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PREVALENCE OF DIARRHEA AND ASSOCIATED RISK FACTORS AMONG UNDER FIVE CHILDREN VISITING HAMUSIT HEALTH CENTER, DERA DISTRICT, SOUTH GONDAR ZONE, NORTHWEST ETHIOPIA

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GRADUATE STUDIES OFFICE

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BY

KINDALEM DESSIE MENGISTU

ADVISOR: SISSAY MENKIR (PhD)

A THESIS SUBMITTED TO THE DEPARTMENT OF BIOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTERS OF SCIENCE DEGREE IN BIOLOGY (BIOMEDICAL SCIENCES)

JULY, 2021

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY

GRADUATE STUDIES OFFICE

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Approval Sheet of Thesis for Defense in Advisor's

As the thesis advisor, I hereby certify that I have supervised, read, and evaluated this thesis entitled "**Prevalence of diarrhea and associated risk factors among under five children visiting Hamusit Health Center, Dera District, South Gondar Zone, northwest Ethiopia**" by **Kindalem Dessie Mengistu** prepared under my guidance. I recommend that it can be submitted as fulfilling the thesis requirement.

Sissay Menkir (Ph.D.) _____ ------/----/----

Advisor's name Signature Date

Kindalem Dessie Mengistu _____ ----/------/----

Student's name Signature Date

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Approval Sheet of Thesis for Defense Result in Examiners

As members of the Board of Examiners of the MSc. Thesis opens Defense Examination, we certify that we have read, evaluated the thesis entitled **"Prevalence of diarrhea and associated risk factors among under five children visiting Hamusit Health Center, Dera District, South Gondar Zone, northwest Ethiopia**" by **Kindalem Dessie Mengistu,** and examined the candidate. We recommended that the thesis be accepted as fulfilling the thesis requirement for the degree of Master of Science in Biomedical Science.

Board of Examiners

_____ _____ ___/____/____

Internal Examiner I Signature Date

_____ _____ ___/_____/____

Internal Examiner II Signature Date

_____ _____ ___/____/____

External Examiner Signature Date

DEDICATION

I dedicate this thesis to my family for their love, affection, and unrestricted encouragement during this research work and my success in life.

DECLARATION (STATEMENT OF AUTHOR)

For this thesis first, I declare that this thesis is the result of my work and that all sources or material used have been duly acknowledged (cited). This thesis is submitted for partial fulfillment of the requirements of an MSc. in Biology (Biomedical Sscience) degree at Bahir Dar University and to be made available at the university's Library under the rules of the Library. I confidently declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree or certificate.

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Kindalem Dessie Mengistu _____

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Place

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Date of submission

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ACRONYMS /ABBREVIATIONS

AOR	Adjusted Odd Ratio
ARSHB	Amhara Regional State Health Bureau
CDC	Center of Disease Control and prevention
CDD	Control for Diarrheal Disease
CFR	Case Fatality Rate
CSA	Central Statistics Agency
COR	Crude Odds Ratio
EDHS	Ethiopian Demographic Health Survey
HEW	Health Extension Workers
HIV	Human Immunodeficiency Virus
MOH	Ministry Of Health
NGO	Non-Governmental Organization
ORS	Oral Rehydration Salt
ORT	Oral Rehydration Therapy
SPSS	Statistical Package for Social Science
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

ABSTRACT

Diarrheal disease is a major cause of child morbidity and mortality in developing countries, including Ethiopia. The objective of this study was to determine the prevalence of diarrheal disease and associated the risk factors among under-five age children who were visiting Hamusit Health Center, Dera District, South Gondar Zone, northwest Ethiopia. A Health Center based cross-sectional study was conducted from February 30 to March 30, 2021. The sample size selected in the present study were 191 and data were collected by administering questionnaires to the parents/caretakers of the children. Both univariate and multivariate logistic regression analyses were employed to identify risk factors. p-value < 0.05 were considered significant. The point prevalence of diarrhea among under five children was 25.7% (95% CI: 19.3-31.9). The mthors/caretakers who had low economic income of family with less than 3874 Ethiopian Birr [AOR= 19.45 (1.439, 263.059)], child's age from 12-23 months [AOR= 8.096 (0.447, 146.70)], children mostly taking food/fluid of adult food [AOR= 6.419 (1.098, 37.527), duration of breast feeding a child with less than six months [AOR=7.640 (1.511, 38.627), a child start supplementary feeding before less than six months [AOR= 9.764 (95% CI, 1.79, 53.071)] and lack of measles vaccination [AOR= 4.78 (1.813, 12.647)] were predictors of the occurrence of diarrhea. There was a high prevalence of diarrheal disease among children in the study area. The mthors/caretakers who had low economic income of family with less than 3874 Ethiopian Birr, child's age from 12-23 months, children mostly taking food/fluid of adult food, duration of breast feeding a child with less than six months, a child start supplementary feeding before less than six months and lack of measles vaccination were notably associated with childhood diarrheal disease. Therefore, improving economic income, pure water supply, increasing the frequency of breast feeding after six months, exclusive breast feeding before six months and measles vaccination and would minimize the burden of diarrheal disease.

Keywords/phrases: Diarrheal Case, Hamusit Health Center, Predictors, Under Five Children, Ethiopia.

1. INTRODUCTION

1.1 Background of the Study

Diarrhea is the passage of three or more watery or loose stools per day, and when the mother considered as increased stool frequency or liquidity (Gidudu *et al.,* 2011). Despite remarkable progress in the reduction of under-five mortality, childhood diarrheal disease is still a leading cause of mortality and morbidity (Liu *et al.,* 2015; WHO, 2017). Globally, diarrhea accounts for the death of 525,000 under-five children per year, and about 2,195 children deaths every day (UNICE, 2016). Annually, 1.7 billion diarrhea episodes occurred among children under-five years worldwide (UNICEF, 2019). Of the leading infectious causes of death worldwide, diarrhea is the second responsible for 578,000 deaths among under 5 children years of age in 2013 (Liu *et al.*, 2015). The majority of morbidity and mortality occurred in south Asia and sub-Saharan African countries (88%), were correlated to the utility of unsafe water, inadequate sanitation, and insufficient hygiene practices (WHO, 2017).

In Sub-Saharan Africa, diarrhea accounted for 25 to 75 % and 50% childhood morbidity and mortality, respectively (Walker *et al.,* 2013). In this region, rotavirus contributed the highest child death rate and remained the main cause of diarrhea (Tate *et al.,* 2012). In East Africa, the prevalence of childhood diarrhea was found in the range of 13-32 % (Diouf *et al.,* 2014).

Studies in different parts of Ethiopia showed that the prevalence of childhood diarrhea was in the range of 15–29 % (Teklemichael Gebru *et al.,* 2014; Thomas Sinmegn *et al.,* 2014). However, the point prevalence of childhood diarrhea at national level has shown a decline from 24 % in 2000 to 13.5 % in 2011 (Ethiopian Demographic Health Survey, 2011).

Multiple factors contribute to the occurrence of diarrhea among children less than 5 years of age. Childhood diarrhea was associated with low maternal education (Bbaale, 2011; Teklemichael Gebru *et al.,* 2014; Thomas Sinmegn Mihrete *et al.,* 2014), age of children with 12-23months (Bbaale, 2011; Teklemichael Gebru *et al.,* 2014), number of under five children greater than two in the household (Gebremariam Woldemicael, 2001; Thomas

Sinmegn *et al.,* 2014), no latrine availability (Wanzahun Godana and Bazetu Mengistie, 2013; Thomas Sinmegn *et al.,* 2014), improper child stool disposal methods (Thomas Sinmegn *et al.,* 2014), mothers not practicing hand washing at critical times (Teklemichael Gebru *et al.,* 2014), lack of improved water sources (Sheillah Simiyu, 2010; Wanzahun Godana and Bazetu Mengistie, 2013), improper handling of drinking water (Sileshi Teklemariam *et al.,* 2000; Wondwossen Birke Eshete, 2008; Sheillah Simiyu, 2010), and improper refuse disposal (Bazetu Mengistie *et al.,* 2013; Teklemichael Gebru *et al.,* 2014). Systematic studies indicated diarrheal diseases, which are widespread in areas with water scarcity, unsafe drinking water supply, poor hygiene, and lack of sanitation which is poorly accessed (Lamberti *et al.,* 2012). However, in rotavirus-vaccinated children, occurrence of childhood diarrhea decreased significantly (Enweronu-Laryea *et al.,* 2014; Fernandes *et al.,* 2014).

According to WHO, the availability of improved drinking water supply in Ethiopia increased from 13 % in 1990 to 57 % in 2015 (UNICEF and WHO, 2015). Improved and shared latrine facility availability in Amhara Region rose from 2 % in 2000 to 46 % in 2012 (Baker and Ensink, 2012). The promotion of hygiene and sanitation through the health extension program has been active since 2003 (MOH, 2008). Rotavirus vaccine was launched in Ethiopia at the end of 2013 (Alliance, WHO, MOH and UNICEF, 2013). However, health facility-based report in Amhara Region showed that morbidity of childhood diarrhea was one of the top five leading causes of childhood morbidity in the past decade (Amhara Regional State Health Bureau, 2011/2012). There is no recent information about childhood diarrhea at community level after implementation of the above mentioned interventions, particularly in the present study area.

According to clinical reports of Dera District Health Center, diarrhea is listed as the top reason causing children to visit health center. However, there is paucity of scientific report on the prevalence of Diarrheal cases and associated risk factors among under-five children who visited the study area. Therefore, the present study was undertaken to assess the prevalence of diarrheal case and its associated risk factors among under-five children who visited Hamusit Health Center, Dera District, northwest Ethiopia.

1.2 Statement of the Problem

Diarrhea disease is the second cause of deaths among under five children (WHO, 2015). Studies in Ethiopia showed that low maternal education, poor sanitation, contaminated water source, duration of breast feeding, failure to wash hands, absence of rotavirus vaccination, failure to dispose of feces hygienically, age of child and adequate food hygiene were significant predictors of diarrheal disease occurrence in children under-five years (Sissay Shine *et al.,* 2020). Socioeconomic status like; monthly income, number of under-five children, methods of complementary feeding, types of water storage equipment, mother's poor hand washing practices, lack of hand washing facilities, duration of breastfeeding and improper waste disposal practices were also the significant predictors of diarrheal disease occurrence in children under-five years (Amare Belachew *et al.,* 2019).

There is a considerable variation in the prevalence and risk factors for diarrhea disease in Ethiopia. Despite the interventions and innovations undertaken regarding childhood diarrhea, the burden of the disease is high in the current study area during the surveying of the Healthy centers. Therefore, this study was conducted to assess the prevalence of diarrhea and major associated risk factors among under-five years' old children visiting Hamusit Health Center, Dera District, northwest, Ethiopia.

