



Prevalence of Underweight and Associated Factors among Lactating Women in Ethiopia: A Mini-review

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Authors' contributions

This work was carried out in collaboration between both authors. Author QS conceived the idea, drafted the manuscript, performed analysis and interpreted the results. Author JK participated in the design of the study, helped in results interpretation and writing, reviewed the first draft and drafted the subsequent versions of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

Nutritional status is considered as one of the key indicators of the overall wellbeing of a population. Lactating women and children are among the most vulnerable groups due to their higher nutritional needs and detrimental effects of poor nutrition on their health. Lactating women have increased nutritional needs and if not well met, breast milk quality and quantity are negatively affected, which leads to increased risk for child morbidity and mortality. Studies have been done in the different regions of Ethiopia to assess the nutritional status among lactating women and have reported various prevalence and different associated factors. Despite the different efforts to improve nutrition in Ethiopia, the prevalence of underweight is still high, with most regions having a higher prevalence than the documented 5-20% of African women. We aimed to review the prevalence and associated factors of underweight among lactating women in Ethiopia. We used literature searched from key databases such as Google Scholar, Web of Science, among others, to collect relevant information about the prevalence of underweight among pregnant women in Ethiopia.

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The mini-review identified the highest prevalence at 50.6% in the Northern parts and the lowest at 17.4% in the Southern parts of Ethiopia. Several factors were identified to be associated with underweight among lactating women in Ethiopia including; dietary diversity score, household food security, family income, place of delivery, nutritional education programs and antenatal care attendance. This implies the need for targeted programs/policies to promote household food security and family income, community nutritional education, and nutritional counselling during antenatal care attendance. Besides, there is a need to conduct national and regional studies to inform policy further since there were more studies done in the Southern parts of the Country with less information from other regions.

Keywords: Ethiopia; lactating women; prevalence; underweight.

1. INTRODUCTION

Nutritional status is a key indicator in assessing the overall wellbeing of a population [1]. In Sub-Saharan Africa, the Prevalence of chronic and acute under-nutrition among women is 10–20% and 20–25%, respectively [2]. Lactating women and children are among the most vulnerable groups of the population due to their higher nutritional needs and detrimental effects of poor nutrition on their health [3]. Maternal nutritional status is crucial as it also affects the health of their children as children born from undernourished women have an increased risk of perinatal health problems [1,4]. Lactating women have increased nutritional needs and if not well met, breast milk quality and quantity are negatively affected, which leads to increased risk for child morbidity and mortality [5,6].

Women in developing countries are more vulnerable to under-nutrition as they are less likely to access food, health care, and education [7,8] compared to men, and this is evidenced by studies that have shown female illiteracy, poverty, and lack of empowerment of women as common associated factors to maternal under-nutrition in developing countries [8,9]. Studies have reported that lactation has different effects on women's nutritional status, and this depends on various factors, such as its duration and intensity [10]. The high energy cost of lactation as well as the risks it poses to maternal health and nutrition emphasizes the need for prioritizing of maternal nutrition needs [10].

Maternal underweight is mainly assessed by anthropometry taking height, and weight measurements [11] and calculating the body mass index (BMI) by dividing weight in kilograms by height squared in meters (kg/m^2) whose value less than $18.5 \text{ kg}/\text{m}^2$ indicates underweight [12]. According to World Health Organization, the BMI cutoffs are; less than $16 \text{ kg}/\text{m}^2$ severely

underweight, $16\text{--}16.9 \text{ kg}/\text{m}^2$ moderately underweight, $17.0\text{--}18.49 \text{ kg}/\text{m}^2$ mildly underweight, $18.5\text{--}24.9 \text{ kg}/\text{m}^2$ normal, $25\text{--}29.9 \text{ kg}/\text{m}^2$ overweight and above or equal kg/m^2 to 30 obese [13]. Mid-upper arm circumference (MUAC) is another measurement that is used mainly to screen for underweight. MUAC is measured at the mid-point between the tips of the shoulder and elbow of the left arm using non-elastic, non-stretchable MUAC tapes [3]. According to the SPHERE guidelines and Ethiopian national protocol, acute malnutrition is defined as $\text{MUAC} < 21 \text{ cm}$ [3].

