to inform strategies to reduce growth failure at birth. Thus, this study aims to identify the prevalence of growth failure at birth and to identify the factors associated in public hospitals in West Harerghe Zone, Oromia Region, Ethiopia.

1.3 Significance of the study

The findings of this study can provide valuable insights into the prevalence of growth failure at birth and its associated factors, which can inform evidence-based interventions aimed at improving newborn health outcomes in the region. As a result, it will benefit the West Harerghe Zonal Health Bureau or any other stakeholders focused on addressing growth failure at birth. Additionally, the study results can contribute to the existing literature on newborn health and guide policymakers and healthcare providers in

developing and implementing effective strategies to address growth failure at birth and improve overall newborn. The study can have policy implications for improving child health outcomes in Ethiopia. The findings can inform policymakers and nutrition programmers to develop effective strategies to prevent linear growth failure at birth and improve child health outcomes.

1.4. Objectives

1.4.1. General Objective

The general objective of this study was to assess the prevalence of growth failure at birth and its associated factors among newborns delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025.

1.4.2. Specific Objectives

- To assess the prevalence of growth failure at birth in the study area
- To assess factors associated with growth failure at birth in the study area

2. LITERATURE REVIEW

2.1. Prevalence of Growth Failure at Birth

A pooled analysis of 32 longitudinal cohorts conducted across 14 low- and middle-income countries in South Asia, sub-Saharan Africa, and Latin America (1987–2017) found that the prevalence of stunting at birth varied widely between cohorts—from 0.3% to 42%—with an overall average of 13% (Benjamin-Chung *et al.*, 2023). Global burden analyses highlight the disparities in stunting prevalence across regions. The Global Burden of Disease Study (2025) reported that children in regions with low socio-demographic indices (SDI) experience disproportionately high rates of growth failure, with limited improvements over the past three decades (Lin *et al.*, 2025). Growth failure at birth, often reflected in stunting, is a widespread concern in low- and middle-income countries (LMICs), with significant implications for child survival and development. A systematic review by *Tomori et al. (2024)* revealed that approximately 15% of children globally are born stunted, and an additional 25% become stunted within the first six months (Tomori *et al.*, 2024). This early onset is closely linked to maternal undernutrition, low birth weight, and small-for-gestational-age status, which are prevalent in marginalized populations.

The growth failure at birth was most prevalent in South Asia, where 20% of children were stunted at birth and an additional 21% became stunted by three months of age. In Africa (10%) and Latin America (9%), the proportion of growth failure at birth was lower than that observed during the first three months postnatally which were 18% and 13% respectively. Across all regions, stunting onset declined at later ages. Countries characterized by lower health expenditure as a share of GDP, elevated child mortality rates, and a larger population living below the international poverty line (US$1.90 per day) exhibited a higher prevalence of stunting at birth or by three months, with reduced incidence beyond early infancy (Benjamin-Chung *et al.*, 2023).

Growth failure at birth, often reflected in stunting, remains a pressing concern in low- and middle-income countries, particularly in South Asia and Latin America. With the highest incidence of growth faltering occurring between birth and three months of age (Benjamin-Chung *et al.*, 2023). In Latin America, although overall stunting rates have declined, growth failure at birth remains a significant issue among marginalized populations,

particularly indigenous communities. A systematic review across 13 countries revealed that indigenous children are nearly twice as likely to be stunted compared to their non-indigenous peers, even after adjusting for socioeconomic status (Gatica-Domínguez *et al.*, 2020).

A systematic review and meta-analysis study conducted by Benjamin and his colleagues found that stunting, the most widespread indicator of child growth failure, decreased from 39.1% in 2000 to 21.9% in 2018 across low- and middle-income countries (Benjamin-Chung *et al.*, 2023). In Guatemala, 47% of all children under five years are stunted, according to reports made in from (2014 –15). However, national stunting data hide the significant disparities in the country, with stunting reaching around 70% in some indigenous populations and when the birth interval is less than 24 months (Roe, 2020).

A recent study published in Nature found that linear growth faltering occurs very early in the prenatal and postnatal phase, before the age of 6 months when most postnatal linear growth interventions begin. The study reported that the highest incidence of stunting onset occurred from birth to the age of 3 months, with substantially higher stunting at birth in South Asia than in Sub-Saharan Africa (Benjamin-Chung *et al.*, 2023).

A study conducted in Hawassa city public hospitals, Sidama region, Ethiopia found that stunting at birth was prevalent among newborns. The study reported that 35.6% of newborns were stunted at birth. Another locally conducted study in Ethiopia, North region Gondar found that, the proportion of growth failure at birth was 30.5% (Ejigu and Tafese, 2023;Gonete *et al.*, 2021).

2.2. Factors Associated with Growth Failure at Birth

2.2.1 Socio-demographic characteristics

Studies found that the socio demographic characteristics of the mother and the newborn play a crucial role in influencing growth failure at birth among newborns. Some of the factors associated with growth failure at birth in relation to social demographic characteristics include:

2.2.1.1. Maternal Age

According to a study conducted in Indonesia, it was found that newborns born to mothers aged 25 years or older had lower odds (AOR 0.8, 95% CI 0.68-0.95) of being stunted compared to those in the reference group (Sari and Sartika, 2021).

2.2.1.2. Educational status

Newborns born to mothers with no formal education had a higher risk (AOR 2.9, 95% CI 1.59-4.2) of experiencing growth failure at birth, as reported by a study conducted in Ethiopia (Kassaw *et al.*, 2023). In contrast to the previous study, a study by Ghosh et al found no statistically significant association (AOR 1.76, 95% CI 0.5-6.03) between maternal education level and growth failure at birth (Ghosh *et al.*, 2014).

2.2.1.3. Sex of the newborn

According to a study conducted in Gondar, Ethiopia, male newborns are three times more likely (AOR 2.9, 95% CI 1.6-5.2) to be stunted compared to female newborns (Gonete *et al.*, 2021). Another study in Ethiopia also found that being female is a protective factor (AOR 0.75, 95% CI (0.63-0.90) against stunting in children. Similarly, a different study reported that female children were less likely (AOR 0.7, 95% CI (0.51, 0.98) to be stunted compared to males (Sahiledengle *et al.*, 2022;Ghosh *et al.*, 2014).

2.2.2. Obstetrical and Maternal Related Factors

2.2.2.1. Birth interval

According to a study conducted in Hawassa, Ethiopia, there is a more than double likelihood of newborn stunting among mothers with a birth interval of less than 24 months (AOR 2.55; 95% CI 1.39, 4.69) compared to those mothers with a birth interval of 24 months or more (Ejigu and Tafese, 2023). In contrast to the previous study, a study by Ghosh and his colleagues were not found statistically significant association (AOR 0.99, 95%CI 0.99-1) between stunting and birth interval (Ghosh *et al.*, 2014).

2.2.2.2. Birth order and birth weight

A study conducted in Indonesia revealed that firstborn children had 2.3 times higher odds (AOR 2.31, 95% CI, 2.16 to 2.47) of being stunted at birth compared to non-firstborn newborns (Sari and Sartika, 2021). Additionally, low birth weight newborns had high odds of being stunted at birth compared to those newborns who had normal birth weight. The odds of stunting among low birth weight newborns were 3.1 (AOR 3.1, 95% CI 1.6-6.06)

and 10.9 (AOR 10.9, 95% CI 5.8-20.3) times higher compared to normal weight newborns, according to a study conducted in Gondar and Hawassa of Ethiopia, respectively (Ejigu and Tafese, 2023;Gonete *et al.*, 2021).

2.2.2.3. Maternal Stature

In a study conducted in Gondar, Ethiopia, it was found that newborns born to mothers with short stature had a higher likelihood (AOR 2.8, 95% CI 1.21-6.6) of being stunted compared to newborns born to taller mothers (Gonete *et al.*, 2021). Another study in Ethiopia, based on the 2016 Ethiopia Demographic Health Survey, showed that mothers with a height of less than 150cm were 2.5 times more likely to have stunted children compared to mothers over 160cm. (Amaha and Woldeamanuel, 2021). Similarly, a study from Indonesia also reported that newborns from mothers with short stature had a higher likelihood of being stunted compared to newborns from mothers with taller stature (Sari and Sartika, 2021).

2.2.2.4. Antenatal Care

A longitudinal survey study done in low and Middle income countries, evidence reported that having at least one ANC visit have significantly associated with lower risk of linear growth failure at birth (Kuhnt and Vollmer, 2017). A study conducted in Ethiopia also revealed that, Each visit to the ANC clinic is associated with a 6.8% reduction in the odds of stunting ($p < 0.0001$) (Amaha and Woldeamanuel, 2021).

2.2.3. Nutritional characteristics of the mothers

2.2.3.1. Maternal dietary diversity

A study done in rural Bangladesh shows a maternal reduced food diversity is strong predictor stunting. Another study also done in central region of Mozambique shows that children of undernourished mothers are more likely to be stunted (Cruz *et al.*, 2017). A study conducted in Ethiopia also found that, maternal insufficient variety in diet was associated with over four times (AOR 4.03; 95% CI 2.18, 7.48) higher odds of having a stunted newborn (Ejigu and Tafese, 2023).

2.2.3.2. Maternal nutritional status

Newborns born to mothers suffering from chronic malnourishment had a significantly higher likelihood of being stunted (AOR = 15.3; 95% CI 8.12, 29.1) (Gonete *et al.*, 2021).

Additionally, newborns from mothers with MUAC <23 cm were found to have a 2.13 times higher risk of stunting at birth (AOR 2.13; 95% CI 1.13, 4.01) compared to newborns from mothers with MUAC ≥23 cm (Ejigu and Tafese, 2023). Similarly, the baseline survey was done as a part of interventional study undertaken in the ruler part of Southern Ethiopia, shows maternal anthropometry predict children nutritional status (Negash *et al.*, 2015).

2.2.3.3. Household food insecurity

Household food insecurity refers to limited or uncertain access to adequate and nutritious food for all household members. Mothers living in food-insecure households are at higher risk of inadequate dietary intake, which can lead to nutrient deficiencies and poor health outcomes for both the mother and her children. The study done on household food insecurity and demographic factor in south Africa found indicate that chronic household food insecurity during the periconceptional and antenatal period likely extends into the early years of childhood and is associated with both low birth weight and restricted linear growth (Harper *et al.*, 2023).

Moreover, a study done on associations of childhood, maternal and household dietary patterns in Ethiopia shows higher adherence to a "dairy, vegetable and fruit" dietary pattern is associated with increased HAZ and reduced risk of stunting (Melaku *et al.*, 2018). Similarly, newborns who were born to mothers from food-insecure households increases their risk of being stunting almost three times (AOR 2.56; 95% CI 1.46, 4.49) (Ejigu and Tafese, 2023).

2.4. Conceptual Framework

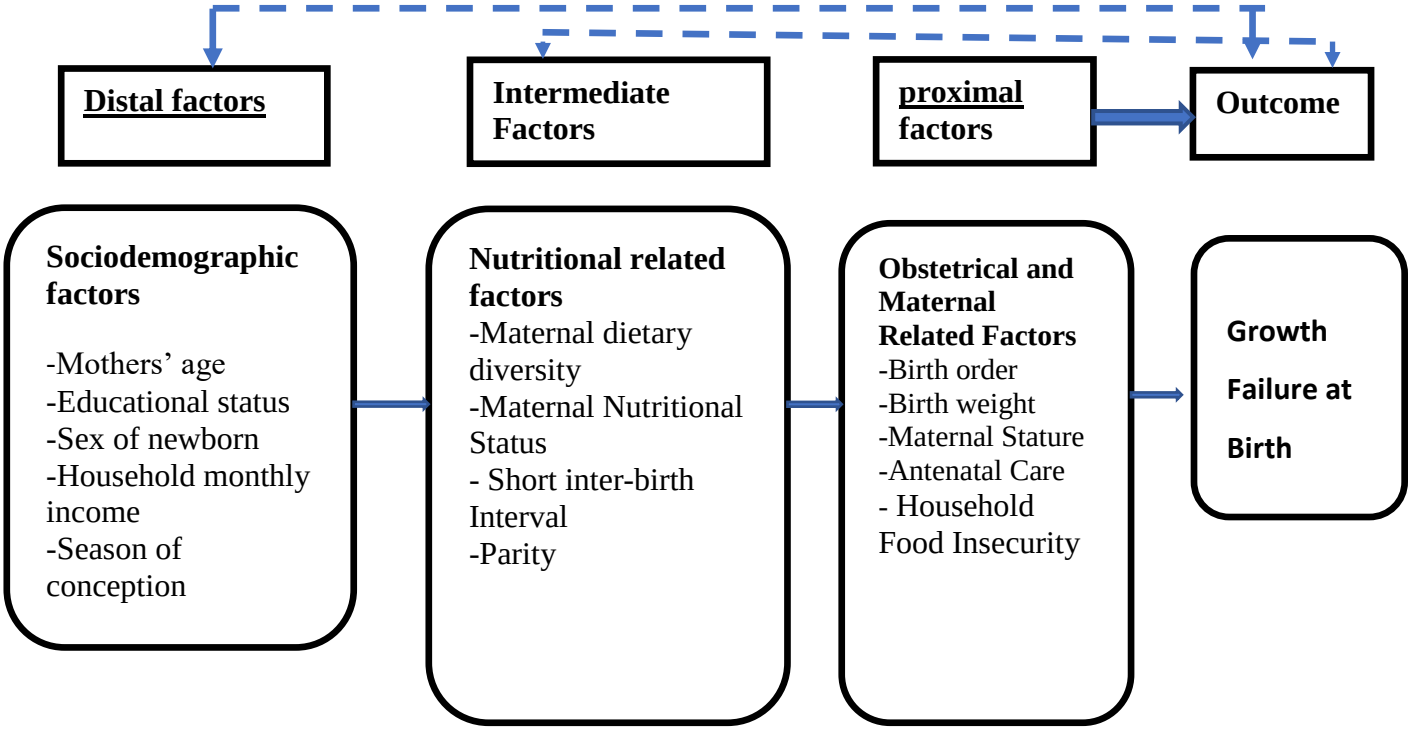

Figure 1: **Conceptual Framework**

Source: variables were retrieved from the following literatures (UNICEF, 2021;Sari and Sartika, 2021;Kassaw *et al.*, 2023;Gonete *et al.*, 2021;Ejigu and Tafese, 2023;Kuhnt and Vollmer, 2017;Benjamin-Chung *et al.*, 2023;Sahiledengle *et al.*, 2022). **Note**: the broken arrow line shows the possible less strength and the solid arrow line shows the high strength of association that existed between the sub grouped independent variables and the outcome variable.

