

Prevalence of Malnutrition and Associated Factors Among Under-Five Children Visiting Wolaita Sodo University Hospital, Wolaita sodo, Ethiopia

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Abstract

Background: Malnutrition is a state of nutrition in which a deficiency or an excess of energy, protein, and other nutrients which cause measurable adverse effects on tissue body form for function and clinical outcome. Children are most vulnerable to malnutrition in developing countries because of low dietary intakes, lack of appropriate care, and inequitable distribution of food within the household. Malnutrition remains one of the most common causes of morbidity and mortality among children throughout the world. Malnutrition in Ethiopia, in the form of stunting, underweight and wasting was identified as 44%, 29% and 10% in children under five. The magnitude and various associated factors were not clearly known in the study area. **Objective:** To assess the prevalence of malnutrition and associated factors among under-five children at Wolaita Sodo university hospital, Wolaita Sodo, SSNPR, Ethiopia. **Methods:** A facility based cross-sectional study was conducted from May to June 2016 in Wolaita Sodo town, southern Ethiopia. Data were collected from 123 respondents, who visited WSUH under-five OPD using pre tested structured questionnaires and measuring weight, MUAC and height of children. **Result:** A total of 123 respondents were included in the study giving the response rate 100%. From the total 123 respondents 28(22.8%) are stunting, 11(8.9%) are wasting, 6(4.9%) are under weight. The prevalence of Malnutrition is 25.2%, and out of this stunting, wasting, and underweight were 90.3%, 35.5% and 19.4% respectively, and 29% 12.9%, 3.2% are kwashiorkor, marasmic and marasmic-kwashiorkor respectively. The larger (54.8%) prevalence of PEM was found in rural. **Conclusion:** The prevalence of PEM among under-five children among those attending under-five OPD at WSUH is relatively high. The finding of this study confirmed that demographic and socio-economic factors and many independent variables have significant association with PEM.

Keywords: malnutrition, PEM, and prevalence

Introduction

Malnutrition refers to under nutrition or deficiency in protein-energy nutrition. Protein energy malnutrition refers to a child with both acute (wasting and underweight) and chronic (stunting) malnutrition. (1)

Malnutrition during childhood is as a result of a wide range of factors, most of which relate to unsatisfactory food intake or severe and repeated infections, or a combinations of the two. The most frequently suggested causes of malnutrition are: poverty, low parental education, lack of sanitation, low food intake, diarrhea and other infections, poor feeding practices, family size, short birth intervals, maternal time availability, child rearing practices and seasonality. There are also economic, social, and cultural causes of malnutrition which underscore the close link between malnutrition. (2)

The greatest risk of under nutrition occurs during pregnancy and in the first 2 years of life, the effects of this early damage on health, brain development, intelligence, educability, and productivity are potentially irreversible. Deficiencies of both macro- and micronutrients impair the immune system, with well-documented consequences. The most immediate consequence of under nutrition is premature death. (3, 4, 5)

The global estimates conclude that stunting, severe wasting, and IUGR jointly contributes to 2.2 million deaths of children <5 yr of age. This accounts for 35% of all child mortality globally, under nutrition have substantial consequences for survivors and their families by requiring them to spend additional resources on health care and by affecting the productivity of malnourished persons. There is substantial evidence that early child malnutrition is detrimental to productivity in adulthood. (6)

Malnutrition is a state of nutrition in which a deficiency or an excess of energy, protein, and other nutrients which cause measurable adverse effects on tissue /body form for function and clinical outcome. There are an estimated 3 million malnutrition is by far the largest contributor to child mortality globally, cure present in 45% of all cases. Under weight births & IUGR are responsible about 2.2 million children deaths annually in the world. Deficiencies in vitamin A or zinc cause 1 million deaths each year. (7)

Children are most vulnerable to malnutrition in developing countries because of low dietary intakes, lack of appropriate care, and inadequate distribution of food within the households. Malnutrition remains one of the most common causes of morbidity & mortality among children throughout the world. (3)