1.3. Significance of the Study

The significance of this research is used to determine and assess the prevalence of diarrhea and risk factors among under-five age children visiting Hamusit Health Center, Dera District, and northwest Ethiopia. The finding will be served the health offices and NGOs so that they are taking standardized measures like Rotavirus vaccination and improved water quality assessment.. The study findings will be used as a benchmark for further study on the prevalence of Diarrhea diseases in the Dera District, Amhara Regional state, Ethiopia.

1.4. Objectives

1.4.1 General objective

The main objective of the study was to determine the prevalence of diarrhea and its major associated factors among under-five age children who were visiting Hamusit Health Centre, Dera District, South Gondar Zone, northwest Ethiopia.

1.4.2 Specific objectives

Specific objectives were:

- ✓ To determine the prevalence of diarrhea cases among under-five children in the study population.
- ✓ To assess the major factors those are associated with prevalence of diarrheal case among under-five children in the study population.

1.5 Limitation of the study

The study was limited to only macroscopic (physical examination) stool examination of the children for the presence of diarrhea. Despite this, a bigger picture of the prevalence of diarrhea and cause of pathogens in the area was not being found. Including other techniques like microscopic blood count test and doing endoscopic evaluations of upper and lower digestive tract (ulcers, infections, and neoplastic process) techniques could help to get a bigger picture of the prevalence of diarrhea in the area.

2. REVIEW OF RELATED LITERATURE

2.1. Definition of diarrhea

Diarrheal illness is defined as three or more loose or liquid stools per day, or more frequent occurrence of stools than in normal time for an individual. It can be caused by infectious diseases, changes in diet, such as eating more than usual amounts of certain foods, and use of some medications (Oklahoma State Department of Health, 2014).

Diarrhoeal disease is the second leading cause of death in under five children, and is responsible for killing around 760,000 children every year. Diarrhoea can last several days, and can leave the body without the water and salts that are necessary for survival. Most people who die from diarrhoea actually die from severe dehydration and fluid loss. Children who are malnourished or have impaired immunity as well as people living with HIV are most at risk of life-threatening diarrhoea (WHO, 2013).

Diarrhea is characterized by an increased frequency and volume, and decreased consistency of stool from the norm. It must be remembered that frequency of passing stool varies with age and is higher in infants. Dysentery is defined as the passage of blood and mucous in diarrheal stools. Persistent diarrhea occurs when the duration of symptoms exceeds seven days and chronic diarrhea when it lasts more than 14 days (Cooke, 2010).

According to etiological factors, there are two general types of diarrhea: infectious and non-infectious diarrhea. Infectious diarrhea is caused by a virus, parasite, or bacterium**.** It can spread quickly from person-to-person, especially in daycare centers. Some of the causes of infectious diarrhea are Campylobacteriosis, shiga-toxin producing *Esherchia coli*, giardiasis, salmonellosis and shigellosis. There are other agents that can also cause infectious diarrhea in children. These include parasites (e.g., cryptosporidiosis, amoeba) other bacteria (e.g., Yersinia) and other viruses (e.g., Rotavirus) (National Center for Rural Water Supply Technical Guidance, 2005).

Non-infectious Diarrhea is caused by mal-dietary, For example diarrhea of the infant who take cow’s milk instead of mother's milk or caused by adding food unknown before,

toxins (e.g., certain types of food poisoning), chronic diseases (e.g., cystic fibrosis) or allergic diarrhea caused by antibiotics (e.g., ampicillin)(CDC, 2009).

There are three major diarrhea syndromes: acute watery, persistent, and bloody diarrhea. Acute watery diarrhea is the one that lasts less than 2 weeks, rapidly dehydrating, with stool losses of 250 milliliters per kilogram per day or more is considered acute (Hall, 2010). This phenomenon is most likely caused by an infectious agent, such as bacterial, parasitic or viral invasion, or by a non-infectious agent such as dietary indiscretion or a new medication (Amerine and Keirsey, 2006). These pathogens can cause an inflammatory response in the gut where the epithelial lining is damaged either by a toxin produced by the organism or by an organism invading the mucosa (Bliss *et al.*, 2006). Acute diarrhea most likely leads to rapid dehydration. This form is the most deadly in young children and is commonly associated with rotavirus, enterotoxigenic *E. coli* or *V. cholerae* (Wellness, 2011).

Persistent diarrhea lasts longer than two weeks but resolving within a month is known as persistent diarrhea. It is less common and typically connected with malnutrition and is disproportionally associated with an increased risk of death (Wellness, 2011). Chronic diarrhea, on the other hand, lasts longer than four weeks (Bliss *et al*., 2006). Chronic diarrhea can be the result of disease processes, medication, genetic abnormalities, or a variety of other causes. Bloody diarrhea is often related to malnutrition, intestinal damage, and secondary sepsis. It is often associated with dysentery (Marchiondo, 2009).

2.2 Prevalence of diarrhea in worldwide

Globally, around 1.3 million people were died due to diarrhea and of the total deaths about 0.54 million were children's of under-five years of age. Majority of the mortality were occurred in developing countries (WHO, 2015). Of all child deaths from diarrhea, 78% occur in the African and South-East Asian regions (Farthing, 2012). Diarrhea is the second most cause of mortality and morbidity of under-five childhood illnesses in sub-Saharan Africa countries. In these countries, only 40% of people living in urban setting were accessing improved sanitations (WHO, 2015) and 72% of the people in Ethiopia were living without improved sanitation facilities (Bartram *et al*., 2014).

Diarrheal diseases account for one in nine child deaths worldwide, making diarrhea the second leading cause of death among children under the age of five. In Ethiopia, morbidity reports and community-based studies have shown that diarrheal disease is a major public health problem that causes morbidity and mortality in children. Morbidity-Mortality-and Treatment (MMT) surveys conducted in Ethiopia in 2000 at different times revealed five diarrheal episodes per child/year; and the two-week incidence rate to be 16%.The diarrhea associated mortality rate is about 10/1000 under-five population. Despite these sobering statistics, strides made over the last 20 years have shown that, in addition to rotavirus Vaccination and breastfeeding, diarrhea prevention focused on safe water and improved hygiene and sanitation is not only possible, but cost effective (CDC, 2012).

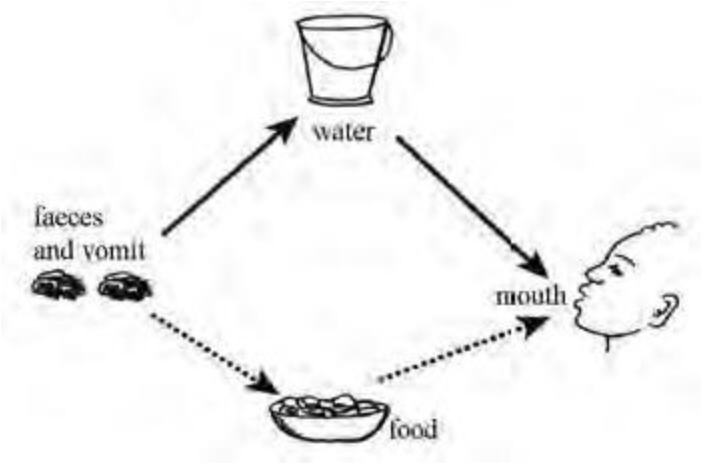

Figure 1: The fecal oral rout of diarrheal disease (adapted from www.aarogya.com, 2016).

2.3. Prevalence of diarrhea among under-five children in Ethiopia

The systematic review and meta-analysis showed that the pooled prevalence of diarrhea in From this meta-analysis, the highest prevalence was 37% (95%CI: 32, 43) reported in a study by Keneni *et al* (Nagga *et al.*, 2016) whereas the lowest prevalence of 8% was reported elsewhere (Muluken Dessalegn *et al.*, 2011; Alambo Kedir Addisu, 2015). Accordingly, the highest prevalence was observed in Afar region with a prevalence of 27% (95% CI: 25, 30) followed by Somali and Dire Dawa regions at 26% (95% CI: 15, 37) and then Addis Ababa at 24% (95% CI: 7, 41). With regard to sample size, the

prevalence of diarrhea was higher in studies having a sample of size<670, 23% (95% CI: 19, 27) compared to those having a sample size> = 670, 20% (95%CI: 16, 24) (Animut Alebel *et al.,* 2018).

Studies in different parts of Ethiopia showed that A total of 9185 children under-five years of age were included in the study, of which 1314 children had diarrheal illness diarrhea two weeks before the interview, thus giving a prevalence of 14.3% (Kassaye Wudu Seid and Belayneh Debasu Kelkay, 2018).

Studies showed that in Jamma district, South Wello zone, the prevalence of diarrhea among under-five children was 23.1%. Child's age 6 to 23 months, Living in rural area, absence of latrine, absence of hand washing facility, unprotected drinking water source, and Improper waste disposal practices were associated with diarrhea disease (Getachew Yismaw Workie *et al.,* 2019).

2.4. Risk factors associated with diarrhea

2.4.1 Socio-demographic factors

The different socio-demographic factors like no formal education, housewives, less than four family members per household and caregivers had less than two under-five children were the risk factors for diarrhea (Melese Dubie Agegnehu *et al.,* 2019). Similar studies conducted from Bahir dar Zuria district lack of formal education, low source of income, family size more than four in the house hold were some of the socio demographic factors of diarrhea (Dessalegn Tesfa Asnakew *et al.,* 2017).

The studies in Debre Berhan town showed that the age of mothers, the age of children, the marital status, house hold family size between one and four and the education level of the mothers/ care givers were the socio demographic factors of diarrhea (Sissay shine *et al.,* 2020). Studies also conducted in Debre Berhan town showed that female sex of the guardians/ care takers, age of the study participants, lack of educational status of mothers, work status and the age of the children between 0-60 months were the socio demographic factors of diarrhea (Tizazu Zenebe Zelelie *et al.,* 2018).

Studies conducted in the Hulet Ejju Enessie Woreda, East Gojjam Zone, the number of family less than Five persons in the house hold, number of under-five age children, and age of children within 36-47 months age category, educational background marital status, and low economic activity were some of the socio demographic factors of the diarrhea (Andualem Anteneh and Abera Kumie, 2010).

Studies showed that in Farta Woreda, South Gondar Zone, the marital status, educational background, age of mothers, type of employed and number of the families in the house hold were some of the socio demographic factors of diarrhea (Genet Gedamu *et al.*, 2017). Studies also conducted in Farta Woreda, age of mothers/caregivers, educational status, occupation of the respondent and family average monthly income were some of the socio demographic factors of diarrhea (Yilkal Tafere *et al.,* 2020).

Studies in University of Gondar Comprehensive Specialized Hospital showed that age of child, age of mothers with greater than 35, residence of rural, low monthly income, lack of education of mothers, marital status, malnutrition, knowledge, attitude were some of the socio demographic factors that are significantly associated with diarrhea (zewudu andualem *et al.,* 2019).

