



ARSI UNIVERSITY
COLLEGE OF HEALTH SCIENCE
DEPARTMENT OF PEDIATRICS AND CHILD HEALTH

**Determinants of delay in timely treatment seeking for diarrheal diseases
among mothers with under-five children in public health facilities of Asella
town, Oromia, central Ethiopia: a case - control study**

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Abstract

Background: Early treatment of diarrheal disease reduces morbidity and mortality among under-five children. However, in many low-income countries, mothers and caregivers often fail to seek care promptly or do not seek care at all. Delayed treatment may result in chronic diarrhea, malabsorption, malnutrition, growth retardation, and long-term impairment. Factors such as maternal knowledge, type of diarrhea, and distance to health facilities influence treatment-seeking behavior. This study aimed to identify determinants of delayed treatment seeking for diarrheal disease among under-five children attending public and private health facilities in Asella town, Oromia region, central Ethiopia.

Methods: An institutional-based unmatched case–control study was conducted from October 1 to November 30, 2025, among 324 under-five children (162 cases and 162 controls). Three government and two private health facilities were selected, and the sample size was proportionally allocated to each facility. Data were collected using a pretested questionnaire and analyzed using SPSS version 27. Variables with a p -value ≤ 0.25 in bivariate analysis were entered into multivariable logistic regression. Statistical significance was declared at p -value < 0.05 with 95% confidence intervals.

Results: A total 324 participants were included, giving a 100% response rate. Children under 24 months were more likely to experience delayed treatment seeking than those aged ≥ 24 months (AOR = 2.19; 95% CI: 1.23–3.99). Living more than 10 km from the nearest health facility increased the likelihood of delayed treatment (AOR = 2.67; 95% CI: 1.67–4.27). Children of mothers or caregivers with poor knowledge were also more likely to delay seeking treatment (AOR = 2.60; 95% CI: 1.50–4.43).

Conclusion and recommendation: Delayed treatment seeking was significantly associated with younger child age, long distance to health facilities, and poor mothers/caregivers knowledge. Strengthening community-based health education and improving access to health services are essential. Targeted interventions for high-risk families are necessary to reduce diarrhea-related morbidity and mortality among under-five children.

Keywords: Diarrhea, Ethiopia, treatment delay, under-five

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Acronyms and abbreviations

AIDS - Acquired Immune Deficiency Syndrome

AOR - Adjusted Odds Ratio

CDC - Center for Disease Control

CI - Confidence Interval

EDHS - Ethiopian Demographic and Health Survey

EFY - Ethiopian Fiscal Year

ETB - Ethiopian Birr

GMP - Growth Monitoring and Promotion

HH -House Hold

KM - Kilometer

LMICs - Low and Middle Income Countries

NGOs - Non-Governmental Organizations

ORS - Oral Rehydration Salt

SD - Standard Deviation

SPSS - Statistical Package for Social Science

UNICEF - United National Children's Fund

VIF - Variance Inflation Factors

WHO - World Health Organization

1. Introduction

1.1 Background

According to World Health Organization (WHO) diarrhea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual) It is a symptom of intestinal infections caused by a host of bacterial, viral and parasitic organisms, most commonly transmitted through water contaminated with fecal matter (1). Among pathogens, rotavirus is the main source of intense loose bowels, and is accountable of around 40% hospitalizations of children under- five years of age. Clinically, diarrhea is categorized into three main types acute watery diarrhea, acute bloody diarrhea and persistent diarrhea (2). It can last several days, and may result in excessive loss of fluids and electrolytes, leading to dehydration, which remains the primary cause of death associated with diarrheal disease can (3).

Globally diarrheal disease is the third leading cause of death in children under five years old and is responsible for killing around 443 832 children every year of which (50-60)% were within of African region (1). Sub Saharan Africa are also the place where under five years old children's death take place tragically due to diarrhea (4). Diarrheal among under five children in Ethiopia were also ranging from 23% to 31.7% (5).

Diarrheal disease is more common with inadequate sanitation, hygiene and limited access to water for drinking, cooking and cleaning. Rotavirus and *Escherichia coli* are the two most common etiological agents of moderate-to-severe diarrhea in low-income countries. Other pathogens such as *cryptosporidium* and *Shigella* species may also be important. Location specific etiologic patterns also need to be considered (1). Though most episodes of childhood diarrhea are not always severe, acute cases can lead to significant fluid loss and dehydration; consequently, deaths or other severe consequences can arise if fluids are not replaced early at the first sign of diarrhea (6). Early use of health services and enforcement with successful treatment will reduce morbidity, disability, and mortality due to diarrhea among under five children (7).

Children who die to diarrheal disease often have underlying malnutrition, which increases susceptibility to infection. Conversely, recurrent diarrheal episodes further exacerbate malnutrition, creating a vicious cycle. Diarrhea is leading cause of malnutrition and consequence of malnutrition among under-five children. Water contaminated with human feces, for example, from sewage, septic tanks and latrines, is of particular concern. Animal

feces also contain microorganisms that can cause diarrhea. Diarrheal disease can also spread from person-to-person, aggravated by poor personal hygiene. Food is another major cause of diarrhea when it is prepared or stored in unhygienic conditions (1).

Delay treatment seeking for diarrheal disease among under five children increases severity of illness and the risk of mortality(6). World Health Organization reported that 70% of child deaths are associated with delays in seeking appropriate healthcare (8). Poor health care seeking behavior has been consistently linked to increased morbidity and mortality of children (9–11). Ethiopian ranked 5th from the world by under-five diarrheal death due to delays in seeking care (8)

1.2 Statement of the Problem

Diarrhea is a significant contributor to the global burden of disease and affects all communities across the world (2). In low-income and developing nations, it is one of the main causes of morbidity and mortality among children. Children under the age of five are especially susceptible to diarrhea, which is thought to be responsible for 8% of all diarrheal deaths globally and more than 25% of all deaths in this age group (2,10). Centers for Disease Control and prevention (CDC) reported that diarrhea claims the lives of 2,195 children every day, which equates to approximately 32 school buses full of kids every day. This is even worse than the combined prevalence of Acquired Immune Deficiency Syndrome (AIDS) and malaria(2).

Diarrhea is still a common cause of morbidity and mortality among children under five in Ethiopia, according to data from the Ethiopian Demographic and Health Survey (EDHS), despite advancements in case management and diagnostic technologies over the past few decades (5). Pooled estimation also suggest that, the prevalence of diarrhea in under five children estimated to be 22% (1 in 5 children) experienced diarrheal illness in Ethiopia(12). Moreover, yearly childhood death due to diarrheal illness in Ethiopia was estimated to be 95,000. (170 deaths/1000 children under-five mortality rate), 20% of those are caused by diarrhea (9)

Treatment for common childhood disease illnesses like diarrhea is very successful when treatment sought early. Thus, morbidity and mortality from this disease decreased when early care sought. Caregiver's ability to recognize and seek prompt care for these common childhood diseases instrumental in reducing child deaths in Low-and Middle-Income Countries (LMICs) (8,13). The problem has been widely attributed to the lack of access to quality health care, early treatment seeking and effective treatments (2,14,15).

The majority of fatalities linked to diarrheal stem from dehydration caused by significant losses of fluid and electrolyte. Thus, if treatment not sought timely and effectively (2,14). There are low cost and effective interventions that can prevent and treat diarrheal diseases; thus, deaths from diarrhea are largely preventable if adequate treatment is sought timely in the course of the illness (16) and the practice of seeking medical care seeking behavior is the most determinant factors to avert diarrheal mortality among pediatrics (17). However, majority of caregivers of children with diarrheal diseases in developing countries did not seek healthcare timely (11,13,18,19) or not sought at all (20).

Mothers who sought appropriate and timely care early reduced childhood mortality by 20% due to diarrheal illnesses and long-term complications (21,22). However, only a small percentage of children under five in Ethiopia receive timely and appropriate treatment due to the country's relatively poor health care seeking habits. Additionally, the use of medical facilities to treat common childhood illnesses varies by location. It ranges from 5 to 72%, with nearly 73% of those seeking treatment in government hospitals (11) and also the pooled estimation confirms health seeking behavior for common childhood illness is 60.7% (23).

Similarly, according to the 2016 EDHS report, only 44% of under-five children with diarrheal were received advice or treatment in the health facility. Thus, despite the need for health care, it has often been delayed ever reaching a health facility, contributing to the morbidity and mortality of a significant number of under-five children including long term complications (24).

Delay in treatment seeking for diarrheal disease among under five children increases complexity of diarrhea treatment and under five mortality (1,21). World Health Organization reported that 70% of child deaths are related to delayed care-seeking (10). Poor health care seeking behavior increases the chance of morbidity and mortality of children (9–11). Ethiopian ranked 5th from the world by under-five diarrheal death due to delays in seeking care (10).

Delayed treatment seeking for diarrheal disease among under five children leads to chronic childhood diarrhea which can causes malabsorption and this is an important risk factor associated with child malnutrition (25). the growth retardation in children and cause long-term disability (24).

Delays in treating diarrhea can result in increased expenses for managing complications and additional hospital stays (6). according to a study conducted in Rwanda and Burundi to understand the economic burden attributable to a child's inpatient admission for complicated diarrhea disease concluded that, households often bear the largest share of the economic burden attributable to diarrhea hospitalization and the burden can be substantial and especially for households in the lowest income quintile (26,27).

Treatment for diarrhea in children frequently delayed due to various reasons. Children under 24 months old, not attending school, being female, preferring government health facilities, being young mothers or caregivers (15–25 years old), not receiving counselling, and not having visited a medical facility before (7,28). Mothers and caregivers who do not have a formal education, are in the lowest wealth index category, do not have health insurance, and

self-medication (7). Children from households with more than two children prefer traditional healers to treat diarrhea because they live in rural areas and do not own televisions or radios. Living more than 10 km from the nearest health facility and perceiving diarrhea can cure without treatment.(16).

Access to a medical facility continues to be a major obstacle to treating childhood diarrhea, according to a 2010 WHO report. To cure childhood diarrhea quickly, mothers' lack of education and awareness of oral rehydration salts needs to be addressed (15). Poor care-seeking behaviors and an inability to recognize life-threatening situations cause caregivers to put off seeking treatment. The Global Pneumonia and Diarrhea Control Action Plan of the World Health Organization and the United Nations Children Fund (UNICEF) also highlights the significance of parents' capacity to recognize and promptly treat their children (29).