Malnutrition is the leading causes of morbidity & mortality in children under the age of 5 in developing

countries, Ethiopia is being one of these countries malnutrition is an important public health problem; stunting, under weight and wasting were identified as 44.1%, 25.7%, and 6.6% respectively in under 5 ages, and in SNNPR. (2)

It is estimated that 150 million children under 5 years are under weight and more than 20 million suffer from severe malnutrition. About 47 million children under 5 are stunted in sub-Saharan Africa where as in the eastern & southern Africa 24 million are stunted. Stunting is an indicator of past growth failure, which is a sign of poor nutritional status, wasting indicates failure of gaining weight or weight loss. (8)

As nutritional status can vary by background characteristics, there is a need to investigate underlying variations of these nutritional indicators and determinant factors among regions and localities or residence for proper priority setting and interventions and to improve the nutritional status. (9)

The result of this study, which specifies the prevalence of child malnutrition with these various causes and their relative contributions by residence, can serve as reference in priority setting, designing effective nutritional programs to address the problem and its consequences, in monitoring and evaluation of the impacts of programs and for policy responses specifically tailored to the needs of different population groups.

OBJECTIVES

General objective

To assess the prevalence of malnutrition and associated factors among under-five children in Wolaita Soddo University Hospital.

Specific objectives

To determine prevalence of malnutrition in under five children.

To identify associated factors of child malnutrition in the study area.

METHODOLOGY

Study area & period

The study was conducted at Wolaita Soddo University Hospital/WSUH in OPD regular working hours from May to June 2016. The hospital is serving more than 2 million people in the catchment area in all four major departments and other units since 1928. The hospital is located in Soddo town of Wolaita zone.

Wolaita zone is one of the 13 zones in SNNPR Regional State located in the southern part of the region at 329 km distance from Addis Ababa and 165 km south west of the regional capital, Hawassa. Soddo Town is the capital city of Wolaita zone and located in 6°04'8"-6°05'3"N latitude, 37°04'4"-37°04'6"E longitude, at the altitude of 1500-2500m with an area of 82.1 km².

Based on the 2007 census conducted by the central statistical agency/CSA of Ethiopia, this zone has a total population of 1,501,112 of whom 739,533 are men and 761,579 are women with an area of 4,208.64 square kilometers. Wolaita is spoken as a first language by 96.82% of the inhabitants; the remaining 3.18% spoke all other primary languages reported. 71.34% were Protestants, 21% of the population said they practiced Ethiopian orthodox Christianity, and 5.35% embraced Catholicism.

The town is structured in 3 sub-cities and 11 administrative kebeles. There are 2 hospitals, 3 health centers, 11 health posts & more than 21 private health institutions providing health services in the town. Number of households earn their livelihood being employed in the civil services, non-government organizations, trading, small-scale industries (woodwork, metalwork) and other petty businesses. The main staple food of the population is teff and maize. The climate is stable, the dry temperate heat makes the climate simply "delicious".

Study period

The study was conducted from May to June, 2016

Source population

The source population is all under-five children, who live in Wolaita Sodo town and catchment area.

Sample population

All under 5 children, that came to visit Wolaita Soddo university hospital in the need of different health services.

Study population

The study population was systematically selected under-five children and their mothers/care takers who utilized services at WSUH.

Inclusion and exclusion criteria

Inclusion criteria

All children under five years of age, who came to visit the OPD at WSUH, and their care takers.

Exclusion criteria

All children those were severely ill, and difficult for measurement.

Study design

A facility based cross-sectional study design was used to investigate the prevalence and associated factors of malnutrition among under-five children.

Sample size determination

With 95% confidence interval and using proportion of 67% (12) and marginal error of 5% the required sample size for population more than 10000 will be determined by the formula:

$$n = z^2 p (1-p)/d^2$$

Where n = required sample size for very large population (N > 10000)

- Z (confidence interval of 95% which is = 1.96)
- P- estimated proportion of the problem to be studied
- W- marginal error
- $n = z^2 p (1-p)/d^2$
- $n = (1.96)^2 * 0.67 (1-0.67) / (0.05)^2$
 $n = 340$

Since N is less than 10,000 so it needs finite population correction

$$n_f = n/1 + n/N \text{ where } n = \text{sample size}$$

$$N = 180$$

$$340/1 + 340/180 = 118$$

5% (non response rate is added) to 123

Then, totally 123 Sample size is required.

