Under-nutrition and Associated Factors among Children aged 6 months to 24 months in Gida Ayana District, East Wollega, Western Ethiopia

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Abstract

Background: Malnutrition is the major public health problem over the world. Asian and Sub-Saharan African countries, including Ethiopia, contribute the highest of all. However, little evidences were documented on nutritional status and associated factors among infants and young children particularly in the study area.

Objective: To assess the under-nutrition and associated factors among infants and young children aged 6-24 months.

Methods: A community based cross-sectional study was conducted on 379 randomly selected children aged 6 to 24 month old living in Gida Ayana District. Data was collected using structured questionnaire and anthropometric measurements were also taken. The data was entered in to Epi-info version 7 and analyzed using SPSS version 20. Multivariable analysis was carried out to see association between under nutrition and other factors.

Results: This study revealed that, 35.9%, 24.8 % and 12.4 % of infants and young children were stunted, underweight and wasted respectively. Started complementary feeding after 6 months (AOR=2.072, 95%CI: 1.215, 3.536) was significantly associated with stunting. Started complementary feeding

after 6 months (AOR =2.426, 95%CI: 1.077, 5.463), family monthly income <=2000 birr (AOR=3.151, 95%CI: 1.691, 5.873), age group 12-24 months (AOR= 7.549, 95%CI: 3.84614.815), cough two weeks before this survey (AOR=2.571, 95% CI: 1.129-5.857) were significantly associated with wasting.

Conclusion: In this study, prevalence of under-nutrition in the study area was high. Complementary feeding initiation time, family income, age of the child, cough, Family size, immunization status, Vitamin A supplementation and method of child feeding were predictors of child under-nutrition.

Key words: Stunting, wasting, underweight, children, Gida Ayana, East wollege, Ethiopia.

Introduction

Nutritional status among children is an important outcome measure of their health status [Federal Ministry of Health, 2008]. Child under nutrition (stunting, wasting and underweight) which is highly prevalent in low and middle income countries is crippling global economic growth [World Bank, 2008]. Wasting is a health condition that reflects acute nutritional deficit, while stunting is a measure of linear growth retardation showing the cumulative effect of chronic food deprivation [Federal Ministry of Health, 2008]. Globally, about one quarter (26 %), and nearly one-tenth (8 %) of children are stunted and wasted, respectively [Federal Ministry of Health, 2008 & World Bank, 2008].

A considerable burden (80 %) of global under nutrition is observed in developing countries where most of the children live in substandard and insanitary conditions [Federal Ministry of Health, 2007]. Asia alone bears 42 % of the stunting and 70 % of the wasting. Likewise, in Africa, the overall prevalence of stunting is 47 % [Central Statistical Agency, 2016] which is 42 % in East Africa [Federal Ministry of Health, 2007].

In Ethiopia, the burden of child under nutrition has persisted as a severe public health problem for decades [Central Statistical Agency, 2016]. According the 2016 Demographic and Health Survey (DHS) Report, about 38% and 10 % of the children were stunted and wasted, respectively. This fact confirms the public health significance of under nutrition in Ethiopia [Central Statistical Agency, 2016]. Furthermore, because of the difference in socio-economic and ecological characteristics, the magnitude of under nutrition exhibited regional variations ranging from 15% to 46 % for stunting and 10% to 16 % for wasting [Central Statistical Agency, 2016 & Central Statistical Agency, 2012].

Child under nutrition is the consequence of complex interactions of various factors mainly related to socioeconomic, feeding pattern, health care, and environmental factors. Previous reports from different countries claimed that poor feeding practices, rural residence, maternal and paternal illiteracy, advanced maternal age, poor household economic status, non-attendance of antenatal care, poor access to safe water, unavailability of toilet facility, closed birth interval, and a large number of siblings are factors significantly associated with under nutrition [Aziz Kamran GS et al, 2016, Badake Qd et al, 2014 & Birhanu A MS et al, 2015].

Also, a number of factors have been suggested to affect both the level of food security at household level and the children's nutritional status, some of which are independently associated with households in which children live [UNICEF, 2013]. These can broadly be classified into child characteristics (e.g., age and gender), household characteristics (e.g., household income, and number of children in the household), parental characteristics (e.g., occupation, educational level and age of the household head) and community factors (e.g., water supply and sanitation) [UNICEF, 2013].

Malnutrition is among the most series health problem facing in Ethiopia. In Ethiopia, prevalence of stunting, wasting and underweight is 38%, 10% and 24% respectively [Central Statistical Agency, 2016]. And in Oromia region, the prevalence of stunting, wasting and under weight is 36.5%, 10.6% and 22.5% respectively [Central Statistical Agency, 2016].

However, there is little information about magnitude and specially factors contributing to infant and young child stunting, wasting and underweight in Ethiopia in general and in Gida Ayana District in particular. Therefore, it is very important to assess magnitude and associated factors among infants and young children age 6 to 24 months in Gida Ayana Woreda. This will be helpful for community, for policy makers, partners working on child health and other stakeholders as this is one of the critical windows of opportunity for intervention to address under-nutrition through the lifecycle approach as stated in the national nutrition program [Federal Ministry of Health, 2008][figure 1].

