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St. Paul's Hospital Millennium Medical College

SCHOOL OF PUBLIC HEALTH

GRADUATE STUDY PROGRAM

**PREVALENCE OF UNDER NUTRITION AND ASSOCIATED
FACTORS AMONG LACTATING MOTHERS IN SELECTED
HEALTH CENTERS IN ADDIS ABABA, ETHIOPIA, 2023**

BY: LALISE MEKONNEN (BSC. NURSE)

**A THESIS SUBMITTED TO THE DEPARTMENT OF PUBLIC
HEALTH; ST. PAUL HOSPITAL MILLENNIUM MEDICAL
COLLEGE PRESENTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER'S IN
NUTRITION**

AUGUST 2024

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List of Abbreviations and Acronyms

ANC	Ante natal care
BMI	Body Mass index
DHS	Demographic health survey
EDHS	Ethiopian demographic and health survey
FANTA	Food and nutrition technical assistance
HC	Health center
HFIAS	Household food insecurity access scale
Kg/m ²	Kilogram per meter square
LBW	Low birth weight
LM	Lactating Mother
PTB	Pulmonary tuberculosis
SSA	Sub-Saharan Africa
WHO	World health organization.
WDDS	Women dietary diversity score.

Abstract

Background: Under nutrition during lactation is one of the determinants of women's health and the health of the next generation. Undernutrition of lactating mothers not only affects milk composition and production but also the health of the mothers and their infants.

Objectives: This study aimed to assess prevalence of under nutrition and associated factors among lactating mothers in selected health centers in Addis Ababa, Ethiopia in, 2023.

Methods: A cross-sectional study was conducted from May 01 to August 01, 2023, in Addis Ababa, among 632 participants selected from nine health centers. Participants were selected using a multi-stage sampling technique. Data was collected through face-to-face interviews and anthropometric measurements. Descriptive statistics and multivariable logistic regression were employed with a 95% confidence interval identified variables with a p-value of 0.05 as statistically significant independent predictors of under nutrition among lactating mothers.

Results: With about 92% response rate, this study revealed that 200(31.6%) of participants were undernourished. Factors associated with under nutrition included lack of formal education (AOR=1.2, $p=0.021$, CI = 0.04-2.77), being single (AOR=3.9, $p=0.022$, CI = 1.39-7.75), and absence of ANC follow-up (AOR=3.9, $p=0.006$, CI = 1.49-10.12). Mothers with daily eating frequencies of two times (AOR=5, $p=0.001$, CI = 3.55-12.77) and three times (AOR=3, $p=0.001$, CI = 2.44-8.58) showed strong associations with under nutrition. Additionally, households experiencing food insecurity had higher odds of under nutrition (AOR=3.7, $p=0.001$, CI = 1.92-10.8).

Conclusion: The findings indicate that approximately one-third (31.6%) of the lactating mothers in Addis Ababa, Ethiopia, are undernourished. This prevalence is significantly higher than the threshold recommended by the World Health Organization (WHO) and the Federal Ministry of Health (FMOH), which is typically set at 15% for vulnerable populations.

Key words: Body Mass Index, Dietary Diversity, Food insecurity, Lactating mothers, Maternal Nutrition, Prevalence, Undernutrition.

1. Introduction

1.1. Background of the study

Under nutrition refers to inadequate food consumption and/or poor absorption and/or poor natural use of nutrients consumed. Under nutrition is continued to be significant public health problem worldwide. The extra calories and nutrients required to support breastfeeding make lactating mothers at higher risk of malnutrition than general population (1).

Based on certain studies, 9.7% of women are underweight globally (2). In developing countries, especially in Sub-Saharan Africa, including Ethiopia, there is a high burden of under nutrition problem among lactating mothers 20%–25% of women are underweight in Ethiopia (1).

Globally every year, an estimated 14 million adolescent girls enter lactation from which more than 90% live in developing countries (2). Women in developing countries with underweight have a threat of mortality and morbidity, and it affects the quality and volume of milk produced; undernourished women produce a lower quantum of breast milk than well-nourished woman (3). Evidence indicated that women with a body mass index (BMI) $\leq 18.5 \text{ kg/m}^2$ are at increased risk of illness and mortality rate (4).

The first six months of exclusive breastfeeding increase women's need for energy requirements by 30% or 1260 kJ/day above the gestation energy demand, and the breast milk product has a total energy value that requires an average diurnal energy cost of breastfeeding of roughly 2.9 MJ/day. The energy, protein, and other nutrients in milk come from the women's diet or her body's stores (5).

According to WHO report, under nutrition during lactation is one of the determinants of women's health and the health of the next generation. Loss of nutrient through colostrum and through breast milk increase nutritional requirements therefore women must eat sufficient quantity of food during this period (5).

The nutritional stores of lactating woman may be reduced as a result of the pregnancy and the loss of blood during childbirth (3). The total energy requirements during lactation are equal to those of the pre-pregnancy period, plus the additional demands imposed by the need for adequate milk production and secretion (3).

Maternal under nutrition has been shown to negatively affect the secretion of nutrients in breast milk leading to the increased risk of child morbidity, mortality and a long-term impact on the child's health. It also increases vulnerability and susceptibility to morbidities through lowering of the immune system. Women with persistent underweight have been reported to have increased risk of infertility arising from an ovulatory menstrual cycle, higher risk of mental illness and osteoporosis later in life (6).

Lactating mothers are the most vulnerable to malnutrition due to: low dietary intakes and low family income, inequitable distribution of food within the household, low educational level and low occupational status, lack of frequent meal delivery, short birth to pregnancy interval, limited accessibility of nutritional information and nutritional knowledge and health care (2).

Maternal nutritional status is assessed by anthropometry taking height, and weight measurements and calculating the body mass index (BMI) by dividing weight in kilograms by height squared in meters (kg/m^2) (1).

Even, the prevalence of under nutrition is higher in Ethiopia than in other sub-Saharan African countries based on the most recent DHS survey conducted (7). Therefore, under nutrition among lactating mothers is a serious public health problem in Ethiopia; and it is evident that one of every four lactate mothers in Ethiopia is undernourished (6). And also, according to different pocket studies conducted in Oromia, Amhara, Tigray, and Southern Nations, about one fifth of lactating mothers were underweight (8). This indicates that the prevalence of under nutrition was significant, and unacceptably high numbers of lactating mothers are suffering from under nutrition (2). Therefore, this study aims to assess the nutritional status and associated factors of lactating mothers in selected health center in Addis Ababa, Ethiopia.

1.2. Statement of the Problem

Under-nutrition is a serious public health problem linked to a substantial increase in the risk of mortality and morbidity (9). Malnutrition causes more than 3.5 deaths among women and children every year and accounts 11% of disability adjusted life years globally (10). In sub-Saharan Africa (SSA), south-central and southeastern Asia, more than 20% of women were underweight. The prevalence of women having body mass index less than 18.5 kg/m² in Bangladesh, Eritrea and India goes up to 40 % (11).

Survey evidence in Indonesia, Tibetan and Myanmar showed that the prevalence of under nutrition among lactating women was range from 9–12% (11-13). In Ethiopia based on 2016 EDHS report 22% women are underweight or thin. Some studies showed that in Ethiopia the prevalence of underweight (BMI < 18.5 kg/m²) among lactating women ranges from 20-40.6% (12).

Under nutrition among lactating women contributes to risk of neonatal deaths and stunting by 2 years of age. Suboptimum breastfeeding results in an increased risk for mortality in the first 2 years of life and it cause 800,000 child deaths annually (14). Suboptimum breastfeeding, stunting, and wasting cause 45% of child deaths, resulting in 3.1 million deaths annually (15).

Maternal underweight is likewise associated with offspring growth and development, including increased risk for PTB, low birth weight (LBW), under-five mortality, and poor mental and physical development. Poor maternal nutrition is associated with maternal ill health, a lack of resistance to infection by mothers (16). In addition, under nutrition reduces economic productivity through reduced labor productivity, high treatment costs, reduced wages and human capital losses. This negatively affects the community and national development through reduced family income and gross domestic product (1).

Household food insecurity, low dietary diversity score, poor ANC visits, low level of educational status, and high burden of reproduction were reported as determinants of maternal under nutrition in Ethiopia(9).In addition, lactating mothers are considered a

nutritionally vulnerable group due to frequent pregnancy, caring, and nurturing of the family which in turn leads to high maternal mortality (17).

Despite different efforts taken by government of Ethiopia in order to address the nutritional problems in improving the nutritional status of vulnerable groups including lactating mothers is not as such as expected and the situation continues to prevail. Moreover, as per my search, there is limited study conducted in Addis Ababa. Even those studies did not incorporate valuable factors mainly food security.

This study set out to assess the prevalence of under nutrition among lactating women and to determine important contributing factors. The nutritional status affected by other contributing factors of underweight among the lactating women from this study can be added to existing evidence in Ethiopia to use for policy development. Therefore, this study is aimed to assess the prevalence of under nutrition and associated factors among lactating women in selected health center in Addis Ababa, Ethiopia.

1.3. Significance of the study

The nutritional status of lactating mothers is paramount for maternal and infant health, as breast milk quality relies on maternal well-being. This study investigates undernutrition among lactating women to inform policy, program development, and healthcare strategies. Targeting stakeholders like the Ministry of Health and local health centers, the findings aid in prioritizing interventions. By tailoring services based on research insights, healthcare professionals can enhance maternal and child health outcomes. Ultimately, this study contributes to improving the overall health of lactating mothers and their infants, offering valuable guidance for policymakers and healthcare providers in addressing maternal undernutrition.

2. Literature Review

2.1. Overview of Maternal Undernutrition on Lactation and Infant Health

The literature review elucidates the profound impact of undernutrition on lactating mothers and its ramifications for infant health. Undernutrition, stemming from inadequate energy and nutrient intake, disproportionately affects women due to reproductive demands and socio-cultural factors (13). During lactation, maternal nutrient demands escalate significantly to meet the needs of breastfed infants. However, inadequate maternal nutrition during this critical period can compromise the nutritional quality of breast milk, thereby jeopardizing long-term infant health outcomes (18).

Global data underscore the pervasive challenge of women's undernutrition, particularly prevalent in regions such as Sub-Saharan Africa and South Asia (7). Studies from diverse contexts, including Sudan, Ethiopia, Bangladesh, and Haiti, underscore the multifaceted nature of malnutrition, shaped by environmental, dietary, and maternal factors (19). Notably, maternal antenatal care utilization and body mass index emerge as key determinants of undernutrition risk (19).

Moreover, research from Eastern Ethiopia reveals a significant association between maternal nutritional status and breastfeeding frequency, emphasizing the interplay between maternal health and infant feeding practices (12). These findings underscore the urgent need to address maternal undernutrition comprehensively to safeguard maternal and child health in vulnerable populations (13).

2.1. Prevalence of under nutrition among Lactating Mothers

Globally, evidences show that about 13% of women are underweight and this number is higher in economically poor countries varying from by 20–25% for underweight (22). In Dehradun, Uttarakhand, India the prevalence of under nutrition among lactating women is 7.33% (5). The Survey evidence in Indonesia, Tibetan, and Myanmar showed that under nutrition among lactating women was range from 9% to 12% (12).

In Sub-Saharan Africa (SSA), south-central and south-eastern Asia, more than 20% of women were underweight. Women having a body mass index less than 18.5 kg/m² in Bangladesh, Eritrea, and India go up to 40%. Despite the different efforts to improve nutrition in Ethiopia the prevalence of underweight is still high. Based on the 2016 EDHS report, 22% of women are underweight or thin (20).

From the reviewed studies, the prevalence of underweight among lactating women was highest in rural Tigray located in Northern Ethiopia at 50.6% and lowest in Arba Minch district in Southern Ethiopia at 17.4% (1). The magnitude of under nutrition (BMI <18.5 kg/m²) among lactating women in Dire Dawa was 22%, 21.5% in Ambo, in Nekemte, East Wollega 20.5%, lactating mothers was underweight (8, 13, 18).

According to 2012 CSAEDHS report the finding in Oromia region indicates that; 7.5% were moderately and severely malnourished/ thin (BMI < 17 kg/m²) and 19.4% were mildly malnourished (BMI = 17 - 18.5 kg/ m²). The study conducted in Urban area of Shashamane indicates that 3.3% of women with a BMI ≤ 18.5 kg/m², 37.5% were mildly malnourished, 50.0% moderately malnourished and 12.5% severely malnourished (6).

2.2. Factors Associated with Maternal Under nutrition

Socio demographic factors, dietary and food access factors, maternal healthcare service, health and comorbidities was identified to examine their association with under nutrition.

2.2.1. Socio demographic factors

Study conducted among women of reproductive age in Nepal, which showed that younger women aged 15 to 24 years were almost three times more likely to be malnourished than older women (21). Studies conducted in Dessie town; Amhara region showed that lactating women in the age group of 15–19 years were 10.3 times more likely to be underweight than older mothers 20–29 years age group (18). The study conducted in Dega Damot Woreda, Northwest Ethiopia showed that Lactating mothers who were unmarried were 2.65 times more likely to become undernourished than those lactating women who were married (12).

Women's educational status was reported as a determinant of women's malnutrition in developing countries. The study conducted among 400 lactating women in Tigray showed that 5.5% underweight women was literate; 33.8% lactating women have normal weight, while 7.5% illiterate women are in underweight range and 53.3% have normal weight (22).

Study conducted in Yilmana, Northwest Ethiopia indicate under nutrition among lactating mothers who had an average monthly household income of less than <1600 ETB were 3.5 times more likely to be undernourished than those who had greater monthly income (23).

Family size was another important factor that influences nutritional status of lactating mother. A study conducted among 317 lactating mothers in Nekemte, Ethiopia showed 27.7% underweight women are those whose family size was greater than six (6) were found to be more likely to develop underweight (2).

2.2.2. Dietary and Food access factors

Low dietary diversity is one of the most important factors associated with under nutrition. Studies conducted in some Asian countries showed that low dietary diversity ranges from 55.2% to 87.8%, whereas in African country studies, low dietary diversity ranges from 42.1% to 88.7%. In Ethiopia, the low dietary diversity ranges from 56.4% to 99.9% (10).

The study conducted in Eastern Ethiopia showed that dietary diversity score of the mother was found to be associated with under nutrition and this finding revealed that study participants who had dietary diversity score <5 food groups (422, 40.5%) undernourished while those who had dietary diversity score ≥ 5 food groups (422, 11.6%) (13).

Lactating mothers who had inadequate dietary diversity score were 3.8 times more likely to be undernourished than those who had adequate dietary diversity score. The study conducted in Desse, Amhara region showed that lactating women who had ≤ 3 Meals/day (408, 33.3%) and women who had greater than 3 (408, 22.3%) underweight (18).

