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Dietary Patterns and Anthropometric Status of Under-Five Children in Arba Minch Zuria, Gamo Gofa Zone: Community-Based Cross-Sectional Study

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Abstract

Background: Malnutrition continues to be a major public health problem in developing countries. The problem is very significant among infant and young children. Although malnutrition is remarkably responsible for childhood death, the contributing factors are not well studied in the study area. Therefore, this study aimed to assess dietary patterns and anthropometric status of under-five children in Arba Minch Zuria, Gamo Goffa Zone, Southern Ethiopia.

Methods: This cross-sectional study was conducted on child-mother-pairs in Arba Minch Zuria from February-July, 2012. Quantitative data were obtained from sample of 762 respondents by using pretested questionnaires and observational checklists. Qualitative data were collected by using in-depth interviews with tape recorder. Socio-demographic status, maternal and child characteristics, child feeding practices, anthropometry and dietary diversity were assessed.

Results: Breastfeeding is considered as natural gift in this community. About 95.8% of mothers had ever breastfed their children. More than half of mothers (57.3%) initiated breastfeeding within first hour of delivery and small number 78(10.2%) of mothers discarded colostrum. About 60.4% of mothers exclusively breastfed their children to 5-6 months. Majority of (74.5%) children had diets in the lowest dietary diversity group (<3 food groups), 16% of the children had diets in the medium dietary diversity group (4-5 food groups). Thirteen percent of the children are wasted and 45.9% of them are stunted. Stunting was significantly associated with number of under-five children, lack of paternal education, not exclusive breastfeeding and lack of dietary diversity. More than one-fourth (25.7%) of children are underweight which significantly associated with lack of dietary diversity, lack of maternal and paternal education.

Conclusions: Behavioral change communications on key optimal child feeding behaviors need to be given in this community to maximize the effect of global and national infant and young child feeding recommendations. In addition, consumption of different types of food and nutrition education interventions that address the dietary diversity issues of the study area are urgently required in the study participants.

Keywords: Under five; Malnutrition; Factors; Anthropometric status; Arba Minch Zuria

Introduction

Globally, 60% of the child deaths occur due to unfitting feeding practices and infectious disease where two-thirds of these deaths are accounted to sub-optimal breast feeding practices [1]. Especially, in developing countries seventy percent of children were typically supplemented with non-breast milk liquids within few weeks of birth [2-4].

Sub-optimal feeding practices are major determinants of the risks of malnutrition in infant and young children [5,6]. Children are most vulnerable to malnutrition in developing countries because of inadequate dietary intakes, lack of appropriate care and inequitable distribution of food within the household. Inadequate dietary intake increases susceptibility to disease and may lead to several forms of malnutrition in children [7,8].

Appropriate infant feeding practices have short and long-term health outcomes in individual, social and economic development of the nation [6,9,10]. Mothers and babies should stay together and provided the support they need to maintain the appropriate child feeding option under the difficult circumstances [1,6,10]. Children who are not breastfeed properly have repeated infections, grow less and are more likely to die by the age of one month than children who receive at least some breast milk [7,11,12].

WHO and UNICEF identified the main cause of malnutrition into basic causes, underlying causes and immediate causes. All these problems result in, insufficient household food security; poor maternal and child care; insufficient health services and poor environmental sanitation which in turn can affect infant and young child feeding practices [2,13].

Many observational studies, both in developing and developed countries, showed that exclusive breastfeeding to six months, continued partially breastfeeding and the timely transition to adequate complementary food is basic to deliver physiological and economic benefits to mothers and to promote balanced dietary intakes, growth,

development and to keep health of a child [6,11]. Introducing solid foods into an infant's diet is recommended at about six months because at that age breast milk is no longer adequate in meeting a child's nutritional needs to promote optimal growth [2,14].

Ethiopia ranks third in Africa for the prevalence of stunting at 18 months, after Madagascar and Zambia. It is the same level as some of the poorest countries of Asia, such as Bangladesh and Nepal [5]. In Ethiopia infant and young child malnutrition is highly associated with poverty, food insecurity and low access into health care which result in an inadequate infant and young child feeding practices and high levels of infectious disease [2,7,12].

