DSpace Institution

DSpace Repository **http://dspace.org**

School of Public Health Thesis and Dissertations

2019-07

Determinant of Acute Bloody Diarrhea Among Adults Who Visit out Patient Department of Governmental Health Facilitys in Bahir Dar Zuria District North West Ethiopia 2019

Etsehiwot Debe

http://ir.bdu.edu.et/handle/123456789/13523

Downloaded from DSpace Repository, DSpace Institution's institutional repository

BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DETERMINANT OF ACUTE BLOODY DIARRHEA AMONG ADULTS WHO VISIT OUT PATIENT DEPARTMENT OF GOVERNMENTAL HEALTH FACILITYS IN BAHIR DAR ZURIA DISTRICT NORTH WEST ETHIOPIA 2019

BY ETSEHIWOT DEBE (BSc)

ADVISORS: MULUSEW ANDUALEM (MPH/HI, Ph.D. FELLOW, ASSOCIATE PROFESSOR)

Mr. ABEBAYEHU BITEW **(**MPH, IN EPIDEMIOLOGY AND BIOSTATISTICS**)**

A THESIS SUBMITTED TO DEPARTMENT OF EPIDEMIOLOGY, AND BIOSTATISTICS, SCHOOL OF PUBLIC HEALTH, COLLEGE OF MEDICINE AND HEALTH SCIENCES, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH IN FIELD EPIDEMIOLOGY

JULY 2019

BAHIR DAR, ETHIOPIA

NAME AND ADDRESS OF PI	ETSEHIWOT DEBE (BSc) MOBILE : +2519 13160153 E-MAIL: debetsehiwote121@gmail.com
NAME AND ADDRESS OF ADVISORS	MULUSEW ANDUALEM(MPH, PhD FELLOW, ASSOCIATE PROFESSOR E-MAIL: muler.hi@gmail.com MOBILE: +251 913814608
	MR. ABEBAYEHU BITEW(MPH, IN EPIDIMIOLOGY AND BIOSTATISTICS) E-MAIL: abebayehubitew@gmail.com MOBILE:+251921528949
FULL TITLE	DETERMINANTS OF ACUTE BLOODY DIARRHEA AMONG ADULTS WHO VISIT OUTPATIENT DEPARTMENT OF GOVERNMENTAL HEALTH FACILITIES IN BAHIR DAR ZURIA DISTRICT NORTHWEST ETHIOPIA, 2019
DURATION	MARCH/24-MAY/19/2019
STUDY AREA	BAHIR DAR ZURIA DISTRICT, NORTHWEST ETHIOPIA

Acknowledgment

My early acknowledgment goes to Bahir Dar University, school of public health for giving the opportunity to expand my knowledge by opening field epidemiology training program

I would like to put across my grateful appreciation to my academic advisors Associate Professor Mulusew Andualem and Mr. Abebayehu Bitew for their constant support by giving direction how to prepare my thesis proposal, data collection tools, analysis and final thesis thought early comment and communication.

My appreciation also goes to Bahir Dar Zuria District; health centers health workers, data collectors and supervisors for their great work and support for the data collection.

Finally thanks the Amhara Public Health Institute, Public Health Emergency Management (PHEM) directorate staffs for their technical support to conduct my thesis.

Tanks to my husband for your great support for my work

Table of Contents

Acknowledgment ii
Table of Contents iii
List of Tables v
List of figures v
Abbreviations and Acronyms vi
Abstract vii
1. Introduction 1
1.1 Back ground 1
1.2 Statement of the problem 3
1.3 Significance of the study 5
2 Literature review 6
2.1 Socio-economic and demographic factors 6
2.2 Environmental related factors 6
2.3 Behavioral related factors 8
2.4 Conceptual Framework 10
3 Objective 11
4 Methods 12
4.1 Study area 12
4.2 Study design and period 12
4.3 Population 12
4.3.1 Source population 12
4.3.2 Study population 12
4.4 Eligibility criteria 13
4.4.1 Inclusion criteria 13
4.4.2 Exclusion criteria 13
4.5 Study Variables 13
4.6 Operational definition 14
4.7 Sample size determination and sampling technique 15
4.8 Sampling Technique 15
4.9 Data collection tools and techniques 16
4.10 Data quality assurance 17
4.11 Data Analysis 17
4.12 Ethical consideration 17

5 Results 19
5.1 Descriptive Statistics 19
5.1.1 Socio-demographic characteristics of respondents 19
5.1.2 Environmental characteristics of respondents 20
5.1.3 Behavioral characteristics of respondents 20
5.2 Factors associated with acute bloody diarrhea 22
6 Discussions 25
7 Limitation of the study 28
8 Conclusions and recommendation 29
8.1 Conclusion 29
8.2 Recommendation 29
9 Reference 30
Annex 1 : Informed Consent form 34
Annex 2: Questionnaires (tools) used for data collection 35
የፈቃደኝነት ማረፋፈጫ ቅጽ 40

List of Tables

Table 1: Sample size determination for (double population proportion formula) from similar study .. 15
Table 2: Socio-demographic characteristics of adults in Bahir Dar Zuria district, Ethiopia, 2019 19
Table 3: Environmental and behavioral characteristics of adults in Bahir Dar Zuria district, Ethiopia, 2019 21
Table 4: Factors associated with acute bloody diarrhea among adults age18 and above in Bahir Dar Zuria district 2019. 23

List of figures

Figure 1: Conceptual framework of acute bloody diarrhea and expected determinant factors, adapted from different literatures, 2019 10
Figure 2: Schematic presentations of sampling procedures in acute bloody diarrhea among adults, Bahir dar Zuria woreda, 2019 16

Abbreviations and Acronyms

AOD	Adjusted Odds Ratio
APHI	Amhara Public Health Institute
CI	Confidence Interval
DALY	Disability Adjusted Life Years
EDHS	Ethiopia Demographic and Health Survey
EFY	Ethiopia Fiscal Years
FDRE MOH	Federal Democratic Republic of Ethiopia Ministry of Health
ETEC	Enterotoxigenic Escherichia Coli
HH	House Hold
IDSR	Integrated Disease Surveillance and Response System
IRB	Institution Review Board
NGO	None Governmental Organization
OPD	Out Patient Department
OR	Odds Ratio
PHEM	Public Health Emergency Management
PI	Principal Investigation
STEC	Shiga Toxin-Producing Escherichia Coli
SPSS	Statistical Package for Social Science
WHO	World Health Organization
YLD	Years Lost by Death

Abstract

Background: Acute bloody diarrhea (dysentery) is defined as an acute bout of diarrhea lasting less than 14 days in which subjects are passing grossly bloody stools. In Africa, an estimate of 115 people dies of diarrheal diseases every hour due to poor sanitation and hygiene. Acute bloody diarrhea is one among the 20 prioritized public health importance diseases. However, studies related to its determinants were not well known in the study area.

Objective: To assess the determinants of acute bloody diarrhea among adults who visit outpatient departments in government health facilities Bahir Dar Zuria, North West Ethiopia,

Methods: A facility-based Case-control study was employed between March 24 –May/19 /2019 among 326(81case, 245 control) adults' age ≥18years who visited the outpatient departments in the public health facilities using systematic random sampling. Data were collected by trained nurses using interviewer-administered structured questionnaires, entered using Epidata-3.1 and exported to the SPSS version-20 for analysis. Various descriptive and analytical statistics were computed. Variables with p value ≤ 0.2 in bi-variable logistic regression analysis were taken into multivariable logistic regression analysis. Finally, Significances of variables was considered at p-value of <0.05

Result: A total of 321(81cases, 240 controls) were participated with a response rate of 98.5 %(100%casesand 98%controls). water consumption per capital ≥ 20 Litters [AOR=0.32(0.17-0.63)], water lost from main source ≥one day [AOD=3.43(1.65-7.14], draw water by dipping [AOR=2.95(1.23-7.07)], use of shared latrine [AOR=8.48(3.49-20.57)], infrequent hand washing before food preparation[2.27(1.08-4.75), no detergent use during hand washing [AOR= 4.37;(2.01-9.48)] were among the determinants of acute bloody diarrhea.

Conclusion and recommendation: Based on this study, water availability and consumption, not having independent latrine, knowledge about bloody diarrhea and personal behavior (no habit of hand washing before food preparation and no use of detergents) were statistically significant factors to bloody diarrhea among adults of the study area. It is vital to access water sources, improving latrine ownership and regular awareness creation about the cause, transmission, prevention and management of acute bloody.

Key words: Bloody diarrhea, Adults, Determinant factors, Bahir Dar Zuria district, Ethiopia

1. Introduction

1.1 Back ground

Diarrhea is the passage of three and more loose (unformed) stool per day for previously well person (1-3). There are different types of diarrhea based on the stool content and duration of time (includes acute watery diarrhea, acute bloody diarrhea known as dysentery and persistent diarrhea (1, 3).

Acute bloody diarrhea (dysentery) is defined as an acute bout of diarrhea lasting less than equal to 14 days in which subjects are passing grossly blood in loose or watery stools (2-4).

Diarrhea is occurred by fecal- oral contamination of different pathogens (bacteria, virus, parasites) ,food intolerance of some food material and by some medications(laxatives) (1). Dysentery is one of the oldest known diarrheal infectious disorders, characterized by inflammation of the gastrointestinal tract, mainly the colon. It is usually a sign of invasive enteric infection that brings a considerable risk of serious morbidity and mortality in low economic countries(4).

Different types of acute bloody diarrhea (dysentery) epidemics were frequently occurred worldwide with different etiological agents (3, 5) . Among them, Bacillary dysentery, which is also known as shigellosis caused by four species of strain Shigella, Salmonella and Campylobacter are main causes of acute bloody diarrhea epidemics abroad(2, 6). Different Viruses like (rotaviruses, caliciviruses, astroviruses, noroviruses, and adenoviruses) causes bloody diarrheal specially for travelers and called traveler's dysentery(7). In developed countries, Shiga toxin-producing Escherichia coli (STEC) are well-known causes of bloody diarrhea, whereas as in developing tropical and semitropical regions, Shigella type one and Entamoeba histolytica are an important causes of dysentery especially in older children and adults living in rural areas (2). Shigella is major human-specific bacterial agent that results mucopurulent bloody diarrhea and common cause of severe cases that couse extra intestinal complication. *coli* O157:H7 was found 20 times more frequently in visibly bloody stool specimens than in no bloody specimens(8).

The evaluation of bloody diarrhea in adults is not as straightforward as in children because adults have a higher incidence of noninfectious causes of bleeding like hemorrhoid, cancer are common and must be rapidly identified to manage urgent(9). In Africa, an estimate of 115 people dies of diarrheal diseases every hour, due to poor sanitation and hygiene (9).

The transmission of many pathogens microorganisms of acute bloody diarrhea is via indirect feeding/contact with fecal contamination of food or water (swimming in contaminated water) or direct person-to-person contact(10, 11). Houseflies also serve as vectors for transmission of shigellosis, particularly in settings where disposal of human feces is inadequate and inanimate objects(10, 11). Different studies indicate direct person-to person transmission were facilitated by few requirement of infective dose (as few as 10-100 viable organisms and mild illness (3, 10).

Clinical manifestations of bacillary dysentery is chills, fever, abdominal pain, and diarrhea with blood (11). Different study sited proper sanitization and hygiene interventions are critical to prevent bloody diarrhea. This includes appropriate hand washing (using soap or ash) after using the toilet, before preparing or handling food and properly sanitizing food contact. Hand washing with soup decrease incidence of diarrhea by 40%. Improved water supply quantity and quality, including treatment and safe storage of household, avoiding of community open defecation are important to prevent acute diarrhea including dysentery(3, 12).

