ORIGINAL RESEARCH

Prevalence and Factors Associated with Child Feeding Practice Among Mothers of Woldia Town, Northeast Ethiopia

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Background: Improving infant and young child feeding practices in children aged 6 to 24 months is crucial to improved nutritional status, and growth and development. Ethiopia had practiced infant and young child feeding through health extension package. Nevertheless, the prevalence of malnutrition, particularly stunting, is still notorious for the Amhara region of Ethiopia. The aim of this study was to assess complementary feeding practice and associated factors among mothers, who had children aged 6 to 24 months old in Woldia town, Ethiopia.

Methods: A community-based cross-sectional study was carried out on 415 mothers who had children aged 6 to 24 months old in Woldia town. A simple random sampling technique was used to select the required sample in house-to-house level. Interview was used to collect data using a pretested and validated questionnaire. The practice was considered using timely introduction, minimum dietary diversity, and meal frequency. The data was entered to EpiData version 4.2.0.0 and imported to SPSS version 23 for analysis. A descriptive statistic to present categorical variables, and bivariable and multivariable logistic regressions to assess the associations were computed. A variable with *P*-value <0.05 was considered as statistically significant.

Results: The optimal complementary feeding practice among early children was 49.6% (95%CI: 44.7–54.4%).The educational status of mothers (AOR: 0.37,95%CI: 0.18–0.75), number of children in the family (AOR: 3.50,95%CI: 1.57–7.83), and place of delivery (AOR: 3.24,95%CI: 1.33–8.07) had association with complementary feeding practice.

Conclusion: The prevalence of optimum complementary feeding practice is low. Thus, mothers need to consider all components of food diversification like meat/fish/chicken while preparing their infants' and young children's meal. For this purpose, health education should be delivered for mothers to promote utilization of varied food groups, as well as to improve the content of complementary food.

Keywords: complementary feeding, practice, meal frequency, meal diversity, Woldia, Ethiopia

Background

Complementary feeding (CF) is the process started when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk. Thus, the transition from exclusive breastfeeding to family foods is referred to as complementary feeding.[1] Therefore, the period from birth to two years of age has been recognized as the best time for developing good dietary habits. It is also an important time for ingesting

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nutrients for most appropriate growth and development.[2] Optimal infant feeding is having exclusive breastfeeding for six months and nutritionally sufficient and safe CF starting from the age of six months with continued breast-feeding up to two years of age or beyond.[3] In considering infant and young child feeding (IYCF) practices on improving the nutritional status of children under two years of age, WHO developed a set of core indicators to assess IYCF practices.[4] Various indicators have been used to assess IYCF practices, the major ones being early initiation of breastfeeding, exclusive breast feeding under six months, continued breast feeding, introduction of complementary foods, minimum dietary diversity, minimum meal frequency, minimum acceptable diet and consumption of iron-rich or iron-fortified foods.[5] Optimal complementary feeding considers the quantity and quality of food, frequency and timeliness of feeding, food hygiene and feeding during or after illness.[6] Irrespective of these facts, inadequate CF practice of 6 to 24-month-old children is a major problem.[7] In 2016, globally 155 million children under five years were estimated to be stunted, and 52 million were estimated to be wasted. Undernutrition is estimated to be associated with 2.7 million child deaths annually or 45% of all child deaths, which results from suboptimal infant feeding.[8] Particularly, most developing countries are poorly practicing CF.[9] In developing countries only, 6% of all under-five-year-old children's deaths can be prevented by appropriate complementary feeding. Dietary diversity and meal frequency are the most major issues.[10] Suboptimal infant feeding practices, poor quality of complementary foods, micronutrients deficiencies and frequent infections have mainly contributed to the high mortality among infants and young children in Sub-Saharan African regions.[11] According to the Ethiopian Demographic and Health Survey (EDHS) 2016 report, the feeding practices of only 7% of children in Ethiopia aged 6 to 24 months meet the minimum standards with respect to all three IYCF practices (breastfeeding status, number of food groups, and times they were fed).[7] Insufficient quantities and inadequate quality of complementary foods, poor child feeding practices have serious effect on health and growth in children less than two years of age. Even with most appropriate breastfeeding, children will become stunted if they do not receive sufficient dietary diversity and meal frequency after six months of age.[12] Despite the evidence in different parts of Ethiopia,[10,11] there is no study in Woldia town on IYCF practice. Therefore, this study was conducted to assess the

prevalence and associated factors of complementary feeding practices among mothers who have children aged 6 to 24 months old.

