

Prevalence of Wasting and Associated Factors Among Children Aged 6-23 Months in Garowe, Puntland, Somalia

Abdulahi Abdiwali^{1*}, Berhe Gebremichae^{1,2}, Solomon Gebretsadik Bereka³, Kedir Teji Roba⁴

¹Department of Public Health Nutrition, College of Health and Medical Science, Admas University, Garowe Campus, Puntland, Somalia

²School of Public Health, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia

³Department of Public Health College of Health Sciences, Arsi University, Asella, Ethiopia

⁴School of Public Health College of Health and Medical Science, Haramaya University, Harar, Ethiopia

*Corresponding author

Abdulahi Abdiwali, Department of Public Health Nutrition, College of Health and Medical Science, Admas University, Garowe Campus, Puntland, Somalia

Submitted: 29 May 2022; Accepted: 04 Jun 2022; Published: 15 Jun 2022

citation: Abdulahi Abdiwali, Berhe Gebremichae, Solomon Gebretsadik Bereka, Kedir Teji Roba. (2022). Prevalence of Wasting and Associated Factors Among Children Aged 6-23 Months in Garowe, Puntland, Somalia. *Int J Women's Health Care*, 7(2), 96-103.

Abstract

Background: Child wasting is one of the most serious public health problems in developing countries, including Somalia. It affects child growth and development. If not treated early it causes chronic malnutrition that will affect brain development and can cause premature death of the children. However, there is limited evidence regarding child wasting in Somalia and no study in Puntland in particular. Therefore, this study was designed to assess the prevalence of wasting and associated factors among children aged 6-23 months in Garowe Town, Puntland, Somalia.

Methods: A community based cross-sectional study was conducted using pre-tested questionnaire among 409 children aged 6-23 months, from June 05-15, 2021. A systematic random sampling technique was used to select study participants. The collected data were entered and cleaned using EpiData version 3.1 and then exported into statistical package for social science (SPSS) version 20 for analysis. Both bivariable and multivariable logistic regression models were employed to identify factors associated with wasting. Variables having p -value < 0.05 were considered to be significantly associated with the dependent variable. The adjusted odds ratio (AOR) with 95% confidence interval (CI) was used to show the presence, strength and direction of associations.

Results: The prevalence of wasting among children aged 6-23 months was 34.2%, (95%CI 28.7 CI, 40.3); of which, 12% were severely wasted. Being from daily laborer father (AOR=3.1, 95% CI: (1.1, 8.7)), initiating complementary feeding before six months (AOR=8, 95% CI: (4.5, 14)), breastfeeding initiation after some hour of birth (AOR=3.9, 95% CI: (1.8, 8.4)), being unvaccinated (AOR=2.9, 95% CI:(1.7, 5.2)), mother with no formal education (AOR=3.4, 95% CI: (1.6, 7.0)) and mothers who didn't attend ANC follow-up during last pregnancy (AOR=5.3, 95% CI: (2.9, 9.5)) were significantly associated with occurrence of wasting among children aged 6-23 months.

Conclusion: The prevalence of wasting among children aged 6-23 months in the study area is a serious public health problem. Therefore, to reduce the incidence of malnutrition, the ministry of health should work closely with all health facilities in the country, as well as improve the quality of health workers and strengthen maternal and child health care.

Keywords: Prevalence, Associated Factors, Wasting, Children, 6-23 Months, Garowe, Puntland, Somalia

Introduction

Nutrition is essential for good health and development during the early years of life. If children do not take right amounts of macronutrients and micronutrient, they may become ill, have delayed mental and motor development that can have enduring adverse effects beyond the childhood, or may be die. The optimal nutrition and improvement of nutritional shortages during the early time are particular significance as beyond two years of age, reversal may become very difficult [1].

Nutritional deficiencies remain disturbing multifaceted problems which affecting infants, young children, adolescents, pregnant mothers and old age. Under-nutrition represents a violation of children's right to survival and development and the highest attainable standard of health. Nations trapped in poverty are often crippled by the burden of hunger and under-nutrition although trends in under-nutrition are improving [2].