In Ethiopia 20(13 immediately and 7weekly reportable) diseases are identified as priority for national and international interest and entered to integrated disease surveillance and response (IDSR) in the ministry of health. The disease/events are prioritized based on their high epidemic potential, public health importance, available effective control and prevention measures, target for eradication/elimination and international health required(13). Acute bloody diarrhea is reported weekly as part of priority diseases under IDSR nationally and regionally for its significant public health importance and availability of effective control and prevention measures(13).

Person considered as use improved water if he/ she use water from protected spring, protected dug well, bottled water and piped water sources, which is protected from outside contamination, in particular from contamination with fecal matter. Whereas, river; pond unprotected dug well and unprotected spring considered as non-improved sours (3, 5, 14, 15).

Water consumption per capita is calculated by considering frequency of water collection in a day, capacity of container and family size i.e. Per capita water Consumption = Frequency of collection X Capacity of container /Family size(3).

1.2 Statement of the problem

Acute bloody diarrhea is a medical crisis that deserves serious medical investigation. Acute bloody diarrhea may cause immediate life threatening conditions, complication or significant long lasting effects/infirm living on patients by causing the intestinal damages, nutrients losses, anorexia, and rapid weight loss, in some infected adult patients; specially Shigella and Enterotoxigenic Escherichia coli(ETEC) causes of dysentery (2, 9, 12, 16).

Eventhouth diarrheal disease including acute bloody diarrhea is preventable and its number decreased globally from time to time (17). Yet it caused for about 89,513 Disability-adjusted life years (DALYs)annually in 2012.Of which bloody diarrhea was responsible for7052(8%) or 102 DALY per 10,000people(17). In the same ways, (WHO2016) health summery report reveals diarrhea causes 7.5million Years Lost by Death (YLD) (18). About 4.5(60%) million YLD were adults' age 15 years and above. In developing countries , like Ethiopia YLDs increased from 1.0 million in 2010 to 1.19million in 2015 and 1.2million in 2016 (18).About 1.325 million death was reported from diarrhea of all ages worldwide in 2016 and 506,000(38%) was due to bloody diarrhea of Shigella and ETEC (16).

Another study reveals Bloody diarrhea of Shigella is a cause for 80-160 million cases,700,000-1 million death annually, globally and 99% in developing countries (11).

A study conducted in china and United States reveals acute bacterial bloody diarrhea affects all age groups,74% of cases ≤ 40 years and 9% were under five children's in china and about 23 million cases each year in adults in United States (7, 19).

African countries have curried the highest burden of diarrhea. Nigeria lost 277381YLD,Congo158181,south Africa 100571,Egypt 120647, Kenya 979314 and Ethiopia 189202YLDs by diarrhea in 2016, but the burden of diarrhea with bloody was not estimated independently(18).

In Ethiopia, according to health and health report of 2012/3 reveals dysentery couse 263,457 admission and 17 death, of which 64, 656(25%) of admission and 12(71%) of death were from Amhara regional state(20). The 2014/5 Ethiopian Federal Ministry of Health annual performance report reveals 267,489 dysentery cases and 229 deaths were reported from all regions of the country in 2013/4. Majority of the cases 83,980 (31.4%) were from Oromia followed by the Amhara Region, 60,877 (22.8%). The incidence rate was highest in Benishangul Gumuz Region (1,751/100,000 population) and 2% case fatality rate in Harar region(21).

There also an epidemic of dysentery in Jimma city, Ethiopia from December 12 to 22, 2008 due to Shigella flexnneri with a total of 566 cases and 355(62.7%) were adult age bettween20-29 years and 438(77.4%) males. the first sours of the outbreak was food borne followed by person to person contact with similar illness(22).

Based on the 2014/5-2016/7 Amhara Regional Health Bureau inpatient data, about 2631 admissions and 30 death of acute bloody diarrhea/dysentery was reported. Of which 2117(80.5%) admissions and 28(93%) deaths were among ≥ 15 years age (23).

Amhara Public Health Institute annual report of 2017/8,reveals bloody diarrhea increased from 90,016 in 2016/7 to 91,828 and the Bahir dare Zuria district is 7^{th} with the burden among 161 woredas of Amhara region by reporting 1621 Dysentery cases per year(24).

Various study findings, social-demographic (residency, income (poverty) infrastructure, limited education, overcrowding), poor environmental sanitation and hygiene, inadequate water supply, emergency of antibiotic resistance strains, unsafe water sources and behavioral practices like method of draw drinking water were identified factors to the acute bloody diarrhea morbidity(3, 6, 11, 25, 26).

Although the amount of acute dysentery diarrhea is known by the weekly facility reports in the Amhara Region and the study area districts, the determinant factors of the acute dysentery diarrhea are not yet identified well by the research works. Thus, the aim of this study was identifying the determinant factors of acute dysentery diarrhea among the adults in the Bahir Dar Zuria districts, Northwest Ethiopia.

1.3 Significance of the study

Weekly surveillance data collection of acute bloody diarrhea is important to know the magnitude of the disease in time and please. However, a better knowledge of the determinant factors and distribution of acute bloody diarrhea will be an important start for development of strategies to reduce the public health risk, effective control and prevention methods of acute bloody diarrhea in the study area.

Therefore, this study aimed at identifying determinants of acute bloody diarrhea among adult outpatient visitors in Bahir dar Zuria district. The study findings will be helpful to district health facilities, District health offices, Zonal Health department, Amhara Regional health Bureau; none governmental organizations (NGOs) working on public health disaster, and PHEM office to plan and make evidence based interventions to fight against acute bloody diarrheal diseases. Moreover, these study findings will be important literature to the coming researchers who are interested in acute bloody diarrhea.

2 Literature review

Diarrheal diseases are a major cause of disease burden worldwide. Various factors may contribute for the transmission of microbes in to the apparently health person that couse diarrheal diseases including the acute bloody diarrhea among adults. The main determinants are socio-economic and demographic, environmental related and behavioral related factors. Consequently, a few studies have been carried out to identify factors affecting the acute bloody diarrhea.

Eating of fecal contaminated food and water or person-to-person contacts are the main transmission routes of acute bloody diarrhea in areas of low or inadequate water supply, and sanitary conditions(10).

2.1 Socio-economic and demographic factors

Socio-economic development plays an important role in the occurrence of bacillary dysentery(27). The determinants of diarrheal disease could be socio-demographic, personal behavior, environmental and organization levels(28).

Study conducted in Indonesia on the effects of water and sanitation in diarrhea revealed that living in urban and adult education have significant positive effect with decreasing of diarrhoea(28). The incidence of acute bloody diarrhea in the rural settings was related to poor general compound cleanliness (hygiene)(28).

Based on a case control study conducted in Kenya, the proportion of acute bloody diarrhea among ≥18 age groups was 61% (6). The incidence rate of acute bloody diarrhea differed significantly across different age groups, where it was higher among the under 5 age groups compared to the above under 5 years (14, 29).

A cross sectional study conducted on the prevalence of acute diarrhea in Eastern Ethiopia revealed that living in a rural areas was a risk to acquire acute bloody diarrhea compared to those who lived in the urban settings (30).

2.2 Environmental related factors

Safe water storage and hand hygiene have been shown to reduce fecal contamination and improve health. Study conducted in Indonesia in 2014 and 2017on the effects of water and sanitation in diarrhea indicated that access to piped water was significantly with decreasing diarrhoea diseases than use from other sours (28, 31). Improved sanitation at the household level reduces the risk of getting diarrhoea diseases including bloody diarrhea among the older children and adults (28, 31).

Another meta-analysis indicates that the quality of water was variable within the given types of sources that need extensive scope for reducing exposure to fecal contamination through systematic management of water safety. But at general improved sources is less likely to contain FIB than unimproved sources (32).

The Nigerian EDHS of (2013) showed that using water from the unprotected sources and use of narrow-mouth container for storage of drinking water were risk and preventive determinant factors to acquire acute bloody diarrhea(33, 34).

Access to clean water and sanitation are supposed to be important factors in preventing diarrhea. Popularization rate of tap water and access rate to the sanitation toilets in rural areas were factors showed a significantly negative correlation with rate of bacillary dysentery incidence(27, 28).

An adequate amount of water is necessary to reduce the risk of water-related disease, to provide for consumption, for cooking purposes and to ensure personal and domestic hygienic requirements(35).

A meta-analysis on the impact of water, sanitation, and hygiene interventions in developing countries concluded that increasing water quantity reduced the occurrence of diarrheal diseases by 25%. Improved sanitation led to reductions in diarrheal diseases 32%. Sanitation may have resulted in greater reductions because they directly block pathways of exposure(36).

A facility based matched case control study conducted in Kenya, to determine risk factors of acute bloody diarrhea showed that presence of coliforms in main water source was found to be a risk factor to acquire acute bloody diarrhea. Detection of coliform bacteria and Escherichia coli in drinking water was used as markers of fecal contamination(3, 6).

Likewise, an outbreak investigation in Jimma city revealed that shortage of running water in food preparation room for hand washing, poor refuse disposal, and inadequate and unsafe toilet and absence of hand washing facility after toilet were risk factors for acute bloody (22).

A recent meta-analysis findings indicated that eventhouth, communal facilities are the most economical and feasible solution for providing sanitation access to the 2.5 billion people without a private facility in densely populated urban areas, the shared sanitation was associated with an increased risk of adverse health outcomes, including diarrhea(37). Furthermore, shared sanitation may still represent an improvement in hygiene conditions

relative to open defecation (6, 38). Among those who reported that they washed their hands in or near the dwelling/yard, keeping soap or ash at the hand washing area demonstrated a protective effect against moderate-to-sever-diarrhea in children <5 old in Mozambique (14).

A study conducted in eastern Ethiopia showed that improper refuse disposal practices and lack of hand washing facilities were risk factors for different types of diarrheal diseases (30).

Another similar study in Bibugn district of Ethiopia reveals adults use less than 20 liters of water per capital, disposes refuse in open field, Poor compound cleanliness and poor sanitation were more likely to develop acute bloody diarrhea than closed disposal method clean their compound well (3).

2.3 Behavioral related factors

If proper mechanisms for fecal disposal are not in place, then enteric agents can contaminate the environment. At this point secondary barrier behaviors such as washing hands before preparing food, reheating of food, controlling flies, water treatment or boiling become important.

A meta-analysis systemic review on Water, sanitation, and hygiene interventions to reduce diarrhea in less developed countries stated that household treatments at the point of use (eg chemical treatment, boiling, pasteurization, and solar disinfection) decrease the occurrence of diarrhea significantly (36).

Exposures to diarrhea-causing agents are frequently related to the use of contaminated water and to unhygienic practices in food preparation and disposal of excreta. Poor sanitation, lack of access to clean water and inadequate personal hygiene are responsible for an estimated 90 percent of diarrhea(39). Interventions including promoting hand washing resulted in a 31% reduction in diarrhea episodes in communities in low-middle income countries. Significant reduction in diarrheal incidences was observed in all age groups for all pathogens and was comparable to the effect of providing clean water in low-income areas(40).

A study in Kenya revealed that the level of water contamination was much higher at household level in both rural (40.9%) and urban (10.7%) compared with the main source which was 38.6% and 8.2% respectively(6). Hand-washed after last defecation and storage of drinking water separate from water for other use decrease the risk of acute bloody diarrhea in adults (6).

According to EDHS (2016) nationally, proper hand washing availability and practices was very low and only 57 %, 7% of rural households have access to improved source of drinking

water and essential hand washing agents respectively. In Amhara region, only 5% of household have essential hand washing agents (water with soap or ash)(15).