In Ethiopia, malnutrition is reported to be responsible for about 57% of all under five deaths particularly in combination with abrupt cessation of breastfeeding, diarrhea, malaria or measles, but it is closely linked to inappropriate feeding practices and food insecurity [7]. The prevalence of malnutrition differs across the regions of Ethiopia. For instance stunting ranges from 18% in Addis Ababa to 52% in the Southern Nations Nationalities and Peoples Regional State (SNNPR) [12]. As nutritional status can vary by background characteristics, there is a need to investigate underlying variations of these nutritional indicators and determinant factors among different localities or residences for proper priority setting and interventions. Hence, this study being the first of its kind in the woreda will provide baseline information for any nutritional intervention programs in the area. The result of this study can also serve as reference in priority setting, designing effective nutritional programs to address the problem and its consequences.

Methods

Study setting and sampling procedure

After official permission from an ethical clearance committee of Arba Minch University, College of Medicine and Health Sciences obtained a cross-sectional community based study was carried out from January to February, 2012 in Arba Minch Zuria, Southern Ethiopia. Arba Minch Zuria is located in the Southern Nations, Nationalities and Peoples' Region of Ethiopia, which is a part of the **Gamo Gofa Zone,** located in the Great East African Rift Valley. There are 31 kebeles (Administrative units) in Arba Minch Zuria and 9 kebeles (Administrative units) were randomly selected. Simple random sampling technique was employed to select the kebeles. Mothers who had children aged from 6 months to 5 years and permanent resident of selected kebeles were identified using the most recent population registration data base. Finally simple random sampling technique was employed to take the mothers-child pairs from each selected kebele.

10 key informants were also selected purposely for in-depth interview to capture their first-hand knowledge about a topic of interest. The selection was done based on their role in community.

The sample size was calculated using a formula for estimation of single proportion as follows:

$$n = \frac{\left((Za/2)^2 p(1-p)\right)}{d^2}$$

Where Z=Standard normal variable at 95% confidence level (1.96)

P=Estimated proportion of sub-optimal child feeding, 50%

d=0.05 (5% margin of error)

Considering design effect, the total sample size was multiplied by two, 2 × 384=768

This study included mothers who had children aged from 6 months to 5 years and permanent resident of selected kebeles. Mothers who come to visit their parents were not included.

Data collection procedure

Data were collected after getting official permission from Arba Minch Zuria administration. Informed verbal consent was obtained from each study participant after the objective of study and confidentiality were clearly explained.

This study used an interviewer administered questionnaires and in-depth interview questionnaires. The survey included questions concerning socio-demographics, maternal and child characteristics, dietary diversities, child feeding practices and environmental health conditions. Data were collected by trained Health Extension Workers.

The in-depth unstructured interview was used to generate descriptions of women's knowledge, experiences and perceptions of infant feeding. This allows each participant to contribute her own knowledge of infant feeding within broadly defined research themes. Initially, open ended questions was used to follow research themes, then followed up using the participants own words and phrases as a means of generating further information. All interviews were conducted by the interviewer in the participant's home. Audio tape recorder was used with the consent of each individual and then transcribed as verbatim. The interviewer probed for feelings, opinions and views of the key informants. Both quantitative and qualitative questionnaires were prepared in English and translated to Amharic. Then it was translated back to English language by another person who can speak both languages. The questionnaire was pre-tested for its understandability by selecting some subject before the data collections begin. Based on a pretest additional adjustment was made in terminologies and formatting of questionnaires. Anthropometric measurements like weight, height and length was taken to determine the nutritional status of the children. The weight of the children was measured by digital scales. Length/height of children was measured by a length/Height board. Children under 2 years of age were measured lying down (length) and older children were measured standing up (height). Every completed questionnaire was handled by supervisors and the principal investigator who monitored the overall quality of the data collection.

Data analysis procedure

Data were entered and analyzed using SPSS for windows version 16.0. Descriptive statistics were presented using standard statistical parameters such as percentages, means and standard deviations. Logistic regression analyses were done to see the strength of associations between dependent and independent variables using odds ratios and 95% of confidence intervals. Qualitative data were analyzed by system of open coding which involves sorting the data into analytical categories by breaking down, examining, comparing and categorizing data. These categories of data were compared and contrasted to generate themes from the analysis and discussion. On completion of the research, participants were invited to provide comments on final narrative. Finally the result was presented in triangulation with the quantitative findings. We assessed the

nutritional status using WFA, WFH, and HFA based on NCHS/WHO reference value. If WFA<-2SD, WFH<-2SD and HFA<-2SD the child was underweight, wasted, and stunted respectively.