Wasting is a form of acute under-nutrition characterized by a loss of body weight in relation to height, which increases a child's risk of infection and death and decreases their ability to learn. A wasted child is a child who has a weight-for-height Z-score less than -2.0 standard deviations [3]. Weight loss or a failure to gain normal weight as the fetus/infant/child grows, which left unchecked, results in wasting and, in some cases, nutritional oedema [4].

Globally, children under 5 years of age face multiple burdens: 144 million are stunted, and 47 million are wasted. Africa (with 40% of children under 5 stunted and 27% wasted) and Asia (with 54% of children under 5 stunted and 69% wasted) bear the highest share of all forms of malnutrition among under-5 children [5].

In the African continent, wasting was highest in Niger (18.0%), Burkina Faso (15.50%) and Mali (12.7%) Comoros (11.1%), Southern Africa Namibia (6.2%) in East Africa; Ethiopia (8.70%) in North Central Africa; Chad (13.0%) and Sao Tome & Principe (10.5%) [6].

The high prevalence of wasting is likely to be an underestimate, given that new cases occur throughout the year; when all new cases are accounted for the number of wasted children triples. High levels of wasting can exist in fragile contexts; however, wasting is by no means a problem limited to crises, as evidenced by high burdens of wasting in many development contexts, particularly in South Asian countries where 50% of cases live [5]. On top of that, the current COVID-19 pandemic could result in an additional 6.7 million children with wasting during the first 12 months [7].

The consequences of wasting are serious and long-lasting that an estimated 12.6% of under-five child deaths are attributed to wasting alone each year [8]. And the severe effects of wasting are child growth, brain development and lifelong opportunities and can cause premature death [7].

In response to the burden of malnutrition, the World Health Assembly planned nutrition targets in 2012. One of these targets was to reduce and maintain childhood wasting to less than 5% by 2025 and the purpose of this policy brief is to increase attention to, investment in, and action for a set of cost-effective interventions and policies that can help Member States and their partners to reduce and maintain the rate of childhood wasting [9].

There is insufficient data to assess the progress that Somalia has made towards achieving the target for wasting, however, the latest prevalence data shows that 14.3% of children are affected. This year higher than the average of Africa region (6.0%) [10]. Puntland has its own health policy and tried to give priority for diseases caused by malnutrition in general. Therefore, periodic assessment of the status of child wasting in various setting of the country is imperative to plan and practice appropriate control intervention. However, there is scarcity of information regarding child wasting in the Puntland, except the national survey conducted in Somalia 11% of children suffered from acute malnutrition and were too thin their height (wasting). This study is, therefore, designed to assess the prevalence of wasting and associated factors among children aged 6-23 months in Garowe city. Puntland Somalia.

Materials and Methods

Study Area and Period

A community based cross-sectional study was conducted in Garowe Town/City, the capital city of Puntland state government, Somalia from June 05-15, 2021. Garowe is located in the northeast Somalia 785 km distance away from the capital city of Somalia, Mogadishu. The climate in the town is arid with orographic and coastal influences contributing to the high rainfall variability. Temperatures range from a minimum of 14°C to a maximum of 34°C. The total population of Garowe town is estimated to be 207,338 people (the estimated total number of children aged 6-23 months is 41,467). The city has 1 governmental referral hospital and more than 10 private health institutions [11].

Study Design and Population

A community based cross-sectional study design was applied in Garowe city, children (aged 6-23 months). while study population was all children aged 6-23 months with their mothers/caregivers from the selected villages of the town. Mothers/caregivers of children aged 6- 23 months who were unable to respond due to severe illness and disabled children during the study period were excluded from this study

Sample Size Determination and Sampling Procedure

The sample size was calculated by using the standard formula for estimating a single population proportion formula considering, 95% confidence level, 5% margin of error, and a 50% prevalence of wasting among children aged 6-23 months since no previous studies that clearly show the prevalence wasting among children aged 6-23 months was done in the area and there were no enough

pieces of evidence available for hypothesizing. To compensate for the non-response rate, 10% of the determined sample size was added, which gives a total sample size of 422.