A study in Bibugn woreda east Gojjam zone of Ethiopia revealed Adults who draw drinking water by dipping were more likely to develop acute bloody diarrhea than who draw drinking water by pouring. The study suggested that drawing of drinking water by dipping from storage contaminates pathogenic microorganisms', on the surface of the cup and finally lead them develop acute bloody diarrhea watery diarrhea and not Store of drinking water separately from water of other uses was an other risk factors of acute bloody diarrhea among adults(3).

2.4 Conceptual Framework

The conceptual framework involves socio-economic and demographic, Environmental and Behavioral related factors of acute bloody diarrhea among adults in Bahir dar Zuria district adopted from different related literatures is listed in the diagram below.

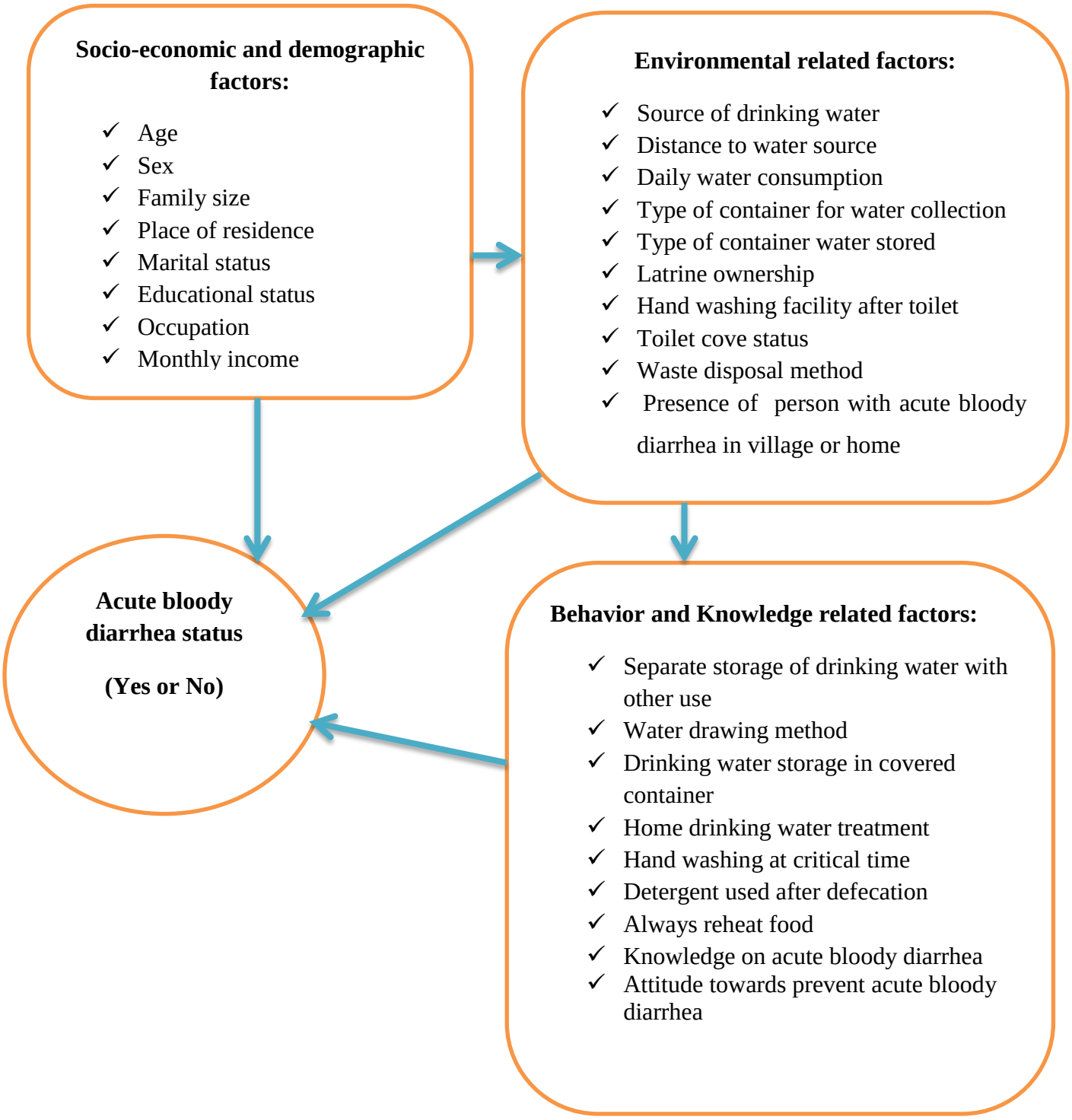

Figure 1: Conceptual framework of acute bloody diarrhea and expected determinant factors, adapted from different literatures, 2019

3 Objective

To identify determinants of acute bloody diarrhea among adults who visit Outpatient department of Governmental health Facilities in Bahir Dar Zuria district, 2019

4 Methods

4.1 Study area

Bahir Dar Zuria woreda is one of the 15 Woredas of West Gojjam Zone of Amhara, Ethiopia. The administrative office of the woreda is found in Bahir Dar town, which is the capital city of Amhara regional state. Bahir Dar is located 551 Km from Addis Ababa. The borders of the district are Yilmana Densa(south), Mecha(southwest), Lesser Abay River (northwest) which separates the district from Semien Achefer, Lake Tana(north) that situates the town and special zone of Bahir Dar, and Abay River(on east) which separates it from the south Gondar Zone(41).

Based on 2007 population and housing census projections the total population of Bahir Dar Zuria Woreda estimated to 231,426 in 2018/9Gc.There are 32 rural kebeles in the district nine health centers, 32 health posts, and 10 Low-level privet clinics provide health service for the population in the district. In 2017/8 Bahir Dar Zuria latrine coverage, latrine utilization and safe water coverage were 77.8%, 94.4% and 80% respectively.

4.2 Study design and period

Facility based case control study involving incident cases of acute bloody diarrhea was conducted from March/24-May/19/2019.

4.3 Population

4.3.1 Source population

The source population was all people aged 18 years and above, residing in Bahir Dar Zuria district at least for six months and visit outpatient department in governmental health facilities.

4.3.2 Study population

Cases: Patient's age ≥ 18 years diagnosed with acute bloody diarrhea less than 14 days duration in outpatient department of governmental health facilities in Bahir dar Zuria district during the study period

Controls: patients age ≥18 years diagnosed with other medical illness in outpatient deportment of governmental health facilities in Bahir dar Zuria district during the study period

4.4 Eligibility criteria

4.4.1 Inclusion criteria

Cases: Adults age ≥18 years who visit an outpatient department in government health facilities of Bahir Dar Zuria district due to acute bloody diarrhea less than 14 days

Control: Adults age ≥18 years who visited an outpatient department, in government health facilities other than acute bloody diarrhea in Bahir Dar Zuria district.

4.4.2 Exclusion criteria

Cases: Patients' severely ill, psychiatric and who have a known Concomitant causes of anorectal bleeding were excluded from the study. Those selected participants who came the second and more times were excluded by marking their charts to avoid repetition.

Controls: Patients with severe illness, psychiatric and those selected participants who come for the second and more times were excluded by marking their charts not to miss important factors from other patients and to avoid repetition.

Patient with non-bloody diarrhea at the time of data collection was excluded from study, to avoid potential confounding (invisible blood and fire of change towards bloody diarrhea after diagnosis).

4.5 Study Variables

Dependent variable

Acute bloody diarrhea status (yes/no)

Independent variables

Socio-economic and demographic factors-

Age	Sex
Family size	Residence
Educational status	Occupation
Marital status	Family monthly income

Environmental related factors:

Daily water consumption,	Source of drinking water,
Distance to water source,	Type of container for water collect
Type of container water stored	Latrine ownership
Toilet covered	Hand washing facility after toilet

Waste disposal method

Presence of patients with acute bloody diarrhea in village or home

Behavioral related factors:

Method of drinking water drawing

Home drinking water treatment

Storage of drinking water separate from water for other use

Reheat food before eating

Hand washing at critical times (before eating and food prepare, after defecation and childcare)

Detergent used after defecation

Knowledge on acute bloody diarrhea Attitude towards acute bloody diarrhea

4.6 Operational definition

For this study, the following variables defined as:

Home drinking water treatment: is defined as the household us any one of the following treatment methods, such as boiling, filtering, use water gurd (*bishangary or wohagar*) to the water before its consumption for the last two week, to increase the water quality. A study participant from a household, who always uses one or more method of water treatment in the last two weeks, will be considered as user of home drinking water treatment.

Separate Storage of drinking water from other use: Is defined as always use separate storage of drinking water from other uses for the last two weeks.

Latrine ownership household: In this study, if only one household and their guest use the latrine, is considered as privet and if the latrine used for two and more HHs considered as shared latrine.

Hand washing after defecation: is defined as always hand washing after defecation in the last two weeks

Hand washing after childcare: is defined as always wash hands after disposing children's stool in the last two weeks

Hand washing before eating: is defined as always wash hands before eating in the last two weeks

Hand washing before food prepare is defined as always wash hands before food preparation in the last two weeks

Reheat food before eating: is defined as always heating of cooled cooked foods, which was prepared before 6hrs in the last two weeks.

Sufficient knowledge towards acute bloody diarrhoea: Seven knowledge questions were computed. Those who scores above the mean value will classify as sufficient.

Attitude towards acute bloody diarrhoea: when the respondents positively reacted and scored above the mean value consider as having positive attitude towards, acute bloody diarrhoea.

4.7 Sample size determination and sampling technique

The sample size is determined based on two-population proportions of Fleiss with continuity correction formula using EpeInfo version 7 stat calculation software. The assumption made for sample size calculation was 95% Confidence Interval, 80% of power and ratio of controls to cases 3:1. The sample size was calculated by assessing different predictors to the outcome variable from previous studies by taking the proportion exposer among controls and AOR.

Table 1: Sample size determination for (double population proportion formula) from similar study

s/n	Variables		Percentage control exposed	AOR	Sample size	References
1	Separet drinking water	Yes	57.88%	0.412	242	(6)
		No				
2	Draw drinking water from storage container	Dipping	16.90%	2.49	296	(3)
		Pouring				
3	Daily water consumption per capital	<20L	65.10%	2.89	246	(3)
		≥20L				
4	Hand washing last defecation	Yes	86.3%	0.244	131	(6)
		No				

Finally, (proportion of draw drinking water from storage container by dipping among controls which gives the largest sample size of 296(74 cases and 222 controls). Then adding 10% of none response rate the final total sample size was 326 (81cases and 245 controls) was participated in the study.

4.8 Sampling Technique

There are nine Health centers in Bahir Dar Zuria district. All nine-health centers provide health service currently were included in the study. Firstly, the last six-month average monthly adult bloody diarrhea cases reported from all health centers were calculated. Then based on the magnitude of their cases proportional allocation was provided to each health centers to get cases and controls from all study areas for generalization. Those cases and controls were selected from outpatient department visitors that were diagnosed by the patients' compline and health professions final diagnoses. Cases and controls were selected

systematically every other cases and controls were selected systematically by taking average adult outpatient cases loads in the health facilities in the last six months in every 27 intervals.

