ORIGINAL RESEARCH

Women's Involvement in Household Decision-Making and Nutrition Related-Knowledge as Predictors of Child Global Acute Malnutrition in Southwest Ethiopia: A Case–Control Study

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Background: Global acute malnutrition is one of the major contributors to the death of young children. It accounts for about 35% to 55% of all childhood deaths in low- and middle-income countries. However, there have been limited studies examining the relationship between global acute malnutrition and women's involvement in decision-making, and nutrition-related knowledge in the locality.

Patients and Methods: A case–control study was conducted from March to April 2018. The sample size was determined using Epi Info statistical software, and a total of 234 children with their parents involved in the study. Childs' height was measured using a stadiometer, and a digital weight scale was used to measure child weight. Weight-for-height Z-score (WHZ) was computed using the World Health Organization (WHO) Anthro Software. Women's involvement in household decision-making was assessed using the household decision-making index. Socio-demographic and maternal nutrition-related knowledge were assessed using a structured questionnaire. Data entry and statistical analysis were done using EpiData 3.1 and Statistical Package for Social Science 24.0 (SPSS). Statistically, a significant association was declared by adjusted odds ratio (AOR), 95% confidence interval (CI), and P-value less than or equal to 0.05.

Results: About three-fifths of mothers whose children were cases had poor nutrition-related knowledge regarding optimal child feeding. The study found poor maternal nutrition-related knowledge (AOR 5.16, 95% CI (1.9, 13.96)), not attending formal education (AOR 4.98, 95% CI (2.09, 11.82)), lack of maternal involvement in household decision-making (AOR 4.68, 95% CI (1.99, 10.97)), and lowest wealth index (AOR 3.76, 95% CI (1.24, 11.38)) as independent predictors.

Conclusion and Recommendation: Maternal nutrition-related knowledge, maternal educational status, and involvement in household decision-making were found to be independent predictors of child global acute malnutrition. Emphasis needs to be given in strengthening girls' education, nutrition education, household economic strengthening activities, and women empowerment in decision-making.

Keywords: global acute malnutrition, Southwest Ethiopia, household-related factors

Introduction

Adequate child nutrition is essential to ensure survival, healthy growth, and proper development. Childhood malnutrition is a major global health problem contributing to increased morbidity and mortality.[1,2] Worldwide, 55 million children younger

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than age five are affected by global acute malnutrition (GAM) and 19 million affected by severe GAM.[3] The Joint United Nations International Children's Emergency Fund (UNICEF), World Health Organization (WHO), and World Bank (WB) group report indicated that GAM continued to threaten the lives of an estimated 7.5% or nearly 51 million young children. As per the report, the problem is even more severe in Africa, where more than one quarter lived in Africa, and in Eastern Africa, about 13.8% of children are affected by GAM.[4] Ethiopia has the highest rates of malnutrition in Sub-Saharan Africa.[5] A nationwide survey in Ethiopia indicated that 10% of children wasted and 3% severely wasted.[6,7]

It is recommended that infants should exclusively be breastfed during the first 6 months of life and thereafter supplementation of nutritionally adequate and safe complementary foods.[8] However, optimal child feeding and caring practices are a major immediate factor for malnutrition. Human resource determinants take major consideration for the fulfillment of optimal child nutrition. Parental education and parental nutrition-related knowledge are key factors in maintaining optimal child nutrition.[9–12]

Analysis of the study conducted in 63 countries indicated that women's education was strongly associated with child malnutrition in developing countries.[13] A study conducted in rural Uganda[14] and Nigeria[15] revealed a significant statistical association between maternal educational status and nutritional-related knowledge and child nutritional status. The results of the Ethiopian Demographic Health Survey (EDHS) showed a positive relationship between mothers' education and the nutritional status of their children.[16] Similar findings were reported in Southern Ethiopia,[17] Ghana,[18] and Nairobi.[19]

In low-resource settings where women invest more in the welfare of their children, women's ability in decisions is quite important for the nutritional outcome of children. A review of previous studies from LAMICs reported the effect of women empowerment on child nutritional status.[20,21] Women's decision-making roles were significantly compromised in a household earning lower income and those in the lowest quartile of wealth index. This, in turn, has been found a risk factor for child malnutrition.[16,22] Furthermore, maternal hand-washing practice and large family size with overcrowding and inadequate spacing have been implicated as risk factors for acute malnutrition.[23] Overall, several studies have examined the determinant factors of acute malnutrition. These studies are limited in examining the relationship between global acute malnutrition and maternal nutrition-related knowledge and decision-making roles. Most of the studies focused on either of the parents' and often did not address women's involvement in intra-household decision-making. Thus, the study was designed to assess predictors of global acute malnutrition focusing on maternal education, nutrition-related knowledge, and decision-making roles.