3. METHODS AND MATERIAL

3.1. Study Area and Period

The study was conducted in public hospitals of Western Haraghe zone, Oromia regional state, Eastern Ethiopia. Chiro town is capital city of west Hareghe zone and the town located 321kms away from Addis Ababa in the eastern direction. In 2020, the Zone's population totaled 2,728,836. It comprises 15 districts and 2 city administrations. There are a total of seven public hospitals, 84 public health centers, and 482 health posts in the zone. The healthcare facilities include two general hospitals, Chiro and Gelamso General Hospital, and five primary hospitals: Asebot, Hirna, Burka Dhimtu, Badessa, and Daro Labu. All of the hospitals are giving Emergency management of obstetric and neonatal care (EMONC) service in Western Haraghe zone. The service given for pregnant mother in this hospital was antenatal care, skilled birth attendance, obstetric ultrasound and others similar services (West Harerghe Zone Health Bureau). The study was conducted from February 5 to March 30, 2025.

3.2. Study Design

A facility based cross sectional study was employed.

3.3. Population

3.3.1 Source population

The source population for this study comprised all newborns delivered in public hospitals and their index mothers in West Harerghe Zone.

3.3.2. Study Population

The study population of the current study were mothers with their newborns at who were attended the postnatal unit of selected public hospitals of West Harerghe Zone, during the data collection period.

3.4. Inclusion and Exclusion Criteria

3.4.1. Inclusion Criteria

All alive newborns and their index mother, who had attended postnatal ward during the data collection period was included in the current study.

3.4.2 Exclusion criteria

Multiple births (e.g., twins, triplets) were excluded to avoid confounding factors unique to these cases and newborns with congenital anomalies or genetic disorders that could independently affect growth parameters were excluded.

3.5. Sample Size Calculation

Sample size was calculated using both single and double proportion based on the specific objective.

3.5.1. Sample Size Determination for First Objective

For the first objective, sample size was calculated by using single population proportion formula, $n= (Z\alpha/_2)^2*P\ (1-P)/d^2$

It was summarized in the below table by using the prevalence of growth failure among different studies. Additionally, the following assumptions were considered,

- Single population proportion formula: $n= (Z\alpha/_2)^2*P\ (1-P)/d^2$
- 95% level of confidence, and 5% margin of error
- Where, n = minimum sample size required for the study
- $Z\alpha/2=1.96$, standardize normal distribution curve value for the 95% confidence interval

Table 1. sample size calculation for first objective of growth failure at birth and its associated factors among newborns delivered at public hospitals of West harerghe Zone.

Proportion of growth failure at birth	Calculated sample size	References
At Hawassa, P=35.6%	352	(Ejigu and Tafese, 2023)
At Gondar, P=30.5	326	(Gonete *et al.*, 2021)

3.5.2. Sample Size Calculation for the Second Objective

- For the second objective we used a double population proportion formula The sample size was calculated by using Epi Info version 7 software and the following assumption were considered: 95% confidence level and Power 80%.

Table 2: Sample size calculation for second objective of growth failure at birth and its associated factors among newborns delivered among public hospitals of WestHarerghe Zone.

Variables	% of Growth failure at birth		AOR	Sample Size	Reference
	Exposed	Non-exposed			
Nutritional status	59.4 (malnourished)	12.7 (Normal	15.4	40	(Gonete *et al.*, 2021)
Birth weight	49.4 (LBW)	25.6 (Normal)	3.1	144	(Gonete *et al.*, 2021)

Note: LBW-low birt weight

So that, the largest sample was founded from the first specific objective which is 352. In order to get an optimal sample size a10% non-response rate was added. Accordingly, the final sample size was found to be 387.

3.6. Sampling technique and procedure

Firstly, the health institutions were selected from the given Zone. In the West Harerghe Zone, there are seven public hospitals, consisting of two general hospitals and five primary hospitals. For this study, four hospitals were selected based on specific criteria to ensure representativeness of both general and primary hospitals. Among the two general hospitals, Chiro General Hospital was randomly selected. Additionally, from the five primary hospitals, three were chosen based on key considerations. One significant factor was the proximity of hospitals to one another for instance, Asebot Primary Hospital and Hirna Primary Hospital are located near Chiro General Hospital and serve a relatively homogeneous patient population (Moreover, these hospitals are located in the Woreda capitals, where residents share relatively similar socio-economic conditions). Given this, Asebot Primary Hospital was selected at random. Same consideration was made for the rest of hospitals.

Secondarily, the determined sample size was proportionally allocated to these four hospitals. Study subjects were then selected using the systematic random sampling technique. To apply this method, the sampling interval (K) needed to be determined. To

get the sampling interval (K), the total population (average one-month number of deliveries) which is (N), was divided by the determined sample size. To get the total population (N), the annual number of deliveries had been taken from all hospitals, and then the average number of deliveries for one (1) month was calculated.

Finally, every K^{th} (2) of newborns and the index mother was selected from the delivery registration book. Data was collected immediately after delivery. However, mothers were selected based on the order of their registration in the delivery registration book to maintain the randomness of the sample. On the first day of data collection, the initial participant (the first K) was chosen using a lottery method from among the first two recorded mothers and who gave birth during that day. Subsequently, every second mother who gave birth and was registered in the delivery book was selected.

The equation to calculate the proportional allocation of sample size, $n_i = \frac{N_i * n}{N}$

$n_{i=}$ proportionally allocated sample size for each hospital

N_i= one-month average number of deliveries for each hospital

n= determined sample size

N= one-month average number of deliveries for all hospital

Each selected hospitals 1-month average number of deliveries (N_i)

- Chiro General hospital-280, $n_{i=}$ 163
- Daro Labu primary hospital- 150, $n_{i=}$ 88
- Bedesa primary hospital-121, n_i= 71
- Asebot primary hospital-112, n_i= 65

Total (N)=663, so K=N/n, 663/387=1.71≈2, K=2

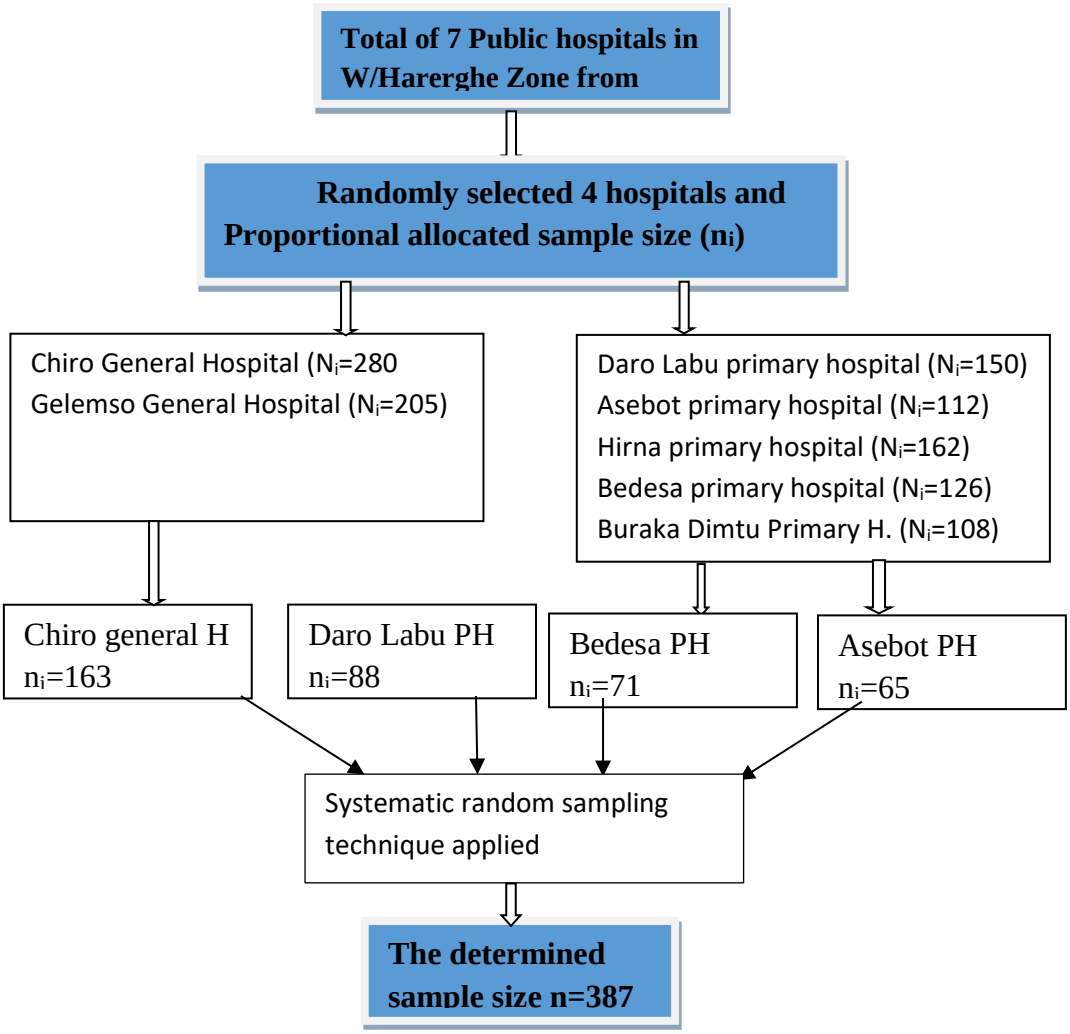

Figure 2: schematic presentation of sampling procedure

3.7. Data Collection Methods

3.7.1. Data Collection Instrument

An interviewer-administered questionnaire and checklist was utilized for data collection., Questionnaire was developed and uploaded to the Kobo Tool box mobile based data collection platform, The questionnaire was adapted from other similar studies (Gonete *et al.*, 2021;Ejigu and Tafese, 2023;Sari and Sartika, 2021). It is prepared in English and translated in to local languages of Affan-Oromo and Amharic languages. The questionnaire contains three parts: socio demographic characteristics, Obstetrics and maternal related factors, nutrition related factors. If the mother did not know her gestational age, it was cross-checked using the maternal medical card. Similarly, the number of antenatal care

(ANC) follow-up visits was verified from the same card. Minimum Dietary diversity score for women of reproductive age (MDD-W)**:** was calculated based on the number of food groups consumed by the mother women in the previous 24 h of the survey. The tool of MDD-W of dietary diversity score has ten food groups with the food listing method and it was adapted from Food and Agriculture Organization (FAO). It has ten food groups with the food list that was common foods in the local context. A score of 1 to each food group if the subject was consumed it in previous 24 hr. or 0 if not (FAO, 2016).

To assess the household food insecurity, the Household Food Insecurity Access Scale (HFIAS) tool, which was adopted from the previous studies was utilized. The score is based on the responses to nine questions (questions related to anxiety about food supplies, quality of foods, inadequate food intake and its consequences, and their frequency of occurrence) with scores ranging from 0 to 27. A score of 0-1 is considered food secure, while a score of 2-27 is considered food insecure (Coates *et al.*, 2007).

3.7.2. Data Collectors

Four (4) BSc Midwifes was recruited for the data collection purpose. Two (2) supervisors who had MSc in Maternity and neonatology nursing and MPH was recruited from the same facility, to oversaw the administration of the questionnaire, ensuring data quality control and to monitor the performance of data collectors.

3.7.3. Data Collection Procedure

Data collectors recruited study participants in the postnatal ward immediately after delivery, once they had stabilized. Initially, participants were asked about their willingness to participate, and eligibility criteria were assessed. The data collector then conducted interviews in a manner that ensured confidentiality and privacy. Finally, the collected data was recorded using the Kobo Tool mobile application platform

Measurement

Anthropometric measurements

Weight of the newborns: - was measured immediately after birth by using a balanced digital scale to the nearest 100 g, in every scale was calibrated to zero level before weighting the newborn (Ejigu and Tafese, 2023).

Length of the newborn: - was measured when the newborn lay in a supine recumbent position. Two persons, one supported and secures the head of the newborn and the other took measurements of the newborn's length from the top of their head to the heel of their foot. The measurement had been completed three times using an infant-meter the average length of three measurements was recorded to the nearest 0.5 cm to ensure accuracy (Gonete *et al.*, 2021).

MUAC of the mother: was measured using inelastic MUAC tape. The midpoint of the left upper arm was located by flexing the women's elbows to 90 degree with the palm facing upwards, and the midpoint between the acromion and olecranon processes was marked. After this, a measuring tape was placed around the arm at the midpoint. Two measurements was taken and reported to the nearest 0.1 cm. mothers with MUAC < 23 cm is considered undernourished, and ≥ 23 cm is considered well-nourished (FMOH., 2019).

Minimum Dietary diversity score for women of reproductive age (MDD-W)**:** was calculated based on the number of food groups consumed by the mother women in the previous 24 h of the survey. Tool MDD-W of dietary diversity score has ten food groups with the food listing method, in which a list of food items was replaced by common foods in the local context. A score of 1 to each food group if the subject will be consumed it in previous 24 hr. or 0 if not. The scores of the ten food groups will be summed up to calculate the total dietary diversity score of women. So, a MDD-W score of ≥ 5 was labeled as the woman had adequate dietary diversity and score <5 inadequate (FAO, 2016).

House hold food insecurity: was assessed by household food insecurity during the 4 weeks preceding the survey. The Household Food Insecurity Access Scale (HFIAS) Score is based on the responses to nine questions with scores ranging from 0 to 27. A score of 0-1 is considered food secure, while a score of 2-27 is considered food insecure (Coates *et al.*, 2007).

3.9. Study Variables

Dependent variable: growth failure at birth

Independent variables

Socio-demographic characteristics: - Maternal age, mothers' educational status, and sex of the newborn.

Obstetrics and maternal related factors: - short inter-birth interval, birth order, ANC follow-up, birth weight, maternal stature.

Nutritional characteristics of mothers: - House hold food insecurity, maternal dietary diversity, and maternal nutritional status.

