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Hygienic feeding practices of home prepared complementary foods and associated factors in slum households with children of age 6-24 months: a case study in Addis Ababa, Ethiopia

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ABSTRACT

Currently, developing countries are challenged with foodborne diseases especially children during the period of complementary feeding. This is getting worse in slum households which are characterized by poor environmental hygiene and a lack of basic facilities. To assess hygienic feeding practices and associated factors of home-prepared complementary foods in slum households with children of age 6-24 months in Addis Ababa. A community-based cross-sectional study was conducted. A total of 602 mother/caregiver-child pairs were included in this study. Three sub-cities were randomly selected and all woreda in each sub-city having slum households were included. Households with children of age from 6-24 months were included using systematic random sampling. A structured pretested questionnaire and observation checklist was used to collect data. Multivariable bivariate logistic regression analyses were done to identify factors associated with feeding practices. The magnitude of good hygienic feeding practice was 60.8% with [95% CI: (57-65%)] and it has a positive association with fathers having secondary education and above [AOR= 2.59, 95% CI: (1.06-6.68)], mothers/ caregivers having a variety of feeding utensils for their children [AOR= 1.89, 95% CI: (1.23-2.91)], mothers/ caregivers that never give leftover food for their children [AOR= 3.47, 95 CI%: (1.86-6.49)], child feeding methods involving spoon [AOR= 3.14, 95% CI: (1.22-8.06)] and having a hand washing facility after the toilet [AOR= 2.14, 95% CI: (1.26-3.64)] and it has a negative association with mothers/caregivers having children aged between 19-24 months [AOR= 0.490, 95% CI: (0.293-0.82)] and mothers/ caregivers not in union with their husband [AOR= 0.534, 95% CI: (0.296-0.96)]. The practice of hygienic feeding of complementary food is poor. Therefore, interventions targeting those associated factors should be made in order to improve hygienic feeding and minimize the contamination of foods.

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1. Introduction

Complementary feeding is defined as the gradual introduction of solid food and fluids along with the usual milk feed (breast milk or infant formula) to

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an infant's diet (1). As the age of the child increases, the nutritional needs also increase correspondingly and additional food is needed to complement breast milk, but it should not replace breast milk (2-3). Essential nutrition action (ENA), which is used to promote "nutrition through the lifecycle" indicated that children should be provided with complementary foods from 6 months and beyond for proper growth and to prevent child malnutrition (4-6). At this age, the growth rate is greater than at any other time, and it lays the foundation for future health (7-9). Therefore, adequate, diverse, nutritious, hygienic and safe infant and young child food (IYCF) is mandatory (6, 10), and it is emphasized in food and nutrition policy and programme at global level and in developing countries including Ethiopia (10-15). However, holistic application of ENA is lacking and priority is given more to safety and hygiene of commercial complementary foods (10, 13). Several studies shows a clear relationship between child feeding practices and occurrence of morbidity such as diarrhea in children (15-18). Preparing complementary food without maintaining proper hygiene practices exposes the child to various pathogens (19) and they are at risk of contracting and dying from common food borne or food-related diseases as foodborne pathogens take advantage of immature immune systems (20).

In developing countries, commercial complementary food is expensive and home prepared weaning food is mostly practiced (3). However, home is a dynamic environment and it supports the proliferation and spread of food borne diseases (21) due to inadequate food safety awareness, the contamination of raw food wit cooked food, improper food handling and poor personal hygiene (22).

This is very imperative in slum households which is characterized by poor housing and shortage of basic facilities (23). Unhygienic conditions, open defecation system, burning of wood inside ill ventilated rooms, ill-habits such as chewing of tobacco, smoking, drinking, and lest care about health and lack of adequate child supervision are the risk factors inside these households (24-26). In Addis Ababa, up to 80% of the population is said to live in slum conditions. In the urban core, 60% of housing is said to be of slum-standard and 25% is thought to be informally built (27). Hence, the possibility of contamination of child foods prepared in such coditions is very high and it results in child morbidity such as diarrhea and poor nutritional status. Food borne and waterborne diarrheal disease kill an estimated 2 million people annually in developing countries (28). Diarrhea is one of the three major causes of childhood mortality in Ethiopia and it is still accountable for the deaths of 8 percent of children under 5 in the country (29). Of the total global burden due to food borne diseases (FBD), over 90% of illnesses are estimated to be related to diarrheal disease. Children under five years bear a disproportionate share of the burden of FBD; accounting for 9% of the global population, but 38% of all cases of illness and 40% of Disability Adjusted Life Years (DALYs) (20, 30).