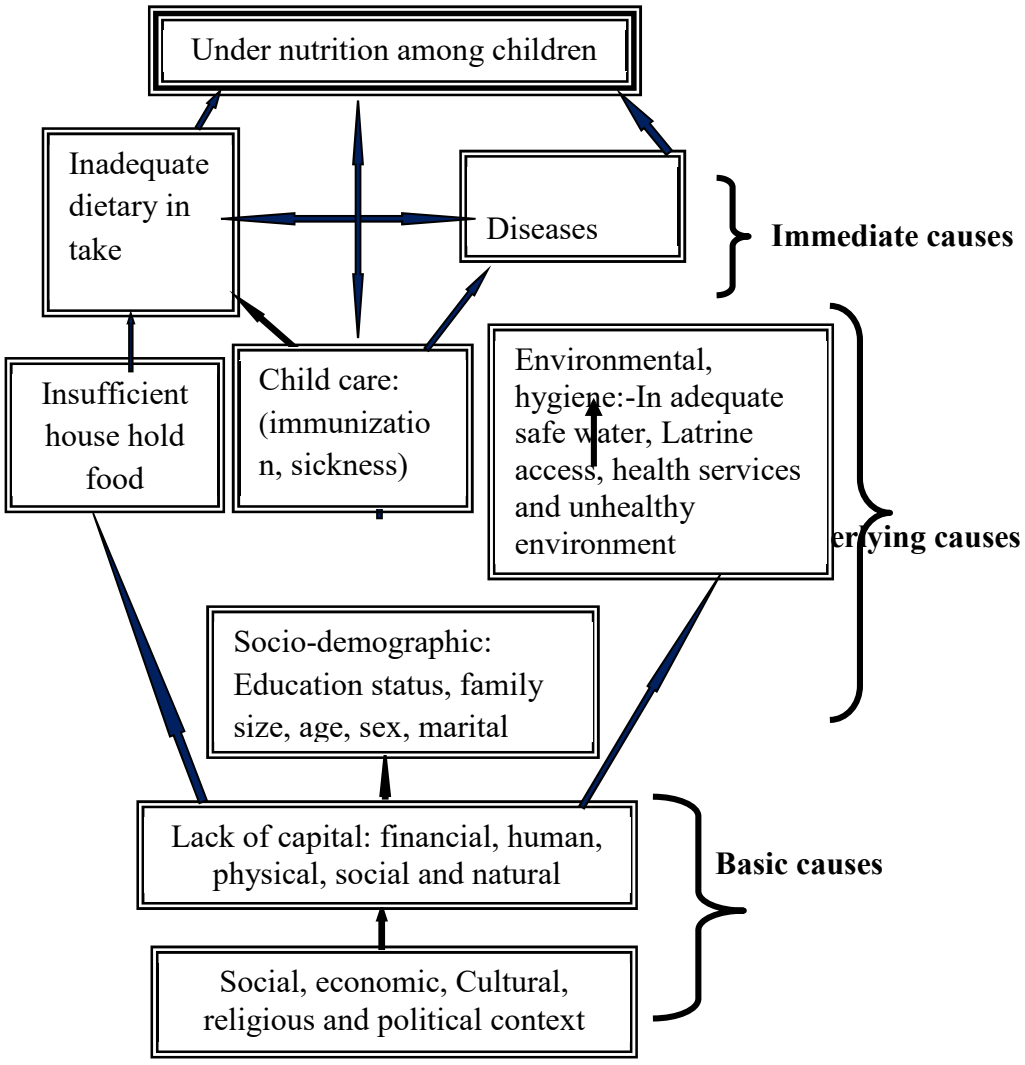

Figure 1: Conceptual framework of study on magnitude and associated factors of under nutrition among infants and young children aged 6 to 24 months in Gida Ayana District, East Wollega, Oromia, western Ethiopia, 2018

Method and material

Study area and period

The study was conducted at Gida Ayana District which is located in Oromia Regional State, East Wollega Zone, Ethiopia. It is 444 km away from Addis Ababa and 112 km from Nekemte which is the Capital town of the east wollega administrative zone. The District has a total of 28 *kebeles* (In Ethiopia *Kebele* is the lowest governmental administrative structure). The population of the District is 142,228 by population projection of 2017 Out of this 71,110 are males and 71,118 females and 8,000 are children less than 24 months of age. The District has a total of 32 governmental and nongovernmental health institutions. This study was conducted from March 1, 2018 to August 30, 2018.

Study design

Community based cross-sectional study was conducted.

Source Population

Source population of this study was all children aged 6 months to 24 months old in Gida Ayana district during data collection period.

Study population

Study Population was all randomly selected children aged 6 months to 24 months old living in selected *kebeles* of Gida Ayana district.

Sample size determination

Sample size was estimated using single population proportion formula ($n = ((Z\alpha/2)^2 P (1-p))/d^2$, considering 38% of magnitude of stunting taken from EDHS 2016. Other parameters considered were 5% margin of error, 95% CI and 10% non-response. Hence, the calculated sample size was 398.

Since the source population is below 10,000 which is 8,000, the sample size was again adjusted with finite population correction formula. The Final sample size n=n0*N/ (n0 + (N-1)) =398*8000/ (398+ (8000-1)) =379

Sampling Procedure

Out of the 28 *kebeles* in the district, 9 *kebeles* were selected by the lottery method. The registration of mothers who have a child age 6 -24 months by the local health extension workers was used to get the list of children in each selected *kebele.* The total number of children of the above indicated age group in the selected *kebele* was 2,688. Then, sample from each *kebele* was determined using proportional allocation to size (PAS) of study population in the *kebele.* Finally, study subjects were selected using simple random sampling method. Lottery method was used for children of the same age who were present in the same house [Figure2].