3.10. Operational Definition

Growth Failure at Birth: For the purposes of this study, growth failure at birth refers to newborns that are born with a birth Length-for-age (LAZ) <-2, while those newborns with the LAZ ≥ -2 was classified as 'does not have growth failure', it was based on the same sex references (De Onis and Branca, 2016).

Short Maternal stature: if the mothers height is below 145cm after it is measured with standard height measurement instrument it was reported as short maternal stature. If it is greater than 145 cm it was categorized as appropriate (Sumarmi, 2016).

Maternal undernutrition: a measuring tape was placed around the arm at the midpoint. Two measurements had been taken and reported to the nearest 0.1 cm. mothers with MUAC < 23 cm is considered undernourished, and ≥ 23 cm is considered well-nourished (Ververs *et al.*, 2013).

Short inter-birth interval: if the months between the index neonate and the older child is below 24 month it was declared as short inter-birth interval (Organization, 2007).

Low Birth weight: if the weight of the newborn is <2500 gm after it was measured with a calibrated digital scale it was reported as low birth weight (Sintayehu *et al.*, 2023).

3.11. Data Quality Control

To assure the quality of data, the following measures were employed to overcome major areas of bias introduction during the data collection process. Pretest was conducted at Hirna primary hospital one week prior to actual data collection time. By taking 5% of the sample size that was not included in the actual study population and corrections was made based results of the pretest. Daily, on site supervision by the supervisor was carried out during the whole period of data collection. To minimize anthropometric measurement errors, data collectors were trained to follow standardized procedures using calibrated equipment. MUAC and maternal length, as well as neonatal height and weight, were measured twice, and a third measurement was taken if discrepancies exceeded acceptable limits.

Supervisors closely monitored the process, and data were checked for implausible values during cleaning. To assess the reliability of anthropometric measurements the Coefficient of Variation (%CV) was computed on the 5% of the total sample size. For instance the %CV for the repeated measurement of neonatal height was found to be 7.2% which was in the acceptable range.

3.12. Data Processing and Analysis

After data collection was completed, the data was downloaded from the Kobo Toolbox and imported to SPSS Version 26 for analysis. WHO Anthro Software was used to convert the anthropometric measurements to WHO Z-score. The outcome variable was dichotomized in to 'Yes' (having growth failure at birth) and 'No' (not having growth failure at birth). The neonate was declared of having growth failure if the Length/Height-for-age z-score (HAZ) < -2. Descriptive analysis such as frequencies and percent were calculated. The analyzed data was summarized using mean (±SD) for normally distributed continuous variables or median (IQR) for non-normally distributed continuous variables and frequency table with percent for categorical variables. The result was presented in tables and graphs. A Candidate variable with p-value less than 0.25 in bivariate analysis was entered to multiple logistic regressions. Multivariate logistic regression analysis was performed to assess the association of each independent factor with growth failure at birth.

The model goodness of fit was tested by Hosmer-Lemeshow statistic and omnibus test. The model was declared a good fit because it was found significant for omnibus test (P= 0.000) and insignificant for Hosmer-Lemeshow (P= 0.201). To assess the correlation between independent variables, a multicollinearity test was conducted. The results showed no variable with a Variance Inflation Factor (VIF) greater than 10 or a tolerance value less than 0.1, indicating no significant multicollinearity. Statistical Significance association was determined using 95% confidence intervals of adjusted odds ratios and p-value of less than 0.05.

3.13. Ethical Consideration

Ethical clearance was obtained with reference letter number of (IHRERC/301/2024) from Research Ethical Review Committee of Haramaya University School of Public Health. Letter of permission was obtained from medical directors of respective hospitals. In

addition to that, informed, voluntary, written, and signed consent was obtained from all study subjects who assured that participation. Finally, all questionnaires were kept locked after data entry completion. Issues related to risks and benefits, confidentiality and rights are considered.

3.15. Information Dissemination

The result from the current study will be presented for the final defence, then after it will be submitted to Hramaya University College of Health and Medical Sciences, to the West Harerghe Zone Health Bureau. Finally, it will be published on international peer reviewed and reputable journals.

4. RESULT

4.1. Socio Demographic Characteristics of Mothers

Among the 387 intended newborns and their respective mothers admitted to the immediate postnatal room, all were included in this study, resulting in a 100% response rate. The median age of the mothers was 33 years, with an interquartile range of 2 years. A significant portion of the women, 130 (33.6%), reported being able to read and write. Regarding income, the majority of women (78.3%) indicated that their monthly income was greater than or equal to 5,000 Ethiopian birr (Table 3).

Table 3. Socio Demographic Characteristics of Mothers of newborns delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025 (n=387)

Variables	Frequency	Percentage
Maternal age (n=387)		
<20 years	17	4.4
20-34 years	281	72.6
≥35 years	89	23

Maternal education (n=387)		
Unable to read & write	33	8.5
Read & write	130	33.6
Primary school	88	22.7
Secondary school	93	24
College & above	43	11.1
Average monthly household income (n=387)		
≤2000 birr	42	10.9
2000-5000	42	10.0
≥5000	303	78.3
Sex of neonates		
Male	219	56.6
Female	168	43.4
Gestational age		
≥37 wks.	305	78.8
<37 wks.	82	21.2

4.2. Obstetrical and Maternal related factors

Among the total study participants (n=387), the majority 361(93.3%) were multiparous, while only 26 (6.7%) were primiparous. Among the mothers with previous births (n=361), 290 (80.3%) of them had a birth interval of 24 months or more, and 71 (19.7%) of them had intervals shorter than 24 months. Regarding antenatal care, 241 (62.3%) of the mothers attended ANC follow-ups, whereas 146 (37.7%) did not. Among those who received ANC (n=241), 182 (75.5%) of the mothers had more than four visits, while 59 (24.5%) had four or fewer visits (Table 4). Additionally, the largest proportion of women (39.6%) reported that this was their sixth child in the birth order and most (41.6%) of them reported that they were conceived during Kiremt season (Table 4).

Table 4. obstetrics and maternal related factors of Mothers of newborns delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025 (n=387)

Variables	Frequency	Percentage
Parity (n=387)		
Primipara	26	6.7
Multipara	361	93.3
Birth interval (n=361)		
<24 months	71	19.7
≥24 months	290	80.3
ANC follow-up (n=387)		
No	146	37.7
Yes	241	62.3
ANC frequency (n=241)		
≤4	59	24.5
>4	182	75.5
Birth order		
1	26	6.7
2	24	6.2
3	23	5.9
4	28	7.2
≥5	286	74
Season of conception		
Winter	91	23.5
Spring	70	18.1
Rainy	161	41.6
Autumun	65	16.8

Primipara= Women who gave one viable birth, Multipara= Women who had more than one pregnancy resulted viable offspring, ANC=Antenatal care

4.3. Household Food Insecurity Access Scale (HFIAS)

Based on this classification, the results indicated that approximately 192 households (49.6%) (95% CI: 44.9, 54.0) experienced food insecurity, whereas 195 households

(50.4%) were food secure, as illustrated in the figure below. The mean and median score was found to be 5.1 and 1.0 respectively.

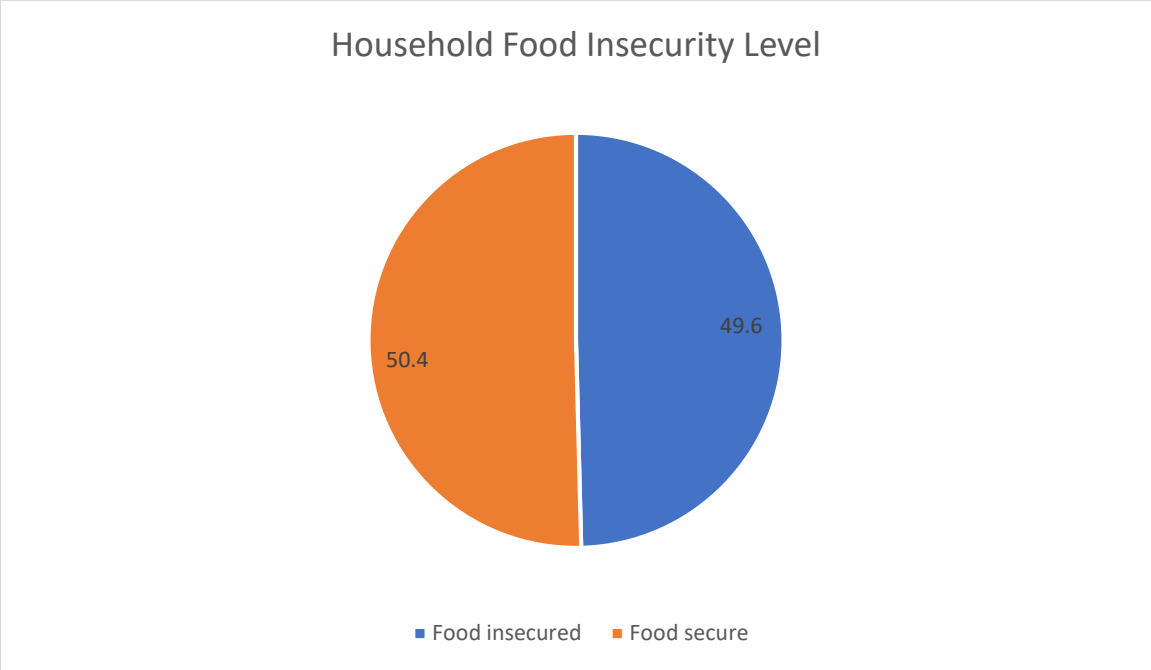

Figure 3. Household foof insecurity level mothers of newborns delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025 (n=387)

4.4. Dietary diversity of mothers with neonate

Among the intended number of study participants (n=387), three hundred eighteen (82.2%) (95% CI: 78.6, 86.0) of mothers with neonate had adequate dietary diversity, whereas 69 (17.8%) did not. The mean dietary diversity score was 7.5 and the median score was found to be 9.

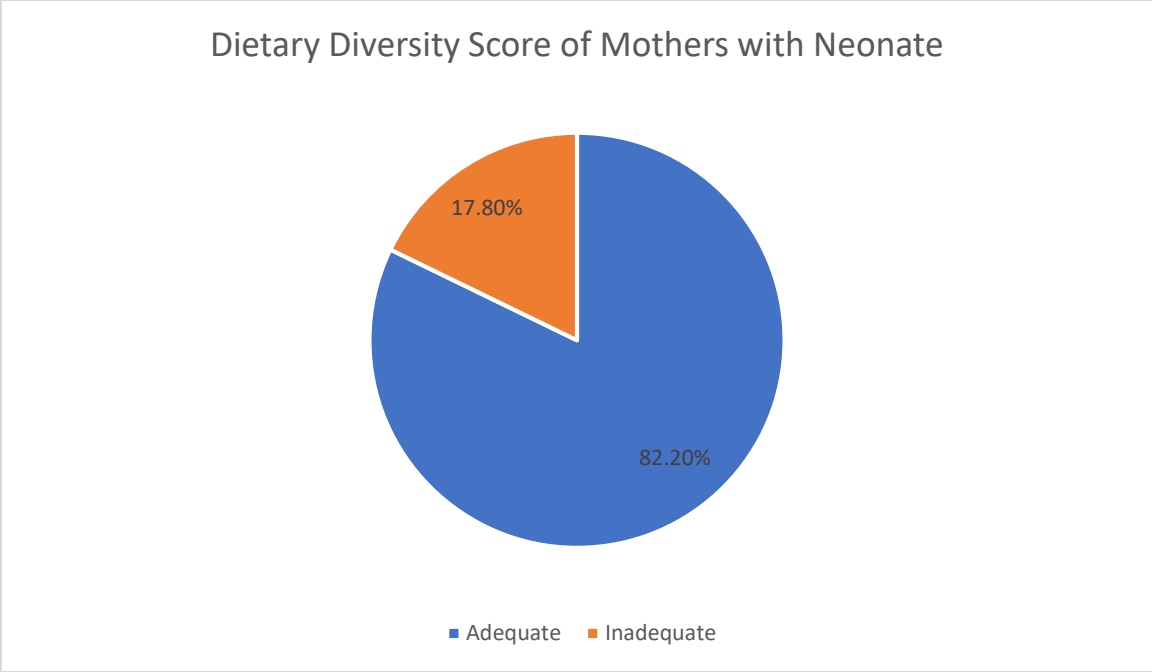

Figure 4. Dietary diversity level of mothers of newborns delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025 (n=387)

4.5. Anthropometric Measurements of the Mothers

Maternal nutritional status, as measured by mid-upper arm circumference (MUAC), revealed that 256 (66.1%) of mothers had a MUAC below 23 cm. Additionally, 365 (94.3%) of mothers were greater than 150 cm. The mean MUAC value of the mothers was 21.5 and the median score was 20.

Table 5. Anthropometric measurements result of the mothers delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025 (n=387).

Variables	Frequency	Percentage
Maternal MUAC		
≥23 cm	131	33.9
<23 cm	256	66.1
Maternal height		
≥150cm	365	94.3
<150cm	22	5.7

4.6. Anthropometric Measurement Result of Neonates

A majority of infants (84.8%) had a healthy birth weight of 2,500 grams or more, while 15.2% were born underweight, suggesting a notable concern for growth failure. The mean birth weight of newborns was 2881.2 gram and the median weight was 3000 gram. Male neonates slightly outnumbered females, comprising 56.6% of births. Most deliveries occurred at full term (≥37 weeks), with 78.8% reaching this milestone and 21.2% born preterm. Additionally, two-thirds of newborns (66.7%) measured at least 50 cm in length, though 33.3% fell below this threshold (Table 6).

Table 6. anthropometric measurements result of neonates delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025 (n=387).

Variables	Frequency	Percentage
Birth weight		
≥2500 gm	328	84.8
<2500 gm	59	15.2
Length of the neonate		
≥ 50 cm	258	66.7
<50 cm	129	33.3

4.7. Prevalence of Growth Failure at Birth

According to the result of this study the prevalence of growth failure at birth was found to be 28.2% (95% CI: 23.8, 33.1) among a sample of 378 newborns. The proportion of growth failure among male neonates was found to be greater than that of female, where the proportion of growth failure were found to be 15.5% and 12.7% respectively. The mean of Z score was 0.02 and the median was 0.06. Regarding the proportion of growth failure at birth among neonates of a mother who had ANC follow up and who hadn't, around 15% of the neonates of mothers who had ANC follow up had developed a linear growth failure at birth compared to 13.2% among who didn't had ANC follow up. The proportion of growth failure at birth was four times higher among neonates from food-insecure households (22.7%) compared with those from food-secure households (5.5%) (Figure 7).

