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Associated Factors of Undernutrition among Lactating Mothers: Literature Review

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ABSTRACT/ ABSTRAK

ABSTRACT. *Lactating mothers in low and middle-income countries including Ethiopia and Uganda are vulnerable to undernutrition. Undernutrition during lactation increases the risk of disease among mothers and children. This study aimed to review the prevalence and factors associated with undernutrition among lactating mothers. We used literature from several electronic databases including BioMed Central, Pubmed, SpringerPlus, Wiley Online Library, Google Scholar, and Taylor & Francis to collect relevant literature about the prevalence and associated factors of undernutrition among lactating mothers. Of the eight studies, the lowest prevalence of undernutrition among lactating mothers was 8.2% and the highest was 54.8%, and most of them (6 of 8 studies) showed a prevalence of undernutrition above 20%. Many factors are associated with undernutrition among lactation mothers, including household food security, food diversity, not using additional food, meal frequency, place of delivery, nutrition education, potable water source, latrine facilities, birth spacing, family income, and maternal age, education, and maternal working status. The prevalence of undernutrition among lactating mothers is still high. Inadequate access to food and health services, poor environment, and low family socio-economic factors were associated factors of undernutrition among lactation mothers.*

Kata kunci:

Ibu Menyusui, Keberagaman Pangan, Kekurangan Gizi, Ketahanan Pangan, Laktasi

ABSTRAK. Ibu menyusui di negara berpenghasilan rendah dan menengah termasuk Ethiopia dan Uganda merupakan kelompok yang rentan mengalami kekurangan gizi. Kekurangan gizi pada ibu menyusui meningkatkan kerentanan ibu dan anak terhadap penyakit. Studi ini bertujuan untuk melakukan review terkait prevalensi dan faktor-faktor yang berhubungan dengan kekurangan gizi pada ibu menyusui. Peneliti menggunakan literatur yang diperoleh dari beberapa *database* elektronik diantaranya *BioMed Central, Pubmed, SpringerPlus, Wiley Online Library, Google Scholar*, dan *Taylor & Francis* untuk mengumpulkan literatur relevan terkait prevalensi dan faktor-faktor yang berhubungan dengan kekurangan gizi pada ibu menyusui. Studi ini menemukan prevalensi kekurangan gizi pada ibu menyusui terendah 8,2% dan tertinggi 54,8%, dengan mayoritas (6 dari 8 studi) menunjukkan prevalensi >20%. Beberapa faktor berhubungan dengan kekurangan gizi pada ibu menyusui diantaranya ketahanan pangan keluarga, keberagaman konsumsi pangan, tidak mengonsumsi makanan tambahan, frekuensi makan ibu, tidak melahirkan di layanan kesehatan, edukasi gizi, ketersediaan air bersih, ketersediaan fasilitas jamban, jarak lahir, pendapatan keluarga, serta usia, pendidikan, pekerjaan ibu. Prevalensi kekurangan gizi pada ibu menyusui masih tinggi. Akses pangan dan akses layanan kesehatan tidak memadai, lingkungan yang buruk, serta faktor sosial ekonomi keluarga yang rendah merupakan faktor yang berkaitan dengan kekurangan gizi pada ibu menyusui.

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INTRODUCTION

Adequate nutrition among lactating mothers is essential to support optimal maternal health and infant growth. During the breastfeeding phase, nutritional requirements are higher than those of women who are not breastfeeding. Based on the recommended nutritional intake set by WHO, lactating mothers require 25% more energy and 54% more protein than non-breastfeeding women (Fekadu et al., 2024). Lactating mothers in the first six months are recommended to increase their energy intake by 330 kcal and 20 grams of protein, and in the second six months add 400 kcal of energy and 15 grams of protein. Adequate nutrition is needed by the mother to produce breast milk. In the first six months, mothers use about 640 kcal/day to produce a normal amount of breastmilk, and about 510 kcal/day in the following six months (Nilawati and Sapnita, 2023).