Under nutrition among lactating women are more likely happen among women who not take additional food during breast feeding. Study done in Dire Dawa among 401 lactating mothers showed that 26.1% underweight women was those who not take additional food during lactating and 6.1% underweight was those who take additional food (12).

Food insecurity is reported as determinants of maternal under nutrition in Ethiopia. Women from food-secure households had a better nutritional status compared to women from food-insecure households. The study conducted in Arbaminch Zuria district; Southern Ethiopia showed among 478 lactating mothers 14% of food insecure women are underweight while 59% have normal weight (24).

The study conducted in Ambo showed that the prevalence of underweight of lactating mothers among severely food insecure was high (619, 20%) when compared with Food secure (619,14%) mild(619,9%) and moderate food insecure(619,16%) (25).

2.2.3. Maternal healthcare service factors

A study conducted on the effect of births spacing on maternal or child nutritional outcomes showed that short interval between pregnancies is associated with adverse outcome in women's nutritional status. The review showed significant association of short birth interval with increased risk for maternal under nutrition (26). A study done in Dire Dawa, Easter Ethiopia showed under nutrition was more likely high among women who has birth interval 1–2 year (401,25.2%), as compared with women who has first birth interval (401,21.2%), and > 2-year birth interval (401,16.7%)(27).

Study conducted in Ataye District, North Shoa Zone, Central Ethiopia showed under nutrition of lactating women were more than five times more common among mothers who had poor knowledge of nutrition than those who had good knowledge of nutrition (17).

Study conducted in North West Ethiopia showed that respondents who gave birth at home were more than two times more likely to be underweight when compared with women who deliver at a health institution. This could be explained by a reduced risk of obstetric complications in women who deliver at health institutions. Such risks include; hemorrhage which could influence the overall health status of the lactating women. In addition, women who deliver at health facility can get nutrition-related health education from health professionals, which will help them to adapt good behaviors related with nutrition and prevent malnutrition (28).

The finding in Eastern Ethiopia showed that (422,24.6%) under nutrition women was who had less than four (<4) ANC visit and those greater than equal to four visits had (422,15.4%) under nutrition (29). Women who did not get a regular nutritional education in their community were more than five times more likely to be underweight than those who got a nutritional education in their local area (30).

2.2.4. Comorbid factors

Infections can alter nutritional status mediated by changes in dietary intake, absorption and nutrient requirements and losses of endogenous nutrients (5, 16). Thus, the presence of infections can contribute to the malnourished state. The study conducted in Tigray indicate that women who had history of illness was two times more likely to be underweight compared to those who had no history of illness (31).

2.3. Conceptual framework

The relationship between various factors and undernutrition among lactating mothers can be depicted through a conceptual framework comprising socio-demographic, dietary and food access, maternal healthcare service, and comorbid factors. Socio-demographic factors such as age, marital status, educational level, family size, and monthly income play a crucial role in determining access to resources and socio-economic status, which in turn influence dietary practices and nutritional intake. Dietary and food access factors, including the number of meals, dietary diversity, and household food insecurity, directly impact the quality and quantity of nutrients available to lactating mothers. Maternal healthcare service factors, such as birth interval, place of delivery, utilization of antenatal care (ANC), maternal knowledge about nutrition, and frequency of nutrition counseling, are indicative of access to healthcare and maternal health-seeking behaviors, which can influence maternal nutritional status. Additionally, comorbid factors like illness and infection can exacerbate nutritional deficiencies among lactating mothers, further compromising their nutritional status. This conceptual framework provides a comprehensive understanding of the multifaceted determinants of undernutrition among lactating mothers, highlighting the interconnectedness of socio-demographic, dietary, healthcare, and health-related factors in

shaping maternal nutritional outcomes. Adopted and modified from (1, 3-5, 8, 12, 20, 25, 29, 32, 33).

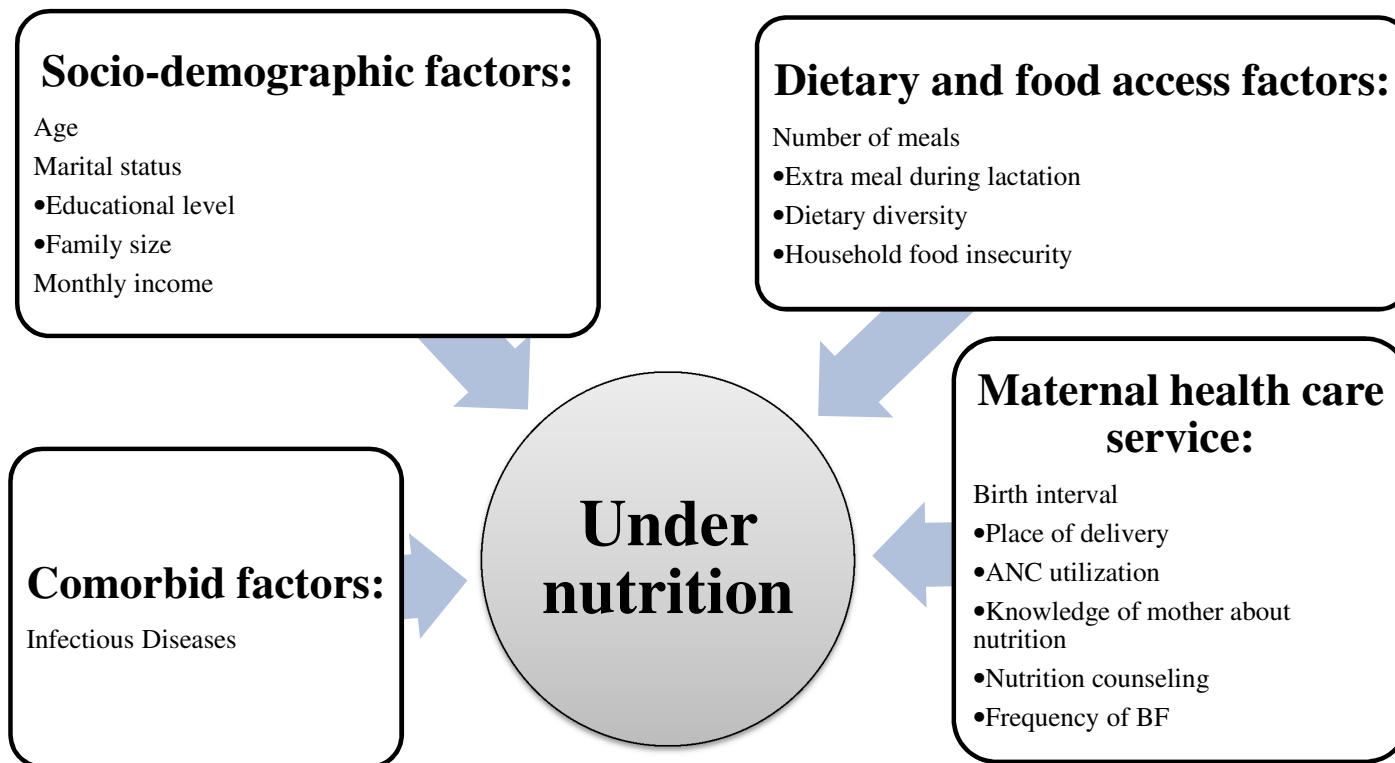


Figure 1: Conceptual framework of the study from May 1 to August 1, 2023

3. Objectives of the study

3.1. General Objective

The aim of this study is to assess the prevalence of under nutrition and associated factors among lactating mothers in selected health center in Addis Ababa, Ethiopia in 2023.

3.2 Specific Objectives

1. To assess the prevalence of under nutrition among lactating mothers in selected health centers in Addis Ababa,
2. To assess associated factors of under nutrition among lactating mothers in selected health centers Addis Ababa,

4. Methods and materials

4.1. Study Area and Period

The study was conducted in Addis Ababa, the capital and largest city of Ethiopia, consisting of 11 administrative sub-cities. According to the UN World Urbanization Prospects, the metro area population of Addis Ababa in 2023 was estimated to be 5,703,628 (34). The city boasts over 25 private for-profit hospitals, 98 health centers, and 13 governmental hospitals, with approximately 8,000 lactating mothers visiting health centers annually (6). The study was conducted from May 1 to August 1, 2023.

4.2. Study Design

A health facility-based cross-sectional study was conducted.

4.3. Population

Source population

The source population for this study is all lactating women who have a child/children less than 24 months who were visited health centers in Addis Ababa.

Study Population

All lactating women who were visited selected health centers from May 1 to August 1, 2023 in Addis Ababa.

4.4. Eligibility Criteria

Inclusion Criteria

The study included lactating mothers residing in Addis Ababa with children less than 24 months of age who visited health centers for postnatal care, immunization, family planning, growth monitoring, and follow-up during the study period.

Exclusion Criteria

Lactating women who were critically ill, confirmed pregnancy and with physical deformity was excluded from the study.

4.5. Sample Size Determination and Sampling Technique

Sample Size Determination

For the first specific objective of this study, the sample size was calculated using a single-population proportion formula. The following parameters were considered in the calculation:

1. **Marginal Error (d):** A margin of error of 4% was selected to ensure a precise estimate of the prevalence of undernutrition among lactating mothers.
2. **Confidence Interval (CI):** A 95% confidence interval was chosen, corresponding to a z-value of 1.96, which indicates that we can be 95% confident that the true population proportion falls within our calculated range.
3. **Expected Prevalence Rate (p):** The expected prevalence of undernutrition among lactating mothers was based on previous research conducted in Dire Dawa, which reported a prevalence rate of 22% ($p = 0.22$) (12) .
4. **Complementary Proportion (q):** This is calculated as $q=1-p$ $q=1-0.22=0.78$ yielding $q=1-0.22=0.78$.
5. **Design Effect:** A design effect of 1.5 was applied to account for the potential clustering effects in the sampling process.
6. **Non-Response Rate:** A non-response rate of 10% was factored in to ensure that the final sample size would still be adequate even if some participants were unable to respond.

Calculation Steps

Using the above parameters, the sample size (n) was calculated using the formula:

$$n = \frac{(z\alpha/2)^2 \times pq}{d^2}$$

Substituting the values:

$$n = \frac{(1.96)^2 \times 0.22 \times 0.78}{(0.04)^2}$$

Calculating this gives:

$$n = \frac{(3.8416) \times (0.1716)}{(0.0016)} \approx 412$$

Adjusting for Non-Response and Design Effect

To account for the 10% non-response rate, the sample size was adjusted as follows:

Adjusted Sample Size(n')

$$n' = \frac{n}{1 - \text{non response rate}} = 412/0.90 \approx 458$$

Next, applying the design effect of 1.5:

Final Sample Size for Objective 1=458×1.5≈687

Sample Size for the Second Objective

Objective 2: Assessing Associated Factors of Undernutrition

For the second objective, we were calculated the sample size needed for binary logistic regression.

Parameters for Objective 2

1. **Number of Independent Variables (k):** 8
2. **Expected Event Rate (p):** Assuming an event rate of 20% (0.20)
3. **Significance Level (α):** 0.05 (z-value = 1.96)
4. **Power (1 - β):** 0.80 (z-value = 0.84)

5. Design Effect (DE): 1.5

Sample Size Calculation for Objective 2

Using the rule of thumb for events per variable (EPV), we need at least 10 events per independent variable:

Total Events Needed = $k \times 10$

$$= 8 \times 10$$

=

To find the total sample size needed to achieve 80 events with an event rate of 20%:

$$N = \frac{\text{Total Events Needed}}{P}$$

$$N = \frac{80}{0.20}$$

$$= \underline{\underline{400}}$$

Adjusting for Design Effect

Now, adjust for the design effect:

$$N_{\text{adjusted}} = N \times DE = 400 \times 1.5 = 600$$

Final Sample Size Determination

- Final Sample Size for Objective 1: 687 participants
- Final Sample Size for Objective 2: 600 participants

Overall Final Sample Size

Since the final sample size for the study should be based on the larger of the two calculations, the final calculated sample size for the study was: **687 participants**

Sampling technique and procedures

The study employed a multi-stage sampling technique to recruit participants. Initially, four sub-cities were selected from the eleven sub-cities of Addis Ababa using a simple random

sampling technique, utilizing the lottery method. Subsequently, approximately 25% of the health centers within the chosen four sub-cities were selected. Proportional allocation was then utilized to determine the sample size for the selected health centers. Within these health centers, a systematic random sampling approach was employed to select lactating mothers. The first lactating mother at each health center was chosen using the lottery method, followed by selecting subsequent participants at K-value intervals until the required sample size for each health center was attained.

To determine the K interval, the estimated number of lactating women accessing various services, including post-natal care, immunization, family planning, growth monitoring, and under 5 outpatient clinic services, over a six-month period was calculated. This estimation yielded a total of 4891 expected lactating mothers. Consequently, the K interval varied for lactating women visiting each health facility, determined by dividing the total number of lactating mothers visiting each health facility over six months by the total sample size allocated for the health center.

$$K = 4891/687$$

$$\approx 7$$

Hence, every 7th lactating mother visiting the health center was asked to participate in the study.

Table 1: Sampling procedures of lactating mothers at health centers from May 1 to August 1, 2023, Addis Ababa.