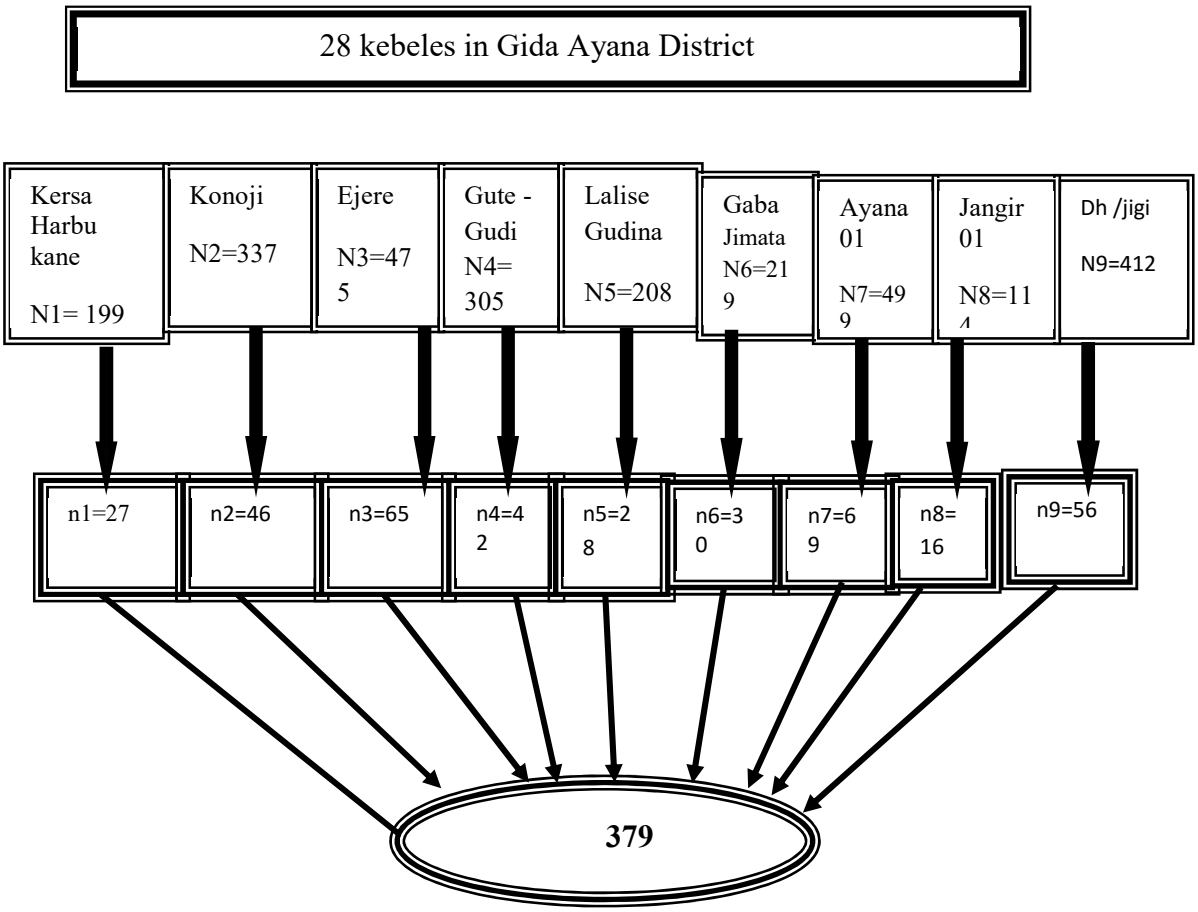

Figure 2: Sampling scheme for study of under-nutrition among infants and young children aged 6 to 24 months in Gida Ayana District, East Wollega, Oromia, western Ethiopia, 2018

Data collection instrument

Data was collected using pre-tested structured questionnaire adopted from other validated published literatures. The questionnaire comprises of Socio-demographic characteristics of the child and their mother/care taker , Children health status , environmental and sanitation related factors and Dietary related factors .The instrument first prepared in English language

and then it was translated in to Afan Oromo language(local language) for data collection purpose and then translated back to English to check for consistency.

In addition to the data collected from mother/caretakers, anthropometric measurements were also taken from the selected infants and young children. Length/Height and weight of the children was measured using standard wooden board and 50 kg hanging spring scale respectively. Household Food Security was assessed using the household level component of HFIAS .Dietary Diversity of the child was also assessed

Data collection procedure

During data collection, face-to-face-interview, anthropometric measurements and standard checklists were used to collect data from children and their mother/caretaker after the interviewers explained the purpose of the study and obtained the mothers/caretakers verbal consent to participate in the study. The data was collected at the household level from mothers/care takers of the selected children.

As anthropometric measurements, length/height of the children was measured using Wooden board in recumbent position while the child barefooted and free of head wearing to the nearest 0.1 cm**.** Weight of the child was measured using a 50 kg hanging spring scale while clothes are removed and was recorded to the nearest 0.1 kg. The scale was brought to zero reading immediately before and during each session by placing standard calibration weights of 5 kg iron on the scale to ensure accuracy.

Household Food Security status of the selected household was measured using Households Food Insecurity Access scale (HFIAS). Based on the responses given to the nine questions and frequency of occurrence over the past 30 days, households were assigned a score that ranges from 0 to 27. A higher HFIAS score is indicative of poorer access to food and greater

household food insecurity. The lower the score, the more food secured a household was. A score of<17 was classified as food secured and a score of ≥17 classified as food insecure. Household Food Security was assessed during the site assessment using the household level component of HFIAS [Jennifer Coates AS et al, 2007].

