



**ASSESSMENT OF DIARRHEA IN UNDER-FIVE CHILDREN: A
COMPARATIVE CROSS-SECTIONAL STUDY IN OPEN DEFECATION
AND OPEN DEFECATION FREE RURAL SETTINGS IN DANGLA
DISTRICT, NORTH WEST ETHIOPIA**

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THE DEGREE OF MASTERS OF PUBLIC HEALTH IN ENVIRONMENTAL HEALTH**

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COLLEGE OF HEALTH SCIENCES
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ABBREVIATIONS/ACRONYMS

- CLTSH: Community Led Total Sanitation and Hygiene
- DALYs: Disability-Adjusted Life Year
- EDHS: Ethiopian Demographic Health Survey
- EFY: Ethiopian Fiscal Year
- FMOH: Federal Ministry of Health
- HEP: Health Extension Program
- HEW: Health Extension Workers
- HMIS: Health Management Information System
- JMP: Joint Monitoring Program
- MCH: Maternal and Child Health
- MEDHS: Mini Ethiopian Demographic Health Survey
- MDG: Millennium Development Goals
- NODF: Non Open Defecation Free
- NGO: Non-Governmental Organizations
- ODF: Open Defecation Free
- OD: Open Defecation
- PHAST: Participatory Hygiene and Sanitation Transformation
- SNNP: South Nations and Nationalities and Peoples
- UNDP: United Nations Development Programme
- UNICEF: United Nations international Child Emergency Fund
- WASH: Water, Sanitation and Hygiene

- WHO: World Health Organization

ABSTRACT

Background: Open defecation is a widespread problem in the developing world. This practice facilitates the transmission of diarrheal diseases – one of the leading causes of mortality in children under 5 in sub-Saharan Africa. In Ethiopia, still the national open defecation rate in 2014 was 34.1% (37.9% rural, and 8.7% at urban)

Objective: To assess diarrheal morbidity in under-five children and associated factors in ODF and non-ODF settings in Dangla district, north-west Ethiopia, 2016

Methods: The study period was February 2016. A community based comparative cross-sectional study design was employed. A multistage random sampling technique also applied. The total sample size was 550 i.e. 275 NODF and 275 ODF. A structured questionnaire and observation checklist was applied. After selecting 10 kebeles from each setting, the samples were distributed proportionally by their number of under-five children's. SPSS version 20 was used for data analysis. The study was approved by the Ethical Review Committee of Addis Ababa University School of Public Health and Dangla woreda Administration

Result: A total of 525 (263 from ODF and 262 from NODF) participants were interviewed making the response rate 95.45 %. The prevalence of diarrhea were 9.9% in ODF and 36.1% in NODF kebeles ($\chi^2=50.791$, $P=0.000$). From the total respondents, 158(60.3%) from ODF and 188(71.5%) from NODF kebeles uses unimproved water sources. The majority of the respondents in both ODF and NODF kebeles use jerrycan as their main storage for drinking water. The majority of respondents in both settings have private latrine. In ODF kebeles, Child immunization (AOR=0.037; 95%CI: 0.006-0.243), latrine presence (AOR=0.036; 0.006-0.233), water shortage (AOR=8.756; 95%CI: 1.130-67.831) and solid waste disposal (AOR=0.143; 95%CI: 0.020-0.998) have statistically significant association with diarrhea. Whereas in NODF kebeles Child Immunization (AOR=0.032; 95%CI: 0.008-0.123), water access of 7.5-15 liter/day (AOR=0.029; 95%CI: 0.006-0.152) and water access of greater than 15 liter/day

(AOR=0.068;95%CI:0.010-0.474),water shortage(AOR=18.478; 95%CI: 4.692-72.760) and Proper solid waste disposal(AOR=0.023;95%CI:0.005-0.117]) have statistically significant association with diarrhea.

Conclusion and recommendation: ODF status reduced the overall prevalence of under-five diarrhea among the individuals living in the ODF villages compared with the NODF villages. It is better to work together with line ministries, regions, zones, woreda health structures, government partners, and local NGO`s to improve, latrine presence at household, water shortage in household and solid waste disposal practices.