Having up-to-date evidence for the factor affecting the timely healthcare-seeking behavior of mothers/caregivers of under-five children with diarrheal diseases is essential for planning intervention strategies, improving treatment compliance, evaluating health care services in the study area. Therefore, this study aimed to identify determinant factors of delay in timely care seeking for diarrheal diseases among mothers with under-five children who visit the health facilities of Asella town, central Ethiopia.

1.3 Significance of the Study

This study will provide evidence on determinants of delay in timely treatment seeking of diarrheal diseases among mothers/caregivers with under-five children in study area. This will enable professionals and organizations to design effective interventions targeting the identified determinants of delay, thereby promoting early treatment seeking for diarrheal disease among mothers and caregivers of pediatric patients

The availability of evidence increases the chance that Non-Governmental Organizations (NGOs) and donor agencies will support the area with projects that assist caregivers of children under five. This study will also use as important literature for the future researchers who want under take similar study. Additionally, it will help stakeholders and policy manager who work on this area to develop further plan and policy on identified determinants of delay.

2. Literature review

2.1 Determinants of delay in seeking treatment for diarrhea

2.1.1 Socio- Demographic Factors

Determinants of delay in treatment seeking for diarrheal disease among mothers/caregivers with under five children are various(9–11,17–20). According to different studies, age of mothers/caregivers is one of the determinant for delay in timely treatment seeking for under five diarrheal disease (23,30). Community based cross- sectional study in rural Uganda provided that caregivers who were (aged 30-39)years took their child under the age of five to a healthcare center late for treatment of diarrhea(31). On the other hand, a case control study conducted in Bangladesh and central Ethiopia found that younger (aged 15-25years) mothers/caregivers were sought treatment after 24 hours of onset diarrhea when compared to older mothers/caregivers (25,28). However, research from India indicated no correlation between the age of caregivers and the delay in seeking treatment for diarrhea in children under five(15).

According to case control studies from Central and North Ethiopia, caregivers of younger children (<24 months) were more likely to delay than those with older children (>24 months) (7,28). However, global reports indicate that older children are more likely to seek early health care than younger ones (6). Additionally, a case-control study from southwest Ethiopia suggests that the child's age does not affect the delay in receiving health treatment. (16). On the other hand, Cross sectional study from Gambia, case control studies from north, central and cross sectional study from north west Ethiopia found that female child were delayed in treatment seeking for diarrheal disease (7,28,32,33). However, a longitudinal study from rural Zambia reported that 52% of female children had most of their diarrhea episodes treated within 24 hours of onset (30). But, Community based cross sectional study done in rural Uganda indicated that there was no association between sex of a child and delay in seeking treatment for diarrhea in under five children (31).

Longitudinal study in rural Uganda showed that female caregivers were more likely to seek timely diarrhea treatment for their children than male caregivers (31). However, studies from India and central Ethiopia found no association between the caregiver's sex and the delay in seeking treatment for diarrhea in children under five (15,28).

Different studies showed that the education, occupation, wealth index and knowledge of the mother was strongly associated with timely health seeking behavior for under five children with diarrheal disease(7,17,18,23,33). The factors affecting the health care seeking behavior

were the decision making abilities of the mothers and the source from which they got the information regarding diarrhea (34).

Mothers' education ($P \leq 0.001$) and marital status ($P \leq 0.001$) were significantly linked to their care-seeking behavior for pediatric treatment (23). Also study from Gambia found that mother with primary level of education were sought health facility timely for their child with diarrheal disease (33). Similarly, according to study from North Western Ethiopia, 2020, mother/caregiver educational status, was statistically significant for delayed treatment-seeking among mothers/caregivers of under-five children with diarrheal disease (7). A meta-analysis from Ethiopia also revealed that mothers' marital status played a significant role in healthcare-seeking behaviors. Caregivers who were single were less likely to receive timely healthcare services than married mothers for children with diarrhea (23).

Other socio-demographic variables that significantly determine delay in treatment seeking among mother's/care givers paired with under five children included: higher household income (35). As study from Gambia, being from the middle, and rich household wealth have brought their child with diarrhea early to health facility (32). Additionally, a case-control study from Arba Minch, Ethiopia, reported that mothers with lower socio-economic status were associated with delays in seeking treatment (36). A case control studies from central, north and south west Ethiopia showed that, mothers/caregivers from rich class of wealth index sought health facility early for treating their under-five children with diarrhea (7,16,33).

Research indicates that the caregivers' residence significantly affects the time to seek treatment for diarrhea in children under five (15,16,23). Meta-analysis from Ethiopia, provided that mother from rural area brought their child to health facility lately for treatment of childhood diarrhea (23). According to case control study conducted in south west Ethiopia, Children from rural areas had higher odds of delay to be taken to health facilities for medical care for diarrheal diseases than children from urban areas(16).

Moreover, the number of children under five in a household significantly influenced the time to seek treatment. A case-control study from southwest Ethiopia found that mothers with more than two children showed a higher likelihood of delaying treatment compared to those with two or fewer children (16). But a case-control studies from central and North Ethiopia did not found any association between number of under five children in households and delay in treatment seeking (7,28).

2.1.2 Enabling Factors

Physical accessibility is one of enabling factor to sought health facility early for treatment of under-five diarrheal disease. A reasonable standard physical accessibility to primary health facility, is defined as living with in 5kms or 1hour away from nearest health facility (29). Physical distance is one of the main barriers that prevent caregivers from getting timely treatment for diarrhea.

A study from India reported that mothers with a nearer health facility experienced delays in seeking treatment for their children (15). But cross sectional study done in Uganda show that; caregivers living with in 5km distance from nearest health facilities were more likely to seek timely for diarrheal treatment for under five children than caregivers who live further than 5km from a health facility (31).

Also a case control study from south west Ethiopia said that, households living in more than 10 km from the nearest health facility sought health facility after 24 hours onset of diarrhea for pediatric treatment(16). Similarly, research from slums in Addis Ababa, Ethiopia, suggested that having a health facility within a 15-minute walk significantly increased the chances of timely treatment than those located beyond that distance (24). But, study done in central Ethiopia show that there was no association between distance to nearest health facility and delay in seeking treatment for diarrhea in under five children (28).

Other enabling factor is mother's exposure to knowledge. Mothers who have exposure to knowledge about oral rehydration have sought health facility early for their child with diarrheal disease (24). A study in Uganda found that caregivers who perceived the cost of treating diarrhea as low were more likely to seek timely treatment compared to those who viewed it as expensive (31). A study carried out in 3 south Asia set- tings (Bangladesh, India and Pakistan) suggested that cheap treatment cost have positive association with early treatment seeking for five children diarrheal disease(37).

2.1.3 Disease Factors

Other Critical determinants of delay in timely treatment seeking among mothers/caregivers with under five children for treatment diarrheal disease are disease factors (11,23). A cross-sectional study from Mekelle, Ethiopia, found that mothers of children with bloody diarrhea and severe dehydration sought care earlier. However, this study did not find a connection between previous experiences with diarrhea and delays in treatment-seeking (11). On the other hand, according to case control studies from Arba Minch, south Ethiopia and central Ethiopia, taking children to a health facility as a first response to diarrhea was the determent factor to sought health facility within 24 onset of diarrhea (28,36). In similar, lack of past

history of taking children to health facility is contributing factor for delaying in timely treatment seeking(28).

2.1.4 Health system and behavioral factors

According case control study conducting in public health facilities of Arba Minch, south Ethiopia, perceived health care professionals respect were important determinants of delay in seeking care (36). Case control study finding from central Ethiopia, showed that, lack of counseling was another determinant factor for delay in treatment seeking among mothers/caregivers of under-five children with diarrheal disease(28). In addition to this, mothers/caregivers who believed that health unit may have medicine were high odds of experiencing timely diarrhea treatment compared to those did not believe that health centers may have medicine (31).

Studies indicated that, mothers/caregivers who perceived diarrhea can be cured without treatment showed higher odds of delayed treatment-seeking (6,16). a cases control study from south west Ethiopia provided that, preferring traditional healers for the treatment of diarrhea was the determinant factor for delaying from treatment seeking (16). Furthermore, a preference for government health facilities among caregivers for treating children with diarrhea was positively associated with delays in seeking care (28). Caregivers who recognized that diarrhea could be fatal were more likely to seek timely treatment compared to those who did not share that belief (31).

In general, the findings from various studies(7,10,15,16,18,23,28,31,33,34,36,38) revealed that the main factors affecting early treatment of diarrhea in children under five are the child's age and sex, the family's residence, the education level and job of mothers or caregivers, family economic status, and treatment costs. Other factors include the distance to the nearest health facility, caregivers' knowledge about diarrhea, disease factors, visits to traditional healers, self-medication, lack of counseling, and caregivers' belief that diarrhea is not fatal. Additionally, caregivers who doubt that health centers have medicine also contributed to delays in seeking treatment for diarrheal diseases in children

2.2 Conceptual frame work

Socio-demographic and economic factors, enabling factors, disease factors, and health system and behavioral factors may lead to delays in seeking treatment for diarrhea in children under five among mothers and caregivers. This relationship between dependent and independent variables is shown in a conceptual framework developed by reviewing various literatures (7,10,36,38,15,16,18,23,28,31,33,34) (**Figure-1**)

