



## Article

# Complementary Food Feeding Hygiene Practice and Associated Factors among Mothers with Children Aged 6–24 Months in Tegedie District, Northwest Ethiopia: Community-Based Cross-Sectional Study

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**Abstract:** The hygienic practices of mothers during complementary food feeding are crucial in the protection of vulnerable infants and children aged 6–24 months from childhood communicable diseases such as diarrhea and malnutrition. However, sufficient evidence on the hygienic practices of mothers during complementary food feeding and their associated factors is limited. Thus, this study is aimed at assessing the levels of complementary feeding hygiene practice and its associated factors among mothers of children aged 6–24 months in the Tegedie District, Northwest Ethiopia. **Method:** A community-based cross-sectional study was conducted from 17 March to 17 April 2021, among 576 mothers with children aged 6–24 months in the Tegedie District, Northwest Ethiopia. A multistage sampling technique was used to select the study participants. Data were collected using a pretested structured questionnaire, then entered into Epi Data version 4.6 and exported to SPSS version 23 for analysis. Bivariable and multivariable logistic regressions were used to identify factors associated with outcome variables, and variables with *p*-values of <0.05 in the final models were considered statistically significant. **Result:** The prevalence of hygienic practice during complementary food feeding of their children aged 6–24 months was 33.6%, with 95% (CI 29.7% to 37.6%) of them having good practice. Living in an urban area (AOR = 7.02, 95% CI: (4.14, 11.88)), the presence of a handwashing facility near the latrine (AOR = 3.02, 95% CI: (1.18, 7.70)), the presence of a separate area to store raw and cooked foods (AOR = 5.87, 95% CI: (2.84, 12.13)), and the presence of a three-compartment dish washing system (AOR = 5.70, 95% CI: (3.41, 9.54)) were predictors of practicing good hygienic complementary food feeding. The prevalence of good hygienic practices during complementary feeding among mothers was low. The district health office and health extension workers should work to improve maternal hygienic practices during complementary feeding.

**Keywords:** complementary food feeding; hygienic practice; children aged 6–24 months; Tegedie District

## 1. Introduction

The World Health Organization (WHO) defines complementary food feeding (CF) as the process that starts when breast milk alone is no longer sufficient food and liquids are needed to meet the nutritional requirements along with breast milk [1,2]. Breastfeeding should begin at 6 months and continue for 2 years or longer in normal conditions, according to guidelines for infant and young child feeding indicators, and complementary foods

should be prepared, stored, and fed with clean hands and utensils rather than bottles and teat feedings [1,3]. It is a transition from exclusive breastfeeding to family foods and a very critical time in which poor hygiene practice of CF in many young children significantly contributes to the high prevalence of gastrointestinal and respiratory illnesses [4]. Gastrointestinal diseases associated with preventable food borne bacteria for children under 2 years of age remain a global health challenge since they have immature immune systems and are vulnerable to infections with enteric pathogens [5].

Hygienic practices during the CF of infants and children play a major role in the occurrence of childhood diarrheal diseases [6]. Studies have shown that diarrheal incidence increases at the age when complementary foods are usually introduced, as unhygienic preparation and handling of foods can be a source of diarrheal pathogens [7–9]. Diarrhea is associated with malabsorption of significant nutrients, fluid losses, and reduced appetite [10], which results in severe childhood nutritional problems, such as wasting and stunting [11]. Although hardware components such as improved water supplies and sanitation facilities make it easier to practice, better hygiene can make a huge difference to health, especially in keeping children safe from infection through feeding contaminated foods [12]. Improving hygienic complementary food feeding is given special attention in the Sustainable Undernutrition Reduction in Ethiopia (SURE) program. It collaborates with a multi-sector intervention to deliver a complex multi component intervention to improve child feeding and reduce stunting [13].

Worldwide, the lives of approximately 525,000 children are lost each year from 1.7 billion cases of different infectious diseases such as childhood diarrhea, with the highest mortality rates reported among children aged less than 2 years in South Asia and sub-Saharan Africa [14]. Furthermore, 230,000 die every year globally because of diarrheal diseases associated with contamination of complementary foods [3]. The contaminated complementary food feeding process is directly related to malnutrition, which is estimated to be the underlying cause of 45% of all deaths in children under the age of 5 years [15]. Among the predictors of child mortality, poor hygiene, home environment, toilet facilities, fuel used for cooking, availability of refrigeration, drinking water, and the household members were associated with a greater likelihood of having a child who died before the age of 5 years [16]. A staggering 88% of child deaths were caused by diarrheal diseases, which are linked to a lack of access to sanitation, water, and hygiene (WASH) services and can be avoided by improving WASH, according to [17].