1. INTRODUCTION

1.1. BACKGROUND

The majority of Open Defecation (OD) practices, referred to in national surveys as defecating in fields, forests, bushes, bodies of water or other open spaces, take place in rural areas of low-income countries (1). The practice of open defecation is deeply rooted in poverty but has also been related to convention and customs in some countries and societies(2). Worldwide diarrheal disease is the second leading cause of death in under-five year children responsible for 1.7 million morbidity and 760, 000 mortality every year(3). In Ethiopia diarrhea kills half million under-five children annually next to pneumonia(4).

According to 2014 Joint Monitoring Programme (JMP)indicates,OD was reducing by half in developing regions from 1990 to 2012. About 825 million people practicing OD — reside in just 10 countries: Five in Asia: India, 597 million, Indonesia, 54 million, Pakistan, 41 million, Nepal, 11 million, China, 10 million, Five in Africa: Nigeria, 39 million, Ethiopia, 34 million, Sudan, 17 million, Niger, 13 million, Mozambique, 10 million (5). In the rest of the world, the number of people practicing open defecation is estimated at 182 million(1, 5).

In sub-Saharan Africa, it is estimated that 215 million people that is 8% of the urban population and 35% of the rural population continue to engage in OD(1).In Ethiopia, still the national open defecation rate in 2014 was 34.1% (37.9% rural, and 8.7% at urban)(6). This practice facilitates the transmission of diarrheal diseases – one of the leading causes of mortality in children under 5 in sub-Saharan Africa (7).

Totalsanitation approaches,the most promising approaches aim to empower communities as a whole to become ‘ODF’(8).This approach aims to raise awareness of the risks associated with OD and generates a collective sense of intolerance towards OD (9-11).Nevertheless, it has been

suggested that total sanitation approaches can result in rapid, significant improvements, and holds promise for decreasing open defecation in sub-Saharan Africa (12). In Ethiopia the south nations and nationalities and peoples (SNNP) region adapted CLTS to local Ethiopian conditions in 2003 GC and achieved a remarkably rapid reduction in OD(13). The approach was scaled up and mainstreamed in the national sanitation strategy and integrated into the Health Extension Worker program (13).

Poor sanitation, lack of access to clean water supply and inadequate personal hygiene are responsible for 90% of diarrheal disease occurrence, these can be easily improved by health promotion and education (4).The study was planned to study the prevalence of under-five diarrhea in ODF villages and compare the data with NODF villages.

1.2. STATEMENT OF THE PROBLEM

It is estimated that 1.7 billion cases of diarrhea occur every year, causing 800,000 deaths among children under 5 years of age worldwide (14, 15). It is estimated that 15% of the global population still engage in OD (1). It also underlines that OD leads to deadly diarrhea and other intestinal diseases which kills hundreds of thousands of children every year(16).About 80% of the rural and 20% of urban sub Saharan population have no access to safe water and sanitation(11).

In Ethiopia,3/4 of the health problems of under five children are communicable diseases comes from the environment, specially water and sanitation (17). Diarrhea is the leading cause of Under-5 mortality causing 23% deaths and around 44% stunted (5). In Ethiopia over 75-80% of the communicable disease are caused due to poor environmental health conditions arising from unsafe and inadequate water supply and poor hygienic and sanitation practices (17).An estimated 64,540 children could be saved every year by improving Water, Sanitation and Hygiene in the country(5).It is critical to understand what factors influence the pace to reduce OD in order to develop effective strategies to improving sanitation and reducing diarrhea morbidity and mortality caused by the lack of sanitation. Furthermore, there is a need for more realistic targets for global campaigns that will put forth following the MDGs that end in 2015.

To date, Information on the impact of ODF on under-five diarrhea is limited or meager as a comprehensive package. It is hypothesized that people living in the ODF villages will have reduced diarrheal-related morbidity and mortality compared with people living in non-opendefecation-free (NODF) villages. However, all exposure routes to the increased burden of disease must be considered.

1.3. SIGNIFICANT OF THE STUDY

Sanitation and hygiene-related diseases seriously impact the morbidity and mortality rates among children in developing countries. The knowledge of existing gaps in the differences between ODF and non-ODF kebeles can be linked to a proper problem inventory so this paper helps. This work also helps to appreciate the basics of ODF status in the prevention of diarrhea and also what changes can come after the ODF verification which in turn plays a major role in the proper planning and monitoring of sanitation & hygiene activities and programs that contribute for diarrhea prevention.