Results

Out of 768 selected participants, 762 (99.23%) respondents gave complete response. The majority of mothers 749 (98.29%) were married. More than two-third (67.2%) of households had a family size less than 5 people. Four-hundred (56.3%) mothers did not attend formal education. A large proportion of households 556 (73%) had their own land. Four-hundred twenty nine (56.3%) mothers gave birth with the help of traditional birth attendants where majority of them 735 (96.5%) gave birth at home. The majority (27.6%) of children were 25-36 months (Table 1).

Variable	Frequency	Percent
Maternal age (in years)		
15-20	38	5
21-30	451	59.3
31-40	230	30.2
>40	43	5.6
Current marital status		
Married	749	98.3
Unmarried	13	1.7
Family size		
<5	250	32.8
>5	512	67.2
Infant age		
6-12 month	168	22
13-24 months	185	24.3
25-36 months	210	27.6
37-48 months	162	21.3
> 49 months	37	4.9
Delivery assistant		
TBA	429	56.3
Health workers	89	11.7
Others1	244	32
Attended ANC		
Yes	635	83.3
No	127	16.7
Religion		
Protestant	486	63.8
Orthodox	249	32.7
Muslim	27	3.5
Mothers' occupation		
House wife	750	98.4
Traders	12	1.6
Farm land owners		
Yes	556	73
No	206	27
Ethnicity		
Gamo	609	79.9
Wolaita	36	4.7
Others	117	15.4
Source of drinking water		
Unprotected spring	58	7.61
Protected spring and piped water	542	71.13
Surface water	162	21.26
1Relatives, Neighbor		

Table 1: Socio-demographic characteristics of respondents in Arba Minch Zuria, 2012.

Our results showed that 95.8% of mothers had ever breastfed their children (Table 2). In-depth interviews with the majority mothers showed that breastfeeding is considered as a natural gift. Some mothers reported that an infant should be breastfed for there was no better food rather than breast milk for newborn infants. Some verbatim expressions of the mothers which represent this idea were:

"Breast feeding is natural practice; it is a gift for newborn infants..."

More than half of mothers (57.3%) initiated breastfeeding within the first hour of delivery. Qualitative data also revealed that some women initiated breastfeeding within one hour of delivery since they gave birth with the aid of health workers. Some direct verbatim assertions which represent this idea where:

"…I started breastfeeding soon after I gave birth, because health extension workers assisted me."

The majority of mothers (60.4%) were exclusively breastfed their children to 5-6 months. The proportion exclusive breastfeeding decreased as the babies grew older. At the end of the first month of life the proportion of exclusive breastfeeding were 92.7% which dropped to 60.4% at age of 5- 6 months. Similarly, in-depth interview findings showed that majority of women who had information about exclusive breastfeeding were not early introduced complimentary food before six months.

"…breast milk is sufficient for infants to six months; early introduction of additional food can cause diarrhea and other disease."

However, some mothers reported that they couldn't provide only breast milk to their children due to field and home activities like collecting wood and food preparation. Twenty years breast feeding mothers said:

"…I have no time to provide only breast milk for my child since I have no body who share both home and field activities..."

Variables	Frequency	Percent
Ever breastfed		
Yes	730	95.8
No	32	4.2
Initiation of breastfeeding		
Within one hour	437	57.3
After one hour	285	37.4
Unknown	40	5.3
Exclusive breastfeeding by month		
0-2	77	11.1
3-4	138	18.1
5-6	460	60.4
>7	87	11.4
Giving colostrum		
Yes	684	89.8
No	78	10.2
Pre-lacteal feeding		
Yes	56	7.35
No	706	92.65
Type of pre-lacteal food		
Milk	9	16.11
Water	23	41.12
Butter	6	10.73
Others*	18	32.14
Giving additional food		
0-2 months	72	9.4
3-4 months	177	23.2
5-6 months	401	52.6
>7 months	112	14.7
Method of giving fluids/foods		
Bottle	17	2.2
Spoon	105	13.8
Cup	249	32.7
Others**	356	51.3
*Fenugreek, Tena-addam (rue), Fruits		

Table 2: Child Feeding Pattern in Arba Minch Zuria, 2012.