Maternal undernutrition is estimated to be responsible for about 20% of childhood stunting [14]. The nutritional status of women has been shown to greatly affect the outcome of pregnancy and child health [14]. Maternal undernutrition is associated with poor obstetric complications such as preterm birth, low birth weight, increased risk of infant mortality and stillbirths [15]. This, further risks the intergenerational cycle of undernutrition [16], where the risk is increased in situations of social, economic, and gender inequities [17] which are highly prevalent in developing countries. Maternal undernutrition 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 [18,19].

Women with persistent underweight have been reported to have increased risk of infertility arising from anovulatory menstrual cycles, higher risk of mental illness and osteoporosis later in life [20-24]. Undernutrition leads to a higher risk of mortality as it increases vulnerability and susceptibility to morbidities through lowering of the immune system and subsequent long-term chronic health problems [25,26]. Also, undernutrition reduces economic productivity through reduced labour productivity, high treatment costs, reduced wages and human

capital losses [27-29]. This negatively affects the community and national development through reduced family income and gross domestic product [27,29].

Ethiopia's government has launched different programs, policies and initiatives to address food insecurity and undernutrition [30]. Among these are; the National Nutrition Program, the Health Sector Development Plan IV, the 2015 Seqota declaration, the 2015-2020 Productive safety net program and the Agricultural growth program [30]. The Seqota declaration aimed at eradicating hunger and undernutrition by 2020 coordinated by two multi-sectoral bodies, one handling policy and the other handling technical decision-making aspects [30]. The Productive safety net program is a 5-year project aiming at providing safety nets for food-insecure rural households through cash/food transfers and technical assistance [30]. The Agricultural growth program aims at increasing agricultural productivity and access to markets for the produce, focusing mainly on women and the youth [30].

Improving women's nutrition is one of the ways of reducing malnutrition in children [14] and a strong pillar in the global efforts of reducing maternal mortality [12]. Ethiopian studies have shown a high prevalence of undernutrition among lactating women which prevalence is among the highest in Sub-Saharan Africa [4,10]. Studies have been done in the different regions of Ethiopia to assess the nutritional status among lactating women and have reported various prevalence and different associated factors. There is scanty of information regarding undernutrition among lactating women since the different studies have been done in certain areas of the Country. Hence we aimed to review the underweight prevalence and associated factors among lactating women in Ethiopia, and this data can be used to guide the development of national nutritional policies and hence improve on the nutritional status of lactating women.

We carried out a systematic search in multiple databases, including; PubMed, Web of Science, Google Scholar, Scopus, WFP and WHO database using the following keywords: "Underweight", "lactating women" and "Ethiopia". We sought studies that investigated the prevalence and associated factors of underweight among lactating women in Ethiopia. Only original articles published in English were considered. Eight relevant research articles from 2013 to 2020 were found eligible for review.

These were quantitative original research articles and qualitative studies were excluded for better quantification of the relevant study parameters. Below is a narrative synthesis of studies that included lactating women with underweight.

2. UNDERWEIGHT PREVALENCE AMONG LACTATING WOMEN IN ETHIOPIA

Despite the different efforts to improve nutrition in Ethiopia [30], the prevalence of underweight is still high, with most regions having a higher prevalence than the documented 5-20% of African women [31]. From the reviewed studies, the prevalence of underweight among lactating women was highest in rural Tigray located in Northern Ethiopia at 50.6% [29] and lowest in Arba Minch Zuriya district in Southern Ethiopia at 17.4% [2]. Most of the studies showed the prevalence to range from 20% to 25% [3,4,10,18], with the exception of Alemayehu et al. in Dedo and Seka-chorkosa districts Southwestern Ethiopia at 40.6% [8]. Desalegn et al.'s study that showed the highest prevalence included two groups, women who were fasting and those that were not fasting in a study area that is known to have food insecurity and environmental disasters. This region was seriously affected by the 2015-2016 El-Nino rains that occurred in Ethiopia, and the study was conducted shortly after [29]. Fasting mothers reported the highest prevalence of 50.6% while non-fasting mothers reported an average of 25% prevalence which is similar to the prevalence reported by Hailelassie et al., Gebre et al. and Berihun et al.