Sampling technique and procedure

The number of under-five children who attended under five OPD currently, were followed for three consecutive days on the 1st, 2nd and 3rd day which is 10, 7 and 13 respectively. Then, the average 10 was taken as the number of under-five children who attend at OPD per day. Then we calculate the source population by multiplying the average number of under-five children per day by the data collection period which is 18 days from which the sample was drawn using simple random sampling technique.

Data collection

Data collection was carried out by all researchers. It was collected by using both open & closed ended questionnaires and, by interviewing the mothers/ care takers and, By anthropometric measurements.

Data Quality Control

To ensure the quality of data pre test was done on 5-10% of a study population 1 week prior to the data collection. There were daily data checking for their completeness and clarity.

Data processing & analysis and interpretation

After the data collection, each questionnaire was checked for its completeness. Data cleaning, editing and, coding as well as analyzing was done manually. The anthropometric assessments of the nutritional status of under 5 ages for the 3 indices namely weight for age (WFA) height for age (HFA) and weight for height (WFH) by taking the age & sex into consideration, it was classified according to water low & well come classification in comparison with NCHS/WHO. The prevalence of PEM in general and its specific variants (stunting, wasting, and underweight) were determined, and the associated risk factors were demonstrated. Chi-square and p-value was used to confirm association. The Data were presented using frequencies, percentages, tables and graphs.

Ethical Consideration

Ethical clearance was obtained from WSU college of Medicine & health science to this research to be conducted in the study population, and to ask the respondents willingness to participate in the research & inform the purpose of study clearly.

RESULT

A total of 123 children 4-59 month of age and their mothers/care takers, participated in the study, providing 100% response rate. Out of these 101 (82.1%) of the respondents were mothers. The largest proportion (47.2%) of the children were in the age range of 13-35 months, 24.4% were in the group of 36-59 months. 19.5% was in the age 6-12 months, and 8.9% were in the age of <6 months. The 52.8% were females.

Majority of the house hold (54.5%) had 2-3 under five children while (45.5%) household had single under-five children. The majority of mothers were married 110 (89.4%), protestant religion followers 70 (56.9%). Most mothers (84%) were wolaita in ethnicity. The mean age group of the mothers was 25-35 years

About 26 (21.1%) of mothers were illiterate and the rest 97 (79%) were literate, and only 11.3% of the fathers are illiterate.

House wife was the most frequent occupation (62.6%) among the mothers and the least proportion of them (8.9%) were private Job. The biggest (31.7%) of the fathers were government employers followed by farmers (26%). The mean family size was 5. (26.8%) of. The greater portion of households (26.8%) had a monthly income between 500-1000 and others 26.8% also had between 1000-2000 ETB -(table 1)

Table 1: Socio demographic and economic characters of respondents, wolaita sodo university hospital, wolaita, may 2016

S.N	Category	Category	Number	Percentage
1	Ethnicity	Wolaita	106	86
		Gurage	7	5.6
		Gamo gofa	4	3.3
		Others	6	4.9
2	Religion	Orthodox	38	30.9
		Muslim	11	8.9
		Protestant	70	56.9
		catholic	4	3.2
3	Residence	Urban	79	64.2
		Rural	44	35.8
4	Marital status	Married	110	89.4
		Widowed	6	4.8
		divorced	7	5.6
		Single	0	0
5	Family size	2-5	60	48.7
		>-5	63	51.3
6	Sex of the child	Male	58	47.2
		female	65	52.8
7	Age of child in months	<6	11	8.9
		6-12	24	19.5
		13-36	58	47.2
		37-59	30	24.4
8	No of <5yrs children	1	56	45.5
		2-3	67	54.5
9	Maternal level of education	Illiterate	26	21.1
		1-4	14	11.3
		5-8	32	26
		9-12	36	29.2
		above	15	12.2
10	Paternal level of education	Illiterate	14	11.3
		1-4	13	10.5
		5-8	25	20.3
		9-12	34	27.6
		above	37	30.1
11	Maternal occupation	House wife	77	62.6
		Farmer	0	0
		Merchant	20	16.2
		Gov't employe	15	12.2
		Private gob	11	8.9
12	Paternal occupation	Gov't employee	43	35
		Farmer	32	25.9
		Merchant	26	21.1
		Private gob	11	8.9
		Daily laborer	11	8.9
13	Monthly income of the HHs	<500	26	21.1
		500-1000	33	26.8
		1000-2000	33	26.8
		>2000	31	25.2

