

# Systematic Reviews of Prevalence and Associated Factors of Under Five Malnutrition in Ethiopia: Finding the Evidence

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**To cite this article:**

Mulugeta Molla Birhanu. Systematic Reviews of Prevalence and Associated Factors of Under Five Malnutrition in Ethiopia: Finding the Evidence. *International Journal of Nutrition and Food Sciences*. Vol. 4, No. 4, 2015, pp. 459-464. doi: 10.11648/j.ijnfs.20150404.17

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**Abstract:** Background: Globally, 165 million children are stunted. Currently in Ethiopia, 14 %, 9%, and 25% of children are stunted, wasted and underweight respectively. This paper is intended to provide compressive and up to date evidence on the prevalence and investigate the associated factors of Malnutrition in Ethiopia from January, 2000 to May, 2015. Methods: A quantitative epidemiological systematic literature review was conducted by searching different published articles in different data bases which is written in English including MEDLINE, PubMed, Google scholar, Cochrane and grey literatures. The search was restricted to population based studies on malnutrition in Ethiopia published between January 2000 and May 2015. All data were extracted independently by a single reviewer using a standardized protocol and data collection form. Eleven publications met the inclusion criteria. The total pooled data were eleven surveys involving over 7,959 participants. Results: The reported rate of malnutrition is varied widely; the highest rate of under nutrition, stunting and wasting was 49.2, 57.1 and 42.3 respectively and the lowest rate of under nutrition, stunting and wasting was 8.9, 24, 4.1 respectively. This variation could be due to seasonal variation; differences in participants mean ages, source population and study settings. This review found a high prevalence of malnutrition both in urban and rural residents and different associated factors including age, sex, prelactal feeding, malaria, deprivation of colostrum and other 17 other associated factors. Conclusion and recommendation: Under five malnutrition was considerably prevalent in Ethiopia. Further investigation is important for other vulnerable groups like lactating women, school children, people with different chronic non communicable diseases and older age groups. Primary prevention tailored to provide education on weaning practice, early initiation of breast feeding, family planning, prevention of malaria and diarrhea, health education about fruits and vegetables and malnutrition screening in primary health care context would be of immense value. Further Meta-analysis study is also recommended.

**Keywords:** Prevalence, Associated Factors, Malnutrition, Systematic Review, Ethiopia

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## 1. Background

Globally, 165 million children are stunted; under nutrition underlies 3.1 million deaths in children younger than 5 years. (1) Stunting prevalence has been decreasing slowly. (2) Under nutrition, consisting of fetal growth restriction, stunting, wasting, and deficiencies of vitamin A and zinc, along with sub optimum breastfeeding, underlies nearly 3.1 million deaths of children younger than 5 years annually worldwide, representing about 45% of all deaths in this group. (3)

Improvement of exclusive breastfeeding practices, adequate and timely complementary feeding, along with continued breastfeeding for up to two years or beyond, could save annually the lives of 1.5 million children under five

years of age. (4) Growth failure during intrauterine life and poor nutrition in the first two years of life, have critical consequences throughout the life-course. Appropriate breastfeeding and complementary feeding practices not only play a significant role in improving the health and nutrition of young children, they also confer significant long-term benefits during adolescence and adulthood. An estimated 13 million children are born with intra-uterine growth restriction every year. (5)

Prevalence of stunting of linear growth of children younger than 5 years has decreased during the past two decades, but is higher in South Asia and Sub-Saharan Africa

than elsewhere and globally affected at least 165 million children in 2011; wasting affected at least 52 million children. Deficiencies of vitamin A and zinc result in deaths; deficiencies of iodine and iron, together with stunting, can contribute to children not reaching their developmental potential. (2)

Under nutrition among children is a critical problem because its effects are long lasting and go beyond childhood. It has both short and long term consequences (6, 7). For instance, undernourished children are physically, emotionally and intellectually less productive and suffer more from chronic illnesses and disabilities than well nourished children (8-11).

Although Ethiopia has already achieved a remarkable progress in reducing under-five mortality in the last decades (12, 13) under nutrition among children is still a common problem in this country (12-15). Ethiopia is one of the countries with very high burden of under nutrition (13). Under nutrition can best be described in the country as a long term year round phenomenon due to chronic inadequacies in food combined with high levels of illness in under-five children. It is the underlying cause of 57 % of child deaths. Under nutrition is currently the most wide spread and serious health problem of children. According to Ethiopian DHS 2011 data, among under-five children 44%, 29% and 10% were stunted; underweight and wasted respectively (12).