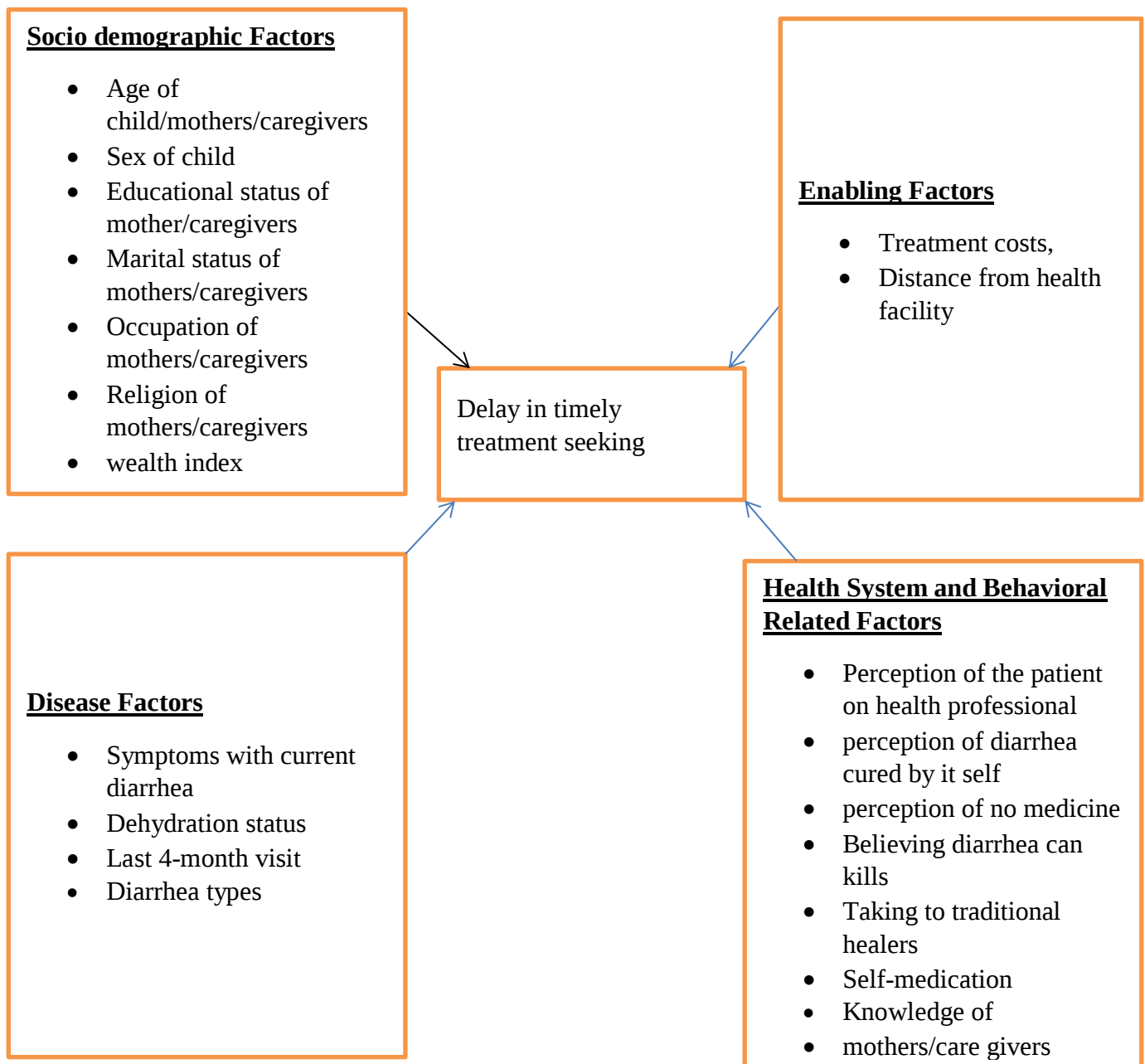


Figure 1- Conceptual framework to determine determinants of delay in treatment seeking among under - five children paired with their mothers/caregivers in Asella town, Oromia, central, Ethiopia, 2025

3. Objectives

3.1 General objectives

To assess determinants of delay in timely treatment seeking for diarrheal diseases among mothers with under-five children in Asella town, Oromia, central, Ethiopia, 2025.

4. Methods and materials

4.1 Study area and study period.

The study was conducted from October 1 to November 30, 2025 G.C in Asella town is found in Oromia regional state; capital city of Arsi zone established in 1945, located 175KM southeast of Addis Ababa. The town has total population of 139,537 among this males are 69,459 and females are 70,078, from the total population under five children are 18,639. In addition, have one teaching and referral Hospital, two governmental health centers, two private hospitals and 18 medium clinics



Figure 2- Study area map for the study of delay in timely treatment seeking among mothers/caregivers with under five children for diarrheal disease in Asella town, Oromia, central, Ethiopia 2025

4.2 Study design:

An institutional based unmatched case-control study was used.

4.3 Source and study population

4.3.1 Source population

All children under the age of 5 years old in Asella town and the surrounding area.

4.3.2 Study Population

All children under the age of 5 years paired with mothers/caregivers who sought selected health facilities due to diarrhea within study area during data collection period.

Control– Was under-five children with signs/symptoms of diarrhea whose mothers sought treatment within 24-hours of the recognition of diarrhea.

Case- Was under-five children with signs/symptoms of diarrhea whose mothers sought treatment after 24-hours of the recognition of diarrhea.

4.3.3 Study unit

A randomly selected child paired with mother/caregiver's was study unit.

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion criteria

All children under 5 years paired with their mothers/caregiver is who sought selected health facilities due to diarrhea during data collection period.

4.4.2 Exclusion criteria

Child with mothers/caregiver unable to communicate and Children whose mothers/caregivers did not mention the exact dates of onset of diarrhea was excluded from the study.

4.5 Sample size determination and sampling procedures

4.5.1 Sample size determination

Sample size was calculated using Epi info software for unmatched case-control study design. Age was an exposure variable used to estimate the optimum sample size for this study. From previous related study 60% of children aged ≥ 24 months were sought treatment for diarrheal disease within 24 hours of recognition of diarrhea with odds ratio of 2.1(28). Then, assuming 95% CI, 80% power and 1:1 case to control ratio, the Fleiss results of Epi info software provided as sample size 294 and 10% contingency for non-response rate, the total sample size was 324 children-paired with their mothers/caregivers (162 cases and 162 controls).

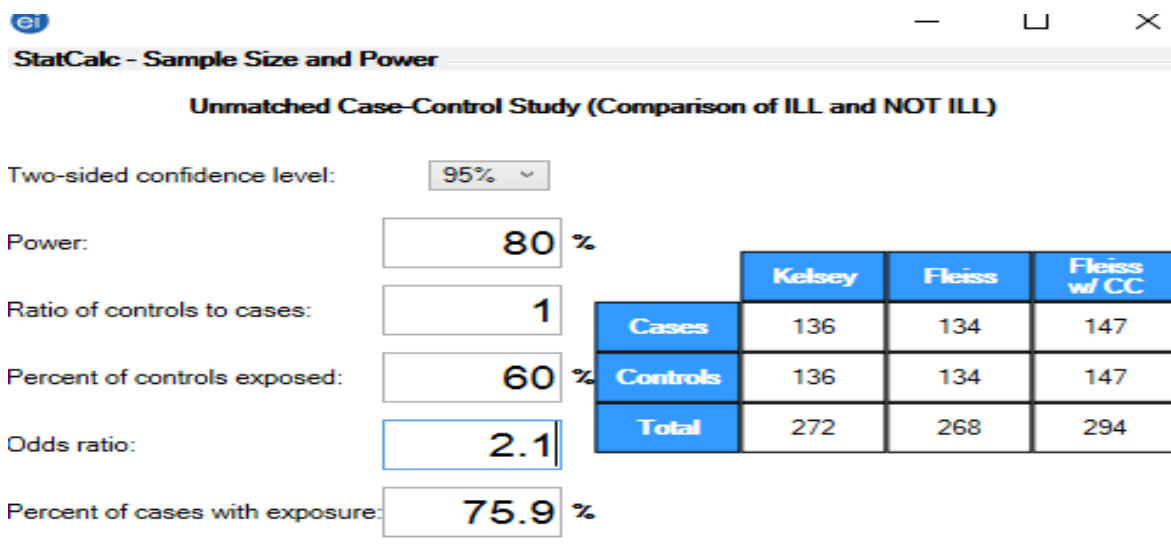


Figure3 - Sample size calculation result by STAT CALC of EPI INFO software for the study of determinants of delay in timely treatment seeking among mothers/caregivers with under-five children for diarrheal disease, Asella town, Oromia, central Ethiopia, 2025

4.5.2 Sampling technique

First three governmental health facilities (ATRH, Asella health Center and Halila health center) and two private health facilities (Rohobot general hospital and Kidus Medium Clinic) were selected randomly by lottery method. Then proportional allocation was made for all health facilities based on the number of diarrhea cases reported in October and November 2024 Ethiopian fiscal year (EFY), same month for each health facility.

List accordingly, (ARTH-144, Asella HC-134, Rohobot general hospital-112, Halila HC- 94, Kidus Medium Clinic-100) under five diarrheal cases were reported during the past two months. Total sample size 324 divide by case/control/ which is 162 then K is ~ '2' was determined by dividing number diarrheas cases reported in October and November 2024 from those selected health facilities by calculated sample size. Then after, we were selected respondents by systematic random sampling techniques. The first participant was selected randomly using a lottery method from the first sampling interval (between 1 and K), after which every second eligible participant was recruited separately for cases and controls based on the allocated sample size for each of the five health facilities. Following completion of consultation with a health professional, mothers/caregivers whose children had diarrhea were moved to a private room for an interview. Recruitment continued until the required sample size was achieved.