Name of Sub-city	Number of health centers	Number of Selected health centers	Name of Selected health centers	Number of lactating mothers	Number of Selected lactating mothers
Gulele	10	2	Shegole health centers	727	102
			Hiddase health centers	512	71
Arada	12	3	Abuare Health Center	410	59
			Arada health centers	402	57
			Janmeda health centers	459	64
Nifas silk	8	2	Woreda 6 health centers	425	61
			Woreda 2 health centers	393	56
Yeka	10	2	Cheffe health centers	650	92
			Kotebe health centers	913	125
Total	40	9		4891	687

4.6. Study Variables

Dependent variable

Prevalence of under nutrition among lactating mothers

Independent Variable

1. Socio-demographic factors:

- Age
- Marital status
- Educational level
- Family size
- Monthly income

2. Dietary and food access factors:

- Number of meals
- Extra meal during lactation
- Dietary diversity
- Household food insecurity

3. Maternal health care service:

- Birth interval
- Place of delivery
- ANC utilization
- Knowledge of mother about nutrition
- Nutrition counseling
- Frequency of BF

4. Comorbid factors:

- Infectious Diseases

4.7. Operational definitions

Socio-demographic factors

- **Age:** The chronological age of the lactating mother at the time of data collection. For example, "Age was recorded in years at the time of the study." (35)
- **Marital status:** The marital status of the lactating mother, categorized as single, married, divorced, or widowed. For example, "Marital status was classified as single, married, divorced, or widowed based on self-report." (12)
 - ❖ **Single:** For the purpose of this study, "single" refers to lactating mothers who have never been legally married or entered into a legally recognized marital union, regardless of whether they have children. This includes individuals who may be in a relationship or have children but have not formalized their partnership through marriage.
 - ❖ **Married:** "Married" refers to lactating mothers who are currently in a legally recognized marital union or have been married at any point in the past, irrespective of whether their spouse is currently present or deceased.
 - ❖ **Widowed:** "Widowed" applies to lactating mothers whose spouse has passed away, leaving them as the surviving partner in a marital union.
 - ❖ **Divorced:** "Divorced" describes lactating mothers who have legally ended their marriage through divorce proceedings and are no longer in a marital union with their former spouse.
- **Educational level:** The highest level of education attained by the lactating mother, typically categorized as primary, secondary, or tertiary education. For example, "Educational level was categorized as primary, secondary, or tertiary based on self-report or educational certificates." (36)
- **Family size:** The total number of individuals living in the household of the lactating mother. For example, "Family size was determined by counting all household members residing with the lactating mother." (37)
- **Monthly income:** The total income earned by the household of the lactating mother per month, measured in the local currency (ETB). For example, "Monthly income

was assessed by self-report or financial records and recorded in the local currency."
(38)

Dietary and food access factors

- **Number of meals:** The total number of meals consumed by the lactating mother per day. For example, "Number of meals per day was assessed by self-report or dietary recall methods." (39)
- **Extra meal during lactation:** Any additional meal or snack consumed by the lactating mother specifically during the lactation period to meet increased energy and nutrient demands. For example, "Extra meal during lactation was defined as any additional meal or snack consumed beyond regular meals during the breastfeeding period." (40)
- **Dietary diversity:** The variety and range of foods consumed within the diet of the lactating mother, typically measured using standardized dietary diversity scores or food group consumption. For example, "Dietary diversity was assessed using a validated dietary diversity questionnaire or tool, capturing the consumption of foods from various food groups." (18)
- **Household food insecurity:** The limited or uncertain access to adequate and nutritious food within the household of the lactating mother, typically measured using validated household food insecurity scales or indices. For example, "Household food insecurity was assessed using the Household Food Insecurity Access Scale (HFIAS), a validated tool that measures various levels of household food insecurity." (41)

Maternal health care service

- **Birth interval:** The average length of time between consecutive births within the population of lactating mothers, typically measured in months or years. For example, "Birth interval was calculated as the time elapsed between the previous birth and the current birth, measured in months." (42)
 - ✓ At Birth: This category includes mothers who have given birth recently, with no previous births recorded.

- ✓ 1-2 Years: This category encompasses mothers who have had their previous child between one and two years prior to the current birth.
- ✓ Above 2 Years: This category includes mothers who have had their previous child more than two years before the current birth.
- **Place of delivery:** The location where the lactating mother gave birth, categorized as home, health facility, or other. For example, "Place of delivery was recorded as home, health facility, or other based on self-report or medical records." (43)
- **ANC utilization:** The utilization of antenatal care services by the lactating mother during pregnancy, typically assessed based on the number and timing of ANC visits attended. For example, "ANC utilization was measured by the number of antenatal care visits attended by the lactating mother during her pregnancy, recorded from medical records or self-report." (44)
- **Knowledge of mother about nutrition:** The level of knowledge possessed by the lactating mother regarding nutrition and dietary practices, typically assessed using structured questionnaires or surveys. For example, "Knowledge of mother about nutrition was evaluated using a validated nutrition knowledge questionnaire, covering various aspects of maternal and child nutrition." (45)
- **Nutrition counseling:** The provision of tailored dietary advice, guidance, and support to lactating mothers to optimize their nutritional intake, typically delivered by healthcare professionals. For example, "Nutrition counseling was provided by trained healthcare providers during antenatal care visits or postnatal consultations, focusing on maternal dietary needs and breastfeeding practices." (46)
- **Frequency of breastfeeding (BF):** The number of times per day that a lactating mother feeds her infant with breast milk, typically assessed through self-report or breastfeeding diaries. For example, "Frequency of breastfeeding was recorded as the number of breastfeeding sessions per day reported by the lactating mother or documented in breastfeeding diaries." (47)

Comorbid factors

- **Infectious Diseases:** Refers to communicable diseases caused by pathogens such as bacteria, viruses, parasites, or fungi, which can coexist alongside undernutrition in lactating mothers. For example, "Infectious diseases included conditions such as tuberculosis, HIV/AIDS, malaria, and other communicable diseases diagnosed through laboratory tests or clinical assessments." (45, 48)

Lactating mothers: A woman who has less than 24 month's old breastfed child/children.

Under nutrition: Lactating mothers whose body weight is too low, i.e., BMI < 18.5 kg/m² (49).

Dietary diversity: It is a qualitative measure of food consumption that reflects mothers' access to a variety of foods and is also a proxy measure of nutrient adequacy of the diet which is measured among nine food groups (33).

Mildly food insecure (access): Household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. But it does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating) (32).

Moderately food insecure: Household sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions (32).

Severely food insecure: Household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely (32).

Household Food security: Household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely (32). Household food insecurity was measured with the Household Food Insecurity Access Scale (HFIAS), a structured, standardized, and locally validated tool that was developed mainly by the FANTA, to

classify households as food secure or not. The HFIAS has nine questions asking household's last month experience about three domains of food insecurity: feeling uncertainty of food supply, insufficient quality of food, and insufficient food intake and its physical consequences. Study households were categorized into different levels of food-security (food-secure and mildly, moderately, or severely food-insecure) according to the recommendation in HFIAS (50).

Minimum Dietary Diversity Score (MDDS): was calculated using the nine food groups' category(33). The mother was asked the type of food she ate 24-hours preceding the survey regardless of the portion size. WDDS is considered as

1. **Low:** if the mother consumed ≤ 3 food groups out of the nine food groups
2. **Moderate:** if the mother consumed 4–5 food groups out of the nine food groups
3. **High:** if the mother consumed ≥ 6 food groups out of the nine food groups

Anthropometric measurements: The nutritional status of the mothers was assessed by using the body mass index. therefore, measures of height in centimeters (to the nearest 0.1 cm) and weight in kilograms (to the nearest 0.1 kg) for every mother was taken using a weighing scale with an attached height meter. Measurements of height and weight was done with no shoes and with light clothing as much as possible. Three measurements at a time was taken for each mother, and in the final analysis, the average of three measurements was taken (1).

BMI range:

- Severe underweight: BMI ≤ 15.9
- Moderate underweight: BMI 16.0-16.9
- Mild thin (underweight): BMI 17.0-18.4
- Normal weight: BMI 18.5–24.9

4.8. Data collection methods, tools, and procedures

The data collection methods, tools, and procedures for this study were carefully designed and implemented to ensure accuracy and reliability of the gathered information. Initially, a

questionnaire was adapted from existing validated instruments to suit the specific objectives of the study. Prior to the main data collection, a pre-test was conducted in a different but similar setting to assess the clarity, relevance, and comprehensiveness of the questionnaire. Based on the pre-test findings, the questionnaire was modified and refined to enhance its effectiveness.

To ensure uniformity and consistency in data collection, the data collectors underwent comprehensive training sessions. They were trained on the objectives of the study, the use of the data collection tools, and proper interviewing techniques. Additionally, they received training on how to use Open Data Kit (ODK) Collect, a mobile data collection platform. After modifications, the questionnaire was deployed on ODK for efficient and streamlined data collection.

Data collection was carried out through face-to-face interviews conducted by trained interviewers using the structured questionnaires. The questionnaire focused on various domains including socio-demographic factors, dietary and food access factors, maternal health care services, health, comorbidities, and anthropometric measurements. It consisted of 35 multiple-choice questions and four parameters to assess undernutrition and associated factors.

Anthropometric measurements including height, weight, and Body Mass Index (BMI) were also recorded during the interviews. A total of nine health workers were recruited as data collectors, each assigned to a specific health center. Additionally, one supervisor, who was a BSc. Nurse working in the health center, was appointed to oversee the data collection process at each site.

To ensure consistency, data collection was conducted simultaneously in all selected health centers by separate data collectors. This approach minimized the potential for variation in data collection procedures and enhanced the reliability of the collected data.

4.9. Data quality control

The data quality control measures were meticulously implemented throughout the data collection process to ensure accuracy, reliability, and validity of the gathered information.

To maintain the quality of data, several steps were taken. Firstly, the questionnaire design and data collection procedures were carefully designed to address the research objectives. The questionnaires were initially prepared in English and Amharic, and then translated back into English to ensure consistency and accuracy of the questions.

Comprehensive training sessions were provided to the data collectors and supervisors on the data collection procedures and ethical considerations. A pretest was conducted on 5% of the total sample size in a location other than the selected health centers to assess the clarity and understandability of the questionnaire. Any questions found to be unclear or confusing were modified based on the results of the pretest.

To ensure the reliability and validity of the data collected in this study, several measures were implemented to minimize biases, including recall bias and social desirability bias.

1. **Use of Objective Measures:** To validate self-reported data, objective measures such as anthropometric assessments were employed. These assessments included measuring the height and weight of participants to calculate Body Mass Index (BMI) accurately. By using objective data alongside self-reports, the study aimed to reduce the impact of recall bias, which can occur when participants struggle to accurately remember their dietary habits or health service utilization.
2. **Confidentiality and Anonymity:** The data collection process was designed with a strong emphasis on confidentiality and anonymity. Participants were informed that their responses would be kept confidential and used solely for research purposes. This assurance was crucial in creating a safe environment for participants to share their experiences and information honestly, thereby helping to mitigate social desirability bias, where individuals may alter their responses to align with perceived social norms or expectations.

Throughout the data collection period, the supervisor conducted daily checks to ensure the completeness and consistency of the collected data. Additionally, the principal investigator closely monitored the overall quality of data collection and meticulously entered and

cleaned the data before analysis. These rigorous quality control measures enhanced the reliability and validity of the study findings.

Data collection was facilitated through the use of Open Data Kit (ODK), a digital platform that supports multi-language capabilities. The questionnaire was prepared in both English and the local language (Amharic), and then deployed to ODK, ensuring accessibility to respondents in their preferred language.

ODK features built-in data validation systems, logic checks, and eliminates manual errors, streamlining the data collection process and minimizing the risk of errors. Upon completion of data collection, the collected data were exported to Statistical Package for the Social Sciences (SPSS) for analysis.

4.10. Data processing and analysis

In the data processing and analysis phase, rigorous methods were employed to ensure the reliability and validity of the findings. Prior to analysis, the collected data underwent necessary recoding to facilitate the statistical procedures. Descriptive statistics, including frequency, mean, and percentage, were utilized to summarize the results pertaining to various factors such as socio-demographic factors, dietary and food access factors, maternal health care service factors, and comorbid factors in relation to the prevalence of undermatrons.

For the multivariable regression analysis, a p-value threshold of 0.25 was used during the bivariable logistic regression stage. A stricter cut-off (like $p < 0.05$, commonly used) might exclude variables with weaker but potentially relevant relationships. A looser cut-off (like $p < 0.5$) might include too much noise and irrelevant variables. Thus, 0.25 threshold was chosen to be inclusive of potentially relevant variables that may have a moderate association with the prevalence of undermatrons. Variables with a p-value less than or equal to 0.25 were selected for inclusion in the multivariable logistic regression model. This approach allowed for a comprehensive examination of potential confounding factors and ensured that important variables were not overlooked in the analysis.

In order to address potential multicollinearity among predictor variables, Variable Inflation Factors (VIF) analysis was performed. This technique assessed the degree of correlation between independent variables and helped identify any collinearity issues that could affect the reliability of the regression analysis. Variables with Tolerance values closer to 1 and VIF values closer to 1 indicate lower collinearity and are considered more reliable predictors in the model. Lower Tolerance values (close to 0) and higher VIF values (above 10) suggest high multicollinearity, indicating potential redundancy among variables.

The multivariable logistic regression model's fitness was evaluated using the Hosmer-Lemeshow goodness-of-fit test. Odds ratios, along with 95% confidence intervals, were calculated to quantify the strength of association between the independent variables and prevalence of undermatrons.

Finally, the findings were presented using a combination of sentences, graphs, tables, frequencies, and percentages, providing a clear and interpretable summary of the results while adhering to robust statistical practices.

4.11. Ethical Considerations

Before the start of the data collection process ethical clearance and approval for the study was obtained from the ethical review committee of St. Paul's hospital millennium medical college with protocol number pm23/1/13/7/24. Additionally, permission to conduct the study was obtained from the Addis Ababa Regional Health Bureau, specifically the Public Health Research and Emergency Management Directorate with protocol number h/h/m/1202/227 and date 28/11/15. Prior to data collection, the aim of the study was explained to the respondents. Verbal informed consent was obtained from participants who could not read and write, while written informed consent was obtained from participants who can read and write. The confidentiality of the study participants was ensured by avoiding an identifier like a name. Participation in the study was based on volunteer decisions. Privacy was kept by taking the data anonymously, and the participants have the right to be excluded from the study if they do not want to participate. The Participants also was told as he/she has the right to withdraw from the study at any stage.

4.12. Disseminations of the Findings

The dissemination of the study findings will involve multiple channels to ensure broad visibility and impact. Firstly, the study will be submitted to St. Paul's Hospital Millennium Medical College, as it is a requirement for academic purposes. Additionally, the findings will be disseminated to the Addis Ababa Regional Health Bureau and sub-cities' health offices to raise awareness about the issue of undernutrition among lactating mothers residing in the area. This dissemination aims to inform local health authorities about the prevalence and factors associated with undernutrition, enabling them to develop targeted interventions and policies to address the issue effectively.

Furthermore, the study findings will be shared through various seminars, workshops, and conferences, providing an opportunity to reach a diverse audience of healthcare professionals, researchers, policymakers, and other stakeholders. These dissemination events will serve to foster discussion, exchange knowledge, and promote collaboration in addressing the challenges of undernutrition among lactating mothers.

Moreover, efforts will be made to publish the study findings in reputable scientific journals. By publishing in peer-reviewed journals, the study aims to contribute to the body of scientific literature on maternal and child health, nutrition, and public health. This dissemination strategy will enable the findings to reach a wider audience, including policymakers, decision-makers, researchers, and practitioners, who can utilize the evidence to inform policies, programs, and interventions aimed at improving the nutritional status and well-being of lactating mothers and their infants. Overall, the dissemination of the study findings is essential for maximizing the impact of the research and catalyzing positive change in addressing undernutrition among lactating mothers in Addis Ababa.