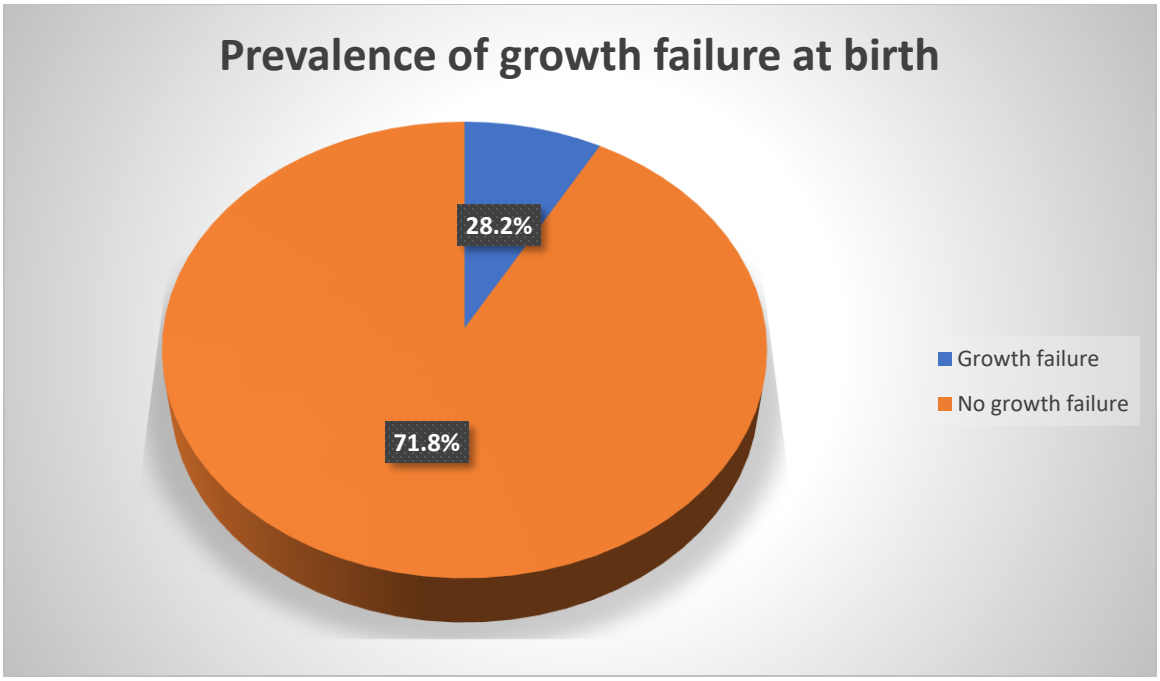

Figure 5. prevalence of growth failure at birth of mothers of newborns delivered in public hospitals of West Harerghe Zone, Ethiopia, from February 5 to March 30, 2025 (n=387)

4.8. Factors Associated with Growth Failure at Birth

To examine the relationship between the independent variables and growth failure at birth, both bivariate and multivariate logistic regression analyses were conducted. In the bivariate analysis, several variables were found to have significant (with $P \leq 0.25$) associations with growth failure. These included household food insecurity, maternal dietary diversity, antenatal care (ANC) frequency, maternal height, birth weight, gestational age, maternal MUAC, birth interval, maternal age, maternal education, season of conception, and household income. All these variables were subsequently included in the multivariate logistic regression model. However, after adjusting for potential confounders, only maternal age, household food insecurity, and maternal MUAC remained statistically significant predictors of growth failure at birth**.**

Newborns from food-insecure households had 4.5 times higher odds of experiencing growth failure compared to those from food-secure households (AOR = 4.5; 95% CI: 1.7–11.7). Similarly, the odds of growth failure among newborns whose mothers had a mid-upper arm circumference (MUAC) less than 23 cm were 3.2 times higher than those whose

mothers had a MUAC of 23 cm or more (AOR = 3.2; 95% CI: 1.1–9.5), indicating the impact of maternal undernutrition. Maternal age also showed a strong association: newborns of mothers between 20-34 years had 6.5 times higher odds of growth failure compared to those born to mothers aged 35 years and above (AOR = 6.5; 95% CI: 2.3-18.8) (Table 8).

Table 7. Factors Associated with Growth Failure at Birth of mothers of newborns delivered in public hospitals of West Harerghe Zone, Ethiopia (n=387)

Variables	Response	Growth failure at birth		COR (95% CI)	AOR (95% CI)	P-value for AOR
		Yes	No			
Household food insecurity	Secure Insecure	21 88	174 104	1 7.01 (4.1, 11.9)	1 4.5 (1.7, 11.7) *	0.002
Dietary diversity	Inadequate Adequate	43 66	26 252	6.3 (3.6, 11.02) 1	3.2 (0.8, 12.6) 1	0.097
ANC frequency	≤4 >4	18 40	41 142	1.55 (0.80, 3.0) 1	1.4 (0.4, 5.0) 1	0.576
Maternal height	≥150cm <150cm	97 12	268 10	0.3 (0.12, 0.72) 1	0.5 (0.1, 2.4) 1	0.395
Birth weight	≥2500gm <2500gm	81 28	247 31	0.36 (0.2, 0.64) 1	0.3 (0.05, 1.3) 1	0.102
Gestational age	≥37 wks. <37wks.	76 33	229 49	0.49 (0.2, 0.82) 1	0.9 (0.3, 3.1) 1	0.948
MUAC	≥23cm <23cm	43 66	88 190	1.4 (0.88, 2.23) 1	3.2 (1.1, 9.5) * 1	0.034
Birth interval	<24month ≥24months	28 66	43 224	2.2 (1.27, 3.82) 1	0.4 (0.09, 1.6) 1	0.195

Maternal age	<20 yrs.	12	5	6.5 (2.1, 20.3)	1.1 (0.04, 29.4)	0.96
	20-34 yrs.	73	208	0.9 (0.5, 1.62)	6.5 (2.3, 18.8)	0.00
	≥ 35 yrs.	24	65	1	**	
					1	
Maternal education	Unable to read & write	16	17	4.1 (1.4, 11.5)	1.03 (0.16, 6.5)	0.97
	Read & write	24	106	0.9 (0.4, 2.4)	0.7 (0.2, 3.09)	0.62
	Primary (1-8)	29	59	2.1 (0.8, 5.2)	2.2 (0.6, 8.9)	0.25
	Secondary (9-12)	32	61	2.3 (0.9, 5.5)	1.9 (0.5, 6.9)	0.34
	College & above	8	35	1	1	
Season of conception	Winter	15	76	0.3 (0.15, 0.7)	0.3 (0.08, 1.2)	0.09
	Spring	27	43	1.1 (0.5, 2.1)	1.8 (0.55, 5.6)	0.33
	Rainy	43	118	0.6 (0.3, 1.1)	0.8 (0.25, 2.2)	0.60
	Autumn	24	41	1	1	
Household monthly average income	≤2000 birr	30	12	8.3 (4.04, 11.1)	0.9 (0.12, 7.1)	0.94
	2000-5000 birr	9	33	0.9 (0.4, 1.98)	0.4 (0.13, 1.4)	0.16
	>5000 birr	70	233	1	1	

*****significant with P<0.05 and **significant with P<0.001, CI= Confidence Interval, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio**,** MUAC=mid upper arm circumference, ANC=antenatal care

5. DISCUSSION

This study sheds light on the prevalence of growth failure at birth in Ethiopia's West Harerghe Zone and its key contributing factors. Its finding will provide actionable insights for improving maternal nutrition and household food security to enhance newborn health outcomes. The prevalence of growth failure at birth in this study was slightly lower than that reported in other studies conducted in Ethiopia. In the current study, maternal age, household food insecurity, and maternal MUAC were found to be statistically significantly associated with growth failure at birth.

Our study found that the prevalence of growth failure at birth was 28.2% (95% CI: 23.8, 33.1). Benjamin-Chung et al. (2023) reported a stunting prevalence of 21.9% across LMICs in 2018, indicating a general decline. However, the higher prevalence found in the present study (28.2%), along with recent local data, such as 30.5% in Gondar and 35.6% in Hawassa, highlights the persistent disparities in underserved regions like Ethiopia (Ejigu and Tafese, 2023;Gonete *et al.*, 2021). The finding of the current study mirrors the authors' observation that stunting at birth is particularly severe in Sub-Saharan Africa compared to South Asia (Benjamin-Chung *et al.*, 2023). The reason for this can be attributed to the relatively higher poverty rate found in this area.

The overall proportion of growth failure at birth from this study which was 28.2% (95% CI: 23.8, 33.1) is consistent with a study conducted in Gondar, of Ethiopia in which the prevalence of growth failure at birth was reported to be 30.5% (Gonete *et al.*, 2021) and with a study conducted in Guatemala where the prevalence of growth failure at birth was reported to be 33% (Solomons *et al.*, 2015). This can be attributed to the fact that, these all previous studies were institution based, nearly approximate sample size utilization.

However, the prevalence of growth failure at birth in the current study (28.2%) is lower than that reported in Hawassa (35.6%) (Ejigu and Tafese, 2023). A possible explanation for this difference could be the higher rate of household food insecurity (58.6%) and inadequate dietary diversity (22.4%) reported in the Hawassa study. In contrast, the present study found a lower household food insecurity rate (49.6%) and a women's dietary diversity score of 17.8%, which may have contributed to the relatively lower prevalence of growth failure.

In the current study, newborns from food-insecure households had 4.5 times higher odds of experiencing growth failure compared to those from food-secure households. This finding is consistent with previous studies conducted in Hawassa, Ethiopia (Ejigu and Tafese, 2023) and with study conducted in South Africa (Harper *et al.*, 2023). This could be attributed to, chronic household food insecurity during the periconceptional and antenatal period likely extends into the early years of childhood and is associated with both low birth weight and restricted linear growth.

In this study, maternal mid-upper arm circumference (MUAC) below 23 cm was associated with a threefold increase in the odds of growth failure (AOR = 3.2). This finding is consistent with previous studies conducted in Gondar (AOR = 2.8; Gonete et al., 2021) and Hawassa (AOR = 2.13; Ejigu & Tafese, 2023). A possible explanation for this association may lie in broader national disparities in food insecurity, which can significantly impact maternal nutritional status and, consequently, fetal growth and development (Ejigu and Tafese, 2023;Gonete *et al.*, 2021).

In contrast to a study conducted in Indonesia, which found that newborns of mothers aged 25 years or older had lower odds of being stunted (AOR = 0.8; 95% CI: 0.68–0.95) compared to younger mothers (Sari and Sartika, 2021), the current study revealed that mothers aged 20–34 years had 6.5 times higher odds of delivering growth-compromised newborns compared to those aged 35 years and above. This discrepancy may reflect contextual differences in maternal health, nutrition, and access to care across settings.

Growth failure at birth is a critical early indicator of chronic undernutrition and is strongly associated with increased risks of infant morbidity, mortality, impaired cognitive development, and long-term health complications. The strong associations identified between growth failure and factors such as maternal undernutrition (MUAC < 23 cm), household food insecurity, and maternal age highlight the multifaceted nature of the problem. These findings emphasize the need for integrated maternal and child health interventions that address both immediate nutritional needs and the broader social determinants of health.

This study provides critical evidence that growth failure at birth is a significant public health issue in West Harerghe, with direct links to maternal nutrition, food insecurity, and maternal age. Its implications are far-reaching: it calls for policymakers to strengthen maternal nutrition programs, integrate routine MUAC screening into antenatal care, and expand food security initiatives targeting vulnerable households. The findings also challenge assumptions about maternal age risk profiles, suggesting the need for more inclusive maternal health strategies. By highlighting locally relevant risk factors, the study supports the localization of national nutrition policies and encourages the use of birth outcomes as key indicators in health monitoring systems ultimately guiding more targeted, data driven interventions to improve maternal and child health outcomes.

6. STRENGTH AND LIMITATION OF THE STUDY

6.1 Strength of the study

This study possesses strengths. First, unlike previous studies conducted in Ethiopia, which were limited to single-institution settings, the current study was conducted in multiple institutions, this will improve the generalizability of the finding. Additionally, this research addresses growth failure at birth, a specific and early indicator of child undernutrition that is often overlooked in favor of late childhood stunting. This focus helps fill a gap in the literature and emphasizes the importance of perinatal health

6.2 Limitation of the study.

Despite these strengths, the study also has some limitations. The cross-sectional design restricts the ability to establish causal relationships between the identified factors and growth failure at birth, as it captures data at a single point in time. Being a facility-based study, it may not reflect the experiences of mothers who deliver at home or in private facilities, limiting the generalizability of the findings. Some variables, such as dietary diversity and household food insecurity, were based on self-reported data, which may be subject to recall or social desirability bias.

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

The result of this study demonstrates that growth failure at birth remains a pressing public health issue in the West Hararghe Zone. This rate is consistent with findings from other regions in Ethiopia and comparable LMICs, underscoring the persistent burden of early-life undernutrition in underserved settings. The study identified maternal undernutrition (MUAC < 23 cm), household food insecurity, and maternal age (particularly 20–34 years) as significant predictors of growth failure. These findings highlight the complex interplay between maternal health, nutritional status, and socio-demographic conditions in shaping neonatal outcomes. Notably, the strong association between food insecurity and growth failure reinforces the need for integrated interventions that address both nutritional and social determinants of health. Moreover, the higher prevalence observed in this study compared to global averages reflects regional disparities and calls for targeted, context-specific strategies. Strengthening maternal nutrition programs, improving household food security, and enhancing antenatal care services are critical policy priorities to mitigate the risk of growth failure at birth. Finally, this study contributes valuable evidence to the national and regional understanding of neonatal growth failure and provides actionable insights for public health planning and policy formulation aimed at improving maternal and child health outcomes in Ethiopia.