Regarding the sampling procedure, first four villages were selected using simple random sampling (lottery method). Then, the total sample size was allocated for each village by using proportional allocation to size (PAS). Finally, the list of children aged 6-23 months in the selected villages was obtained from the local community health workers and the study subjects were selected using systematic random sampling methods. If the eligible mother was absent from the house at the time of data collection, revisit was done again and if they have been absent at second visit they were considered as non-respondent

Data Collection Methods

A structured interviewer administered questionnaire and a checklist for anthropometric measurements was used to collect data from mothers/caregivers of children aged 6-23 months which was developed in both English and (af-Somali) languages and which was pre-tested on 5% of the sample. The questionnaire contents included socio-demographic factors, maternal related factors, child related factors, and environmental factors.

A checklist was used to record the anthropometric measurements of the children. Weight was measured with minimum clothing and no shoes using a Salter spring scale and beam balance in kilogram to the nearest of 0.1 kg. Measurement of height (length) were in a lying position with wooden board for children of age under two years (below 85 cm). MUAC was measured on left mid upper arm to the nearest 1mm and the result was recorded for both children and their mothers. All this anthropometrics was measured two times and the average value was used for analysis.

Operational Definition

Wasting as a clinical sign means visible loss of subcutaneous fat and skeletal muscles (severe thinness). It is also known as Marasmus. Anthropometric wasting refers strictly to low weight-for-height, which is usually observed in cases of clinical wasting [12].

Data Quality Control

Questionnaire was prepared first in English then was translated into local language (Af-Somali languages) and back to English for consistency by using different language experts. All data collectors and supervisors were oriented and trained on how to interview and record the data and was assigned to each village. In order to assess appropriateness of wording, clarity of the questions and respondent reaction to the questions and interviewer, it was pre-tested on 5% of the calculated sample size among children who were not part of the actual study and adjustment was made based on the results of the pre-test. If the children were not available during data collection period, repeated trial was attempted to get her/him. During the data collection time, close supervision and monitoring was carried

out by supervisors and the investigator to ensure the quality of the data. The collected data were checked by the supervisor and investigator for its completeness. The anthropometric measurement tools were calibrated to minimize measurement errors. Standardization of anthropometric measurements was done using technical error of measurement (TEM), %TEM and reliability coefficient (R) under ENA for SMART software. Finally, the data was double entered by two data clerks to minimize errors during data entry and inconsistencies were checked under EpiData

Data Processing and Analysis

All the collected data were checked for completeness by cross-checking and then was coded and double entered into Epi Data 3.1 computer software package and cleaned for inconsistency. For analysis the data were exported to SPSS version 20 software.

Descriptive statistics such as mean, standard deviation, frequency, percentage, tables and graphs were used to summarize the characteristics of the study participants. WHO Anthro version 3.2 was used to compute the z-score values of the weight-for-length index. The outcome variable (wasting) was coded as “1” if the weight-for-length of the children was less than -2 z-score or if the MUAC measurement was less than 12.5 cm, and “0” if weight-for-length was >-2 or if MUAC was > 12.5 .

A binary logistic regression model was used to see the association between each independent and dependent variable. Covariates at this stage with a p-value less than 0.25 were identified as candidates for the multivariable logistic regression analysis. Before performing the multivariable logistic analysis, multicollinearity of independent variables was checked using variance inflation factor. In the second stage, a multivariable analysis was conducted to control potential confounders and identify factors associated with wasting. Model goodness-of-fit of the final model was assessed by Hosmer-Lemeshow test. In the multivariable analysis, a significant association of variables with the outcome was determined using adjusted odds ratios with 95% confidence interval. Variables with a p-value of less than 0.05 were declared as statistically significant

Results

Socio-Demographic Characteristics of Participants

A total of 409 children-mothers/caregivers pairs participated in the study, with a response rate of 97%. The mean (\pm SD) age of the mothers was 30.6 (\pm 4.5) years with age range of 15-45 years. Most of the mothers belonged to the age group of 26-35 years (61.1%) followed by 15-25 years (34.1%). A total 394 (96.3%) participants were urban residents and 261(63.8%) were married. Regarding the husband's work, 106 (25.9%) of them were government employees. While mothers/caregiver occupation 177(43.3%) were a house wife. Concerning the educational level of the mothers/caregivers, 168(41.1%) were educated up to secondary and above, while number of under-five children 209(51.1) had less

than 1-3 children. While the most of the participants of the study 209(51.1) had less than 3 children. Coming to the family income, 231(56.2%) of them had an average monthly family income of less than 200 USD (Table 1).