Patients and Methods
Study Design and Period
The institution-based age-matched case–control study design was conducted from March to April 2018.

Study Area and Setting
This study was conducted in all public health facilities in Jimma city, Ethiopia. The city has thirteen administrative Kebeles. Four public health centers are delivering primary health care services for the community: Jimma Health Center, higher two Health Center, Mandera Koche Health Center, and Bacho Bore Health Center. The city has one zonal hospital and one medical center which are namely Shenan Gibe Hospital and Jimma Medical Center (JMC), which delivers advanced medical services for approximately fifteen million people in Southwest Ethiopia.

Measuring Tools
Childs anthropometry was collected using a stadiometer, digital weight scale, and Salter scale. Parental nutrition-related knowledge was assessed using a structured questionnaire that included 13-items. The questionnaire has three main components: breastfeeding, complementary feeding, and feeding during difficult situations. The percentage score for each study participant was determined by the sum of correct responses given divided by the total number of questions. The overall composite score was categorized into three: score of less than 60% considered as poor knowledge, a score of 60–75% fair knowledge, and a score greater than 75% good knowledge. Women's involvement in decision-making was assessed by the household decision-making index. The questionnaire contains women's decisions regarding the use of once-earning, health care, major household purchase, and a visit to family or relatives. Each question had five responses: (1) respondent alone, (2) respondent and husband/partner jointly, (3) husband/partner alone, (4) someone else, and (5) others. The index was dichotomized for analysis, and we grouped one and two as women involved in decision-making, and responses 3–5 as women have no say

in the decision.[16] The food security status of the households was determined by the household food insecurity scale (HFIAS) developed by food and nutrition technical assistance (FANTA) in 2007.[24] Wealth index was assessed using a structured questionnaire adapted from EDHS, and the scoring was based on ownership of fixed assets, and ownership of each fixed asset given a value of one, and non-ownership a value of zero.[16] Other socio-demographic and environment-related factors were assessed using a structured questionnaire.

Population

Cases were all randomly selected children aged 6 to 59 months attending public health facilities in Jimma city during the data collection period, and who were found to have global acute malnutrition (WHZ-score less than −2 standard deviations (SD)).[25] Controls were age-matched children visiting the same health facility with cases, and who were found to be without global acute malnutrition (WHZ-score above and equal to −2SD). Age intervals used for matching: 6–11 months, 12–23 months, 24–35 months, 36–47 months, and 48–59 months.

Sample Size Determination and Sampling Techniques

The sample size required for the study was determined using Epi Info statistical software version 7. The following assumptions were considered: the percentage of children with global acute malnutrition (cases) among households' having fewer than five family members was 68.14%;[26] the percentage of children without acute malnutrition (controls) among households' having more than five family members was 46.9%;[26] 95% CI, 80% power, case to control ratio of 1:2 to detect an odds ratio of 2.4 and 10% of non-response rate. Thus, 234 children and their corresponding parents were included in the study. All public health facilities that were found in Jimma town and delivering medical services for children were identified and approached. The health facilities were Jimma Health Center, higher two Health Center, Mandera Koche Health Center, Bacho Bore Health Center, Shenan Gibe Hospital, and Jimma Medical Center (JMC). Retrospective data of 6 months regarding patient flow were obtained prior to data collection to be used as a base for proportional allocation to study subjects. Accordingly, study participants were proportional allocated to health facilities. A systematic random sampling technique was used to select cases, and every 2nd child from each health facility was recruited into the study. Controls were selected from the same health facility from which cases were selected (Figure 1).