Some women provided prelacteal feeds because of traditional influences. The key informant interviews indicated that infants were given butter, water and others soon after birth. They believed that it cleanses the stomach of the child. In addition some mothers gave cow's milk, fruits and vegetables after a few days of infant birth.

"…He is not satisfied with breast milk; he cried a lot since he couldn't get sufficient breast milk…"

More than half (52.6%) of mothers provide additional food at the age of 5-6 months. Mothers who introduced complementary food used instruments like cup 249(32.7%), bottle 17(2.2%) and spoon 105 (13.8%) (Table 3).

Food groups	n	%
Fruits	415	54.46
Vegetables	175	16
Legumes and nuts	298	39.11
Cereal products	490	64.30
Roots and tubers	356	46.72
Enset	200	18
Meat and meat products	77	10.1
Egg and egg products	16	2.1
Milk and milk product	161	21.13
Child diet diversity score (Mean(+ SD))=2.1 (+0.7)		
Fruits (mango, papaya, Orange, avocado, banana, pineapple), Vegetables (leaf, leaf of pumpikin, cabbage, lettuce), Legums and nuts (peas, bean, nut, lentils haricot beans), Cereal products (teff, sorghum, rice, maize, millet, wheat, barley, dagusa), Root and tubers (carrot, sweet potato, cassava, dinichi), Enset (Qocho and bula), Meat and meat products (cow's meat and bull meat, chicken meat)		

Table 3: Reported foods and liquids consumed by children in the 24 hrs preceding the survey, Arba Mich Zuria, 2012.

Foods and beverages consumed by the children during the day preceding the survey are presented in Table 4. Child dietary diversity score for study participants in this study was calculated and divided into three categories based on the Food and Agriculture Organization (FAO) guidelines for measuring individual dietary diversity (27). The majority of (74.5%) children had diets in the lowest dietary diversity group (<3 food groups), 16% of the children had diets in the medium dietary diversity group (4-5 food groups) and 9.5% of the children's diet fall in the high dietary diversity group (>6 food groups). All of the participating children were eating solid foods at the time of the survey. The majority (54.46%) of mothers in this study reported that their children consumed foods made of mango, papaya, avocado and banana. About 16% of children have been consumed vegetables in the preceding day. The dietary intake of animal products was very low; 77(10.1%) and 161(21.13%) of the children consumed meat and milk products in the last 24 hours prior to data collection respectively.

Anthropometric measurements	Age in months		
	Age 6-24 mnths	Age 25-36 months	Age 37-59 months
Height (cm)	71.04 ± 8.36	83.74 ± 8.89	93.93 ± 13.75
Weight (kg)	8.98 ± 3.99	11.49 ± 2.36	13.58 ± 2.62
Height –for- age Z score	-1.88 ± 2.93	1.51 ± 0.50	1.30 ± 0.46
Weight-for-age Z score	1.29 ± 0.45	1.22 ± 0.72	1.18 ± 0.39
Weight-for-height Z score	-0.16 ± 2.39	1.00 ± 01	1.11 ± 0.31
	n%	n%	n%
Prevalence of stunting	143 40.51	107 50.95	60 30.05
Prevalence of wasting	40 11.33	0 0	22 11.06
Prevalence of underweight	80 22.66	47 22.80	36 18.09

Table 4: Mean +SD anthropometric measurements of children involved in the study.

Findings from this study showed that 13% of the children were wasted (Weight-for-height/length <-2 SD), 45.9% of them were stunted (Height/length-for-age <-2SD) and 25.7% were underweight (Weight-for-age < -2SD). Edema was not observed and there were no cases of over nutrition in this study.

The anthropometric indices of children participated in the study is presented in Table 5. The mean HAZ, WAZ and WHZ scores were positive for children in all aged from 25-59 months. In contrast, mean HAZ and WHZ-score were slightly negative for children in age groups of 6-24 months. The prevalence of stunting, wasting and underweight were 40.51%, 11.33% and 22.66% respectively for children aged 6-24 months.