2. LITERATURE REVIEW

2.1. Diarrhea among under-five children

Diarrhea infection spreads through the ingestion of contaminated food or drinking-water, or person-to-person as a result of poor hygiene. There are three clinical types of diarrhea: (i) acute watery diarrhea which lasts several hours or days and includes cholera; (ii) acute bloody diarrhea, also called dysentery; and (iii) persistent diarrhea that lasts 14 days or longer(18).

Diarrhea is the most important disease globally, causing around 1.6–2.5 million deaths annually, many of them are children under 5 years old living in developing countries(18). About 1.8 million people die every year due to diarrhea, and children under the age of 5 years account for 90% of diarrhea. Moreover, 88% of diarrheal diseases are attributed to unsafe water supply, inadequate sanitation, and poor hygiene (19, 20). Overall child mortality could be reduced by 55% with the provision of safe water, sanitation and hygiene(21).

A longitudinal study in urban Brazil found that the major risk factors for diarrhea in the first three years of life were low socioeconomic status and poor sanitation condition therefore diarrheal disease could be substantially decreased by interventions designed to improve the hygiene and sanitary conditions of households (22).

In India Diarrheal morbidity assessed through personal interview was significantly higher (five times) in the NODF villages compared with ODF villages in the three months preceding the survey (2). Similar to the past morbidity, present morbidity also shows that diarrheal disease is six times more common among the individuals living in the NODF villages compared with the villagers of ODF villages (2). The study in India of ODF and NODF villages indicates that there is a reduction in diarrhea disease in villages that are ODF(2). The same study indicates 2.72% of the population suffered from diarrheal disease in ODF compared with 15.9% in NODF(2).

In 2008, diarrhea was the leading cause of death among children under 5 years in sub-Saharan Africa, resulting in 19% of all deaths in this age group(22). The prevalence of diarrhea in Ethiopia has wider variation, from 11% to 38% , that mainly depends on season, ecology, and water and sanitation coverage (17). In Ethiopia up to 60% of the current disease burden is attributable to poor sanitation where 15% of total deaths are from diarrhea, mainly among the large population of under-five year's children(4, 23). The study done in SNNP shows, the prevalence of diarrhea in under-five children was high in both ODF (24.7%) and non ODF (26.5%) households with no significant difference between the two communities (24).

2.2. ODF status and current WASH strategies

According to the Ethiopian ODF verification protocol, ODF kebeles must fulfill 100% of latrines are in use; Handwashing facilities are on working order and have water and soap or a soap substitute; Household safe water handling and existing water source/s are well protected from potential contamination by livestock and others, with good drainage (25). According to the government of Ethiopia there are 3,655 kebeles that were declared as to Open Defecation Free (ODF) in EFY 2006 (26). Moving from open defecation to fixed-point defecation achieves little health impact if the latrine is not used by all families, including children, is not maintained, or is not kept hygienically(27). Spot assessments of sanitation coverage over 13 districts of Amhara Region indicated an average coverage rate of 80% (27). A systematic and representative end line survey representative of the entire Amhara Region showed OD dropping from 64% to 40%(27). Although sanitation and hygiene development is not uniform throughout the learning woreda, latrine coverage in the first two years in many targeted kebeles climbed from as low as 5% to 100%(27). From study in Mozambique, disaggregated results for sanitation indicate a reduction in the sustainability of ODF status since the time of declaration i.e. in 2011 84% level of sustainability for ODF communities however in 2012 71% level of sustainability, this highlighted concerns about the overall sustainability (28).

Community-Led total Sanitation and hygiene (CLTSH), CLTS encourages community self-analysis of existing defecation patterns and threats, and promotes local solutions to reduce and ultimately eliminate the practice of open defecation(11, 29). CLTS initiatives do not stress latrine construction per se, and avoid the use of hardware subsidies (27, 29) instead, mobilization efforts focus on helping communities and individuals understand the health risks of open defecation and use disgust and shame as “triggers” to promote action, which ultimately lead to the construction and exclusive use of locally built low cost household latrines (11, 27). The ultimate goal of CLTS is that communities achieve and maintain “open defecation free” status (27, 30). The main