Data Collection Procedure and Statistical Analysis

All children visiting public health facilities were screened for global acute malnutrition by the research team. A semi-structured interviewer-administered questionnaire was used to collect data related to the objectives of the study. The
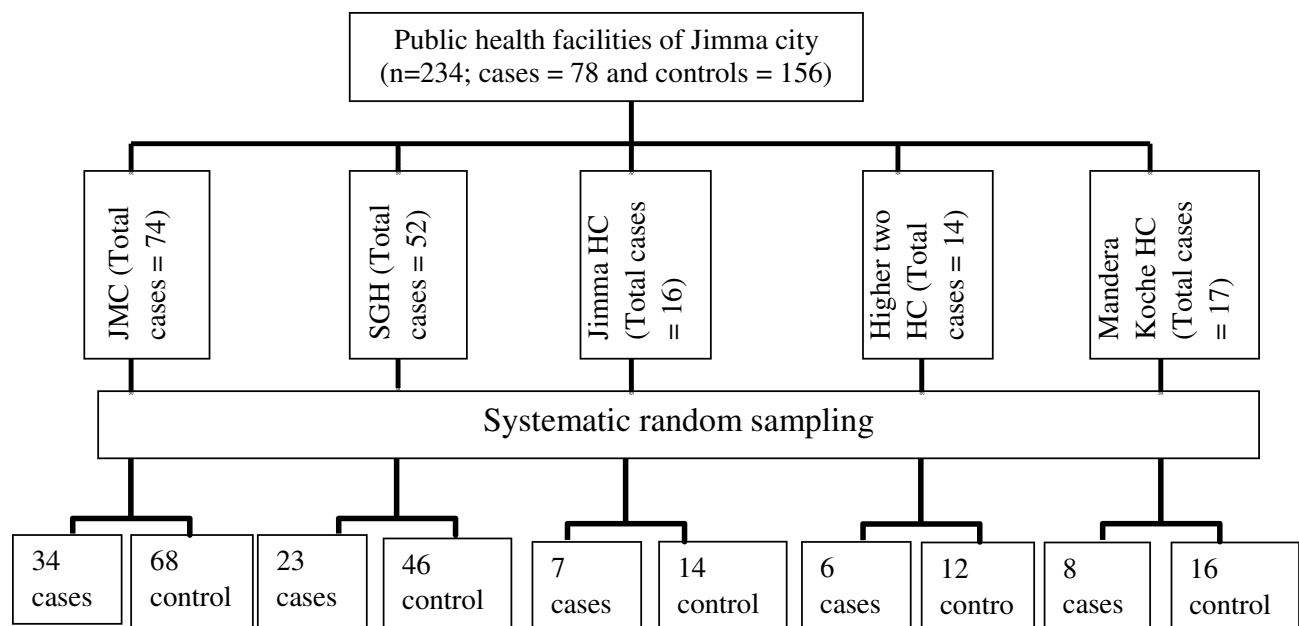
Figure 1 Flow chart of the sampling procedure of study participants attending public health facilities in Jimma city, Southwest Ethiopia (n = 234).

questionnaires were prepared in English, translated to Afaan Oromo and Amharic, and finally back translated into English language by other person who has good command of English, Afaan Oromo, and Amharic to check for its consistency. The questionnaire covered a range of topics including socio-demographic factors, child characteristics, and parental child feeding and caring knowledge. It took an average of 30–45 minutes to be filled. Height measured in standing position for children aged 24 months and older in a standard Frankfurt position. Weight was measured using a digital weight scale (SECA made in Germany) while a child dressed in a light cloth. Height and weight measurements were taken to the nearest 0.1cm/kg. Measurements' taken twice, and the mean score was used in case of a significant difference between measurers during analysis. Following measurement, individual anthropometric data were entered into the WHO Anthro software version 3.2.2 to compute WHZ. Once a case of global acute malnutrition was identified, parents approached to collect the necessary data. For every case, respective two age-matched controls were identified. Data were entered into EpiData version 3.1 and exported into SPSS version 24.0 for analysis. Logistic regression analysis was used to determine factors that were independently associated with global acute malnutrition. AOR, 95% CI, and P-value less than or equal to 0.05 were used to decide statistically significant associations with the outcome variable. Seven nurses were recruited as data collectors, five nurses with their assistance were recruited as measurers, and two Nutritionists were recruited as supervisors. Training was given to data collectors, measurers, and supervisors for two days on the overall procedure of the study.

Result
Characteristics of the Study Participants
The mean ages of mothers and fathers were 25.74 ± 4.75 and 35.05 ± 6.15, respectively. More than two-thirds (69.7%) and (68.4%) parents were Muslim by religion and Oromo by ethnicity. The mean age of children with global acute malnutrition was 18.29 ± 10.23 months. Close to two-fifths of study participants, ie, 43.6% of mothers and 38.9% of fathers of children had no formal education (Table 1).