Methods
Study Design, Setting, and Period
A community-based cross-sectional study design was conducted from April 12–30, 2019. The study was carried out in Woldia town. Woldia is located at a distance of 520 km from Addis Ababa, the capital city of Ethiopia. The town is structured with six urban Kebeles for administrative purposes. According to the 2019 national census estimation conducted by the Central Statistical Agency of Ethiopia (CSA), the town had a total population of 180,000. By gender, 81,750 were men and 98,250 were women. The number of children aged 6 to 24 months old was 12,136 during the study year, 2019.

Population
Mothers who had children aged 6 to 24 months old in all Kebeles of Woldia town for six months were the source/ study population. The study units were all the selected 415 households in Woldia town.

Eligibility Criteria
Mothers or caregivers of children aged 6 to 24 months who live in Woldia town were included in this study. But mothers who have children with chronic diseases or with congenital anomalies, and seriously ill mothers or mothers who are unable to communicate were excluded.

Sampling Size Determination and Procedure
Sample Size Calculation
The sample size, 415 were calculated using a single population proportion formula by considering the following statistical assumptions: P=proportion of feeding practice, 56%,[13] ($Z_{\alpha/2}$, Z score of 95%CI, d=margin of error 5%), (35), and 10% nonresponse rate.

Sampling Procedure
Woldia town has six urban Kebeles. All Kebeles were included in this study. The sample, 415 was drawn out from 12,136 children aged between 6 and 24 months old. The number of study participants' were allocated for each Kebele based on proportion to population size allocation methods. The community-based demographic and health-related information booklet prepared by the minister of health

and distributed to Health Extension workers in order to register children from birth to five years was used as a sampling frame. From the registry book, children aged 6 to 24 months of old house's number were selected. When two and above children were registered in one house, the house number was only taken once and one child was selected randomly. Finally, infant-mother pairs were selected from each Kebele using simple random sampling technique for each household whose child was aged from 6 to 24 months old (Figure 1).

Study Variables

The dependent variable is complementary feeding practice (CFP), while the independent variables were sociodemographic status (age, marital status, educational level, occupation, gender, and family size), obstetrics and gynecologic history, and health service (ANC, PNC, and place of delivery).

Definition
Optimal Complementary Feeding Practice

CFP is the initiation of complementary feeding at the beginning of six months and received the minimum dietary diversity either solid or semisolid meal at a minimum number of frequencies.

Good Complementary Feeding Practice

Is getting above the median level of complementary feeding practice for CFP questions.

Poor Complementary Feeding Practice

Is getting below the median level of complementary feeding practice for CFP questions.

Data Collection Tools and Technique

A structured questionnaire was prepared in English language and translated to Amharic (local language), and finally translated back to English to check its consistency. Then the data collectors collected data using face-to-face interview with mothers. The questionnaire consists of three parts; sociodemographic characteristics, obstetric history and profile, health service utilization, and CFPs.
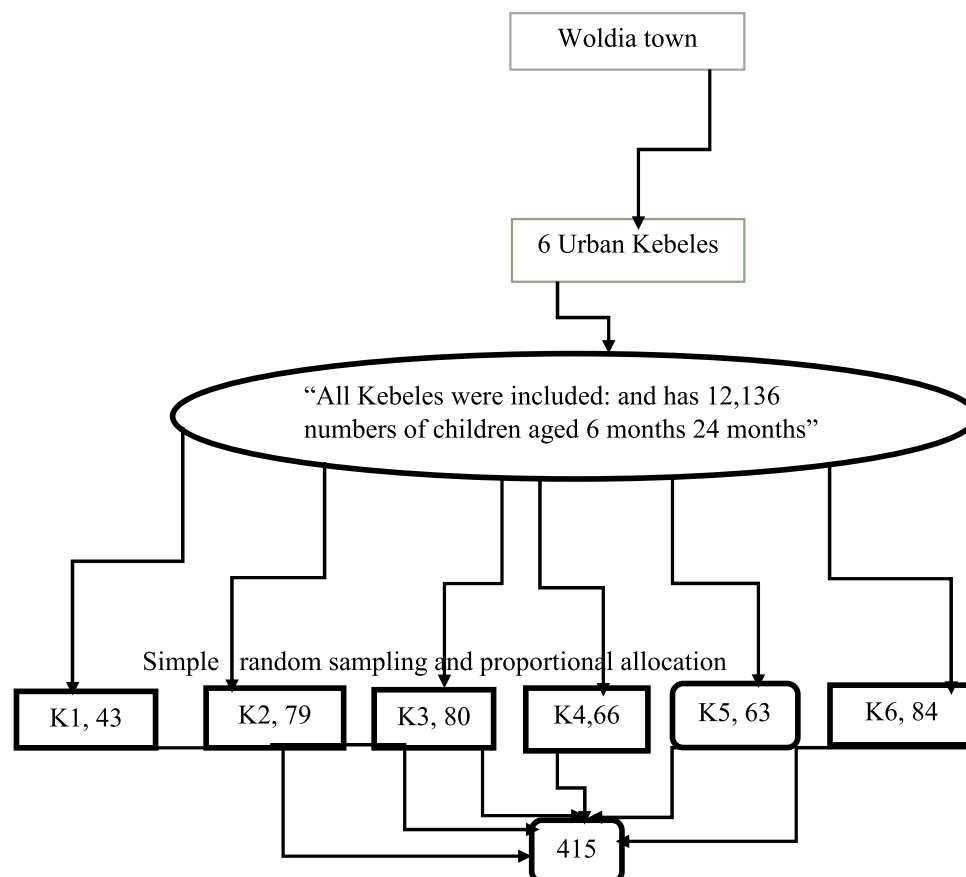