Epidemiological data indicate that food could be more important than water in transmitting diarrheal diseases, and it is estimated that 40% of the burden of food borne diseases lies with children aged less than 5 years in African countries [4]. This corresponds with reports that at least 70% of diarrhea-related pathogens among children could be caused by contaminated complementary foods [18]. In Africa, more than 30% of children aged less than 5 years suffered from different microbial pathogen diseases. Scientific evidence indicates that poor hygienic practices during complementary food feeding can have profound consequences for the growth, development, and survival of infants and children [19,20]. This is explained by a study conducted in Malawi that reported that 27% of 6-to 24-month-old children were reported to have had diarrhea during the 2 weeks after the initiation of CF, resulting in 80% suffering from reduced height and growth rate and 20% being underweight [21]. Across three studies in rural India, they showed that the prevalence of child stunting ranged from 25% to 50% [22]. A descriptive study in Malawi showed that the prevalence of diarrhea among children under 5 years old was 43.4%, and that this diarrhea among children whose mothers prepared their children's food on the floor was 45.5%, those who prepared it on the table 40.7%, and those who used only water 48.2%; 40.3% used soap and water for handwashing [21]. Handwashing and basic hygiene behavior during the preparation of complementary food could minimize the spread of germs and, as such, prevent diarrhea, acute respiratory infections such as influenza, and skin infections [23].

According to the Mini Demographic and Health Survey 2019 of Ethiopia, the current prevalence of CF was 13%, in addition to breast milk, and infant mortality was 43% due to

the preventable bacterial pathogens causing diseases. Inadequate food hygiene is considered to be one of the major contributors to diarrhea [24]. Appropriate CF practice requires good hygienic preparation of complementary foods, sufficient household-level food availability, and adequate nutritional knowledge application by caregivers [25,26]. Many studies explain that the incidence of diarrheal diseases is especially high after the initiation of complementary feeding, which is the result of the consumption of contaminated complementary foods that may introduce diarrhea-causing pathogenic microorganisms [27,28].

Understanding the risk of hygiene practices in complementary food feeding is a major concern in Ethiopia for preventing and controlling food borne diseases in children aged 6–24 months. However, the implementation of these conditions is often limited in Ethiopia. On top of this, there is the problem of real hygiene practices in complementary food feeding, resulting in serious consequences of poor health outcomes. In [28], scholars recommended that evidence-based awareness creation on poor complementary food feeding practices and increasing caregiver mothers' access to health education be recommended to reduce child morbidity and mortality. As far as our knowledge goes, there is a limited study conducted on the level and associated factors of complementary food feeding hygiene practice among mothers of children aged 6–24 months in Ethiopia. Improving food hygiene practices plays a great role in child morbidity and mortality. However, determinant factors of poor complementary food feeding hygienic practice are not well addressed, which *may be why it is important to offer the proper information about those who are vulnerable age groups*. Therefore, the present study is aimed at assessing the level and associated factors of complementary food feeding hygiene practiced among mothers of children aged 6–24 months in the Tegedie District, Northwest Ethiopia.

## 2. Materials and Methods

### 2.1. Study Area, Design, and Period

This study was conducted in the Tegedie District, which is located 115 km from central Gondar and 748 km from Addis Ababa, the capital city of Ethiopia. The district has 1 primary hospital, 3 governmental health centers, 24 health posts, and 7 private medium clinics. The district is structured into 21 kebeles (2 urban and 19 rural). According to Tegedie District health office reports, a total of 96,035 (48,497 males and 47,537 females) people are living in the district. The number of breastfeeding mothers in the district was 4026. A community-based cross-sectional study was conducted in the Tegedie District from 17 March to 17 April 2021.

### 2.2. Study Population

All mothers/caregivers with children aged 6–24 months in the randomly selected kebeles in the district were considered the study population. Mothers with children aged 6–24 months who were seriously ill and unable to hear and those mothers who lived a minimum of 6 months and did not start complementary food feeding at the time of data collection were also excluded from the study.