Even though the government health sector development plan IV (2010/11-2014/15) continues to improve the nutritional status of mothers and Children through different programmes; the poor nutritional status of children and women continues to be a serious problem in Ethiopia. (16)

According to the latest Ethiopian Mini Demographic and Health Survey (EMDHS); there has been a substantial decline in the proportion of children stunted and underweight in the last 15 years and a smaller decline in the prevalence of wasting. Forty percent of children under age five were stunted, 9% were wasted and 25% underweight in 2014. (16)

Ethiopia is an ancient country, situated in the Horn of Africa. It is one of the cradles of mankind, for instance, “Dinknesh” or “Lucy” and Ardi was discovered in Hadar in 1974 and 1994 respectively. “Lucy” was dates back 3.5 million years and Ardi dates back 4.5 million years. Throughout its long history Ethiopia has been a melting pot of diverse customs and cultures. (12)

Ethiopia was one of few African countries that maintained its independence, founding members of UN, OAU, and seat of AU. At present Ethiopia is administratively structured in to nine regional states and two city administrations. (12)

Even though there are many studies across different regions of Ethiopia, to my knowledge reliable information’s about the prevalence and associated factors of malnutrition results in different regions have not been pooled and done together. These kinds of evidences are important for policy makers, researchers, educators, and all other concerned bodies in order to plan and design appropriate intervention strategies and produce justified evidences to enhance nutritional status of children so that it will help to reduce

child mortality and morbidity. On top of this it will also help to identify regions needing effective interventions and provide the basis for future research and for a discussion of policy implication. So, this initiated me to conduct a systematic review in this area.

The objective of the present study was to synthesize the current prevalence and investigate the associated factors of under five nutrition in Ethiopia; based on the studies published between January, 2000 and May, 2015.

## 2. Methods

The reporting of this review adhered to the preferred reporting items for systematic reviews and meta-analysis (PRISMA) statements. (17)

### 2.1. Study Search

A systematic review of all papers published on under five malnutrition in Ethiopia between January, 2000 and May, 2015, which are available on PubMed, EMBASE, Google Scholar, and Cochrane were searched. The articles were searched for providing data from Ethiopia on malnutrition, stunting, under five children, wasting, under nutrition, prevalence, incidence, causes, determinants, associated factors and cross sectional studies. Grey literature, from sources including the websites of world health organization and National and international Nutritional organization were reviewed. The researcher manually searched the references of selected studies for any additional studies that were not captured by the electronic search using references cited in original study articles and reviews.

### 2.2. Study Selection

The eligibility criteria for this paper were papers which had clear objectives and methodology, cross sectional studies, English language, and full article, carried out in Ethiopia, and published and unpublished articles from January, 2000 to May, 2015. Published studies, which reported the prevalence of under five malnutrition and were conducted in representative population samples, were included in the review. When information needed to consider eligibility was missing, the study was excluded.

### 2.3. Study Population

Children less than 5 years of age (paired with their mothers)’, residing in Ethiopia were participated in this research.

### 2.4. Study Outcomes

The primary outcome of this review was overall prevalence of under five malnutrition in Ethiopia and the secondary outcome was risk factors associated with under five malnutrition.

The determination of under five malnutrition was made by measuring the weight, height and MUAC of children. Children Height for-Age (HAZ), Weight-for Age (WAZ) and

Weight-for-Height (WHZ) below -2 were characterized as stunted, underweight and wasted, respectively, taking sex into consideration using WHO 2006 standards. (11)

### 2.5. Study Design

Community and institution based cross-sectional studies that were carried out in Ethiopia including more than 200 participants and reported prevalence of under five malnutrition and associated factors were included. Studies were excluded if they did not provide the prevalence of under five malnutrition and failed to fulfill WHO 2006 growth standards

### 2.6. Data Extraction

All data were extracted independently by a single reviewer using a standardized protocol and data collection form. Uncertainties were resolved by discussion with one colleague and during disagreement the final decision was made based on the opinion of senior experts and majority decision was taken.

Data on year of publication and survey, region of study, age of participants, sampling methods, study design, response

rate, sample size, and measurement of malnutrition, definition(s) used for malnutrition, number of weight, height and MUAC measurement and type of measuring device used were extracted. Prevalence of under weight, stunting, wasting and associated factors were also obtained.

The author described the population used for the standardization of malnutrition prevalence where this information was available. If it was available, the prevalence was obtained by age, gender, socio-economic status, and rural-urban residence. Multiple papers from a study were included if these were found and consistency of results checked for the same study.