2.4.2. Environmental and behavioral factors of diarrhea

According to Atalay Getachew *et al.,* (2018) type of grass roof material, lack of hand washing facility, lack of latrine facility, lack of ownership of latrine, intermittent water supply, household water treatment, presence of feces around the pit hole, presence of feces around the house compound, risk of contamination of household storage were environmental factors of diarrhea disease. In this study, type of roof material, hand washing facility, lack of latrine facility, presence of feces around the pit hole, presence of feces around the house compound and risk of contamination of household storage had significant associations with diarrheal morbidity (Atalay Getachew *et al.,* 2018).

Studies showed that in Mecha District in West Gojam Zone, children whose mothers were below secondary level education, living in rural area and family wealth of low and medium income were highly vulnerable to diarrhea. Drinking water source, latrine

availability and waste disposal had an association with childhood diarrhea. Families who had unimproved drinking water source, being rural and improper refuse disposal had a significantly increased the risk of childhood diarrhea (Muluken Dessalegn *et al.,* 2011). Similarly, children who were partially on breast milk were more likely to have diarrhea than children who were exclusively on breast milk. The odds of diarrhea were significantly higher for those children who had <1 year of breast feeding and for those who were between one and two years as compared with 2 years and above. Maternal history of diarrhea had a significant risk on their children's diarrhea status. The likelihood of developing diarrhea among under five children was five times higher for those children whose mothers had a history of diarrhea as compared to those whose mothers did not have diarrhea (Muluken Dessalegn *et al.,* 2011).

The study showed that being a member of HDA, private workers with occupation of mothers, distance of latrine from the house greater than 200m, lack of availability of separate kitchen, hand-washing practice with soap, proper disposal of children's feces and child age were significant predictor of under five diarrhea. Children whose families practiced open disposal of child feces were more likely to develop diarrhea when compared to children whose families practiced safe methods of child feces disposal (Fekadeselassie Berhe Zedie and Dejen Hailu Kassa**,** 2018). Studies showed that in Jamma district, South Wello zone, living in rural areas, lack of sanitation facilities, unprotected sources of drinking water, improper waste disposal, and child age were significantly associated with childhood diarrheal disease (Getachew Yismaw Workie *et al.,* 2019).

The study from Hulet Ejju Enessie District, Amhara region, showed only 12.4% households responded that there were under-five children who used latrines. About one third of them began to use the latrine by the age of three-years and two-third by the age of four years. One hundred and eight (38.9%) households disposed their children's feces improperly by throwing out of houses somewhere either in the garden or in the bush (Andualem Anteneh and Abera Kumie, 2010).

The study from Dale district, Sidama Zone, Southern Ethiopia, mothers'/caregivers' educational status, age of the child, nutritional status of child, hand washing practice of mother/caregiver after latrine visit, mothers/ caregiver hand washing method, methods of refuse disposal and housing floor material were a determinant factors of diarrhea disease (Behailu Melese *et al.*, 2019).

2.4.3. Host factors that increase susceptibility to diarrhea

Several environmental and host factors are associated with increased incidence, severity, or duration of diarrhea. They include: lack of safe water supply, Contaminated food, Overcrowding, Poor sanitation, Malnutrition (Katherine, 2012).

Under nutrition: The frequency, severity, duration, and risk of death from diarrhea are increased in undernourished children, especially those with severe under nutrition.

Current or recent measles: Diarrhea and dysentery are more frequent or severe in children with measles or who have had measles in the previous four weeks. This presumably results from immunological impairment caused by measles.

The other factors that increase susceptibility to diarrhea include

Age: Most diarrheal episodes occur during the first two years of life. Incidence is highest in the age group 6-11 months, when weaning often occurs. This pattern reflects the combined effects of declining levels of maternally-acquired antibodies, the lack of active immunity in the infant, the introduction of food that may be contaminated with fecal bacteria and direct contact with human or animal feces when the infant starts to crawl. Most enteric pathogens stimulate at least partial immunity against repeated infection or illness, which helps to explain the declining incidence of disease in older children and adults.

Seasonality: Distinct seasonal patterns of diarrhea occur in many geographical areas. In temperate climates, bacterial diarrheas tend to occur more frequently during the warm season, whereas viral diarrheas, particularly disease caused by rotavirus, peak during the winter. In tropical areas, rotavirus diarrhea tends to occur throughout the year, increasing in frequency during the drier, cool months, whereas bacterial diarrheas tend to peak during the warmer, rainy season. The incidence of persistent diarrhea follows the same seasonal pattern as that of acute watery diarrhea.

3. MATERIAL AND METHODS

3.1 Description of study area

The study was conducted in Dera District, South Gondar Zone, Amhara Region State, Ethiopia (Figure: 2). It is located 535 km north-west of Addis Ababa (the capital city of Ethiopia) and 42 km away from Bahir Dar. Dera is bordered on the South by the Abay River which separates it from the West Gojjam Zone, on the West by Lake Tana, on the North by Fogera District, on the Northeast by East Este, and on the East by West Este. Dera District covers total areas of 158,948 hectares, of which 35% is plain, 20% mountainous, 18% gorges, and 27% is undulating. The District is located at the geographical location of 11° 43' 0" N and 37° 38' 0" E and with elevation ranging from 1,560 to 2,600 m above sea level. The mean annual temperature of the District is about 26°C and its average annual rainfall ranges from 1,000 to 1,500 mm (Dera district Office of agriculture Annual Report, 2020). As to the agro-ecology, 85% is Woynadega while 15% is Dega. The selected study site is located in Hamusit town, which is one of the urban areas among the three urban kebeles in Dera District, South Gondar Zone.

Based on the 2007 national housing and population census, the total population of the District is 320,320 of whom 163,678 are men and 156,642 are women. Of which, 21,622 or 6.75% are urban inhabitants and the rest 93.25% are rural inhabitants (Central Statistical Agency, 2007). Among this, the total population of the Hamusit city administration is 25,916. Of which, male 12,506(48.3%) and female 13,410 (51.7%) (Hamusit municipality personal communication, 2021). The main activity of the people in this area is agriculture. The most dominant food crops grown in the area are Finger millet (*Eleusine coracana*), Teff (*Eragrosis teff*), and Maize (*Zea mais*). However, there are some other food crops, vegetables, and fruits grown in lesser quantity (Dera Woreda Office of agriculture Annual Report, 2020). There are 11 Health centers and 36 Health posts in the Woreda. A Hamusit Health center is my study area and that serves the surrounding kebeles. Hamusit Health Center serves for 55,426 populations in the catchment area. Under these Health Centers, ten rural and one urban health posts are assigned to implement the health extension program (Dera Woreda Health Office Annual Report, 2020). Health Extension Workers (HEWs) spend 50% of their time visiting

families in their homes and performing outreach activities in the community. To address strong community demands for basic curative care, HEWs are trained to provide first aid; treat malaria, dysentery, intestinal parasites, and other ailments; and to refer cases to the nearest health center when more complicated care is needed (Ababor *et al*., 2014).

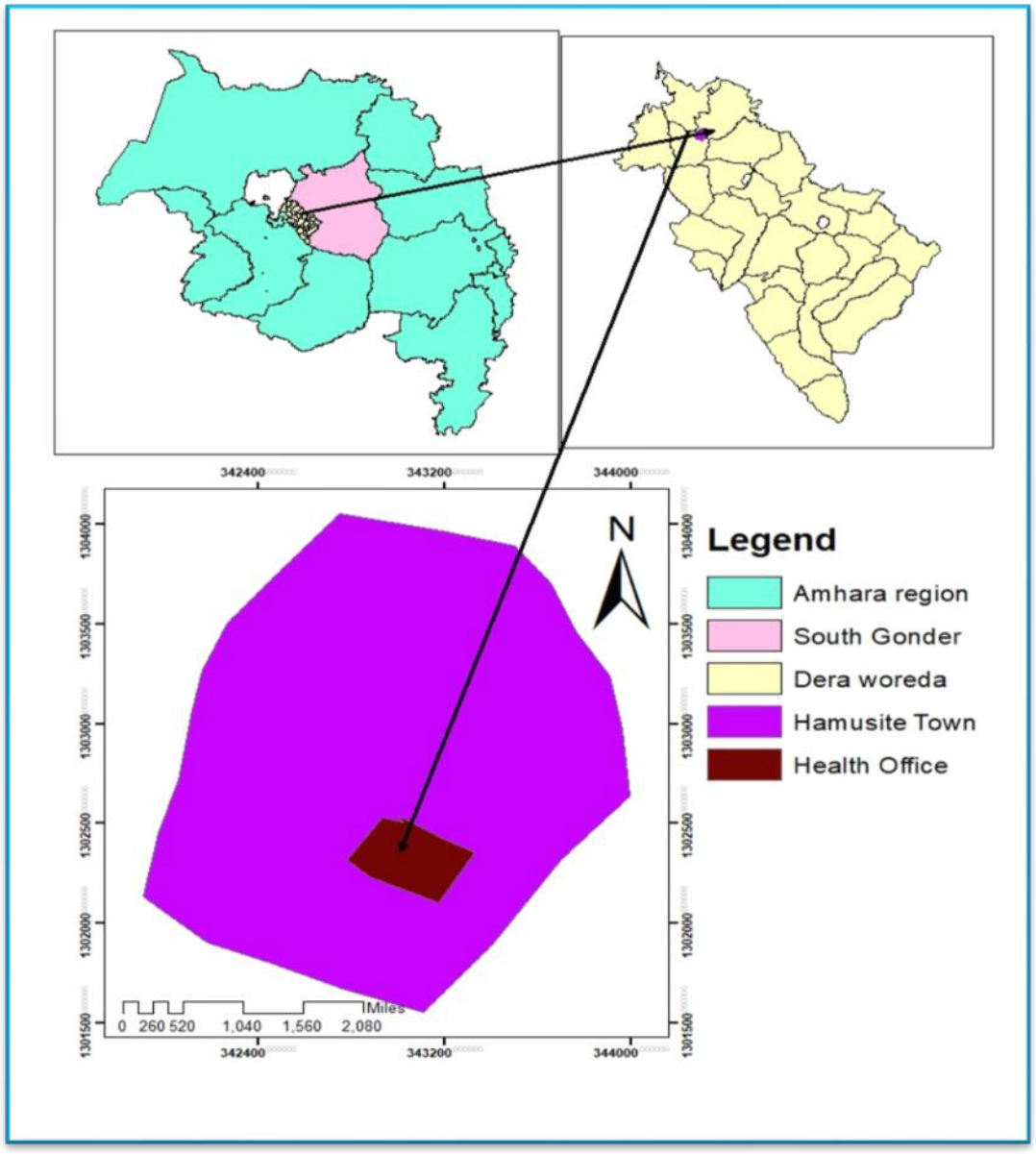

Figure 2: Location of the study area, Hamusit Health Center, Dera District, Amhara regional state, northwest Ethiopia.