### 2.3. Sample Size and Sampling Technique

The sample size (n) was determined by using the single population proportion formula by taking an estimate of  $p = 38.9\%$  from previous research conducted in the Bahir Dar Zuria District in Northwest Ethiopia [29].  $Z_{\alpha/2} = 1.96$  is the critical point for the standard normal tabulated value at a 95% confidence interval and a  $d = 5\%$  margin of error. The final sample size, including a 5% non response rate and considering 1.5 design effects, was 576.

The multistage sampling technique was used to get the study participants. Out of the 21 kebeles in the Tegedie District, 7 (30%) kebeles were selected using a simple random sampling technique. The sample size was proportionally allocated to each selected kebele based on the size of the population of mothers with 6- to 24-month-old children in each kebele. The list of mothers with 6- to 24-month-old children in each kebele was used as a sampling frame, which was found in health posts in the respective kebeles. A systematic

random sampling technique was used to select the study participants after proportional allocation. The sampling interval Kth value was determined by dividing the total number of mothers with 6–24 children in each by the sample size allocated for each kebele.

#### 2.4. Variable

##### 2.4.1. Dependent Variable

Hygiene practices for complementary food feeding.

##### 2.4.2. Independent Variables

Socio demographic factors (age, marital status, place of residence, and number of children), socioeconomic factors (occupation, level of education, income, residence, and access to media (radio and TV)), mothers' knowledge, and attitudes toward hygienic practice during complementary feeding of children, as well as household and environmental factors such as the presence and type of latrine, the presence of a handwashing facility near the latrine, the source and quantity of water used per day, the presence of a separate kitchen, and a three-compartment dishwashing system.

#### 2.5. Operational Definition

The respondents were asked 16 questions (6 related to handwashing with water and soap with 3 scales: 1—always, 2—sometimes, and 3—wash only with water; 10 questions related to safety measures during food preparation with a “yes” or “no” response). The responses forwarded by the study participants to the 6 questions related to handwashing with water and soap were dichotomized as 1 “for always” and 0 “for sometimes and washing only with water”. The responses forwarded by the study participants to 10 questions related to safety measures during food preparation were dichotomized as 1 “for correct” and 0 “for incorrect responses”. Those study participants who had the correct response to 75% of the questions were reported as having good hygienic practice during complementary food feeding; otherwise, they were reported as having poor hygienic practice during complementary food feeding [30].

The respondents were asked 20 questions (Cronbach's alpha, 0.83) about their knowledge of hygienic complementary food feeding, such as whether they knew how to keep their hands safe and clean during food preparation, the critical times for handwashing, the importance of handwashing with soap at critical times, whether the respondents knew the best way of handwashing during food preparation, the importance of separate storage of raw and cooked foods, whether they knew contaminated water can contaminate foods, and whether fruits and vegetables should be washed before eating. The correct answers were coded as 1, and the wrong answers were coded as 0. The respondents' responses to knowledge questions were computed to get the total knowledge score. Those study participants whose scores were equal to the mean (17.04) and above the mean of the sum of the knowledge questions were considered to have good knowledge [25].

Improved water sources: Sources that include piped water, boreholes or tube wells, protected dug wells, protected springs, and packaged or delivered water. Unimproved water sources include unprotected wells, unprotected springs, and surface water [15]. In Ethiopian contexts, dega means cold and less than temperate zones with altitudes ranking between 2600 and 3200 meters above sea level, whereas weynadega is warm, wet, and lies below 2600 m sea level, and kola means the calamite of hot lowland with an altitude of large annual temperature large between 20 and 30 degrees Celsius.

#### 2.6. Data Collection and Quality Control

Data were collected by interview and observation using a structured questionnaire. The questionnaire was prepared by reviewing previous studies conducted on the hygienic practices of mothers with children aged 6–24 months during complementary food feeding of their children [31–34]. The questionnaire comprised five parts: socio demographic, household-, and environment-related variables, maternal knowledge and attitude about hy-

gienic complementary food feeding, and self-reported hygienic practices of mothers during complementary food feeding. The questionnaire was developed in English, then translated into Amharic (the local language), and finally back to English to ensure consistency. Five health extension workers as data collectors and one BSC Degree holder in the environmental health profession as supervisor were recruited for the data collection process.