Figure 1 The schematic presentation of sampling procedure in assessing complementary feeding practice among mothers who had children aged 6 to 24 months old in Woldia town.

Data Quality Assurance

The data collectors were trained about how to approach mothers during interview, objectives of the research, and each sections of the questionnaire. The meaning of the questions included in the questionnaire were explained during training to standardize data collector's interviewing technique and to request questions in a consistent manner after incorporating the gaps identified during pretest. The pretest was done in Lalibella town with 20 mothers and their respective children aged 6 to 24 months old. The questionnaires were checked for completeness at the end of each day of data collection.

Data Processing and Analysis

The data was entered to EpiData version 4.2. The cleaning and analysis of data was done using SPSS version 20. A descriptive statistic was used to compute the prevalence of CFP and other variables. Multiple logistic regression model was used to assess the associations of the outcome variable with its predictor variables with a consideration of 95%CI, OR, and P-value. Variables that had P-value less than 0.25 in the binary logistic regression analysis was entered to multiple logistic regressions statistical analysis to identify independent associated factors of CFP. A statistical association declared at 95%CI with its adjusted odd ratio, and P-value <0.05.

Results

Sociodemographic and Economic Status

The mean age and its standard deviation of mothers was 29.34±5.9 years with an age range of between 18 and 45 years old. Regarding the educational status of mothers, 254 (61.2%) attended formal education, and 158 (38%) husbands of mothers attended formal education. The majority mothers, 354 (85.3%) were married, and 180 (43.4%) of mothers were government employees, and 130 (31.3%) were housewives. Regarding economy, 198 (47.7%) of parents earned an average monthly income of less than or equal to 999 Ethiopian birr. The mean age of children was 15.13 months with a standard deviation of ±5.728 with an age range between 6 and 24 months old (Table 1).

Obstetrics History and Health-care Services

Almost all 402 (96.9%) mothers had history of antenatal care follow-up during their last pregnancy. Of these mothers 350 (87.1%) received infant and child feeding practice advice from professionals during ANC follow-up. About 92.8% of mothers gave birth to their youngest

Table 1 Sociodemographic, Obstetric and Health-related Status of Mothers and Children in Woldia Town, Northeast Ethiopia