An estimated 30% of premature deaths due to FBD are in children under the age of five (30).

Therefore, appropriate food hygiene practices and protecting prepared foods from unclean environments

That contaminate the food, reduces occurrence of diarrhea in children somewhere from 15% to 70% (31-32) and children have a lower risk of contracting diarrhea when they live in households with good hygiene and consume healthy food (33).Although Ethiopia has a regulatory service for commercial complementary foods which is rendered by Ethiopian Food, and Drug Administration (EFDA), Ethiopian Standards Agency (ESA) and other stakeholders, there are gaps on food safety system on legal and policy frame work, food-borne diseases surveillance, coordination of organizations involved in food safety management, and laboratory services for relevant food hazards (34-35). Even when functional, it has no direct influence in controlling quality f home prepared complementary foods. Moreover, recent evidence in the study area is very rare and continuous research on hygiene of complementary food has also been recommended (36-37). Therefore, generating information associated with complementary foods has overriding significance (38).

Therefore, the aim of this study is to evaluate the hygienic feeding practices and associated factors of home prepared complementary foods in slum households with children of age 6-24 months in Addis Ababa, Ethiopia.

2. Materials and Methods

2.1. Description of the study setting

The study was conducted in Addis Ababa, Ethiopia in 2021. The city is divided in to 11 sub-cities and 116 Woredas for administrative reasons. Namely, Addis Ketema, Akaki-Kality, Arada, Bole, Gulelle, Kirkos, Kolfie-Keraniyo, Lideta, Nefas Silk-Lafto, Leme Kura and Yeka Sub-city, Kirkos, Arada and Yeka Sub-city were selected for this study.

The total population of the three sub-cities are 291, 001; 278,194 and 455, 998 with area of 14.62, 9.91,85.98/km^2 respectively (39).

2.2. Study design and period

A community based cross-sectional study was conducted from March to May, 2021. Only primary data generated by using questionnaire and observation checklists were utilized.

2.3. Sample size determination

In this study, the sample size was determined by using a single population proportion with the assumption of 95% confidence interval, a margin of error of 5%, non-response rate of 10% and considering proportion of 39% of hygienic feeding practice in the study made at Bahirdar Zuria District, Ethiopia (38).

Therefore, sample size is:

$$n = \frac{(z\ \frac{\propto}{2})^2 * P\ (1 - P)}{d^2} = \frac{(1.96)^2 * 0.39\ (0.61)}{(0.05)^2} = 365$$

Where n=sample size

$Z\propto/2$ is equal to 1.96 for 95% confidence interval and d^2 (Margin of error) which is 5%

Accordingly, with design effect of 1.5 and 10% non-response rate, it became 602.

2.4. Eligibility criteria

Slum households that possess children of age from 6-24 months and use home prepared weaning foods were included and mothers/caregivers who are seriously ill during the time of data collection, and have children who are placed on special case feeding due to diseases such as malnutrition/ and TB were excluded.

2.5. Data collection tools and procedures

A pretested structured questionnaire was used to assess the hygienic practice of mothers or caregivers during complementary feeding.

The questionnaire was developed from published literatures (40-44).The questionnaire includes socio-economic-demographic information of the children's family, and hygiene of the primary caregiver and food preparation practices adopted by the primary caregivers. Data was collected by well-trained health professionals.

2.6. Operational definitions

Good hygienic practices is defined as a score of greater than the mean of 11 questions that comprises hand and utensil washing practice, food preparation and storage practice, and feeding practices and poor hygienic practices is defined as a score of less than the mean of 11 questions that comprises the same area of practices (43).