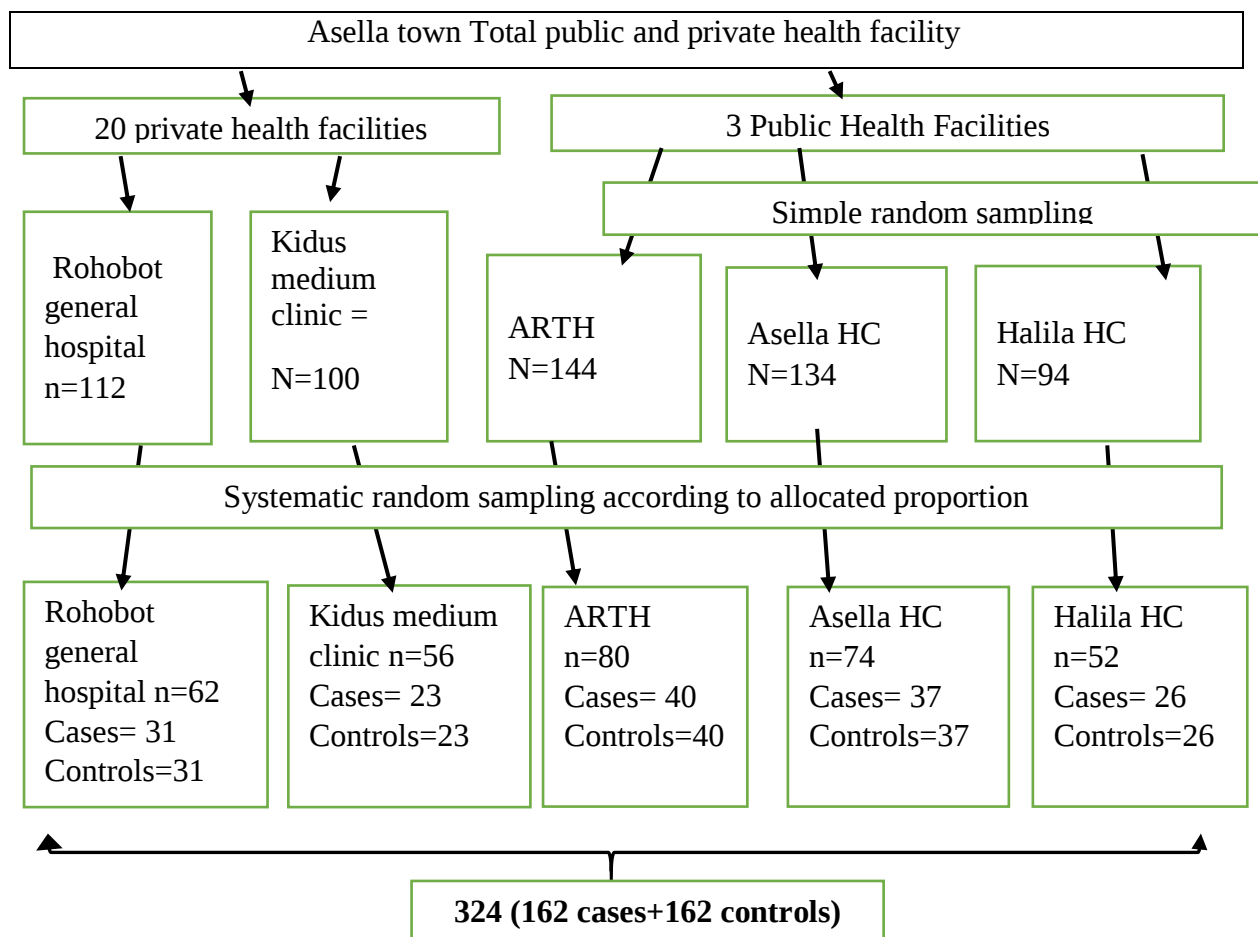


Figure 4 -Diagrammatic presentation of sampling technique for the study of determinants of delay in timely treatment seeking among mothers/caregiver's with under-five children for diarrheal disease in Asella town, Oromia, central Ethiopia, 2025

4.6 Study variables

4.6.1 Dependent variable

Delay in treatment seeking

4.6.2 Independent variables

Socio demographic variables-Age of mothers/caregiver, age of child, sex of child, marital status of mothers/caregivers, religion of mothers/caregivers, residence of mothers/caregivers, educational status of mothers/caregivers, and occupation of mothers/caregivers.

Enabling factors-Annual income, distance to the nearest health facility

Disease factor- Symptoms with current diarrhea, dehydration status, last 4-month visit, traditional medicine, and diarrhea types

Health system-related and behavioral factors -Traditional medicine, knowledge of mothers/caregivers.

4.7 Operational definitions

Mother/caregiver's ; Any person above 18 years of age who is directly responsible for the child's care at the study time (12).

Treatment seeking; Any treatment was sought from a defined governmental and private health facility for a child with diarrheal disease (29).

Treatment delay; Care or treatment sought from after 24 hours from recognizing the presence of diarrhea in under five children(23,29) .

Treatment seeking timely; Seek care or treatment within 24 hours from recognizing diarrhea in under-five children (23,29).

Knowledge of mothers/caregivers; mothers /caregivers who score $\geq$ mean score of knowledge question was considered as knowledgeable, otherwise not knowledgeable

4.8 Data collection methods and tools.

Data was collected by face-to-face interview with mothers/caregivers using structured questionnaires prepared for this purpose by kobo tool. We used the patient history card to take vital signs and dehydration status. Trained one BSc nurse and two diploma nurses collected data. Cases and controls were recruited from Hospital, health center and private medium clinic after they came to the facilities and were diagnosed with diarrhea. The interview was conducted in a private room to create an atmosphere of empathy and confidence with in a secure environment. The mother /caregivers' report measured delays in timely treatment seeking and exposure variables.

4.9 Data quality assurance

The questionnaires coded by Excel and then exported to SPSS windows version 27 for further analysis. Data was summarized and presented using descriptive statistics that we had run for frequency statistics to measure a central tendency and dispersion. Socio demographic and economic variables, enabling factors, disease factors and health system related and behavioral factors were analyzed by using descriptive and analytic statistics and described by using sentences, tables and charts. In addition, Chi square computed to see cell adequacy for all variables. Bivariate and multivariate logistic regressions computed to identify the presence and strength of associations. Variables with p value <0.25 in binary logistic regression were taken to multiple logistic regression for further analysis. However, before taking variables to

multiple logistic regression, multicollinearity checked for all candidate variables using collinearity diagnostic test in linear regression model. The result of collinearity diagnostic test showed that no multicollinearity as the maximum Variance Inflation Factor (VIF) result was 1.3, which is below ten, and we did not remove any variables from analysis due to multicollinearity. Interaction also checked by Breslow-Day test using cross-tabulation that calculate crude odds ratio and stratum specific odds ratio. As a result, no significant interaction detected between each pair of variables and crude odds ratio considered to measure strength of association. At the end, we had run for multiple logistic regression, odds ratio with 95% CI computed and variables having p-values less than 0.05 in the multiple logistic regression models considered as a significantly associated with the dependent variable (delay in treatment seeking). Finally, model fit using backward elimination methods and Hosmer-Lemeshow goodness of fit test was used to the test the model fitness, which provided with p- value of 0.43 that indicates the model fit well.

4.10 Ethical consideration.

After proposal approved by the advisors, an ethical clearance letter is obtained from Arsi University Ethical review board College of health science. Each health facilities were contacted after official letter summited to them. Interview was held after informed verbal consent is obtained from each study subjects, so that collected data stored in secured place and the study could be published and presented at different workshops while protecting the participants' confidentiality. Confidentiality was ascertained by explaining that no data would be disclosed as an individual respondents basis, rather, information were displayed and disseminated at a community level in general. This all-ethical producer was followed by Arsi University, research and ethical review committee.

4.11 Data dissemination plan.

The result is going to be disseminated to Arsi University, college of health sciences department of pediatrics and child health for in partial fulfillment of the requirement for specialty certificate in pediatrics and child health. It also is going to be presented on different research symposiums and efforts made to publish the finding in peer reviewed scientific journals. The research result submitted to zonal and regional health bureaus and other concerned bodies who want support the population.

5. Results

5.1 Socio demographic Profile of Study Participants

Among the total respondents, 324 (162 cases and 162 controls) children along with their mothers/ caregivers were included, yielding a response rate of 100% among cases and controls. According to current study 88 (54.3%) of mothers/caregivers with cases and 81 (50.0%) for that of controls were falls in age group of between (25-34) years. The mean age for mothers/caregivers with cases was 30.24 and Standard Deviation (SD) of ± 5.6 and for that of controls was 27.99 (± 7.5 SD). Regarding the children's age, 133 (82.1%) among cases and 109 (67.3%) in that of controls were in age group of <24 months. The mean age for cases was 12.41 months (± 12.39 SD) and 14.27 months ($11.46 \pm$ SD) months for that of controls. More than half, 87(53.7%) children among cases and 94 (58%) out of controls were male sex.

More than half, mothers/caregivers 86 (53.1%) of cases, and 99 (61.1%) controls were in urban residents. The majority of mothers/caregivers 141(87%) of cases and 137 (84.6%) for controls were married and only 11 (6.8%) among cases and 15 (9.3%) for that of mothers/caregivers with controls were single. Again according to current study finding, 54 (33.3%) cases and 50 (30.9%) of mothers/care givers with control were house wife. 69(42.6%) of mothers/caregivers with cases were Muslim religion followers while Orthodox flowers were 76 (46.9%) among mothers/caregivers with controls. Out of total mothers/caregivers with cases, 57(35.2%) were primary educator and 56 (34.6%) for that of controls were attend above secondary education.

Among respondents in the case group, 135 (83.3%) reported having fewer than two under-five children in their household, compared to 147 (90.7%) in the control group. More than half of children in both cases 85 (52.5%) and controls 94 (58%) groups were born second or third birth order. The current study also found that, 76 (46.9%) of mothers/caregivers with cases and 64 (39.5%) for that of controls were get monthly income less than or equal to 3000 Ethiopian Birr (ETB). Similarly, majority 121 (74.7%) of cases and 85 (52.5%) of controls were ≥ 10 KM (Kilo Meter) far away from nearby health facility. **(Table 1)**

Table 1 - Socio-demographic profile of study participants in a case–control study on determinants of delayed treatment seeking among mothers/caregivers of under-five children with diarrheal disease in Asella town, Oromia, central Ethiopia, 2025 (n=324)

Variables	Categories	Cases (n=162) No (%)	Controls (n =162) No (%)	Total
Residence	Rural	76(46.9%)	63(38.9%)	
	Urban	86 (53.1%)	99(61.1%)	
Age category of mother/caregiver's	(15-24)yrs.	28(17.3%)	52(32.1%)	
	(25-34)yrs.	88(54.3%)	81(50.0%)	
	>=35 yrs.	46(28.4%)	29(17.9%)	
Age of child	<24months	133 (82.1%)	109 (67.3%)	
	>=24 months	19(17.9%)	53(32.7%)	
Sex of child	Male	87(53.7%)	94(58%)	
	Female	75(46.3%)	68(42%)	
Educational status of mother/caregiver's	No formal education	26(16.0%)	14(8.6%)	
	Primary education	57(35.2%)	49(30.2%)	
	Secondary education	34(21.0%)	43(26.5%)	
	Above Secondary education	45(27.8%)	56(34.6%)	
Family monthly income	<=3000 ETB	76(46.9%)	64(39.5%)	
	(3001-7000) ETB	41(25.3%)	35(21.6%)	
	(7001-15000) ETB	30(18.5%)	53(32.7%)	
	(15001-30000) ETB	14(8.6%)	9(5.6%)	
	>30000 ETB	1(0.6%)	1(0.6%)	
Occupation mother/caregiver's	House wife	54(33.3%)	50(30.9%)	
	Merchant	21(13.0%)	27(16.7%)	
	Farmer	28(17.3%)	18(11.1%)	
	Daily Laborer	25(15.4%)	12(7.4%)	
	Government Employee	34(21.0%)	55(34.0%)	
Religion	Orthodox	65(40.1%)	76(46.9%)	
	Muslim	69(42.6%)	65(40.1%)	
	Protestant	28(17.3%)	21(13.0%)	
Distance from nearby health facility	<=10KM	41(25.3%)	77(47.5%)	
	>10KM	121(74.7%)	85(52.5%)	
Birth order of child	1 st birth	20(12.3%)	37(22.8%)	
	2 nd and 3 rd birth	85(52.5%)	94(58.0%)	
	>= 4 th birth	57(35.2%)	31(19.1%)	
Number of under five children	More than two children	27(16.7%)	15(9.3%)	
	Less than two children	135(83.3%)	147(90.7%)	
Marital Status of mother/caregiver's	Single	11(6.8%)	15(9.3%)	
	Widowed	6(3.7%)	5(3.1%)	
	Divorced	4(2.5%)	5(3.1%)	
	Married	141(87.0%)	137(84.6%)	
Total		n=162	n=162	324