From the total 123 respondents 28(22.8%) are stunting, 11(8.9%) are wasting, 6(4.9%) are under weight. The largest (54.8%) prevalence of PEM was found in rural area.

The prevalence of PEM was 31(25.2%) and out of this, prevalence of stunting, wasting and under-weight were 90.3%, 35.5 % and 19.4% respectively, and 29% 12.9%, 3.2% are kwashiorkor, marasmic ,and marasmic-kwash respectively.

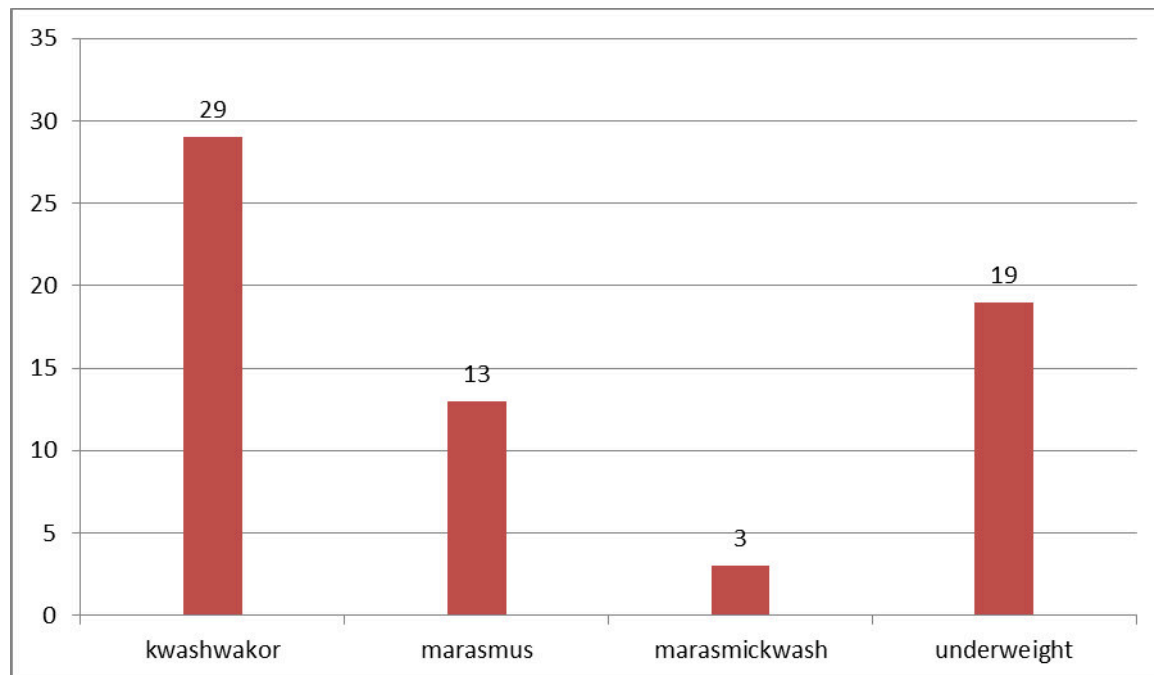


Fig1: Anthropometric results by age of under-five OPD at WSUH, Wolaita, may 2016

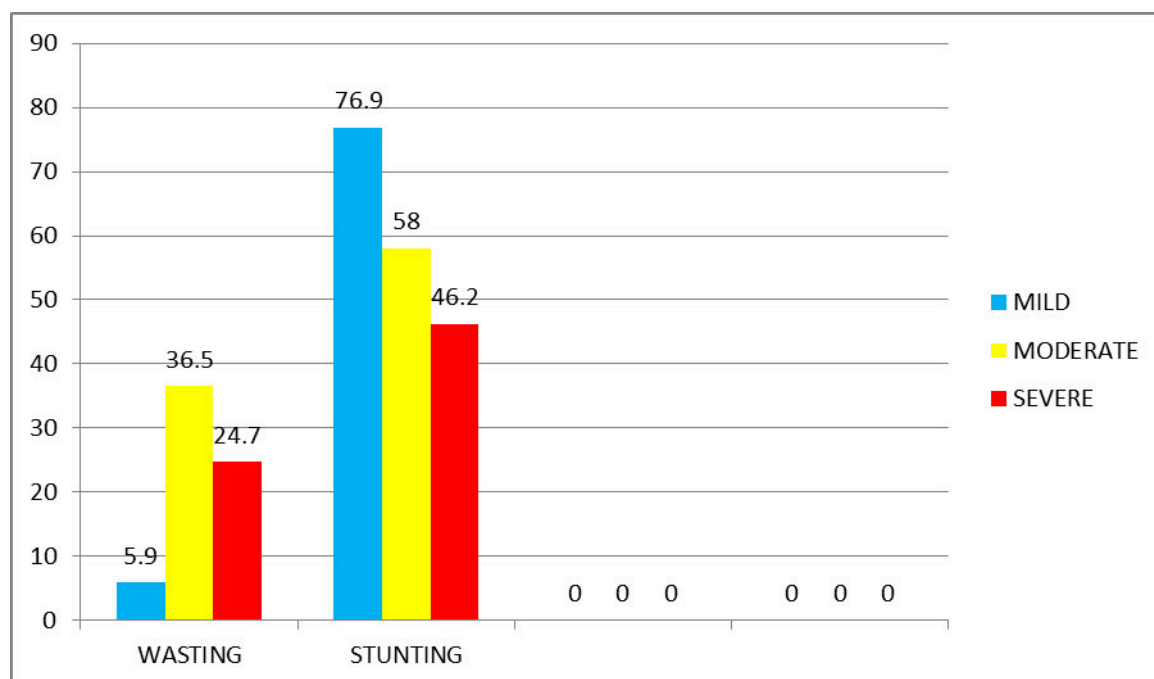


Fig2: Anthropometric results by age of under-five OPD at WSUH, Wolaita, may 2016

Table2. The prevalence of PEM as compared between urban and rural area at under five OPD WSUH, wolaita, May 2016

	Nutritional status				X ²	p-value	OR(95% CI)
	PEM		Normal				
	No	%	No	%			
Urban	14	45.2	65	70.7	6.6	0.01	2.92
Rural	17	54.7	27	29.3			

Table 3: Nutritional status of under-five children by maternal socio-economic, health characteristics and illness at WSUH