2.7. Data analysis

EPI-Data was used for data entry. Then, it was cross-checked with the hard copy for completeness and consistency. Then, it was transported to SPSS 23. Frequency distribution, median, interquartile range and percentage were used for describing the results and logistic regression was used to identify the associated factors. Hosmer and Lemeshow test, correlation estimates and collinearity test (VIF and Tolerance) were used to check for model fit.The presence and strength of association was determined using AOR with its 95% CI. Variables with P-value less than 0.2 in bivariate analysis were considered to multi variable analysis. Finally, variables with a P-value less than 0.05 were considered as statistically significant. Tables, graphs and charts were used for result presentation.

3. Results

3.1. Socio-economic, demographic and household characteristics of the respondents

A total of 602 mothers/caregivers-child pairs were included in the study giving a response rate of 95.4%. As indicated in Table 2, the age of mothers/caregivers ranged from 18-48 with median age of 28 years and 70% mothers/caregivers have an age of < 30 years. The median age of the children was 15 months. Thirty-nine percent and 34% of the children have an age of < 6-12 months and 13-18 months, respectively. Percentage of male and female children was almost equal.Majority of mothers (73%) were orthodox and more than 80% of mothers completed primary school and above and 67% are housewife. More than 80% of fathers completed primary school and above, and 40% and 31% are Gov't/non-gov't employee and causal labor, respectively. More than 80% of mothers were married and living together with their husband. The monthly income of the family ranges from 0-300 USD with median income of 40 USD and more than 60% have monthly income levels of greater than 120 USD. Fifty-one percent and 26% of the respondents have a refrigerator and animals in the home, respectively (Table 1).

3.2. Hygienic practice and related conditions during complementary feeding

3.2.1. Initiation of complementary feeding and feeding methods

From the total, 440 (77%) of the child started complementary feeding at and after 6 months of age. Child feeding methods involved spoon, hand/finger, and bottle in 38, 31 and 26%, respectively.

A household that used child feeding utensils exchangeable one after the other are 52.3% and 74% of children have feeding utensils privately.

3.2.2. Food preparation and storage

Prepared food was given for the child within 2 h of preparation in 74% of the children and in 64% of the household, tap water is given for the child without any treatment. Food left from previous preparation was stored by 52% of the respondents and half of the mother/caregiver provided food left from previous preparation for the children.

3.2.3. Hand and utensil washing practices

In this study, 65% and 63% wash their hand with soap and water before food preparation and before feeding the child, respectively. Similarly, in 20% and 45.5%, child's hand and their utensils were washed with soap and water, respectively. After toilet, 71% and 44% of the family used soap and water to wash their hands and their children's hand, respectively. Moreover, in 79% of the households there was no proper hand washing facility on site (Table 2).

3.2.4. Location of water source and home hygiene

In 75% of the respondents, water source was found in the residence compound. Child utensils and house floor were observed to be clean in 78% and 64% of the respondents, respectively. However, flies, and animal droppings were found in 43%, and 12% of the household, respectively.

3.3. Factors associated with hygienic feeding practice of complementary foods

Factors associated with hygienic feeding practice of complementary foods were indicated by multivariate binary logistic regression analysis showed in Table 4. It revealed that the odds of hygienic feeding practice lower by51% for mothers/caregivers having children in the age of 19-24 months, [AOR=0.49, 95%CI: (0.29-0.82)]. Occurrence of hygienic feeding practice increased by more than two-fold for a father that has an education level in secondary school and above [AOR=2.59, 95% CI: (1.01-6.68)].

Table 1. Socio-economic, demographic and household characteristics of mothers/caregivers and their children in slum households in Addis Ababa (n=574), 2021.