## 3. Result

### 3.1. Study Selection

In the initial search 94 articles were identified and 11 studies were deemed eligible. Figure 1 shows the PRISMA flow chart of the selection of studies. Those eleven studies (n=7,959) were selected for this review. The studies were carried out from 2004/5-2014.

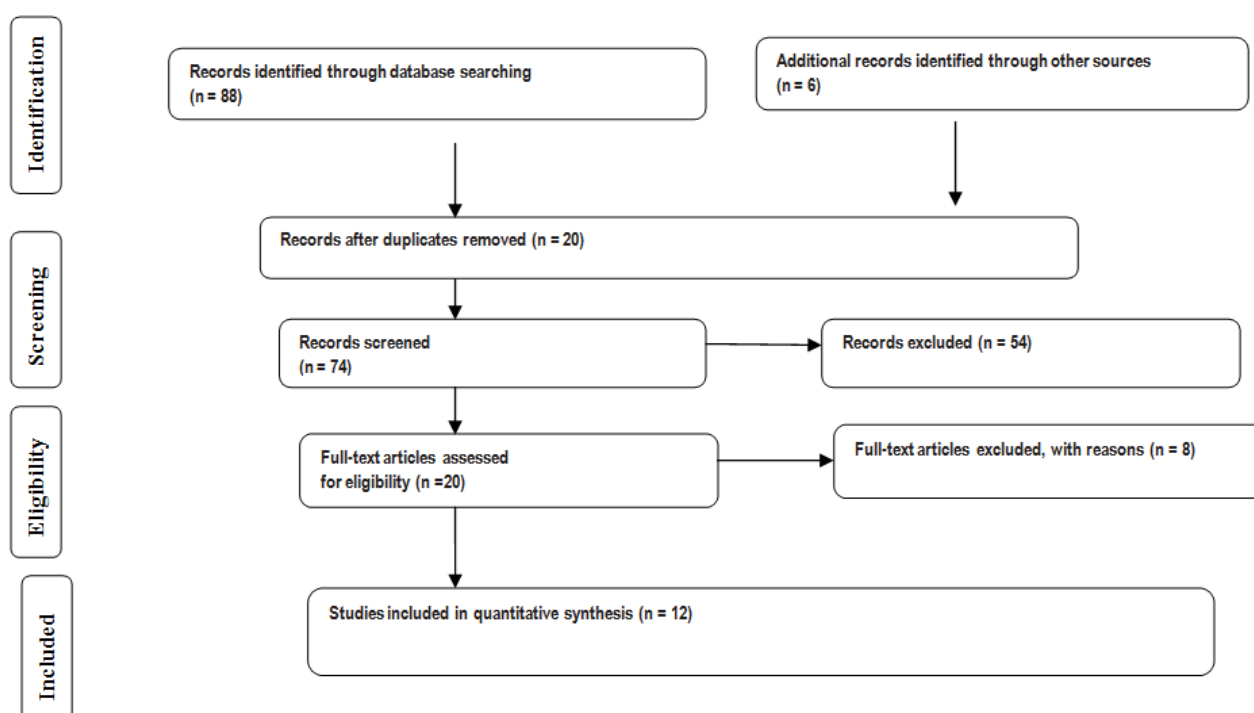


Figure 1. PRISMA flowchart of the selection of studies. Adapted from Moher et al. (17).

### 3.2. Characteristics of the Studies

All selected studies were cross sectional design (Table 1). The studies included participants, ranging from 219 (18) to 2410 (19). The largest study was carried out in Oromia region in Gilgel gibe field research center, South West Ethiopia.

All included studies were done with different standardized age. Seven numbers of studies were done with participant age less than 5 years(18-23) and three other studies were carried

out with age between 6 months and 59 months of age (24-26) years. Only one study was done with participant's age of less than 2 years of age (27).

Among all, three studies were conducted in urban areas (18, 22, 26); other three studies were done in rural areas (20, 23, 27). The rest five studies were both in urban and rural settings (19, 14, 21, 24, 25). Among eleven included studies, all studies were using WHO criteria for the classification of malnutrition.

### 3.3. Risk of Bias

Among included studies all are random sampling techniques. The maximum and minimum response rate was about 99.4% (24) and 97.7% (for the largest scale survey) (25) respectively, while in seven studies the non response rate was absolutely zero (14, 18-22).

### 3.4. Prevalence of Under Five Malnutrition

The prevalence of malnutrition in Ethiopia among different regions is presented in Table 1. Even though some pocket studies have been conducted in different parts of Ethiopia, there is no national study yet. The reported rate of

malnutrition is varied widely; the highest rate of under nutrition, stunting and wasting was 49.2, 57.1 and 42.3 respectively (14, 18, 24).