5. Results

5.1. Socio-demographic factors

The study participants were 632 with 92% response rate. To achieve a high response rate of 92% among the 632 participants in this study, several strategies were implemented to enhance participant engagement. Clients' awareness was conducted to inform potential participants about the study's purpose and benefits, with the involvement of health educators every morning schedule of health education at health centers to foster trust. The informed consent process was clear and ensured confidentiality, while flexible scheduling and multiple data collection locations accommodated participants' availability. Additionally, well-trained data collectors established rapport with participants, creating a comfortable environment that contributed to the overall success of the study.

The median age was 29 (IQR= 6) and more than half of participants were aged below 30 (55.2%), with 48.1% having completed secondary education. Notably, 64.4% of husbands possessed a college diploma or higher. Housewives constituted a significant portion (50.8%) of the participants, and the predominant occupation for husbands was government employment (55.2%). The majority of participants were married (84.7%), while (9.8%) were divorced. More than half had a family size of less than five 63.6% (10% less than two and three to four 53.6%). The median income was 10,000 (IQR = 8000) and around half of the households had an income below the mean 8548 ETB (50.9%).

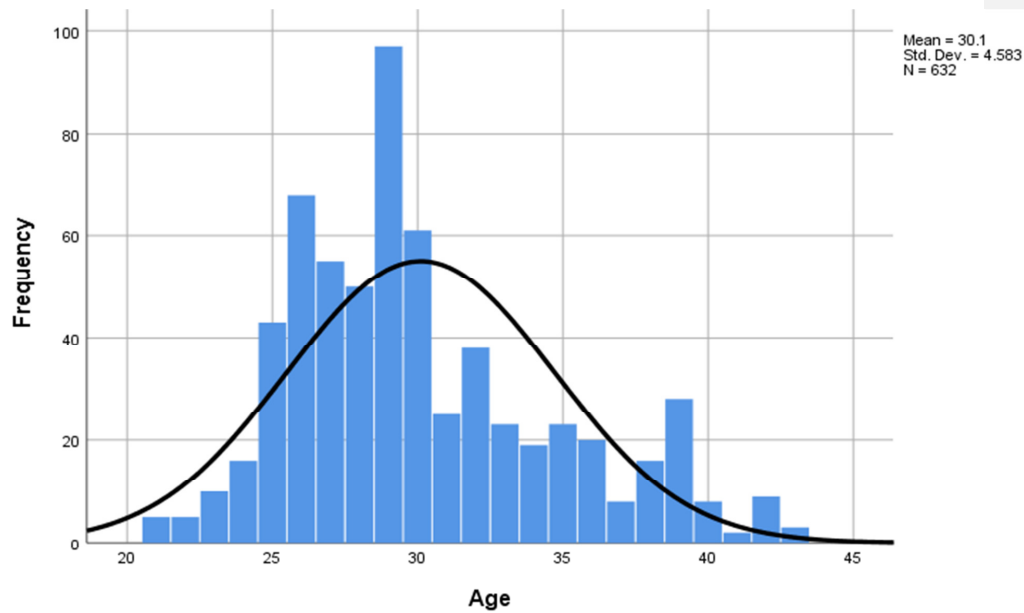


Figure 2: Distribution of age among lactating mothers, August, 2023 (N-632).

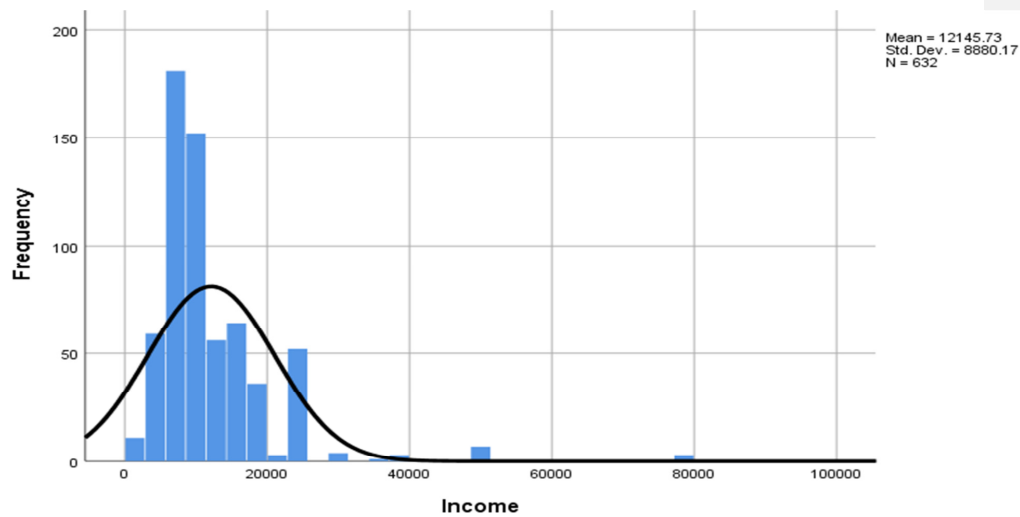


Figure 3: Distribution of income among lactating mothers, August, 2023 (N=632)

Table 2 Sociodemographic characteristics of the lactating mothers, August, 2023 (N=632).

Variable	Category	Frequency	Percentage
Age in Category	Age less than 30	349	55.2
	Age from 30 to 39	261	41.3
	Age greater than 39	22	3.5
Educational Status	No formal education	49	7.8
	Primary education	95	15.0
	Secondary education	304	48.1
	College diploma and above	184	29.1
husband's educational status	No formal education	17	2.7
	Primary education	67	10.6
	Secondary education	141	22.3
	College diploma and above	407	64.4
Mother occupation status	House wife	321	50.8
	Daily labourer	60	9.5
	Merchant	0	0
	Government employee	124	19.6
	Private business	127	20.1
husband's Occupation	No work	0	0
	Daily labourer	91	14.4
	Merchant	0	0
	Government employer	349	55.2
	Private business	192	30.4
current marital status	Single	19	3.0
	Divorced	62	9.8
	Widowed	16	2.5
	Married	535	84.7
Family size	≤ 2	63	10
	3 – 4	339	53.6
	≥ 5	230	36.4
Household income	Below 8548 ETB	322	50.9
	Above 8548 ETB	310	49.1

5.2. Maternal health care service utilization and Comorbid factors

The majority of lactating women in the study gave birth at health facilities (94.1%). A high percentage had ANC follow-up (86.6%), with more than three fourth having four (4) or more ANC visits (79.4%). Birth intervals were predominantly 1-2 years (73.4%). Breastfeeding patterns varied among the participants, with more than one-third (35.1%)

reporting a breastfeeding frequency of 5-8 times in a 24-hour period. The occurrence of any illness in the last two weeks was reported by 29% of participants. Access to nutrition education was promising, with 64.6% receiving health information. Healthcare workers (33.2%) and mass media (31.3%) were the key sources of nutritional information.

Table 3: Maternal health care service utilization and Comorbid factors of participants, August 1, 2023.

Variable	Category	Frequency	Percentage
Place of delivery	At home	37	5.9
	At health facility	595	94.1
At least one ANC follow-up	Yes	547	86.6
	No	85	13.4
ANC visit	1-3	47	7.4
	4 and above	502	79.4
Birth interval	At birth	32	5.1
	1-2 years	464	73.4
	Above 2 years	136	21.5
Breast feeding child in 24hrs	1-4	147	23.3
	5-8	222	35.1
	8-12	71	11.2
	Above 12	192	30.4
Illness in the last two weeks	Yes	183	29.0
	No	449	71.0
Access of nutrition information	No	224	35.4
	Yes	408	64.6
Source of health information	Healthcare worker	210	33.2
	Mass media	198	31.3

5.3. Dietary diversity and food access factors

Above one-third (35.8%), of participants reported eating two times daily followed by those eating four or more times (37.0%). Notably, 39.7% experienced changes in food intake during lactation. Among those experiencing changes, modifications in both meal frequency and amount were common (23.4%). However, a substantial percentage reported no alterations in food intake (60.3%).

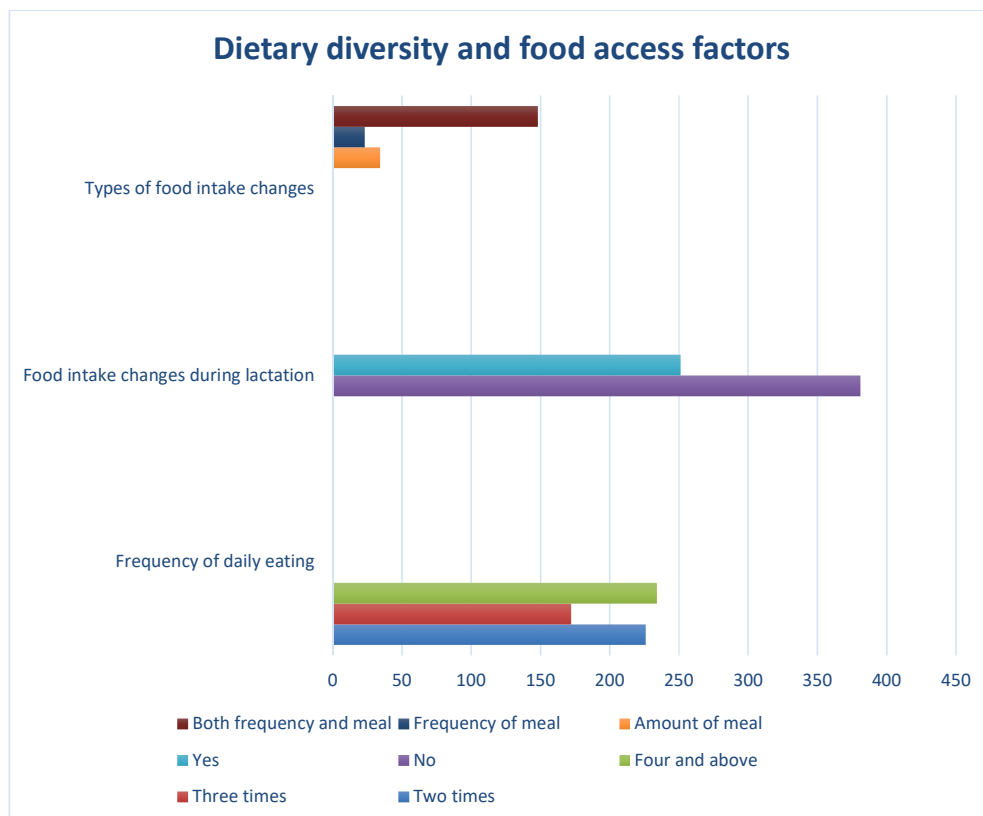


Figure 4: Dietary diversity and food access factors of lactating women during lactation August, 2023 (N=632).

Majority of participants reported consuming starchy staples, roots, and tubers (84.7%), reflecting a common dietary component. Dark green leafy vegetables (84.3%) and vitamin A rich fruits and vegetables (75.5%) were also widely consumed. Despite this, a substantial proportion experienced food insecurity (51.4%), with varying degrees of severity. The majority had a diet diversity intake of five or more food groups (71.7%), indicating a relatively diverse dietary pattern.

Table 4: Dietary diversity and household food insecurity of lactating mothers, August, 2023 (N=632).

Food Group	Category	Frequency	Percentage
Starchy staples, roots and tuber crops	Yes	535	84.7
	No	97	15.3
Dark green leafy vegetables	Yes	533	84.3
	No	99	15.7
Vitamin A rich fruits and vegetables	Yes	477	75.5
	No	155	24.5
Other fruits and vegetables	Yes	437	69.1
	No	195	30.9
Fats and oils	Yes	471	74.5
	No	161	25.5
Meat and fish	Yes	381	60.3
	No	251	39.7
Eggs	Yes	452	71.5
	No	180	28.5
Legumes, nuts and seeds	Yes	437	69.1
	No	195	30.9
Milk and milk products	Yes	451	71.4
	No	181	28.6
Diet diversity	Intake < 5 food groups	179	28.3
	Intake $\geq$ 5 food groups	453	71.7
Food security status	Food secured	307	48.6
	Food insecure	325	51.4

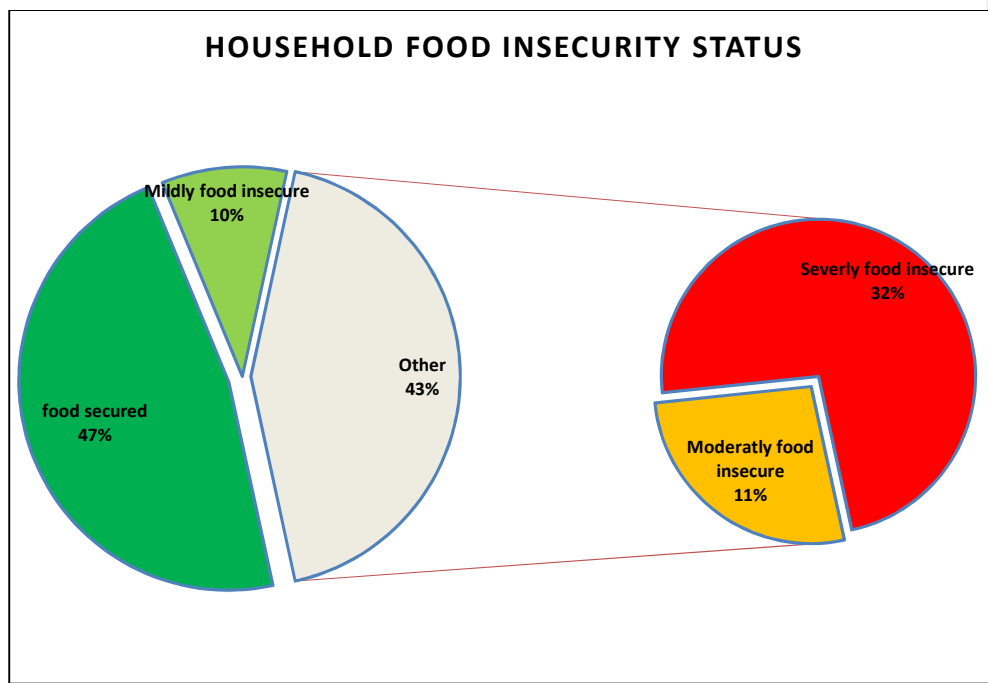


Figure 5 Food insecurity status of lactating mothers, August, 2023 (N=632).