difference between CLTSH and other approaches are the rejection of hardware subsidies and the use of the “shame and disgust” trigger as the key motivation for behavior change (27). Sanitation and hygiene activities in Ethiopia are informed by a clear set of policies and strategies that has been adopted as the national approach for rural sanitation and there are also guidelines on CLTS facilitation, monitoring, verification, and certification (13, 25, 30, 31). Despite the policy framework and apparent institutional support, CLTS implementation is initiated primarily by non-government actors which is then often led by local government and trainings are held at national, regional, and woreda levels (13, 25, 30). The local government then ‘cascades’ CLTS from woreda to kebeles, providing training for HEWs on facilitation (13, 27). The cadre of HEWs is the primary local actor group supporting CLTS in Ethiopia Established in 2003 through the HEP(13). They work through health posts, conducting house-to-house visits to promote health and education and facilitating CLTS. As they are present in every kebeles, they are a force for scaling CLTS nationally(13, 27).

2.3. Hand washing practices and household water access, treatment and storage

The availability and utilization of a handwashing facility at strategic location can be an important behavior indicator. A concurrent study in Amhara region showed that while 40% of households had handwashing facilities, only 7% have water and soap for washing and cleansing purposes (27). While sanitation coverage increased, proportionally kept pace with increasing number of latrines, but remained about 16% (27). There were more latrines in the region, so more handwashing stations as well; but still at a constant and low percentage (27). The self-reported use of any cleansing agent increased from 55% to 60% and that difference is statistically significant(27). Knowledge of when to wash hands increased significantly, particularly knowledge to wash hands after defecation; but was not yet linked to increases in actual practice (27). Effort was made to increase handwashing stations with soap/ash and water. However, one limiting factor for handwashing behavior change is lack of water (27). The study in SNNP indicates, knowledge of hand washing at critical times, more positive answers were responded by the dwellers of ODF villages as compared to the non-ODF kebeles But, the overall number of hand washing facilities found at household level was low both in ODF (9.5%) and non-ODF (3.6%) villages(24).

Household water access, treatment and storage, inadequate protection or conservation of water sources leads to scarcity and increases the likelihood that available water will be unsafe to drink(32). According to 2014 mini EDHS, 55% of the households in have access to an improved source of drinking water i.e. 95% urban households and 46% rural households (6). Coverage levels for water and sanitation in Ethiopia remain low even considerable efforts by the government and

partner organizations (31). In general, hygiene awareness levels are also low, a fact which compounds the health risks associated with low water supply coverage (31). The study in SNNP shows the quantity of water the householders obtained per day is less than the national minimum standard from which slightly more than 66% households in the ODF and 60% in the non-ODF villages used their drinking water within a day (24). Use of narrow mouthed containers for drinking water storage and proper closing of them, properly placement of drinking water utensils, and use of separate kitchen was better in the ODF villages than the non-ODF ones However, practicing water treatment at home was poorer in the ODF villages (24).

2.4. The effect and status of WASH

In relation with water, sanitation and hygiene (WASH), Lack of access and serious concerns about sanitation and hygiene that contaminate water sources, food and other things that eventually cause diarrhea (32). However, 2.4 billion people, 40% of the total world population, lack improved sanitation and 80% of these people live in rural areas of the developing world(1).According to World Resources International inadequate access to water and sanitation contribute to 2.5 million childhood deaths each year from diarrhea (32).

In the WHO African Region, a total of 631 million people, (40%), had no access to any kind of improved sanitation facilities in 2000. This figure is about the same (36%) in 2002 for Sub-Saharan African nations (14, 17).Analyses of the impact of WASH in Nigeria shows that children under 5 years in households with access to both un-improved water and sanitation facilities had increased risk of child death.In addition the results revealed that households in rural areas, poor income households, care-givers age at birth, and illiterate parents had a significantly higher risk of child mortality. The findings also shows WASH community-based interventions are needed to prevent child deaths, and interventions should target low socioeconomic households in Nigeria(33).

Inadequate water supply and sanitation services are still the major cause of childhood illness death in Ethiopia, where the infant mortality rate is 77/1,000 live births and the under-five mortality rate is 123/1,000 live births (31).According to World Resources International inadequate access to water and sanitation contribute to 2.5 million childhood deaths each year from diarrhea (32).