5.2 Clinical characteristics of study participants

This study showed show, 73(45.1%) among cases and 64 (39.5%) controls were presented to health facility with moderate diarrhea. In addition, record review showed that, 45 (27.8%) and 40 (24.7%) among cases and controls were presented with severe dehydration respectively. Watery diarrhea was the most common type reported by mothers/caregivers, accounting for 54 (33.3%) of cases and 74 (45.7%) of controls. In addition, fever accompanying diarrhea was reported in 16 (9.9%) of cases and 33 (20.3%) of controls. Bloody diarrhea was observed in 10 (6.2%) of cases and 5 (3.1%) of controls. Bloody diarrhea was also observed 10(6.2%) of cases and 5 (3.1%) of controls. Furthermore, 28 (17.3%) of cases and 28 (17.3%) of controls had experienced diarrhea in the four weeks preceding the survey. At the time of interview, the situation of diarrhea was becoming worse in 34(21.0%) of cases and in 22(13.6%) of controls. (**Table 2**)

Table 2- Clinical characteristics of study participants for determinants of delay in timely treatment seeking among mothers/caregivers with under-five children for diarrheal disease, Asella town, Oromia, central Ethiopia, 2025 (n=324)

Variables	Category	Cases (n=162) No (%)	Controls (n =162) No (%)	Total
Perceived severity of illness	Mild	44(27.2%)	58(35.8%)	
	Moderate	73(45.1%)	64(39.5%)	
	Severe	45(27.8%)	40(24.7%)	
Type of diarrhea	Watery	54(33.3%)	74(45.7%)	
	Bloody	10(6.2%)	5(3.1%)	
	Yellow	46(28.4%)	50(30.9%)	
	Green	27(16.7%)	11(6.8%)	
	Mucoid	25(15.4%)	22(13.6%)	
Outcome of diarrhea during interview	Improved	52(32.1%)	72(44.4%)	
	No change	76(46.9%)	67(41.4%)	
	Worse	34(21.0%)	22(13.6%)	
	Death	0(0.0%)	1(0.6%)	
Attacked by diarrhea in the last 4 weeks	Yes	28(17.3%)	28(17.3%)	
	No	134(82.7%)	134(82.7%)	
Associated symptoms	Presence of fever	16(9.9%)	33(20.3%)	
	Change of child behavior	17(10.5%)	11(6.8%)	
	Increased frequency and duration of diarrhea	89(54.9%)	65(40.1%)	
	Sunken fontanel	15(9.3%)	22(13.6%)	
	Weakness of child with diarrhea	15(9.3%)	16(9.9%)	
	Bloody diarrhea	10(6.2%)	15(9.3%)	
Total		n=162	n= 162	n= 324

5.3 Parenteral knowledge status about under five diarrhea

Nine knowledge question asked the mothers/caregivers to categorize them as knowledgeable or not knowledgeable. Thus, 82 (50.6%) among mothers/caregivers with cases and 45 (27.8%) for that controls were categorized as not knowledgeable since they answered less than mean of knowledge question correctly. Furthermore, out of mothers/caregivers with cases 33 (20.4%) and 19 (11.7%) among mothers/caregivers with controls were responded that they had never heard of Oral Rehydration Salt (ORS).

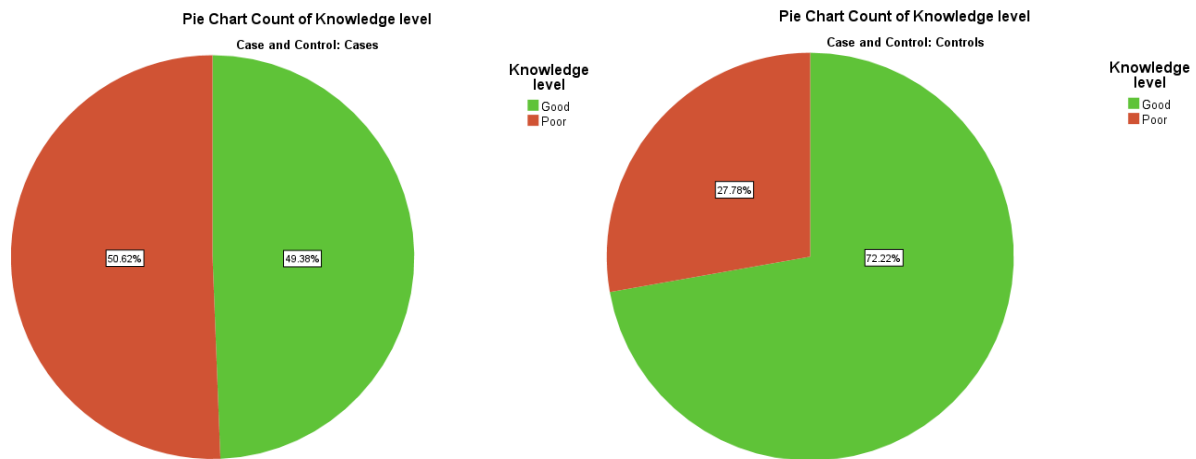


Figure 5 - Level of mothers /caregivers' knowledge regarding under-five diarrheal disease and delayed timely treatment seeking among under-five children in Asella town, Oromia, Central Ethiopia, 2025

5.4 Determinants of delay in timely treatment seeking

In the binary logistic regression analysis, eight socio-demographic variables—maternal/caregiver educational status, place of residence, child's age, maternal/caregiver occupation, monthly household income, maternal/caregiver age, number of under-five children in the household, and birth order of the child—were identified as candidates for multivariable logistic regression. From the disease-related factors, severity of diarrhea was selected, as a candidate variable, and knowledge status of mothers/caregivers from behavioral theme distance from nearby health facility from enabling factors were variables that were candidate for multiple logistic regression. Finally three variables (Age of children, knowledge status of mothers/caregivers and distance from nearby health facility) were significantly associated with delay in timely treatment seeking among mothers/caregivers with under five children for diarrheal disease.

According to result from multiple logistic regression output, children < 24 months were 2.19 (95 % CI=1.204-3.987) times more likely delayed in timely treatment seeking than children $\geq$ 24 months. Also children with mothers/ caregivers away from nearby health facility >10KM were 2.67 (95 % CI, 1.67-4.27) times more likely delayed for treatment of diarrheal disease when compared with away from nearby health facility $\leq$ 10KM of their counterparty. In addition, children with not knowledgeable mothers/caregivers were 2.6 (95 %, CI, = (1.5-4.43) more likely delayed in timely treatment seeking than children with knowledgeable mothers/ caregivers. **(Table 3)**

Table 3- Binary and multiple logistic regression and 95 % CI with adjusted odds ratio of determinants of delay in timely treatment seeking among mothers/caregivers with under five children for diarrheal disease, Asella town, Oromia, central Ethiopia, 2025 (n=324)

Variables	Categories	Cases (n=162)	Controls (n=162)	COR (95% CI)	P- value	AOR (95% CI)	Total
Residence	Rural	76 (46.9%)	63 (38.9%)	1.96 (1.262–3.058)	0.218	1.393(0.822–2.359)	
	Urban	86 (53.1%)	99 (61.1%)	1		1	
Age category of mother/caregiver	(15–24) yrs.	28 (17.3%)	52 (32.1%)	0.496 (0.286–0.859)	0.086	0.565(0.294–1.084)	
	≥35 yrs.	28 (28.4%)	29 (17.9%)	1.46 (0.839–2.541)		0.906(0.457–1.794)	
Age of child	(25–34)yrs.	88 (54.3%)	81 (50.0%)	1	0.01	1	
	<24 months	133 (82.1%)	109 (67.3%)	2.23 (1.327–3.746)		2.19 (1.204–3.987)	
	≥24 months	19 (17.9%)	53 (32.7%)	1		1	
Educational status of mother/caregiver	No formal education	26 (16.0%)	14 (8.6%)	2.311 (1.082–4.937)	0.641	1.251(0.484–3.204)	
	Primary education	57 (35.2%)	49 (30.2%)	1.448 (0.837–2.503)		0.883(0.437–1.784)	
	Secondary education	34 (21.0%)	43 (26.5%)	0.984 (0.542–1.787)	0.153	0.59 (0.287–1.216)	
	Above secondary	45 (27.8%)	56 (34.6%)	1		1	
Family monthly income	3001–7000 ETB	41 (25.3%)	35 (21.6%)	0.986 (0.563–1.728)	0.839	1.0755(0.535–2.1)	
	7001–15000 ETB	30 (18.5%)	53 (32.7%)	0.477 (0.273–0.833)		0.988 (0.399–2.4)	
	15001–30000 ETB	14 (8.6%)	9 (5.6%)	1.31 (0.532–3.225)	0.127	2.582 (0.764–8.73)	
	>30000 ETB	1 (0.6%)	1 (0.6%)	0.842 (0.052–13.733)		1.811 (0.089–3.001)	
	≤3000 ETB	76 (46.9%)	64 (39.5%)	1	0.700	1	
Occupation of mother/caregiver	Housewife	54 (33.3%)	50 (30.9%)	1.747 (0.983–3.105)	0.118	2.018 (0.836–4.868)	
	Merchant	21 (13.0%)	27 (16.7%)	1.258 (0.617–2.566)		1.145 (0.488–2.69)	
	Farmer	28 (17.3%)	18 (11.1%)	2.516 (1.212–5.224)	0.404	1.6 (0.531–4.817)	
	Daily laborer	25 (15.4%)	12 (7.4%)	3.37 (1.499–7.578)		4.214 (1.38–12.866)	
	Government employee	34 (21.0%)	55 (34.0%)	1	0.012	1	
Distance from nearby	>10 KM	121	85 (52.5%)	2.673 (1.672–	0.007	2.104 (1.221–	