The pretest was performed on 5% of the sample size (29 participants) in a kebele, a district where the main study was not undertaken. Training was given for the data collectors and the supervisor on the aim of the study, inclusion and exclusion criteria, data collection techniques, going through the questionnaires, the art of interviewing, the way of collecting data, and clarification before the actual data collection. Every day after data collection, a review was conducted by the supervisors and the principal investigator to ensure the completeness of the questions. The completeness of the questionnaires was checked before data entry by the principal investigator. Incomplete questionnaires were excluded from the analysis.

### 2.7. Data Processing and Analysis

The data were entered into the Epi Data software version 4.6 and exported to the SPSS statistical package version 23 for further analysis. Descriptive statistics were used to describe the data. Bivariable and multivariable logistic regressions were used to identify predictors of hygienic complementary feeding practice. In bivariable logistic regression, a  $p$ -value  $< 0.25$  was considered to retain variables for a multivariable logistic regression model. A backward stepwise analysis method was used to select variables in multivariable logistic regression to control the confounding effect. Most variables were removed from a backward stepwise method. Crude and adjusted odds ratios with 95% confidence intervals were computed to assess the association between independent predictors and outcome variables. A  $p$ -value  $< 0.05$  was considered the level of statistical significance. The Hosmer–Lemeshow tests were checked to assess the model fitted to conduct logistic regression.

## 3. Results

### 3.1. Socio demographic Characteristics of Participants

A total of 572 mothers who have children aged 6–24 participated in this study, with a response rate of 99.3%. The mean age of the mothers and caregivers was 29.74 years, with an SD of 5.719. Nearly two-thirds (374, or 65.4%) of the mothers or caregivers who participated in this study lived in urban areas. Nearly two-thirds (345, or 60.3%) of the mothers or caregivers had no formal education. Similarly, the occupation of more than 329 (57.5%) of the mothers or caregivers was housewife. More than 338 (59.1%) of the households had family sizes of five or more. Nearly all 551 (96.3%) of the mothers/caregivers who participated in this study had one child aged 6–24 months (Table 1).

**Table 1.** Socio demographic characteristics of the participants in the Tegelie District, Northeastern Ethiopia, March 2021.

<i>Variable/Categories</i>	<i>Frequency (n)</i>	<i>Percent (%)</i>
<b><i>Ethnicity</i></b>		
<i>Amhara</i>	559	97.7
<i>Tigray</i>	8	1.4
<i>Others *</i>	5	0.9
<b><i>Religion</i></b>		
<i>Orthodox</i>	488	85.3
<i>Muslim</i>	78	13.6
<i>Catholic</i>	2	0.3
<i>Others **</i>	4	0.7

**Table 1.** Cont.

<i>Variable/Categories</i>	<i>Frequency (n)</i>	<i>Percent (%)</i>
<b><i>Maternal educational status</i></b>		
<i>No formal education</i>	345	60.3
<i>Primary level</i>	81	14.2
<i>Secondary level</i>	58	10.1
<i>Diploma and above</i>	88	15.4
<b><i>Maternal occupation</i></b>		
<i>Civil servant</i>	88	15.4
<i>Merchant</i>	52	9.1
<i>Unemployed</i>	64	11.2
<i>Daily laborer</i>	38	6.6
<i>Housewife</i>	329	57.5
<i>Student</i>	1	0.2
<b><i>Marital status of mothers</i></b>		
<i>Married</i>	519	90.7
<i>Lives separately</i>	4	0.7
<i>Single</i>	9	1.6
<i>Divorced</i>	31	5.4
<i>Widowed</i>	9	1.6
<b><i>Husband's educational status (N = 523)</i></b>		
<i>Diploma and above</i>	105	20.1
<i>Secondary level</i>	68	13.0
<i>Primary level</i>	151	28.9
<i>No formal education</i>	199	38.0
<b><i>Husband's occupational status (N = 523)</i></b>		
<i>Civil servant</i>	109	20.8
<i>Merchant</i>	166	31.7
<i>Unemployed</i>	9	1.7
<i>Daily laborer</i>	66	12.6
<i>Farmer</i>	173	33.1
<b><i>Family size</i></b>		
<i>Fewer than 5</i>	338	59.1
<i>5 and above</i>	234	40.9
<b><i>No. of children under 2</i></b>		
<i>One</i>	551	96.3
<i>More than 1</i>	21	3.7
<b><i>Household monthly income</i></b>		
<i>Mean and above(2756.65)</i>	249	43.5
<i>Below mean</i>	323	56.5
<b><i>Place of residence</i></b>		
<i>Urban</i>	374	65.4
<i>Rural</i>	198	34.6
<b><i>Access to media (TV or radio)</i></b>		
<i>Yes</i>	288	50.3
<i>No</i>	284	49.7
<b><i>Got training on child food preparation</i></b>		
<i>Yes</i>	85	14.9
<i>No</i>	487	85.1

\* Afar, Somali, \*\* Protestant and Adventist.