Variables	Category	Frequency	Percentages
Age of mother/caregiver	18-24	123	21.4
	25-30	277	48.3
	31-36	122	21.3
	>37	52	9
Age of child	6-12	222	38.7
	13-18	195	34.0
	19-24	157	27.4
Sex of child	Female	292	50.9
	Male	282	49.1
Religion of the mother/caregiver	Orthodox	419	73.0
	Muslim	86	15
	Protestant	56	9.8
	Catholic	11	1.9
	Others**	2	.3
Education level of mother	Can't read and write	67	11.7
	Can read and write	44	7.7
	Primary school	232	40.4
	Secondary and above	231	40.2
Occupation of mother/caregiver	House wife	385	67.1
	Gov't/non-gov't employee	113	19.7
	Daily laborer	35	6.1
	Merchant	32	5.6
	Others*	9	1.6
Education level of father	Can't read and write	31	5.4
	Can read and write	44	7.7
	Primary school	168	29.3
	Secondary school and above	321	55.9
	Unknown	10	2.3
Occupation of father	Gov't/non-gov't employee	226	39.4
	Daily laborer	177	30.8
	Merchant	80	13.9
	Jobless	56	9.8
	Others	27	4.7
	Unknown	8	1.4
Marital status of mother	Currently in union	486	84.7
	Not in union	88	15.4
Monthly income of a family	<3000	134	23.3
	3001-6000	71	12.4
	6001-9000	119	20.7
	9001-12000	83	14.5
	>12000	167	29.1
Presence of refrigerator	No	279	48.6
	Yes	295	51.4
Presence of animals	No	423	73.7
	yes	151	26.3

Table 2. Hygienic practice and related conditions during complementary feeding (n=574) in Addis Ababa, 2021

Variables	Category	Frequency	Percentages
Time a child start comp. food	before six month	134	23.3
	after six month	440	76.7
Child feeding method	spoon	215	37.5
	bottle	150	26.1
	cup	30	5.2
	hand or finger	179	31.2
Used variety of feeding utensils	No	274	47.7
	Yes	300	52.3
Private feeding utensil	No	149	26.0
	Yes	425	74.0
Cooked food served immediately	No (not within two hours)	151	26.3
	Yes (within two hours)	423	73.7
How children drink water	water is given as it is	370	64.5
	water is given after boiled and cooled	179	31.2
	water is given after chemicals such as wuha agar is added	25	4.4
Used food left from previous preparation stored	yes, stored without refrigerator	218	38.0
	yes, stored in refrigerator	80	13.9
	not stored	276	48.1
The child served food left from previous preparation	yes, given all the time	104	18.1
	yes, given sometimes	189	32.9
	not given for the child	281	49.0
Mothers/caregivers wash their hand before food preparation	do not wash	9	1.6
	yes, wash with water only	156	27.2
	not wash always with soap and water	35	6.1
	wash always with soap and water	374	65.2
Mothers/caregivers washtheir hands before feeding the child	do not wash	12	2.1
	wash with water only	164	28.6
	not wash always with soap and water	39	6.8
	wash always with soup and water	359	62.5
Child hand washed before feeding	do not wash	327	57.0
	wash with water only	137	23.9
	not wash always with soapand water	11	1.9
	wash always with soap and water	99	17.2
Child utensils washed	do not wash	36	6.3
	wash with water only	216	37.6
	not wash always with soap and water	61	10.6
	wash always with soap and water	261	45.5
Mothers/caregivers wash their hands after using toilet	do not wash	22	3.8
	wash with water only	103	17.9
	not wash always with soap and water	44	7.7
	wash always with soap and water	405	70.6
Child properly washed after toilet	do not wash	43	7.5
	wash with water only	240	41.8
	not wash always with soap and water	40	7.0
	wash always with soap and water	251	43.7
Hand washing facility after toilet	No	452	78.7
	Yes	122	21.3
Water source is found	in residence compound	430	74.9
	out of residence compound	144	25.1
Presence of flies at home	No	328	57.1
	Yes	246	42.9
Child utensils are clean	No	129	22.5
	Yes	445	77.5
Presence of animal droppings	No	508	88.5
	Yes	66	11.5
House floor is clean	No	206	35.9
	Yes	368	64.1

"Wuha-agar" is a chlorine solution added to 20 L Jerrycan of water

Table 3. Bivariate and multivariate binary logistic regression showing factors associated with hygienic feeding practice of complementary foods