The lactation phase has implications for maternal nutritional status. Breastfeeding mothers, especially in low- and middle-income countries, are highly vulnerable to undernutrition. This is caused by many factors, including increased physiological needs, lactogenesis process, workload, poverty, inadequate nutrition intake, poor nutrition quality, and increased nutrition requirements during lactation (Fekadu et al., 2024). Undernutrition in lactating mothers increases vulnerability to disease in mothers and children, as well as impaired growth and development in children (Hartini et al., 2023). Undernutrition in lactating mothers leads to nutrition-related metabolic disturbances in early infancy and irreversible physiological changes in infants (Hundera et al., 2015).

Sub-Saharan African countries are the epicenter of the crisis in adolescent girls and women, with 2-3 teenage girls and women undernourished. Evidence suggests that 5-20% of African women have a low Body Mass Index (BMI), which is associated with chronic hunger (Raymond et al., 2018). Many factors are associated with undernutrition in lactating mothers, including poverty, lack of nutrition education, low diversity of food consumption, and household food insecurity (Fekadu et al., 2024). Lactating mothers are vulnerable to undernutrition due to low food intake, low family income, unequal distribution of food in the household, low education level, low employment status, short birth interval, cultural and work overload in the household, lack of meal frequency, low family encouragement, inadequate access to nutrition education and health services, and infectious diseases (Hundera et al., 2015). The prevalence of undernutrition in lactating mothers is still high, even some studies showed the prevalence higher than the national prevalence. In addition, information regarding risk factors of undernutrition in lactating mothers is still limited. Hence, this study aimed to review the prevalence of undernutrition and associated factors among lactating women.

RESEARCH METHOD

Search Strategy

This study used a literature review design. We identified, evaluated, and synthesized various sources relevant to the research topic. The literature search was conducted using search engines across several electronic databases, including BMC Nutrition, PubMed, SpringerPlus, Wiley Online Library, Google Scholar, and Taylor & Francis. The keywords used in the literature search were malnutrition, undernutrition, lactating mothers, and nutritional status. Boolean operators (*AND* and *OR*) were applied to refine the search parameters. This keyword-based search resulted in a total of 98 articles.

Duplicate Removal

A deduplication procedure was conducted to remove redundant literature using a database automation engine or a reference management application, specifically *Mendeley*, during the literature export process. As a result, 17 articles were eliminated in this phase.

Screening Procesure

To ensure the integrity of the review, duplicate articles were removed, and independent article selection was conducted by the reviewer based on the title and abstract. In addition to title and abstract screening, filtering was performed based on the research topic and studied variables. Duplicate or irrelevant literature was excluded. As a result, 58 articles were removed in this phase.

Inclusion and exclusion criteria

This study included open-access and full-text articles published between 2015-2024, which examined associated factors of undernutrition among lactating mothers. Exclusions were applied to studies that did not focus on undernutrition among lactating mothers, lacked full-text accessibility, were not cross-sectional studies, or were not written in English. In the final stage, 8 articles were selected for inclusion in this study.