Anthropometry measurement and nutritional status

Anthropometric measurements were conducted to assess the nutritional status of lactating women. The median weight was 57.0 kg (IQR = 12.0), with a range from 30 to 78 kg. The median height was 1.60(IQR = 11) meters, ranging from 1.45 to 1.76 meters. The median Body Mass Index (BMI) was 22.43(IQR = 7), falling within the normal range. However, the range (12.33 to 30.85) suggests considerable variability in BMI. The BMI distribution among the lactating mothers shows that the majority (54.4%) have a normal weight, while nearly 30% are underweight (including severe, moderate, and mild categories). A smaller portion of the population is overweight (13.1%), with only 0.5% classified as moderately obese. The data reveals that out of the total sample, 31.6% of lactating mothers fall into the category of undernutrition, while the remaining 68.4% do not exhibit signs of undernutrition.

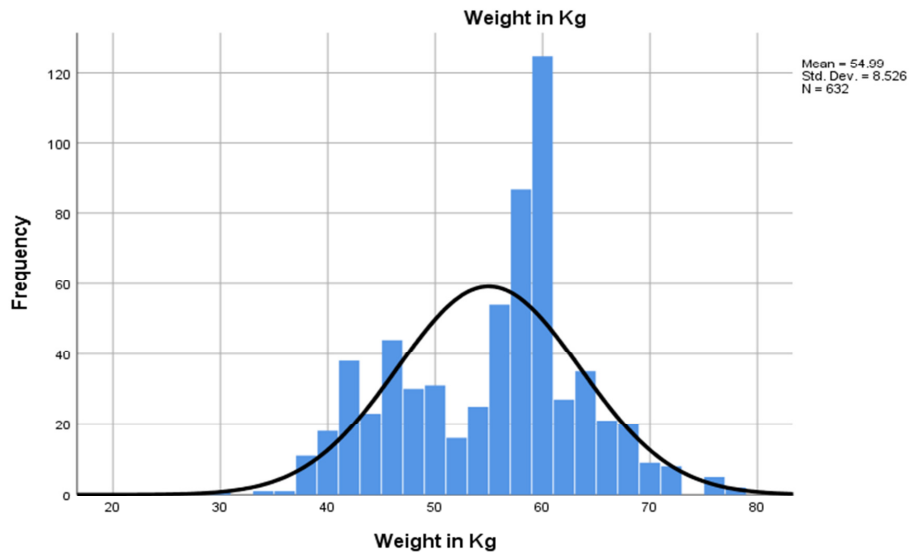


Figure 6: Weight distributions overview of lactating mothers, August, 2023 (N=632).

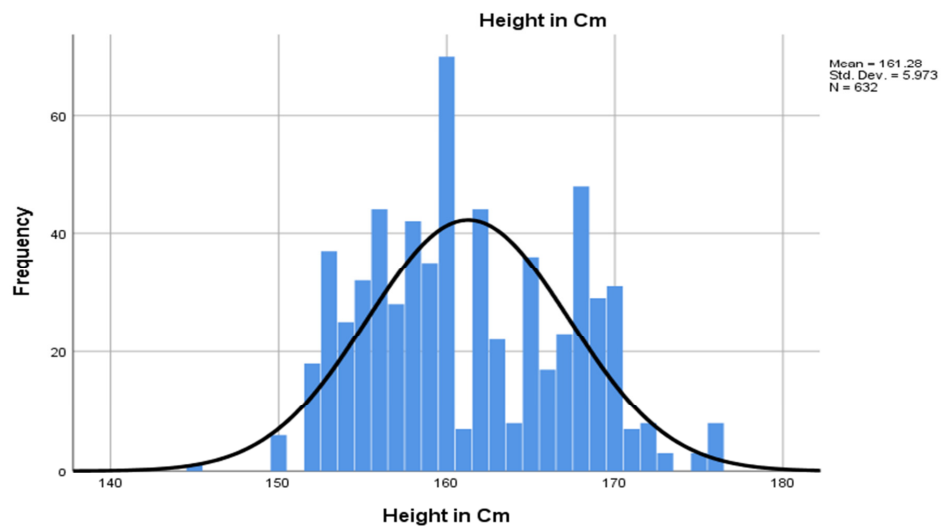


Figure 7: Height distributions overview of lactating mothers, August, 2023 (N=632).

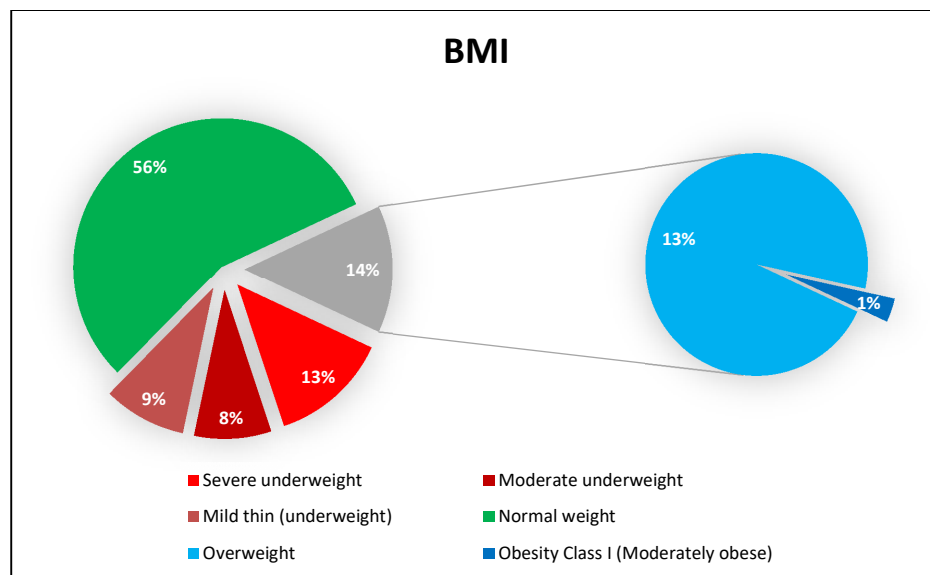


Figure 8: BMI Distribution Overview of lactating mothers, August, 2023 (N=632).

Table 5: Anthropometry measurement and nutritional status of lactating mothers, August, 2023 (N=632).

Anthropometry measurement	Minimum	Maximum	Median	IQR
Weight in Kg	30	78	57.0	12.0
Height in meter	1.45	1.76	1.60	11.0
BMI	12.33	30.85	22.43	7.0
Under Nutrition Status	Undernutrition	200	31.6	
	Normal	432	68.4	

5.4. Factors associated with under nutrition among lactating mothers

To select candidate variables for multi-variable analysis, bi-variable analyses were carried out. Based on predetermined criteria ($p < 0.25$), the results of bi-variable analyses indicated that some of socio-demographic; maternal health care service; and dietary diversity and food insecurity status variables below were selected as candidate for multi-variable analysis.

The analysis of socio-demographic factors highlighted those mothers lacking formal education (COR=8.4, $p=0.001$, CI = 4.1-17.02) and husbands with lower educational levels faced elevated odds of undernutrition. Moreover, the occupational status of daily laborers, whether as mothers (COR=3.6, $p=0.001$, CI = 1.9-6.90) or husbands (COR=6.4, $p=0.001$, CI = 3.6-11.31), was significantly associated with undernutrition. In terms of health service utilization, inadequate ANC follow-up (COR=16.4, $p=0.001$, CI = 8.9-30.12) and delivering at home (COR=7.7, $p=0.001$, CI = 3.5-16.55) increased the likelihood of undernutrition. Dietary factors played a crucial role, with lower daily eating frequency, particularly two times (COR=14.4, $p=0.001$, CI = 5.86-19.77) and three times (COR=14.7, $p=0.001$, CI = 5.11-14.23), strongly linked to undernutrition. Mothers who refrained from consuming extra food during lactation exhibited reduced odds of undernutrition (COR=5.3, $p=0.001$, CI = 3.67-7.58). Additionally, a lack of dietary diversity, specifically intake < 5 food groups (COR=11.2, $p=0.001$, CI = 7.39-24.24), and food insecurity (COR=6.7, $p=0.001$, CI = 2.69-13.89) were significant factors associated with undernutrition.

After controlling the confounder, the result indicated that Educational Status, Current marital status, ANC follow-up, Frequency of daily eating, and Food security status were had statistically significant association with under nutrition among lactating mothers at 95% CI and $p<0.05$. Factors significantly associated with under nutrition among lactating mothers in this study are summarized below (Table 8).

The multivariable logistic regression analysis identified several socio-demographic and health-related factors associated with undernutrition among lactating mothers in Addis Ababa. While the analysis found that mothers lacking formal education had increased odds of undernutrition (AOR=1.2, $p=0.021$), the confidence interval (CI=0.04-2.7) included 1, indicating that this association may not be statistically significant. In contrast, being single (AOR=3.9, $p=0.022$, CI=1.4-7.75), lack of ANC follow-up (AOR=3.9, $p=0.006$, CI=1.5-10.12), lower daily eating frequency—particularly eating two (AOR=5.0, $p=0.001$, CI=3.6-12.77) or three times a day (AOR=3.0, $p=0.001$, CI=2.4-8.58)—and food insecurity (AOR=3.7, $p=0.001$, CI=1.9-10.8) were all significantly associated with increased odds of undernutrition.

Collinearity statistics indicated that variables like 'age' and 'income' had higher Tolerance values (.695 and .576) and lower VIF values (1.438 and 1.735), suggesting minimal collinearity and greater reliability as predictors in the model. In contrast, 'household food insecurity status' and 'dietary diversity' showed lower Tolerance values (.459 and .186) and higher VIF values (2.181 and 5.372), pointing to potential multicollinearity issues due to correlations with other independent variables. Despite this, the Tolerance values were not close to 0, and the VIF values did not exceed 10, so these variables were retained in the model. Other variables, such as 'current marital status' and 'occupation,' also showed low collinearity based on their Tolerance and VIF values.

The Hosmer-Lemeshow test assesses the goodness-of-fit of a logistic regression model by comparing observed and expected outcomes across different groups or deciles of predicted probabilities. In this case, the test statistic is 4.052 with 8 degrees of freedom, resulting in a p-value of 0.852. Interpreting the results, since the p-value (0.852) is greater than the chosen significance level (e.g., 0.05), we fail to reject the null hypothesis. This suggests that there is no evidence of lack of fit between the observed and expected outcomes, indicating that the logistic regression model adequately fits the data. Examining the contingency table, it shows the observed and expected frequencies for each decile or group of predicted probabilities. Across the ten steps, the observed and expected frequencies generally align closely, with minimal deviation. This further supports the conclusion that the model fits the data well. Overall, based on the Hosmer-Lemeshow test results and the contingency table, we can infer that there is no significant lack of fit in the logistic regression model, indicating that it effectively predicts the undernutrition status of lactating mothers based on the included predictor variables.

Table 6 Bivariate and multivariable logistic regression analyses outputs of factors associated with under nutrition among lactating mother in Addis Ababa, August, 2023 (N=632)

Variable	Category	Crude Odds Ratio		Adjusted Odds Ratio	
		COR (95% CI)	P-value	AOR (95% CI)	P-value
Age	Age less than 30	0.57(0.24-1.38)	0.21*		
	Age between 30 and 39	0.79(0.32-1.91)	0.59		
	Age greater than 39	1			
Educational Status	No formal education	8.43(4.17-17.02)	0.001*	1.19 (0.04-2.77)	0.021
	Primary education	3.79(2.22-6.48)	0.001*	0.49(0.09-1.14)	0.079
	Secondary education	1.31(0.844-2.02)	0.232*	0.32(0.18-1.39)	0.498
	College diploma and above	1		1	
Husband's educational status	No formal education	21.71(6.08-77.52)	0.001*	3.18(0.43-5.26)	0.255
	Primary education	9.52(5.38-16.83)	0.001*	1.68(0.47-5.24)	0.460
	Secondary education	4.46(2.94-6.77)	0.001*	1.57(0.62-4.58)	0.311
	College diploma and above	1		1	
Mother occupation status	House wife	1.16(0.75-1.81)	0.510	1.07(0.44-2.57)	0.884
	Daily labourer	3.63(1.91-6.90)	0.001*	0.60(0.19-1.86)	0.378
	Government employee	0.31(0.16-0.6)	0.001*	0.51(0.14-1.78)	0.288
	Private business	1		1	
Husband's Occupation	Daily labourer	6.42(3.64-11.31)	0.001*	1.22(0.40-3.67)	0.725
	Government employer	0.49(0.33-0.74)	0.001*	1.81(0.77- 4.26)	0.173
	Private business	1		1	
Current marital status	Single	7.88(6.35-12.2)	0.001*	3.9(1.39-7.75)	0.022*
	Divorced or separated	10.28(5.56-19.00)	0.001*	1.45(0.57-3.69)	0.432
	Widowed	7.22(2.46-21.16)	0.001*	0.39(0.24-3.66)	0.924
	Married or living together	1		1	
Family size	Five and above	1.37(0.97-1.93)	0.076*		
	Less than five	1			
Household income (ETB)	Below 8548 ETB	3.21 (2.24-4.58)	0.001*	1.98 (0.59-2.42)	0.614
	Above 8548 ETB	1		1	
Place of delivery	At home	7.65(3.54-16.55)	0.001*	0.89(0.26-3.08)	0.861
	At health facility	1		1	

⇒ Table continued on the next page

ANC follow-up	No	16.43 (8.96-30.12)	0.001*	3.88 (1.49-10.12)	0.006*
	Yes	1		1	
ANC visit	1-3	7.04(2.46-14.12)	0.001*		
	4&above	1			
Birth interval	At birth	4.9(2.14-11.31)	0.001*	4.48(0.81-24.8)	0.086
	1-2 years	0.93(0.61-1.41)	0.724	0.91(0.43-1.94)	0.802
	Above 2 years	1		1	
Child breast feeding in 24hrs	1-4	1		1	
	5-8	0.93(0.61-1.43)	0.755	1.45(0.65-3.22)	0.362
	8-12	0.46(0.24-0.86)	0.016*	1.69(0.52-5.46)	0.380
	above 12	0.34(0.21-0.55)	0.001*	0.91(0.36-2.32)	0.848
Illness in the last two weeks	Yes	3.09(2.15-4.43)	0.001*	1.04(0.54-2.00)	0.901
	No	1		1	
Access of nutrition education	No	3.19(2.25-4.54)	0.001*	0.72(0.36-1.47)	0.369
	Yes	1		1	
Source of education	Healthcare worker	1			
	Mass media	0.86(0.54-1.37)	0.531		
Frequency of daily eating	Two times	14.42(5.86-19.77)	0.001*	5(3.55-12.77)	0.001*
	Three times	14.69(5.11-14.23)	0.001*	3(2.44-8.58)	0.001*
	Four and above	1		1	
Avoid eating extra food during lactation	No	1		1	
	Yes	5.28(3.67-7.58)	0.001*	1.15(0.57-2.33)	0.698
Food intake changes during lactation	Yes	1		1	
	No	1.68(1.15-2.44)	0.007*	1.17(0.57-2.39)	0.672
Types of food intake changes	Amount of meal	2.91(2.29-6.54)	0.010*		
	Frequency of meal	4.30(1.71-10.81)	0.002*		
	Both frequency and meal	1			
Diet diversity	Intake < 4 food group	13.39(7.39-24.24)	0.001*	1.78(0.68-4.63)	0.235
	Intake ≥4 food group	1		1	
Food security status	Food secured	1		1	
	Food insecure	6.66(2.69-13.89)	0.001*	3.7(1.92-10.8)	0.001*

6. Discussion

The study aimed to assess undernutrition prevalence among lactating mothers in Addis Ababa's health centers and identify associated factors. Findings revealed a notable undernutrition prevalence of 31.6%, emphasizing the urgency of addressing this issue in line with global standards. Socio-demographic factors like maternal education, marital status, and health service utilization, particularly ANC follow-up, were linked to undernutrition. Dietary factors, including lower eating frequency, limited dietary diversity, and food insecurity, also played a pivotal role. Multivariable analysis confirmed these associations, highlighting the multifaceted nature of undernutrition and the need for comprehensive interventions addressing socio-demographic, health-related, and dietary factors.