Individual dietary diversity score Was Calculated on the basis of the number of food groups consumed within the 24 hours recall period from the total of 11 food groups. The food group consumption frequency score (FGFS) was calculated by assigning a score of 0 if not consumed during the previous 24 hours, 1 if consumed. For children 6 months to 24 months was scored as high DDS if the score out of the 11 is >5, and as low DDS if ≤5 [FAO, 2013].

Data quality control

Instruments used were translated into local languages (Afan Oromo) by native speakers and then back translated to English by two other language experts to check for its consistency. Five diploma nurses and two-degree nurses (who were competent in Afan Oromo) were recruited to collect data and to supervise the data collection processes respectively. Data collectors and supervisors were given one day training by principal investigators on the purpose of the study, on the instruments and procedures used, on issues related to methods used and ethical considerations. The pretest of the instrument was carried out in 5% of the sample in Gobu Guda kebele which was not selected for this study.

The completeness and consistency of data was assured through direct and daily supervision by the supervisors and principal investigators. They returned to interviewers if the data were incomplete and inconsistent. Interviewers re-administered the questionnaire to the respondent under supervision by the supervisor.

Study Variables

Stunting, wasting and underweight among infants and young children aged 6 months to 24 months old were considered as the outcome variables and others like socio-demographic characteristics of the child and their mother/care taker, children health status, environmental and sanitation related factors and dietary related factors were considered as independent variables.

Data processing and analysis

The collected data entered into Epi-Info version 7 software and then, exported to SPSS version-21 for analysis. Before analysis, data was checked for incompleteness and inconsistency, then cleaned, composite indexes were computed and recoded after missing values and extreme values/outliers were identified and avoided.

Then, descriptive statistics was used to describe the sample as per the studied characteristics.

Bivariate logistic regression was carried out to see the association of each independent variable with the three outcome variables separately (stunting, wasting and underweight). Independent variables with p- values below 0.2 remained in to the final model (multivariate logistic regressions). Model fitness was assessed using Hosmer and Lemeshow test (p=0.896). Collinearity between independent variables were checked and not found. Odds Ratios was generated for each variable and the independence of any association was controlled by entering all variables into the model using backward stepwise method (backward conditional). The magnitude of the association between the independent variables in relation to child stunting, wasting and underweight was measured using adjusted odds ratios (AOR) and 95% confidence interval (CI) and P- values below 0.05 was considered statistically significant.

Operational definition

Under nutrition: A deficit (Z-score below -2SD) from the WHO reference of the median of the standard curve in any one of WAZ, HAZ and WHZ reflects under-nutrition [UNICEF, 2013 & UN, 2017].

Underweight: Weight-for-age (WAZ) was found to be (Z-score below -2SD) [UNICEF, 2013 & UN, 2017].

Stunting: Height/length for age (HAZ) index was found to be (Z-score below -2SD) [UNICEF, 2013 & UN, 2017].

Wasting: Weight-for-height/length (WHZ2) was found to be (Z-score below -2SD) [UNICEF, 2013 & UN, 2017].

Household food insecurity: Nine standard HFIAS occurrence questions developed and recommended by FANTA 2007 guideline were asked to women (in past 28 days) and HH was food secured when all items were answered 'NO' or HFIAS scored<1 and food insecure otherwise [Jennifer Coates AS, 2007].

Dietary diversity: The number of food items consumed by the children/household from recommended food groups. For household 12 food groups were included (cereals), (roots and tubers), (vegetables), (fruits), (meat, poultry,), (eggs), (fish and seafood),(pulses/legumes/nuts), (milk and milk products), (oils/ fats), (sugar/honey) and (miscellaneous). For children 8 food groups were included (grains, roots or tuber), (vitamin A-rich plant foods), (other fruits or vegetables), (meat, poultry, fish, seafood), (eggs), (pulses/legumes/nuts), (milk and milk products) and (foods cooked in oil/fat) [FAO, 2013].

Dietary diversity score: It is the sum of food groups eaten in a 24 hour period, serves as a proxy indicator of nutrient adequacy and quality for children and economic ability of household to get variety of food items. Low score (The proportion of children aged 6-59 months who received three and

less than three food groups of the eight food groups), medium score (4 and 5 food groups) and high score (greater than 6 and more food group) [FAO, 2013].

Result

Socio demographic, economic and cultural characteristics

A total of 379 children aged 6-24 months were participated, which makes the response rate 100%. Out of the total 379 surveyed children, 267 (70.4%) were found in the age group of 12-24 months with a mean age of 15.07 month. Regarding sex, 200 (52.8%) of the study participants were females and 179 (47.2%) were males. In 16 (4.2%) of households, there were two and more children aged below 24 months. Protestant and orthodox were the dominant religions in this study which was 186 (49.1%) and 116(30.6%), respectively. Oromo was the dominant ethnicity 358 (94.5%). In this study 374 (98.7%) of the respondents were parents and 145 (38.3%) of mothers/care takers attended primary education and above. Concerning the occupation of mothers/care takers, majority 338 (89.2%) were house wife [table 1].

Table 2: Socio demographic characteristics of infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018.