Variables	Categories	Frequency (n=415)	Percentage
Mothers' age	<20	23	5.5
	20–24	81	19.5
	25–29	114	27.5
	30–34	106	25.5
	≥35	91	21.9
Marital status	Married	354	85.3
	Single	38	9.2
	Divorced	17	4.1
	Widowed	6	1.4
Mothers' educational status	Cannot read and write	74	17.8
	Can write and read	87	21.0
	1 year education	68	16.4
	2 year education	105	25.3
	College and above	81	19.5
Fathers' educational status	Cannot read and write	117	28.2
	Can write and read	140	33.7
	1 year education	52	12.5
	2 year education	54	13
	College and above	52	12.5
Mothers' occupation	Housewife	130	31.3
	Private employed	78	18.8
	Government employed	180	43.4
	Daily laborer	13	3.1
	Student	14	3.4
Monthly income (Ethiopian birr)	≤999	198	47.7
	1000–2999	118	28.4
	3000–3999	30	7.2
	≥4000	69	16.6
Child's age in month	6–11	133	32.0
	12–17	116	28.0
	18–24	166	40.0
Sex of child	Male	173	41.7
	Female	242	58.3
Parity	1–3	365	88.0
	4–6	50	12.0
Number of family members live in the same house	2–4	290	69.9
	5–9	125	30.1
ANC follow-up	Yes	402	96.9
	No	13	3.1
How many visits did you have	One	3	0.7
	Two	13	3.1
	Three	62	14.9
	Four	225	54.2
	Above	99	23.9

(*Continued*)

Table 1 (Continued).

Variables	Categories	Frequency (n=415)	Percentage
Advice from professions	Yes No	350 52	87.1 12.9
Place of delivery	Home Health institution	30 385	7.2 92.8
Postnatal care	Yes No	354 61	85.3 14.7

child in health institutions. The majority of the mothers (85.3%) had received postnatal care (PNC), and 365 (88.0%) of mothers had less than three 6 to 24 month-old children (Table 1).

Complementary Feeding Practices

Non-inclusive, but consecutive questions were used to assess the practice of mothers in Woldia town. Mothers were asked about the age of initiation of CF, first food to start CFP, number of frequencies per day, and food groups that they ate for the last 24 h. The optimum CFP in Woldia town was 49.6% (95%CI: 44.7–54.4%). Two hundred and twenty-nine (55.2%) mothers introduced CF between 7 and 12 months of age, whereas 157 (37.8%) of mothers introduced exactly at six months. The majority of mothers start the meal for their children with milk 178 (42.9%), porridges 135 (32.5%), adult food 78 (18.8%), and with

butter (24 5.8%). Of the study population, grains (79.5%), both legumes and nuts in the form of combination (78.8%), eggs (65.1%), and oil/butter (60.0%) were the most commonly taken food items in the past 24 h during the study period. Of the participants, 84.8% of mothers feed their children, whose age is 9 to 24 months, three times a day and 66.5% mothers feed a meal composed of 4four and above food groups (Figures 2 and 3).

Factors Associated with Complementary Feeding Practice

On the bivariable logistic regression analysis CFP and maternal education, primary education (COR: 0.38, 95% CI: 0.19−0.75), secondary education (COR: 0.45, 95%CI: 0.25–0.81), daily laborer (COR: 0.52, (95%CI: 1.15–1.77), number of family members (COR: 1.75, 95%CI: 1.1–2.67), ANC follow-up (COR: 12.86, 95%CI: 1.657–99.877), place of delivery (COR: 0.33, 95%CI: 0.15–0.77), and PNC follow-up (COR: 1.99, 95%CI: 0.98–1.13) had associations. However, educational status of fathers, sex of the child, and monthly income of parents had no association with CFP on bivariable logistic regression analysis. In multivariable logistic regression analysis, only three factors were retained as having association with CFP. Primary educational status of mothers (AOR: 0.75, 95%CI: 0.18–0.37), and secondary level educational status of mothers (AOR: 0.76, 95%CI: 0.22–0.46) were less likely to have good CFP than their counterparts. But, mothers who have four or more children
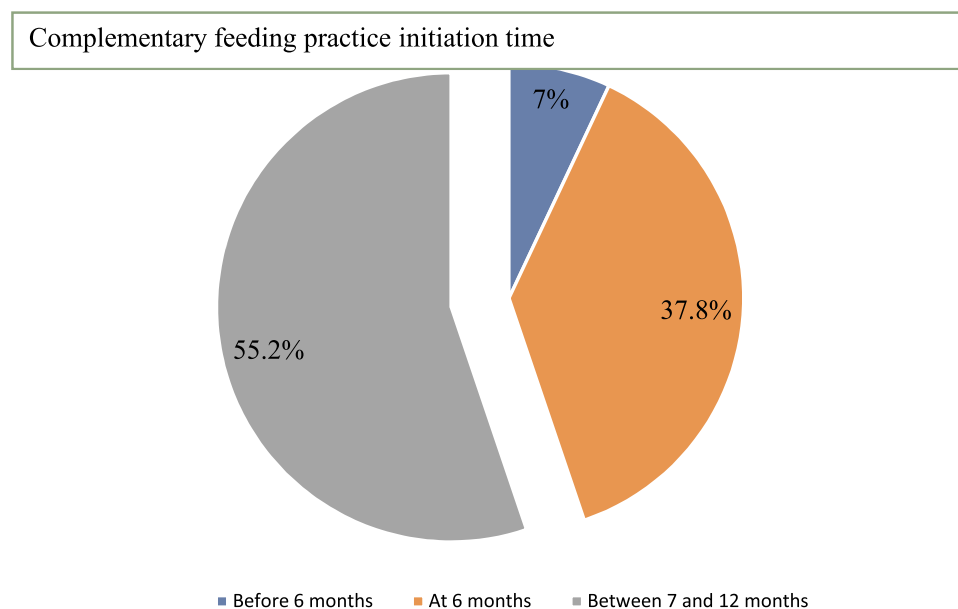