Child Related Characteristics

A total of 409 children participated in the study; 207(50.6%) of them were males and 388(94.9%) had normal birth weight. Regarding the time of initiation of complementary feeding, 260(63.6%) started before the age of 6 months, while 260(63.6%) were breastfed on demand. More than half of the children, 222(54.3%), were sick during one year prior to the study and more than half of the children 215(52.6%) had never take immunization.

(Table2) Maternal Related Factors

A total of 409 mother/caregivers participated in the study. The age at first pregnancy was 20-24 years for 240(58.7%) of the mothers, while more than half of the mothers 213 (52.1%) didn't attend ANC follow-up service during their last pregnancy. regarding the majority of the participants 304(74.3%) they are well oriented for knowledge and experience about the problems lack of feeding of the children at the time of the school (Table 3).

Environmental Related Factors

Nearly around complete of the participant house members 388 (94.9%) drink a piped water, while the rest of the participants use surface water 21 (5.1%). In addition to this for 259 (63.3%) of the participants, it took less than 5 minutes to get the water and come back to their homes. Moreover, close to one third, 139 (34%), of the participants boil water to make it safer for drinking, while the rest use chlorine and sedimentation 147 (35.9%) and 123 (30.1%) respectively.

Factors Associated with Wasting

To determine the association between wasting and explanatory variables, bi-variate and multivariate analyses were performed using logistic regression model. As shown in (table 4), there are 6 factors in the bi-variate analysis at a p-value of <0.25, and these include, occupation of the father, time of initiation of complementary feeding, time of breastfeeding initiation, child immunization, educational level of the mother/caregiver and ANC service during the last pregnancy (Table 4).

Then all of these factors listed above were further analyzed and entered into the final model for adjusting the confounding factors. After adjusted in multi-variable logistic regression. Six factors remained significantly associated with Wasting (Table 4).

Children, whose fathers were daily laborers, were 3.1 times more likely to become wasting compared with governmental and non-governmental organization laborers {AOR=3.1, 95%CI (1.1, 8.7)}. A child those start complementary feeding before six

months (not complete exclusive breastfeeding) were 8 times more likely to become wasting compared a child successfully breastfeed exclusive breastfeeding {AOR=8, 95%CI (4.5, 14)}. A child those breastfeed some hours later after delivery but less than 24 hours were 3.9 times more likely to become wasting compared those children breastfeed a colostrum first four hours after the delivery {AOR=3.9, 95%CI (1.8, 8.4)}. Children those didn't get immunized were 1.8 times more likely to become wasting compared immunized children {AOR=1.8, 95%CI (1.7, 5.2)}. Children those mothers had No formal education were 3.4 times more likely to become wasting compared academic mothers {AOR=3.4, 95%CI (1.6, 7.0)}. and children of mothers who didn't get ANC service during last pregnancy were 5.3 more likely to become wasting compared to their counterparts

{AOR=5.3, 95%CI (2.9, 9.5)}.

Discussion

We found that the prevalence of wasting was 34.2% among children aged 6-23 months, of which; 12% were severely wasted. The main predictors of wasting were occupation of the father, time of initiation of complementary feeding, time of breastfeeding initiation, immunization status of the child, educational level of the mother/caregiver and ANC service follow-up of mother during her last pregnancy. Further, we assessed socio-demographic factors, infant related factor, maternal related factors, environmental factors and MUAC related factors. As the result, presence of occupation of the father, time of initiation of complementary feeding, time of breastfeeding initiation, child immunization, educational level of mothers/caregivers and ANC service during last pregnancy mother being used were significantly associated with wasting among children aged 6-23 months.

We found that more than 1 in 3 children were wasted (34.2%). This finding was much closer to a prevalence of study done in Gojjam zone, Amhara (35.5 %), in 12 kebeles in the kersa HDSS (Eastern Ethiopia) (16.8%), in libokemkem Likeke District, Amhara Region, Ethiopia (7.10%), Sidama zone, Ethiopia (20.5%), wukro town, Tigray regional 28(7.2%) [13-16]. The reasons for this discrepancy might be attributed to the difference in geographical location among the study areas and methodology including sampling techniques.