3.2 Study Design

A Health Center based Cross-sectional study was conducted from February 30 to March 30, 2021 to determine the prevalence of diarrhea and associated risk factors among under five children visiting the Hamusit Health Center, Dera District, Northwest Ethiopia.

3.3 Source population

The study populations were all under five children visiting Hamusit Health Center from February 30 to March 30, 2021.

3.4 Sample Size Determination

The minimum number of sample size (n) required is determining by using a single population proportion formula for cross-sectional surveys (Niang *et al*., 2006). $n = Z^2 * p (1-P) / d^2$

Where n = sample size; Z = 1.96 at 95% confidence level; P = estimated prevalence rate of 14.5% (two weeks prevalence of diarrhea among under five children Bahir Dar city, Northwest Ethiopia=14.5%) (Amare Belachew Dagnew *et al.,* 2019) and d = margin of error =0.05

Accordingly, the total sample size is, $n = 1.96^2 * 0.145(1-0.145)/0.05^2 = 191$ children.

3.5 Inclusion Criteria

Voluntary caregivers/mothers/ guardians who have under five age children visiting Hamusit Health Center, signed informed ascent and children had no anti-Diarrheic treatments for the last two weeks were included.

3.6. Exclusion Criteria

Children on anti-diarrheic therapy and those who took medications within two weeks period were excluded from the study. Furthermore, parents/guardians did not sign ascent, and those who were not voluntary to be part of the study were excluded. In addition, children who take the rota virus vaccination were not the part of the study.

3.7 Sampling Technique

The sample was selected using simple random sampling technique. The children who were visiting Hamusit Health Center was selected randomly for each day admission until, 191 children were selected.

3.8 Data Collection Methods

3.8.1 Questionnaire survey

The data was collected using face to face interview with pre-tested structured questionnaires and observational checklists which were prepared in English and translated to the local language, Amharic, which all the local dwellers communicate with. To improve the quality of data collection, two-day training was given to two data collectors and one supervisor about way of interview, the nature of questionnaires, rechecking of filled questionnaires and approaches to household heads. These face-to-face interviews were based on the questionnaire conducted on mothers of the children who were recruited into the study. Interviews were conducted on the day of admission. The questionnaire contained different sections that included demographic and socio-economic, water and hygiene and behavioral factors.

3.8.2 Stool sample collection

The mothers were instructed properly and given clean labeled collection cups along with applicator sticks. Each mother/caretaker was instructed to collect about 3 to 5g of her Childs 'fresh stool. At the time of collection; the date of sampling and the name, age, and sex of each participant was recorded in a recording format.

3.8.3 Macroscopic examination of stool sample

The physical examinations of feces were due to volume, color, blood and mucus that were examined by the laboratory technicians. After collecting the stool, the laboratory technicians decided whether the feces mixed with watery, mucus and blood to examine stool for whether the children are positive or negative with diarrhea were the major purpose of the examination.

3.9 Data analysis

All data collection forms were checked for completeness and reliability before entry into Software. Statistical package for social sciences (SPSS) version 26.0 was used to analyze the collected data. Chi-square ($\chi 2$) test was performed to verify the possible association between the prevalence of diarrhea and socio-demographic, economic characteristics, behavioral factors, hygienic practices, and environmental sanitation factors. Univariate logistic regression analysis and multivariate logistic regressions were used to measure the strengths or degrees of association between the prevalence of diarrhea and their associated risk factors. The $p<0.05$ was used to show the accuracy of data analysis.

3.10. Ethical considerations

Before conducting the investigation, the investigator obtained ethical clearance from the ethical committee of Science College, Bahir Dar University. A letter describing the objective of the research was written to Hamusit Health Center. Ascent forms were obtained from the parents/guardians of children after explaining the purpose and the procedures of the study.

3.11. Variables

The independent variables of the present study were socio demographic factors, Environmental; behavioral and hygienic practices of the respondents, knowledge of the respondents and associated risk factors for diarrhoea. The dependent variable is the prevalence of diarrhea.

3.12. Operational Definitions

Diarrhea is defined as more than three loose watery stools passed in a twenty-four hour period.

Hand washing technique at critical time defined as the habit of washing hands mainly after visiting a larine, before eating, before handling food/cooking, and after cleaning a baby's bottom.

Index child refers to a child that was included in the study from a household to have information on the demographic and health characteristics, and also to calculate the prevalence of diarrheal morbidity.

Sanitation facility is defined as a functioning excreta disposal facility, a toilet or latrine.

4. RESULT

4.1 Socio-demographic characteristics of the mothers/ guardians and children

A total of 191 mother/guardians completed the questionnaires. One hundred sixty two (84.8%) live in the rural area. Among the study participants, one hundred sixty four (85.9%) were having more than 4 family members in the household, while most (80.1%, 153/191) of the house-hold had two and above under-five children in the family. More than half (59.7%) of the children were male and 38.2% were 12–23 months of age. The majority 72.8% (139/191) of the mothers/caretakers were 25-34 years of age. From the total study participants, 91.1% (174/191) were married. All most all (99.0%) study participants were mothers for their relation to their children. One hundred twenty six mothers (66.5%) were illiterate on their educational background and one hundred sixty nine (88.5%) were housewives by occupations. The majority 66% (126/191) of the study participants had low monthly income of with less than 3874 Ethiopian birr (Table 1).

Table 1: Socio demographic characteristics of mothers/guardians and children in Hamusit Health Center, Dera District, Amhara Regional State, Ethiopia.

Variables Name	Category	Frequency(n = 191)	Percent (%)
Residence of the respondent	Rural	162	84.8
	Urban	29	15.2
	Total	191	100.0
Household family size (n=191)	4 and less than	27	14.1
	More than 4	164	85.9
	Total	191	100.0
Number of under five children in the house(n=191)	One	38	19.9
	Two and above	153	80.1
	Total	191	100.0
Age of the index child (n=191)	Below 12 months	41	21.4
	12-23 months	73	38.2
	24-47 months	59	30.9
	48-59 months	18	9.4
	Total	191	100.0
Age of mothers/guardians(n=191)	18-24 years	10	5.2
	25-34 years	139	72.8
	35 years and above	42	22.0
	Total	191	100.0
Educational level of the mother	Illiterate	126	66.0

(n=191)	Basic education	48	25.1
	Primary education	12	6.3
	Secondary and above	5	2.6
	Total	191	100
Occupation of mother (n=191)	Government employer	4	2.1
	Merchant	1	0.5
	Private worker	17	8.9
	House wife	169	88.5
	Total	191	100.0
Monthly income of family (n=191)	Less than 3874	126	66.0
	Between 3875-4488	47	24.6
	Greater than 4489	18	9.4
	Total	191	100.0

4.2 Environmental Characteristics of the Households

Among the total respondents of the study, seventy two (37.7%) mothers/guardians were gain their source of drinking water from hand-dug well and one hundred two (53.4%) of the study participants gained from distance of less than fifteen minutes. Of which, one hundred seventy five (91.6%) of mothers used to drink untreated water and 64.9% were using container with a lid to store/ fetch water. One hundred seventy nine (93.7%) and one hundred seventy eight (93.2%) of the households had the dwelling with the mud floor and corrugated iron roof, respectively. A majority of the households didn't have latrine and hand washing facility which accounts 88.0% and 96.3%, respectively. About 9.4 % of households had traditional pit latrine and 2.6% had improved in type. Most households (91.6%) and (94.2%) disposed their solid and liquid waste in the open field (Table 2).

Table 2: Environmental characteristics of the households in Hamusit Health Center, Dera District, northwest, Ethiopia, 2021.

Variables Name	Category	Frequency (n = 191)	Percent (%)
Source of drinking water (n=191)	Hand dug well	72	37.7
	River or stream	52	27.2
	Spring	53	27.7
	Piped water	14	7.3
	Total	191	100.0
Distance of water source to home (n=191)	Less than 15 minutes	102	53.4
	More than 15 minutes	89	46.6
	Total	191	100.0

Treatment of drinking water (n=191)	Yes	16	8.4
	No	175	91.6
	Total	191	100.0
Kind of utensils used to store/fetch water (n=191)	Container with a lid	124	64.9
	Container without a lid	67	35.1
	Total	191	100.0
Type of floor material (n=191)	Mud	179	93.7
	Cement	12	6.3
	Total	191	100.0
Type of roof material (n=191)	Corrugated iron sheet	178	93.2
	Grass	13	6.8
	Total	191	100.0
Hand washing facility (n=191)	Yes	7	3.7
	No	184	96.3
	Total	191	100.0
Availability of latrine	Yes	23	12.0
	No	168	88.0
	Total	191	100.0
Type of latrine used (n=191)	Traditional pit latrine	18	9.4
	Ventilated Improved pit latrine	5	2.6
	Open field	168	88.0
	Total	191	100.0
Solid waste disposal methods (n=191)	Pit	4	2.1
	Open field	175	91.6
	Burning	9	4.7
	Garbage can	3	1.6
	Total	191	100.0
Liquid waste disposal methods (n=191)	Seepage pit	11	5.8
	Open surface	180	94.2
	Total	191	100.0

4.3 Behavioral characteristics of the respondents

Most 77.5% and 79.1% of the respondents practiced mixed feeding and did not separately prepare food using different materials, respectively. The majority (61.3%) of respondents had fed adults food to their children. Only 3.7% and 9.4% of mothers/caregivers had hand washing facility and washing their hands after visiting the latrine, respectively. Similarly, 7.3% wash their hand using soap with water. However, all most all caregivers

didn't wash their hands after visiting the latrine. On the other hand, nearly two third (63.4%) of respondents used a hand to feed their children (Table 3).

Table 3: Behavioral characteristics of under five age children visiting Hamusit Health Center, Dera District, Amhara Regional State, northwest Ethiopia, 2021.

Variables Name	Category	Frequency (n = 191)	Percent (%)
Additional food with breast milk (n=191)	Yes	148	77.5
	No	43	22.5
	Total	191	100.0
Separately prepare food using separate material (n=191)	Yes	40	20.9
	No	151	79.1
	Total	191	100.0
Child mostly taking food/fluid (n=191)	Adult food	117	61.3
	Cow's milk	37	19.4
	Gruel	25	13.1
	Powder milk	12	6.3
	Total	191	100.0
Use of material to feed the child(n=191)	Cup and Spoon	70	36.6
	Hand	121	63.4
	Total	191	100.0
Hand washing facility(n=191)	Yes	7	3.7
	No	184	96.3
	Total	191	100.0
Hand washing habit after visiting the latrine (n=191)	Yes	18	9.4
	No	173	90.6
	Total	191	100.0
Materials used to wash hand (n=191)	Not wash	173	90.6
	Only water	4	2.1
	Soap and water	14	7.3
	Total	191	100.0

4.4 Demographic and health characteristics of the indexed children

From the total study participants, one hundred fourteen (59.7%) of the children were males and the mean age of the children was 25.11 months. The majority (77.5%) of the children were less than six months of their duration of breast feeding and 74.3% of the children were not breast feeding based on current status of breast feeding. Similarly, most (86.9%) of the children were starting supplementary feeding before less six months. Most of the children received measles and rotavirus vaccine which is (68.6%) and (81.2%),

respectively. Forty Nine (25.7%) children had diarrhea during February 30, to March 30, 2021 at the time of data collection (Table 4).