Variables	*Frequency*	*Percent (%)*
Age of the child in Month (n= 379)		
6-<12	11	29.6
12 -24	26	70.4
Mean age		15.07
Sex of child (n=379)		
Male	17	47.
Female	20	52.
Under 24 months children in HH (n=379)		
< 2	36	95.
>=2	16	4.2
Religion of parents/care takers (n=379)		
Orthodox	11	30.
Muslim	77	20.3
Protestant	18	49.1
Ethnic group (n=379)		
Oromo	35	94.
Amhara	21	5.5
Educational status of mothers (n=379)		
Unable to read and write	15	40.
Read and write	80	21.
Primary	12	32.
Secondary and above	21	5.5
Occupation of mothers/care takers (n=379)		
House wife	33	89.
Farmer	5	1.3
Merchant	24	6.3

Private employee	4	1.1
Government employee	8	2.1
Marital status (n=379)		
Married couple	36	96.
Divorced	4	1.0
Widowed	8	2.1
Separated	1	0.3

Water, sanitation and hygiene characteristics

The source of water for 283(74.7%) of the households, from which children were, is protected spring well and 350(92.3%) the households were using above 20 liters of water per day. Three hundred fifty nine (94.7%) of the mothers/caretakers were washing their hand whenever they feed their child. Three hundred and fifty eight (94.5%) of the house hold had access to latrine and all of the latrines available were pit type. Two hundred thirty two (61.2%) of the households were disposing their domestic waste on open field. Three Hundred seventy (97.6%) of the house hold have separated kitchen for cooking [table 2].

Table 2: Water, sanitation and hygiene characteristics of infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018.

Variables	*Frequency*	Percent
Source of water (n=379)		
Pipe	45	11.9
Protected spring	283	74.7
Unprotected spring	51	13.5
Amount of water used per day (n=379)		
<=20L	29	7.7
>20L	350	92.3
Hand washing while feeding child (n=379)		
Yes	359	94.7
No	20	5.3
Latrine availability (n=379)		
Yes	358	94.5
No	21	5.5
Waste disposal system (n=379)		
Open	232	61.2
In Pit	108	28.5
Common pit	33	8.7
Burning		1.6

Dietary intake and feeding practice

Three hundred and seventy eight (99.7%) of the infants and young children were breast fed. Similarly, 333 (87.9%) initiated breast feeding within the first hour after delivery. About 265 (70.1%) of the infants and young children were exclusively breast fed for six month and 265 (70.1%) introduced complementary food at 6 month. Moreover, 336 (88.7%) of the infants and young children's first complementary food was milk and 193 (51%) used bottle for child feeding

followed by cup and spoon feeding 151 (39.8%) [Table 3].

Table 3: Feeding practice as reported by mothers/caretakers of infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018.

Variable	*Frequency*	Percent
Child Breast feeding status (n=379)		
Yes	378	99.7
No	1	0.3
Initiation of breast feeding (n= 378)		
Within the first hour of delivery	333	88.1
Within 8 hour of delivery	44	11.6
Don't know	1	0.3
Age starting complementary feeding (n=378)		
Before 6 month	101	26.7
At 6 month	265	70.1
After 6 month	12	3.2
First complementary food child received (n=379)		
Milk	336	88.7
Porridge	43	11.3
Means of child feeding (n=379)		
Hand	35	9.2
Bottle	193	51
Cup and spoon	151	39.8

Three hundred fourth four (90.8%) of infants and young children consumed cereal based foods within 24 hours prior to the survey. Three hundred thirteen (82.6%) of the study participants consumed roots and tubers. Two hundred seventy three (72%) of study participants consumed dark green leafy vegetables within 24 hours prior to the survey. Two hundred forty seven (65.2%) of study participants consumed fruits. Two hundred fifty (66%) of infants and young

children had dietary diversity score less than or equal to five food groups and hence achieved low dietary diversity score [table 4].

Table 4: Dietary Diversity as reported by mothers/caretakers of infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018.

Food item consumed	*Frequency*	Percent (%)
Cereals		
Yes	344	90.8
No	35	9.2
Roots and Tubers		
Yes	313	82.6
No	66	17.4
Vegetables		
Yes	273	72
No	106	28
Fruits		
Yes	247	65.2
No	132	34.8
Meat		
Yes	215	56.7
No	164	43.3
Eggs		
Yes	190	50.1
No	189	49.9
Milk and Milk product		
Yes	253	66.8
No	126	33.2
Oils and fats		
Yes	141	37.2
No	238	62.8
Sugar , honey or sweet/soft drink		

Yes	74	19.5
No	305	80.5
Dietary diversity score		
Low(≤5 food groups)	250	66
High (more than 5 food groups)	129	34

Maternal and child care characteristics

Three hundred and fifty five (93.7%) mothers had ANC follow up during their previous pregnancy and three hundred twenty (84.4%) of them gave birth at health facilities. Three hundred seventy seven (99.5%) of the infants and young children had ever received vaccination and out of those who received vaccination, 271(71.5%) were fully immunized. Three hundred sixteen (83.4%) of the young children had received vitamin A supplementation [table 5].

Table 5: Maternal and child care characteristics in Gida Ayana Woreda, East Wollega, Ethiopia, 2018

Variables	*Frequency*	*Percent (%)*
ANC follow up (n=379)		
Yes	355	93.7
No	24	6.3
Place of delivery (n=379)		
Home	59	15.6
Health facility	320	84.4
Child ever received vaccination (n=379)		
Yes	377	99.5
Don't know	2	0.5
Fully Immunized (n=379)		
Yes	271	71.5
No	108	28.5
Vitamin A supplementation in the last 6 months (n=379)		

Yes	316	83.4
No	63	16.6
Measles infection in the last 2weeks(n=379)		
Yes	17	4.5
No	362	95.5
Cough in the last 2weeks(n=379)		
Yes	37	9.8
No	342	90.2
Diarrhea in the last 2 weeks (n=379)		
Yes	62	16.4
No	317	83.6

Prevalence of Stunting, Wasting and Underweight among assessed infants and young children

In this study, the results for the level of child nutrition status are presented using three common anthropometric indicators: Length/height-for-age (HAZ), weight-for-age (WAZ), and weight-for-height/Length (WHZ) Z-scores. Accordingly, the study revealed that the prevalence of stunting (< –2HAZ), underweight (< –2WAZ) and wasting (< –2WHZ) is 35.9 %(95% CI: 31.1-40.7), 24.8 %(95% CI: 20.5-29.2) and 12.4 %(95% CI: 9.1-15.7), respectively [table 6].