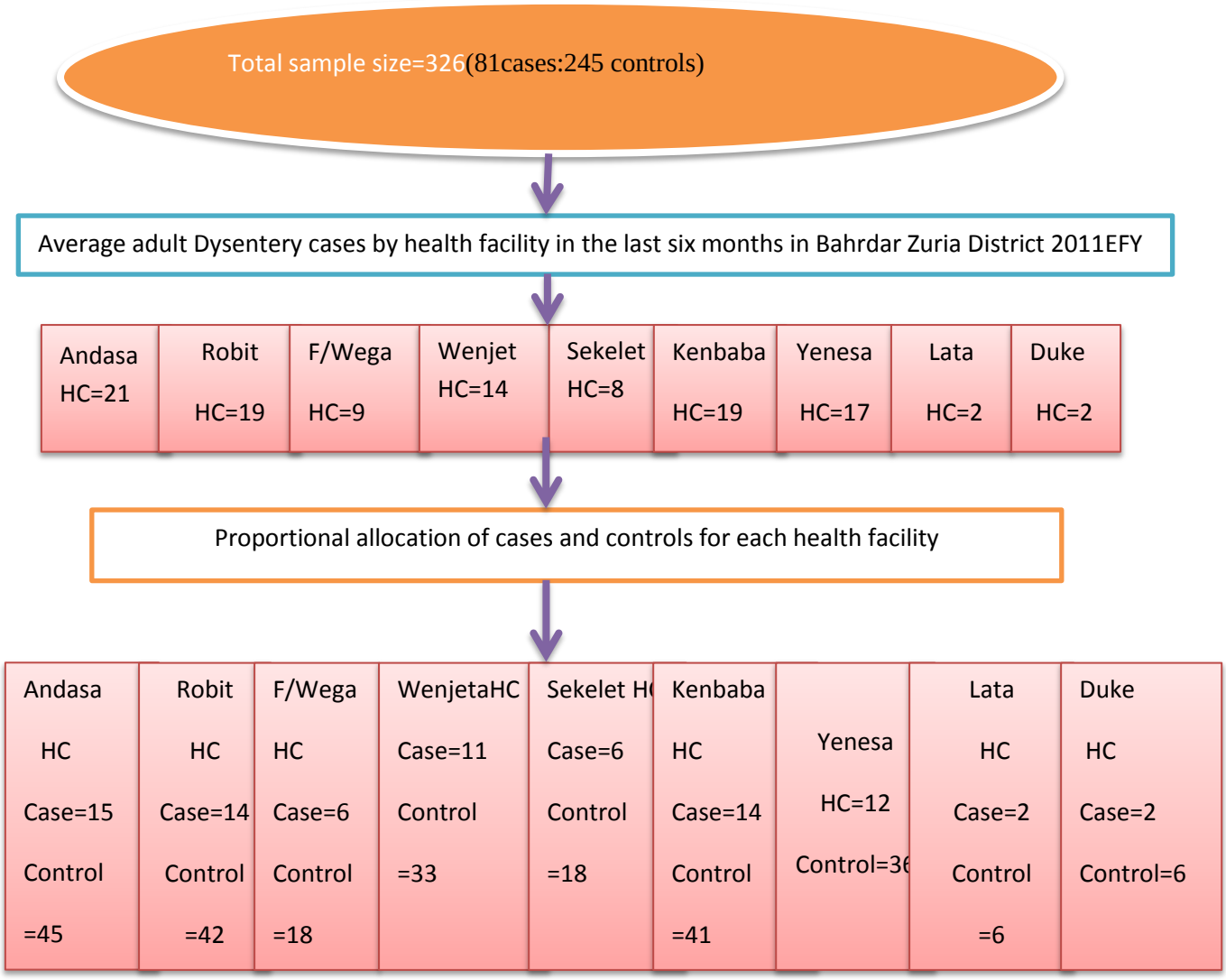

Figure 2: Schematic presentations of sampling procedures in acute bloody diarrhea among adults, Bahir dar Zuria woreda, 2019

4.9 Data collection tools and techniques

First, the questionnaire was developed in English after reviewing relevant literatures to the topic to include all possible variables that address the objective of the study. The questionnaires have three sections on socio-demographic, environmental and behavioral related factors of acute bloody diarrhea (dysentery). Data were collected using a pre- tested structured questionnaire thought interviewer-administered in Amharic version after diagnosis. The presence or absence of blood in the stool was diagnosed based on the patients complain clinically and health professions. Nine clinical nurses and five (BSc nurses/PHO) were recruited for data collection and supervision respectively. Data collection was started after

informing them about the study objective, data collection procedures, and data confidentiality issues to the facility heads, health providers working on adult OPD, and the study participants.

4.10 Data quality assurance

The English version questionnaire was translated to Amharic version for the data collection purpose and then retranslated back to English by language experts to check its consistencies. Before the actual data, collection pre-test was done in 5% (13 controls and 3 cases) of the responders in merawi health center. Then, corrections were made on the questionnaire based on the pretesting findings. One-day training was given for data collectors and supervisors on study objectives, questionnaire contents, data collection procedures, data quality, data confidentiality and participants' right.

Moreover, the completed questionnaires were checked every day after data collection for completeness and consistency by the supervisors and the principal investigator. Then, necessary feedbacks were provided to the data collectors to the next data collection.

4.11 Data Analysis

The data were entered into a pre-drafted coding sheet on Epidata software, version 3.1 and exported to the SPSS version 20 for analysis. Various descriptive statistics (frequency table, mean with standard deviation) were computed to describe the study variables. Binary logistic regression was carried out for all variables with an outcome variable to identify candidates for multivariable logistic regression analysis. Then predictors with P-value <0.2 from binary logistic finding was selected for final multivariable logistic regression analysis to control the confounding effects. The Hosmer-Lemeshow goodness of fit test for the model was checked-Value=0.091 and backward LR was used. Chi square test checked for multi colenierity before multiple logistic analyses.

Finally, predictor variables with p-value of less than 0.05 were considered as statistically significant determinant factors of an acute bloody diarrhea. The strength of association was described using the odds ratio at 95% CI.

4.12 Ethical consideration

Ethical clearance and approval was obtained from the Institution Review Board (IRB) of Bahir Dar University College of medicine and Health Sciences after reviewing the proposal for the Bahir Dar Zuria district and Health facilities. Respondents were provided information on the purpose of the study, data collection procedures, data confidentiality, and their right to refuse or decline participation in the study at any time. Verbal and written consent was

obtained from the study participants. Confidentiality was assured, as the information they give was not be used for any purpose other than the study. The overall confidentiality and privacy of the information was kept safe throughout the whole process of the research work.

5 Results

5.1 Descriptive Statistics

5.1.1 Socio-demographic characteristics of respondents

A total of 321 adults' age≥ 18 years attending the Outpatient department in governmental health facilities were participated in the study with the response rate of 98.5 %(100% cases and 98%controls). Female were 41(50.6%) among cases and 130(54.2%) among controls. The proportions of rural dwellers were 66 (81.5%) among cases and 194(80.8%) among controls. The mean age was 32.9years (±11.55 SD) and 33.9(±11.28SD) among cases and controls respectively. About 59(72.8%) cases and 149 (62.1%) controls were married. The average family size of participants were 4.28(±1.86 SD) among cases and 4.34(±1.75SD) among controls. Their median monthly household income was 2500 among cases and 2400 ETB (Table 2).

Table 2: Socio-demographic characteristics of adults in Bahir Dar Zuria district, Ethiopia, 2019

Variables	Responses	Diseases status	
		Case(N=81) No. (%)	Control(n=240) No. (%)
Age	18-29	36 (44.4)	134(55.8)
	30-39	21(25.9)	88(36.7)
	40-49	15(18.5)	59(24.6)
	50-59	6(7.4)	26(10.8)
	≥60	3(3.7)	14(5.8)
Sex	Female	41(50.6)	130(54.2)
	Male	40(49.4)	110(45.8)
Residence	Rural	66(81.5)	194(80.8)
	Urban	15(18.5)	46(19.2)
Marital status	Married	59(72.8)	149(62.1)
	Single	18(22.2)	66(27.4)
	Divorced	0(0)	12(5.1)
	Widowed	4(5)	13(5.4)
Educational level	Unable to read and write	53(65.4)	131(54.6)
	Primary Education	15(18.5)	63(26.2)
	Secondary and above	13(16.1)	46(19.2)
Occupational status	Farmer	38(46.9)	123(51.3)
	House wife	21(26)	49(20.4)

	Merchant	4(4.9)	23(9.6)
	Government employee	7(8.6)	18(7.5)
	Student	11(13.6)	27(11.3)
Family size	≥5	37(45.7)	105(43.8)
	<5	44(54.3)	135(56.2)
Family income	≤1500	19(23.5)	62(25.8)
	15001-2500	19(23.5)	73(30.4)
	>2500	43(53)	105(43.8)

5.1.2 Environmental characteristics of respondents

Concerning to the water sources 60(74%) participants with acute bloody diarrhoea and 178(74.2%) participants without bloody diarrhoea got water from protected sources. The mean water consumption per capital was15 Lt (±8.9SD) for cases and 20Lt (±12.4SD) for controls. Average distance time to fetch water was 33(±21.8SD) for cases and 24.6(±14.7SD) controls.

The proportion of having private/shared latrine of all participants was 209(65%) or 46(56.8%) among cases and 163(68%) among controls. Among all latrine types 41 (89.1%) among cases and 154(94.5%) among controls) were functional during the day of the interview. From participants who have functional latrine currently 7(17.1%) of among cases and 53(34.4%) among controls have hand washing facility after toilets (Table3).

5.1.3 Behavioral characteristics of respondents

Washing habit after defection in the last two weeks was not practiced in 50(62) of cases and 92(38.3%) of controls. The participant mostly used only water to wash their hands 44(54%) cases, 65(27%) control). After clean their child feces, 25(30.8%) of participants with acute bloody diarrhea wash their hands in the last two weeks. The non-dysenteric adults wash their hand always in the last two weeks after clean their child feces was 128(53.3%), before food preparation199(83%) and before eating 188(78.3%). The handling mechanism of drinking water regarding of the participant 68 (83.9%) cases and 222 (92.5%) controls use jerry can. Of the total; 55(67.9%) cases and 190(79.2%) controls store drinking water in a separate container. Sixty (74.1%) 60 cases and 221(92.1%) controls draw water using purring.

Table 3: Environmental and behavioral characteristics of adults in Bahir Dar Zuria district, Ethiopia, 2019

Variables	Response	Diseases status	
		Cases=81 N (%)	Controls=240 N (%)
Water source	Protected sours	60(74)	178(74.2)
	Unprotected sours	21(26)	62(25.8)
Distance to fetch water	<30Minites	38(46.9)	148(61.7)
	≥30Minites	43(53.1)	92(38.3)
Daily water consumption	<20Lt	51(62.9)	99(41.3)
	≥20Lt	30(37.1)	141(58.7)
Absence of water for ≥1days	Yes	42(51.8)	65(27.1)
	No	39(48.2)	175(72.9)
Ownership of latrine	Privet	19(23.5)	130(54.2)
	Shared	27(33.3)	33(13.8)
	No latrine	35(43.2)	77(32)
Type of latrine	Privet traditional pit latrine	7(15.2)	56(34.4)
	Privet wooden slab latrine	7(15.2)	63(38.7)
	Privet cement slab latrine	5(10.9)	11(6.7)
	Shared wooden slab latrine	26(56.5)	28(17.2)
	Shared VIP& flash sewerage	1(2.2)	5(3)
Currently functional latrine	Yes	41(89)	154(94.5)
	No	5(11)	9(5.5)
Latrine with pit hole cover	Yes	7(17)	49(31.8)
	No	34(83)	105(78.2)
Latrine with hand washing access	Yes	7(17)	53(34.4)
	No	34(83)	101(65.6)
If no latrine where you empty the bowels	Open field	11(26.2)	40(46)
	At forest	18(42.9)	2124.1)
	Around river	2(4.7)	4(4.6)
	Around the Gourden	11(26.2)	22(25.5)
Way of dispose wastes	Note open field	41(50.6)	156(65)
	Open field	40(49.4)	84(35)
Presence of person/s with dysentery in village or home	Yes	17(20.9)	23(9.6)
	No	54(66.7)	173(72.1)
	I don't Know	10(12.4)	44(18.3)
Water collection container	Jerry can	68(83.9)	222(92.5)
	Pots/bucket	13(16.1)	18(7.5)
Water storage container	Neck narrow	54(66.7)	190(79.2)
	Neck wild	27(33.3)	50(20.8)
Always wash hand after defecation in the last two weeks	Yes	31(38.3)	148(61.7)
	No	50(61.7)	92(38.3)