Parental Nutrition-Related Knowledge and Maternal Decision-Making Role
Two-fifths of women and about half of fathers scored poor for child nutrition-related knowledge. Regarding maternal

involvement in decision-making roles, two-thirds (63.5%) of controls' mothers and one-third (32.1%) of cases' mothers had a say in making decisions on their own health care. Similarly, three-fourth (77.6%) of controls' mothers and more than half (52.6%) of cases' mothers were involved in decision-making regarding family visits. Regarding decisions regarding major household purchases, three-fourth (75%) of controls' mothers and more than one-third (38.5) of cases' mothers had active involvement in joint decision-making with their partner (Table 2).

Other Co-Variables
The wealth index of the household was determined based on the ownership of fixed assets by householders. Principal component analysis was used to generate factors and components that define the index. Finally, the factors that fulfilled the assumption for the analysis and computed to generate the index were ownership of mobile phone, bed with mattress, chair, and having electricity. Accordingly, more than half (57.7%) of cases and about two-third (64.7%) of control households were found to have the lowest and highest wealth index, respectively. About 73% of cases and 36% of controls had reported food insecurity in the last one month prior to the data collection period (Table 2).

Multivariable Analysis
The final logistic regression model indicated that children whose mothers had poor nutrition-related knowledge were six times more likely to be acutely malnourished than their counterparts (AOR 6.23, 95% CI (2.49, 15.57)). Similarly, children whose mothers had fair nutrition-related knowledge were found to be four times more likely to be acutely malnourished than mothers who had good knowledge (AOR 3.59, 95% CI (1.21, 12.80)). Regarding women involvement in decision-making, children living in households in which women have no say in decision-making were five times more likely to be acutely malnourished than in households where women involved in joint decision-making (AOR 4.68, 95% CI (1.99, 10.97)). Furthermore, the lowest wealth index (AOR 3.76, 95% CI (1.24, 11.38)) and maternal hand-washing practice (AOR 4.51, 95% CI (1.99, 10.19)) were found to be independent predictors of GAM (Table 3).

Discussion
The major finding of our study was maternal nutrition-related knowledge, maternal educational status, and

Table 1 Socio-Demographic Characteristics of Study Participants Attending Public Health Facilities in Jimma City, Southwest Ethiopia (n = 234)

Variable	Category	Case (n = 78) Number (%)	Control (n=156) Number (%)
Child sex	Female	53 (67.9)	57 (36.5)
	Male	25 (32.1)	99 (63.5)
Child ge in months	6–11	26 (33.3)	59 (37.8)
	12–23	29 (37.2)	60 (38.5)
	24–35	16 (20.5)	32 (20.5)
	36–47	7 (9.0)	5 (3.2)
Maternal age	15–24	6 (5.0)	9 (7.4)
	25–34	52 (43.0)	43 (35.5)
Maternal education	No Formal Education	52 (66.7)	48 (30.8)
	Formal Education	26 (33.3)	108 (69.2)
Paternal educational status	No Formal Education	31 (39.7)	62 (39.7)
	Formal Education	47 (60.3)	94 (60.3)
Maternal occupation	GoE	6 (7.7)	25 (25)
	Farmer	20 (25.6)	37 (23.7)
	Merchant	6 (7.7)	20 (12.8)
	House wife	40 (51.3)	60 (38.5)
	Daily Labourer	6 (7.7)	14 (9.0)
Paternal occupational	GoE	5 (6.4)	25 (16.0)
	Farmer	56 (14.1)	71 (45.5)
	Merchant	8 (10.3)	45 (28.8)
	Daily Labourer	9 (11.5)	15 (9.6)

Abbreviation: GoE, government employee.

women involvement in decision-making strongly predicts global acute malnutrition. Children whose mothers had poor nutrition-related knowledge were six times more likely to be acutely malnourished than their counterparts. This result is consistent with a study conducted in Nigeria, which revealed that mother's nutrition and health-related knowledge safeguard young children from occasions that reduce height-for-age z-score (HAZ) and WHZ scores.[18] Other studies report an independent association between maternal nutrition-related knowledge and global acute malnutrition.[27,28] Regarding parental educational status, maternal educational status was found to be an independent predictor of acute malnutrition. A review of a demographic health survey of 62 low - and middle-income countries (LAMICs) revealed a stronger protective effect of maternal education.[20] Similarly, several studies reported the same finding.[29–32] Research findings indicated that an increased level of maternal education enhances higher health-seeking behavior for her

childhood illness, and this helps the child in regain health shortly. The other possible reason might be that education generates confidence and allows women to be strongly involved in joint decision-making. This is supported by the current finding which found out women's involvement in decision-making increases with the level of education.