Table 4: Demographic and health characteristics of the indexed children in Hamusit health Center, Dera District, Amara region, Ethiopia, 2021.

Variables Name	Category	Frequency (n= 191)	Percent (%)
The index child's age (in months) (n = 191)	Below 12 months	41	21.4
	12-23 months	73	38.2
	24-47 months	59	30.9
	48-59 months	18	9.4
	Total	191	100.0
The index child's sex (n = 191)	Male	114	59.7
	Female	77	40.3
	Total	191	100.0
Duration of breast feeding (n = 191)	Less than six month	148	77.5
	Six and above months	43	22.5
	Total	191	100.0
Current breast feeding status (n = 191)	Exclusive breast feeding	16	8.4
	Partial breast feeding	33	17.3
	Not breast feeding	142	74.3
	Total	191	100.0
A child start supplementary feeding (n = 191)	Before less than six months	166	86.9
	Six and above months	25	13.1
	Total	191	100.0
Measles vaccination (n = 191)	Yes	131	68.6
	No	60	31.4
	Total	191	100.0
Rota virus vaccination (n = 191)	Yes	155	81.2
	No	36	18.8
	Total	191	100.0
Presence of diarrheal case during February 30, to March 30, 2021	Yes	49	25.7
	No	142	74.3
	Total	191	100.0

4.5 Overall Prevalence of Diarrhea among the Study participants

The prevalence of diarrhea among the study participants is presented in Table 5. Out of the 191 examined for diarrheal case, (49, 25.7%; 95% CI: 19.3-31.9) were positive for diarrheal disease. The gender distribution of diarrheal disease positives were 33 (28.95%) males and 16 (20.8%) females. Based on these result male children were independently associated with childhood diarrhea (p; < 0.05). Among the study participants, the age distribution of diarrheal disease positive were 32 (43.8%) children whose age from 12-23 months (Table 5).

Table 5: The overall prevalence of diarrhea among under five children in Hamusit Health Center, Dera District during February 30 to March 30, 2021.

Sex and Age(months)		No of examined	No of positive (Diarrhea case) (%)	No of negative (Non-Diarrhea case) (%)	Chi-square	p-value
Male	Below 12	23(20.2)	7 (30.44)	16 (69.56)	17.5	0.001
	12-23 months	46 (40.35)	22 (47.8)	24 (52.2)		
	24-47 months	32 (28.07)	4 (12.5)	28 (87.5)		
	48-59 months	13 (11.4)	0 (0.00)	13 (100)		
	Total	114 (100)	33 (28.95)	81 (71.05)		
Female	Below 12	18 (23.4)	2 (11.11)	16 (88.89)	6.892	0.075
	12-23 months	27 (35.06)	10 (37.04)	17 (62.96)		
	24-47 months	27 (35.06)	3 (11.11)	24 (88.89)		
	48-59 months	5 (6.5)	1 (20.0)	4(80.0)		
	Total	77 (100.0)	16 (20.8)	61(79.2)		
Both sex	Below 12 months	41 (21.5)	9 (21.9)	32 (78.05)	22.64	0.000
	12-23 months	73 (38.2)	32 (43.8)	41(56.2)		
	24-47 months	59 (30.9)	7 (11.87)	52 (88.13)		
	48-59 months	18 (9.4)	1 (5.56)	17 (94.44)		
Overall	Total	191(100.0)	49 (25.7)	142 (74.3)	22.64	0.000

* Statistically significant difference

4.6 Factors associated with childhood diarrhea in Hamusit Town, Dera District, Amhara Region

4.6.1. Chi-square association of the different risk factors with childhood diarrhea

Chi-square association of the different risk factors with childhood diarrhea is presented in Table 6. Rural residence of mothers, size of family members in the house greater than four, number of under five children in the house greater than two, lack of educational level of mother, low monthly income of family with less than 3874 birr, distance of water source to home with greater than fifteen minutes , kind of utensils used to store/fetch water without a lip, lack of proper liquid waste disposal methods, additional food with breast milk, lack of separately prepare food using separate material, child mostly taking adult food/fluid, use of material to feed the child, the index child's age, duration of breast feeding less than six months, a child start supplementary feeding before six months, lack of measles vaccination and lack of rota virus vaccination were significantly associated with childhood diarrhea ($p < 0.05$).

However, age of mothers/guardians, marital status of mother, occupation of mother, occupation of father, source of drinking water, hand washing habit after visiting the latrine, use of material to wash hands, solid waste disposal methods, hand washing facility, availability of latrine, type of latrine used by the household, sex of the index child and current breast feeding status were not significantly associated with childhood diarrhea ($p >0.05$).

Among study participants, rural residences (43, 26.5%) were highly associated with diarrhea. The infection rate of children from family sizes of greater than four (49, 29.9%) was significantly higher than that of children from family sizes of ≤ four (0, 0.0%). The number of under five children in the house hold(48, 31.3%), lack of education level of mother (43, 34.2%), low economic income of the family with less than 3874 birr (47, 37.4%), distance of water source greater than 15 minute (47, 52.9%), lack of proper liquid waste disposal method (49, 27.3%), kind of utensils used to store/fetch water container without a lip (43, 64.2%), children who takes additional food with breast milk

(25, 58.2%), mothers/guardians do not separately prepare food using separate material (47, 31.1%), child mostly taking food/fluid for adult food (41, 35.1%), age of children from 12-23 months (32, 43.8%), duration of breast feeding less than six months (45, 30.4%), a child start supplementary feeding before less than six months (47, 28.3%), children who do not take measles vaccination and rota virus vaccination (29, 48.4)%) and (18, 50.0%) respectively were more likely to be associated with childhood diarrhea in the study population (Table 6).

Table 6: Chi-square analyses of socio-demographic, socio-economic, and behavioral potential risk factors associated with childhood diarrhea among under-five age children in Hamusit Health Center, Dera Woreda Northwest, Ethiopia, 2021.

Socio-demographic, socio-economic and behavioral variables	Categories	(N) Total examined (Percent)	Negative (Percent)	Positive (Percent)	Chi-square (χ^2)	P-value
Residence of the respondent	Rural	162 (84.8%)	119(73.5)	43 (26.5)	4.433	0.035*
	Urban	29 (15.2%)	23(79.3)	6(20.7)		
Size of family members in the house	4 and less than	27 (14.1%)	27 (100)	0 (0%)	10.851	0.001*
	More than 4	164 (85.9%)	115 (70.1)	49 (29.9)		
Number of under five children in the house	One	38 (19.9%)	37 (97.3)	1 (2.7)	13.183	0.000**
	Two and above	153 (80.1%)	105 (68.6)	48(31.3)		
Educational level of the mother	Illiterate	126 (66.0%)	83 (65.8)	43 (34.2)	14.264	0.003*
	Basic education	48 (25.1%)	44 (91.6)	4 (8.4)		
	Primary	12 (6.3%)	11 (91.6)	1 (8.4)		
	Secondary and above	5 (2.6%)	4 (80.0)	1(20.0)		
Monthly income of family	Below 3788	126 (66.0)	79 (62.6)	47 (37.4)	26.414	0.000***
	3789-4488	47 (24.6)	46 (97.5)	1 (2.5)		
	Greater than 4489	18 (9.4)	17 (94.4)	1(5.6)		
Distance of water source to home	<15 minutes	102 (54.4)	100 (98.1)	2 (1.9)	64.43	0.000***
	>15 minutes	89 (46.6)	42 (47.1)	47 (52.9)		
Liquid waste disposal methods	Seepage pit	11(5.8)	11 (100.0)	0 (0.0)	4.028	0.045*
	Open surface	180 (94.2)	131 (72.7)	49 (27.3)		
Additional food with breast milk	Yes	148 (77.5)	124 (83.7)	24 (16.3)	30.704	0.000***
	No	43 (22.5)	18 (41.8)	25 (58.2)		
Separately prepare food using separate material	Yes	40(20.9)	38 (95.0)	2 (5.0)	11.317	0.001**
	No	151 (79.1)	104 (68.9)	47 (31.1)		
Child mostly taking food/fluid	Cow's milk	37 (19.4)	35 (94.5)	2 (5.5)	12.714	0.005**

	Gruel	25 (13.0)	22 (88.0)	3 (12.0)		
	Powder milk	12 (6.3)	9 (75.0)	3 (25.0)		
	Adult food	117(61.3)	76 (64.9)	41 (35.1)		
Use of material to feed the child	Hand	121(63.4)	81 (66.9)	40 (33.1)	9.488	0.002**
	Cup and spoon	70 (36.6)	61 (87.1)	9 (12.9)		
The index child age	Below 12 months	41(21.4)	32 (78.1)	9 (21.9)	22.64	0.000**
	12-23 months	73 (38.2)	41 (56.2)	32 (43.8)		
	24-47 months	59 (30.9)	52 (88.13)	7 (11.86)		
	48-49 months	18 (9.4)	17 (94.44)	1 (5.56)		
Duration of breast feeding	Less than six months	148 (77.5)	103 (69.6)	45 (30.4)	7.780	0.005**
	Six and above months	43 (22.5)	39 (90.6)	4 (9.4)		
A child start supplementary feeding	Before less than six months	166 (86.9)	119 (71.7)	47 (28.3)	4.701	0.030*
	Six and above months	25 (13.1)	23 (92.0)	2 (8.0)		
Measles vaccination	Yes	131(68.6)	111 (84.7)	20 (15.3)	23.591	0.000***
	No	60 (31.4)	31(51.6)	29 (48.4)		
Rota virus vaccination	Yes	155(81.2)	124 (80.0)	31 (20.0)	13.786	0.000***
	No	36 (18.8)	18 (50.0)	18 (50.0)		

NOTE: Statistically significant at $p < 0.05$ = * Significant, ** Very significant, *** highly very significant

4.6.2. Logistic regression analysis of the most important associated factors of diarrhea

The most important risk factors for childhood diarrhea among under-five age children visiting Hamusit Health Center were identified using Univariate and Multivariate Logistic Regression Analysis (Table 7). Univariate logistic regression analysis showed that statistical differences in childhood diarrhea resulted due to the variation of residence of mothers/caregiver/guardians, number of under five children in the household, monthly income of the family with less than 3874 birr, distance of water source to home, kind of utensil to store/fetch water container without a lid, additional food with breast milk, lack of separately prepare food using separate material, child mostly taking adult food/fluid, use of material to feed the child with hand, the index child's age, duration of breast feeding less than six months, a child start supplementary feeding with less than six months, lack of measles and rota virus vaccination were major risk factors for childhood diarrhea in the study population ($P < 0.25$).