Complementary feeding practice initiation time

7%

37.8%

55.2%

■ Before 6 months ■ At 6 months ■ Between 7 and 12 months

Figure 2 Time to start complementary feeding among mothers who had children aged 6 to 24 months old in Woldia town, Northeast Ethiopia.
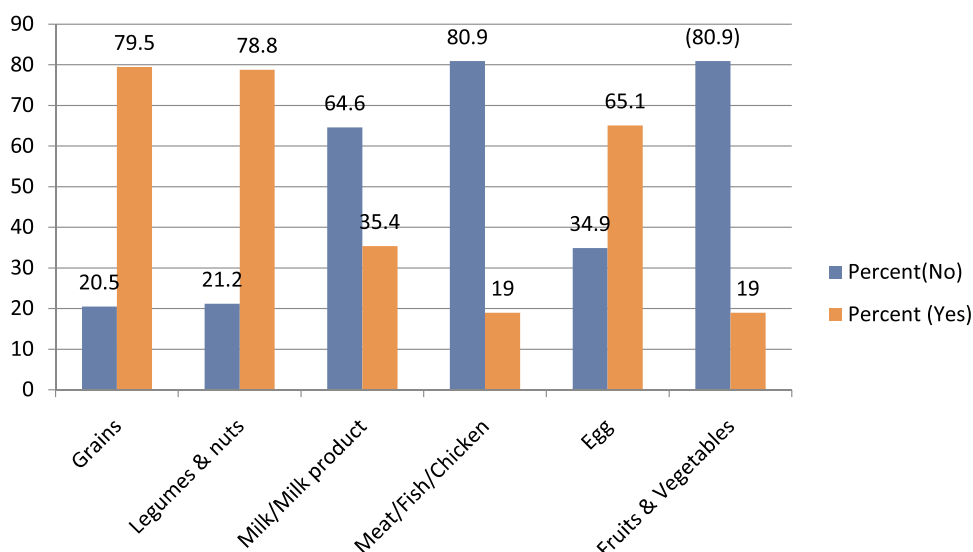
Figure 3 The type of foods given to children aged 6 to 24 months old in the past 24 h in Woldia town, Northeast Ethiopia.

(AOR: 7.83, 95%CI: 1.57–3.50), and mothers who gave birth at a health institution (AOR: 8.07, 95%CI: 1.34–3.24) (Table 2) were more likely to have good CFP.

Discussion

The aim of this study was to assess CFP and associated factors among mothers who had children aged 6 to 24 months old in Woldia town, Ethiopia. The prevalence of good CFP was 49.6% (95%CI: 44.7–54.4). The present study's prevalence is much higher than a study from Ghana (13%).[14] However, the current evidence reports a lower prevalence than a finding from Addis Ababa (83%).[15] The difference might be as a result of socioeconomic and health-care access dispirits. The current prevalence was also lower than a study from Lasta district, Amhara region (56.5%).[16] The possible variation might be because of population dissimilarity. We considered children aged 6 to 24 months but the former considers birth to 24-month-old children. The current study reported a higher child feeding practice than a study from Northern Ethiopia, Oromia regional state (37.2%)[17] and Debre Markos (15%).[18] The difference might be as a result of study population, and sample size difference. The current study was limited to urban residents and a small sample relative to the former studies done in both urban and rural communities using a large sample size. However, this study was in line with a study from Harar (54.4%).[19] According to the WHO's recommendation, complementary food is important to prevent malnutrition and it should be introduced at six months of age, when the infant's stomach is ready to digest other foods. In this study,