7.2. Recommendation

In light of these findings, several recommendations are proposed for key stakeholders involved in maternal and child health:

For the national and regional health bureaus

- Addressing Household Food Insecurity: Policies aimed at improving food security such as social protection programs, food subsidies, and agricultural support can have a direct impact on maternal and child health outcomes.

- Enhancing Antenatal Care Services: Integrating nutrition counseling, food security assessments, and maternal health education into antenatal care can help identify and mitigate risks early.
- Focusing on High-Risk Groups: Given the unexpected finding that mothers aged 20–34 had higher odds of delivering growth compromised newborns, further investigation is warranted. In the meantime, maternal health programs should not overlook this age group, assuming they are at lower risk.

For Health Facilities and Health Care providers

- Strengthen community-based nutrition education to raise awareness about the importance of maternal diet and its impact on fetal growth
- Develop and implement targeted nutrition programs for pregnant women, especially in food-insecure areas, including the provision of supplements and fortified foods.
- Train health workers on early identification and management of maternal undernutrition and food insecurity.
- Enhance ANC services by incorporating regular assessments of household food security and maternal nutritional status.

For Researchers

- Further longitudinal and community-based studies are recommended to explore causal relationships and to capture data from non-institutional births, thereby improving the generalizability of future research.
- Conduct further studies to explore the underlying causes of the unexpected association between maternal age (20–34 years) and growth failure at birth.

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7. ANNEXES

7.1. Information Sheet and Informed Voluntary Consent Form for The Head of Hospital

Introduction:

My name is **Habtamu Tesfaye** I am working as a principal investigator of the study being conducted in this Hospital. I am MPH student at Haramaya University, College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your institutions being selected as a study participant.

Title of the study:

Growth Failure at Birth and Associated Factors Among Newborns Delivered at Public Hospitals in West Harerghe, Oromia Region, Ethiopia.

Purpose of the study:

The findings of this study can be of a paramount importance for the Hospital to plan intervention programs to prevent growth failure at birth in the community, thereby improve child health and survival in general. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in Public Health Nutrition for the principal investigator.

Procedure and duration:

The data collectors will ask the mother of the neonates about themselves and their newborn baby by using a questionnaire and they will extract some information from baby's medical record by using check-lists, additionally they will perform some measurements on the mother as well as on the neonate that will help us to now the prevalence of growth failure at birth and its associated factors. There are around 48 questions to answer where the data collector will fill the questionnaire by interviewing the mothers of neonates. And around 6

maternal and neonate anthropometric measurements which will be filled after taking measurements.

Risks and benefits:

The risk of being participating in this study is very minimal, but only taking a few minutes from mothers' time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for different stakeholders.

Confidentiality:

The information that would be provided will be kept confidential. There will be no information that will identify participants in particular. The finding of the study will be general for the study community and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. The participants have the right to declare to allow their neonates to be involved or not in this study. If they decide to participate in this study, they have the right to withdraw from the study any time and this will not label them for any loss of benefits which they entitled. They don't have to answer to any question that they don't want to answer. Additionally, The Hospital has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in the Hospital's premises

Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact the following address: Principal investigator: Habtamu Tesfaye, E-mail-tesfahabtamu038@gmail.com, Mobile phone-0910159036. Institutional Health Research Review Committee: Office Phone Number+251254662011, P.O.BOX 235, Harar, Ethiopia.

Declaration of informed voluntary consent:

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risk and benefits, issues of confidentiality, the right of participating and the contact address to for any queries. I have been given the opportunity to ask questions for thigs that may have been unclear. I was informed that participants have the right to withdraw from the study at any time or not to answer any questions that they don't want. I am also informed that the hospital has the right to stop this study from being conducted if any misdeeds or unethical procedures are observed during the data collection process in the hospital's premises. Therefore, I declare my voluntary consent on behalf of (_____) management to allow this study to be conducted in the (_____) hospital with my initials (signatures).

Name and signature of head of the hospital _____,
_____date_____.

Name and signature principal investigator_____, _____
date_____

Thank you for your cooperation!

7.2. Participant Information Sheet and Informed Voluntary Consent Form for the Participants (for competent adults: ages ≥ 18 years)

Introduction:

My name is **(_____)**. I am working as a data collector for the study being conducted in this Hospital by (Habtamu Tesfaye) who is studying for his Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your being selected as a study participant.

Title of the study:

Growth Failure at Birth and Associated Factors Among Newborns Delivered at Public Hospitals in West Harerghe, Oromia Region, Ethiopia

Purpose of the study:

The findings of this study can be of a paramount importance for the Hospital to plan intervention programs to prevent growth failure at birth in the community, thereby improve child health and survival in general. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in Public Health Nutrition for the principal investigator.

Procedure and duration:

I will be interviewing you using a questionnaire to provide me with pertinent data that is helpful for the study**.** Additionally, I will measure your height and mid upper arm circumference, as well as your neonate's weight and height. This information will help us to determine the prevalence of growth failure at birth and its associated factors. There are around 48 questions to answer where I will fill the questionnaire by interviewing you. And around 6 maternal and neonate anthropometric measurements which will be filled after taking measurements. The whole process will take around 50 minutes.

Risks and benefits:

The risk of being participating in this study is very minimal, but only taking a few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for different stakeholders.

Confidentiality:

The information you will provide us will be confidential. There will be no information that will identify you or your newborn in particular. The finding of the study will be general for the study community and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the

study any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you don't want to answer.

Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact the following address:

Principal investigator: Habtamu Tesfaye, E-mail- tesfahabtamu038@gmail.com, Mobile phone-0910159036.

Institutional Health Research Review Committee: Office Phone Number- +251254662011, P.O.BOX 235, Harar, Ethiopia.

Declaration of informed voluntary consent:

I have read/was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risk and benefits, issues of confidentiality, the right of participating and the contact address for any queries. I have been given the opportunity to ask questions for thigs that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any questions that I don't want. Therefore, I declare my voluntary consent to participate in this study with my initials (signatures).

Name and signature of participants _____, _____date_____

Name and signature of data collector_____, _____ date_____

Thank you for your cooperation!

7.3. Afan Oromo Version of Participants Information Sheet and Informed Voluntary consent Form to be Filled by Participants (for competent adults: ages ≥ 18 years)

Haadholii gaffi irratti hirmatanif odeffanno kennamufii Gabatee odeffanon irratti guutamu

Maqaan koo_____ Jedhama yeroo amma kanatti isin faana kanan argame university haramayatti kollejji fayya fii saayinsii yaalatti barataa digirii lammaffa kan ta`efii barreffama ebbisaa **kufaatii guddina sararaawaa yeroo dhaloota fi sababa kanaan walqabatu** kan qoratu barataa Habttaamu Tasfayetiif ragaalee barbachisan sassaabudhafi. Kanaafuu wa`ee qorannoo kanaa ibsa gababaan isinif kennamee qoranno kanarratti qooda akka fudhattan kabajan isin gaafanna.

Mataduree Qorannichaa: **- kufaatii guddina sararaawaa yeroo dhaloota fi sababa kanaan walqabatu**

Kayyoo qorannichaa: Argannoon qorannoo kanaa Hospitaalichi sagantaalee gidduu seensaa yeroo dhalatan hawaasa keessatti guddinaan akka hin kufne karoorsuu, kanaanis fayyaa daa'immanii fi walumaa galatti lubbuun jiraachuu fooyyessuuf barbaachisummaa olaanaa qabaachuu danda'a. Kana malees, kaayyoon qorannoo kanaa qorataa ijoodhaaf Sagantaa Maastarsii Nyaata Fayyaa Hawaasaa galmaan ga'uuf akka barbaachisummaa gartokkeetti barruu qorannoo barreessuudha.

Haala adeemsa gaaffichafii yeroo inni fudhatu:- Gaffichi waliigalati gafi 48 kan qabu yoo ta`u giddugalessatti daqiiqa 50 ni fudhata. Kanaafu yeroo qabdanirraa yero murasa gaffile kanaf akka naaf eyyamtan dhifamanin isin gaafadha.

Faayidaafi midhaa qorannichaa: - qorannoo kanarratti hirmachuu keessanif gaffii gaafachuuf yeroo isin jalaa fudhatun ala isinifii daa`iman kessan irratti midhan ga`u hin jiru. Qorannoo kanarratti hirmachuu keessanif kaffaltin isinif laatamu hin jiru garuu, faayidaan qorannichaa wajjiralee fayyaa nannootiif akkasumas waajjiralee tajajila fayya kennanif fayidaa guddaa qaba.

Odeeffanno kessanif ofegganno taasifamu: - odeffannon isin nuuf laattan iccitidhan waan qabamuuf homalle yaadda`un isinirra hin jiru. Haala kaminuu odeeffannon kessan qaama hin ilaallanne harka hin galu. Qorannichi akka waligalaatti malee isin qofa wabii goonee kan ibsinu miti. Gaafficharratti maqaan keessan hin jiraatu.

Mirga isin qorannicharratti qabdan: - guutumatti qorannon kun fedha keessanirratti kan hunda`e yoo ta`u irratti hirmachus ta`e dhisuufis mirga guutuu qabdu. Qaama qorannicha ta`uf fedha yoo qabattan gaffi deebisuu hin feene debisuu dhisuu akkaasumas qorannicha yeroo barbaddan addan kutuf mirga qabdu. Sababa kana gootanif tajaajilli isinitti hira`atuu fi yakki isinirra ga`u hin jirus hin jiraatus.

Naannoo qorannichaa: - qorannichi yeroo taasifamu kamittuu haala qorannichaa ilaalchisee fi gaaffii kamiyyuu yoo qabaattaan odeeffannoo kanaa gaditti fayyadamtani nu argachuu dandeessuu.

i. Qo`ata olanaa: - Habtamu Tasfayee

Toora emaili: tesfahabtamu038@gmail.com

Lakk. Bilbilaa: - 0910159036.

ii. Dhaabbata qoranno fayya fi hoji raawwachistu to`anna sirna naamusaa: -

Lakk bilbilaa: - +251254660708

Lakk sanduqa poosta: - 235, harar, Ethiopia

Hubanno gubbaatti argattani irraatti hunda`udhan hirmaattota qorannoo kanaa ta`uu kessaan kan itti dhugomsitan: - haala qorannichaa odeeffannoo kennamerra naaf dubbifameera/dubbifadheera. Kaayyoo bu`uura qorannichaa, adeemsi isaa, faayidaafi midhaa, fayyummaa odeeffannoo kootii, mirga hirmannaa koofi bakki qoratichaa naaf ibsameera. Yeroo qoranna sana gaaffii naaf hin galle gaafachuu akkan danda`uufi yeroon barbaadetti qoranicha addan kutuu akkan danda`u carraan naaf laatameera. Haaluma kanaan qoranicharatti hirmachuuf fedha qabaachu ko mallattoo ko kanan gaditinan raggaasisa.

Maqaa fi mallattoo hirmataa……

Mallatto walitti qabaa …….

Guci feedhumma ibsuf guutamu kun walitti qabaan harmee gaafatamtu fulduratti mallatteessu kan qabu yoo ta`u garagalchisaa haadhasanaaf laatamu qaba.

Gargaarsa keessanif onnerra isin galateeffanna!!!!

7.4. Amharic Version of Participant Information Sheet and Informed Voluntary Consent Form to be Filled by Parents/Guardian (for competent adults: ages ≥ 18 years)

የተሳታፊዎች የመረጃ ቅጽ በአማርኛ

እንደምን አደሩ/ዋሉ?

ስሜ_____እባላላዉ፡፡ በሀረማያ ዩኒቨሪስቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ክፍል ማስተርስ ዲግሪ ተማሪ በሆነዉ ሀብታሙ ተስፋዬ አማካኝነት እዚህ ሆስፒታል ለሚሰራዉ ጥናት መረጃ ሰብሳቢ ነኝ፡፡ ስለጥናቱ ምንነት እና እርስዎ ለምን ለዚህ ጥናት እንደተመረጡ እንዳስረዳ ፡ የርስዎን መላክም ትብብር እንዲሰጡኝ ስል በትህትና እጥይቃለሁ፡፡

የጥናቱ ርእስ፡

በምእራብ ሀረርጌ ዞን ዉስጥ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ በሚወለዱ ህጻናት ላይ የጨቅላ ህጻናት መቀንጨር አምጪ ሁኔታዎች

የጥናቱ አላማ፡

ከጥናቱ የሚገኘውን ውጤት በመጠቀም፤ ሆስፒታሎች በህበረተሰቡ ዉስጥ የሚከሰት የጨቅላ ህጻናት መቀንጨርን ለመከላከል የሚረዳ ፕሮግራም ሊነድፉበት ይችላሉ። ከዚህም ባሻገር፣ የማስተርስ ዲግሪዉን በህብረተሰብ የምግብ ጤና የትምህርት ዘርፍ በመማር ላይ ለሚገኘው ተማሪ ሀብታሙ ተስፋዬ ለመመረቂያ የሚሆን የጥናት ጽሁፍ ማዘጋጀት ሲሆን ከዚህም በላይ ከጥናቱ የሚገኘው ውጤት በአካባቢው ለሚገኙ ጤና ቢሮዎች እንዲሁም ሌሎች ፈላጊዎች ያገለግላል።

የጥናቱ አሰራር እና የሚወስደዉ ጊዜ፡

የችግሩን አጋላጭ ሁኔታዎች ለማወቅ በሚረዳ መጠይቅ እርስዎን (ማለትም የህጻኑን እናት) እጠይቆታለሁ። እንዲሁም የህጻኑን ጤና በሚገልጹ ምልክቶች በተዘጋጀ ቅጽ መሰረት ከህጻኑ የህክምና ካርድ ላይ የምወስዳቸዉ መረጃዎች ይኖራሉ። ለዚህም ሲባል 48 የሚሆኑ የርስዎን ሁኔታ የሚገልጹ እንዲሁም 6 የሚሆኑ የልጅዎን የጤና ሁኔታ የሚጠይቁ ቅጾች በአጠቃላይ ወደ 50 ደቂቃ የሚፈጁ ተዘጋጅቷል።

የጥናቱ ጥቅም እና ጉዳት፡

ጥናቱ የእርስዎን የተወሰነ ጊዜ ከመሸማት በስተቀር በእርስዎም ሆነ በልጅዎ ላይ የሚያስከትለዉ ምንም አይነት ጉዳት አይኖርም። በዚህ ጥናት ውስጥ በመሳተፍዎ የሚከፈል ምንም አይነት ክፍያ የለም ፤ ነገር ግን ከዚህ ጥናት የሚገኘው ዉጤት በዚህ ዙሪያ ፍላጎት ላላቸዉ ሰዎች እንዲሁም አካላት የሚጠቅም ይሆናል።

የመረጃዉ ሚስጥራዊነት፡

ከእርስዎ የሚገኘዉ መረጃ ሚስጥራዊነቱ የተጠበቀ ሲሆን፤ ከጠያቂዉና ከአጥኚዉ በስተቀር በምንም አይነት መልኩ ለሌላ ሶስተኛ ወገን ተላልፎ አይሰጥም። እንዲሁም የእርስዎን ማንነት በተለየ መልኩ የሚገልጽ ምንም አይነተ መረጃም አይኖርም።

የተሳታፊዉ መብት፡

ጥናቱ ዉስጥ ለመሳተፍ ሙሉ በሙሉ በእርስዎ ፍቃድ ላይ የተመሰረተ ነዉ። ልጅዎን በጥናት ዉስጥ እዲሳተፍ የመከልከልም ሆነ የመፍቀድ መብት የእርስዎ ነዉ። እንዲሳተፍ ከፈቀዱ ደግሞ በፈለጉት ሰአት ጥናቱን የማቋረጥ መብት የእርስዎ ነዉ። እንደዚህ በማድርጉዎ የሚያጥት ምንም አይነት ጥቅም የለም። ከዚህም በላይ የማይፈልጉትን ጥያቄ ያለመመለስ መብት የእርስዎ ነዉ።

አድራሻዎች

ለማንኛውም አይነት ጥያቄ በየትኛዉም ሰአት የሚከተሉትን አድራሻዎች ይጠቀሙ።

ዋና አጥኚ፡- ሀብታሙ ተስፋዬ፣ E-mail: tesfahabtamu038@gmail.com , ስልክ ቁጥር: - 0910159036.