The prevalence of malnutrition both in urban and rural settings of different regions is quite similar. Among all regions the highest prevalence of underweight, stunting and wasting is reported in Amhara, Tigray and Somalia regions respectively.

The reported rate of malnutrition is varied widely; the highest rate of under nutrition, stunting and wasting was 49.2, 57.1 and 42.3 respectively and the lowest rate of under nutrition, stunting and wasting was 8.9, 24, 4.1 respectively.

**Table 1.** Prevalence and associated risk factors of malnutrition in cross sectional surveys in Ethiopia from January, 2000 to May, 2015.

S.No.	Author/year of publication	Year of survey	Region	Site ( Urban / rural )	Mean age and SD/ Age in Months	Sample size ( response rate %)	Study design / sampling method
1.	Tamiru M, et al <sup>18</sup> , /2015	2014	Tigray	Urban	30.7 /17.13	219/100	CBCS/SRS
2.	Deribew A et al <sup>19</sup> , /2010	2009	Oromia	Urban/Rural		2410/100	CS/Cluster random
3.	Beka T, et al <sup>14</sup> , /2009	2006	Amhara	Urban/Rural		630/100	CBCS
4.	Mulugeta A. et al <sup>20</sup> , /2010	2004/2005	Tigray	Rural	32	318/100	CBCS
5.	Brhane G et al <sup>21</sup> , /2014	2013	Tigray	Urban/Rural	24.5/15.3	325/100	CBCS/MSRS
6.	Asres G. et al <sup>22</sup> , /2011	2010	Amhara	Urban	36.3/15.9	794/100%	CBCS
7.	EndrisM, <sup>23</sup> , /2007	2006	Amhara	Rural		450/99.1	CS
8.	Solomon D, et al <sup>24</sup> , /2013	2012	Somalia	Urban/rural	18.3/	600/99.4	CBCS/MSRS
9.	Asfaw M et al <sup>25</sup> , /2015	2013	Oromia	Urban/Rural	28 (14.6)	796/97.7	CBCS/MSSST
10.	Mengistu K. et al <sup>26</sup> , /2013	2012	Oromia	Urban	32.1/14.9	820/100	CBCS/MSRS
11.	Hailemariam T. <sup>27</sup> , /2014	2014	Oromia	Rural		597/99.3	CBCS

**Table 1.** Continue.

S.No.	Instruments	No. of measu / measur used	Prevalence (%) (95% CI)			Associated Risk factors
			Under weight	Stunted	Wasted	
1.	EDWS, WB	2/ average	37.4	57.1	17.8	Family size, Income, Parity, Parental Education, Family Planning utilization and diarrhea
2.	EDWS, WB	>>	34.2	40.4	5.1	Age, sex, Malaria
3.	EDWS, WB	MW+CW/ the difference	49.2	43.2	14.8	Sex, Age, Deprivation of colostrum, Diarrhea, Breast feeding, Introduction of complementary feeding
4.	EDWS, WB	Once	33.0	46.9	11.6	pre-lacteal feed, Child age, maternal anthropometric characteristics, inadequate complementary foods, the use of prelacteal feeds and area of residence
5.	EDWS, WB	2/average	20.9	56.6	4.1	Age, Maternal education, Child birth weight, BMI, early initiation of breast feeding, early initiation of breast feeding
6.	EDWS, WB	Once	14.6%	37.2%	4.5%	Age, smaller family size and inadequate sources of complementary feeds for the breastfeeding
7.	EDWS, WB	Once	28.5	24	17.7	Family Income
8.	EDWS, WB	1/1	47.7	34.4	42.3	Gender, Age, Maternal education, Monthly income
9.	HS, EDWS, WB MUAC tape meter	Once	29.2	47.6	13.4	Diarrhea, Male sex, uneducated father
10.	EDWS, WB	Once	30.9	47.6	16.7	Age, Monthly Income, Family planning, butter as pre-lacteal feeding, treatment of water
11.	EDWS, WB	3/ average	8.9	-	-	Age, Birth weight, Frequency of Breast feeding, health information after delivery and vitamin A-rich fruits/vegetables

EDWS=(Electronic digital weight scale), HWLB (horizontal wooden length board), HS (Hanging scale), CBCS (Community based cross sectional study), MSRS (Multi stage random sampling), MSSST (Multi stage systematic sampling technique), LBW, low birth weight, HH (House hold), BMI(Body mass Index), MW=Mothers' weight, CW=Childs' weight

### 3.5. Risk Factors of Under Five Malnutrition

From all eleven pooled data 22 associated risk factors for under five malnutrition were identified.