37.8% of the mothers had initiated complementary feeding by the sixth month of the child's age, which is lower than the percentage of mothers reported from Northern Ethiopia (79.7%)[20] and Harar (54.4%),[19] but higher than the finding from national data, Ethiopia (EDHS) (49%).[8]

In this study 66.5% mothers feed a meal composed of four and above food groups. In line with this a study conducted in Lasta district, Amhara region (60.7%) mothers offered four or more food groups to their child.[13] And also 84.8% of mothers feed their children three times a day, which is higher than findings from Northern Ethiopia (44.7%).[20]

Maternal education, place of delivery and number of children were associated with CFP. Mothers who deliver in health institutions were 8.07 times more likely to practiced good CF than those who deliver at home, (AOR: 8.07, 95%CI: 1.34–3.24). This agreed with a study done in Addis Ababa, mothers who delivered their child at home were 68% less likely to initiate CF (AOR: 0.32, 95%CI: 0.32 (0.12–0.82).[15] The justification might be due to mothers in the postnatal period receiving health education differences between Addis Ababa and Woldia. The mother's educational status was also associated with CFPs. This study indicated that the majority of mothers start the meal for their children with milk (42.9%), porridges (32.5%), adult food (18.8%), and butter (24 5.8%). Of the study population, grains (79.5%), legumes and nuts (78.8%), eggs (65.1%), and oil/butter (60.0%) were the food items eaten in the past 24 h during the study period. In this regard a study from Hawasa

Table 2 The Bivariable and Multivariable Logistic Regression Analyses in Assessing the Associations Among Mothers in Woldia Town, Northeast Ethiopia

Variables	Categories	Complementary Feeding Practice		COR	95%CI		AOR	95%CI		P-value
		Goodn (%)	Poorn (%)		Lower	Upper		Upper	Lower	
Mothers age	<20	14 (46.7)	16 (53.3)	0.44	0.17	1.12	6.65	2.38	0.84	0.10
	20–24	51 (51. 0)	49 (49.0)	0.60	0.33	1.11	3.13	1.43	0.65	0.37
	25–29	56 (49.1)	58 (50.9)	0.71	0.40	1.24	3.54	1.61	0.74	0.23
	30–34	56 (55.4)	45 (44.6)	0.61	0.34	1.08	2.47	0.52	0.13	0.76
	≥35	29 (41.4)	41 (58.6)	1	–	–	–	1	–	–
Marital status	Married	169 (47.7)	185 (52.0)	1	–	–	–	1	–	–
	Single	24 (63.2)	14 (36.8)	5.47	0.63	47.33	1.45	0.68	0.32	0.31
	Divorced	8 (47.1)	9 (52.9)	2.91	0.30	27.56	2.41	0.83	0.28	0.73
	Widowed	5 (83.3)	1 (16.7)	0.63	0.53	58.91	2.48	0.26	0.02	0.24
Mothers educational status	Cannot read and write	27 (36.5)	47 (63.5)	1.08	0.56	2.07	1.81	0.90	0.45	0.77
	Can write andread	45 (51.7)	42 (48.3)	0.58	0.31	1.07	1.12	0.59	0.31	0.11
	1 year education	42 (61.8)	26 (38.2)	0.38	0.19	0.75	0.75	0.37	0.18	0.01*
	2 years education	61 (58.1)	44 (41.0)	0.45	0.25	0.81	0.76	0.46	0.22	0.01*
	College and above	31 (38.3)	50 (61.7%)	1	–	–	–	1	–	–
Mothers occupation	Housewife	67 (51.5)	63 (48.0%	1	–	–	–	1	–	–
	Private employed	37 (47.4)	41 (52.0)	1.11	0.63	1.95	2.66	1.44	0.78	0.24
	Government employed	86 (47.8)	94 (52.0)	1.42	0.91	2.24	1.93	1.18	0.71	0.52
	Daily laborer	10 (76.9)	3 (23.1)	0.52	1.15	1.77	1.37	0.32	0.08	0.12
	Student	6 (42.9)	8 (57.1)	1.56	0.51	4.74	5.39	1.65	0.50	0.41
Number of children	1–3	187 (53.7)	161 (46.0)	1	–	–	–	1	–	–
	4–6	19 (28.4)	48 (71.6)	1.71	0.93	3.13	7.83	3.50	1.57	0.00*
Number of family members	2–4	156 (53.8)	134 (46.2%)	1	–	–	–	1	–	0.60
	5–9	50 (40.0)	75 (60.0)	1.75	1.1	2.67	2.0	1.16	0.67	
ANC follow-up	Yes	204 (50.7)	198 (49.3)	12.86	1.66	99.88	1.28	0.26	0.05	1.10
	No	2 (15.4)	11 (84.6)	1	–	–	–	1	–	
Place of delivery	Health institution	184 (47.8)	201 (52.0)	0. 33	0.15	0.77	8.07	3.24	1.34	0.01*
	Home	22 (73.3)	8 (26.7)	1	–	1	–	–	–	
Postnatal care	Yes	177 (50.0)	177 (50)	1.99	0.98	1.13	1.81	1.01	0.56	0.98
	No	29 (47.5)	32 (52.5)	1	–	–	–	1	–	