The prevalence of undernutrition among lactating mothers in this study, determined by anthropometric measurements, indicates significant nutritional challenges in this population. According to WHO standards, a Body Mass Index (BMI) below 18.5 indicates undernutrition. In our study, the median BMI was 22.4, with an interquartile range (IQR) of 7.0, indicating a relatively normal distribution. However, the range (12.33 to 30.85) reveals considerable variability, with 31.6% of lactating mothers classified as undernourished (11, 51). This suggests that although the median BMI may appear normal, a substantial proportion of lactating mothers still face nutritional challenges, emphasizing the limitations of relying solely on central tendency measures.

When compared to previous studies, our findings indicate a higher prevalence of undernutrition than reported in some regions of Ethiopia. For instance, studies conducted in the Dega Damot Woreda and Moyale District, Borena Zone reported undernutrition rates ranging from 17.7% to 21.8% (4, 32). In contrast, our study's prevalence of 31.6% reflects a significant nutritional concern that may be attributed to several factors. Possible reasons for this discrepancy could include differences in socio-economic conditions, and dietary practices among the populations studied. For example, the higher prevalence in our study may be linked to increased food insecurity and lower dietary diversity due to being urban area, which are critical determinants of nutritional status.

Moreover, the prevalence of undernutrition among lactating mothers in Addis Ababa exceeds the global target set by the World Health Assembly, which aims to reduce the prevalence of moderate and severe undernutrition in women of reproductive age by **50%** by **2025**. This finding aligns with the Sustainable Development Goals related to maternal and child health, indicating an urgent need for targeted interventions to meet these global targets (11, 23, 26, 32, 51, 52).

Multivariable logistic regression analysis identified key factors significantly associated with undernutrition. Marital status, played a crucial role, with single mothers exhibiting higher odds of undernutrition. The significant association between single marital status and undernutrition among lactating mothers in the study raises important considerations when compared to existing literature. Single mothers, defined as those unmarried but with children, represent a vulnerable subgroup facing unique challenges that can contribute to undernutrition. Several factors may contribute to single motherhood, including unintended pregnancies, unwanted sexual intercourse, and in some cases, instances of rape or coercion. These circumstances can lead to increased stress, economic hardship, and social stigma, all of which can impact maternal health and nutrition. The study aligns with existing research highlighting the vulnerability of single mothers to nutritional challenges. Studies such as conducted by Rahman and Hromi-Fiedler have demonstrated that single mothers face increased risk factors for poor nutritional status due to socioeconomic disadvantages and limited social support networks (53, 54). Furthermore, research by Ayoya and Jones emphasizes the impact of stress and psychological factors associated with single parenthood on dietary behaviors and food security (55, 56). Being single significantly increased the odds of undernutrition (AOR=3.9, 95%CI: (1.39-7.75), $p=0.022$). Single mothers had a 3.9 times higher likelihood of undernutrition compared to married/living together mothers. This finding underscores the need for targeted interventions for single mothers to improve their nutritional status.

Mothers with no ANC follow-up exhibited a significantly higher prevalence of undernutrition (AOR=3.9, 95%CI: (1.49-10.12), $p=0.006$) compared to those with ANC follow-up. The AOR of 3.9 indicates a nearly fourfold increased likelihood of

undernutrition among mothers without ANC follow-up. This highlights the importance of ANC services in addressing maternal undernutrition. The frequency of daily eating (two and three times a day) showed a strong association with undernutrition (AOR=5.0, 95%CI: (3.55-12.77), P=0.001) and (AOR=5.0, 95%CI: (2.44-8.58), P=0.001) respectively. Mothers who ate two times a day had a fivefold increased likelihood of undernutrition, while those who ate three times a day had a threefold increased likelihood compared to those who ate four times and above. This underscores the significance of regular and diverse daily eating habits in preventing undernutrition. Mothers classified as food insecure had a significantly higher likelihood of undernutrition (AOR=3.7, 95%CI: (1.92-10.8), p=0.001). The AOR of 3.7 indicates a 3.7 times higher likelihood of undernutrition among food-insecure mothers. This emphasizes the crucial role of food security in determining the nutritional status of lactating mothers.

Comparing these findings with existing literature reveals both consistencies and unique features in the sociodemographic profile of lactating mothers. The role of factors such as occupation, and income align with global and local studies (33, 57). The high percentage of institutional deliveries and antenatal care (ANC) follow-up in the study resonates with global recommendations for improving maternal health outcomes (51).

In a broader global context, maternal undernutrition has been extensively studied, emphasizing the impact on both maternal and child health. Our findings align with global trends, particularly regarding the role of education in maternal nutrition. Lower educational levels have consistently been associated with increased odds of undernutrition internationally (21, 33), a pattern mirrored in our study and underscoring the universality of factors influencing maternal undernutrition. Local studies in Ethiopia also highlight similar challenges, emphasizing the persistent influence of educational and economic factors on maternal nutrition (57, 58). These consistencies underscore the need for context-specific interventions.

The increased odds of undernutrition among single mothers resonate with studies highlighting the vulnerability of single mothers in diverse socio-economic contexts (3). The study by Smith in a South Asian context also emphasizes the need for targeted interventions

based on local socio-demographic characteristics, supporting the importance of addressing the unique challenges faced by single mothers (59). The significant association between lack of ANC follow-up and increased undernutrition is consistent with the literature emphasizing the role of antenatal care in maternal health outcomes (15, 60). The study conducted by Goudet highlight the potential positive influence of ANC services on maternal nutrition, aligning with the findings of the current study (31). The association between infrequent daily eating and higher undernutrition risk corresponds with global trends. That irregular eating habits contribute to child malnutrition (59). The importance of regular and diverse eating habits in preventing undernutrition is also supported by studies emphasizing the significance of dietary diversity (31). The increased likelihood of undernutrition among food-insecure mothers is consistent with a body of literature highlighting the link between food insecurity and poor nutritional outcomes (30). The study demonstrated in rural Bangladesh show that low dietary diversity is a predictor of child stunting, supporting the notion that food security plays a pivotal role in nutritional well-being (31).

By comparing these significant results with existing literature, the study reinforces the global patterns of maternal undernutrition while highlighting specific contextual factors in Addis Ababa that demand targeted interventions. These findings collectively underscore the need for comprehensive strategies addressing socio-economic, and healthcare factors to improve the nutritional status of lactating mothers. Addressing food insecurity is paramount for sustained improvements in nutritional well-being. Despite a relatively high dietary diversity intake, the coexistence of food insecurity among participants indicates the importance of targeted interventions (22, 61, 62). Nutrition education programs delivered through healthcare workers and mass media, as identified in this study, can serve as effective channels for disseminating information.

The implications of the observed undernutrition prevalence extend beyond individual health to the broader community. Targeted interventions should focus on improving socio-economic conditions, enhancing educational opportunities, and promoting dietary diversity. Healthcare providers play a pivotal role in delivering nutritional education and monitoring

the health of lactating mothers. The observed associations have profound implications for public health interventions in Addis Ababa. Strengthening educational opportunities for women, especially those with no formal education, becomes a key strategy to alleviate undernutrition (33, 57). Targeted interventions should be designed for single mothers, focusing on both nutritional education and economic support, in line with previous findings (25, 63). Enhancing ANC follow-up rates is critical, emphasizing the potential for health services to positively influence maternal nutrition (51, 64). Dietary interventions promoting regular and diverse eating habits, particularly among vulnerable groups, are instrumental in addressing undernutrition, aligning with previous recommendations (23, 31).

The diverse socioeconomic landscape of the study population, as revealed by demographic and socioeconomic characteristics, underscores the need for context-specific interventions. The prevalence of undernutrition among lactating mothers is influenced by a complex interplay of factors, including education, occupation, marital status, health service utilization, and dietary habits. The significant association between education and undernutrition highlights the role of education as a protective factor (49, 65). Investing in educational programs for mothers and their families could have far-reaching effects on maternal nutrition. Moreover, the association between food security and undernutrition emphasizes the need for comprehensive strategies addressing economic factors and access to nutritious food (12, 30).

The findings also underscore the importance of antenatal care (ANC) in preventing undernutrition among lactating mothers. Mothers with inadequate ANC follow-up showed a higher likelihood of undernutrition. Strengthening ANC services and emphasizing the importance of maternal nutrition during these visits can contribute to improved outcomes (25, 63, 64). The dietary habits of lactating mothers, including the frequency of daily eating and changes in food intake during lactation, emerged as significant factors associated with undernutrition. Tailoring nutritional education programs to address these specific dietary behaviors is essential for promoting optimal maternal and child health outcomes (62, 66).

Strengths and limitations of the study

The research on the prevalence of undernutrition among lactating mothers in Addis Ababa, Ethiopia, exhibits several notable strengths. With a substantial sample size of 632 participants, the study offers a comprehensive examination of diverse factors, including socio-demographic, obstetric, health service utilization, dietary habits, and anthropometric measurements. This multifaceted approach enables a nuanced understanding of the issue, fostering the development of targeted interventions. The use of multivariable logistic regression enhances the robustness of the analysis by controlling for confounding variables, contributing to the accuracy of identified associations. Additionally, the study's contextual relevance to Addis Ababa ensures that the findings have practical implications for public health interventions in the local context, emphasizing the need for strategies tailored to the unique socio-economic and healthcare landscape of the area.

Despite its contributions, the study has several limitations that warrant consideration. Its cross-sectional design limits the ability to establish causal relationships between the identified factors and undernutrition. Additionally, reliance on self-reported data, particularly regarding dietary habits and health service utilization, introduces the possibility of recall bias and social desirability bias, which may affect the accuracy of the reported information. To minimize these biases, several efforts were implemented: objective measures, such as anthropometric assessments, were used to validate self-reported data, thereby reducing the impact of recall bias. Furthermore, the data collection process was designed to ensure confidentiality and encourage honest responses, which helps mitigate social desirability bias. However, the findings may still have limited generalizability beyond the specific health centers in Addis Ababa.

7. Conclusion and Recommendations

7.1. Conclusion

The results reveal that around one-third (31.6%) of lactating mothers in Addis Ababa, Ethiopia, are experiencing undernutrition. This prevalence is considerably above the 15% threshold recommended by the World Health Organization (WHO) and the Federal Ministry of Health (FMOH) for vulnerable populations. Significant socio-demographic factors, such as marital status, were identified as key determinants of undernutrition, with single mothers having four times higher odds of being undernourished compared to those who are married or living with a partner. Additionally, a lack of antenatal care (ANC) follow-up was linked to an almost fourfold increase in the likelihood of undernutrition among lactating mothers. These findings highlight the crucial roles of marital stability in reducing the risk of undernutrition in this group. Furthermore, dietary factors, including the frequency of meals consumed daily and food security status, were found to significantly impact nutritional outcomes. Mothers who ate only two meals a day were five times more likely to be undernourished, underscoring the importance of maintaining regular and varied eating patterns to prevent undernutrition. Additionally, food-insecure mothers faced a greater risk of undernutrition compared to their food-secure counterparts, emphasizing the need to tackle food insecurity to enhance maternal nutrition.

7.2. Recommendations

Ministry of Health (MoH) and Addis Ababa Health Bureau:

1. **ANC Strengthening:** Given the significant association between undernutrition and lack of ANC follow-up, the MoH should prioritize efforts to enhance antenatal care services. This includes targeted interventions to increase awareness and accessibility of ANC services.
2. **Collaboration with Local Stakeholders:** Collaborate with local and international NGOs and community organizations to implement targeted interventions that address the specific nutritional needs of lactating mothers.
3. **Supportive-Supervision:** Regular assessments of health centers' performance in maternal nutrition, coupled with feedback mechanisms, will help tailor interventions and allocate resources efficiently.

Health Centers:

1. **Antenatal Care (ANC) Enhancement:** Increase the accessibility and quality of ANC services, ensuring that nutritional assessments and counseling are integral components of care.
2. **Community-Based Initiatives:** Health centers should engage in community-based initiatives, organizing regular workshops, support groups, and awareness campaigns within their catchment areas. By involving community health workers, these initiatives can effectively disseminate information on the importance of maternal nutrition and encourage positive dietary practices.

Lactating Mothers:

1. **Regular ANC Attendance:** Mothers are encouraged to attend ANC visits regularly. ANC visits provide opportunities for healthcare providers to offer personalized nutritional advice, monitor the mother's health, and address any emerging concerns.

Research Centers and Academics:

- 1. Further Research:** Conduct longitudinal studies to explore the long-term effects of undernutrition on maternal and child health outcomes, as well as the effectiveness of various interventions.

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Annexes

<https://ee.kobotoolbox.org/x/oy0tERuS>

Annex 1: Written Information Sheet for participant and Consent Form

Introduction

Hello, my name is _____. I am working as data collector with Lalise Mekonnen, who is completing her master's Degree in Nutrition, at St. Paul's Hospital Millennium Medical College. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

Study Title

Assessment of Prevalence of Under nutrition and Associated Factors among Lactating Women Visiting Selected Health centre of Addis Ababa, Ethiopia, 2023.