Alemayehu et al. in Southwestern Ethiopia showed the second highest prevalence of underweight. This study was conducted in 2014, unlike most of the other studies that were done later on when the government had intensified its commitment to improving nutrition. The study was done among women who were participants of a nutrition intervention project hence the possibility that these women were already at an increased risk of underweight. Furthermore, 94% of the study population resided in rural areas, and the evidence has shown rural areas to be at increased risk of underweight [8]. Tikuye et al. in Southern Ethiopia showed the lowest prevalence of underweight which value was similar to that of Hailu et al. in Southeastern Ethiopia. These studies are recent (2019 and 2020) hence conducted after the government and NGOs intensifying nutritional programs in the region,

implying the population have been empowered evidenced by the high production of income-generating fruits hence were less disadvantaged [2].

Temesgen et al. in Nekemte city, Western Ethiopia showed a prevalence of 20%, which was not so far from the lowest prevalence of Tikuye et al. of 17.4%. This study, unlike the rest of the other studies, was an institutional-based study that recruited women who had come for maternal health services in health facilities. This could have recruited women who were sick and at risk of underweight or those who were healthy and had come for other services such as immunization. The study also included both rural and urban participants, unlike the other studies where most of the participants were mainly rural inhabitants who are at increased risk for underweight. Additional data on the study area, study design, nutritional status assessment method used, prevalence, sample size and year of publication were extracted from the selected articles and summarised in Table 1.

3. FACTORS ASSOCIATED WITH UNDERWEIGHT AMONG LACTATING WOMEN

Women have a higher risk of undernutrition compared to men due to biological and socio-

economic factors [32-34]. Lactating mothers are at an increased risk of undernutrition compared to their reproductive age counterparts due to physiological changes [35] that lead to increased energy and nutrient requirements [29]. Several studies have shown several socio-economic factors such as female illiteracy, poverty, and lack of empowerment of women to be associated with maternal undernutrition [8,9]. All these factors lead to women having a lower status in the communities hence having less control over household resources, tighter time constraints, less access to information and health services, poorer mental health, and lower self-esteem [8,36].

In Ethiopia, among the eight selected articles, several factors have been shown to be associated with underweight as summarised in Table 2. From Southern Ethiopia, Alemayehu et al. showed dietary diversity score with women who had eaten six or more food groups 24 hours before the survey were 40% less likely to be underweight compared to those who ate three and fewer food groups [8]. Hailu et al. showed dietary diversity score, monthly income, the taking of extra meals, place of delivery, and household food security to be associated with underweight [37]. Women who had a low dietary-diversity score, less monthly income, were not taking extra meals, had food insecurity and

Table 1. Underweight prevalence among lactating women in Ethiopia (2013-2020)

Author/year	Region	Sample size	Underweight prevalence	Age group	Study design	Assessment method
Alemayehu et al. 2015 [8]	Southwestern(Dedo and Seka-chorkosa districts)	355	40.6%	15-49	Community-based cross-sectional	BMI
Berihun et al. 2017 [4]	Northwestern (Amhara region)	668	25.4%	15-49	Community-based cross-sectional	BMI
Gebre et al. 2018 [3]	Southeastern (Rayitu Woreda, Oromia region)	900	24%	15-45	Community-based cross-sectional	MUAC
Hailu et al. 2020 [37]	Southeastern (Moyale, Oromia region)	545	17.7%	15-49	Community-based cross-sectional	BMI
Temesgen et al. 2015 [10]	Western (Nekemte City)	317	20%	15-49	Institutional-based cross-sectional	BMI
Tikuye et al. 2019 [2]	Southern (Arba Minch Zuriya district)	478	17.4%	15-49	Community-based cross-sectional	BMI
Haileslassie et al. 2013 [18]	Northern (Samre Woreda, Tigray)	400	25%	15-49	Community-based cross-sectional	BMI, MUAC
Desalegn et al. 2018 [29]	Northern (rural Tigray)	572	50.6%(fasting) 25% (non-fasting)	15-49	Community-based cross-sectional	BMI

delivered from home were 149%, 422%, 176%, 557% and 165% respectively more likely to be underweight [37].