For instance, our current study was conducted in wasting endemic area with a high rate of malnutrition. That could be related repeatedly occurring droughts and civil wars compared the neighbor countries like Ethiopia and also socio-economic differences such as religion, culture and feeding habits. In general, the population living in malnutrition endemic areas have a greater chance to occur in malnutrition. In contrast, those living in low-rate wasting areas have a low probability of being wasting, which can lead to a low prevalence of wasting.

However, our current study finding of prevalence of wasting was lower than a study done at Bule-hora district, south Ethiopia (47.6), Sindh, Pakistan (48.2%), Haramaya district eastern Ethiopia (45.8%), west Gojjam zone, east Gojjam zone (44.7%). Belesa District, northwest Ethiopia (57.7%), in Dabat HDSS site Amhara Ethiopia (58.1%) [17-22]. The difference in the prevalence might be due to, study periods, study designs and economic differences between the study areas as well as better implementation of improved wasting interventions including to enhance availability and maintenance of occupation of the father, increasing the awareness of feeding exclusive breastfeeding, increasing midwiferies skills to motivate delivery mother in sake of feeding a birth child to feed colostrum immediately, to enhance awareness campaigns of child immunization, and to increase the level of mothers/caregivers educational level and empowering mothers to attend ANC during their pregnancy in our study area. Based on proposal communication on of the regional health office, this difference may be due to better availability of supplementary feeding in Garowe, good health awareness of the community, increase educational level of mothers/caregivers, midwiferies skills and expanded health service coverage and utilization in Garowe city.

Our findings showed that the status of wasting children was significantly associated with among those children their father's occupation is a daily labor had a significant association with wasting. This finding in line/similar with a previous study in Gonder town, Ethiopia, which found that those children whose fathers were daily labor were highly likely to increase risk of wasting among children aged 6-23 months we observed that, the time of initiation of complementary feeding had a significant association with wasting [23]. This finding was agreed with a previous study in Gondar Town, and in East Belesa District, northwest Ethiopia [21], which found that children were not exclusive breastfeed or mothers/caregivers started feeding other foods before six months had significantly increase the risk of wasting among children aged 6-23 months.

The finding of current study indicated that, children who were breastfeed colostrum after a birth some hours later but less than 24 hours (pre-lacteal feeding) had a significantly association with wasting. similar finding was reported at East belesa district, northwest Ethiopia and Dubti district samara [21,24]. Which found that children those mothers give pre-lacteal feeding to their children had significantly increase the risk of wasting among children aged 6-23 months.

In this study, children did not take immunization had a significance of association with wasting compared the immunized mothers/caregivers. This was corroborated with previous studies in Wonsho Woreda, Southern Ethiopia, Mecha district Ethiopia and Dubti district, Samara [4,24,25]. Which found that children did not take immunization had significantly increase the risk of wasting among children aged 6-23 months. Furthermore, Children whose mothers were uneducated had a significantly association with wasting,

compared with educated mothers/caregivers. This finding was in line with previous evidences in libokemkem Amhara district, Ethiopia, Dodoma region, Tanzania, Mecha District, Amhara Regional State, which found that children whose mothers/caregivers were uneducated had significantly increased the risk of wasting among children aged 6-23 months, while the other hand a finding study in Sindh, Pakistan [4,15,18,26]. They found that children who were educated mothers had no significant associated with wasting among children aged 6-23. Besides, mothers did not visit ANC last pregnancy had a significant association with wasting compared children those whose mothers take ANC during last. The current finding was agreed with previous studies in Merhabete woreda (district), North Shewa zone and Haramaya district, eastern Ethiopia [19,27]. That found positively associated with wasting among children aged 6-23.

Overall, timely intervention strategy is a mandatory and should be focus on the World Health Organization (WHO) recommendations, in this study although majority of the fathers occupation is a daily labor, time of initiation of complementary feeding, time of breastfeeding initiation, children's doesn't take immunization, mothers those are uneducated level and mother hadn't attend ANC service, so the health care providers in the region and stakeholders should create health awareness campaigns on the importance of attending ANC service for mothers, specifically target pregnant women during routine care visits, every children to complete exclusive breastfeeding, enhance midwiferies skill to increase immediate feeding of colostrum, immunization of the child to reduce the rate of wasting, to increase level of educational mother and create job vacancies to increase the fathers income of the family because most of daily labor father are difficult to get secure money that they can feed their families.