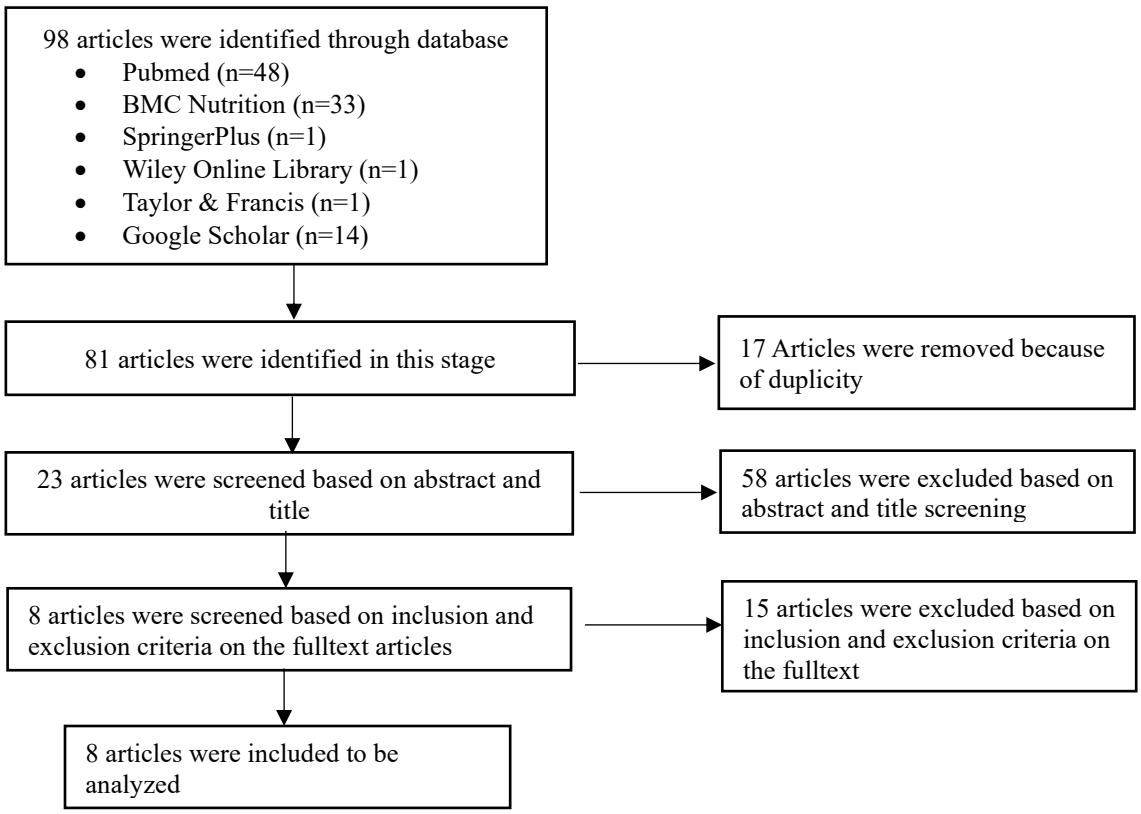

Figure 1. Review Process PRISMA Flow Diagram

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RESULTS

The studies included in this literature review were predominantly conducted in Ethiopia (7 out of 8 studies), with one study from Uganda. The prevalence of undernutrition among breastfeeding mothers varied significantly across the studies, ranging from 8.2% in Uganda (Sserwanja et al., 2021) to 54.8% in Northern Ethiopia (Mengstie et al., 2023). The second highest prevalence was reported by Alemayehu, Argaw, and Mariam (2015) at 40.6%. Undernutrition was assessed using body mass index (BMI), with a threshold of <18.5 kg/m², and mid-upper arm circumference (MUAC), with a threshold of <23 cm.

Alemayehu, Argaw, and Mariam (2015) found that breastfeeding mothers who consumed six or more food groups had a 40% lower risk of malnutrition compared to those who consumed three or fewer food groups. Similarly, Berihun, Kassa, and Teshome (2017) identified several factors significantly associated with undernutrition in breastfeeding mothers, including household size, maternal age at first pregnancy, place of delivery, and access to nutrition education. Mothers who had their first pregnancy before the age of 18 had 3.72 times higher risk of undernutrition compared to those who had their first pregnancy at 18 or older. Likewise, women who gave birth at home had 2.36 times higher risk of being undernourished than those who delivered in a health facility. Notably, receiving nutrition education significantly reduced the risk of undernutrition by 5.5 times.