Variable	Stunted children in Arba Minch Zuria					
	Yes	No	COR	AOR	95%CI	P-Value
Family size						
< 5	165	85	3.43*	0.84	0.61, 1.18	0.31
>5	185	327	1	1		
Marital status						
Married	345	404	1.37	0.64	0.20, 2.04	0.4
Not married	5	8	1	1		
Number of U5 children						
1	246	325	0.63	0.64*	0.16, 0.93	0.006
>2	104	87	1	1		
Mothers' education						
Illiterate	226	203	2.38	0.63	0.30, 1.32	0.22
Can read and write	80	99	1.72	0.77	0.36, 1.65	0.49
Primary education	29	78	0.79	1.51	0.67, 3.38	0.32
Secondary and above	15	32	1	1		
Fathers' education						
Illiterate	173	158	2.81*	1.51	1.01, 1.79	0.008
Can read and write	84	81	2.66*	0.49	0.22, 1.06	0.31
Primary education	79	137	1.48	0.69	0.32, 1.39	0.282
Secondary and above	14	36	1	1		
Ethnicity						
Gamo	286	323	1.04	1.26	0.82, 1.93	0.29
Wolaita	8	28	3.21*	3.49*	1.42, 8.59	0.007
Others1	56	61	1	1		
Religion						
Protestant	219	267	12.01	1.57	0.67, 3.68	0.301
Orthodox	114	135	12.37*	1.77	0.74, 4.19	0.095
Others	17	249	1	1		
Farm land owners						
Yes	256	298	1.02	1.16	0.78, 1.71	0.47
No	94	112	1			
Size of farmland owned						
<0.5 Hectare	215	263	0.9	1.05	0.74, 1.49	0.8
>0.5 Hectare	135	149	1	1		
Breastfeeding practices						
Exclusive breastfeeding	128	117	1.45*	1.23	1.08, 2.72	0.023
Not exclusive breastfeeding	222	295	1	1		
Dietary diversity						
Not diversified	250	315	0.77	1.2	1.02, 1.98	0.02
Diversified	100	97	1	1		
*Significant at 0.5, [1]konso, Gofa, Zeyse, Amhara, Gurage.						

Table 5: Predictors of stunting among under-five in Arba Minch Zuria, 2012.

After adjustment of explanatory variables using logistic regression chronic nutritional problems (stunting) were positively associated with lack of paternal education, number of under-five children in the house hold, non-exclusive breastfeeding practices and lack of dietary diversity.

The number of under-five children in the household significantly associated with stunting. The children who were born in family who had more than one under-five children were more stunted than children who were born in the household who had one child (AOR=0.64[0.16, 0.93]).

The lack of paternal education was positively associated with stunting of children. Children whose father non-educated were more

stunted (AOR=1.51[1.01, 1. 79]) than children born to educated fathers.

Exclusive breastfeeding was negatively associated with stunting. Children who were exclusively breastfeed for six months were less stunted than their counterparts (AOR=0.67[1.08, 2.72]). Lack of dietary diversity was one of the contributing factors to stunting. Children who were fed with non-diversified diet were more stunted (AOR=1.20[1.02, 1.98]) than those who were fed with diversified diet.

After adjustment of explanatory variables using logistic regression, underweight was significantly associated with lack of maternal and paternal education and lack of dietary diversity.

Children whose mothers had no formal education (can read and write only) were more under-weight than (AOR=1.36[1.13, 1.96]) compared to children whose mothers were attended secondary school and above. Similarly paternal education was significantly associated with children's underweight. Children born to non-educated fathers were more underweight than (AOR=1.26[1.09, 1.80]) those whose fathers' were attended secondary school and above.

Dietary diversity was significantly associated with nutritional status of under-five children. Children who did not consume diversified diet were more underweight (AOR=1.47[1.19, 2.17]) than who consumed different types of food (Table 6).