Variables	Categories	Cases (n=162)	Controls (n=162)	COR (95% CI)	P- value	AOR (95% CI)	Total
health facility		(74.7%)		4.276)		3.626)	
	≤10 KM	41 (25.3%)	77 (47.5%)	1		1	
Birth order of child	1st birth	20 (12.3%)	37 (22.8%)	0.598 (0.322– 1.109)	0.451	0.758 (0.37– 1.555)	
	4th and above	57 (35.2%)	31 (19.1%)	2.033 (1.201– 3.443)	0.243	1.495 (0.761– 2.935)	
	2nd–3rd birth	85 (52.5%)	94 (58.0%)	1		1	
Number of under-five children	>2	27 (16.7%)	15 (9.3%)	1.96 (1.00– 3.842)	0.168	1.756 (0.788– 3.915)	
	≤2	135 (83.3%)	147 (90.7%)	1		1	
Perception on severity of diarrhea	Mild	44 (27.2%)	58 (35.8%)	0.674 (0.378– 1.203)	0.189	0.629 (0.314– 1.258)	
	Moderate	73 (45.1%)	64 (39.5%)	1.014 (0.59– 1.744)	0.654	1.159 (0.608– 2.21)	
	Severe	45 (27.8%)	40 (24.7%)	1		1	
Knowledge level of mother/caregiver	Poor	82 (50.6%)	45 (27.8%)	2.665 (1.68– 4.228)	0.000	2.606 (1.532– 4.434)	
	Good	80 (49.4%)	117 (72.2%)	1		1	
Total		n=162	n=162				n= 324

6. Discussion

This study identified determinants of delay in treatment seeking of diarrhea in under-five children among caregivers in Asella town. Age of the child, Knowledge status of mothers/caregivers, distance from nearby health facility of mothers/caregivers were a determinants of delay in timely treatment seeking among mothers/caregivers with under-five children for diarrheal disease.

Thus, compared to older children (≥ 24 months), children under 24 months had a lower chance of being taken to a health facility within 24 hours. This is in parallel with studies from India(15), Central Ethiopia(28), Arba Minch, southern Ethiopia(36), and North western Ethiopia(7), which suggest the caregivers of younger children (<24 months) were more likely to delay than those with older (>24 months) children. Similarly study from China found that children's age had a negative correlation, protecting older children from seeking treatment for diarrheal disease later said that age of children was negatively associated with

treatment seeking in such way that, older children were protected against late treatment seeking for diarrheal disease(39).

Again the global reports on the trend in care seeking and access to health service utilization, justify our finding in which it stated that, older children were more likely to seek early health care than young children (6). This might be due to believing that mothers/caregivers link diarrhea with the eruption of milk teeth that in younger children result in mild and self-limited diarrhea.

In addition, this finding has an implication that, the implementation of government program targeting to reach children under 2 years was not met. According to strategic approach, the first two years were the honeymoon period for children development. Thus, strategic approach like treating children with diarrhea with ORS and Zinc early, treating pneumonia with antibiotics and under two years Growth Monitoring and Promotion (GMP) were among some strategies to tackle the problem related with that disease if treatment was sought early. However, children < 24 months were sought treatment lately, which suggests that more work needs to be done.

The current study found that mothers' exposure to information was another factor that contributed to mothers/caregivers of children under-five delaying seeking treatment for diarrheal disease. In this regard, children who had not knowledgeable mothers/caregivers were 2.6 times more likely than those who had exposure to knowledge mothers/caregivers to put off obtaining timely treatment. This is consistent with a multi-level analysis from Ethiopia that revealed mothers who were exposed to information about oral rehydration sought medical attention for their child's diarrheal illness early(24)

Again meta-analysis from Ethiopia (23) and study from rural Wardha District, Maharashtra of India (34), provide similar finding with this study as such, mothers/caregivers with poor knowledge brought their child lately to seek treatment. This is if mothers/caregivers may not have basic knowledge about under five diarrheal disease, they do not know the potential risk of delay. Moreover, not knowledgeable mothers/caregivers were might not notice severe symptoms. Therefore, this may make them to wait for the improvement of diarrhea alone at home resulting in delay to sought health facility.

Similarly, the results of this study suggest that, there were knowledge gap among mothers/caregivers with under five children for diarrheal disease to seek treatment early and a lot

should be done to address the consequences of this delay in timely treatment seeking for under five diarrheal disease.

In this study also, distance from the nearest health facility was found to be a significant predictor of delayed treatment seeking for diarrheal disease among under-five children. Mothers/Caregiver's more than 10 km from a health facility were more likely to delay seeking care compared to those living closer. This result could be explained by longer journey times, difficulties with transportation, and financial limitations related to great distances. According to community-based study in northwest Ethiopia reported that caregivers living far from health facilities were significantly more likely to delay seeking treatment for childhood diarrheal disease(40). Studies carried out in Southern Ethiopia revealed similar results, with great distances and a lack of transportation being significant obstacles to under-five children's timely access to healthcare. Research from other sub-Saharan African countries has also demonstrated that a greater distance to medical facilities is linked to a delay in seeking treatment for pediatric illnesses, such as diarrhea, because of transportation difficulties and indirect costs (16,41). However, study from southeastern Ethiopia has reported no significant association between distances to health facilities and delayed treatment seeking for childhood illnesses. Study conducted in urban settings and areas with strong health extension programs found that caregivers sought care promptly regardless of distance. This may be attributed to better road infrastructure, availability of transportation, higher caregiver awareness, and improved outreach services such as health extension workers(42).

In previous studies(7,11,15,16,18,28,32,36), found that factors such as the child's sex, the cost of treatment, the mothers' or caregivers' age, their educational status, their preferences for healthcare facilities, their history of prior diarrheal episodes, and their wealth index all contributed to the delay in seeking early treatment for diarrheal disease in mothers and caregivers of children under five. Nevertheless, such factors did not significantly influence our study population's delay in obtaining urgent treatment. This could be due to the time and location of the study.

7. Strengths and limitations

7.1 Strengths

Using the same inclusion and exclusion criteria, cases and controls were selected. Health personnel working in outpatient department of under-five children did case and control selection process. The study also includes both government and private health facilities.

7.2 Limitations

The study's generalization may not accurately reflect mothers and caregivers of children under five who had diarrhea but did not attend a health facility. When inquiring about a set of illnesses, recall bias might be introduced during asking on set of illness.

8. Conclusion and recommendations

8.1 Conclusion

This study identified that children under 24 months, greater distance from health facilities, and poor knowledge of mothers/caregiver's were significant determinants of delayed treatment seeking for under-five diarrheal disease in health facilities of Asella town. These findings evidenced the need for targeted interventions, including community-based health education, improved accessibility of health services, and focused support for high-risk families. Addressing these factors is essential to promote timely healthcare utilization and reduce the morbidity and mortality associated with diarrheal disease among under-five children in study area.

8.2 Recommendation

Based on the findings of this study, it is recommended that community-based health education programs be strengthened to improve mothers' knowledge on the recognition of diarrheal symptoms and the importance of timely treatment, especially for children under 24 months. Efforts should be made to improve access to health services through mobile clinics, satellite health posts, or community transport for families living far from facilities. Community health volunteers and peer support networks should be engaged to provide early referral guidance and support for mothers with limited knowledge. Additionally, zonal health office should consider distance and maternal knowledge barriers in planning and resource allocation, and continuously monitor treatment-seeking behaviors to ensure effective interventions.

9. References

1. Diarrhoeal disease [Internet]. [cited 2025 Jul 27]. Available from: <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>
2. Anonim. Diarrhea: Common Illness, Global Killer [Internet]. Vol. 19, Centers for Disease Control and Prevention. 2013 [cited 2025 Jul 17]. p. 1–4. Available from: <https://stacks.cdc.gov/view/cdc/13557>
3. UNICEF, World Health Organization. Diarrhoea: why are children still dying. Who/Unicef. 2009;13.
4. Demissie GD, Yeshaw Y, Aleminew W, Akalu Y. Diarrhea and associated factors among under five children in sub-Saharan Africa: Evidence from demographic and health surveys of 34 sub-Saharan countries. PLoS One [Internet]. 2021 Sep 1 [cited 2025 Jul 17];16(9 September). Available from: <https://pubmed.ncbi.nlm.nih.gov/34543347/>
5. Ethiopian Public Health Institute (EPHI), ICF. Ethiopia Mini Demographic and Health Survey 2019: Final Report [Internet]. 2021. 1–207 p. Available from: <https://dhsprogram.com/pubs/pdf/FR363/FR363.pdf>
6. Manetu WM, M'masi S, Recha CW. Diarrhea Disease among Children under 5 Years of Age: A Global Systematic Review. Open J Epidemiol [Internet]. 2021 Jun 28 [cited 2025 Jul 17];11(03):207–21. Available from: <https://www.scirp.org/journal/paperinformation?paperid=110128>
7. Kbede AG, Alemayew M, Tafere Y, Baye G. Determinants of Delayed Treatment-seeking for Diarrheal Diseases among Mothers with under-five Children in North Western Ethiopia , 2020 : A case-control Study. Ethiop J Heal Sc. 2020;31(November):1–12.
8. DEFEATDD PATH. Stop the Cycle of Diarrheal Disease: A State of the Field Report. 2017 [cited 2025 Jul 17];54. Available from: http://report.defeatdd.org/wp-content/uploads/2018/01/101721-008_DefeatDD_Report_v4r13.pdf
9. Sahiledengle B, Atlaw D, Mwanri L, Petrucka P, Kumie A, Tekalegn Y, et al. Burden of Childhood Diarrhea and Its Associated Factors in Ethiopia: A Review of Observational Studies. Int J Public Health. 2024;69.
10. Harb A, Abraham S, O'Dea M, Hantosh HA, Jordan D, Habib I. Sociodemographic determinants of healthcare-seeking options and alternative management practices of childhood diarrheal illness: A household survey among mothers in Iraq. Am J Trop Med Hyg [Internet]. 2021 Feb 1 [cited 2025 Jul 17];104(2):748–55. Available from: <https://pubmed.ncbi.nlm.nih.gov/33289474/>
11. Fissehay T, Damte A, Fantahun A, Gebrekirstos K. Health care seeking behaviour of mothers towards diarrheal disease of children less than 5 years in Mekelle city, North Ethiopia. BMC Res Notes [Internet]. 2018 Oct 22 [cited 2025 Jul 17];11(1):1–7. Available from: <https://pubmed.ncbi.nlm.nih.gov/33289474/>
12. Alebel A, Tesema C, Temesgen B, Gebrie A, Petrucka P, Kibret GD. Prevalence and determinants of diarrhea among under-five children in Ethiopia: A systematic review and meta-analysis. PLoS One [Internet]. 2018 Jun 1 [cited 2025 Jul 17];13(6):e0199684. Available from:

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0199684>

13. Zenebe GA, Gebretsadik S, Muche T, Sisay D, Meno A, Hareru HE, et al. Level of Mothers'/Caregivers' Healthcare-Seeking Behavior for Child's Diarrhea, Fever, and Respiratory Tract Infections and Associated Factors in Ethiopia: A Systematic Review and Meta-Analysis. *Biomed Res Int* [Internet]. 2022 [cited 2025 Jul 17];2022:4053085. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC9314182/>
14. Melese B, Paulos W, Astawesegn FH, Gelgelu TB. Prevalence of diarrheal diseases and associated factors among under-five children in Dale District, Sidama zone, Southern Ethiopia: A cross-sectional study. *BMC Public Health* [Internet]. 2019 Sep 6 [cited 2025 Jul 17];19(1):1–10. Available from: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7579-2>
15. Malhotra N, Upadhyay RP. a?Why are there delays in seeking treatment for childhood diarrhoea in Indi. *Acta Paediatr Int J Paediatr* [Internet]. 2013 Sep [cited 2025 Jul 17];102(9). Available from: <https://pubmed.ncbi.nlm.nih.gov/23718747/>
16. Asefa A, Qanche Q, Asaye Z, Abebe L. <p>Determinants of Delayed Treatment-Seeking for Childhood Diarrheal Diseases in Southwest Ethiopia: A Case–Control Study</p>. *Pediatr Heal Med Ther* [Internet]. 2020 Jun [cited 2025 Jul 17];Volume 11:171–8. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC7293983/>
17. Bekele D, Merdassa E, Desalegn M, Mosisa G, Turi E. Determinants of diarrhea in under-five children among health extension model and non-model families in wama hagelo district, west ethiopia: Community-based comparative cross-sectional study. *J Multidiscip Healthc* [Internet]. 2021 [cited 2025 Jul 17];14:2803–15. Available from: <https://pubmed.ncbi.nlm.nih.gov/34675529/>
18. Mukiira C, Ibisomi L. Health care seeking practices of caregivers of children under 5 with diarrhea in two informal settlements in Nairobi, Kenya. *J Child Heal Care* [Internet]. 2015 Jun 4 [cited 2025 Jul 17];19(2):254–64. Available from: <https://pubmed.ncbi.nlm.nih.gov/24270995/>
19. Musuka G, Dzinamarira T, Murewanhema G, Cuadros D, Chingombe I, Herrera H, et al. Associations of diarrhea episodes and seeking medical treatment among children under five years: Insights from the Zimbabwe Demographic Health Survey (2015–2016). *Food Sci Nutr* [Internet]. 2021 Nov 1 [cited 2025 Jul 17];9(11):6335–42. Available from: <https://pubmed.ncbi.nlm.nih.gov/34760263/>
20. Lwin KS, Nomura S, Yoneoka D, Ueda P, Abe SK, Shibuya K. Associations between parental socioeconomic position and health-seeking behaviour for diarrhoea and acute respiratory infection among under-5 children in Myanmar: A cross-sectional study. *BMJ Open* [Internet]. 2020 Mar 26 [cited 2025 Jul 17];10(3). Available from: <https://pubmed.ncbi.nlm.nih.gov/32220909/>
21. Mohammed S, Tamiru D. The Burden of Diarrheal Diseases among Children under Five Years of Age in Arba Minch District, Southern Ethiopia, and Associated Risk Factors: A Cross-Sectional Study. *Int Sch Res Not* [Internet]. 2014 Nov 18 [cited 2025 Jul 17];2014:1–6. Available from: <https://pubmed.ncbi.nlm.nih.gov/27433486/>
22. Asfaha KF, Tesfamichael FA, Fisseha GK, Misgina KH, Weldu MG, Welehaweria NB, et al. Determinants of childhood diarrhea in Medebay Zana District, Northwest

- Tigray, Ethiopia: A community based unmatched case-control study. *BMC Pediatr* [Internet]. 2018 Mar 29 [cited 2025 Jul 17];18(1). Available from: <https://pubmed.ncbi.nlm.nih.gov/29598815/>
23. Tekalign T, Guta MT, Awoke N, Asres AW, Obsa MS. Mothers' Care-Seeking Behavior for Common Childhood Illnesses and Its Predictors in Ethiopia: Meta-Analysis. *Int J Pediatr (United Kingdom)* [Internet]. 2022 [cited 2025 Jul 17];2022. Available from: <https://pubmed.ncbi.nlm.nih.gov/36304521/>
 24. Sahiledengle B, Teferu Z, Tekalegn Y, Zenbaba D, Seyoum K, Atlaw D, et al. A Multilevel Analysis of Factors Associated with Childhood Diarrhea in Ethiopia. *Environ Health Insights* [Internet]. 2021 [cited 2025 Jul 17];15:11786302211009894. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC8056729/>
 25. Hossain MI, Faruque ASG, Sarmin M, Chisti MJ, Ahmed T. Prolonged diarrhea among under-five children in Bangladesh: Burden and risk factors. *PLoS One* [Internet]. 2022 Oct 1 [cited 2025 Jul 17];17(10 October):e0273148. Available from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0273148>
 26. Ngabo F, Mvundura M, Gazley L, Gatera M, Rugambwa C, Kayonga E, et al. The economic burden attributable to a child's inpatient admission for diarrheal disease in Rwanda. *PLoS One* [Internet]. 2016 Feb 1 [cited 2025 Jul 18];11(2):e0149805. Available from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0149805>
 27. Niyibitegeka F, Riewpaiboon A, Youngkong S, Thavorncharoensap M. Economic burden of childhood diarrhea in Burundi. *Glob Heal Res Policy* [Internet]. 2021 Dec 1 [cited 2025 Jul 18];6(1):1–12. Available from: <https://ghrp.biomedcentral.com/articles/10.1186/s41256-021-00194-3>
 28. Degefa G, Gebreslassie M, Meles KG, Jackson R. Determinants of delay in timely treatment seeking for diarrheal diseases among mothers with under-five children in central Ethiopia: A case control study. *PLoS One* [Internet]. 2018 Mar 1 [cited 2025 Jul 18];10(27):1–12. Available from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0193035>
 29. World Health Organization. Ending Preventable Child Deaths from Pneumonia and Diarrhoea by 2025 The integrated Global Action Plan for Pneumonia and Diarrhoea (GAPPD). 2013 [cited 2025 Jul 18];1–61. Available from: http://apps.who.int/iris/bitstream/10665/79200/1/9789241505239_eng.pdf
 30. Hamooya BM, Masenga SK, Halwiindi H. Predictors of diarrhea episodes and treatment-seeking behavior in under-five children: A longitudinal study from rural communities in Zambia. *Pan Afr Med J* [Internet]. 2020 May 1 [cited 2025 Jul 17];36:1–9. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC7406458/>
 31. Muhumuza J. Factors Influencing Timely Response to Health Care Seeking for Diarrheal Episodes Among Children Under Five by Caregivers in Rural Uganda. *Sci J Public Heal* [Internet]. 2017 Apr 13 [cited 2025 Jul 18];5(3):246. Available from: <https://www.sciencepg.com/article/10.11648/j.sjph.20170503.23>
 32. Terefe B, Mulat B, Shitu K, Assimamaw NT. Individual and community level factors associated with medical treatment-seeking behavior for childhood diarrhea among the Gambian mothers: evidence from the Gambian demographic and health survey data,

- 2019/2020. BMC Public Health [Internet]. 2023 Dec 1 [cited 2025 Jul 18];23(1):1–14. Available from: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-023-15493-2>
33. Nega B, Bogale KA, Nigussie ZM. Health care seeking behavior and associated factor among mothers/caregivers of under-five children with acute diarrhea in Dangila zuria Woreda, North west Ethiopia. *bioRxiv* [Internet]. 2019 Jun 11 [cited 2026 Jan 29];667923. Available from: <https://www.biorxiv.org/content/10.1101/667923v1>
34. Chintaman Patil S, Dixit P. Health Seeking Behavior among 0-5 Years of Children in Diarrhea in Rural Wardha District, Maharashtra. *Prim Heal Care Open Access*. 2018;08(02).
35. Asamoah A, Ameme DK, Sackey SO, Nyarko KM, Afari EA. Diarrhoea morbidity patterns in Central Region of Ghana. *Pan Afr Med J* [Internet]. 2016 [cited 2025 Jul 18];25(Suppl 1). Available from: <https://pubmed.ncbi.nlm.nih.gov/28149442/>
36. Fikire A, Ayele G, Haftu D. Determinants of delay in care seeking for diarrheal diseases among mothers/caregivers with under-five children in public health facilities of Arba Minch town, southern Ethiopia; 2019. *PLoS One* [Internet]. 2020 Feb 1 [cited 2025 Jul 18];15(2):e0228558. Available from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228558>
37. Khan NT, Jahan N. Prevalence of *E. histolytica* Associated Dysentery in Children in Satellite Town, Quetta. *Epidemiol Open Access* [Internet]. 2017 Jan 30 [cited 2025 Jul 18];07(01):1–3. Available from: <https://www.omicsonline.org/open-access/prevalence-of-e-histolytica-associated-dysentery-in-children-in-satellite-town-quetta-2161-1165-1000290.php>
38. Fissehay T, Damte A, Fantahun A, Gebrekirstos K. Health care seeking behaviour of mothers towards diarrheal disease of children less than 5 years in Mekelle city , North Ethiopia. *BMC Res Notes*. 2018;749(11):1–7.
39. Gao W, Dang S, Yan H, Wang D. Care-Seeking Pattern for Diarrhea among Children under 36 Months Old in Rural Western China. *PLoS One*. 2012;7(8):1–9.
40. Marew A, Jebero Zaza Z, Birhanu S, Belachew A, Kasse T. Delays in health care seeking for diarrheal disease and associated factors among caregivers of under five children in health centers of northwest Ethiopia: a mixed-method study. *BMC Public Health* [Internet]. 2025 Dec 1 [cited 2026 Jan 29];25(1):138. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC11731159/>
41. Rutherford ME, Mulholland K, Hill PC. How access to health care relates to under-five mortality in sub-Saharan Africa: systematic review. *Trop Med Int Health* [Internet]. 2010 May [cited 2026 Jan 24];15(5):508–19. Available from: <https://pubmed.ncbi.nlm.nih.gov/20345556/>
42. Bekele M, Urgessa M, Kumsa K, Sinba E. Contributing factors of delay in seeking treatment for childhood diarrheal diseases in Berbere Woreda, Ethiopia: an unmatched case–control study. *J Health Popul Nutr* [Internet]. 2023 Dec 1 [cited 2026 Jan 29];42(1):65. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10331957/>

10. Annexes

10.1 Information sheet and Consent form.

10.1.1 Information Sheet

Determinants of delay in timely treatment seeking for diarrheal diseases among mothers of under-five children in Asella town, Oromia, central Ethiopia: 2025

Title of the research project: – Determinants of delay in timely treatment seeking for diarrheal diseases among mothers with under-five children in Asella town, Oromia, central Ethiopia: 2025

Name of principal investigator: - Dr.Abdisa Gonfa

Name of organization: - Arsi University College of health science

Name of sponsor: Arsi University College of health science

Introduction: - This information sheet and consent form prepared for participant of this study that conducted from October 1 to November 30 2025. The main aim of this study is to identify the determinant of delay in timely treatment seeking of diarrheal disease among mothers with under five children in Asella town. The investigators include two-diploma nurse as data collectors and one BSc supervisors.