### 3.2. Housing and Environmental Characteristics

Of the 572 respondents, the majority of 482 (84.3%) had latrines of any type for their household members. The most common type of latrine was a pit latrine with a slab, with a total of 239 (41.8%), and almost all 561 (98.1%) households obtained drinking water from protected sources. About 510 households had a separate kitchen for food preparation, and

nearly 380 households (66.4%) used cultural cook stoves for cooking. Other housing and environmental characteristics and the results of the bivariate analysis of their association with complementary feeding hygienic practice among mothers are summarized in (Table 2).

**Table 2.** Housing and environment of the household in the Tagedie District, Northeastern Ethiopia, March 2021.

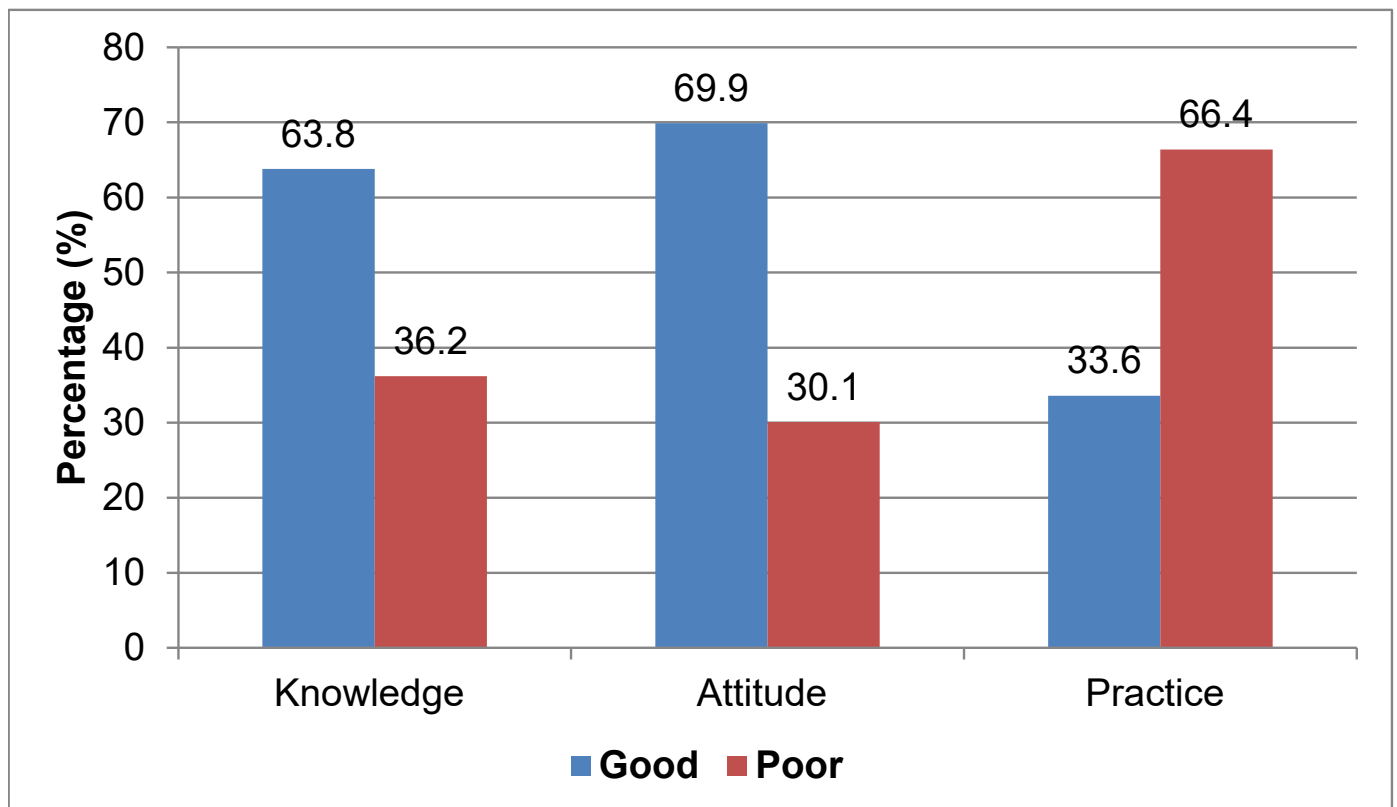
<i>Variable/Categories</i>	<i>Frequency (n)</i>	<i>Percent (%)</i>
<b><i>Presence of latrine</i></b>		
Yes	482	84.3
No	90	15.7
<b><i>Type of latrine</i></b>		
Pour flush	21	3.7
VIP latrine	118	20.6
Pit latrine with slab	239	41.8
Pit latrine without slab	105	18.4
No latrine facilities	89	15.6
<b><i>Presence of handwashing facility near the latrine</i></b>		
Yes	29	5.1
No	543	94.9
<b><i>Handwashing with soap after visiting toilets</i></b>		
Always	274	47.9
Sometimes	93	16.3
Never	205	35.8
<b><i>Handwashing with soap after cleaning child's bottom</i></b>		
Always	276	48.3
Sometimes	91	15.9
Wash only with water	186	32.5
Never	19	3.3
<b><i>Wash child's hands with soap after he/she defecates</i></b>		
Always	308	53.8
Sometimes	158	27.6
Wash only with water	106	18.5
<b><i>Source of drinking water</i></b>		
Protected water	561	98.1
Unprotected water	11	1.9
<b><i>Distance to the water source</i></b>		
<b><i>In the yard</i></b>		
≤30 min	185	32.3
>30 min	196	34.3
	191	33.4
<b><i>HH water treatment</i></b>		
Yes	62	10.8
No	510	89.2
<b><i>Presence of separate kitchen for food preparation</i></b>		
Yes	510	89.2
No	62	10.8
<b><i>Type of cook stove</i></b>		
Modern stove	192	33.6
Cultural stove	380	66.4
<b><i>Presence of separate area to store raw and cooked foods</i></b>		
Yes	375	65.6
No	197	34.4