Purpose

This study is intended to assess prevalence nutritional status of lactating women and associated factors in selected health centre in Addis Ababa. Therefore, the information obtained from this study may be used by MOH, organizations supporting services in your health centre, researchers and local health planners for promotion of nutritional and other related intervention and prevention of factors contributing for maternal under nutrition in general.

Procedure and duration

First of all, you were selected by lottery method. I was interviewing you using a questionnaire to provide me with pertinent data that is helpful for the study. There are questions to answer where I will fill the questionnaire by interviewing you and I will measure your height, weight and MUAC. The interview will take about 30 minutes, so I kindly request you to spare me this time for the interview and measurement.

Risks

The risks of being participating in this study are very minimal, but only taking few minutes from your time. Other than this the interview and measurement will not cause any physical harm on you and the community.

Benefit

There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

Confidentiality

The information that you provide us was confidential. There was no information that will identify you and your organization. The findings of the study were general for the study population and will not reflect anything particular of individual persons or housing. The questioner was coded to exclude showing names; no references was made in oral or written reports that could link participants to the research.

Rights

Participation in this study is fully voluntary. You have the right to declare for your organization to participate in this study. You may refuse to answer any question or choose to stop the interview at any time. However, we hope you will answer the questions, which was benefit the services you provide and the nation.

Contact address

If there are any questions or enquires any time about the study, please contact and speak to principal investigator. Name: Sr.Lalise Mekonnen, Phone number: **+2519 36917676** and Email: lalimekonnen@gmail.com.

Statement of Consent

I have read (was read to me) the participant information sheet. I have clearly understood the purpose of the research, the procedure, risks and benefits, issues of confidentiality, rights of participating and contact address for any queries. I have given the opportunity to ask questions for things 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 question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initials (signature) as indicated below.

Participant's signature _____ date ____/____/2023

Interviewer's name and signature _____ date ____/____/2023

May I begin the interview? Yes ☐ No ☐

Annex 2: Data Collection tool (English version)

Name of the interviewer _____ Date of interview _____

Date of visit [____|____|____] CODE _____

DD IMM |YYYY

Part I: Background & Socio-demographic characteristics information about the lactating woman

N ^o	Questions	Alternatives/Answers	Skip Guide
1	How old are you?	Age in complete years _____	
2	What is your religion?	Muslim (1) Orthodox (2) Protestant (3) Others (specify) _____ (4)	
3	What is your educational status?	No formal Education (1) Primary Education (1-8) (2)	

		Secondary Education (9-12) (3) College Diploma and above (4)	
4	What is your husband's educational status?	No formal Education (1) Primary Education (1-8) (2) Secondary Education (9-12) (3) College Diploma and above (4)	
5	What is your occupation?	House wife (1) Daily laborer (2) Merchant (3) Private Business (4) Government employee (5) Other (specify) _____ (6)	
6	What is your husband's Occupation?	No work (1) Daily laborer (2) Merchant (3) Private Business (4) Government employee (5) Other (specify) _____ (6)	
7	How much is your family monthly income?	_____ ETB.	
8	What is your current marital status?	Married/Living together (1) Single (never married) (2) Divorced/ Separated (3) Widowed (4)	
Part II. Questions on obstetric history and health service utilization of lactating women			
1	Where are you given a birth?	1.at home 2.at health facilities	
2	At what interval range you give a birth?	1. At birth 2. 1-2year	

		3.>2 year	
3	Have you face any illness in the previous two weeks?	Yes (1) No (0)	
4	Have you got any type of nutrition education?	Yes (1) No (0)	If the answer is no skip to 301
5	If the answer to Q-209 is yes, from where did you get it?	From health workers (1) From mass media (3) Others (specify) _____ (4)	

Part III: Questions related to dietary diversity of lactating women

Please describe the foods (meals and snacks) that you ate yesterday during the day and night, whether at home or outside the home. Start with the first food eaten in the morning.

Enumerator: Please probe carefully about the food items that the mother ate yesterday during the day and night, whether at home or outside the home.

	Food group consumed in previous 24 hour	Description/examples	Response Yes (1) No (0)
1	Starchy staples, roots and tuber crops	Breads, porridges of maize, sorghum, millet or cassava, rice, pasta/noodles potatoes, white-fleshed sweet potatoes	
2	Dark green leafy vegetables	Any medium-to-dark green leafy vegetables, including, Broccoli, Chili greens, cabbage, Kale, Lettuce, Spinach	
3	Other vitamin A rich fruits and vegetables	Ripe mango, ripe papaya, orange fleshed sweet potato, carrot, pumpkin, pepper.	
4	Other fruits and vegetables	Apple, Avocado, Banana, Grapes, Guava, Lemon, Mandarin, Strawberry, Lettuce, Cucumbers, Onion, Peas (when eaten as	

		fresh pod), Eggplant, Corn, Green pepper, Tomato, Zucchini.	
5	Fats and oils	Any fat and oils	
6	Meat and fish	All meats, organ meats (liver, kidney, heart), Beef, lamb, goat poultry, fresh and dried fish	
7	Eggs	Any egg and foods with eggs	
8	Legumes, nuts and seeds	Bean, kidney bean, chickpea, pigeon pea, lentil and soybean/soybean products or other legume products. Seeds: sunflower seed, Pumpkin seed, groundnut/peanut, or peanut butter, Flaxseed seed etc.	
9	Milk and milk products	Milk, cheese, yoghurt or other milk products rather than butter	
Part IV: Questions related to eating habits of lactating women during lactation			
1	How many times did you eat daily in the previous 7 days?	Two times (1) Three times (2) Four times and more (3)	
2	Did you avoid eating extra food during lactation?	Yes (1) No (2)	
3	Did you change food intake during lactation?	Yes (1) No (2)	If the answer is no skip to 405
4	If the answer is yes to question 404, what were your food intake changes?	Frequency of meal (1) Amount of meal (2) Both frequency & amount of meal (3)	
Part V: Questions to assess household food security condition (HFIAS9 items)			
	Questions	Response Yes (1) No (0)	
1	In the past four weeks, did you worry that your household would not have	0=No	(Skip

	enough food?	Ques.) 1=Yes
1a	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)
2	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 ques.) 1=Yes
2a	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)

3	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 ques.) 1=Yes
3a	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)
4	In the past four weeks, did you or any household member forced to eat un preferred foods because of a lack of resources to obtain other types of food?	0=no (skip ques) 1=yes
4a	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)

		weeks)
5	In the past four weeks, did you or any household member have to eat a smaller portion of meals than you felt you needed because there was not enough food?	0=No (Skip ques.) 1=Yes
5a	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)
6	In the past four weeks, did you or any household member skip meals due to lack of food?	0=No (Skip ques.) 1=Yes
6a	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)
7	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 ques.) 1=Yes
7a	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)
8	In the past four weeks, did you or any household member have gone to sleep at night hungry because there was not enough food?	0=No (Skip ques.) 1=Yes
8a	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)
9	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 (Skip Ques) 1=yes
9a	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)
Part VI: Anthropometric measurement of lactating women		
1	Weight in Kg	_____ Kg
2	Height in Cm	_____ Cm

THANK YOU FOR YOUR GENUINE E RESPONSE TO MY QUESTIONS!

አባሪ 3: የመረጃ እና የስምምነት ቅጽ

<https://ee.kobotoolbox.org/x/oy0tERuS>

መግቢያ

ስሜ _____ . በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ሕክምና ኮሌጅ ሁለተኛ ዲግሪዎን በሥነ-ምግብ ትምህርት እያጠናቀቁት ካለው ከላሊስ መኮንን ጋር በመረጃ ሰብሳቢነት እየሰራሁ ነው። ስለ ጥናቱ እና የጥናት ተካፋይ ሆኖ መመረጥዎን ለማስረዳት ትኩረትዎን እንዲሰጡኝ በአክብሮት እጠይቃለሁ።

የጥናት ርዕስ

አዲስ አበባ፣ ኢትዮጵያ የተመረጠ ጤና ጣቢያን በመጎብኘት ላይ ያሉ የሚያጠቡ ሴቶች የተመጣጠነ ምግብ አጥረት እና ተያያዥ ምክንያቶች ግምገማ፣ 2023።

ዓላማ

ይህ ጥናት በአዲስ አበባ ከተማ በተመረጡ የጤና ጣቢያዎች የስርጭት ሁኔታን እና የሚያጠቡ ሴቶችን የአመጋገብ ሁኔታ እና ተያያዥ ሁኔታዎችን ለመገምገም ያለመ ነው። ስለዚህ ከዚህ ጥናት የተገኘው መረጃ MOH፣ በጤና ጣቢያዎ ውስጥ ያሉ አገልግሎቶችን የሚደግፉ ድርጅቶች፣ ተመራማሪዎች እና የአካባቢ የጤና እቅድ አውጪዎች የአመጋገብ እና ሌሎች ተዛማጅ ጣልቃገብነቶችን በማስተዋወቅ እና በአጠቃላይ በአመጋገብ ስር ያሉ እናቶችን በአመጋገብ ውስጥ የሚያበረክቱትን ሁኔታዎች ለመከላከል ሊጠቀሙበት ይችላሉ።

ሂደት እና ቆይታ

በመጀመሪያ ደረጃ በሎተሪ ዘዴ ተመርጠዋል። ለጥናቱ አጋዥ የሆኑ ተዛማጅ መረጃዎችን ለመስጠት መጠይቁን ተጠቅሞ ቃለ መጠይቅ አደርግልዎታለሁ። ቃለ መጠይቁን በቃለ መጠይቅ የምሞላበት እና ቁመትህን፣ክብደትህን እና MUACን እለካለሁ። ቃለ-መጠይቁ 30 ደቂቃ ያህል ይወስዳል፤ስለዚህ ለቃለ መጠይቁ እና ለመለካት በዚህ ጊዜ እንድትቆጥቡልኝ በአክብሮት እጠይቃለሁ።

አደጋዎች

በዚህ ጥናት ውስጥ የመሳተፍ አደጋዎች በጣም አናሳ ናቸው፤ ነገር ግን ከእርስዎ ጊዜ ጥቂት ደቂቃዎችን ብቻ ነው የሚወስዱት። ከዚህ ውጭ ቃለ መጠይቁ እና መለኪያው በእንተ እና በማህበረሰቡ ላይ አካላዊ ጉዳት አያስከትልም።

ጥቅም

በዚህ ጥናት ውስጥ ለመሳተፍ ምንም አይነት ቀጥተኛ ክፍያ አይኖርም። ነገር ግን የዚህ ጥናት ግኝቶች ለአካባቢው የጤና እቅድ አውጪዎች ጠቃሚ መረጃን ሊያሳዩ ይችላሉ።

ሚስጥራዊነት

የምታቀርቡልን መረጃ ሚስጥራዊ ይሆናል። እርስዎን እና ድርጅትዎን የሚለይ መረጃ አይኖርም። የጥናቱ ግኝቶች ለጥናቱ ሕዝብ አጠቃላይ ይሆናል እናም የግለሰብን ወይም የመኖሪያ ቤትን ምንም የሚያንፀባርቅ አይሆንም። ጠያቂው ስሞችን ከማሳየት እንዲገለጹ በኮድ ይገለጻል። ተሳታፊዎችን ከጥናቱ ጋር ሊያገናኙ የሚችሉ የቃል ወይም የጽሁፍ ዘገባዎች ማጣቀሻዎች አይደረጉም።

መብቶች

በዚህ ጥናት ውስጥ መሳተፍ መብት በሙሉ በፈቃደኝነት ነው። ድርጅትዎ በዚህ ጥናት እንዲሳተፍ የማወጅ መብት አልዎት። ማንኛውንም ጥያቄ ለመመለስ እምቢ ማለት ወይም ቃለ መጠይቁን በማንኛውም ጊዜ ለማቆም መምረጥ ይችላሉ። ነገር ግን ለጥያቄዎቹ መልስ እንደምትሰጥ ተስፋ እናደርጋለን ይህም የምትሰጡትን አገልግሎት እና ሀገርን ይጠቅማል።

የአውቂያ አድራሻ

ስለ ጥናቱ ማንኛውም ጥያቄዎች ወይም ጊዜ የሚጠይቅ ከሆነ፣ እባክዎን ያነጋግሩ እና ዋና መርማሪን ያነጋግሩ። ስም፡ ሲ/ር ላሊሰ መኮንን፣ ስልክ ቁጥር፡ +2519 36917676 እና ኢሜል፡ lalimekonnen@gmail.com

የስምምነት መግለጫ

የተሳታፊውን የመረጃ ወረቀት እንብቢያለሁ (ተነበበኝ)። የጥናቱን አላማ፣ አሰራሩን፣ ስጋቱን እና ጥቅሞቹን፣ ሚስጥራዊነትን፣ የመሳተፍ መብቶችን እና ለማንኛውም መጠይቆችን የመገኛ አድራሻ በግልፅ ተረድቻለሁ። ግልጽ ባልሆኑ ጉዳዮች ላይ ጥያቄዎችን ለመጠየቅ እድሉን ሰጥቻለሁ። በማንኛውም ጊዜ ከጥናቱ የመውጣት ወይም የማልፈልገውን ማንኛውንም ጥያቄ ላለመመለስ መብት እንዳለኝ ተነገረኝ። ስለዚህ፣ ከዚህ በታች በተገለፀው መሰረት በዚህ ጥናት የመጀመሪያ ሆኜ (ፈርማ) ለመሳተፍ የፈቃዴ ፍቃድ አውጃለሁ።

የተሳታፊው ፊርማ _____ ቀን _____/_____/2023

የጠያቂው ስም እና ፊርማ _____ ቀን _____/_____/2023

ቃለ ምልልሱን ልጀምር? አዎ----- አይ-----

አባሪ 4፡ የውሂብ መስተሰብ መሳሪያ (የአማርኛ ቅጂ)

የቃለ መጠይቁ ጠያቂው ስም _____ የቃለ መጠይቁ ቀን _____

የጉብኝት ቀን [_____|_____|_____] ከድ: _____

ክፍል I፡ ዳራ እና ማህበረ-ሕዝብ ባህሪያት ስለ ሚያጠቡ ሴት መረጃ

ተ.ቁ	ጥያቄዎች	አማራጮች	የሚዘለሉ
1	ስንት አመት ነው?	ዕድሜ መሉ ዓመታት	
2	የትምህርት ደረጃዎ ምን ያህል ነው?	መደበኛ ትምህርት የለም (1) የመጀመሪያ ደረጃ ትምህርት (1-8) (2) የሁለተኛ ደረጃ ትምህርት (9-12) (3) የኮሌጅ ዲፕሎማ እና ከዚያ በላይ (4)	
3	የባልሽ የትምህርት ደረጃ ምንድን ነው??	መደበኛ ትምህርት የለም (1) የመጀመሪያ ደረጃ ትምህርት (1-8) (2) የሁለተኛ ደረጃ ትምህርት (9-12) (3) የኮሌጅ ዲፕሎማ እና ከዚያ በላይ (4)	
4	ሥራህ ምንድን ነው?	የቤት እመቤት (1) የቀን ሰራተኛ (2) ነጋዴ (3) የግል ንግድ (4) የመንግስት ሰራተኛ (5) ሌላ (ይግለጹ) _____ (6)	
5	የባልሽ ስራ ምንድን ነው?	ሥራ የለም (1) የቀን ሰራተኛ (2) ነጋዴ (3) የግል ንግድ (4) የመንግስት ሰራተኛ (5)	