After, the Univariate analysis was done and variables having a (P value of less than < 0.25) were enrolled to the multivariable analysis for association testing. Those variables having a p value of less than 0.05 were declared as significantly associated factors with childhood diarrhea.

Children whose family with low monthly income below 3874 birr were 19.45 times [AOR= 19.45 (1.439, 263.059)] more likely to develop childhood diarrhea than whose family had greater than 3875 monthly income. Again, children mostly taking food/fluid of adult food were 6.4 times [AOR= 6.419 (1.098, 37.527)], children mostly taking food/fluid of gruel were 3.75 times [AOR= 3.75 (0.345, 40.968)] and children mostly taking food/fluid of powder milk were two times [AOR=2.095 (0.204, 21.549)] at high risk to develop diarrhea than children who mostly taking cow's milk (Table 7).

Additionally, a child with age from 12-23 months were eight times [AOR= 8.096 (0.447, 146.70)], a child with age from below 12 months were four times [AOR= 4.771 (0.199, 114.27)] and a child with age from 24-47 months were 1.5 times [AOR= 1.447 (0.076, 27.71) more likely to develop diarrhea than with compared to a child with age from 48-59 months. Regarding duration of breast feeding, a child with less than six months were 7.6 times [AOR=7.640 (1.511,

38.627) more likely to develop diarrhea than children who fed breast milk more than six and above months their of life (Table 7).

On the other hand, the odds of developing childhood diarrhea a child start supplementary feeding before less than six months were 9.764 time [AOR= 9.764 (95% CI, 1.79, 53.071)] times more likely to develop diarrhea than their counterparts.

Lastly, children who don't takes measles vaccination were 4.78 times [AOR= 4.78 (1.813, 12.647)] more likely to develop childhood diarrhea than from their counterpart.

Table 7: Univariate and multivariate logistic regression analysis of potential risk factors associated with childhood diarrhea among under-five year children in Hamusit Health Center, Dera District Northwest, Ethiopia, 2021.

Associated risk factors	Categories	Total No. (%)	Negative No. (%)	Positive No. (%)	COR, 95% CI	P-value	AOR, 95% CI	P-value
Residence of the respondent	Rural	162 (84.8%)	119(73.5)	43 (26.5)	0.419 (0.184, 0.957)	0.039*	0.121 (0.025, 0.585)	0.009*
	Urban	29 (15.2%)	23(79.3)	6(20.7)	1		1	
Number of under five children in the house	One	38 (19.9%)	37 (97.3)	1 (2.7)	1	0.006*	1	0.018*
	Two and above	153 (80.1%)	105(68.6)	48(31.4)	0.059 (0.008, 0 .444)		0.075 (0.009, 0.645)	
Monthly income of family	Below 3874	126 (66.0)	79 (62.6)	47 (37.4)	10.114 (1.304, 78.47)	0.001*	19.455 (1.44, 263.06)	0.002*
	3875-4488	47 (24.6)	46 (97.5)	1 (2.5)	0.370 (0.022, 6.244)		0.805 (0.031, 21.062)	
	> 4489	18 (9.4)	17 (94.4)	1(5.6)	1		1	
Kind of utensils used to store/fetch water	Container with a lip	124 (64.9)	118 (95.1)	6 (4.9)	1	0.000*	1	0.021*
	Container without a lip	67 (35.1)	24 (35.8)	43 (64.2)	35.2 (13.487, 92.055)		0.021 (0.001, 0.560)	
Additional food with breast milk	Yes	148 (77.5)	124 (83.7)	24 (16.3)	0.139 (0.07, 0.294)	0.000*	0.02 (0.002, 0.315)	0.005*
	No	43 (22.5)	18 (41.8)	25 (58.2)	1		1	
Child mostly taking food/fluid	Cow's milk	37 (19.4)	35 (94.5)	2 (5.5)	1	0.005*	1	0.039*
	Gruel	25 (13.0)	22 (88.0)	3 (12.0)	2.386(0.369, 15.437)		3.758 (0.345, 40.968)	
	Powder milk	12 (6.3)	9 (75.0)	3 (25.0)	5.833 (0.844, 40.323		2.095 (0.204, 21.549)	
	Adult food	117(61.3)	76 (64.9)	41 (35.1)	9.44 (2.161, 41.253)		6.419 (1.098, 37.527)	
The index child's age	< 12 months	41(21.4)	32 (78.1)	9 (21.9)	5.0 (0.587, 42.558)	0.007*	4.771 (0.199, 114.27)	0.025*
	12-23 months	73(38.2)	41 (56.3)	32 (43.8)	12.4 (1.558, 98.662)		8.096 (0.447, 146.70)	
	24-47 months	59 (30.9)	52 (88.13)	7 (11.87)	2.074 (0.237, 18.134)		1.447 (0.076, 27.71)	
	48-59 months	18 (9.4)	17 (94.44)	1 (5.56)	1		1	
Duration of breast	Less than six	148 (77.5)	103 (69.6)	45 (30.4)	0.009 (0.009, 0.009)	0.009*	7.640 (1.511, 38.627)	0.014*

feeding.	months							
	Six and above months	43 (22.5)	39 (90.6)	4 (9.4)	1		1	
A child start supplementary feeding	Before less than six months	166 (86.9)	119 (71.7)	47 (28.3)	4.542 (1.030, 20.029)	0.046*	9.764 (1.79, 53.07)	0.025*
	Six and above months	25 (13.1)	23 (92.0)	2 (8.0)	1		1	
Measles vaccination	Yes	131(68.6)	111 (84.7)	20 (15.3)	1	0.000*	1	0.002*
	No	60 (31.4)	31(51.6)	29 (48.4)	5.192 (2.591, 10.403)		4.788 (1.813, 12.64)	

Note: * Statistically significant at $p < 0.05$; 1= Reference value; AOR = adjusted odds ratio; COR= Crude odds ratio.

5. DISCUSSION

This study was conducted to assess the prevalence of diarrhea and associated factors among under-five children visiting Hamusit Health Center, Amhara Regional State, Ethiopia. Diarrhea is one of the major causes of morbidity and mortality among under-five children in Ethiopia. Based on the WHO estimates, diarrhea contributes to more than one in every ten (13%) child deaths in Ethiopia (CSA, 2016). The Ethiopian Demographic and Health Surveys of 2016 showed that diarrheal disease was the leading cause of illness among children under-five years.

The result of this study showed that the prevalence of diarrhea among under-five children was 25.7% (95% CI: 19.3- 31.9). This finding is higher than studies done in East Gojjam zone, (6.5%) (Andualem Anteneh and Abera Kumie, 2010), EDHS report 2005, 18%, (CSA, 2006) and EDHS 2016 report (12%) (ICF, 2016), West Gojjam Zone, 18% (Muluken Dessalegn *et al.,* 2011), Egypt, 19.5% (Yassin, 2000) and Ghana, 19.2% (Boadi and Kuitunen, 2005). Similarly, my finding is nearly two times higher than Ghana's 2014 DHS 12% (GSS, 2014), Kenya's 2014 DHS finding of 15% (KNBS, 2015). The result of this study is in line with the 2000 Ethiopian DHS report, 24% (CSA, 2000; EDHS 2014), Eastern Ethiopia, 22.5% (Bezatu Mengistie *et al.,* 2013), Iraq, 21.3% (Siziya *et al.,* 2009), Benishangul gumz, 22.1% (Thomas Sinmegn Mihrete *et al.,* 2014), India 25.2% (Ahmed *et al.,* 2008). However, the current result is lower than, Burundi, 32.6% (Diouf *et al.,* 2014), Arba-Minch rural community, 31% (Shikur Mohammed *et al.,* 2013), Enderta district, Northern Ethiopia 35.6% (Hailemariam Berhe *et al.,* 2016) and in Kushtia, Bangladesh (44.5%) (Afroza Khatun *et al.*, 2013). This variation may be due to differences in socio-demographic characteristics, environmental factors (climate and geographical differences) and behavioral factors (availability of water, kind of utensil used to fetch and store water, distance of the water source from the home, child taking additional food with breast milk, duration of breast feeding and the time to start supplementary food with breast milk and lack of measles vaccination in the study area compared to other studies.

Children whose family with low monthly income below 3874 Ethiopian Birr were 19.45 times [AOR= 19.45 (1.439, 263.059)] more likely to develop childhood diarrhea than from family had greater than 3875 monthly income. This finding is much higher than studies done in Rwanda (AOR=1.913; CI=1.510-2.424; $p<0.001$) (Gasurira Sylvester, 2017) and studies done in Bahir Dar,

northwest Ethiopia (AOR = 2.10, 95% CI; 1.2, 7.2) (Ghion Shumetie *et al.,* 2018). This might be due to the children did not get balanced diet with their nutritional status.

Improved water is essential to children minimizing the occurrence of childhood diarrhea. The odds of developing childhood diarrhea with using containers without a lid to store/fetch water is 0.021 times more likely to develop diarrhea than who uses container with a lid. This finding is lower than studies done in Jabithennan District, northwest Ethiopia (AOR = 19.50, 95% CI: 8.11-46.90) (Zelalem Alamrew Anteneh *et al.,* 2017).

Again, children mostly taking food/fluid of adult food were 6.4 times [AOR= 6.419 (1.098, 37.527)] at high risk to develop diarrhea than children who mostly taking cow's milk. This variation may be due to direct contamination of food and water with different pathogen that causes diarrheal case.

Additionally, a child with age from 12-23 months were eight times [AOR= 8.096 (0.447, 146.70)], more likely to develop diarrhea than with their counter parts. This finding is greater than studies done in West Gojam Zone (Muluken Dessalegn *et al.,* 2011). The increased risk might be due to the decline/loss in maternal antibodies and at this age child start complementary feeding that might increase their exposure to contaminated foods and water. In addition, crawling begins at this age further increasing potential exposure to fecal contaminated environments.

Children with the age of below 12 months were in agreement with studies done in North Wollo Zone, Debre Berhan town (AOR; 4.2, 95% CI: 1.2–15.3) (Sissay Shine *et al.,* 2020). But this finding is much lower than studies done in Sidama Zone, Dale district (AOR: 12.18, 95% CI: 1.78, 83.30) (Behailu Melese *et al.,* 2019). This may be due to the variation of age group of the children with their behavioral characteristics. In addition to this, 6-11 months children are crawling and easily pick dirt or other contaminated objects (Muluken Dessalegn *et al.,* 2014). Another variation of might be due to children the age from six up to twenty three months were sucking their finger.