Table 2. Cont.

Variable/Categories	Frequency (n)	Percent (%)
<b>Presence of a three-compartment dishwashing facility</b>		
Yes	266	46.5
No	306	53.5
<b>Knowledge</b>		
Good (mean and above)	365	63.8
Poor (below mean)	207	36.2
<b>Attitude</b>		
Good attitude	400	69.9
Poor attitude	172	30.1

### 3.3. Knowledge, Attitude, and Practice of Hygienic Complementary Feeding

Among 572 mothers/caregivers, 33.6% (95% CI) (29.7%, 37.6%) had good hygienic practice during complementary food feeding of their children aged 6–24 months. Additionally, 365 (63.8%) and 400 (69.9%) of mothers and caregivers had good knowledge and attitudes toward hygienic complementary food feeding (Figure 1).



**Figure 1.** Knowledge, attitude, and practice of mothers/caregivers about complementary food feeding of their children aged 6–24 months.

### 3.4. Factors Related to Hygienic Complementary Food Feeding Practices

The association between good hygienic practices of complementary food feeding and its associated factors among mothers with children aged 6–24 months was analyzed using bivariable logistic regression. All factors that had a  $p$ -value of  $<0.25$  in bivariate analysis were considered in the multivariable logistic regression model. Hence, urban residence, access to media, maternal educational status, having good knowledge about the hygienic practice of complementary food feeding, presence of latrine, having improved latrine, presence of handwashing facilities near the latrine, accessible water source (time taken to



reach the source), habit of treating water in the household, having a separate kitchen from the main house, presence of a separate storage area for cooked and raw food, and presence of a three-compartment dishwashing system were candidate variables for the multivariable logistic regression analysis.

After adjusting for confounding variables using multivariable logistic regression analysis, urban residence, the presence of a handwashing facility near the latrine, the presence of a separate area to store raw and cooked foods, and the presence of three-compartment dishwashing facilities had statistically significant associations with hygienic complementary food feeding practice.