		ሌላ (ይግለጹ) _____ (6)	
6	የቤተሰብዎ ወርሃዊ ገቢ ምን ያህል ነው?	_____ ETB.	
7	አሁን ያለህበት የትዳር ሁኔታ ምን ያህል ነው?	ያገቡ/አብረው የሚኖሩ (1) ያላገቡ (ያላገባም) (2) የተፋታ/የተለያዩ (3) ባል የሞተባት (4)	
9	ስንት የቤተሰብ ብዛት አለህ?	(1) 1-2 (2) 3-5 (3) 6-7 (4) >7	
Part II: ስለ የወሊድ ታሪክ እና የሚያጠቡ ሴቶች የጤና አገልግሎት አጠቃቀም ላይ ያሉ ጥያቄዎች			
1	የት ነው የወሊድሽ?	1.በቤት 2.በጤና ተቋማት	
2	በእርግዝናሽ ወቅት የኤሌንሲ ክትትል አለሽ?	1. አዎ 2. አይ	
2a	ለ Q=2 መልሱ አዎ ከሆነ ስንት ጊዜ?	1. 1-3 2. ≥ 4	
3	በየትኛው የጊዜ ልዩነት ውስጥ ይወልዳሉ?	1. ሲወለድ 2. 1-2 ዓመት 3. > 2 ዓመት	
4	ልጅዎን በ24 ሰዓት ውስጥ ስንት ጊዜ ጡት አጠቡት?	1. 1-4 2. 5-8 3. 8-12 4. ≥ 12	
5	ባለፉት ሁለት ሳምንታት ውስጥ በሽታ አጋጥሞዎታል?	1. አዎ 0. አይ	
6	የአመጋገብ ትምህርት አግኝተዋል?	1. አዎ	

		0.አይ	
7	ለQ-6 መልሱ አዎ ከሆነ ከየት አገኙት?	ከጤና ባለሙያዎች (1) ከመገናኛ ብዙኃን (3) ሌሎች (ይግለጹ) _____ (4)	
ክፍልIII: የሚያጠቡ ሴቶች የአመጋገብ ልዩነት ጋር የተያያዙ ጥያቄዎች እባክትን ቤት ውስጥም ሆነ ከቤት ውጭ ትላንትና ቀን እና ማታ የበሉትን ምግቦች (ምግቦች እና መክሰስ) ይግለጹ። በጠዋት ከተበላው የመጀመሪያ ምግብ ጋር ይጀምሩ. ገምጋሚ፡- እባክትን እናትየው ትላንትና ቀን እና ማታ ስለበላቻቸው የምግብ እቃዎች በቤትም ሆነ ከቤት ውጭ በጥንቃቄ መርምር።.			
	ባለፈው 24 ሰዓት ውስጥ ጥቅም ላይ የዋለው የምግብ ቡድን	መግለጫ / ምሳሌዎች	ምላሽ አዎ (1) አይደለም (0)
1	ስታርቶኪ ስቴፕልስ፣ ሥሮች እና የቱበር ሰብሎች	ዳቦ፣ የበቆሎ ገንፎ፣ ማሽላ፣ ማሽላ ወይም ካሳቫ፣ ሩዝ፣ ፓስታ/ኩድል ድንች፣ ስኳር ድንች	
2	ጥቁር አረንጓዴ ቅጠላማ አትክልቶች	ማንኛውም ከመካከለኛ እስከ ጥቁር አረንጓዴ ቅጠላማ አትክልቶች፣ ብሮኮሊ፣ ቺሊ አረንጓዴ፣ ጎመን፣ ጎመን፣ ሰላጣ፣ ስፒናች ጨምሮ	
3	ሌሎች በቫይታሚን ኤ የበለጸጉ ፍራፍሬዎችና አትክልቶች	የበሰለ ማንጎ፣ የበሰለ ፓፓያ፣ ብርቱካን፣ ድንች፣ ካሮት፣ ዱባ፣ በርበሬ.	
4	ሌሎች ፍራፍሬዎችና አትክልቶች	አፕል ፣ አቮካዶ ፣ ሙዝ ፣ ወይን ፣ ጉዋቫ ፣ ሎሚ ፣ ማንዳሪን ፣ እንጆሪ ፣ ሰላጣ ፣ ዱባዎች ፣ ሽንኩርት ፣ አተር (እንደ ትኩስ ፖድ ሲበሉ) ፣ ኤግፕላንት ፣ በቆሎ ፣ አረንጓዴ በርበሬ ፣ ቲማቲም ፣ ዛኩኪኒ።	
5	ስብ እና ዘይቶች	ማንኛውም ስብ እና ቅባት	

6	ስጋ እና ዓሳ	ሁሉም ስጋዎች፡(ጉበት፡ኩላሊት፡ ልብ)፤ የበሬ ሥጋ፤ በግ፤ የፍየል እርባታ፤ ትኩስ እና የደረቁ አሳ	
7	እንቁላል	ማንኛውም እንቁላል እና ምግቦች ከእንቁላል ጋር	
8	ጥራጥሬዎች፣ ፍሬዎች እና ዘሮች	ባቄላ፤ የኩላሊት ባቄላ(ሎጆ)፤ ሽምብራ፤ እርግብ አተር፤ ምስር፤ እና አኩሪ አተር/አኩሪ አተር ወይም ሌሎች የጥራጥሬ ምርቶች። ዘሮች፡ የሱፍ አበባ ዘር፤ የዱባ ዘር፤ አሻሎኒ/አሻሎኒ፤ የአሻሎኒ ቅቤ፤ የተልባ ዘር ዘር ወዘተ.	
9	ወተት እና የወተት ምርቶች	ከቅቤ ይልቅ ወተት፣ አይብ፣ እርጎ ወይም ሌላ የወተት ተዋጽኦዎች	
ክፍል IV፡ ጡት በማጥባት ወቅት የሚያጠቡ ሴቶች የአመጋገብ ልማድ ጋር የተያያዙ ጥያቄዎች			
1	ባለፉት 7 ቀናት ውስጥ በየቀኑ ስንት ጊዜ በለተሻል?	ሁለት ጊዜ (1) ሶስት ጊዜ (2) አራት ጊዜ እና ተጨማሪ (3)	
2	ጡት በማጥባት ጊዜ ተጨማሪ ምግብ ከመብላት ተቆጥበዋል	አዎ (1) ቁጥር (2)	
3	ጡት በማጥባት ጊዜ የምግብ ፍጆታዎን ቀይረዋል?	አዎ (1) ቁጥር (2)	
4	ለጥያቄ 3 መልሱ አዎ ከሆነ፤ የምግብ አወሳሰድዎ ምን ለውጦች ነበሩ?	የምግብ ድግግሞሽ (1) የምግብ መጠን (2) ሁለቱም ድግግሞሽ እና የምግብ መጠን (3)	
ክፍል V፡ የቤተሰብ የምግብ ዋስትና ሁኔታን ለመገምገም ጥያቄዎች (HFIAS9 ንጥሎች)			
	ጥያቄዎች	ምላሽ አዎ (1) አይ (0)	
1	ባለፉት አራት ሳምንታት ውስጥ፤ የእርስዎ ቤተሰብ በቂ ምግብ አይኖረውም ብለው ተጨንቀው ነበር?	0=አይ (ጥያቄዎችን ዝለል) 1=አዎ	
1a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት አስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)	
2	ባለፉት አራት ሳምንታት ውስጥ እርስዎ ወይም ማንኛውም የቤተሰብ አባል በግብአት እጦት ምክንያት	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ	

	የመረጡትን አይነት ምግብ መመገብ አልቻላችሁም?	
2a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)
3	ባለፉት አራት ሳምንታት ውስጥ እርስዎ ወይም ማንኛውም የቤተሰብ አባል በግብአት እጦት ምክንያት የተወሰነ አይነት ምግብ መመገብ ነበረባችሁ?	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ
3a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)
4	ባለፉት አራት ሳምንታት ውስጥ እርስዎ ወይም ማንኛውም የቤተሰብ አባል ሌሎች የምግብ ዓይነቶችን ለማግኘት በግብአት እጥረት ምክንያት ያልተመረጡ ምግቦችን ለመመገብ ተገድደዋል?	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ
4a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)
5	ባለፉት አራት ሳምንታት ውስጥ እርስዎ ወይም ማንኛውም የቤተሰብ አባል በቂ ምግብ ስለሌለ ከምትፈልጉት በላይ ትንሽ ምግብ መብላት ነበረባችሁ?	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ
5a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)
6	ባለፉት አራት ሳምንታት ውስጥ እርስዎ ወይም ማንኛውም የቤተሰብ አባል በምግብ እጦት ምክንያት ምግብን ዘለሉ?	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ
6a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)

7	በአለፉት አራት ሳምንታት ውስጥ ምግብ ለማግኘት በግብአት እጦት ምክንያት በቤተሰብዎ ውስጥ ምንም አይነት የሚበላ ምግብ አልነበረም?	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ
7a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)
8	ባለፉት አራት ሳምንታት እርስዎ ወይም ማንኛውም የቤተሰብ አባል በቂ ምግብ ስለሌለ በረሃብ መተኛት ነበረባችሁ?	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ
8a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)
9	ባለፉት አራት ሳምንታት ውስጥ፣ እርስዎ ወይም ማንኛውም የቤተሰብ አባል በቂ ምግብ ስለሌለ ምንም ሳይበሉ ቀኑን ሙሉ ቆይተዋል?	0=አይ (ጥያቄዎችን ዝለል።) 1=አዎ
9a	ይህ ምን ያህል ጊዜ ተከሰተ?	1=አልፎ አልፎ (ባለፉት አራት ሳምንታት አንድ ወይም ሁለት ጊዜ) 2=አንዳንድ ጊዜ(ባለፉት አራት ሳምንታት ከሶስት እስከ አስር ጊዜ) 3=ብዙ ጊዜ(ባለፉት አራት ሳምንታት ከአስር ጊዜ በላይ)

ክፍል VI: የሚያጠቡ ሴቶች አንትሮፖሜትሪክ መለኪያ

1	ከብደት በኪ.ግ	_____ Kg
2	ቁመት በሴ.ሜ	_____ Cm

ለጥያቄዎቹ ስለሰጡኝ እውነተኛ ምላሽ አመሰግናለሁ!

Annex 5: Location map of Addis Ababa city administration



Figure 9: Location map of Addis Ababa city administration as of 2023.G.C

Annex 6: Research approval letter from St. Paul's Hospital Millennium Medical College

 **St. Paul's Hospital
Millennium Medical College**
የቅዱስ ሳውሎስ ሆስፒታል ሚሊኒየም ሕክምና ኮሌጅ

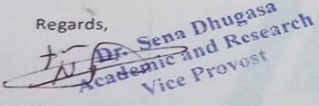
PM23/1
23/7/16

To: - Addis Ababa Health Bureau

Subject: – Request for support in research undertaking

Lalise Mekonnen at department Medical St Paul's Hospital Millennium Medical College (SPHMMC) .The college sponsored her research proposal entitled "*Assessment of the prevalence of under nutrition and associated factors among lactating mother in selected health centers in Addis Ababa Ethiopia* The research proposal reviewed by the SPHMMC IRB (Institutional Review Board) and it has been ethically cleared.

Hence, we would like to request your institution to give the usual support in the process of conducting her research.

Regards,

Dr. Sena Dhugasa
Academic and Research
Vice Provost

C.C



- Vice Provost for Academic and Research
- Research Directorate
- Lalise Mekonnen
SPHMMC

 **A proud Past, An Amazing Future !**

የትራንስፎርሜሽን ሚኒስቴር
የሕክምናና የሕይወት ጥበቃ ሚኒስቴር
የቅዱስ ሳውሎስ ሆስፒታል ሚሊኒየም ሕክምና ኮሌጅ
የሥራና የጥበቃ ሚኒስቴር
የሕክምናና የሕይወት ጥበቃ ሚኒስቴር
የቅዱስ ሳውሎስ ሆስፒታል ሚሊኒየም ሕክምና ኮሌጅ

Annex 7: Letter of Permission to conduct study from Addis Ababa Regional Health Bureau, Public Health Research and Emergency Management Directorate

 አዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
City Government of Addis Ababa Health Bureau

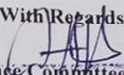
REF.N.O. 21/11/15/1202/227
DATE 28/11/15

TO:

- ARADA SUB-CITY HEALTH OFFICE
- GULELLE SUB-CITY HEALTH OFFICE
- YEKA SUB-CITY HEALTH OFFICE
- NIFAS SILK LAFTO SUB-CITY HEALTH OFFICE

Subject: Request to access Facilities to conduct approved research

This letter is to support LALISE MEKONNEN to conduct research which is entitled as "ASSESSMENT OF THE PREVALANCE OF UNDER NUTRITION AND ASSOCIATED FACTORS AMONG LACTATING MOTHERS IN SELECTED HEALTH CENTERS IN ADDIS ABABA, ETHIOPIA". The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, and the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required. Therefore we request the Health facility and staffs to provide support to the Principal investigator.

With Regards


Ethical Clearance Committee
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Cc

- LALISE MEKONNEN
- ETHICAL CLEARANCE COMMITTEE



Declaration

I, the undersigned graduate student, declare that this thesis is my original work in partial Fulfillment of the Requirements of the Degree of Master's in Nutrition.

Name of the principal investigator: **S/r. Lalise Mekonnen**

Date. _____

Signature _____

Approval of the primary Advisor

This thesis work has been submitted with our approval as the university advisor.

Name of the advisors:

1. Takele Gezahegn

Date. 19/08/2024



Signature _____

2. _____

Date. _____

Signature _____

Examining committee:

Name of examiners:

1. _____

Date. _____

Signature _____

2. _____

Date. _____

Signature _____

Comment [h1]: There is a form that will be inserted after cover pages for approval by examining boards! Remove this one!