Strength and Limitations of the Study

There might be potential recall bias among respondents answering questions relating to events happening in the past. we tried to control the bias through care full selection of the research questions, choosing appropriate data collection method, getting feedback from may respondent and double check data thoroughly (double entry). And the measuring scales were well calibrated and standardized to overcome this problem. And since the study was community based and interview was conducted by going house to house, it can be represented community

Conclusions

This study found that the overall prevalence wasting among children aged 6-23 months in the study area was found high (34.2%). The high proportion of this wasting in our study was a clear implication that there is a need for prevention and control of the malnutrition, especially among young children aged between 6-23 months.

Factors significantly associated with wasting among children aged

between 6-23 months were only six factors, occupation of the child's father, time of initiation of complementary feeding, time of breastfeeding initiation, child immunization, educational level of the mother/caregiver, and ANC service of the mother during her last pregnancy were significantly associated with wasting. Therefore, the following recommendations are forwarded. To initiate job manufactures for the fathers especially attention should be given those are daily labor. Early and uninterrupted skin-to-skin contact between mothers and infants should be facilitated and encouraged as soon as possible after birth. All mothers should be supported to initiate breastfeeding as soon as possible after birth, within the first hour after delivery. Strengthening early childhood immunization to enhance level of nutrition in our community and building capacity of health extension workers. Health extension workers should be strengthen giving participatory ANC services to create awareness and develop for better attending ANC visit among the community especially pregnant mothers. Increase the frequency of breastfeeding during and after illness to limit the weight loss and speed recovery. Community based nutrition program should be established, regular nutrition supervision based on each nutritional status and special to severely under-nutrition children is necessary to reduce the problem and consequence of wasting [28-43].

Abbreviations

ANC: Antenatal Care
AOR: Adjusted Odds Ratio
ENA: Emergency Nutrition Assessment
CI: Confidence Interval
COR: Crude Odds Ratio
FMOH: Federal Ministry of Health
MUAC: Mid-Upper Arm Circumference,
R: reliability coefficient
SD: Standard Deviation

Declarations

Ethics Approval and Consent to Participate

This study was conducted in accordance with the Declaration of Helsinki. Ethical clearance was secured from Institutional Health Research Ethics Review Committee (IHRERC) of the College of Health and Medical Sciences at Haramaya University, Ethiopia. Informed, voluntary, written and signed consent was obtained prior to initiation of the study from each participant (mother/caregiver). For the uneducated participants, the consent form was read to them and their thumbprints were used instead of signature. Initials/signatures and/or fingerprints were approved Institutional Health Research Ethics Review Committee (IHRERC) of the College of Health and Medical Sciences at Haramaya University. The interviews and measurements were carried out privately in separate places. All possible identifiers were excluded from the questionnaires and checklist to ensure participants' confidentiality. And the consent for the uneducated participants was obtained from their fingerprints were used.

Data Availability

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Funding Statement

Haramaya university, postgraduate directorate funded this study. The funding body had no role in designing the study, data collection, analysis, interpretation and writing of the manuscript.

Acknowledgments

Above all we would like to express our grateful gratitude to Haramaya University particularly College of Health and Medical Sciences for providing the opportunity to conduct this research.

We would also like to extend our acknowledgement to our beloved family members, friends, Garowe, regional health office, data collectors and study participants.

Author's contribution

All the authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas, took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the articles has been submitted; and agree to be accountable for all aspects of the work.