Evidence from low-resource settings indicated the differential in preferences between men and women in channelling resources towards the welfare of the child.[33,34] This depends on partners' ability to negotiate, which contributes to women involvement in decision-making.[35] In this study, data regarding women involvement in decision-making were collected on women's involvement in their own health care, making major household purchases, and visits to family or relatives. Accordingly, the results of this study indicated that children whose mothers had no say in the intra-household decision were found to be four times more likely to be acutely malnourished than their counterparts. This study finding is in line

Table 2 Maternal Decision-Making Role and Other Household-Related Factors of Study Participants Attending Public Health Facilities of Jimma City, Southwest Ethiopia (N= 234)

Variable	Category	Case (n = 78) Number (%)	Control (n=156) Number (%)
Women decision on own health	No	53 (67.9)	57 (36.5)
	Yes	25 (32.1)	99 (63.5)
Women decision on major Household purchases	No	48 (61.5)	39 (25.0)
	Yes	30 (38.5)	117 (75.0)
Women decision on family visit	No	37 (47.4)	35 (22.4)
	Yes	41 (52.6)	121 (77.6)
Overall women decision-making	Not inclusive of women	51 (67.9)	44 (28.2)
	Jointly with partner	27 (34.6)	112 (71.8)
Family size	Above five	49 (62.8)	38 (24.4)
	Five and less	29 (37.2)	118 (75.6)
Place of residence	Rural	56 (71.8)	47 (30.1)
	Urban	22 (28.2)	109 (69.9)
Wealth index	Lowest	46 (59)	32 (20.5)
	Middle	32 (41)	124 (79.5)
Household food security status	Food insecure	57 (73.1)	57 (36.5)
	Food secure	21 (26.9)	99 (63.5)
Solid waste disposal site	Other than waste pit	39 (50.0)	37 (23.7)
	Solid waste pit	39 (50.0)	119 (76.3)
Liquid waste disposal site	Other than waste pit	46 (59)	41 (26.5)
	Liquid waste pit	32 (41)	115 (78.2)
Mother hand washing practice	Less frequently	53 (67.9)	32 (20.5)
	More frequently	25 (32.1)	124 (79.5)
Source of drinking water	Non piped water	34 (43.6)	20 (12.8)
	Piped water	44 (56.4)	136 (87.2)

with the study done in low-resource settings in which it is identified that lack of women's decision-making as a predictor of child malnutrition.[20,36] A study conducted in Benin found out that women decision-making autonomy was independently associated with WHZ-score of male children and WHZ and WAZ-scores of female children.[20] A similar finding was also reported in Nepal[37] and Southwest Ethiopia.[38] The status of women in a society is also an important determinant of the nutritional status of women and children.

A previous study finding indicated that women's low social status affects their autonomy in decision-making regarding family size, health-care-seeking behavior, child-feeding, support, and care.[39] Furthermore, male dominance in Ethiopia poses difficulty in ensuring women independent decision-making in individual and household issues, which can affect the health and nutritional status of

the child.[40] Children from the lowest wealth index households were found to be four times more likely to be acutely malnourished. A study done in Ethiopia indicated that children belonging to the low-income group were at a higher risk of being wasted than children of better income families.[41] The economic constraint in LAMICs limits the quality of food consumption and increases the likelihood of infection. In addition to this, a high socio-economic status allows greater purchasing power for food and other goods that ensure the health of children.[42] Family size in the study was found to be associated with global acute malnutrition, and a similar relationship was reported by previous studies.[26,43] The inadequate allocation of household resources among many children may lead to a low nutritional status. The other possible explanation might be due to resource depletion, which is

Table 3 Independent Predictors of Global Acute Malnutrition of Study Participants Attending Public Health Facilities in Jimma City, South West Ethiopia (n = 234)