Variables	Underweight					
	Yes	No	COR	AOR	95%CI	P-Value
Family size						
<5	65	185	1.02	0.95	0.66, 1.38	0.8
>5	131	381	1	1		
Marital status						
Married	190	554	1.32	0.18	0.02, 1.45	0.11
Not married	6	23	1	1		
Number of U5 children						
1	146	425	0.97	1.18	0.79, 1.75	0.42
>2	50	141	1	1		
Mothers' education						
Illiterate	114	315	2.47*	0.48	0.18, 1.27	0.14
Can read and write	53	126	2.87*	1.36	1.13, 1.96	0.041
Primary education	23	84	1.87	0.54	0.19, 1.51	0.24
Secondary and above	6	41	1	1		
Fathers' education						
Illiterate	97	234	4.76*	1.26	1.09, 1.80	0.018
Can read and write	35	130	3.09*	1.49	0.16, 1.53	0.22
Primary education	60	156	4.42*	0.27	0.09, 0.82	0.021
Secondary and above	4	46	1	1		
Ethnicity						
Gamo	171	438	1.89*	0.56	0.32, 0.95	0.033
Wolaita	5	31	0.78	1.28	0.43, 3.81	0.66
Others	20	97	1	1		
Religion						
Protestant	127	359	0.96	0.96	0.39, 2.49	0.96
Orthodox	62	188	0.89	1.27	0.50, 3.31	0.6
Others	7	19	1	1		
Farm land owners						
Yes	139	417	0.89	1.24	0.80, 1.90	0.34
No	57	149	1	1		
Size of farmland owned						
<0.5 Hectare	135	343	1.44*	0.74	0.50, 1.11	0.146
>0.5 Hectare	61	223	1	1		
Breastfeeding practices						
Exclusive breastfeeding	68	177	1.17	1.19	0.81, 1.74	0.38
Not exclusive breastfeeding	128	389	1	1		
Dietary diversity						
Not diversified	133	434	0.64*	1.47	1.19, 2.17	0.05
Diversified	63	132	1	1		

Table 6: Predictors of underweight among under five children in Arba Minch Zuria, 2012.

Discussion

Findings from this study showed that overall the majority of mothers in this community not optimally fed their children. The fact that a large proportion of mothers practiced sub-optimal feeding practices after eight years of development of the national infant and young child feeding guideline indicates the need for strengthening the behavior change communication on optimal infant and young child feeding practices. This might have also impact to meet the fourth millennium development goal which intends to reduce infant and young child mortality by two-thirds from 1990 to 2015 [1,14].

In the rural communities of Arba Minch Zuria woreda, breastfeeding was a common practice. A large proportion of mothers (95.8%) had ever breastfed their children. Similar findings from the in-depth interview showed that the majority of mothers considered breastfeeding as a natural gift. In contrast, in-depth interview findings also revealed that some mothers couldn't appropriately breastfeed because of field works. They left their infants at home in care of elders or others. This finding was consistent with the study done in Gambia in which the majority of mothers left their infants at home when leave to agricultural activities and it is found to be a constraint for optimal child feeding practices [15].

In our survey, 57.3% of mothers initiated breastfeeding within the first hour of delivery, which is relatively low when compared with the findings of 2011 Ethiopian Demographic and Health Survey (EDHS) which was 52% [16]. Detailed interviews with mothers showed that some mothers had no information when breastfeeding should be started.

Large proportions (60.4%) of mothers provided only breast milk to 5-6 months in rural communities of Arba Minch Zuria. This figure is relatively high compared to 2005 and 2011 EDHS reports [12,16]. Qualitative data also showed that some mothers want to exclusively breastfeed to 5-6 months. However, some mothers gave water and milk before they start breastfeeding for they believed that it prevents a child from common cold, colic disease and others. Similar findings from Tanzania and Nigeria also showed that traditionally some mothers gave prelacteal feed since they believed that it used as preventive medicine against disease [17-19] (Figure 1).

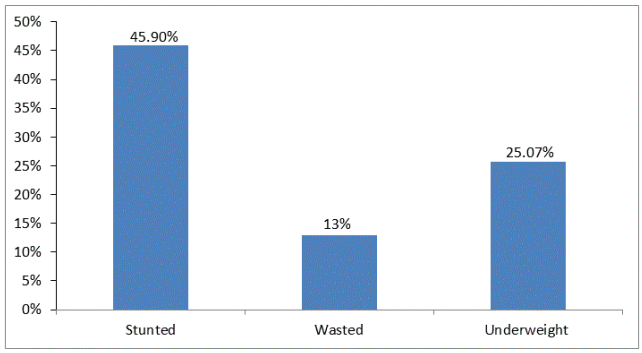

Figure 1: Prevalence of malnutrition in children aged 6 m to 5 years in Arba Minch Zuria.

More than half (52.6%) of mothers introduced complementary food after 5 months for their children. The majority of the mothers provided foods like cow's milk, fruits and vegetables; because they thought that breast, milk was insufficient. Likewise, in-depth interviews with mothers showed that the most common reason for giving an additional food were breast milk insufficiencies for infants. This finding was also consistent with the study done in South Africa in which babies were breastfed to stop them crying, to quench their thirst or to put them to sleep. If breastfeeding alone would not satisfy this condition, an additional food would be immediately given in addition to breast milk [20].