Variables	Category	Hygienic feeding practice			
		Poor (%)	Good (%)	COR(95%CI)	AOR(95%CI)
Age of mother	18-24	50(40.7)	73(59.3)	1	1
	25-30	101(36.5)	176(63.5)	1.19 (0.772-1.84)	1.14 (0.681-1.92)
	31-36	43(35.2)	79(64.8)	1.26 (0.750-2.11)	1.56(0.842-2.92)
	37-42	29(61.7)	18(38.3)	0.43 (0.213-0.85)*	0.488(0.216-1.13)
	>42	2(40)	3(60)	1.03 (0.166-6.37)	1.05(0.131-8.41)
Age of child	6-12	76(34.2)	146(65.8)	1	1
	13-18	74(37.9)	121(62.1)	0.851 (0.570-1.27)	0.773(0.476-1.25)
	19-24	75(47.8)	82(52.2)	0.569 (0.375-0.86)**	0.490(0.293-0.82)*
religion of the mother	orthodox	152(36.3)	267(63.7)	1	1
	protestant	26(46.4)	30(53.6)	0.657 (0.375-1.15)	0.790 (0.402-1.55)
	catholic	10(90.9)	1(9.1)	0.057(0.007-0.45)**	0.217(0.022- 2.11)
	muslim	36(41.9)	50(58.1)	0.791(0.493-1.27)	0.726(0.416-1.26)
	others	1(50)	1(50)	0.569(0.035-9.17)	5.03(0.248-102.2)
education level of father	can't read and write	16(51.6)	15(48.4)	1	1
	can read and write	23(52.3)	21(47.7)	0.978(0.39-2.43)	1.065(0.338-3.36)
	primary school	75(45.2)	92(54.8)	1.272(0.59-2.75)	1.58(0.599-4.14)
	secondary school and above	105(32.8)	216(67.3)	2.183(1.04-4.58)*	2.59(1.006-6.68)*
	Unknown	4(40)	6(60)	1.067(0.256-4.44)	0.546(0.099-3.02)
occupation of father	jobless	19(33.9)	37(66.1)	1	1
	gov't/non-gov't employee	90(39.8)	136(60.2)	0.776 (0.420-1.43)	0.831(0.404-1.71)
	merchant	26(32.5)	54(67.5)	1.067(0.517-2.20)	1.053(0.448-2.47)
	causal laborer	72(40.7)	105(59.3)	0.749(0.399-1.41)	0.743(0.357-1.55)
	Others	14(51.9)	13(48.1)	0.477(0.187-1.22)	0.603(0.197-1.84)
	unknown	6(70)	2(30)	0.514(0.115-2.28)	0.656(0.109-3.96)
Monthly income of a family	<3000	55(41%)	79(59)	1	1
	3001-6000	20(28.2)	51(71.8)	1.77 (0.95-3.30)	1.60 (0.764-3.32)
	6001-9000	44(37)	75(63%)	1.19 (0.72-1.97)	1.60(0.859-2.99)
	9001-12000	30(36.1)	53(63.9)	1.230 (0.699-2.16)	1.12(0.564-2.18)
	>12000	76(45.5%)	91(54.5)	0.834(0.55-1.32)	0.906(0.514-1.59)
marital status of mother	Currently in union	170(35.1)	315(64.9)	1	1
	Not in union	54(61.4)	34(38.6)	0.340(0.213-0.54)**	0.534(0.296-0.96)*
Child feeding method	bottle	63(42)	87(58)	2.07(0.93-4.61)	2.35(0.907-6.07)
	hand or finger	69(38.5)	110(61.5)	2.39(1.08-5.27)*	3.55 (1.37-9.23)*
	spoon	75(34.9)	140(65.1)	2.80(1.28-6.12)*	3.14(1.225-8.06)*
	cup	18(60)	12(40)	1	1
Child has variety of feeding utensil	No	125(45.6)	149(54.4)	1	1
	Yes	100(33.3)	200(66.7)	1.68 (1.19-2.35)**	1.89(1.236-2.91)*
Child has private feeding utensil	No	68(45.6)	81(54.4)	1	1
	Yes	157(36.9)	268(63.1)	1.43(0.98-2.09)	.717(0.431-1.19)
Is food left from previous preparation stored?	Yes	110(50.5)	108(49.5)	1	1
	No	115(32.3)	241(67.7)	2.13(1.51-3.02)**	0.923(0.484-1.76)
Is a child feed food left from previous preparation/meal?	Yes	156(53.2)	137(46.8)	1	1
	No	69(24.6)	212(75.4)	3.49(2.45-4.99)**	3.47(1.86-6.49)**
Presence of hand washing facility after toilet	No	191(42.3)	261(57.7)	1	1
	Yes	34(27.9)	88(72.1)	1.89(1.22-2.93)**	2.14(1.26-3.64)**
Is water source found in the residence compound?	No	71(49.3)	73(50.7)	1	1
	Yes	154(35.8)	276(64.2)	1.74(1.19-2.55)**	1.49(0.919-2.42)
Is refrigerator present at home?	No	101(36.2)	178(63.8)	1	1
	Yes	124(42)	171(58)	0.782(0.559-1.09)	0.650 (0.405-1.04)
Presence of animals at home	No	152(35.9)	271(64.1)	1	1
	Yes	73(48.3)	78(51.7)	0.599(0.41-0.87)	0.636(0.370-1.09)
Is there an animal dropping at home?	No	191(37.6)	317(62.4)	1	1
	Yes	34(51.5)	32(48.5)	0.567(0.339-0.949)*	0.830(0.383-1.80)