Table 1: Prevalence of Underweight among Lactating Mothers

Authors, year	Country	Assessment method	Cut Off	Study Design	Sample Size	Underweight Prevalence (%)
Alemayehu, Argaw, and Mariam (2015)	Ethiopia	BMI	<18.5 kg/m^2	Cross-sectional	342	40.6
Berihun, Kassa, and Teshome (2017)	Ethiopia	BMI	<18.5 kg/m^2	Cross-sectional	668	25.4
Bekele, Jima, and Regesu (2020)	Ethiopia	BMI	<18.5 kg/m^2	Cross-sectional	545	17.7
Boke, Yesuf, and Gutema (2021)	Ethiopia	BMI	<18.5 kg/m^2	Cross-sectional	410	21.2
Sserwanja et al. (2021)	Uganda	BMI	<18.5 kg/m^2	Cross-sectional	1356	8.2
Wubetie and Mekonen (2023)	Ethiopia	BMI	<18.5 kg/m^2	Cross-sectional	259	22.6
Mengstie et al. (2023)	Ethiopia	MUAC	<23 cm	Cross-sectional	420	54.8
Getachew et al. (2023)	Ethiopia	BMI	<18.5 kg/m^2	Cross-sectional	385	30.1

Bekele, Jima, and Regesu (2020) found that several factors significantly increased the risk of malnutrition among breastfeeding mothers. The risk was 2.76 times higher for mothers who did not receive extra food, 2.65 times higher for those who gave birth outside of health facilities, 5.22 times higher for those with low family income, 2.5 times higher for mothers with low food diversity, and 6.57 times higher in households that did not achieve food security. Similarly, Boke, Yesuf, and Gutema (2021) identified key risk factors for undernutrition in breastfeeding mothers. Young maternal age increased the risk 4.12 times, lack of antenatal care (ANC) increased it 2.9 times, and low food diversity raised the risk 2.42 times. On the other hand, mothers with a high wealth index had a significantly lower risk of malnutrition, with an odds ratio of 0.47.

Education level, employment status, and wealth index are significant factors associated with undernutrition in breastfeeding mothers. According to Sserwanja et al. (2021), mothers with no formal education had a 10.21 times higher risk of undernutrition compared to highly educated mothers. Interestingly, non-working mothers had a lower risk of malnutrition, with an odds ratio of 0.5. Additionally, mothers with a poor wealth index had a 4.42 times higher risk of malnutrition compared to those with the highest wealth index. Similarly, Wubetie and Mekonen (2023) identified multiple socioeconomic and environmental factors that increase the risk of malnutrition among lactating mothers. The risk was 3.51 times higher for mothers with low family income, 7 times higher for those without access to clean water, and 5.76 times higher for mothers without a latrine. Additionally, low food diversity, food insecurity, and poor meal frequency were strong predictors of malnutrition, increasing the risk by 9.06 times, 12.91 times, and 14.19 times, respectively. Younger mothers had a lower risk of undernutrition compared to mothers aged ≥35 years, with an odds ratio of 0.21 (Mengstie et al., 2023). However, several factors significantly increased the risk of undernutrition among breastfeeding mothers. Large family size (≥9 people) increased the risk 4.35 times, short birth spacing by 4.85 times, low meal frequency by 2.54 times, and low food diversity by 1.79 times. Similarly, Getachew et al. (2023) identified additional risk factors for undernutrition in breastfeeding mothers. Mothers who did not use contraceptives had a 3.41 times higher risk, while those who married early faced a 2.46 times higher risk. Not consuming supplementary food increased the risk 2.19 times, low food diversity by 3.64 times, and food insecurity posed the highest risk, increasing the likelihood of undernutrition by 7.86 times.