Diversified diet reflects high quality diet and greater possibility of meeting daily energy and nutrient requirements. The majority of (74.5%) children had diets in the lowest dietary diversity group (<3 food groups), 16% of the children had diets in the medium dietary diversity group (4-5 food groups). This figure is low compared to the findings from Kenyan [21,22] and Philippines [23].

Foods made of fruits were the major food type reported to be consumed by the study participants, of which banana and mango were the most dominant one. The high frequency of the consumption of fruits and vegetables is not only a problem for dietary diversity, but is also associated with poor mineral bioavailability as a result of their high fiber content [24].

A small number (10.1%) of children consumed animal source of food. Even if they are consumed in small amounts, animal source foods fill multiple micronutrient gaps compared to plant source foods. For example, an amount as small as 100 gram of cooked beef provides the recommended amounts of protein, vitamin B-12, and zinc, and contributes considerably to meeting the recommendation for riboflavin and iron for an entire day [25-27].

The findings of this study showed that the prevalence of stunting and underweight in the community among the under-five-year-old children are high, which clearly confirms that malnutrition is a wide spread problem of public health significance. The prevalence of stunting was relatively high (45.9%) when compared with national figures [12,16]. This is precipitated by many factors such a number of under-five children, lack of paternal education, non-exclusive breastfeeding practices and lack of dietary diversity.

Paternal education was one the predictors of stunting. Children whose father was illiterate were more stunted than their counterparts. Similar studies in Botswana indicated that parental and maternal education has a significant role in the alleviation of malnutrition. This might be due to the impacts of household income on nutritional status [1,14].

World Health Organization recommends exclusive breastfeeding as a component of optimal breastfeeding practices. Findings from this study indicated that children who were non-exclusive breastfed to six months were more stunted than their counterparts. This might be due to exposure to infections and consumption of diluted food.

Underweight is significantly associated with lack of maternal education, lack of paternal education (illiterate) and low dietary diversity score. Lack of maternal education was significantly associated with chronic nutritional problem. This might be due to lack of knowledge about optimal feeding practices and incapable of providing sufficient food to meet the nutritional requirements of this vulnerable group. A number of findings were also indicated that parental and maternal knowledge about optimal feeding practices had significant role in optimal growth and development of children [1,4,5].

Findings from this study indicated that lack of dietary diversity was one of the contributing factors to underweight. Children who did not consume different types of foods were more exposed to underweight compared to who consumed similar type of food. This might be due to that diversified food reflects higher dietary quality and greater possibility of meeting daily energy and nutrient requirements of young children. Studies also indicated that for vulnerable children, the lack of dietary diversity is particularly critical because they need energy and nutrient dense foods to grow and develop both physically and mentally and to live a healthy life [21,22].

Conclusions

Findings from this study showed that there is high a prevalence of sub-optimal child feeding practices in the study area. Based on the findings from this study it can be concluded that; there is high prevalence of stunting (45.90%) indicative of public health concern in Arba Minch Zuria. The identified factors for stunting were: a number of under-five children, lack of paternal education, non-exclusive breastfeeding practices and low dietary diversity. About one-fourth of children were underweight which significantly associated with lack of maternal and paternal education and low dietary diversity score.

The following recommendations are suggested based on the results of the study.

- Strengthening income generating activities such as small scale gardening and production of small ruminants for increased income and household diet diversity.
- Coordinate exclusive breastfeeding support and promotion with other programs in the health department, private and public health care systems and community organizations, to establish exclusive breastfeeding up to 6 months and as the norm in the community.
- Behavioral change communications on traditional gatherings such as coffee ceremony, market days, edir and the like should be strengthened in collaboration NGO'S and health service providers.

Strengths of this study

- The study was community based approach and it can represent the problem in the community.
- Assessing child feeding practices and identifying factors associated with malnutrition was one of the strong side of this study.
- Using mixed method of data collection improves the quality information obtained from the study since there is comparison of information from both side data collection, quantitative and qualitative data.

Limitation of the study

- The mothers might forget the age of her child; however, all possible ways of reference events was considered in order to help them recall time of birth.
- Measurement biases are likely to occur. However, readjustment of measurement materials was made after every measurement has been taken.

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