Gebre et al. showed that women who had not attended antenatal care were 83% more likely to be underweight while housewives were 41% less likely to be underweight compared to their working counterparts [3]. Furthermore, women who lived in families with at least one person who did not receive targeted supplementary feeding (TSF) were 62% less likely to be underweight compared to those who lived in families with a person who received TSF [3]. Tikuye et al. showed that women who had short birth to pregnancy interval, high workload burden, low level of women education and household food insecurity were 193%, 275%, 131%, and 204% respectively more likely to be underweight while those who had sufficient access to nutrition information were 73% less likely to be underweight [2].

From Western Ethiopia, Temesgen et al. showed that women who belonged to households with a larger family size were 360% more likely to be underweight while those from high-income

families and those who had sufficient nutrition information were 75% and 48% less likely to be underweight [10].

From Northern Ethiopia, Berihun et al. showed that women whose age at first pregnancy was less than 18 years, those that had home delivery and those who lived in areas without nutritional educational community programs were 272%, 136% and 450% more likely to be underweight [4] while those who lived in households with less than five members were 54% less likely to be underweight. Hailesslassie et al. showed that women who had smaller farm-lands, were not cultivating maize, attended less than three antenatal care visits and whose breastfeeding children were above one year were 410%, 200%, 190% and 180% respectively more likely to be underweight while those with more years of marriage were 71% less likely to be underweight [18]. Desalegn et al. showed that younger women, not owning chicken, sickness in the last four weeks, fasting during the lent period, having non-improved water sources and having previous aid experience were 73%, 73%, 262%, 182%, 57% and 186% respectively more likely to be underweight [29].

Table 2. Factors associated with underweight among lactating women in Ethiopia (2013-2020)

Author	Associated factors
Alemayehu et al. [8] Berihun et al. [4]	Higher dietary diversity score (AOR: 0.60, 95% CI: 0.38, 0.96) Smaller family size (AOR: 0.46, 95% CI: 0.26, 0.81), less than 18 years at first pregnancy (AOR: 3.72, 95% CI: 2.33, 6.49), home delivery (AOR: 2.36, 95% CI: 1.50, 3.72), and the absence of community nutritional education programs (AOR: 5.5, 95% CI: 1.8, 16.79)
Gebre et al. [3]	Lack of antenatal care (AOR: 1.83, 95% CI: 1.10, 3.02), housewives (AOR=0.59, 95% CI: 0.37, 0.95), belonging to families from which at least one person did not receive targeted supplementary feeding (TSF) (AOR=0.38, 95% CI: 0.23, 0.62).
Hailu et al. [37]	Low dietary diversity (AOR: 2.49, 95% CI: 1.43, 4.36), lower monthly income (AOR: 5.22, 95% CI: 1.40, 19.40), lack of extra meal taking (AOR: 2.76, 95% CI: 1.43, 5.29), home delivery (AOR: 2.65, 95% CI: 1.24, 5.65), and household food insecurity (AOR: 6.57, 95% CI: 3.50, 12.34)
Temesgen et al. [10]	Larger family size (AOR=4.604, 95%CI=1.903, 11.140 and higher family income (AOR=0.250, 95%CI=0.100, 0.623)
Tikuye et al. [2]	Short birth to pregnancy interval (AOR: 2.93, 95% CI: 1.47, 5.85), high workload burden (AOR: 3.75, 95% CI: 2.02, 6.99), low level of education (AOR: 2.31, 95% CI: 1.31, 4.06), household food insecurity (AOR: 3.04, 95% CI: 1.37, 6.71) and sufficient access to nutrition information (AOR: 0.27, 95% CI: 0.15, 0.48).
Hailesslassie et al. [18]	Assessment with MUAC Small size of farmland (AOR: 5.1, 95% CI: 1.06, 24.46), more years of marriage (AOR: 0.29, 95% CI: 0.09, 0.9) and not growing maize (AOR: 3, 95% CI: 1.3, 7.2). Assessment with BMI Fewer ANC visits (AOR: 2.9, 95% CI: 1.2, 7) and having a breastfeeding child aged greater than 12 months (AOR: 2.8, 95% CI: 1.4, 5.8)
Desalegn et al. [29]	Younger mothers (AOR: 1.731 95% CI: 1.11, 2.71), older age of breastfeeding a child (AOR: 2.01 95% CI: 1.27, 3.18), fasting during pregnancy (AOR: 1.75 95% CI: 1.80, 4.42), acute sickness (AOR: 3.62 95% CI: 2.00, 6.54), decision-making done by grandfathers and history of receiving aid (AOR: 6.02 95% CI: 1.47, 24.80), AOR: 2.86 95% CI: 1.32, 6.20), respectively). Un-improved water and not owning chickens (AOR: 1.57 95% CI: 1.02, 2.43), AOR: 1.73 95% CI: 1.15, 2.61 respectively).