Tabel 2: Associated Factors of Undernutrition among Lactating Mothers

Authors	**Associated Factors of Undernutrition among Lactating Mothers**
Alemayehu, Argaw, dan Mariam (2015)	Household food insecurity (COR 0.6, CI 95%: 0.38-0.96)
Berihun, Kassa, dan Teshome (2017)	Family size ≥5 (AOR 0.46, CI 95%: 0.26-0.81), age at first pregnancy <18 years old (AOR 3.72, CI 95%: 2.13-6.49), delivery at home (AOR 2.36, CI 95%: 1.5-3.72), did not get regular nutritional education (AOR 5.5, CI 95%: 1.8-16.79)
Bekele, Jima, dan Regesu (2020)	Didn't consume extra food (AOR 2.76, CI 95%: 1.43-5.29), delivery at home (AOR 2.65, CI 95%: 1.24-5.65), household income low (AOR 5.22, CI 95%: 1.4-19.4), low dietary diversity score (AOR 2.5, CI 95%: 1.45-4.36), lack of household food security (AOR 6.57, CI 95%: 3.5-12.34)
Boke, Yesuf, dan Gutema (2021)	Younger mother (AOR 4.12, CI 95%: 1.25-13.63), not visited ANC (AOR 2.9: CI 95%: 1.43-5.86), lack of food diversity (AOR 2,42, CI 95%: 1,35-4,36), high wealth index (AOR 0.47, CI 95%: 0.23-0.98)
Sserwanja *et al.* (2021)	No education mother (AOR 10.21, CI 95%: 1.61-64.74), not working mother (AOR 0.5, CI 95%: 0.26-0.94), low wealth index (AOR 4.42, CI 95%: 1.34-14.61)
Wubetie dan Mekonen (2023)	Low household wealth index (AOR 3.51, CI 95%: 1.46-17.68), pipe water availability (AOR 7, CI 95%: 1.05-46.85), not have laterine (AOR 5.76, CI 95%: 1.36-24.43), lack of food diversity (AOR 9.06, CI 95%: 3.74-22.8), household food insecurity (AOR 12.91, CI 95%: 2.85-58.43), meal frequency <3 (AOR 14.19, CI 95%: 2.13-94.44)
Mengstie *et al.* (2023)	Younger mother (AOR 0,21, CI 95%: 0,07-0,65), family size ≥9 (AOR 4.35, CI 95%: 1.32-10.22), birth interval <24 month (AOR 4.85, CI 95%: 1.24-10), meal frequency ≤2 (AOR 2.54, CI 95%: 1.12-5.75), lack of food diversity (AOR 1.79, CI 95%: 1.03-1.30)
Getachew *et al.* (2023)	Non-users of contraceptives (AOR 3.41, CI 95%: 1.05-11.04), age at first marriage ≤18 years old (AOR 2.46, CI 95%: 1.15-5.3), didn't consume additional meal (AOR 2.19, CI 95%: 1.07-4.72), lack of food diversity (AOR 3.64, CI 95%: 1.94-6.82), food insecurity (AOR 7.86, CI 95%: 2.1-29.55).

DISCUSSION

Undernutrition occurs when nutritional needs are not met over an extended period. This condition can lead to an increased breakdown of body fat for energy production, thereby reducing the body's fat reserves (Herawati et al., 2024). Undernutrition can affect individuals at any stage of the human life cycle. In lactating mothers, malnutrition is assessed using Body Mass Index (BMI) and/or Upper Arm Circumference (MUAC) measurements. According to this review, the prevalence of undernutrition in breastfeeding mothers ranged from 8.2% to 54.8%, with most studies (6 out of 8) reporting a prevalence above 20%. This rate is higher than that observed among African women, whose undernutrition prevalence ranges from 5% to 20%.

Multiple factors are associated with undernutrition among lactating mothers, including household food insecurity, lack of dietary diversity, low maternal meal frequency, not consuming additional meals, lack of nutrition education, limited access to health services, sanitation, and hygiene, as well as economic, social, and demographic factors. Several studies have found that household food insecurity is significantly linked to undernutrition in lactating mothers (Bekele, Jima dan Regesu, 2020; Wubetie and Mekonen, 2023; Getachew et al., 2023). Household food insecurity influences the quality and quantity of nutrient intake, which contributes to undernutrition. Women are particularly vulnerable to the impacts of low household food insecurity; mothers may reduce their food intake to ensure that family members have enough to eat as a coping strategy in response to limited food availability (Wubetie and Mekonen, 2023).