References

1. WHO 2021(World Health Organization)
2. UNICEF April 2013united Nations Children's Fund (UNICEF)
3. UNICEF-WHO-The World Bank. Joint child malnutrition estimates—Levels and trends. Global database on child growth and malnutrition [online database]. Geneva: World Health Organization, 2014.
4. Bhutta, Z. A., Berkley, J. A., Bandsma, R. H., Kerac, M., Trehan, I., & Briend, A. (2017). Severe childhood malnutrition. *Nature reviews Disease primers*, 3(1), 1-18.
5. UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates – Key findings of the 2020 edition. www.who.int/publications-detail/jme-2020-edition
6. Akombi, B. J., Agho, K. E., Merom, D., Renzaho, A. M., & Hall, J. J. (2017). Child malnutrition in sub-Saharan Africa: a meta-analysis of demographic and health surveys (2006-2016). *PloS one*, 12(5), e0177338.
7. WHO and WFP 2020 (World Health Organization and World Food Program)
8. Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., De Onis, M., ... & Maternal and Child Nutrition Study Group. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The lancet*, 382(9890), 427-451.
9. WHO 2014 (World Health Organization)

10. Global Nutrition report, 2021 for Somalia federal ministry of health.
11. Population estimation survey 20220 Somalia
12. WHO 2018 (World Health Organization)
13. Alemayehu, M., Tinsae, F., Haileslassie, K., Seid, O., Gebregziabher, G., & Yebyo, H. (2015). Undernutrition status and associated factors in under-5 children, in Tigray, Northern Ethiopia. *Nutrition*, 31(7-8), 964-970.
14. Roba, A. A., Assefa, N., Dessie, Y., Tolera, A., Teji, K., Elena, H., ... & Fawzi, W. (2021). Prevalence and determinants of concurrent wasting and stunting and other indicators of malnutrition among children 6–59 months old in Kersa, Ethiopia. *Maternal & Child Nutrition*, 17(3), e13172.
15. Motbainor, A., & Taye, A. (2019). Wasting in under five children is significantly varied between rice producing and non-producing households of Libokemkem district, Amhara region, Ethiopia. *BMC pediatrics*, 19(1), 1-11.
16. Gebru, T. T., Abady, G. G., Teklu, F. G., Tesfamichael, Y. A., Bitow, M. T., Tekola, K. B., ... & Goytom, M. H. (2019). Assessment of wasting and associated factors among under five children of Wukro town, Tigray regional, North Ethiopia: a cross sectional study. *The Pan African Medical Journal*, 33.
17. Asfaw, M., Wondaferash, M., Taha, M., & Dube, L. (2015). Prevalence of undernutrition and associated factors among children aged between six to fifty nine months in Bule Hora district, South Ethiopia. *BMC Public health*, 15(1), 1-9.
18. Khan, G. N., Turab, A., Khan, M. I., Rizvi, A., Shaheen, F., Ullah, A., ... & Soofi, S. B. (2016). Prevalence and associated factors of malnutrition among children under-five years in Sindh, Pakistan: a cross-sectional study. *BMC nutrition*, 2(1), 1-7.
19. Yisak, H., Gobena, T., & Mesfin, F. (2015). Prevalence and risk factors for under nutrition among children under five at Haramaya district, Eastern Ethiopia. *BMC pediatrics*, 15(1), 1-7.
20. Victora, C. G., Adair, L., Fall, C., Hallal, P. C., Martorell, R., Richter, L., ... & Maternal and Child Undernutrition Study Group. (2008). Maternal and child undernutrition: consequences for adult health and human capital. *The lancet*, 371(9609), 340-357.
21. Fentahun, W., Wubshet, M., & Tariku, A. (2016). Undernutrition and associated factors among children aged 6-59 months in East Belesa District, northwest Ethiopia: a community based cross-sectional study. *BMC public health*, 16(1), 1-10.
22. Derso, T., Tariku, A., Biks, G. A., & Wassie, M. M. (2017). Stunting, wasting and associated factors among children aged 6–24 months in Dabat health and demographic surveillance system site: A community based cross-sectional study in Ethiopia. *BMC pediatrics*, 17(1), 1-9.
23. Abebe, Z., Zelalem Anlay, D., Biadgo, B., Kebede, A., Melku, T., Enawgaw, B., & Melku, M. (2017). High prevalence of undernutrition among children in Gondar town, Northwest Ethiopia: a community-based cross-sectional study. *International Journal of Pediatrics*, 2017.
24. Gebre, A., Reddy, P. S., Mulugeta, A., Sedik, Y., & Kahssay, M. (2019). Prevalence of malnutrition and associated factors among under-five children in pastoral communities of Afar Regional State, Northeast Ethiopia: a community-based cross-sectional study. *Journal of nutrition and metabolism*, 2019.
25. Gamecha, R., Demissie, T., & Admasie, A. (2017). The magnitude of nutritional underweight and associated factors among children aged 6-59 months in Wonsho Woreda, Sidama Zone Southern Ethiopia. *The Open Public Health Journal*, 10(1).
26. Popkin, B. M., Adair, L. S., & Ng, S. W. (2012). Global nutrition transition and the pandemic of obesity in developing countries. *Nutrition reviews*, 70(1), 3-21.
27. Abeway, S., Gebremichael, B., Murugan, R., Assefa, M., & Adinew, Y. M. (2018). Stunting and its determinants among children aged 6–59 months in northern Ethiopia: a cross-sectional study. *Journal of nutrition and metabolism*, 2018.
28. Amare, D., Negesse, A., Tsegaye, B., Assefa, B., & Ayenie, B. (2016). Prevalence of undernutrition and its associated factors among children below five years of age in Bure Town, West Gojjam Zone, Amhara National Regional State, Northwest Ethiopia. *Advances in Public Health*, 2016.
29. Basit, A., Nair, S., Chakraborty, K. B., Darshan, B. B., & Kamath, A. (2012). Risk factors for under-nutrition among children aged one to five years in Udupi taluk of Karnataka, India: A case control study. *The Australasian medical journal*, 5(3), 163.
30. Fuchs, C., Sultana, T., Ahmed, T., & Iqbal Hossain, M. (2014). Factors associated with acute malnutrition among children admitted to a diarrhoea treatment facility in Bangladesh. *International journal of pediatrics*, 2014.
31. Olofin, I., McDonald, C. M., Ezzati, M., Flaxman, S., Black, R. E., Fawzi, W. W., ... & Nutrition Impact Model Study (anthropometry cohort pooling). (2013). Associations of suboptimal growth with all-cause and cause-specific mortality in children under five years: a pooled analysis of ten prospective studies. *PloS one*, 8(5), e64636.
32. Paré, B. C., Dahourou, D. L., Ahmed Kabore, A. S., Kinda, R., Ouaro, B., Dahany, M. M., ... & Méda, N. (2019). Prevalence of wasting and associated factors among 6 to 23 months old children in the Sahel Region of Burkina Faso. *The Pan African Medical Journal*, 34.
33. Gebru, T. T., Abady, G. G., Teklu, F. G., Tesfamichael, Y. A., Bitow, M. T., Tekola, K. B., ... & Goytom, M. H. (2019). Assessment of wasting and associated factors among under five children of Wukro town, Tigray regional, North Ethiopia: a cross sectional study. *The Pan African Medical Journal*, 33.
34. Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., De Onis, M., ... & Maternal and Child Nutrition Study Group. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The lancet*, 382(9890), 427-451.