Table 6: Magnitude of stunting, wasting and underweight among infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018

Under nutrition	*Frequency*	*Percentage (%)*	*95% CI*
Stunting	136	35.9	31.1,40.7
Wasting	47	12.4	9.1,15.7
Underweight	94	24.8	20.5,29.2

Factors associated for malnutrition among assessed infants and young children

In this study average complementary feeding initiation time showed statistically significant association with stunting i.e. infants and children started complementary feeding after 6 months of life were 2.072 times more likely to be stunted compared to those who initiated complementary feeding at 6th month (AOR=2.072, 95% CI: 1.215, 3.536) [table 7].

Table 7: Factors associated to stunting among infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018

Variable	*Stunting*		*COR(95%CI)*	*AOR(95%CI)*	*P-Value*
	Yes	No			
Age at infant/child started complementary food					
Before 6 month	50	63	0.659(0.392-1.107)	1.518(0.904-2.550	0.115
After 6 month	50	86	0.483(0.283-0.823)	2.072(1.215-3.536)*	0.008
At 6 month	36	94	1	1	
Educational status of mother					
Illiterate	54	99	0.358(0.121-1.058)	1.135(0.527-2.444)	0.746
Read and write	33	55	0.373(0.122-1.140)	1.032(0.457-2.332)	0.940
Primary	36	68	0.358(0.118-1.086)	1.159(0.525-2.605)	0.702
Secondary and above	13	21	1	1	
ANC Visit					
Yes	130	225	1	1	
No	6	18	0.577(0.223-1.490)	1.733(0.671-4.47)	0.256
Vitamin A supplementation					
Yes	120	196	1	1	
No	16	47	0.568(0.308-1.048)	1.760(0.954-3.24)	0.070
Immunization status					

No	34	74	0.761(0.474-1.224)	1.314(0.81-2.112)	0.260
Yes	102	169	1	1	
Monthly family income in birr					
Less than 2000	42	71	0.924(0.585-1.459)	1.082(0.68-1.70)	0.734
Greater than 2000	94	172	1	1	

***statistically significant at P value <0.05**

In this study average complementary feeding initiation time showed statistically significant association with wasting i.e. infants and young children started complementary feeding after 6 months of life were 2.42 6times more likely to be wasted compared to those who started complementary feeding at 6^{th} month (AOR=2.426, 95% CI: 1.077, 5.463). In this study average family income of households of the respondents showed statistically significant association with wasting i.e. infants and young children their household monthly income Less than or equal to 2000 Ethiopian birr were 3.151times more likely to have wasting compared to those who have greater that 2000 birr monthly income (AOR=3.151, 95% CI: 1.691, 5.873). Age of infants and child also showed statistically significant association with wasting. Infants and young children 12 months to 24 months old were 7.549 times more likely to have wasting compared to those who were below 12 months old (AOR=7.549, 95% CI: 3.846, 14.815). Immunization status of study participants also showed statistically significant association with wasting. Infants and young children who not fully immunized were 5.747 times more likely to be wasted compared to their counterparts (AOR=5.747, 95% CI: 3.010, 10.973). Infants and young children who had cough prior to 2 weeks of the survey were 2.571times more likely to have wasting compared to their counterparts (AOR=2.571, 95% CI: 1.129, 5.857). Infants and young children who bottle fed were 2.217 times more likely

to have wasting compared to those fed by cup and spoon (AOR=2.217, 95% CI: 1.096, 4.481) [table 8].

Table 8: Factors associated to wasting among infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018

Variable	Wasting		COR(95% CI)	AOR(95%CI)	P-Value
	Yes	No			
Age at complementary food started					
Before 6 month	19	94	0.412(0.183-0.929)	1.831(0.811-4.130)	0.145
After 6 month	18	118	0.755(0.375-1.519)	2.426(1.077-5.463)*	0.032
At 6 month	10	120	1	1	
Monthly family income in birr					
Less than or equal to 2000	25	88	0.317(0.170-0.592)	3.151(1.691-5.873)*	0.000
Greater than 2000	22	244	1	1	1
Age of infants and child in month					
6- <12	33	79	1	1	
12-24	14	253	0.132(0.067-0.260)	7.549(3.846-14.815)*	0.000
Infants and child Immunization Status					
No	30	78	0.174(0.091-0.332)	5.747(3.010-10.973)*	0.000
Yes	17	254	1	1	
Cough					
Yes	9	28	0.389(0.171-0.886)	2.571(1.129-5.857)*	0.02
No	38	304	1	1	
ANC visit					
Yes	41	314	1	1	
No	6	16	0.392(0.147-1.043)	2.553(0.959-6.799)	0.061
Place of delivery					
Home	5	24	0.532(0.205-1.380)	1.878(0.725-4.866)	0.194

Health facility	41	308	1	1	
Method to infant /child feeding					
Hand	4	30	0.669(0.202-2.214)	1.495(0.452-4.946)	0.510
Bottle	31	162	0.451(0.223-0.912)	2.217(1.096-4.481)*	0.027
Cup and spoon	12	139	1	1	

*** Statistically significant at P value <0.05**

Family size was significantly associated with Infants and young children under weight. Infants and young children who were from households having family member of equal to or greater than five were 1.930 times more likely to have underweight compared to those who were from less than five family size (AOR=1.930, 95% CI: 1.160, 3.211). Infants and young children their household monthly income less than or equal to 2000 birr were 1.677 times more likely to be underweight compared to those who had greater that 2000 birr monthly income (AOR=1.677, 95% CI: 1.026, 2.740) [table 9].