Concerning with sanitation/latrine, Worldwide lack of sanitation is a serious health risk, affecting billions of people around the world, particularly the poor and disadvantaged of people (19, 34).Similarly, a recent meta-analysis that explored the impact of the provision of sewerage on diarrhea prevalence reported a pooled estimate of a 30% reduction in diarrhea prevalence and up to 60% reduction in areas with especially poor baseline sanitation conditions (22). Lack of

sanitation facilities compels people to practice open defecation and this increases the risk of transmission of diseases (19). The construction of latrine is a relatively simple technology that is used to prevent the spread of infectious diseases (17). Lack of sanitation facilities is a serious health risk and obliges people to practice open defecation, thereby increasing the risk of disease transmission (19). The use of sanitation facilities is known to interrupt the transmission of faeco-oral related disease (17).

In developing regions almost half the population does not have access to sanitary facilities an estimated 1.1 billion people practice open defecation, exposing themselves and their communities to major health risks(8). In sub-Saharan Africa, only 24% of the rural population was using an improved sanitation facility(19, 34). Systematic reviews suggest that improved sanitation can reduce rates of diarrheal diseases by 32%–37% (22).

The study in India shows, in the ODF villages 79% of the individuals were using a sanitary latrine and none of the individuals of the NODF villages was using a sanitary latrine (2). The same study also indicates by the result from In-depth interviews with the ODF villages revealed that, because of the shortage of water, they are not all using the pour-flush sanitary toilets; instead some are still practicing open field defecation (2). A longitudinal cohort study in Brazil shows that an increase in sewerage from 26% to 80% resulted in a 22% reduction of diarrhea prevalence in children; in those areas where the baseline diarrhea prevalence had been highest and safe sanitation coverage lowest, the prevalence rate fell by 43% (22).

Provision of sanitation facilities initiated in all parts of Ethiopia with interventions of health extension program (HEP) and continued investments to increase access to safe water and improved sanitation(27). The increasing coverage mainly achieved by campaign and most of the effort of health extension workers mainly focuses on new construction with less follow-up to utilization (23). In Ethiopia, according to mini EDHS 2014, about 91% of the households (54.5% in Urban and 96.5% in Rural) had access to non-improved facility but latrine facilities from the 91% households, 34.1 % have no facilities or they use bushes(6). The same data source indicated the proportion of households with private improved sanitation was only 4.5% (6). According to WHO/UNICEF JMP 2015 sanitation coverage estimates of Ethiopia, improved facilities is increased from 3% to 28%, shared facilities 4% to 14%, other un improved from 1% to 29% and OD were reduced from 92% to 29% from the year 1990 to 2015(35).

The study in SNNP shows, there was a significant difference in latrine availability between the ODF 79.4% and Non-ODF 59.1% but, those which were used at the time of visit were 74.5% in the ODF and 55% in the NODF villages respectively. The same study also indicates that among

the latrines 29.7% in the ODF and 22.6% in the non-ODF categories, had no proper soil slab this means that the slabs had holes other than the squat hole, or the pit holes were not properly covered and were exposed to flies but Only 58.0% and 55.6% latrines in the ODF and Non-ODF categories did provide any sort of privacy (shield), which is made up of plastic sheets, leaves, grass or tree branches (24). The same study indicates also that the proportion of hygienic latrines were 34.6% in the ODF kebeles and 56.0% NODF kebeles (24).

Analysis of the sub-components of safe sanitation for latrines across all surveyed households in Mozambique shows an increase of percentage of households have a latrine in 2011 and 2012 (99.4% and 95.4%, respectively) and a durable and easy to clean slab (98.9% and 95.4%, respectively), but other latrine quality (lid, roofing, privacy) and handwashing (presence of handwashing system, soap) sub-indicators drastically reduced(28). There are, moreover, powerful environmental reasons to improve sanitation and hygiene services for the poor because human waste is a major pollutant of rivers and ground water resources (31).A survey of 231 households in East and West Amhara showed only 36% of available latrines were well-maintained and only 26% of squat hole latrines were covered (27).