		Nutritional status				X ²	p-value	OR(95% CI)
		PEM		Normal				
		No	%	No	%			
1	Male	14	45.2	44	47.8	5.7	0.1	1.11
	Female	17	54.8	48	52.2			
2	Months	20	64.5	38	41.3	5.04	0.025	2.58
	13-36	11	35.5	54	58.7			
3	Immunized	21	67.8	85	92.3	11.89	<0.005	5.7
	Not immunized at all	10	32.2	7	7.7			
4	Illiterate	13	42	13	14.1	10.81	<0.0005	4.36
	Literate	18	58	79	85.9			
5	Family size	10	32.3	50	54.3	4.56	0.03	2.5
	2-5	21	67.7	42	45.7			
6	ANC visits	16	51.6	82	89	20.25	<0.0005	7.64
	Yes	15	48.4	10	11			
7	delivery at Home	20	64.5	18	19.6	22.05	<0.0005	7.44
	Health institution	11	35.5	74	80.4			
8	Diarrhea in last 2 wks	21	67.7	12	13	35.5	<0.0005	14
	Yes	10	32.3	80	87			
9	Fever in last 2wks	12	38.7	87	94.6	46.34	<0.0005	0.04
	Yes	19	61.3	5	5.4			
10	AURTI in last 2 wks	15	48.4	41	44.5	0.15	0.1	1.11
	Yes	16	51.6	51	55.5			
11	EBF for 6 months	22	71	81	88	5.03	0.25	3.01
	>6months	9	29	11	12			
12	Income <500 birr	12	38.7	14	15.2	7.72	0.006	3.5
	≥500 birr	19	61.3	78	84.8			