Type of Detergent used for hand wash	Soap & water	30(37)	134(55.8)
	Ash & water	7(8.7)	41(17.1)
	Only water	44(54.3)	65(27.1)
Always wash hand after child care in the last two weeks	Yes	25(30.9)	128(53.3)
	No	41(50.6)	77(32.1)
	No child treat	15(18.52)	35(14.6)
Always wash hand before food preparation in last two weeks	Yes	49(60.5)	199(82.9)
	No	32(39.5)	41(17.1)
Hands washing practice before eating	Yes	50(61.7)	188(78.3)
	No	31(38.3)	52(21.7)
Re-heat cold food	Yes	44(54.3)	150(62.5)
	No	37(45.7)	90(37.5)
Separate container	Yes	55(67.9)	190(79.2)
	No	26(32.1)	50(20.8)
Cover of drinking water storage	Yes	73(90.1)	218(90.8)
	No	8(9.9)	22(9.2)
Water drawing method	Pouring	60(74.1)	221(92)
	Dipping	21(25.9)	19(8)
Water Treatment	Yes	5(6.2)	57(23.7)
	No	76(93.8)	183(76.3)
Knowledge	Sufficient	54(66.7)	197(82.1)
	Insufficient	27(33.3)	43()17.9
Attitude	Good Attitude	63(77.8)	199(82.9)
	Poor Attitude	18(22.2)	41(17.1)

5.2 Factors associated with acute bloody diarrhea

Bivariate analysis was done for socio-demographic, environments and behavior related determinant factors. Finally, 18 variables with p-Value≤0.2 were entered to multivariable logistic regression analysis. The binary and multivariable logistic regression analysis revealed that nine variables were found to be statistically significant (p-value <0.05) to acute bloody diarrheal disease. These include distance to fetch water >30min [AOR= 2.13 (1.13-4.23)], ≥ 20 liters daily water consumption per capita[AOR=0.32(95%CI:0.17-0.63)], main water sours lost for at least one day in the last two weeks[AOR=3.43(95%CI:1.65-7.14], draw drinking water from the storage container by dipping[AOR= 2.95(95%CI:1.23-7.07)], Shared latrine use[AOR=8.48(95%CI :3.49-20.57)], No always wash hand before food preparation in the last two weeks[2.27(95%CI:1.08-4.75),Absence of dysenteric case in home/village in the last two week[AOR=0.36(95%CI:0.14-0.94],use only water during hand washing [AOR= 4.37(95%CI:2.01-9.48)] and sufficient knowledge about acute bloody diarrheal disease transmission, prevention and management.

Daily water consumption ≥20 litter per capital was a protective factor for acute bloody diarrhea. Adults who have gotten water from main water sours after traveling over 30 minutes >30miniutes to fetch water were 2.19times more likely to acquire acute bloody diarrhea compared to their counterpart adults. In addition to this, water lost at least for one day in the last two weeks from the main source, increased the likelihood of disease by 3.4 times (Table4).

Table 4: Factors associated with acute bloody diarrhea among adults age18 and above in Bahir Dar Zuria district 2019.

Variables	Response	Diseases status		COR**(95%**CI**)**	AOR**(**95**%**CI**)**
		Cases N (%)	Controls N (%)		
Age	18-29	36 (44.4)	98(40.8)	1	
	30-39	21(25.9)	67(27.9)	0.85(0.46-1.59)	
	40-49	15(18.5)	44(18.3)	0.93(0.46-1.87)	
	50-59	6(7.4)	20(8.3)	0.82(0.30-2.19)	
	≥60years	3(3.7)	11(4.6)	0.74(0.19-2.81)	
Sex	Female	41(50.6)	130(54.2)	1	
	Male	40(49.4)	110(45.8)	1.15(0.67-1.91)	
Residence	Rural	66(81.5)	194(80.8)	1.04(0.55-1.99)	
	Urban	15(18.5)	46(19.2)	1	
Educational level	Not read and write	53(65.4)	131(54.6)	1.43(0.72-2.86	
	Primary Education	15(18.5)	63(26.2)	0.84(0.36-1.94)	
	Secondary& above	13(16)	46(19.2)	1	
Family size	≥5	36(44.4)	105(43.8)	1.03(0.62-1.71)	
	<5	45(55.6)	135(56.2)	1	
Family income	≤1500	19(23.5)	62(23.8)	0.80(0.43-1.51)	
	1501-2500	22(27.2)	73(30.4)	0.79(0.43-1.44)	
	>2500	40(49.5)	105(43.8)	1	
Water source	Protected sours	60(74)	178(74.2)	1	
	Unprotected sours	21(26)	62(25.8)	1.005(0.56-1.78)	
Distance to fetch water	<30Minites	38(46.9)	148(61.7)	1	1
	≥30Minites	43(53.1)	92(38.3)	1.82(1.09-3.03)	2.19(1.13-4.23)
Per capital daily water consumption	<20Lt	51(62.9)	99(41.2)	1	1
	≥20Lt	30(37.1)	141(58.8)	0.42(0.25-0.71)	0.32(0.17-0.63)
Absence of water for ≥1days	Yes	42(51.8)	65(27.1)	2.9(1.72-4.88)	3.43(1.65-7.14)
	No	39(48.2)	175(72.9)	1	1
Ownership of latrine	Privet	19(23.5)	130(54.2)	1	1
	Shared	27(33.3)	33(13.8)	5.59(2.78-11.28)	8.48(3.49-20.57)
	No latrine	35(43.2)	77(32.1)	3.11(1.66-5.81)	1.87(0.87-4.04)

Way of dispose wastes	Non open field	41(50.6)	156(65)	1	
	Open field	40(49.4)	84(35)	1.81(1.09-3.02)	
Presence of person/s with dysentery	Yes	17(21)	23(9.6)	1	1
	No	54(66.7)	173(72.1)	0.42()0.21-0.45)	0.36(0.14-0.94)
	I don't Know	10(12.4)	44(18.3)	0.74(0.12-0.78)	
Water collection container	Jerry can	66(81.5)	215(89.6)	1	
	Pots/bucket	15(18.5)	25(10.4)	1.95(0.97-3.92)	
Water storage container	Neck narrow	54(66.7)	190(79.2)	1	
	Neck wild	27(33.3)	50(20.8)	1.9(1.09-3.32)	
Hand washing practice after Defecation	Yes	48(59.3)	194(80.8)	1	1
	No	33(40.7)	46(19.2)	2.90(1.68-5.01)	2.02(0.99-4.12)
Always wash hand after defecation	Yes	31(38.3)	148(61.7)	1	
	No	50(61.7)	92(38.3)	2.59(1.54-4.35)	
Type of Detergent used for hand wash	Soap & water	30(37)	134(55.8)	1	1
	Ash & water	7(8.7)	41(17.1)	0.76(0.31-1.86)	0.43(0.14-1.34)
	Only water	44(54.3)	65(27.1)	3.02(1.74-5.24)	4.37(2.01-9.48)
Always wash hand after child care in the last two weeks	Yes	25(30.9)	128(53.3)	1	
	No	41(50.6)	77(32.1)	2.73(1.54-4.83)	
	No child treat	15(18.5)	35(14.6)	2.19(1.05-4.61)	
Always wash hand before food preparation in last two weeks	Yes	49(60.5)	199(82.9)	1	1
	No	32(39.5)	41(17.1)	3.2(1.81-5.54)	2.27(1.08-4.75)
Hands washing practice before eating	Yes	50(61.7)	188(78.3)	1	
	No	31(38.3)	52(21.7)	2.24(1.30-39)	
Re-heat cold food	Yes	44(54.3)	150(62.5)	1	
	No	37(45.7)	90(37.5)	1.4(0.84-2.33)	
Separate container	Yes	55(67.9)	190(79.2)	1	
	No	26(32.1)	50(20.8)	1.79(1.03-3.15)	
Cover of drinking water storage	Yes	73(90.1)	218(90.8)	1	
	No	8(9.9)	22(9.2)	1.08(0.46-2.54)	
Water drawing method	Pouring	60(74.1)	221(92)	1	1
	Dipping	21(25.9)	19(8)	4.07(2.07-8.06)	2.95(1.23-7.07)
Water Treatment	Yes	5(6.2)	57(23.7)	1	
	No	76(93.8)	183(76.3)	4.73(1.83-12.27)	
Knowledge	Sufficient	54(66.7)	197(82.1)	1	1
	Insufficient	27(33.3)	43(17.9)	2.298(1.29-4.04)	2.39()1.12-5.11)
Attitude	Good Attitude	63(77.8)	199(82.9)	1	
	Poor Attitude	18(22.2)	41(17.1)	1.34(0.74-2.5)	

Hosmer Lemeshow p-value=0.091

6 Discussions

This study identified socio-demographic, environmental and behavioral factors to the acute bloody diarrhea among adults of age group ≥18 years.

Water consumption per capita was found to be a significant factor of acute bloody diarrheal diseases. Adults who had consumed ≥20 liters per day per capita were 68% times less likely to acquire acute bloody diarrhea compared to their counterpart. This finding is in line with similar study in finding in Bibugn district where adults use <20 liters per capital were 2.89 times more likely to develop acute bloody diarrhea(3). It is also supported by a sphere standard and meta-analysis result that increasing water quantity/adequate amount of water is necessary to reduce the occurrence of any water-related diarrheal diseases (35, 36, 42). In contrast in areas of low or inadequate water supply, the main transmission routes of acute bloody diarrhea are eating of fecal contaminated food and water (10).This might be due to the fact that an estimates of ≥20Lt per capital water consumption may enough for their personal hygiene, drinking, washing clothes, cooking, latrine use, and washing their materials and equipment clean.

Similarly, distance for fetching water was a significant factor where people who traveled for ≥ 30 mints for fetching were 2.66 times more likely to acquire acute bloody diarrhea than who had access on premises or less than 30 minutes. This might be related to the impact of traveling to have adequate amount of water. If there is long distance to have water, there may be a high probability to have water shortage, which results in poor personal, equipment, clothes and latrine hygiene. Findings of this study also supported that adults who had no water availability for at least one day in the last two weeks were 2.97 times more likely to acquire acute bloody diarrhea. A study conducted in Addis Ababa reported as irregular water flow in the household have an association with acute diarrhea among under five children (42, 43). This might results for poor personal and environmental hygiene that increase the risk for any type of diarrheal diseases including acute bloody diarrhea.

According to this study, drawing drinking water from storage was a factor for acute bloody diarrhea; participants who used dipping method to draw water from water storage containers were 2.95 times more likely to acquired acute bloody diarrhea compared to participants who used purring methods. Drinking water stored at household level tends to be less contaminated by purring method use, than dipping method use because the can/other used to draw water

from the storage might be contaminated with causative agent for acute bloody diarrhea and dipping the water drawing can/others in to the storage container might easily introduce the pathogenic microorganisms to the water that were prepared for drinking, which finally may led them get acute bloody diarrhea. This finding was in line with the study finding in Bibugn district of Ethiopia that dipping increase 2.49-time occurrence of acute bloody diarrhea among adults than whose use purring method(3). It was also supported by study findings from Kenya reveals (40.9%) water contamination occurred at the household level in rural compared with the main source (6). and Indonesia (28, 31) where water contamination was mentioned as determinant factor to acute bloody diarrhea. It is fact that water contamination occurred at all level from source to collection time, traveling, storage, drawing until last uses by poor handling.