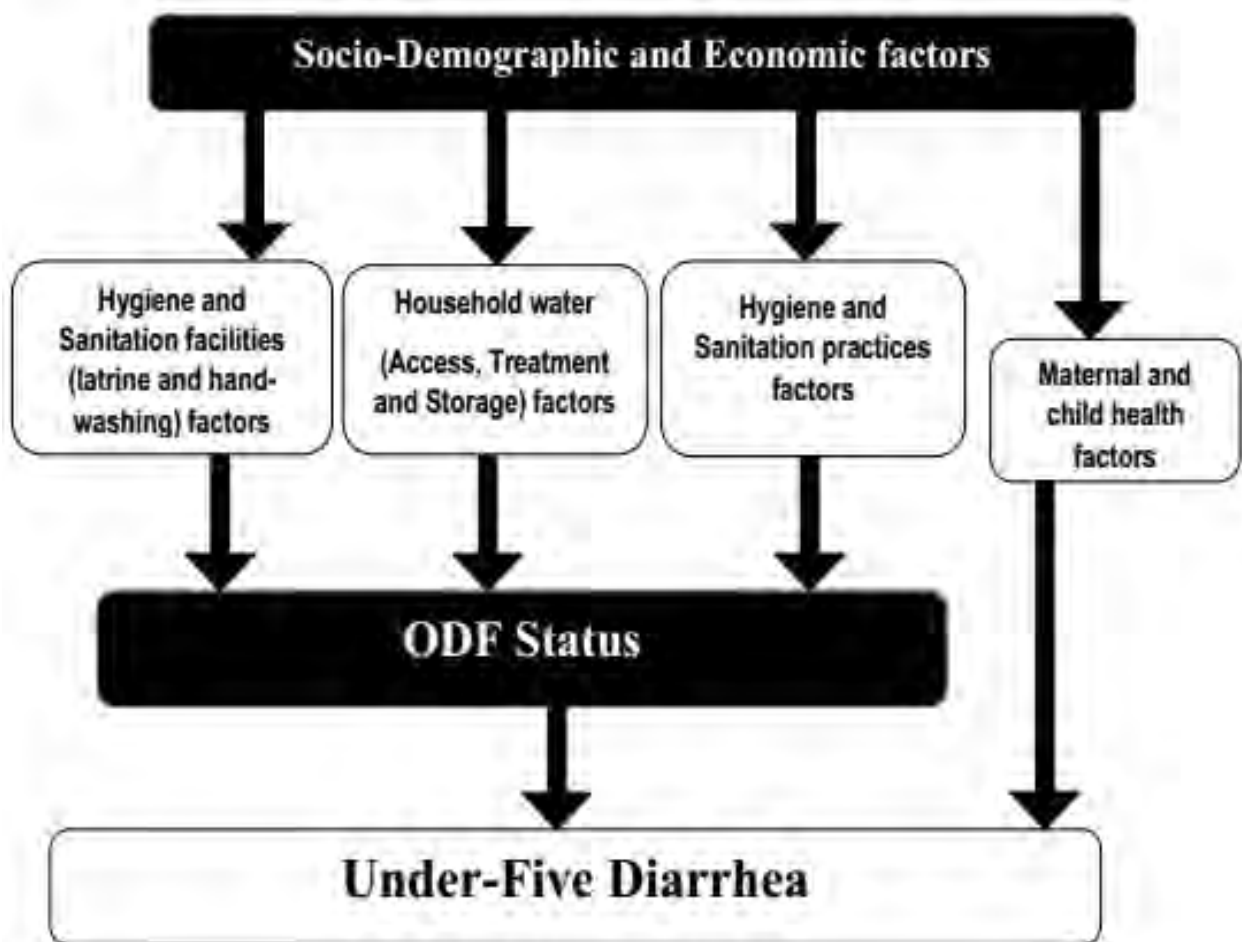


Fig.1. Conceptual framework of under-five diarrheal disease causes developed from different literatures, 2016

The conceptual framework helps us to understand well the basic causes of diarrhea. Problems i.e. socio economic and cultural factors, sanitation, Household water access, treatment and storage, hygiene practices and maternal and child health problems are the distal cause for diarrheal diseases and whereas ODF status are the Proximal factors for diarrheal diseases. In general environmental contamination i.e. ODF status is the major and basic cause for under-five diarrhea.

3. HYPOTHESIS

- Under-Five Diarrhea prevalence have no association withkebeles ODF status

4. OBJECTIVE

4.1. GENERAL OBJECTIVE

- To assess diarrheal morbidityin under-five children and associated factorsin ODF and non-ODF settings in Dangla district, north-west Ethiopia, 2016

4.2. SPECIFIC OBJECTIVE

- To describe the magnitude of diarrhea in under-five diarrhea in ODF and NODF settings in Dangla district, north-west Ethiopia, 2016
- To identify factors associated with diarrheal morbidityin ODF and NODF settingsDangla district, north-west Ethiopia, 2016

5. METHOD AND MATERIALS

5.1. STUDY AREA:The study was conducted in Dangla woreda which is one of the woreda found in Awi zone, a city located 480 kilometers away from the capital city Addis Ababa and 110 KM from regional capital Bahir Dar. In this woreda, there are 27 rural kebeles 15 of the kebeles were ODF and 19309 under five children's are living in the woreda. The region was selected purposively for sake of language and financial issues.