DISCUSSION

In Ethiopia and other developing countries as well as to the study area, malnutrition among children is a major health problem [16]. Nationally, 40 percent of children under age five are stunted, 9 percent of Ethiopian children are wasted, and 25 percent of children under age five are under weight (17).

In our study from the total 123 respondents 28(22.8%) are stunting, 11(8.9%) are wasting, 6(4.9%) are under weight, this implies that though stunting and underweight finding in our study are smaller, the prevalence of wasting was the same as that of the national level.

The findings of this study revealed that quarter of 31(25.2%) the study children ages 4-59 months were affected by PEM, but comparing with the report of similar study which is done at shashemene health centre, shashemene town(12), it is much better.

And out of the total (25.5%), prevalence of stunting, wasting and under-weight were 90.3%, 35.5 % and 19.4% respectively, and 29% 12.9%, 3.2% are kwashiorkor, marasmic, and marasmic-kwash respectively.

Although the prevalence of wasting and underweight are better than the similar study report in shashemene, the prevalence of stunting remains higher which needs the attention of all concerned bodies (12).

Respondent sex and age of children were important demographic variables and were the primary basis of demographic classification in surveys. The risk of malnutrition increases with age (16).

The result of this study indicates that the prevalence of PEM among children aged 13-36 month was 64.5%. This finding was consistent with other studies done in Khartoum, Sudan, which shows that the main contributing factors for under-five PEM were found age of the child (16). The possible reason for this was 70.7% of the mothers stop breast fed at the age of less than or equal 2 years old and probably some mothers start to induce complementary foods too late, Surprisingly 4.8% of mothers introduce it to their children after 12 months celebration. And this age group is also susceptible for diarrheal disease, intestinal parasites and others acute infections as well.

Breast feeding is norm in Ethiopia; nearly all the children in both group were breast fed. The national survey indicates that 96% of children under age of five are breast fed (14). The finding of this study indicates the prevalence of PEM was 29% ($\chi^2=5.03$, $P<0.00005$ OR=3.01,) on children who were stayed on only EBF even after 6 months of age, and they are 3.01 times more at risk of being PEM than those children who were on EBF up to 6 months only, and soon after started complementary foods. And around 3.25% mothers introduce pre-lacteal feeding to their new born. This indicates that children with malnutrition were started complementary diet too late.

The majority (67.7%) of children who were presented with diarrheal disease were being PEM children's from diarrhea were 14 times more likely to have risk of PEM. Even though other disease is associated to malnutrition, diarrhea is the leading cause of morbidity and mortality in children. There is reciprocal relationship with diarrhea leading to malnutrition and malnutrition predisposing to diarrhea. Diarrhea kills over one million children every year through dehydration and malnutrition (13).

The prevalence of PEM of the non-immunized was 32.2% and they are 5.7 more at risk of being PEM than those who are immunized for their age. The reason for immunized children become malnourished was probably, if other factors were existed.

Economic status of the household can directly indicates the level of household food security is positively associated with PEM. The prevalence of PEM in children from households having monthly income less than 500 birr were 38.7 and they are 3.5 times more at risk of being PEM than those children from household having monthly income greater than 500 birr. Household economic status can affect children's nutritional status through its association with adequate dietary intake, use of health service, improved water resource and sanitation facilities. Similar result was reported in sub-Saharan African countries (13).

The number of ANC visit a women had during pregnancy had effect on child PEM. In this study 48.4% of the children from mothers who were not followed at least two ANC visits were being PEM and children's from mothers had not ANC were 7.64 times more likely to have risk of PEM than those children's from mothers having ANC follow up. ANC follow up can help to prevent low birth weight and birth complication while, at the same time providing mothers with valuable information about child care, health and nutrition.