-
35. Spears, D. (2013). How much international variation in child height can sanitation explain?. World Bank policy research working paper, (6351).
 36. Tsedeke, W., Tefera, B., & Debebe, M. (2016). Prevalence of acute malnutrition (wasting) and associated factors among preschool children aged 36–60 months at Hawassa Zuria, South Ethiopia: a community based cross sectional study. *J Nutr Food Sci*, 6(466), 2.
 37. UNICEF 2015 (United Nations Children Funds)
 38. UNICEF., WHO., World Bank Group. Levels and trends in child malnutrition Joint Child
 39. Malnutrition Estimates Key findings of the 2019 edition. 2019.
 40. Unicef, & WHO, W. (2020). Levels and trends in child malnutrition: key findings of the 2019 Edition of the Joint Child Malnutrition Estimates. Geneva: World Health Organization.
 41. World Health Organization. Global targets 2025. To improve maternal, infant and young child nutrition (www.who.int/nutrition/topics/nutrition_globaltargets2025/en/, accessed 6 October 2014).
 42. WHO 2021 (World Health Organization)
 43. Yalew, B. M., Amsalu, F., & Bikes, D. (2014). Prevalence and factors associated with stunting, underweight and wasting: a community based cross sectional study among children age 6-59 months at Lalibela Town, Northern Ethiopia. *J Nutr Disorders Ther*, 4(147), 2161-0509.

Copyright: ©2022 Abdulahi Abdiwali, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.