Similarly, adults who did not use detergent during hand washing were 4.37 times more likely to be affected by the acute bloody diarrhea compared to those who used detergent. This finding was supported by study findings from Mozambique and India. Keeping soap or ash at the hand washing area after defecation and hand wash with detergent at critical time demonstrated a protective effect against moderate-to-sever-diarrhea. Moreover, detergent reduce the risk of any diarrhea diseases by 42 -47 % either through mechanical removal of loosely microorganism (36, 44, 45). This might be due to the power of soup to clean the causative agents of acute bloody diarrhea from our hand if we used it frequently in a proper manner. Generally, hand washing through detergent can be considered as universal prevention mechanism for water and food borne disease.

Participants who use shard latrine were 8.48 times more to acquired acute bloody diarrhea than those who used privet latrine. Different reviews and study finding reveals shared sanitation was associated with an increased risk of adverse health outcomes, including diarrhea (14, 37). This might be due to the status of latrine sanitation because of improper use among those who share it. It is true that when people use a private latrine, they will take more care and become accountable than the shared one. Improper utilization, no proper cleaning, and over crowdedness may increase the risk for being source of infection to acute diarrhea.
This study also identified that, those participants who have insufficient Knowledge about the prevention, control and management of acute bloody diarrhea were 2.39 times more likely to acquire acute bloody diarrhea. This finding was supported by a KAP study on water, sanitation and hygiene among residents of Parla village, Kurnool district, Andhra Pradesh(42,

46). It is true if people have knowledge on acute diarrhea transmission, prevention and management, they will take preventive action timely to prevent getting the disease.

The absence of any person with acute bloody diarrhea in the HH/village in the last two weeks, decrease the likelihood of cases by 64% to acquired acute bloody diarrhea than participants in contrast. The pathogenic agent of acute bloody diarrhea transmitted via fecal ingestion. If any person exist in the HH/Village with acute bloody diarrhea contaminates the drinking water and food due to inappropriate latrine utilization, open defecation and poor hand washing practices.

Whereas adults who did not always wash their hands before food preparation in the last two weeks were 2.27, times more likely to get acute bloody diarrhea than adults wash always wash their hands always in the study area. This study was supported in different findings that, hand washing at critical time before (eating, prepared food), after (defecation and care child) break the natural history of disease and reduce the risk of outbreak(6, 35, 47). These may due to proper hand washing blocks the transmit ion of pathogenic microorganisms from infected person to drinking water and food and consumed by other health person.

7 Limitation of the study

Limited literatures on acute bloody diarrhea will affect the quality of discussion

Fire of miss diagnosis of cases with concomitant bleeding may exist

8 Conclusions and recommendation

8.1 Conclusion

Based on this study, water availability, consumption and distance from main sources, not having independent latrine, insufficient knowledge on acute bloody diarrhea, no history any similar case in home/village and personal behavior (no hand washing habit before food preparation, method of drawing water from storage and no use of detergents) were statistically significant factors to acute bloody diarrhea among adults in the study area.

8.2 Recommendation

Based on the study finding our recommendation goes to the concerned body at each level.

1. The Regional, zonal, district water and energy sector collators with other stakeholders need to make accessible and adequate water supply to the community by considering population size and settlements.
2. The Amhara regional health bureau needs prepare and distribute leaflets, brochures, and pictorial teaching aids to the community to increase their awareness and skills on preventing them from acquiring bloody diarrhea.
3. It is better to educate and assist the community regularly to have private latrine services
4. West Gojjam zone health department and Bahir Dar Zuria district health office need to give regular supportive supervision and feedback for health facilities, on community awareness creation towards acute bloody diarrhea
5. The district HFs need to consider health education and promotion as their routine activity and give awareness creation about prevention, control and treatment of acute bloody diarrhea regularly using various strategies such as community meetings, elders and community leaders, religious places and peers.
6. Health extension workers should give regular health education on safe water handling, proper hand washing especially before food preparation and latrine utilization by using model households, role-plays, and possible detergents.
7. Further research is warranted including an observation the real practice of home water handling, hand washing practices, latrine access and utilization and qualitative support the quantitative one.

9 Reference

1. Ibrahim A, Al-Abduljabbar S, Abou Madi A . (2016). Enteric Protozoa Associated with Acute Diarrhea in Hospitalized Children in Qatar. Qatar Foundation Annual Research Conference Proceedings 2016: HBSP1531 http://dx.doi.org/10.5339/qfarc.2016.HBSP1531.
2. Margaret P, Herbert D, Theresa O. The patient presenting with acute dysentery A systematic review. ournal of Infection. 2012; 64:374-86.
3. Amogn B, Lemessa D, Solomon B. Determinants of Acute Bloody Diarrhea among Adult Outpatient Visits in Bibugn District, Northern Ethiopia. Insight Medical Publishing Group. 2018;26(1):13-9.
4. liebn-E-Abitaleb Hospital Z, IR Iran. Acute Bacterial Dysentery in Children. nfectious Diseases and Tropical Medicine Research Center. 2014;1(3 :e21589).
5. PHOEBE W, JAMES B. DYSENTERY (SHIGELLOSIS)CURRENT WHO GUIDELINES AND THE WHO ESSENTIAL MEDICINE LIST FOR CHILDREN. WHO; 2016.
6. Nijuguna C, Ngeru I, Mgab E, al e. enteric pathogens and factors associated with acute bloody diarrhoea,Kenya. BMC infection disease. 2016;DOI 10.1186/s12879-016-1814-6(16):477.
7. DuPont HL, Khan FM. Travelers' Diarrhea: Epidemiology, Microbiology, Prevention, and Therapy. jurnal of Travel Medicine by liseresources@glosacuk user on 18 November 2018. 2018;**1**(2).
8. Talan et al.Etiology of Bloody Diarrhea among Patients Presenting to United States Emergency Departments: Prevalence of Escherichia coli O157:H7 and Other Enteropathogens. Ettps://academicoupcom/cid/article-abstract/32/4/573/464449 by liseresources@glosacuk user on 28. 2018;32.
9. Holtz LR, Neill MA, Tarr PI. Acute Bloody Diarrhea: A Medical Emergency for Patients of All Ages. Division of Gastroenterology and Nutrition, Department of Pediatrics, Washington University School of Medicin. 2009;136(6).
10. Richard Baydack P, Carla Ens P. Shigellosis (Bacillary Dysentery) Reporting and Case Investigation. wwwmanitobaca. 2015.
11. Chengdong X, Xiao G, Jinfeng W, Xiangxue Z, Jinjun L. Spatiotemporal Risk of Bacillary Dysentery and Sensitivity to Meteorological Factors in Hunan Province, China. International Journal of Environmental Research and Public Health. 2018; 15(47).
12. Unicef/WHO. Diarrhoea :Why children are still dying and what can be done. 20 Avenue Appia, 1211 Geneva 27, Switzerland 2009.

13. FMoH. Public Health Emergency Management Guidelines for Ethiopia Addis abeba. 2012.

14. Baker KK, O'Reilly CE, Myron M. Levine ea. sanitation and Hygiene-Specific Risk Factors for Moderate-to-Severe Diarrhea in Young Children in the Global Enteric Multicenter Study, 2007–2011: Case-Control Study. plos medicine/kelly-k-baker@uiowaedu. 2016.

15. ICF CSACEa. Ethiopia Demographic and Health Survey 2016. Central Statistical Agency Addis Ababa, Ethiopia. 2016.

16. WHO. Bacterial Enteric Pathogens: Enterotoxigenic Escherichia coli (ETEC) Presentation to WHO Vaccine Advisory Committee. 2016.

17. Christopher M, Theo V, Rafael L, al e. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the GBD. wwwthelancetcom 2012;380.

18. WHO.2016.Global Health Estimates Summary Tables.http://www.who.int/healthinfo/global_burden_disease/en/

19. Diseases cCoEIaF. Review of Bacillary Dysentery in Hong Kong, 2003 - 2012. Center for health protection. 2012.

20. FMoH. Health and Health Related Indicators 2005 E.C (2012/2013). 2014.

21. Federal Democratic Republic of Ethiopuia MoH. HEALTH SECTOR DEVELOPMENT PROGRAMME IV ANNUAL PERFORMANCE REPORT. 2015.

22. Alemseged F, yami A, Birky W. et al.Investigetion of dysenteric outbreak and its causes in jimma city south of ethiopia. Ethiopia health J sci. 2009;19(3).

23. Amhara Health Bureau three years Inpatient Data base.

24. Institute ANRSHBAPH. PHEM Annual Report. 2010EFY.

25. Sean W. Pawlowski CAW, Richard Guerrant. Diagnosis and Treatment of Acute or Persistent Diarrhea. Center for Global Health, Division of Infectious Disease and International Health, University of Virginia School of Medicine, Charlottesville, Virginia. 2009;136:1874-86.

26. Yashwant K, Anshu S, Rakesh S, Sunil K. Distribution trends of Salmonella serovars in India (2001—2005). ransactions of the Royal Society of Tropical Medicine and Hygiene. 2009;103:390—4.

27. Nie C, L H, Yang L, Zhong G, Zhang L. Socio-Economic Factors of Bacillary Dysentery Based on Spatial Correlation Analysis in Guangxi Province, China. PLOS ONE | wwwplosoneorgChengjing. 2014;9(7).

28. Komarulzaman A, Smits J, Jong Ed. Clean Water, Sanitation and Diarrhoea in Indonesia: Effects of household and community. CE Working Paper 2014: 14-105.

29. Tajbakhsh1 M, Migura LGa, Rahbar M, al e. Antimicrobial-resistant Shigella infections from Iran: an overlooked problem. J Antimicrob Chemother. 2012;67:1128–33.

30. Bezatu M, Yemane B, Alemayehu W. Prevalence of diarrhea and associated risk factors among children under-five years of age in Eastern Ethiopia: A cross-sectional study. Open Journal of Preventive Medicine. 2013;3(7):446-53.

31. Ahmad Komarulzaman, Jeroen Smits & Eelke de Jong .Clean water, sanitation and diarrhoea in Indonesia: Effects of household and community factors. Global Public Health. 2017; 12:9, 1141-1155, DOI: 10.1080/17441692.2015.1127985.

32. Robert B, Ryan C, Jim W. et al.Fecal Contamination of Drinking-Water in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. PLoS Medicine. 2014;11(5):e1001644.

33. Hanna H. revalence of Diarrhea and Associated Risk Factors in Children Under Five Years of Age in Northern Nigeria.secondary data analysis from nigeria DHS2013. Appsala university. 2017.

34. Tambe A, Nzefa L, Nicoline N. Childhood Diarrhea Determinants in Sub-Saharan Africa: A Cross Sectional Study of Tiko-Cameroon. hallenges doi:103390/challe6020229. 2015;6:229-43.

35. book Sh. Humanitrial charter and minimem standared in humanitrian response. 2018.

36. Fewtrell L, Kaufmann RB, Kay D, Enanoria W, Haller L, Colford JM. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. http://infectionthelancetcom 2005;5(1):42-52.

37. Marieke Heijnen1 OC, Rachel Peletz1, Gabrielle Ka-Seen Chan1, Joe Brown3, Kelly Baker2, Thomas Clasen1,2. Shared Sanitation versus Individual Household Latrines: A Systematic Review of Health Outcomes. PLOS ONE | wwwplosoneorgChengjing. 2014;9(4).