Age of infants and child also showed statistically significant association with underweight. Infants and young children 12 months to 24 months old were 5.641times more likely to have underweight compared to those who were below 12 months old (AOR=5.641, 95% CI: 3.413, 9.324). Immunization status of study participants also showed statistically significant association with infants and young children underweight. Infants and young children who not fully immunized were 3.236 times more likely to be underweight compared to their counterparts (AOR=3.236, 95% CI: 1.979, 5.293). Infants and young children not received vitamin A supplementation were 2.073 times more likely to be underweight compared to their counterpart (AOR=2.073, 95% CI: 1.161, 3.700) [table 9].

Table 9: Factors associated to underweight among infants and young children aged 6 to 24 months in Gida Ayana Woreda, East Wollega, Ethiopia, 2018

Variable	Under weight		*COR(95%CI)*	*AOR(95%CI)*	*P-Value*
	Yes	No			
Number of family member					
< 5	68	164	1	1	
>= 5	26	121	0.518(0.311-0.862)	1.930(1.160-3.211)*	0.011
Monthly family income in birr					
Less than 2000	36	77	0.596(0.365-0.975)	1.677(1.026-2.740)*	
Greater than 2000	58	208	1	1	1
Age of child in month					
6- <12	55	57	0.177(0.107-0.293	5.641(3.413-9.324)*	0.000
12-24	39	228	1	1	
Immunization status					
No	45	63	0.309(0.189-0.505)	3.236(1.979-5.293)*	0.000
Yes	49	222	1	1	
Diarrhea					
Yes			0.533(0.259-1.097)	1.875(0.911-3.85)	0.088
No			1	1	
Vitamin A supplementation					
Yes	70	246	1	1	
No	23	39	0.483(0.270-0.861)	2.073(1.161-3.700)*	0.014

***Statistically significant at P value <0.05**

Discussion

In this study, the prevalence of stunting was 35.9% (95% C.I 31.1-40.7) which was found to be consistent with the regional prevalence of Oromiya which is 36.5% [Central Statistical Agency, 2016]. But it is lower than a studies conducted among same age group in Dabat; Northern Ethiopia (58.1%), Tigray ;Northern Ethiopia (42.7%), Haramaya; Eastern Ethiopia (42.7%), Hawassa; Southern Ethiopia (45.8%), North Shewa ;Central Ethiopia (47.6%) and Bangladesh (41%) respectively [Derso et al.,2017, Asegedech Hagos,2014, Fuad Redi GEaAK,2017, Dereje Danbe Debeko,2017, Mengistu K et al. ,2013 & AM Shamsir Ahmed et al , 2012]. This inconsistency might be due to the difference in socio economic characteristics, health service delivery, and study area and study period. Our finding related to magnitude of stunting was found to be higher than the studies done among infants and young children in Cameroon (30.47 %), Somali Region (17.5 %) and Iran respectively [Mengistu K et al., 2013, Kana sop MM G et al, 2013, Mahyar A, et al., 2010] which could also be due to difference in socio economic characteristics, health service delivery, study area and study period.

In our study, the magnitude of wasting was 12.4% (95% C.I 9.1-15.7). This finding is similar with the study conducted in Sodo Zuria; southern Ethiopia which showed11.1% prevalence of wasting among children [Tufa et al., 2018]. But higher that the study done Lalibela town; Northern which showed 8.9 % prevalence of wasting among children [Yalew BM, Amsalu F, Bikes D, 2014]. Our finding of 12.4% prevalence of wasting is much lower that the study conducted in Kilimanjaro region; Tanzania (24.7%) [Melina Mgongo A, et al, 2017]. This dissimilarity may be due to the difference in study area and setting.

In our study, the magnitude of underweight was 24.8 % (95% C.I20.5-29.2) which is similar with study done in Lalibela town; Northern Ethiopia (25.6%)[Yalew BM, Amsalu F, Bikes D,2014]. But this finding is higher than the finding of study done in Sodo Zuria; southern Ethiopia which was 14.0%. Our finding is also lower than the study done in Kilimanjaro region; Tanzania (46.0%) [Melina Mgongo A, et al., 2017].

In our study, there was significant association between the age at child started complementary feeding and stunting. The odds of stunting among infants and young children who started their complementary food after 6 months of life were 2.072 at increased risk to be stunted than those infants and young children started their complementary food at 6 months of life (AOR= 2.072, 95%CI :1.215, 3.536). This could be due to the fact that in the first six month of life, all the infant's nutritional needs are met by the mother's breast milk, but from the age of six month onwards breast milk alone can't provide the entire nutrient. This could affect the growth of the child. This finding is consistent with the study conducted in Dabat; Northern Ethiopia which showed that children started their complementary food after 6 months of life were more likely to be stunted than those started at 6 months [Derso et al, 2017].

In this study there was also statistically significant association between age at complementary food started and wasting. The odds of infants and young children who started complementary food after 6 months of life were 2.426 times at increased risk to be wasted than those who started at 6 months of life(AOR= 2.426, 95%CI :1.077, 5.463). This finding is consistent with the study conducted in Sodo Zuria district; southern Ethiopia [Tufa et al., 2018].