የሀረማያ ዩኒቨርስቲ የህክምና ጥናት ስነምግባር አጥሪ ኮሚቴ የቢሮ ስልክ ቁጥር- +251254662011, ፖሳቁ 235, ሀረር፣ ኢትዮጵያ።

የስምምነት መግለጫ ፎርም -

እኔ ለዚህ ጥናት የስምምነት ፊርማዬን ስሰጥ፤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 እስከተጠበቀ ድረስ በዚህ ጥናት ለመሳተፍ ተስማምቻለሁ፡፡ በጥናቱ ስሳተፍ በህጻኑ/ኗ ወይም በኔ ላይ ምንም አይነት ጉዳት እንደሌለው በግልጽ ተረድቻለሁ፡፡ በመብቴ ዙሪያም ሆነ ስለጥናቱ ያልገባኝ ጥያቄ ካለ በማንኛዉም ሰአት መጥየቅ እንደምችል ተገልጾልኛል።

የመረጃ ሰጭ ስምና ፊርማ_____፣_____ቀን_____

የመረጃ ሰብሳቢ ስምና ፊርማ_____፣_____ቀን_____

ይህ የፈቃደኝነት ማረጋገጫ ቅጽ መረጃ ሰብሳቢዉ ባለበት ከተጠያቂዋ እናት ፊት ለ ፊት መፈረም ያለበት ሲሆን ቅጂዉ ለእናትዬዋ መሰጠት አለበት፡፡

ለትብብርዎ ከልብ እናመሰግናለን!!!!

7.5. INFORMED VOLUNTARY CONSENT FORM FOR A MINOR (Age < 18 years)/VULNERABLE INDIVIDUAL TO BE SIGNED BY HIS/HER LEGALLY COMPETENT REPRESENTATIVE (e.g.: - PARENT/GUARDIAN

Introduction:

My name is **(_____)**. I am working as a data collector for the study being conducted in this Hospital by (Habtamu Tesfaye) who is studying for his Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and the newborn's participation.

Title of the study:

Growth Failure at Birth and Associated Factors Among Newborns Delivered at Public Hospitals in West Harerghe, Oromia Region, Ethiopia

Purpose of the study:

The findings of this study can be of a paramount importance for the Hospital to plan intervention programs to prevent growth failure at birth in the community, thereby improve child health and survival in general. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in Public Health Nutrition for the principal investigator.

Procedure and duration:

I will be interviewing you using a questionnaire to provide me with pertinent data that is helpful for the study**.** Additionally, I will measure your child's weight and height. This information will help us to determine the prevalence of growth failure at birth and its associated factors. There are around 48 questions to answer where I will fill the questionnaire by interviewing you. And around 6 maternal and neonate anthropometric measurements which will be filled after taking measurements. The whole process will take around 50 minutes.

Risks and benefits:

The risk of being participating for you and your bnewborn baby in this study is very minimal; but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for different stakeholders.

Confidentiality:

The information that we will collect from this study will be confidential. There will be no information that will identify you or your newborn in particular. The finding of the study will be general for the study community and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this stud**y.** Additionally, you have the right to declare to allow your baby to be involved in this study or not. If you would allow your baby for this study, you have the right to withdraw him/her from the study at any time and this will not label you/your baby for any loss of benefits which you/your baby otherwise are entitled. You do not have to answer any question that you do not as well.

Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact the following address:

Principal investigator: Habtamu Tesfaye, E-mail- tesfahabtamu038@gmail.com, Mobile phone-0910159036.

Institutional Health Research Review Committee: Office Phone Number- +251254662011, P.O.BOX 235, Harar, Ethiopia.

Declaration of informed voluntary consent:

I have read/ was read to me/ the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw myself and my baby from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to allow my newborn baby to participate (be involved) in this study with my initials (signature).

Name and signature of parents/guardian _____, _____date_____

Name and signature of data collector_____, _____ date_____

Thank you for your cooperation!

7.6. AFAN OROMO VERSION of INFORMED VOLUNTARY CONSENT FORM FOR A MINOR (Age < 18 years)/VULNERABLE INDIVIDUAL TO BE SIGNED BY HIS/HER LEGALLY COMPETENT REPRESENTATIVE (e.g.: -PARENT/GUARDIAN

Haadholii gaffi irratti hirmatanif odeffanno kennamufii Gabatee odeffanon irratti guutamu

Maqaan koo_____ Jedhama yeroo amma kanatti isin faana kanan argame university haramayatti kollejji fayya fii saayinsii yaalatti barataa digirii lammaffa kan ta`efii barreffama ebbisaa **kufaatii guddina sararaawaa yeroo dhaloota fi sababa kanaan walqabatu** kan qoratu barataa Habttaamu Tasfayetiif ragaalee barbachisan sassaabudhafi. Kanaafuu wa`ee qorannoo kanaa ibsa gababaan isinif kennamee qoranno kanarratti qooda akka fudhattan kabajan isin gaafanna.

Mataduree Qorannichaa: **-** kufaatii guddina sararaawaa yeroo dhaloota fi sababa kanaan walqabatu

Kayyoo qorannichaa: - Argannoon qorannoo kanaa Hospitaalichi sagantaalee gidduu seensaa yeroo dhalatan hawaasa keessatti guddinaan akka hin kufne karoorsuu, kanaanis fayyaa daa'immanii fi walumaa galatti lubbuun jiraachuu fooyyessuuf barbaachisummaa olaanaa qabaachuu danda'a. Kana malees, kaayyoon qorannoo kanaa qorataa ijoodhaaf Sagantaa Maastarsii Nyaata Fayyaa Hawaasaa galmaan ga'uuf akka barbaachisummaa gartokkeetti barruu qorannoo barreessuudha.

Hojimaataa fi yeroo: Meeshaa safartuu sadarkaa isaa eeggate fayyadamuun ulfaatinaafi dheerina daa'ima kee reefuu safara. Dabalataanis, haala guddina isaanii madaaluuf nu gargaaruuf waa'ee daa'ima keessanii gaaffii lama isin gaafadha. Hojimaanni kun gara daqiiqaa 10 si fudhata. Kanaaf yeroo kana akka na qusattan, daa'ima keessan reefuu dhalate irrattis adeemsa kana akkan raawwadhu akka naaf hayyamtan kabajaan isin gaafadha.

Balaa fi faayidaa: Balaan qorannoo kana irratti daa'ima keessaniif hirmaachuu baay'ee xiqqaadha; garuu yeroo kee irraa daqiiqaa muraasa qofa fudhachuudhaan. Qorannoon kun hirmaachuuf kaffaltiin kallattiin hin jiraatu ture. Garuu argannoon qorannoo kanarraa argame qooda fudhattoota adda addaatiif odeeffannoo barbaachisaa ta'e mul'isuu mala.

Odeeffanno kessanif ofegganno taasifamu: - odeffannon isin nuuf laattan iccitidhan waan qabamuuf homalle yaadda`un isinirra hin jiru. Haala kaminuu odeeffannon kessan qaama hin ilaallanne harka hin galu. Qorannichi akka waligalaatti malee isin qofa wabii goonee kan ibsinu miti. Gaafficharratti maqaan keessan hin jiraatu.

Mirga isin qorannicharratti qabdan: - guutumatti qorannon kun fedha keessanirratti kan hunda`e yoo ta`u irratti hirmachus ta`e dhisuufis mirga guutuu qabdu. Qaama qorannicha ta`uf fedha yoo qabattan gaffi deebisuu hin feene debisuu dhisuu akkaasumas qorannicha yeroo barbaddan addan kutuf mirga qabdu. Sababa kana gootanif tajaajilli isinitti hira`atuu fi yakki isinirra ga`u hin jirus hin jiraatus.

Naannoo qorannichaa: - qorannichi yeroo taasifamu kamittuu haala qorannichaa ilaalchisee fi gaaffii kamiyyuu yoo qabaattaan odeeffannoo kanaa gaditti fayyadamtani nu argachuu dandeessuu.

1. Qo`ata olanaa: - Habtamu Tasfayee Toora emaili: tesfahabtamu038@gmail. Lakk. Bilbilaa: - 0910159036. Dhaabbata qoranno fayya fi hoji raawwachistu to`anna sirna naamusaa: -Lakk bilbilaa: - +251254660708 Lakk sanduqa poosta: - 235, harar, Ethiopia

Hubanno gubbaatti argattani irraatti hunda`udhan hirmaattota qorannoo kanaa ta`uu kessaan kan itti dhugomsitan: - haala qorannichaa odeeffannoo kennamerra naaf dubbifameera/dubbifadheera. Kaayyoo bu`uura qorannichaa, adeemsi isaa, faayidaafi midhaa, fayyummaa odeeffannoo kootii, mirga hirmannaa koofi bakki qoratichaa naaf ibsameera. Yeroo qoranna sana gaaffii naaf hin galle gaafachuu akkan danda`uufi yeroon barbaadetti qoranicha addan kutuu akkan danda`u carraan naaf laatameera. Haaluma kanaan qoranicharatti hirmachuuf fedha qabaachu ko mallattoo ko kanan gaditinan raggaasisa.

Maqaa fi mallattoo hirmataa……Mallatto walitti qabaa ……

Guci feedhumma ibsuf guutamu kun walitti qabaan harmee gaafatamtu fulduratti mallatteessu kan qabu yoo ta`u garagalchisaa haadhasanaaf laatamu qaba.

Gargaarsa keessanif onnerra isin galateeffanna!!!!

7.7. AMHARIC VERSION of INFORMED VOLUNTARY CONSENT FORM FOR A MINOR (Age < 18 years)/VULNERABLE INDIVIDUAL TO BE SIGNED BY HIS/HER LEGALLY COMPETENT REPRESENTATIVE (e.g.: -PARENT/GUARDIAN

የተሳታፊዎች የመረጃ ቅጽ በአማርኛ

እንደምን አደሩ/ዋሉ?

ስሜ_____እባላላዉ፡፡ በሀረማያ ዩኒቨሪስቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ክፍል ማስተርስ ዲግሪ ተማሪ በሆነዉ ሀብታሙ ተስፋዬ አማካኝነት እዚህ ሆስፒታል ለሚሰራዉ ጥናት መረጃ ሰብሳቢ ነኝ፡፡ ስለጥናቱ ምንነት እና እርስዎ ለምን ለዚህ ጥናት እንደተመረጡ እንዳስረዳ ፡ የርስዎን መላክም ትብብር እንዲሰጡኝ ስል በትህትና እጥይቃለሁ፡፡

የጥናቱ ርእስ፡

በምእራብ ሀረርጌ ዞን ዉስጥ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ በሚወለዱ ህጻናት ላይ የጨቅላ ህጻናት መቀንጨር አምጪ ሁኔታዎች

የጥናቱ አላማ፡

ከጥናቱ የሚገኘውን ውጤት በመጠቀም፤ ሆስፒታሎች በህበረተሰቡ ዉስጥ የሚከሰት የጨቅላ ህጻናት መቀንጨርን ለመከላከል የሚረዳ ፕሮግራም ሊነድፉበት ይችላሉ። ከዚህም ባሻገር፣ የማስተርስ ዲግሪዉን በህብረተሰብ የምግብ ጤና

የትምህርት ዘርፍ በመማር ላይ ለሚገኘው ተማሪ ሀብታሙ ተስፋዬ ለመመረቂያ የሚሆን የጥናት ጽሁፍ ማዘጋጀት ሲሆን ከዚህም በላይ ከጥናቱ የሚገኘው ውጤት በአካባቢው ለሚገኙ ጤና ቢሮዎች እንዲሁም ሌሎች ፈላጊዎች ያገለግላል።

የጥናቱ አሰራር እና የሚወስደዉ ጊዜ፡

የችግሩን አጋላጭ ሁኔታዎች ለማወቅ በሚረዳ መጠይቅ እርስዎን (ማለትም የህጻኑን እናት) እጠይቆታለሁ። እንዲሁም የህጻኑን ጤና በሚገልጹ ምልክቶች በተዘጋጀ ቅጽ መሰረት ከህጻኑ የህክምና ካርድ ላይ የምወስዳቸዉ መረጃዎች ይኖራሉ። ለዚህም ሲባል 48 የሚሆኑ የርስዎን ሁኔታ የሚገልጹ እንዲሁም 6 የሚሆኑ የልጅዎን የጤና ሁኔታ የሚጠይቁ ቅጾች በአጠቃላይ ወደ 50 ደቂቃ የሚፈጁ ተዘጋጅቷል።