Accordingly, those mothers/caregivers who lived in urban areas had 7 times (AOR = 7.02, 95% CI: (4.14, 11.88)) higher odds of practicing good hygienic complementary food feeding than those who lived in rural areas.

The odds of good hygienic complementary food feeding practice among mothers/caregivers who had a handwashing facility near the latrine were 3 times (AOR = 3.02, 95% CI: (1.18, 7.70)) higher as compared with mothers/caregivers who had no handwashing facility near the latrine.

Those mothers/caregivers who had a separate area to store raw and cooked foods had almost 6 times higher odds of good hygienic complementary food feeding practice than their counterparts (AOR = 5.87, 95% CI: (2.84, 12.13)). The odds of practicing good hygienic complementary food feeding among mothers/caregivers who had a three-compartment dishwashing facility were 5.7 times (AOR = 5.70, 95% CI: (3.41, 9.54)) higher compared with those mothers who did not have it (Table 3).

**Table 3.** Bivariate and multivariable logistic regression analysis of complementary food feeding hygienic practice among mothers who had 6- to 24-month-old children in the Tegedie District, Northeastern Ethiopia, March 2021(N = 572).

Variable/ Categories	Complementary Feeding Hygienic Practices		COR(95% CI)	AOR (95% CI)
	Good	Poor		
<i>Maternal education</i>				
Diploma and above	53	35	1	
Secondary level	20	38	0.35 (1.44, 5.73) **	
Primary level	24	57	0.28 (1.90, 6.82) ***	
No formal education	95	250	0.25(2.45, 6.49) ***	
<i>Place of residence</i>				
Urban	165	209	5.00 (3.17, 7.88) ***	7.02 (4.14, 11.88) ***
Rural	27	171	1	1
<i>Access to media (TV or radio)</i>				
Yes	132	156	3.16 (2.19, 4.56) ***	
No	60	224	1	
<i>Presence of latrine</i>				
Yes	175	307	2.45 (1.40, 4.28) **	
No	17	73	1	
<i>Type of latrine</i>				
Improved	151	227	2.48(1.66, 3.71) ***	
Unimproved	41	153	1	
<i>Time taken to reach the water source</i>				
≤30 min	147	234	2.04(1.38, 3.02) ***	
>30 min	45	146	1	
<i>HH water treatment</i>				
Yes	27	35	1.61 (0.94, 2.76)	
No	165	345	1	

Table 3. Cont.

Variable/ Categories	Complementary Feeding Hygienic Practices		COR(95% CI)	AOR (95% CI)
	Good	Poor		
<i>Presence of handwashing facility near the latrine</i>				
Yes	20	9	4.79 (2.14, 10.75) ***	3.02 (1.18, 7.70) *
No	172	371	1	1
<i>Separate kitchen for food preparation</i>				
Yes	187	323	6.60 (2.60, 16.76) ***	
No	5	57	1	
<i>Presence of separate area to store raw and cooked foods</i>				
Yes	181	194	15.78(8.31, 29.95) ***	5.87 (2.84, 12.13) ***
No	11	186	1	1
<i>Presence of three-compartment dishwashing facility</i>				
Yes	149	117	7.79 (5.21, 11.66) ***	5.70 (3.41, 9.54) ***
No	43	263	1	1
<i>Knowledge</i>				
Good	142	223	2.00 (1.37, 2.93) ***	
Poor	50	157	1	

Note: The Hosmer–Lemeshow model fitness test  $p$ -value was 0.96. 1 = reference category, \* = statistically significant at  $p < 0.05$ , \*\* = statistically significant at  $p < 0.01$ , and \*\*\* = statistically significant at  $p < 0.001$ .

#### 4. Discussion

In this community-based cross-sectional study, the overall prevalence of hygienic complementary food feeding practice among mothers who had children aged 6–24 months was found to be 33.6%, 95% CI: (29.7, 37.6), and factors such as living in urban areas, the presence of handwashing facilities near the latrine, the presence of a separate area to store raw and cooked foods, and the presence of a three-compartment dishwashing system were significant predictors of hygienic complementary food feeding practice.

The prevalence of hygienic complementary food feeding practices in this study was lower than the prevalence (38.9%) reported by a study conducted in the Bahir Dar Zuria District, Northwest Ethiopia [35]. This might be due to the differences in the study setting, as the Bahir Dar Zuria District is located near the capital city of the Amhara National Regional State, Bahir Dar, and mothers/caregivers might have better information and water and sanitation access compared with those in the current study area. Access to better information and water and sanitation services helps mothers and caregivers improve the habit of good hygienic practice during complementary food feeding.