Key: **, statistically significant at p<0.01; *, statistically significant at P<0.05

Marital status of mother is significantly associated with hygienic feeding practice and for mothers/caregivers that are not in union with their husbands, the likely occurrence of hygienic feeding practice decreased by 46.6% with [AOR=0.534, 95%CI: (0.296-0.960)] (Table 3). Using spoon for feeding the child increases likely occurrence of hygienic feeding practice by more than three-fold with [AOR=3.14, 95%CI: (1.23-8.06)], respectively. Having variety of feeding utensils for the child increases the likelihood of good hygienic feeding practice by 89% with [AOR=1.89, 95%CI: (1.23-2.91)]. Mothers/ caregivers that never give leftover food for the children practices good hygienic feeding 3.47 times more than those that feed leftover food for the children [AOR=3.47, 95%CI:(1.86-6.49)]. Respondents who have hand washing facility after toilet follows hygienic practices 2.14 times more likely than their counterparts [AOR=2.14, 95%CI:(1.26-3.64)] (Table 3).

4. Discussion

Child feeding method determines the health of the child as some utensils such as feeding bottles are difficult to wash and make them clean (42). The high practice (26%) of bottle feeding may be linked with the easy manipulation of the material by children. This is consistent with study in slum of Bahir-Dar City (45) and Kenya (46). This similarity may be due to study setting. It is different from study of Zanzibar, Tanzania (47) which may related to cultural background of the study participants and study setting. Having various feeding utensil which are used one after the other exchangeable and private utensil for the children minimizes the chance of serving leftover food for the children and rate of food contamination. Using variety of utensils (52.3%) and private utensil for the child (74%) in this study is higher than study in different parts of Ethiopia (40, 48). It is lower than study that conducted in Kerala, India (44), which may be due to differences . in cultural background of study participants

In the present study, 74% of the households serve prepared food immediately within two hours. This is in harmony with study in Debark Town (49) and relatively lower than study of rural kebeles of Harar (50). Higher percentage in the latter studies reflects that practice of storing cooked food is low in rural households.

In the present study, tap water is served for the child without any treatment in 65% of the household and boiled or used chemicals in the rest. This is in line with study in Bangladesh (51) and higher than in study of Bahidar Zuria Destrict (40). However, the two studies are different in sample size and study design. In urban areas, community water is treated programmatically and is considered to be safe. The latter study was conducted in rural areas.

In the present study, leftover food from previous meal was stored and served for the child both in 50% of the household. This is in agreement with study conducted in Bangladesh (51) and different from the study made Rural Kebeles of Harar (50) and Zanzibar, Tanzania (52), respectively. In rural areas of Ethiopia (Harar in this case), as a culture, food is not stored and is eaten as soon as it is prepared.

Hand-washing with soap and water is an important part of food hygiene, a set of hygienic practices that

keep food safe and prevent food-related illnesses (53). In the present study, the practice of hand washing before food preparation, before feeding the child and after using toilet by using soap and water was higher than the study made in Debark Town (53), Hanoi city, Vietnam (42), Thrissur district, Kerala (44) and Dhaka city (54). Hand washing before feeding the child is better in study of rural kebeles of Harar (50) as 87% of the respondents had hygiene practice training. In study made in slums of Uttar Pradesh, India, only 37% used soap for hand washing after defecation (55).