Purpose of the research project: - The aim of this research is to identify the determinant of delay in timely treatment seeking of diarrheal disease among mothers with under five children in Asella town. The result of this study contributed for policy makers, implementing body and mother/caregiver to improve timely treatment seeking behaviors.

Procedure: - The study conducted by using interviewer based standardized questionnaire systematic random sampling. The interview started by inviting the randomly selected participant to give us her written / verbal consent to participate in the study. After we get consent question on socio-demography, enabling factors and health related our data collectors present factors for participant.

Risk /discomfort: - Except your time, the research have no any other risk that endanger your mental, physical, psychosocial and wellbeing.

Benefit-The result of this study will contribute to improvement of mothers/caregivers on timely treatment seeking for diarrheal disease among under five children.

Incentive/payment for participation-You will not have any payment or incentive to participate in this study.

Confidentiality-The information collected for this research project was kept confidential and used only for this research purpose. Information collected from you for this study was stored in file without any individual identifiers and the principal investigator is the only who overview this data.

Right to refuse or withdrawal-You have full right to refuse to participate in this research and even after you agree to participate, you have full right not to answer question that you cannot need. At any time in process of research, you have the right to with draw form the research without any penalty.

Person to contact-This research project was reviewed and approved by the ethical committee of the Arsi University and you look for the ethical clearance or contact the committee with given address. If there is any unclear and others thing you want to clarify you can use the following address.

Abdisa Gonfa (MD): phone +251910939000

E-mail- robsenabdi5@gmail.com

10.1.2 Consent form

Hello! My name is I am here on behalf of Dr. Abdisa Gonfa Staff of Arsi University College of health sciences. He is conducting a research project on determinants of delay in timely treatment seeking of diarrheal diseases among mothers with under-five children in Asella town, Oromia, Central Ethiopia: 2025. He has received permission from Arsi University to conduct this study. The main part of the study involves collecting information from mothers/care givers. You were selected for the study because your cooperation is an important for us. We are kindly requesting you to answer the questions that we have prepared for you. We assure all information gathered during the course of the study was kept completely confidential. All the information that you are going to deliver to us was coded for anonymity. Only the principal investigator and the research assistants collecting the data will have access to the data.

Could I have your permission to continue?

1. If yes, continue the interview.
2. If no, skip to the next participant by writing reasons for his/her refusal.

Informed consent Certified by:

Interviewer: Code----- signature-----

Date of interview-----Time started----- Time completed-----

Result of interview:

1. Completed
2. Respondent not available,
3. Refused,
4. Partially completed

Checked by:

Supervisor Name-----signature-----Date-----

10.2. Questionnaires

Questionnaire on of determinants of time to treatment seeking of diarrheal diseases among mothers with under-five children in Asella town, Oromia, Central Ethiopia: 2025

Questionnaire identification number -----

Section 1 - General information

No	Questions and filters	Coding categories
1	Residence	1.urban 2.rural
2	Age of mother/care giver's	_____yrs.
3	Age of the child	_____Months.
4	Sex of the child	1.Male 2.Female
5	Educational status of mothers/care giver's	1. Illiterate 2 .Read and write 3 .Grade 1 to 6 4.Grade 7 to 8 5. Grade 9 to 12 6. Above grade 12
6	Average monthly income of your family	_____ETB
7	Religion of households	1 Orthodox 2.Muslim 3 Protestant 4.Other
8	Distance of the house from nearest health institution	_____km
10	Birth order of child	1. First 2. Second 3. Third 4. Fourth 5. Fifth and above
11	Marital status of mother/caregiver's	1. Single 2. Married 3. Divorced 4. windowed

Section 2; - Diarrheal disease and action taken by mother

No	Questions and filters	Coding categories
1	Is diarrheal disease health problem of your community?	1.yes 2.No
2	Did your child attack with diarrhea in the last four weeks?	1.yes 2.No
3	If the answer is 'yes' what action was taken by you	1,No action taken 2,Give home remedies 3,Restricting of food and water 4,Give additional food and fluid 5,Others
4	How you can decide on action you take For managing your child with diarrhea?	1,Depending on types of diarrhea 2,Depending on causes of diarrhea 3,By its signs and symptoms of severity 4,By wording of the loose stool 5,Others
5	What was done in terms of fluid intake	1,Only on breast milk 2,Stopped giving fluid 3,Decreased amount of fluid 4,Gave usual amount of fluid 5,Increased amount of fluid
6	What was done in terms of food intake	1,Not yet weaned 2,Stopped giving food 3,Decreased amount of food 4,Gave usual amount 5,Increased amount of food
7	If not stopped giving fluid, what was Composition of fluid given to the diarrheal child	1,ORT 2,ORS 3,Soup 4,Other type
8	What are the use of ORS	1,Adds the lost water to the child's body 2,cure diarrheal disease 3,Had never heard of it 4,Others

9	Did you seek help from someone for your diarrhea child	1.Yes 2.No
10	Where did you diarrheal child seek help for	1,Herbalist 2,Magician 3,Wogesha 4,Private drug 5,shop Health 6,center Hospital 7,Other place
11	After how many days of diarrhea did you seek help for this diarrhea?	1,On the same day of 2,diarrhea After one day of 3,diarrhea After two day of 4,diarrhea After three day 5,of diarrhea After four day of diarrhea 6,Five and above day of diarrhea
12	If you had the choice, which treatment would you like most for you diarrheal child	1,Injection or tablets 2,Massage of abdomen Herbal 3,medicine 4, Magic procedure (holy water...) 5,Others
13	Which person do you think is the most successful in the treating diarrhea	1,Herbalist 2,Magician 3,Wogesha 4,Private drug shop 5,owner Community or institution health worker
14	Is there childhood diarrhea that cannot treat by modern medicine?	1.Yes 2.No
15	If the answer of above question 'yes' which one?	1,Teething 2, Evil eye 3,Abdominal belly 4,Using medication of child things 5,Others
17	What was the outcome of the diarrhea at time of interview	1,Death 2.worse 3,Improved 4,no change

Section 3:- perceptions on types of diarrhea

No	Questions and filters	Coding categories
1	What are the types of childhood diarrhea you can identify?	1, Yellow 2, Red 3, Green 4, Watery 5, Chichita 7 Others
2	How you can identify?	1, using color of diarrhea 2, By child conditions 3, By its contents 4, By perceived cause 5, Others
3	What is the use of identifying types of diarrhea?	1, To Decide on management 2, To identify the cause 3, Others

Section 4; - perceptions on cause of childhood diarrhea

No	Questions and filters	Coding categories
1	what are causes of childhood diarrhea that you know	1, Evil eye 2, Teething 3, If the child remains without food for long hours 4, Eating contaminated food 5, If the child play in hot Others
2	How you can identify the cause of childhood diarrhea?	1, By the types of diarrhea 2, By the child conditions 3, By the color of diarrhea 4, By symptoms of diarrhea 5, others
3	What is the use of knowing cause of childhood diarrhea?	1, To take action 2, To choice management possibilities 3, Others
4	Does eating with dirty hands cause diarrhea	1, Yes 2, No
5	Can drinking river water cause diarrhea	1, Yes 2, No
6	Does diarrhea cause loss of fluid	1, Yes 2, No

Sections 5; - perceived signs and symptoms of severity

1	According to the respondents perception,how severe was the diarrhea	1,Mild 2,Moderate 3,Severe
2	How severity of childhood diarrhea identified	1,By the child condition 2,By combined symptoms of the disease (vomiting) 3,If the child refused to eat 4,If the diarrhea continue for long 5,If there is sunken eye 6,Others
3	What are signs and symptoms of severity you can identifies for child with diarrhea disease	1,Increased frequency and duration of diarrhea 2,Presence of fever 3,Bloody diarrhea 4,Sunken fontanel 5,Change of child behavior 6,Weakness of the child with diarrhea 7,Others
4	If you see sign of severity on your child with diarrhea what is your action?	1,Trying home remedies 2,Taking to elder care givers to checked by them 3,Take to religion leader 4,Take to medical care 5,Take to traditional healer 6,Drinking medication prepared from lemon sugar and water 7,Others

Annex -2 Declaration

Declaration of Investigator

I, the undersigned Pediatrics and Child Health Resident, declare that this Thesis is my original work in partial fulfillment of the requirement for the Specialty certificate in Pediatrics and Child Health to my best knowledge.

Name of investigator: Abdisa Gonfa : (MD)

Signature: _____ Date Feb, 2 2026

Declaration of Advisors

We, the undersigned Advisors, declare that this Thesis is the investigator original work in partial fulfillment of the requirement for the Specialty certificate in Pediatrics and Child Health. We confirmed that this Thesis is ready for defense with our approval as the university Advisors.

Date of Submission: _____

Name of Advisors:

Signatures

Date

1. Dr. Tejitu Urgessa

Feb, 2 2026

2. Mr. Mesfin Tafa



Feb, 2 2026