Most studies report that lack of dietary diversity increases the risk of undernutrition in lactating mothers. For example, mothers who consume less than five food groups have a 2.42 times higher risk of undernutrition compared to those consuming five or more food groups (Boke, Yesuf, dan Gutema, 2021). Dietary diversity is a proxy indicator of maternal nutrition adequacy. Consuming a varied diet helps ensure sufficient quality and quantity of nutrient intake (Bekele, Jima dan Regesu, 2020). Maternal meal frequency is also linked to undernutrition. Mothers who eat two meals or less per day had a 2.54 times higher risk of undernutrition than those who eat more than three meals per day (Mengstie et al., 2023). Insufficient meal frequency can lead to inadequate nutrient consumption, a critical issue given that lactating mothers require additional nutrients for their health and optimal breast milk production. According to the World Health Organization (WHO), lactating mothers need 25% more energy and 54% more protein than non-lactating mothers (Fekadu et al., 2024). Additional meals are essential to support the nutritional status of lactating mothers. Bekele, Jima, and Regesu (2020) indicate that mothers who do not consume additional food have a 2.76 times higher risk of malnutrition. Additional meals provide additional calories to lactating mothers, thereby preventing the depletion of their energy stores (Getachew et al., 2023).

Nutrition education has a positive impact on maternal knowledge and behavior. Berihun, Kassa, dan Teshome (2017) found that lactating mothers who did not receive nutrition education were 5.5 times more likely to experience undernutrition. Additionally, mothers who did not attend antenatal care (ANC) had a 2.9 times higher risk of undernutrition than those who attended at least four ANC visits during pregnancy (Boke et al., 2021). Regular visits to professionals increase mothers' exposure to nutrition education and other health interventions that can reduce the risk of undernutrition. Mothers who gave birth at home were found to be 2.36 times more likely to be undernutrition than those who birth at

health facilities, a difference attributed to the nutrition counseling received from professionals during facility-based deliveries (Berihun, Kassa, and Teshome, 2017). In addition, not using contraception and having short birth intervals also elevate the risk of malnutrition, with the odds of undernutrition being 3.4 times higher among mothers who did not use contraceptives. This increased risk is thought to be related to the benefits of contraceptive use in promoting longer birth intervals, reducing the number of children, and the potential weight gain effects of hormonal contraceptives (Getachew et al., 2023).

Unhealthy environmental factors, such as inadequate access to pipe water and latrine facilities, are significantly associated with undernutrition in lactating mothers. Wubetie and Mekonen (2023) found that mothers without access to pipe water sources and latrines had a 7-fold and 5.76-fold higher risk of undernutrition, respectively, compared to those with adequate access. This may be due to the increased likelihood of infectious diseases in unhealthy environments, which can reduce appetite and inhibit nutrient absorption, thereby compromising nutritional status. Other factors linked to undernutrition in lactating mothers include young maternal age at first pregnancy, larger family size, low family income, limited maternal education, and maternal employment status. For instance, young mothers (aged 17–25 years) are more at risk of malnutrition than mothers aged over 35, likely because their growth and development, along with the increased nutritional demands of breastfeeding, heighten their nutrient requirements (Boke et al., 2021). Moreover, economic factors and family size influence family food security, with families in better economic conditions being more capable of providing adequate food for all members (Mengstie et al., 2023).

CONCLUSION

The prevalence of undernutrition among breastfeeding mothers ranged from 8.2% to 54.8%. Most studies indicated a higher prevalence of undernutrition compared to that among African women, which ranged from 5% to 20%. Various factors have been identified as being associated with undernutrition in lactating mothers, including family food security, dietary diversity, maternal meal frequency, supplementary food consumption, nutrition education, contraceptive use, birth spacing, access to clean water, availability of latrine facilities, maternal age, family income, maternal education, and maternal occupation.

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