38. Tesfaye AD, Moges TW, Feleke MY, Dagnachew MF, Getnet AG. prevalence and antimicrobial susceptibility patterns of Shigella and Salmonella Species among patients with diarrhea attending Gondar town health institutions, Northwest Ethiopia. Science Journal of Public Health. 2014; 2(5): 469-75.

39. WHO/UNICEF. Millennium Development Goal drinking water target met, Sanitation target still lagging far behind. 2010.

40. Ejemot R. I. EJE, Meremikwu M. M., Critchley J. A. Hand washing for preventing diarrhoea. [Meta-Analysis Review]. . 2008.

41. Bahir dar zuria wikipidia.

42. vision W, children st. KAP in WASH. FINAL REPORT NRC, SC, WV Kirkuk-IRAQ September 2015.

43. Adane M, Mengistie B, Medhin G, Kloos H, Mulat W Piped water supply interruptions and acute diarrhea among under-five children in Addis Ababa slums, Ethiopia: A matched case-control study. . PLOS ONE | wwwplosoneorgChengjing. 2017;12(7): e0181516.

44. Mathur P. Hand hygiene: Back to the basics of infection control. Indian J Med Res. 2011;134(5):611–20.

45. WHO/UNICEF.W A T ER: A SHARED RESPO NSIB ILI T Y wwwwssinfoorg. 2005.

46. Hothur R, Arepalli S, Bhadreshwara ADV. A KAP study on water,sanitation and hygienic among residents of Parla village, Kurnool district, Andhra Pradesh. Int J Community Med Public Health 2019;6:2081-5. .

47. Evidence of hand hygiene as the building block for infection prevention and control. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

Annex 1 : Informed Consent form

Title of the study: To assess Determinants of acute bloody diarrhea among adults >=18 years who visit outpatient patents department in GOVs health facility in Bahir Dar Zuria district of West Gojjam Zone, Amhara Region, Ethiopia, 2019

Hello *Dear participant!* My name is _____, professionally I am _____ and I am a working in_____ I am collecting data for research project intended to assess "Determinant of acute bloody diarrhea among adult outpatient patents of age 18 and above in Bahir Dar Zuria district". Now, I want to ask you, your willingness to participate on this research by your full interest. The research is important for you and for community by giving evidence-based information about contributing factors of acute bloody diarrhea to fight against the disease. We also assure that the interview process will not bring any harm to you and your family. Whatever information you provide will be kept strictly confidential, and will not be shared with anyone other than the investigator. Participation in this study is voluntary, and you can stop the interview at any time. However, we hope you will participate in the study since your views are important.

If you have any question related to the study, you can contact Sr. Etsehiwot Debe through phone number +2519 13160153, E-mail: debetsehiwote121@gmail.com

Would you be willing to participate? 1. Yes 2. No

Signature of the respondent: _____

Reviewer name:_____

Interviewer signature:_____

Annex 2: Questionnaires (tools) used for data collection

Kebele: _____ Health center:_____

Name and signature of data collector: _____

PART I. SOCIOE-CONOMIC CHARACTERISTICS

NO.	Questions	Response	Skip to
	Study participants status	1.Has acute bloody diarrhea 2.Has no acute bloody diarrhea	
101	Age of the Respondent	----------in years	
102	Sex of the Respondent	1. Male 2. Female	
103	Residency of Respondent	1.Urban 2. Rural	
104	Marital status of Respondent	1. Married 2. Single 3. Divorced 4. Widowed	
105	Educational level of Respondent	1. Not read and wright 2. Primary education 3. Secondary and above	
106	Occupation of the Respondent	1. House wife 2. Government employee 3. Merchant 4. Farmer 4. Other (specify):---------	
107	Family income on average per month	----------in birr	
108	Number of household members	----------in number	

PART II. ENVIRONMENTAL HEALTH CONDITIONS

201	From where do you get water for drinking?	1. Pipe 2. Protected well/spring 3. Unprotected well/spring 4. River 5. Others(specify	
202	Distance from the house to the water source (round trip in minutes average)	--------Minutes	
203	Daily water consumption(Per capital water consumption)	_____Litters	
204	Dose water not available at list for one day in the last two weeks from the sours	1. Yes 2. No	
205	Type of water collection container?	1. Pot 2. Plastic bucket 3. Iron bucket 4. Jerry can 5. Other(specify)------	
206	What is the type of drinking water storage container?	1 .Neck narrow container 2.Neck wild container	
207	Do you have latrine	1.Yes 2. No	
208	Ownership of the latrine	1. Privately owned 2. Shared 3. No latrine	If no skip to 215
209	Type of latrine facility	1. Private traditional pit latrine 2. Private wooden slab latrine 3. Private cement slab latrine 4.Private VIP latrine 5. Shared wooden slab latrine 6. Shared VIP latrine 7. Flash to sewerage system 8. Other (Specify)…	
210	Does the latrine currently functioning?	1. Yes 2. No	

211	Does the latrine you use has pit-hole cover?	1.Yes 2. No	
212	Do you use latrine?	1. Yes 2. No	
213	Do you use latrine always in the last two weeks?	1.Yes 2.No	
214	Do you have hand-washing facility after toilet?	1. Yes 2. No	
215	If the family has no latrine, where do you dispose human waste?	1. Open field 2. At the forest 3. At the river 4. Around the gourden 5. Other (specify)----	
216	How do you dispose waste? (more than one answer is possible)	1. Pit 2. Open field 3. Burning 4. Garbage can 5. Other (specify):	
217	Presence of person/s with acute diarrhea with bloody in your village	1. Yes 2. No	
218	Did you have direct/close contact with people who had acute bloody diarrhea in the last two weeks?	1. Yes 2. No	
PART III: BEHAVIORAL ASPECTS			
301	Do you wash your hand after defecation?	1.Yes 2.No	
302	For how many times did you wash your hand after defecation?	1.Alwayes 2.Sometime 3.Rarely 4. Never	
303	Did you always wash your hands after defecation in the last two week?	1. Yes 2. No 3. Other (specify):---------	

304	What materials do you use to wash hands after defecation?	1. Soap & water 2. Ash & water 3. Only water 4. Other (specify):---------	
305	Did you always wash your hands after cleaning and disposing children stools in the last two weeks?	1. Yes 2. No 3. Other (specify):---------	
306	Did you always wash your hands before food preparation in the last two weeks?	1. Yes 2. No	
307	Did you always wash your hands before eating in the last two weeks?	1. Yes 2. No	
308	Did you always eat cold foods after re-heated in the last two weeks?	1. Yes 2. No	
309	Do you store water for Drinking in separate container from other purposes (bathing, washing and others?	1. Yes 2. No	
310	Does the drinking-water storage container have a cover?	1. Yes 2. No	
311	Are there a separate can/others for taking drinking water from the storage container?	1. Yes 2.No	
312	Method of drawing of water from the storage container?	1. Dipping 2. Pouring	
313	Did you treat water in your home?	1. Yes 2. No	
314	IF yes in 316 what method you use treat drinking water to make it safer to drink. In the last two weeks?(not read chooses)	Boiling 2. Filtering 3. add Bishangary 4. add wohagar 5. Other(specify)	>one choose possible
	Knowledge Questions		
315	Have you heard about acute bloody diarrhea?	1. Yes 2. No	
316	Community definition of acute bloody diarrhea (Appropriate if say blood in stool)	1. Appropriate 2. In appropriate	

317	Dose it communicable or non-communicable disease	1. Communicable 2. Non communicable	
318	If yes, Q—what are methods of transition? Greater than one answer possible	1. Drinking contaminated water 2. Eating fecal contaminated food 3. Contact with person with diarrhea 4. Flies 5. Others (list)	
319	Is it preventable?	1. Yes 2. No	
320	If yes for Q--what are the prevention methods to dysentery	1. Use safe water 2. Proper latrine utilization 3. Proper west disposal 4. Hand washing at critical time 5. Others specify----------	
321	Do you think it is treated by medication?	1.Yes 2.No	
	Attitude questions		
401	Do you think separating drinking water with other uses prevent acute bloody diarrhea?	1.stringly agree 2. Agree 3. Neutral 4. disagree 5. strongly disagree	
402	Do you think proper liquid and solid waste disposal used to prevent acute bloody diarrhea?	1. Yes 2. No	
403	Do you believe open defecation risk for acute bloody diarrhea?	1. Yes 2. No	
404	Do you advice your neaborhode/friends to construct and use solid and liquid waste disposal?	1. Yes 2. No	
405	Will you report to HEWs if someone ill with acute bloody diarrhea?	1. Yes 2. No	

የፈቃደኝነት ማረፋፈጫ ቅጽ

ውድ የጥናታችን ተሳታፊ ! ስሜ ----------ይባላል፡፡ ሙያዬ ----------ሲሆን፤ የምሰራበት መሰሪያቤትም----------ውስጥ ነው፡፡ እርስዎን ያገኘሁበት ዋና ምክንያት በአዋቂዎች ላይ ደም የቀላቀለ ተቅማጥ የሚያመጡ መንስኤዎችን ለማወቅና ለውሳኔ ሰጭዎች መረጃ በመስጠት በሽታውን ለመቆጣጠርና ለመከላከል እንዲቻል ለማድረግ ነው፡፡

በዋናንት እንዲያውቁት የምፈልገው፡በጥናቱ የሚሳተፉት ፈቃደኝነት ብቻ እና በመሳተፍዎ በርስዎም ሆነ በቤተሰብዎ የሚደርስ ምንም ችግር እንደሌለ እንዲሁም በመጠየቁ ላይ ያለመሳተፍ ወይም ተሳትፎዎን በማንኛውም ሰዓት ማቋረጥ ይችላሉ፡፡ ነገር ግን እርስዎ የሚሰጡት መረጃ የዚህን ጥናት ለማሳካትና ችግሩን ለመፍታት ወሳኝ ነው፡፡ስለዚህ በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ ትክክለኛውን መረጃ እንዲሰጡኝና የርስዎንና የማህበረሰቡን ችግር መፍታት እንድንችል የበኩልዎን ድርሻ ይወጡ፡፡የሚሰጡት መረጃ ሚስጢራዊነቱ የተጠበቀና ለጥናቱ ብቻ የሚዎል ይሆናል፡፡ውድ ተሳታፊያችን ስለትብብርዎ በጣም አመሰግናለሁ፤ በጥናቱ ለመሳተፍ ፈቃደኛ መሆንዎን በተዘጋጀው ቦታ ላይ ይፈርሙልኝ፡፡ መረጃ ወይም እርዳታ ካስፈለግዎ የጥናቱ ባለቤት የሆነችውን ዕፀሕይዎት ደቤን በስልክ ቁጥር 0913160153 ወይም በኢ-ሜል debetsehiwote121@gmail.com ማግኘት ይችላሉ፡፡

በጥናቱ ለመሳተፍ ተስማምተዋል?

ሀ) አዎተስማምቻለሁ ለ) አልተስማማሁም አመሰግናለሁ!