In this study, washing child's hand before feeding and after toilet by using soap and water is comparable to study in rural kebeles of Harar, Bahir-Dar zuria destrict and Hanoi-city, (40, 42, 50), and is poor. This resemblance may emanate from the fact that slum areas are in short supply of clean water and other hygiene facilities which is the main problems in rural areas of Ethiopia. Practice of washing child's hand before feeding is lower than study in Dhaka City which is 46% (54). Food contact surfaces such as feeding utensils are the main vehicles for the introduction of microorganisms to food if not washed properly. In the present study, child utensils are washed with soap and water in 46% of the respondents. This is lower than study made in Jimma Town (48) and Hanoi city (42)which is 87% and 75%, respectively and is relatively higher than study made in Rural Kebeles of Harar, and rural Malawi (50, 56) which are 34.8%, and 29%, respectively. This may be due to difference in study settings and sample size.Presence of proper hand washing facility at toilet site encourages immediate hand washing practice. Finding of the present study is consistent with study conducted in rural Malawi and Rural Bangladesh (56, 57).

Dirty house floor and child utensils creates conducive environment for the proliferation of microbial pathogens and result in child infections. At age 0-2 years, child hand to mouth contact, contact with every material around and crawling on the floor and possibility of handling their fecal matter is high. Therefore, this creates a possibility of infection if the house floor and utensils are not adequately clean. Sanitation programs, if exist must encourage the safe disposal of children's feces in order to produce maximum health gains in children (58). In the present study, child utensils and house floor are observed to be cleaned in 75.5% and 64% of the respondents' houses. This is higher than study in Bahir-Dar Zuria Destrict and Eastern Nigeria where feeding utensils were observed to be clean in 48.8 % of the households in the former (40) and feeding utensil and house floor are clean in 89% and 83% of the households in the latter (59).

The result from present study revealed that 60.8% [95%CI: (57-65%)] mothers/caregivers havegood hygienic feeding practices of complementary foods. This is slightly higher than study made in rural kebeles of Harar, Bahir-Dar Zuria Destrict, Abobo Destrict and Woldia Town (40, 43, 50, 60), which may be due to differences in study setting. Mothers/ caregivers having children aged between 19-24 months had lower odds of following good hygiene practice than their counterparts. Compared to children of lower ages, this age is time at which a children practice family foods.

Hence, appropriate hygiene practice may not be followed.Mothers/caregivers having husband with education level of secondary school and above, the likelihood of hygienic feeding practice increase by more than two-fold.

Other similar studies revealed that education level of mother is significantly associated with good hygienic practices (44, 50, 60). This can be elucidated that higher level of education to study participants made more aware about the consequence of use of unhygienic foods and preventive measures about food hygiene.

Spoon and cup/glass are considered to be the appropriate methods of feeding (41). In the present study, using spoon increases likely occurrence of good hygienic feeding practice by more than three-fold. Using variety of feeding utensil also increases the odds of hygienic feeding practice by 89%. This minimizes repeated utilization of same utensil and by then promotes hygiene practices. Serving food left from previous meal increase the likelihood of food contamination. In this study, never serving leftover food increases the odds of hygiene practice by three-fold.

Similarly, presence of hand washing facility at toilet site increases the odds of hygiene practice by more than two-fold than those that have no hand washing facility. Similar finding was obtained by study in Bahirdar zuria destrict and rural kebeles of Harar (40, 50) regardless of differences in study setting.

5. Conclusions

In this study, even though the magnitude of hygienic feeding practices of mother/caregiver is relatively higher than the previous related studies, it is still poor, and related with the age of child, education level of father, mothers' marital status, child feeding method, variety of child feeding utensil, consumption of leftover food by the child, and proper hand washing facility after toilet.

Therefore, interventions targeting these factors may improve hygienic feeding practices.

Conflict of Interests

The authors declare that they have no competing interests.

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