Note: *P<0.05.

reported that porridge was a common diet in Ethiopia.[21] Similarly, in Woldia town, there was seasonal variation in producing fruits and vegetables. The area had high vegetables and fruit production from July to September, otherwise the products are small. This might be the reason for having low fruit and vegetable components in the children's diet. Mothers who have primary, and secondary educational status were less likely to practice good CFP than mothers who had a college and above educational status (AOR: 0.75, 95%CI: 0.18–0.37), and (AOR: 0.76, 95%CI: 0.22–0.46), respectively. This might be because educated mothers would have knowledge about the importance of appropriate CFP, and better understanding of information forwarded from health professionals. Furthermore, education might enhance the status of the mother and enable them to develop greater confidence and

capacity to make decisions about their child feeding practice. However, mothers with no/low level education cannot read and also may have low vocabulary. Thus, understanding the complexity of the information may be difficult. Mothers who have four or more children were 7.83 times more likely to have good CFP than mothers having fewer than four children, (AOR: 7.83, 95%CI: 1.57–3.50). This might be due to the fact that mothers who have more children have good knowledge and practice in nutrition and other activities from their pervious children. In this study socioeconomic status, ANC follow-up, occupation of mothers had no associations with CFP but a study conducted in south west Ethiopia found that mothers who work as private and governmental employees were less likely to practice CF than housewives.[22] In Axum, Ethiopia, mothers who attended ANC follow-up were 3.87 times more likely to initiate timely CFP than those who did not attend ANC, (AOR: 3.87, 97%CI: 1.80–8.31).[23]

Conclusion

In Woldia town, the prevalence of optimum complementary feeding practice was low. The majority of mothers/caregivers were not using meat/fish/chicken when they prepared complementary foods for their children. Place of delivery, maternal education, and number of children were associated with the feeding practice of children. The government need to provide emphasis on arranging more education opportunities for mothers with no/low level education with a consideration of meat/fish/chicken.

Limitation of the Study

Respondents might not tell us real information about their socioeconomic status and feeding practice because of social desirability bias. This could have an effect on the strength of statistical association. The 24-h recall for assessing the meal frequency and diversity could also affect the actual feeding practice.

Abbreviations

ANC, antenatal care; AOR, adjusted odds ratio; CF, complementary feeding; COR, crude odds ratio; CSA, Central Statistical Agency; DHS, demographic and health survey; EDHS, Ethiopian Demographic and Health Surveys; FMOH, Federal Minster of Health; HEW, Health Extension Workers; HSPD, Health Sector Development Program; MMF, minimum meal frequency; MOH, Minster of Health; IYCF, infant and young child feeding; PNC, postnatal care.

Data Sharing Statement

The raw materials supporting the conclusions of this research will be available to researchers needing the data to use for noncommercial purposes through request to one of the authors, Lidia Dagne via e-mail.

Ethics Approval and Consent to Participate

An ethical clearance was obtained from Woldia University, College of Health Science. The study protocol was evaluated and approved by the IRB from the College of Health Sciences. Written permission was also obtained from both Woldia town administrator and town health office. Written consent was taken from children's parents. Confidentiality was also maintained by omitting the name and personal identification of respondents (both children and parents), because it was not relevant to the study. Furthermore, the study is in line with the Declaration of Helsinki.

Consent to Publish

The parents of children were informed and gave their written consent to publish the findings in a reputable international journal. The consent to publish was received together with the consent they provided to be involved in the study.

Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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