Maternal education has positive effect on nutritional status of the children. The importance of mother's education in relation to health and nutrition of the child has been stressed by study (13). The result of this study shows the prevalence of PEM in children's from illiterate mothers were 42% and children's from illiterate mothers were 4.36 times more likely to have risk of PEM than those from literate mothers. In general, women's education affects the knowledge and attitude of parents which in turn affect their fertility behavior, their use of health service and their access to information. Hence, considering the importance of women's education for the improvement of children's nutritional status as crucial, more deliberate effort by local government administrator and educational personnel is needed to improve educational opportunities for female children as long term strategy.

The prevalence of PEM in children who were from total family size greater than 5 was 67.7%. A larger family size was also associated with PEM ($\chi^2=4.56$, $p=0.03$ and OR=2.5, 95% CI). The effect of large family size with overcrowding and inadequate spacing has been implicated as a risk factor for severe malnutrition in different studies as well (13, 14, 15).

The place of delivery had a great effect on child PEM. In this study 64.5% of the children who born at home are victims of PEM, and they are 7.44 times more at risk of being PEM than those children who born at health institution. this is due to dalliance on the initiation of breast feeding because of maternal instability and delivery associated complication, at the same time missing of the first milk drop/colostrums, introduction of food items to the new born soon after birth before breast feeding.

The finding of this study shows the prevalence of PEM in rural was 54.5% and they are 2.92 times more at risk of being PEM than those children who lived in urban. The possible reason for children from rural area to have PEM was due to larger participants in this study from urban area. This is for the reason of although children living in rural had more chance of getting foods in higher quantity than those living in urban, it lacks food item

composition in kind, and they mostly didn't apply a balanced diet meal schedule.

CONCLUSION

The prevalence of PEM among under-five children among those attending under-five OPD at WSUH was relatively high. Malnutrition is continued to be a substantial burden in under five age children in Wolaita sodd town. The finding of this study confirmed that demographic and socio-economic factors and many other independent variables had significant association. Such as; household economic status was affect children's nutritional status through its direct association with adequate dietary intake. Maternal educational status, immunization status, time of initiation of complementary foods, place of delivery, and having ANC follow up had a massive effect on the establishment of PEM.

RECOMMENDATION

To reduce childhood malnutrition due emphasis should be given in both community and health sector sides.

For the community

- a) Child age specific attention should be given while feeding.
- b) Availability of food alone was not sufficient to address the nutritional security of children, as they need someone to feed them, teach and guide them, and take them to receive healthcare whenever they become sick.
- c) Late initiation of complementary feeding, and Pre-lacteal feeding to the child, were common among the studied children, such habits need to be tackled by practicing appropriate feeding.
- d) Breast feeding after six months of age needs integration with appropriate complementary feeding

For the health sector

- a) Encouraging and strengthening appropriate complementary feeding with breast feeding child soon after six months of ages.
- b) Health Extension Workers (HEWs) and other health professionals should take a part on improving the knowledge and practices of parents through nutrition education on appropriate feeding practice through community based nutrition program in the study area in order to accelerate improvement in children's nutritional status
- c) Availability and accessibility of ANC services and institutional delivery to pregnant women should be increased as a means to improve long term nutritional and survival status of children.
- d) Regular de worming service to children should be strengthened
- e) Further studies at larger scales and on different population regarding nutritional status of the population should be carried out in the study area.

Competing interests

The authors declare they have no competing interest.

Author's contributions

C.W. was responsible for the development of study design, implementation, analysis, interpretation, writing, critical revision of the paper for intellectual content and the preparation of the draft manuscript. A.M, R.W and A.W participated in conception, development of proposal, analysis, and writing of result.

The authors read and approved the final manuscript.

Acknowledgment

This study was financially supported by the Wolaita Sodo University. We would like to acknowledge with gratitude all the individuals who facilitated the implementation of study. We also extend our gratitude to all study participants for their time and willingness to take part in the study.

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