Similarly, this prevalence was lower than the prevalence (39.6%) reported by a cross-sectional study conducted in rural kebeles of the Harari Region, Ethiopia [29]. This might be due to differences in the measurement of the outcome variable. In the study conducted in the Harari Region, the sum of a three-point score scale (always, sometimes, and never) was used to measure the status of hygienic complementary food feeding practice. However, in this study, this three-point scale was dichotomized into “yes” or “no” responses; coded as 1 and 0, respectively; and added to measure the outcome variable.

Similarly, the result in this study was much lower than the prevalence (51%) reported by a study performed in the Abobo District, Southwestern Ethiopia, on model and non model household mothers [36]. This discrepancy might be due to differences in the measurement of good hygienic practice and the comparative nature of the previous study, which included model households that have a higher tendency to adopt good food hygiene behaviors.

On the other hand, this study also indicated that urban residences, the presence of handwashing facilities near the latrine, the presence of a separate area to store raw and cooked foods, and the presence of three-compartment dishwashing facilities showed a

statistically significant association with hygienic complementary feeding practice among mothers who had children aged 6–24 months.

Living in urban areas was a significant predictor of good hygienic complementary food feeding practice among mothers with children aged 6–24 months. The odds of good hygienic complementary food feeding practice were higher in mothers/caregivers who lived in urban areas compared with mothers/caregivers living in rural areas. A similar finding was reported by a cross-sectional study conducted in the Bahir Dar Zuria District, Northwest Ethiopia [35]. This might be due to the fact that mothers in urban areas might have access to information and an adequate supply of water, which helps them to improve the habit of good hygienic practices.

In this study, the presence of a handwashing facility near the latrine was associated with good hygienic complementary food feeding practice. This finding is supported by a study conducted in the Bahir Dar Zuria District, Northwestern Ethiopia, and the Abobo District, Southwestern Ethiopia [35,36]. The reason for this association is that the presence of a handwashing facility near the latrine inevitably promotes handwashing after visiting the toilet, which helps to adopt hygienic practices in day-to-day activities, especially during food preparation.

**Strength and limitations:** The community-based nature of the study could be taken as the strength of this study. However, the possibility of social desirability bias could be taken as the limitation of this study. Moreover, this study shares the drawbacks of the cross-sectional study design, as it cannot determine the temporal relationship between the predictor variable and the outcome variable.

## 5. Conclusions and Recommendations

The prevalence of good hygienic practice during complementary food feeding among mothers who had children aged 6–24 months was low in the study area. This study also revealed that the observed prevalence of hygienic practice during complementary food feeding was very low compared with those in previous studies in Ethiopia. The study also discovered that among mothers with children aged 6–24 months, urban residences, the presence of a handwashing facility near the latrine, a separate area to store raw and cooked foods, and the presence of three-compartment dishwashing facilities had a statistically significant association with hygienic complementary food feeding practice.

The district health office should design a health education program for both urban and rural mothers with children about the importance of handwashing facilities near the latrine, a separate area to store raw and cooked foods, and a three-compartment dishwashing system to develop the habit of safe and hygienic preparation of foods.

The low prevalence of hygienic complementary food feeding practices can be improved by providing training for mothers, and women's health development armies' weekly discussion agendas should include the plan to raise issues related to hygienic complementary food feeding to facilitate the sharing of information and increase the awareness of mothers. Therefore, health extension workers should design training programs on hygienic food preparation, especially during complementary food feeding.

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**Institutional Review Board Statement:** Before data collection, ethical approval was obtained with ref No/IPH/1499/2013 on 16 July 2013 from the institutional review committee institute of public health, College of Medicine and Health Sciences, University of Gondar. A permission letter was also obtained from the Zonal Health Department and district health offices. Verbal informed consent was obtained from each study participant. The respondents were also informed that they had the full right to withdraw or refuse at any time from the interview. The confidentiality of information given by each respondent was kept properly.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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### Abbreviations

AOR	adjusted odds ratio
CF	complementary feeding
COR	crude odds ratio
HEW	health extension worker
ETB	Ethiopian birr
HH	households
OD	open defecation
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

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