የጥናቱ ጥቅም እና ጉዳት፡

ጥናቱ የእርስዎን የተወሰነ ጊዜ ከመሸማት በስተቀር በእርስዎም ሆነ በልጅዎ ላይ የሚያስከትለዉ ምንም አይነት ጉዳት አይኖርም። ልጅዎ በዚህ ጥናት ውስጥ በመሳተፉ የሚከፈል ምንም አይነት ክፍያ የለም ፤ ነገር ግን ከዚህ ጥናት የሚገኘው ዉጤት በዚህ ዙሪያ ፍላጎት ላላቸዉ ሰዎች እንዲሁም አካላት የሚጠቅም ይሆናል።

የመረጃዉ ሚስጥራዊነት፡

ከእርስዎ የሚገኘዉ መረጃ ሚስጥራዊነቱ የተጠበቀ ሲሆን፤ ከጠያቂዉና ከአጥኚዉ በስተቀር በምንም አይነት መልኩ ለሌላ ሶስተኛ ወገን ተላልፎ አይሰጥም። እንዲሁም የእርስዎን ማንነት በተለየ መልኩ የሚገልጽ ምንም አይነተ መረጃም አይኖርም።

የተሳታፊዉ መብት፡

የልጅዎ በጥናቱ ዉስጥ የመሳተፍ ሁኔታ ሙሉ በሙሉ በእርስዎ ፍቃድ ላይ የተመሰረተ ነዉ። ልጅዎን በጥናት ዉስጥ እዲሳተፍ የመከልከልም ሆነ የመፍቀድ መብት የእርስዎ ነዉ። እንዲሳተፍ ከፈቀዱ ደግሞ በፈለጉት ሰአት ጥናቱን የማቋረጥ መብት የእርስዎ ነዉ። እንደዚህ በማድርጉዎ የሚያጥት ምንም አይነት ጥቅም የለም። ከዚህም በላይ የማይፈልጉትን ጥያቄ ያለመመለስ መብት የእርስዎ ነዉ።

አድራሻዎች

ለማንኛውም አይነት ጥያቄ በየትኛዉም ሰአት የሚከተሉትን አድራሻዎች ይጠቀሙ።

ዋና አጥኚ፡- ሀብታሙ ተስፋዬ፣ E-mail: tesfahabtamu038@gmail.com , ስልክ ቁጥር: - 0910159036.

የሀረማያ ዩኒቨርስቲ የህክምና ጥናት ስነምግባር አጥሪ ኮሚቴ የቢሮ ስልክ ቁጥር- +251254662011, ፖሳቁ 235, ሀረር፣ ኢትዮጵያ።

የስምምነት መግለጫ ፎርም -

እኔ ለዚህ ጥናት የስምምነት ፊርማዬን ስሰጥ፤የዚህ ጥናት ዓላማ በደንብ የተብራራልኝ ሲሆን የጥናቱንም ዓላማ ተረድቻለሁ፡፡ በዚሁ ጥናት ላይ መሳተፍ በሙሉ ፈቃደኝነት ላይ የተመሰረተ መሆኑን በሚገባ የተረዳሁ ሲሆን በማንኛውም ጊዜ ከጥናቱ ልጄን የማግለል መብት እንዳለኝ አውቄአለሁ፡፡ ስለሆነም የምሰጠው መረጃ እስከተጠበቀ ድረስ በዚህ ጥናት ልጄን ለማሳተፍ

ተስማምቻለሁ፡፡ በጥናቱ ስሳተፍ በህጻኑ/ኗ ወይም በኔ ላይ ምንም አይነት ጉዳት እንደሌለው በግልጽ ተረድቻለሁ፡፡ በመብቴ ዙሪያም ሆነ ስለጥናቱ ያልገባኝ ጥያቄ ካለ በማንኛዉም ሰአት መጥየቅ እንደምችል ተገልጾልኛል።

የመረጃ ሰጭ ስምና ፊርማ_____፣_____ቀን_____

የመረጃ ሰብሳቢ ስምና ፊርማ_____፣_____ቀን_____

ይህ የፈቃደኝነት ማረጋገጫ ቅጽ መረጃ ሰብሳቢዉ ባለበት ከተጠያቂዋ እናት ፊት ለ ፊት መፈረም ያለበት ሲሆን ቅጂዉ ለእናትዬዋ መሰጠት አለበት፡፡

ለትብብርዎ ከልብ እናመሰግናለን!!!!

7.8. English Version Questionnaire

Haramaya University College of Health and Medical Sciences, Department of Human Nutrition. A questionnaire to determine ‘Growth Failure at Birth and Associated Factors

Among Newborns Delivered at Public Hospitals in West Harerghe, Oromia Region, Ethiopia'.

Code No. _____.

S.N	**Part I: Maternal Baseline Socio-demographic characteristics**		**Skip**
101	How old are you?	……in year	
102	Mother's educational status	1. Unable To Read And Write 2. Read And Write 3.Primary School(1-8) 4.Secondary School (9-12) 5.College And Above	
103	Household monthly income	_____(Birr)	

Part II. Obstetrical and Maternal related factors

No	**Questions**	**Response**	**Remark**
201	How many times did you give birth? (including the current)	----------in number	
202	How many months have been passed just after your previous delivery? If the answer for Q 201 was >1	_____(months)	
203	What is the birth order level of your current	---------- (in number)	

	newborn among your children?		
204	Did you have ANC follow-up during your pregnancy?	1. Yes 2. No	If no skip to Q 206
205	If yes? How frequent?	---------- times	
206	In which season have you conceived the current pregnancy?	1. Belg (Spring) 2. Kiremt (Rainy) 3. Bega (winter) 4. Meher (Autumn)	

Part III. Household Food Insecurity Access Scale (HFIAS) Measurement Tool

SNO	Question	Response option	Code
301	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q302) 1=Yes	
301a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	

302	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q03) 1=Yes	
302a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	
303	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q304) 1 = Yes	
303a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	
304	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resource so obtain other types of food?	0 = No (skip to Q305) 1 = Yes	

304a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	
305	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q306) 1 = Yes	
305a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	
306	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q307) 1 = Yes	
306a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	

307	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes	
307a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	
308	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes	
308a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	
309	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No (questionnaire is finished) 1 = Yes	
309a	How often did this happen?	1 = Rarely (once or twice in the past four weeks)	

		2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	

IV. Dietary diversity assessment tool

Yesterday during the day or at night, did you eat or drink:

S.N	**Food categories**	**description**	**Consumed** **Yes=1** **No=0**
1	Any foods made from grains, like:	Porridge, bread, rice, pasta/noodles or other foods made from grains	**1. yes** **0. No**
2	Any vegetables or roots that are orange colored inside	Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside	**1. yes** **0. No**
3	Any dark green leafy vegetables, such as:	List examples of any medium-to-dark green leafy vegetables, including wild/foraged leaves	**1. yes** **0. No**
4	any fruits that are dark yellow or orange inside, like:	Ripe mango, ripe papaya	**1. yes** **0. No**
5	Any other types of meat or poultry, like	Beef, lamb, goat, chicken	**1. yes** **0. No**
6	Any eggs	Eggs from poultry or any other bird	**1. yes** **0. No**
7	Any fish or seafood, whether fresh or dried	Fresh or dried fish, shellfish or seafood	**1. yes** **0. No**

8	Any beans or peas, such as	Mature beans or peas (fresh or dried seed), lentils or bean/ pea products,	**1. yes** **0. No**
9	Any nuts or seeds, like:	Any tree nut, groundnut/peanut, or certain seeds or nut/seed "butters" or pastes	**1. yes** **0. No**
10	Any milk or milk products, such as:	Milk, cheese, yoghurt or other milk products, but NOT including butter, ice cream, cream or sour cream	**1. yes** **0. No**

Part V. Maternal anthropometric measurements

1. Height (cm) ----------

2. MUAC (cm) ----------

Part VI: Newborn's socio demographic and anthropometric measurements

1. Sex 1. Male ☐ 2. female ☐

2. Gestational age ---------- (weeks)

3. Birth weight (in gram) ----------

4. Length (cm) ----------

Name of data collector _____ sign _____ date_____ Name of supervisor _____ sign _____ date _____

7.9. Afan Oromo Version Questionnaire

Yuunivarsiitii Haramaya Kolleejjii Fayyaa fi Saayinsii Meedikaalaa, Kutaa Nyaata Namaa.

Gaaffilee 'Kufaatii Guddinaa yeroo Dhalootaa fi Qabxiilee Walqabatan Daa'imman Hospitaalota Mootummaa Naannoo Oromiyaa,Godinaa Harergee Lixaatti Da'an' murteessuuf qophaa'e.

Koodii Lakk . _____.

SN	**Kutaa I: Bu'uura Haadholii Amaloota hawaas-dimoogiraafii**		**Irra darbuu**
101	Umuriin kee meeqa?	.....waggaa keessatti	
102	Haala barnootaa haadha	3. Dubbisuu Fi Barreessuu Dandeetti 4. Dubbisuu Fi Barreessuu 3.Mana Barumsaa Sadarkaa Tokkoffaa(1-8) . 4.Mana Barumsaa Sadarkaa Lammaffaa (9-12) . 5.Kolleejjii Fi Irra	
103 irratti	Galii maatii ji'aa	_____(Birr) .	

Kutaa II. Qabxiilee Da'umsaa fi Haadha waliin walqabatan

Lakki	**Gaaffilee**	**Deebii**	**Yaada**
201 irratti	Yeroo meeqa deesse?(kan ammaa dabalatee)	1. ---------- 1. .	
202 irratti	Ulfa duraan qabdu booda ji'oota meeqatu darbe?	_____(lakkoofsaan) .	

203 irratti	Sadarkaan tartiiba dhalootaa daa'ima reefuu dhalattee amma qabdu ijoollee kee keessaa maali?	1. ---------- 1. .	
204	Yeroo ulfaa hordoffii ANC qabdaa?	1. Eeyyee 2. Lakki	Yoo hin jiru ta'e gara Qn 8.
205	Yoo eeyyee ta'e? Hammam yeroo baay'ee?	1---------- yeroo	
206	Ulfa amma jiru yeroo kam keessatti ulfoofte?	1. Beelg (Birraa) . 2. Kiremt (Rooba) . 3. Beegaa (qilleensaa) . 4. Meeher (Autumun) .	

Kutaa 3. Meeshaa Safartuu Iskeelii Argama Nageenya Nyaataa Manaa (HFIAS).

SNO	Gaaffii	Filannoo deebii kennuu	Koodii
301 irratti kan ibsame	Torban afran darban keessa, manni keessan nyaata gahaa akka hin arganne yaadda'aa turtanii?	0 = Lakki (gara Q2tti darbi) 1=Eeyyee	
301a jalatti	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko	

tumame		ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	
302 irratti kan ibsame	Torban afran darban keessa ati ykn miseensi maatii kamiyyuu sababa hanqina qabeenyaatiin gosoota nyaata filatte nyaachuu hin dandeenyee?	0 = Lakki (gara Q303tti darbi) 1=Eeyyee	
302a jalatti tumame	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	

303 irratti	Torban afran darban keessa ati ykn miseensi maatii kamiyyuu sababa hanqina qabeenyaatiin nyaata adda addaa daangeffame nyaachuu qabdaa?	0 = Lakki (gara Q304tti darbi) . 1 = Eeyyee	
303a jalatti tumame	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	
304 irratti kan ibsame	Torban afran darban keessa, ati ykn miseensi maatii kamiyyuu nyaata tokko tokko kan dhuguma sababa hanqina qabeenyaatiin nyaachuu hin barbaanne nyaachuu qabdaa kanaaf gosoota nyaataa biroo argachuu?	0 = Lakki (gara Q305tti darbi) . 1 = Eeyyee	

304a jalatti tumame	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	
305 irratti kan ibsame	Torban afran darban keessa, ati ykn miseensi manaa kamiyyuu nyaanni gahaan waan hin jirreef nyaata si barbaachisu caalaa xiqqaa ta'e nyaachuu qabdaa?	0 = Lakki (gara Q306tti darbi) . 1 = Eeyyee	
305a jalatti tumame	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	
306 irratti kan	Torban afran darban keessa, nyaanni gahaan waan hin jirreef, ati ykn miseensi manaa kan biraa	0 = Lakki (gara Q307tti darbi) . 1 = Eeyyee	

ibsame	guyyaa tokkotti nyaata xiqqaa nyaachuu qabdaa?		
306a jalatti tumame	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	
307 irratti kan ibsame	Torban afran darban keessa sababa hanqina qabeenya nyaata argachuuf mana keessan keessatti nyaanni gosa kamiyyuu nyaattan dhabee beekaa?	0 = Lakki (gara Q308tti darbi) . 1 = Eeyyee	
307a	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan	

		ol) .	
308 irratti kan ibsame	Torban afran darban keessa ati ykn miseensi manaa kamiyyuu nyaanni gahaan waan hin jirreef beela'ee halkan raftee?	0 = Lakki (gara Q309tti darbi) . 1 = Eeyyee	
308a jalatti tumame	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	
309 irratti kan ibsame	Torban afran darban keessa ati ykn miseensi manaa kamiyyuu nyaanni gahaan waan hin jirreef halkan guutuu osoo homaa hin nyaatin deemtee?	0 = Lakki (gaaffiin xumurame) . 1 = Eeyyee	
309a	Kun yeroo meeqa raawwatame?	1 = Yeroo muraasa (torban afran darban keessatti al tokko ykn lama) . 2 = Yeroo tokko tokko (torban	

		afran darban keessatti yeroo sadii hanga kudhanii) . 3 = Yeroo baay'ee (torban afran darban keessatti yeroo kudhan ol) .	