Regarding duration of breast feeding, a child with less than six months were 7.6 times [AOR=7.640 (1.511, 38.627)] more likely to develop diarrhea than children who fed breast milk more than six and above months of their life. This finding is much greater than studies done in west Gojam Zone, Mecha District (AOR=2.7, 95% CI: 1.1- 7.3) (Muluken Dessalegn *et al.,* 2011). This is because

breastfeeding is an effective means of protecting children from diarrheal disease. This might be lack of awareness of mothers/guardians about breast feeding.

On the other hand, the odds of developing childhood diarrhea a child start supplementary feeding before less than six months were 9.7 time [AOR= 9.7 (95% CI, 1.79, 53.071)] more likely to develop diarrhea than from their counterparts. This finding is lower than studies done in Jabithennan District, northwest Ethiopia [AOR = 50.88, 95% CI: 23.85- 108.54). This variation might be due to children taking contaminated food with soil and other dirt materials.

Lastly, children lack of measles vaccination were 4.78 times [AOR= 4.78 (1.813, 12.647)] more likely to develop childhood diarrhea than who takes measles vaccination. This finding is much higher than studies done in East Gojam Zone, Enemay District (AOR, 0.20; 95% CI, 0.10-0.37) (Abebaw Ayele *et al.*, 2014). It might be due to lack awareness about vaccination to their children.

6. CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In this finding, diarrheal disease among under-five children in the study area was significantly high. The point prevalence of diarrhea among under five children was 25.7% (95% CI: 19.3- 31.9). The independent variables that were found to be associated with diarrheal diseases among under five children were low monthly income of the family, children taking additional food with breast milk, the index child's age, duration of breast feeding for less than six months, child start supplementary feeding the age less than six months and lack of measles vaccination. These independent variables were determinants of diarrheal disease among under-five children in the study area.

6.2 Recommendation

These findings have important policy implications for childhood diarrhoeal disease intervention programs. Government sectors and partners working in collaboration to implement an intervention program focusing on the community to practice proper family planning, increasing the economic sector of the people (improving nutrition) and better childcare also highly recommended.

In addition, I recommend particular emphasis shall be given to the children. Moreover, health educations about family planning as well as, Health Extension Workers (HEW) give awareness to community to fetch/store water container with a lid, education program on the importance of vaccination against measles, increasing breast feeding frequency with complementary food after six months, creating awareness for mothers/caregivers including excreta in integration with the existing national health extension program are highly recommended.

Generally, creating community awareness about diarrheal illness through addressing these risk factors should be prioritized.

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8. APPENDICES

Appendix A: Questionnaire-English Version

General Guide Line

Questionnaire Prepared to Investigate the Effect of Socio-Economic Factors, Water, Sanitation and Hygiene Practices Associated with under-five Diarrheal case prevalence in Hamusit Health Center, Dera District, South Gondar Zone, North West, Ethiopia.

The structured interview oriented questionnaire has four parts. The first part contains questionnaires designed to interview the demographic aspects of the under five children, the second part contains Environmental health condition questionnaires, the third part contains behavioral condition questionnaire, the fourth part consists of sex-related questionnaires. The information obtained through the questionnaires was kept confidential and was used only for the research purpose.

I. **Your response essentially determines the success of this study. Thus your genuine, frank and timely response is kindly requested.**

Identification number: .....

Address/kebeles: .....

Part-I: Socio-demographic questionnaires

1. From where did you live now? A. urban B. rural
2. How many family members do you have in the house? A. 4 and less than B. more than 4
3. How many numbers of under-five children in the house? A. One B. Two and above
4. What is the relation of respondents to the child? A. mother B. guardian
5. How old is the mother or caretakers/guardian's? A. 18-24 years B. 25-34 years C. 35 and above
6. What is the marital status of mother? A. single B. married C. others
7. What is the Educational level of the mother? A. illiterate B. basic education C. primary D. secondary and above
8. What is the educational level of the father? A. illiterate B. basic education C. primary D. secondary and above
9. What is the amount of monthly income of your family? A. >4489 B. 3875-4488 C. <3874
10. What is the occupation of the mother? A. Government worker B. private worker C. Merchant D. Housewife

11. What is the occupation of the father A. Government worker B. Private Worker C. Merchant D. Farmer

Part 2: Environmental health conditions

12. From where did you get your source of drinking water? A. Piped water B**.** spring water C. River or stream water**.** D. hand dug well

13. What is the distance of water source to home?

A. <15 minutes B. >/=15 minutes

14. Do you treat your drinking water? A. Yes B. No

15. What kind of utensils used to store/fetch water?

A. Container with a lip B. container without a lip

16. Type of floor material of the living house (observation)

A. Mud B. Wood C. Cement D. Other

17. Type of roof material of the living house (observation)

A. Wood B. grass C. Corrugated iron sheet

18. Do you have hand washing facility? A. Yes B. No

19. Do you have latrine? A. yes B. no

20. If you say "yes" what type of latrine used by households? A. Traditional pit latrine B. Ventilated improved pit latrine C. Open field

21. Do you wash your hand after visiting the latrine? A/ yes B. no

22. If you say "yes" What did you use to wash your hands? A. Soap and water B. Ash and water C. Only water D. Not wash

23. How to remove Solid waste disposal methods? A. Pit B. Open field C. Burning D. Garbage can

24. How to remove Liquid waste disposal methods? A. Septic tank B. Seepage pit C. Open surface

25. How did Children disposal their feces? A. Toilet B. Open space

Part three: Behavioral conditions

26**.** Does the child take other food than breast milk? A. Yes B. No

27. Do you separately prepare food using separate material for the child? A. Yes B. No

28. What food/fluid is the child mostly taking (if the child is not on exclusive breastfeeding)? More than one is possible

A. Cow's milk B. Powder milk C. Gruel D. Adult food

29. What do you use to feed the child? A. Hand B. Bottle C. Cup and spoon D. Others

30. How do you reuse the stored food? A. After heating B. Without heating

Part Four: Information of the index child

31. What is the index child's age?

A. < 59 months B. 24- 47 months

C. 12- 23 months D. below 12 months

32. What is the index child's sex?

A. Female B. Male

33. For how long did you breastfeed your child? A. Less than 6 months B. Six and above months

34. What is his/her current breast feeding status? A. Exclusive breast feeding B. Partial breast feeding C. Not breast feeding

34. At what age did the child start supplementary feeding/weaning food? A. Before less than six months B. Six and above months

36. Did the child receive measles vaccination (for those greater than nine months age)?

A. Yes B. No

37. Did the child receive Rota virus vaccination? (Rvv1, Rvv2)? A. yes B. No

Data collection sheet after microscopically laboratory result of case group

38. Diarrhea- present ……. no diarrhea (but other disease)……

Thank you!!!!!

APPENDIX B: Amharic Version of the Questionnaires

የጽሑፍ መጠይቅ

ቀበሌ----------

መለያ ኮድ----------

መመሪያ፡-ከዚህ በታች በማህበራዊና በኢኮኖሚያዊ፣ የመጸዳጃ ቤት አጠቃቀም ፤የየዉሃ ምንጭ

የግልና የአካባቢ ንጸህና ከአምስት አመት በታች ህጻናት ላይ በተቅማጥ በሽታ ላይ ያለዉ ተጽኖ የተመለከቱ ጥያቄዎች ቀርበዋል። እያንዳንዱ ጥያቄ በጥሞና ካነበቡ በኃላ ምርጫ ለተሰጣቸዉ ጥያቄዎች የእርሶን ሀሳብ የሚያንጸባርቀዉን (የሚገልጸዉን) አንድ ምርጫ በመምረጥ ይመልሱ ። እባኮ ሲመልሱ በተቻለ መጠን እዉነተኛ መልስ ይስጡ ። የሚሰጡት መልስ ለጥናቱ ወሳኝ ነዉ ። የሚሰጡት መልስ በሚስጥር ይጠበቃል።

የመታወቂያ ቁጥር .....
አድራሻ / ቀበሌ .....

ክፍል-አንድ-ማህበራዊ-ስነ-ህዝብ መጠይቆች

1. **የሚኖሩበት ቦታ የት ነው? ሀ/ ገጠር ለ/ ከተማ ፡**
2. **በቤት ውስጥ ስንት የቤተሰብ አባላት አሉዎት? ሀ/ 4 እና በታች ለ/ ከ 4 በላይ**
3. **በቤት ውስጥ ከአምስት ዓመት በታች የሆኑ ሕፃናት ስንት ናቸው? ሀ/ አንድ ለ/ ሁለት እና ከዚያ በላይ**
4. **ተጠሪዎች ከልጁ ጋር ያላቸው ዝምድና ምንድነው? ሀ/ እናት ለ/ አሳዳ**
5. **የእናት ወይም ተንከባካቢዎች / አሳዳጊ እድሜ ስንት ነው? ሀ/ 18-24 ዓመት ለ/ 25-34 ዓመት ሐ/ 35 እና ከዚያ በላይ**
6. **የእናት የትዳር ሁኔታ ምንድነው? ሀ/ ያላገባች ለ. ያገባች ሐ/ ሌሎች**
7. **የእናትየዋ የትምህርት ደረጃ ምን ያህል ነው? ሀ/ ያልተማረች ለ/ መሰረታዊ ትምህርት ሐ/ የመጀመሪያ ደረጃ መ/ ሁለተኛ ደረጃ እና ከዚያ በላይ**
8. **የአባት የትምህርት ደረጃ ስንት ነው? ሀ/ ያልተማረ ለ/ መሰረታዊ ትምህርት ሐ/ የመጀመሪያ ደረጃ መ/ ሁለተኛ ደረጃ እና ከዚያ በላይ**
9. **የቤተሰብዎ ወርሃዊ ገቢ መጠን ስንት ነው? ሀ/ > 4489 ለ/ 3875-4488 ሐ/ <3874**
10. **የእናት ሥራ ምንድነው ሀ. የመንግስት ሰራተኛ ለ. የግል ሰራተኛ ሐ. ነጋዴ ነጋዴ መ. የቤት እመቤት**
11. **የአባት ሥራ ምንድነው? ሀ. የመንግስት ሰራተኛ ለ. የግል ሰራተኛ ሐ. ነጋዴ መ. ግብርና**

<u>ክፍል 2-የአካባቢ ጤና ሁኔታ</u>

12. **የመጠጥ ውሃ ምንጭዎን ከየት ነው የሚያገኙት? ሀ / የቧንቧ ውሃ ለ/ የምንጭ ውሃ ሐ/ ወንዝ ወይም አነስተኛ ፈሳሽ ወንዝ መ/ የእጅ ጉድጓድ ውሃ**
13. **የውሃ ምንጭ ከቤት ምን ያህል ርቀት አለው? ሀ/ <15 ደቂቃ ለ/ 15 ደቂቃዎች በላይ**