እኔ ሙያተኞች ባማከሩኝ መሰርት የጥናቱ ተሳታፊ ለመሆን በፊርማየ አረጋግጣለሁ፡፡

የተሳታፊ ፊርማ----------,መለያ ቁጥር-------

የጠያቂው ስም----------

የጠያቂው ፊርማ----------

መጠየቁ የተካሄደበት ቀን----------

ክፍል ፡ ማህበራዊና ስነ ህዝባን መሰረት ያደረጉ መንስኤዎችን ለመዳሰስ የተዘጋጀ መጠየቅ			
ተ.ቁ	መጠየቅ	መልስ	ወደ-እለፍ
	የተሳታፊ ጤና ሁኔታ	፡.ደም የቀላቀለ ተቅማጥ ያለበት 2.ደም የቀላቀለ ተቅማጥ የሌለበት	
101	የመላሹ እድሜ	-----በአመት	
102	የመላሹ ጾታ	፡.ሴት 2.ወንድ	
103	የመኖሪያ ቦታ	፡.ገጠር 2.ከተማ	
104	የጋበቻ ሁኔታ	፡.ያላገባ/ች 2.ያገባ/ች 3.የፈታ/ች 4.በሞት የተለየቸው/ባት	
105	የትምህርት ደረጃ	፡.ማንበብና መፃፍ የማይችል 2.አንደኛ መረጃ 3. ሁለተኛ ደረጃና ከዚያ በላይ	
106	የስራ ዘርፍ	፡.የቤት እመቤት 2.የመንግስት ሰራተኛ 3.ነጋዴ 4.ግብርና 5.የቀን ሰራተኛ 6.ሌላ(ግልጽ)	
107	የቤተሰብ ብዛት	በቁጥር----------	
108	የቤተሰብ አማካኝ ወርሃዊ ገቢ	በብር----------	
	ክፍል 2፡ አካባቢያዊ ምክንያቶች		
201	የመጠጥ ውሃ ከየት ነው የምታገኙት?	፡.ከቧንቧ 2. ከተከለለ ጉድጓድ/ምንጭ 3.ካልተከለለ ጉድጓድ/ምንጭ 4.ከወንዝ 5.ሌላ(ግልጽ)	
202	ከቤት እስከ ውሃ መቅጃ ደርሶ መልስ የሚወስደው ጊዜ	በደቂቃ---------	
203	በቀን ምን ያሃል ውሃ ትጠቀማላችሁ?	በሊትር ----------	
204	ባለፉት ሁለት ሳምንት ውስጥ ቢያንስ ለነቀን (24ሰዓት) ውሃ ጠፍቶ ያውቃል?	፡. አዎ 2.ጠፍታ አታውቅም 3. አላውቅም	

205	ውሃ የምትቀዱት በምንድን ነው?	1. በእንስራ 2. በላስቲክ 3.በጀሪካን 4.ሌላ ጥቀስ-----	
206	የመጠጥ ውሃ የምታሰቀምጡት በምንድን ነው?	1.በአፈ ጠባብ እቃ 2. በአፈ ሰፊ እቃ	
207	ሽንትቤት አገልግሎት አላችሁ?	1.አዎ 2.የለኝም	መልሱ የለም ከሆነ ወደ ተ.ቁጥር215ይ ለፉ
208	ሽንትቤቱ ይዞታ አይነት?	1. የግል 2. የጋራ ከጎረቤት ጋር 3. የማህበረሰብ/የህዝብ የጋራ	
209	የመጸዳጃ ቤቱ አይንት?	1. የግል ወለሉ ካፈር የተሠራ 2. የግል ወለሉ ከእንጨት የተሠራ 3. የግል ወለሉ ከስሚንቶ የተሠራ 4. የግል ሆኖ የሽታ ማስወጫ ያለዉ 5. የጋራ ሆኖ ወለሉ ከእንጨት የተሠራ 6. የጋራ ሆኖ የሽታ ማስወጫ ያለዉ 7. በዉሃ የሚሰራ 8. ሌላ ካለ ይገለጽ.....	
210	መጸዳጃቤቱ አሁን እየሰራ ነው?alumni	1. አዎ 2. አይደልም	
211	ሽንትቤቱ/መጸዳጃቤቱ ከዳን አለው?	1. አዎ 2. የለውም	
212	እርስዎ በመጸዳጃ ቤት ይጠቀማሉ	1.አዎ ሁልጊዜ እተቀማለሁ 2.አልፎ አልፎ እጠቀማለሁ 3.አልጠቀምም	
213	ላለፉት ሁለት ሳምንታት ሳያቋርጡ በመጸዳጃ ቤት ይጠቀሙ ነበር?	1. አዎ 2. የለም	

214	ከመጸዳጃ ቤት እንደወጡ የጅ መታጠቢያ አገልግሎት አለዎት?	1. አዎ 2. የለውም	
215	መጸዳጃ ቤት ከሌለዎት የት ይጠቀማሉ?	1. ሜዳ ላይ 2. ጫካ 3. ወንዝ ዳር 4. ከቤት አጠገብ ጓሮ 5. ሌላ ካለ ----------	
216	ደረቅ ቆሻሻ እንዴት ታስወግዳላችሁ?	1 .በማጠራቀሚያ ሰብስቦ ማስወገድ 3. ማቃጠል 4. መቅበር 5. ከጓሮ መድፋት 6. ሌላ(ካለ)---------	
217	ባካባቢቸሁ ደምየቀላቀለ ተቅማጥ የታመመ ሰው አለ?	1. አዎ 2. የለም 3. አላውቅም	
218	በዚህ ሁለት ሳምንት ውስጥ ደም የቀላቀለ ተቅማጥ ከታመመ ሰው ጋር የቅርብ ንክኪ ነበርዎት?	1. አዎ 2. የለም 3. አላውቅም	
	ክፍል 3፡ ባህሪያዊ ምክንያቶች		
301	ከመጸዳጃ ቤት እንደወጡ እጅዎን ይታጠባሉ	1.አዎ 2.አይ	
302	ለቁጥር301አወ ፣ከመጸዳጃ ቤት እንደወጡ መቸመቸ ነው እጅዎን ሚታጠቡት	1.ሁልጊዜ 2.አልፎአልፎ 3.አልታጠብም	
303	በዚህ ሁለት ሳምነት ውስት ሳያቋርጡ ከመጸዳጃቤት መልስ እጅዎን ይታቡ ነበር?	1.አዎ 2.የለም	
304	እጅዎን በአብዛኛው በምንድን ነው የሚታጠቡት?	1.በውሃና ሳሙና 2.በውሃና በአመድ 3.በውሃ ብቻ 4.ሌላ(ግለጽ/ጭ)----------	
305	በዚህ ሁለት ሳምንት ውስት የህጻናትን ሰገራ ካሰወገዱ እና ህፃናትን ካፀዱ በኋላ እጅዎን ሳያቋርጡ ይታጠቡ ነበር?	1.አዎ 2.የለም 3.ህጻን አልተንከባከብሁም	

306	በዚህ ሁለት ሳምንት ውስጥ ምግብ ከመብላትዎ በፊት ሁልጊዜ እጅዎን ይታጠቡ ነበር?	1.አዎ 2.የለም	
307	በዚህ ሁለት ሳምንት ውስጥ ምግብ ከማብሰልዎ በፊት ሁልጊዜ እጅዎን ይታጠቡ ነበር?	1.አዎ 2.የለም	
308	በዚህ ሁለት ሳምንት ውስጥ የቀዘቀዙ ምግቦችን ሁልጊዜ እያሞቁ ይ ጠቀሙ ነበር?	1.አዎ 2.የለም	
309	የመጠጥ ውሃ ማጠራቀሚያ ለሌላ ከምትጠቀሙበት ውሃ የተለየ ነው?	1.አዎ 2. የለም(አንድላይ ነው)	
310	የመጠጥ ውሃ ማስቀመጫ ክዳን አለው?	1. አዎ 2. የለውም	
311	የመጠጥ ውሃ የሚጠልቁበት ለብቻው መቅጃ ጣሳ /ሌላ አላችሁ?	1. አዎ 2. የለም	
312	የመጠጥ ውሃ ከማጠራቀሚያው እንዴት ነው የምትቀዱት?	1. በማንቆርቆር 2. በመጥለቅ	
313	እቤታችሁ ውሃን ታክማላችሁ	1. አዎ 2. አናክምም	አናክምም ካሉ ወደ315ይለፉ
314	ለተቁ/316አዎ ከሆነ በዚህ ሁለት ሳምንት ውስጥ የመጠጥ ውሃን ለማከም ምን ተጠቅመዋል(ከሚከተሉት ቢነስ አንዱን የተጠቀመ ማፍላት፡ ማጥለል፡ ውሃኢጋረ/ቢሻነጋሬ መጨመር ወይም ሌላ)?	1.አዎ 2.የለም 3.ለላ(ግለጽ)------	
የውቀት መጠይቆች			
315	ስለደም ተቅማጥ ሰምተው ያውቃሉ?	1.አዎ ምቼ አውቃለሁ 2.ሰምቼ አላውቅም	
316	ጣዳፊ ደም ተቅማጥ ማለት ምን ማለት ነው(የማህበረሰብና ጠየናኬላ የበሽታ መግለጫን)(ማንኛወም ደም የቀላቀል ተቅማጥ ሁሉ መገለጫወቹ ናቸው)?	----------	
317	በሽታው ከሰው ወደ ሰው ይተላለፋል ብልው ያስባሉ?	1.አዎ ይተላለፋል 2. የለም አይተላለፍም 3. አላውቅም	
318	ለጥያቄ ተ.ቁ.320 አዎ ካሉ በምን በምን ይተላለፋል (ካንድ በላይ መልስ ይቻላል(ምርጫ አታንብብላቸው).	1.የተበከለ ውሃ በመጠጣት 2.የተበከለ ምግብ በመብላት 3.ከታመመ ሰው ጋር ባለ ንክኪ 4.በዝንብ 5.ሌላ(ጥቀስ)	
319	በሽታውን መከላከል ይቻላል	1.አዎ 2.አይቻልም	

320	ለጥያቄ ተ.ቁ.322 መከላከያ መንገዱ ምንድን ነው (ዘርዝር)(ካንድ በላይ መልስ ይቻላል(ምርጫ አታንብብላቸው/ቢላቸው)?	1.የተጣራ ውሃ መጠቀም 2.መጸዳጃ ቤት ሁልጊዜ መጠቀም 3.ቆሻሻን ባግባቡ ስወገድ 4.በወሳኝ ጊዜ እጅን ባግባቡ መታጠብ 5.ሌላ ካለ ዘርዝር	
321	የደም ተቅማጥ የታመመ ሰው በህክምና ይድናል ብለው ያስባሉ?	1.አዎ 2.አይቻልም 3.አላውቅም	
401	የመጠጥ ወሃን ከሌላው ውሃ መለየት የደም ተቅማጥን ይከላከላል ብለው ያምናሉ?	1. በጣም እስማማለሁ 2. እስማማለሁ 3. ገለልተኛ 4. አልስማማም 5. በጣም አልስማማም	
402	ደረቅና ፈሳሽ ቆሻሻን ባግባቡ ማስወገድ የደም ተቅማጥን ለመከላከል ይረዳል ብልው ያስባሉ?	1. አዎ 2. የለም 3. አላውቅም	
403	በየሜዳው መጸዳዳት ለደም ተቅማጥያጋልጣል ብለው ያስባሉ?	1. አዎ 2. የለም 3. አላውቅም	
404	የቆሻሻ ማ ስወገጃ ለሌላቸው ጎረቤት/ ገጓደኛዎትን የደረቅ እና የፍሳሽ ማስወገጃ እንዲሰሩ እና እንዲጠቀሙ መክረው ያውቃሉ?	1.አዎ 2. የለም	
405	ሰው የአጣዳፊ የደም ተቅማጥና ቢታመም ጤና ባለሙያ ይናገራሉ?	1. አዎ 2. የለም	

Declaration

I, the undersigned, declare that this is my original work and has never been presented by another person in this or any other university and that all the source materials and references used for this thesis have been duly acknowledged.

Name	Signature
Etsehiwot Debe	_____
Date of Submission	_____

The thesis has been submitted for examination with my approval as university advisors.

Name	Signature	Date
Advisor:1 Mulusew Andualem	_____	_____
Advisor: 2 Abebayehu Bitew	_____	_____

Examiners:

Internal examiner: Kebadenew Mulat	_____	_____