From all studies age and sex are identified as a common potential risk factor for under five malnutrition.(21-25,27-30). In two studies prelacteal feeding is reported as a risk factor for malnutrition.(23, 29). In one study malaria was found to be a

risk factor for malnutrition. (21). In other three studies complementary feeding was identified as a risk factor for malnutrition.(22, 23, 25) Family income (20, 26, 27, 29)and family size (20, 25)are found to be associated with under five malnutrition.

Parity (20), Parental Education (20,27,28), Family Planning utilization (20,29) and diarrhea (20,28), Deprivation of colostrum (22), maternal anthropometric characteristics (23), area of residence (23), birth weight (24,30) BMI (24), treatment of water (29), Frequency of Breast feeding (30), health information after delivery and vitamin A-rich fruits/vegetables (30) were associated with malnutrition.

## 4. Discussion

Under five nutrition is an important public health problem in developing countries and Ethiopia is not different in this regard. Based on the available data, the present study attempted to synthesize the evidence on prevalence and associated factors for under five malnutrition. Even though there are some researches done in Ethiopia that provide data on malnutrition, very few of these give age standardized data which allow comparability between studies and it make it difficult to conduct Meta Analysis. The individual studies show a general high prevalence of under five malnutrition. The prevalence of malnutrition is higher both in urban and older age groups.

In most studies, the prevalence of under nutrition, stunting and wasting is widely different from region to region and this could be due to the variation in seasonal changes, age category, and study setting. In this study it was very difficult to conduct trends in prevalence of malnutrition because the studies were undertaken at different populations and age groups.

The data in this review provide estimates of the burden of malnutrition in different regions of Ethiopia. Only studies which use WHO criteria were included in the review; this was made for comparison purpose. Variations in categorizing malnutrition, measurement methodology, age range and study site made it difficult for comparison of study.

Studies were included based on the extent to which the methods used were likely to give results which were representative of the population from which samples were drawn. To achieve this, studies were included only if the response rate had been mentioned and was at least 97% and sample size was reasonably large (200 participants).

There is an urgent need to focus on primary prevention tailored to provide education on weaning practice, early initiation of breast feeding, family planning, prevention of malaria and diarrhea, health education about fruits and vegetables and malnutrition screening in primary health care context with health extension workers, Women development army and other stakeholders.

## 5. Strengths and Weaknesses

Since there is no pooled data on the prevalence and risk factors of malnutrition with a variety of designs and in-depth

analysis of risk factors and the effects of interventions, could provide a better understanding of the situations in Ethiopia and provide information to healthcare policy-making. Only a few studies were carried out with the same age group and use the same classification method for malnutrition, which created some difficulties in pooling of age specific prevalence, to pool associated factors and conduct Meta Analysis.

Although this review includes community based cross sectional studies, it is difficult to highlight gaps on the understanding of the major associated factors in the country. None of the studies also establish temporal relation between seasonal variation and nutritional outcome. Future research priorities for the country should include better quantification of the prevalence and locally-important risk factors for under five malnutrition.

## 6. Conclusion and Recommendation

Still the prevalence of malnutrition in Ethiopia is high, with probable underreporting, and will certainly increase in the upcoming years. Providing critical data to formulate evidence based health policy and intervention will play a tremendous role. So, future researchers shall produce evidences in different regions and shall use the same reference criteria for comparison purpose. Moreover, primary prevention tailored to provide education on weaning practice, early initiation of breast feeding, family planning, prevention of malaria and diarrhea, health education about fruits and vegetables and malnutrition screening in primary health care context would be of immense value. On top of these, proactive thinking integrated with the primary healthcare system could be the best way to reduce the burden both in the rural and urban settings of the country. It could also important to provide school education about nutrition and train health extension workers, Women Developmental armies and other stakeholders about malnutrition. Because of the limited number of studies on under five malnutrition in Ethiopia, upcoming well-powered studies, using the standardized research design and covering more regions of the country and Meta Analysis studies are recommended.

Further investigation is important for other vulnerable groups like lactating women, school children, people with different Chronic Non Communicable diseases and older age groups.

## Acknowledgements

First and for most I would like to acknowledge my colleagues Fisha Girma and Ashenafi Shumye for their valuable comments and critics and involvements in the decision making process of selecting studies.

My deepest gratitude also goes to my beloved families for their moral and financial support.

Finally, I would like to thank my wife Wint and my sister Nigest for your day and night moral support and encouragement.

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