Variables	Case (n = 78) N (%)	Control (n=156) N (%)	COR (95% CI)	AOR (95% CI)
Maternal education				
No formal education	52 (66.7)	48 (30.8)	5.06 (2.81,9.12)***	4.98 (2.09, 11.82)**
Primary/Secondary & above	26 (33.3)	108 (69.2)	1	1
Maternal knowledge				
Poor	46 (59)	51 (32.7)	5.44 (2.75, 10.76)***	5.16 (1.9, 13.96)**
Fair	18 (23.1)	20 (12.8)	4.97 (2.16, 11.45)***	3.59 (1.21, 12.80)**
Good	14 (17.9)	85 (54.4)	1	1
Paternal knowledge				
Poor	45 (57.7)	48 (30.8)	5.59 (2.99, 10.47)***	4.47 (0.83, 11.37
Fair	18 (23.1)	21 (13.5)	0.69 (0.24, 1.97)***	2.94 (0.67, 12.84)
Good	15 (19.2)	87 (55.8)	1	1
Women decision-making	51 (65.4)	44 (28.2)	5.57 (3.09, 10.06)***	4.68 (1.99, 10.97)**
Not inclusive of women Jointly partner/ women	27 (34.6)	112 (71.8)	1	1
Family size				
Above five	49 (62.8)	38 (24.4)	7.5 (3.96, 14.22)***	2.79 (1.21, 6.43)*
Five and less	29 (37.2)	118 (75.6)	1	1
Wealth index				
Lowest	45 (57.7)	29 (18.6)	5.59 (2.99, 10.48)***	3.76 (1.24,11.38)*
Middle	5 (6.4)	26 (16.7)	0.69 (0.24, 1.97)	0.49 (0.09, 2.52)
Highest	28 (35.9)	101 (64.7)	1	1
Mother hand-washing practice				
Less frequently	53 (67.9)	32 (20.5)	6.2 (3.41, 11.29)***	4.51 (1.99, 10.19)**
Frequently	25 (32.1)	124 (79.5)	1	1
Source of drinking water				
Non-piped water	34 (43.6)	20 (12.8)	4.8 (2.68, 8.59)***	2.33 (0.88, 6.14)**
Piped water	44 (56.4)	136 (87.2)	1	1
HHDDS				
Low	71 (91.0)	111 (71.2)	4.11 (1.76, 9.62)**	3.56 (0.93, 13.48)
High	7 (9.0)	45 (28.8)	1	1
HHFIAS				
Food insecure	57 (73.1)	57 (36.5)	4.46 (2.46, 8.09)***	1.74 (0.69, 4.4)
Food secure	21 (26.9)	99 (63.5)	1	1

Notes: *Statistically significant at *P*-value < 0.05; **Statistically significant at *P*-value < 0.0; ***p< *0.001*.
Abbreviations: HHDDS, Household Dietary Diversity Score; HHFIAS, Household Food Insecurity Access Scale; COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval.

exposed to poverty and decrement in health care seeking practice, household environmental sanitation, food availability, and nutrition insecurity.

Strengths and Limitation of the Study
The main strength of our study was that two separate measurements were engaged to measure child anthropometry to minimize variability. Calibration of the anthropometric tool was given high emphasis, and factors like women decision-making role were addressed in this study. Measurement tools used to measure some explanatory variables relied on participants' self-reported data, which were prone to recall bias and social desirability bias.

Conclusion

The study found out maternal education, maternal nutrition-related knowledge, women involvement in decision-making, maternal hand-washing practice, and family size as independent determinants of global acute malnutrition in children. Thus, concerned responsible bodies need to invest more in girls' education and women empowerment in decision-making.

Abbreviations

AOR, adjusted odds ratio; CI, confidence interval; EDHS, Ethiopian Demographic Health Survey; GAM, global acute malnutrition; HAZ, height-for-age z-score; HC, health center; JMC, Jimma medical Center; LAMICs, low and middle income countries; SD, standard deviation; SGH, Shenan Gibe Hospital; SPSS, Statistical Package for Social Sciences; UNICEF, United Nations International Children's Emergency Fund; WB, World Bank; WHO, World Health Organization; WAZ, Weight-for-age z-score; WHZ, Weight-for-height z-score.

Data Sharing Statement

Data generated for this study are included in the article. The data set available upon request from the author in charge.

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Institute of Ethical Review Board of Jimma University. Written informed consent was taken from the study participants, and parents provided written informed consent for their child participation. The study was conducted according to the Declaration of Helsinki.

Consent for Publication

Not applicable

Acknowledgments

The authors would like to acknowledge Jimma University, data collectors, supervisors, and study participants.

Author Contributions

Authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Funding

Financial expense for data collection was covered by Jimma University and the authors did not receive any financial support for the publication of the article.

Disclosure

We approve that there is no conflict of interest.

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