14. የመጠጥ ውሃው ይታከማል? ሀ/ አዎ ለ/ የለም
15. ውሃ ለማጠራቀም / ለመቅዳት ምን ዓይነት ዕቃዎች ይጠቀማሉ?
ሀ/ ክዳን ያለው ለ/ ክዳን የለለው
16. የመኖሪያ ቤቱ ወለል ዓይነት (ምልከታ) ሀ/ ጭቃ ለ/ እንጨት ሐ/ ሲሚንቶ መ ሌላ
17. የመኖሪያ ቤት ጣራ ዓይነት (ምልከታ) ሀ/ እንጨት ለ/ ሳር ሐ/ ቆርቆሮ
18. የእጅ መታጠቢያ ቁሳቁስ አለዎት? ሀ/ አዎ ለ/ የለም
19. መጸዳጃ ቤት አለዎት? ሀ/ አዎ ለ/ የለም
20. "አዎ" ካላችሁ ቤተሰቦች የሚጠቀሙባቸው መፀዳጃ ቤት ምን ዓይነት ነው?ሀ/ ባህላዊ የጉድጓድ መጸዳጃ ቤት ለ/የተሻሻለ የሽንት ቤት መፀዳጃ ቤት ሐ/ የጋራ የሽንት ቤት መ/ መስክ
21. መፀዳጃ ቤቱን ከጎበኙ በኋላ እጅዎን ይታጠባሉ? ሀ/ አዎ ለ/ የለም
22. "አዎ" ካሉ እጅዎን ለመታጠብ ምን ይጠቀማሉ? ሀ/ ሳሙና እና ውሃ ለ/ አመድ እና ውሃ ሐ/ ውሃ ብቻ
23. ጠንካራ ደረቅ ቆሻሻ እንዴት ያስወግዳሉ ሀ/ ጉድጓድ ለ/ ክፍት ሜዳ ሐ/ ማቃጠል መ/ ቆሻሻ መጣያ
24. ፈሳሽ ቆሻሻን እንዴት ያስወግዳሉ? ሀ/ ሴፕቲክ ታንክ ለ/ የፍሳሽ ማስወገጃ ጉድጓድ ሐ/ ክፍት ቦታ (ማንኛውም ቦታ)
25. የልጆች መፀዳጃ ቦታ የት ነው ሀ/ መጸዳጃ ቤት ለ/ ክፍት ቦታ

<u>ክፍል ሦስት-የባህሪ ሁኔታዎች</u>

26. ልጁ ከእናት ጡት ወተት በተጨማሪ ሌላ ምግብ ይወስዳል? ሀ/ አዎ ለ/ የለም
27. ለልጁ የተለየ ቁሳቁስ በመጠቀም ምግብ በተናጠል ያዘጋጃሉ? ሀ/ አዎ ለ/ የለም
28. ህፃኑ በአብዛኛው የሚወስደው ምን ምግብ / ፈሳሽ ነው (ህፃኑ በብቸኝነት ጡት ማጥባት ካልሆነ)? ከአንድ በላይ ሊቻል ይችላል
ሀ/ የላም ወተት ለ/ የዱቄት ወተት ሐ/ አጥሚት መ/ የጎልማሳ ምግብ
29. ልጁን ለመመገብ ምን ይጠቀማሉ? ሀ/ እጅ ለ/ ጠርሙስ ሐ/ ኩባያ እና ማንኪያ መ/ ሌሎች
30. ተዘጋጅቶ የቆየን ምግብ እንደገና እንዴት ይጠቀማሉ? ሀ/ አሙቀው ለ/ ሳያሞቁ

<u>ክፍል አራት የመረጃ ጠቋሚው ልጅ መረጃ</u>

31. የልጁ ዕድሜ ስንት ነው?
ሀ/ <59 ወራቶች ለ/ 24- 47 ወሮች
ሐ/ 12 - 23 ወሮች መ/ ከ 12 ወር በታች
32. የልጁ ፆታ ምንድነው?
ሀ/ ወንድ ለ/ ሴት
33. ልጅዎን ጡት ያጠቡት ለምን ያህል ጊዜ ነው? ሀ/ ከ 6 ወር በታች ለ/ ከስድስት እና ከዚያ በላይ ወሮች
34. አሁን ጡት የማጥባት ሁኔታ ምን ይመስላል? ሀ/ ብቸኛ የጡት መመገብ ለ / በከፊል የጡት መመገብ ሐ/ ጡት አለመመገብ

35. ልጁ የተጨማሪ ምግብ ከስንት ወር ጀመረ? ሀ/ ከስድስት ወር በታች ለ/ ከስድስት እና ከዚያ በላይ ወሮች

36. ህፃኑ በኩፍኝ ክትባት (ከዘጠኝ ወር በላይ ለሆኑት) ተቀብሏል? ሀ/ አዎ ለ/ የለም

37. ልጁ የሮታ ቫይረስ ክትባት ወስዷል? ሀ/ አዎ ለ/ የለም

መረጃው በላብራቶሪይ ከተሰበሰበ በኋላ በሽታው ያለባቸውና የሌለባቸው መለያ ፎርም፡፡

38. የተቅማጥ በሽታ ሁኔታ .....ሌላ በሽታ (ማንኛውም ከተቅማጥ ውጭ.....

አመሰግናለሁ!!

APPENDIX C: Consent Declaration (English version)

Informed Consent Declaration (English Version)

I am conducting a study to assess the public health importance of diarrheal case to understand the prevalence and health consequences of the aforementioned problems on the community.

Your child is being to participate in this study. If you agree, I would like to obtain a stool specimen, in plastic sheet, respectively, from your child, which would be used only to detect the presence of diarrheal case. He/ She will not get any risk in participating. The record's information is strictly confidential.

Your child participation in this study is completely voluntary and you/ He/ She can refuse to participate or free to withdraw from the study at any time. Refusal to participate will not result in the loss of medical care provided or any other benefits.

Do you understand what has been said to you? If you have questions, you have the right to get a proper explanation.

I am informed of my satisfaction with the purpose of this study nature of laboratory investigation. I am also aware of my right to out of the study at any time during the study without having to give reasons for doing so. This consent form has been read out to me in my language (Amharic language) and I understand the content and I voluntarily consent to participate in the study.

Study code no. _____

Name _____Signature _____ Date _____/_____/___

Investigator Name **Kindalem Dessie** Signature _____Date___/___/2021

Appendix D: የስምምነት ማረጋገጫ ፎርም (የአማርኛዉ ትርጉም)

ይህ ጥናት የሚጠናው በተቅማጥ በሽታዎች ላይ ሲሆን ጥናቱ በሚካሄድበት ቦታ በምን ደረጃ ላይ እንዳለ ለማወቅና ከጥናቱም በኋላ የመፍትሄ አቅጣጫዎችን ለማስቀመጥም ነው፡፡

በጥናቱ ላይ ለመሳተፍ እርሶዎ ፈቃደኛ ከሆኑ ለሚቀርብልዎት ጥያቄ መልስ እንዲሰጡና ከልጅዎ የአይነምድር ናሙና በመውሰድ የተቅማጥ በሽታ ምርመራ ብቻ እንዲካሄድ ይደረጋል፡፡ በዚህም ጥናት ላይ ልጅዎት በመሳተፉ/ፏ ምንም አይነት ችግር የማያጋጥመዉ/ማት መሆኑን እገልፃለሁ፡፡ የጥናቱ ተሳታፊ በመሆነዎ ሁሉም ነገር በሚስጥር እንዲያዝ ይደረጋል፡፡ በጥናቱ ላይ እርሰዎ እንዲሳተፉ ፈቃደኛ ካልሆኑ በማንኛውም ሰዓት ማቋረጥ ይችላሉ፡፡ ይህም በመሆኑ ምንም አይነት የሚያጋጥምዎት/ የሚያጋጥመዉ/ የሚያጋጥማት ችግር አይኖርም፡፡ እንደዚሁም ግልፅ ያልሆኑ ጥያቄዎች ቢኖርዎት የመጠየቅና መልስ የማግኘት መብትዎት የተጠበቀ ሲሆን የተሟላ ማብራሪያ እንዲያገኙ ይደረጋል፡፡

ስለጥናቱ በሚገባኝ መንገድ ገለፃ ከተደረገልኝና በጉዳዩ ላይ በአግባቡ እንዳስብበት ጊዜ ከተሰጠኝ በኃላ እንደዚሁም ግልፅ ያልሆኑ ነገሮችን የመጠየቅና ከፈለጉም በማንኛውም ጊዜ ያለማሳተፍና የማቋረጥ መብቴ የተጠበቀ መሆኑን ጥናቱ ለልጀም ሆነ ለማህበረሰቡ የሚሰጠውን ጠቀሜታ በመረዳቴ የሚቀርቡልኝን ጥያቄዎች ለመመለስና ልጄ የአይነምድር ናሙና እንዲሰጥ ፈቃደኝነቴን እግልፃለሁ፡፡

የአጥኝው ስም----------

ፊርማ፡----------

ቀን፡----------/----------/----------

ባሕር ዳር ዩኒቨርሲቲ
ባሕር ዳር - ኢትዮጵያ
Wisdom at the source of the Blue Nile
✉ 79
251 (582) 226 6597
ፋክስ Fax: 251 (582) 220- 20- 25
e-mail: negatassie@yahoo.com
website: www.bdu.edu.et

Ref: PRCSVD/93/2013
Date: 12 Feb. 2021

Ethical Clearance Approval Form

Applicant's Name: Kindalem Dessie

Research Title	Prevalence and associated risk factors of diarrheal cases among under five children visiting Hamusit Health Center, Dera District, South Gondar Zone, northwest Ethiopia
Researcher (s) Name (s)	Kindalem Dessie

Thank you for submitting your application for ethical clearance, which was considered at the College of Science Research Ethics Committee meeting on 09 February 2021. The committee has reviewed your ethical application, issues pertaining to participants, consent form, debriefing, and relevant questionnaires.

The researcher should keep the confidentiality of the identity of research participants and data that will be obtained from them. Any serious adverse events or significant changes which occur in connection with this study and /or which may alter its ethical consideration must be reported immediately to the committee for a possible ethical amendment.

We are therefore pleased to inform you that the College's Ethical Clearance Committee has approved your study from an ethical point of view.

With kind regards,

Tsegaye Kassa (PhD)
The Graduate, Research and Community Services V/Dean
College of Science

Dr. Tsegaye Kassa Gogie
P.G.R.C.S. Vice Dean

CC//

- Dean office
- The Graduate, Research and Community Services V/Dean
- Department of Biology

College of Science