Family/household income was significantly associated with wasting among infants and young children. Infants and young children whose family

income less or equal to 2000 Ethiopian birr per month were 3.151times more likely to be wasted than those having greater 2000 Ethiopian birr monthly income (AOR=3.151,95%CI:1.691, 5.873). This finding is similar with the studies done in Gobu Seyo, Northern Ethiopia, Hindabu Abote, which showed association between low-income and infants and young children wasting [Getu Tolera DW et al., 2014, Ergib Mekbib AS, 2014, Kebede Mengistu, 2013].

There was also a significant association between age of infants and young children and Wasting. Infants and young children 12-24 months old were 7.549 times at increased risk to be wasted than those in age group 6-<12 months old (AOR= 7.549, 95% CI: 3.846, 14.815). This could be due to the reason that physiological needs of this age group for growth and development in which the nutrient is highly required. This finding was in agreement with the studies conducted in Guto Gida: western Ethiopia, a systematic review conducted in Sub-Saharan Africa and other studies done in Somali region: Ethiopia [Alemu Adeba et al, 2014, Blessing J. Akombi et al., 2017, Fekadu et al., 2015].

Our study also infants and young children wasting and underweight showed statistically significant association with number of infants and young children in the household and bottle feeding. Infants and young children who bottle fed were 2.217 times more likely to have wasting compared to those fed by cup and spoon (AOR=2.217, 95% CI: 1.096, 4.481). Infants and young children who were from households having family member of equal to or greater than five were 1.930 times more likely to have underweight compared to those who were from less than five family size (AOR=1.930, 95% CI: 1.160, 3.211). This finding was also similar with the studies conducted in Lalibela Town, Northern Ethiopia, a systematic review conducted in Sub-Saharan Africa and other

study done in Somali region: Ethiopia [Blessing J. Akombi et al., 2017, Fekadu et al., 2015].

The odds of underweight among infants and young children who didn't receive vitamin A prior to 6 months of this survey were 2.073 times at an increased risk when compared to infants and young children who received vitamin A prior to 6 month of this survey. (AOR =2.073, 95% CI: 1.161, 3.700) which is similar with the study conducted in southern Ethiopia [Dereje Danbe Debeko, 2017].

Study limitations

Despite our efforts to cover wide range of risk factors, there were variables unmeasured such as laboratory assessment of some nutritional relevant diseases including intestinal parasites. Most data on exposure variables were obtained by Mother/care taker self-report which could be potential for recall biases. Social desirability biases might also occur as some of the questions were culturally sensitive to study participants. The study was not also triangulated with qualitative data.

Conclusion

In this study, magnitude of stunted, underweight and wasted among infants and young children aged 6 months to 24 months in the study area were 35.9%, 24.8 % and 12.4 % respectively. Started complementary feeding after 6 months was the only variables showed statically significant association with infants and young children stunting. Started complementary feeding after 6 months, family monthly income, age of infants and young children, immunization status of infants and young children, cough within 2 weeks of the survey among infants and young children and method of infant and child feeding were predictors of infants and young children wasting. Family size, family monthly income, age of infants and young children,

immunization status of infants and young children and vitamin A supplementation were factors associated to infants and young children underweight.

Recommendation

Based on the findings of the study the following recommendations were given to responsible stakeholders. In general, Ethiopian federal Ministry of health, Oromia regional health bureau, East Wollega zone health department, Gida Ayana District health office, health institutions and health professionals working in the district, and non-governmental partners working on child health should focus on sustainable and intensive behavioral change communication to the community about under nutrition and its health consequences during this very critical period.

Gida Ayana District health office and health institutions in the district should focus on sustainable and intensive behavioral change communication for the community about appropriate feeding practice and health care to infant and young children. They better also focus on strengthening ongoing therapeutic and targeted supplementary feeding programs to carefully address chronically malnourished children. Active nutritional surveillance needs to be done continuously so that problem of under nutrition will be early recognized. Health extension workers working in the district should strengthen giving nutrition education to create awareness about better feeding behavior among the community.

The community should also carefully consider infant and young children age and their food requirement while feeding them, the problem of late and early initiation of complimentary feeding and importance of recommended frequency of infant and young children feeding.

Declaration

Ethical consideration

Ethical clearance was obtained from Institutional Review Board (IRB) of Arsi University College of Health Sciences. Letter of permission to conduct the study was obtained from East Wollege zone, Gida Ayana district and all selected kebeles. Before data collection, the participants were informed about the purpose of the study, their right to refuse participation and discontinue the interview/measurement. The interviewers discussed the issue of confidentiality and obtained verbal consent from all mother/care takers of the selected infants and young children before actual data collection. In addition, any identification information including the name of the participants was not written in the questionnaire. Undernourished infants and young children were linked to local nutritional programs in the area. Verbal Consent was also obtained from all mother/care takers of the selected infants and young children about to publish the data collected.

Availability of data and materials

Data sets supporting the finding of this research are included in to the manuscript. For the detail corresponding author of this study can be reached through the under put email address; Gebi Husein Jima (gebihussein@gmail.com).

Competing Interest

The authors declare that there is no conflict of interests.

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Authors' Contribution

Bayisa Ayana Erena involved in proposal writing, designing, recruitment and training of supervisors & data collectors, analysis & write-up of the paper. Gebi Husein Jima contributed in conception, designing of the project proposal & methodology, led the study, design of questionnaires, supervised and involved in the analysis stage of the project, final approval of the research and preparation of the manuscript. Both authors read and approved the final manuscript.

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