Several factors were identified to be associated with underweight; however, dietary diversity score, households' food security, family income, place of delivery, nutritional education programs, antenatal care attendance and family size have been reported in more than one study to be associated with underweight among lactating women in Ethiopia.

The reviewed studies showed that feeding practices were poor, and dietary diversity scores were generally low due to food insecurity and low family income. In order to improve the food security of the households, there is a need for the government to ensure increased food accessibility and availability by promoting food production at the household and community level. This could be through the provision of low-interest or interest-free agricultural loans, agricultural supplies, and more training to improve the agricultural skills of the people. Since most the population are farmers [30], the government could also consider ensuring value addition and fortification of the agricultural produce. This could help farmers to earn more and hence improve their economic status. Increased home food production will lead to better food security and better economic status hence use of the financial resources to access health services and improve WASH conditions [38].

Besides, antenatal care attendance and place of delivery have also been common factors associated with underweight. Nutritional counselling and screening during antenatal care visits and after delivery in the hospital are essential as they increase the nutritional literacy of the women and help detect malnutrition in the early stages [39]. The government needs to strengthen maternal health programs to ensure that more women access health facilities during pregnancy and childbirth. This could be through more construction and facilitation of health facilities, especially in rural areas. This would help to reduce the distance for the women to access the health facilities and the long waiting hours of women in the health facilities.

4. LIMITATIONS OF THE STUDY

All the studies were cross-sectional designs by nature which makes it not possible to establish a causal relationship between underweight and the

explanatory variables. Studies were mainly done in the Southern regions of the Country with a few from the Northern and Western regions, and the Central and Eastern regions not being represented. Since studies included some women in their post-partum period, the anthropometric measurements might have been measured in women who may not have attained their pre-pregnancy weight which might have led to under-estimation of underweight.

5. CONCLUSIONS

We aimed to review the prevalence and associated factors of underweight among lactating women in Ethiopia. Despite the different efforts to improve nutrition in Ethiopia, the prevalence of underweight is still high, with most regions having a higher prevalence than the documented 5-20% of African women (31). This review identified the highest prevalence at 50.6% in the Northern parts and the lowest at 17.4% in the Southern parts of Ethiopia. Most of the studies have been done in the Southern parts of the Country and with less information from the other regions of the Country especially the East and Central hence the need to conduct national studies and also regional studies to further inform policy. Several factors were shown to be associated with underweight among lactating mothers in Ethiopia, including dietary diversity score, households' food security, and family income, place of delivery, nutritional education programs and antenatal care attendance, among others. This implies a need for targeted interventions and policies aimed at promoting household food security and household income as well as community nutrition education and screening during the antenatal visits for early detection and management of underweight.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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