IV. Meeshaa madaallii adda addaa nyaataa

Kaleessa guyyaa moo halkan, nyaattan ykn dhugdan:

SN	**Gosoota nyaataa**	**Ibsa**	**Nyaatame** **Eeyyee=1** **Lakki=0**
1.	Nyaata midhaan irraa hojjetame kamiyyuu, kan akka:	Daabboo, daabboo, ruuzii, paastaa/noodeelii ykn nyaata biroo midhaan irraa hojjetaman	**1. eeyyee** **0. Lakki**
2.	Kuduraalee ykn hidda halluu burtukaanaa qabu kamiyyuu	Paampii, kaarotaa, iskuwaashii ykn boqqolloo mi'aawaa keessaa keelloo ykn burtukaanaa ta'e	**1. eeyyee** **0. Lakki**
3.	Kuduraalee baala magariisa dukkanaa'aa qaban kamiyyuu, kan akka:	Fakkeenyota kuduraalee baala magariisa giddu galeessaa hanga dukkanaa'aa kamiyyuu, baala bosona/nyaata barbaadu dabalatee tarreessi	**1. eeyyee** **0. Lakki**

4.	firiiwwan keessoo isaanii keelloo ykn burtukaana dukkanaa'aa ta'an kamiyyuu, kan akka:	Maangoo bilchaate, paapaayaa bilchaate	**1. eeyyee** **0. Lakki**
5.	Gosa foon ykn qamadii biroo kamiyyuu, akka	Foon loonii, hoolaa, re'ee, hanqaaquu	**1. eeyyee** **0. Lakki**
6.	Hanqaaquu kamiyyuu	Hanqaaquu qamadii ykn simbirroo biraa kamirraayyuu	**1. eeyyee** **0. Lakki**
7.	Qurxummii ykn nyaata galaanaa kamiyyuu, haaraas ta'e goggogaa	Qurxummii haaraa ykn goggogaa, qola ykn nyaata galaanaa	**1. eeyyee** **0. Lakki**
8.	Baqalaa ykn baaqelaa kamiyyuu, kan akka	Baqalaa ykn baaqelaa bilchaate (sanyii haaraa ykn goggogaa), qamadii ykn oomisha baaqelaa/ baaqelaa, .	**1. eeyyee** **0. Lakki**
9.	Muuzaa ykn sanyii kamiyyuu, kan akka:	Muka mukaa kamiyyuu, boqqolloo/boqqolloo, ykn sanyiiwwan murtaa'an ykn muuzaa/sanyii "dhadhaa" ykn paastaa	**1. eeyyee** **0. Lakki**
10.	Aannani ykn oomishaalee aannani kamiyyuu, kan akka:	Aannani, daabboo, yogurt ykn oomishaalee aannani biroo, garuu dhadhaa, ayiskiriimii, kiriimii ykn dhadhaa dabalatee MITI	**1. eeyyee** **0. Lakki**

Kutaa V. Safartuuwwan antiroopoomeetirii haadha

1. Olka'iinsa (cm) ---------- .

2. MUAC (cm) ---------- .

Kutaa VI: Safartuuwwan hawaas-dimoogiraafii fi antiroopoomeetirii daa'imman reefuu dhalatan

1. Walqunnamtii saalaa 1. Dhiira 2.dubartii

2. Umurii ulfaa ---------- (torban) .

3. Ulfaatina dhalootaa (giraamiin) ---------- .

4. Dheerinni (cm) ---------- .

Maqaa nama odeeffannoo walitti qabuu _____ mallattoo _____ guyyaa_____ Maqaa supparvaayizaraa _____ mallattoo _____ guyyaa _____ .

7.10. Amharic Version Questionnaire

በሀረማያ ዩኒቨርስቲ በህክምና እና ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ክፍል የድህረ ምረቃ ትምህርት ፤ በምእራብ ሀረርጌ ዞን ዉስጥ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ በሚወለዱ ህጻናት ላይ የጨቅላ ህጻናት መቀንጨር አምጪ ሁኔታዎች ለማጥናት የቀረበ መጠይቅ።

Code No. _____.

ክፍል ፣ አጠቃላይ ሁኔታዎች

ተራ ቁጥር	ጥያቄዎች	መልስ	ይዝለሉ
101	እድሜዎት ስንት ነው?	_____አመት	
102	የትምህርት ደረጃ	1. መጻፍ እና ማንበብ የማይችሉ 2. መጻፍ እና ማንበብ የሚችሉ 3. የመጀመሪያ ደረጃ 4. ሁለተኛ ደረጃ 5. ኮሌጅና ከዛ በላይ	
103	የቤተሰቡ አጠቃላይ ወራዊ ገቢ	_____በብር	
ክፍል 2፡ ከእናትየው እና ከእርግዝና ጋር የተገናኙ ሁኔታዎች			
201	የአሁኑን ጨምሮ ስንት ልጅ ወልደዋል?	_____በቁጥር	
202	ከዚህ በፊት በወለዱት እና በአሁኑ ወሊድ መካከል ምን ያህል የወራት ልዩነት አለ? ከ 1 በላይ ከወለዱ	_____ወራት	
203	የአሁኑ ልጅዎ ስንተኛ ልጅ ነው?	_____በቁጥር	
204	በእርግዝና ወቅት የእርግዝና ክትትል ነበሮዎት?	1. አዎ 2. አይ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 206 ይዝለሉ
205	መልሶ አዎ ከነበረ ምን ያህል ጊዜ ክትትል አድርገዋል?	_____(በ ቁጥር)	
206	የጸነሱበት ወቅት ምን ነበር	1. በልግ 2. ክረምት 3. በጋ 4. መኸር	
ክፍል 3፡ በቤት ዉስጥ የምግብ ዋስትና ችግር ካለ ለማወቅ የተዘጋጀ መጠይቅ			
301	ባለፉት 4 ሳምንታት፤ ቤት ውስጥ በቂ ምግብ አይኖርም ብለው አሳስቦዎት ነበር?	0. አይ 1. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 302 ይሂዱ
301a	ይህ ነገር ለምን ያህል ጊዜ አሳስቦዎት ያውቃል	1. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ)	

		2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ ነ0 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ ነ0 ጊዜ በላይ)	
302	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ እርስዎ ወይም ከቤታችሁ አባል ውስጥ፤ በአቅም እጥረት የተነሳ የምትፈልጉትን ምግብ ሳትመገቡ ቀርታችሁ ታውቃላችሁ?	0. አይ ነ. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 303 ይሂዱ
302a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	ነ. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ ነ0 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ ነ0 ጊዜ በላይ)	
303	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ እርስዎ ወይም ከቤታችሁ አባል ውስጥ፤ በአቅም እጥረት የተነሳ ውስን በሆነ መልኩ የተመጣጠነ ምግብ ለመመገብ ተገዳችሁ ታውቃላችሁ?	0. አይ ነ. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 304 ይሂዱ
303a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	ነ. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ ነ0 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ ነ0 ጊዜ በላይ)	
304	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ እርስዎ ወይም ከቤታችሁ አባል ውስጥ፤ ሌሎች አማራጭ ምግቦች ለማግኘት አቅም ከማጣት የተነሳ ውስን የሆነ እና ለመብላት የማትፈልጉትን ምግብ ለመመገብ ተገዳችሁ ታውቃላችሁ?	0. አይ ነ. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 305 ይሂዱ
304a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	ነ. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ ነ0 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ ነ0 ጊዜ በላይ)	

305	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ እርስዎ ወይም ከቤተሰብ አባል ውስጥ፤ በቂ ምግብ ባለመኖሩ የተነሳ ለመብላት ከሚያስፈልጋችሁ የምግብ መጠን በታች ለመመገብ ተገዳችሁ ታውቃላችሁ?	0. አይ 1. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 306 ይሂዱ
305a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	1. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ 10 ጊዜ በላይ)	
306	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ እርስዎ ወይም ከቤተሰብ አባል ውስጥ፤ በቂ ምግብ ባለመኖሩ የተነሳ በቀን ውስጥ ትንሽ መጠን ያለዉ ምግብ ለመመገብ ተገዳችሁ ታውቃላችሁ?	0. አይ 1. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 307 ይሂዱ
306a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	1. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ 10 ጊዜ በላይ)	
307	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ፤ ምግብ ለማግኘት አቅም በመጥፋቱ በቤታችሁ ዉስጥ ምንም አይነት ምግብ ጠፍቶ ያውቃል?	0. አይ 1. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 308 ይሂዱ
307a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	1. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ 10 ጊዜ በላይ)	
308	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ እርስዎ ወይም ከቤተሰብ አባል ውስጥ፤ በቂ ምግብ ባለመኖሩ የተነሳ ሳትበሉ አድራችሁ ታውቃላችሁ?	0. አይ 1. አዎ	መልሱ አይ ከሆነ ወደ ጥያቄ ቁጥር 309 ይሂዱ
308a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	1. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ 10 ጊዜ)	

		3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ 10 ጊዜ በላይ)	
309	ባለፉት 4 ሳምንታት ጊዜ ዉስጥ እርስዎ ወይም ከቤተሰብ አባል ውስጥ፤ በቂ ምግብ ባለመኖሩ የተነሳ ሳትበሉ ዉላችሁ እና አድራችሁ ታውቃላችሁ?	0. አይ 1. አዎ	
309a	ይህ ነገር ለምን ያህል ጊዜ ተከስቶ ያውቃል?	1. እምብዛም (ባለፉት 4 ሳምንታት አንዴ ወይም ሁለቴ) 2. አልፎ አልፎ (ባለፉት 4 ሳምንታት ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ባለፉት 4 ሳምንታት ከ 10 ጊዜ በላይ)	
ክፍል 4 የምግብ *መመጣጠን* ለማወቅ የተዘጋጀ መጠይቅ ትናንትና ቀን ወይም ማታ ላይ ከሚከተሉት ዉስት የትኛዉን በልተሽ/ጠጥተሽ ነበር.....			
ተራ ቁጥር	የምግብ አይነቶች	ማብራርያ	ተመገብሽ አዎ=1 አይ=0
1	ከእህል/ጥራጥሬ ተዋእጾ የተዘጋጀ ምግብ	እንደነ ገንፎ፣ዳቦ፣ሩዝ፣ፓስታ ወይም ሌላ የ እህል ተዋእጾ የሆነ ምግብ	1. አዎ 0. አይ
2	ዉስጡ ብርትኳናማ የሆነ አትክልት ወይም ስራስር	እንደነ ዱባ፣ካሮት፣ ዉስጡ ቢጫ/ብርትኳናማ የሆነ የተዳመጠ ስኳር ድንች	1. አዎ 0. አይ
3	ማንኛውም ተቆር ያለ አረንጓዴ ቅጠል ያላቸው አታክልቶች	እንደነ ጎመን	1. አዎ 0. አይ
4	ማንኛዉም ጠቆር ብሎ ቢጫ ወይም ባርትኳናማ የሆነ ፍራፍሬ	የበሰለ ማንጎ ወይም ፓፓያ	1. አዎ 0. አይ
5	ማንኛውም አይነት ስጋ ወይም ዶሮ	እንደነ በሬ፣በግ፣ፍየል፣ዶሮ	1. አዎ 0. አይ
6	እንቁላል	የዶሮ ወይም የሌላ	1. አዎ 0. አይ
7	ማንኛውም አሳ ወይም የባህር ምግብ፤ ትኩስም ሆነ ደርቆ/ቆይቶ	እንደ አሳ ወይም ሌላ የባህር ምግብ	1. አዎ 0. አይ
8	ባቄላ ወይም አተር	የተቀቀለ/አሹቅ ባቄላ ወይም አተር ወይም ምስር እና የምስር ተዋእጾ	1. አዎ 0. አይ
9	ለውዝ ወይም ስራስር ምግቦች እንደነ....	ለውዝ ወይም የለውዝ ቂቤ ወይም *ሙቅ*	1. አዎ 0. አይ

10	ማንኛውም አይነት ወተት ወይም የወተት ተዋእጾዎች	ወተት፣አይብ፣እርጎ ወይም ሌላ የወተት ተዋእጾዎች ነገር ግን ቅቤ እና አይስክሬም ሳያካትት	1. አዎ 0. አይ

ክፍል 5 የእናትየውን ተክለሰውነት ለመለካት የተዘጋጀ ቅጽ

1. የእናተየው ቁመት በ ሴንቲሜትር_____

2. MUAC_____in cm

ክፍል 6 የህጻኑን አጠቃላይ ሁኔታ ለማወቅ የተዘጋጀ ቅጽ

1. ጾታ 1. ወንድ 2. ሴት

2. የእርግዝናው ወራት _____በሳምንት

3. ህጻኑ ሲወለድ የነበረው ክብደት_____በ ግራም

4. የህጻኑ ቁመት_____በ ሴንቲሜትር

መረጃውን የሰበሰበዉ ሰው

ስም_____ፊርማ_____ቀን_____

የሱፐርቫይዘር ስም_____ፊርማ_____ቀን_____

7.11. Curriculum Vitae Of Principal Investigator

1. Personal Details

- Name Habtamu Tesfaye Erko
- Marital status Married
- Sex Male
- Date of birth December 4/1985 E.C
- Place of birth Kersa Malima, South West Shawa, Ethiopia
- Health status Normal
- Nationality Ethiopian
- Profession Public Health (MSc candidate)
- Mobile 0910159036

2. EDUCTIONAL BACKGROUND

Year E.C	Educational grade	Place	Name of institution
1992-1999 E.C	Elementary school (1-8)	Lemen	Elementary school G/s (1-8)
2000- 2003 E.C	Secondary school (9-12)	Lemen	Lemen prep & 2ry school
2004-2007 E.C	University (BSC degree)	Jimma	Jimma university

3. Language proficiency

Language	Speaking	Listening	Writing	Reading
Amharic	Excellent	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent	Excellent
Afan Oromo	Excellent	Excellent	Excellent	Excellent

1. Personal skill

- I have Very good Communicative Skills
- I possess Sufficient computer skills i.e. networking, Programming and Maintenance
- I'm a Team player happy to work with others and share knowledge and skills.
- I am a Quick learner, keen to learn and improve my skills.
- I have the ability to work well under pressure.

4. Experiences

2015-2020 Meta Robi Health Center

(Clinical experience at delivery, OPD, MCH, PHCU Director)

2021uptoknow I work on CDC at Gelemso General Hospital(on HIV/AIDS control and Preventation)

2023---Now MSc student at Haramaya University, Ethiopia

5. Hobbies

- Watching movies and Film
- Reading different literatures
- Enjoying with family & reading different books

6. Reference

Mr, Sagn Tesfaye, Co-Worker at Gelemso General Hospital

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