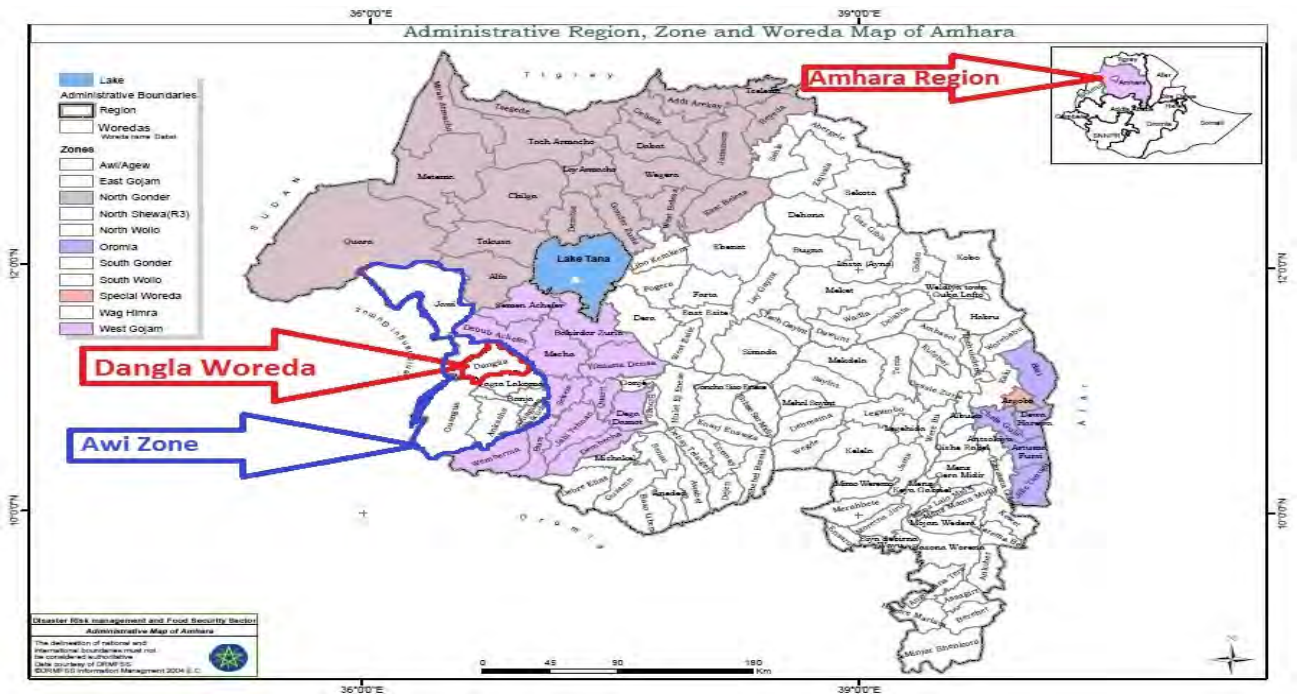


Fig.2. Pictorial presentation of Dangla Woreda, 2015

- 5.2. **STUDY PERIOD:**the study was conducted on February, 2016
- 5.3. **STUDY DESIGN:** The study was a community based comparative cross-sectional study design
- 5.4. **SOURCE POPULATION:**the population from which children and caretakers in ODF and NODF settings of Dangla woreda.
- 5.5. **STUDY POPULATION:**population who has children of under-five years of age lives in ODF and NODF settings of Dangla woreda.
- 5.6. **INCLUSION CRITERIA:**those households that have at least one under-five children in the house who lives in the OD or ODF kebeles
- 5.7. **EXCLUSION CRITERIA:**those households that are located in the urban settings because ODF status assignment is not applied in the urban settings
- 5.8. **SAMPLE SIZE:**

The sample size was calculated by epi-info by double proportion formula.

- The following formula is used with below assumptions

- Assumptions:
 - From the result gets from study done in Sidama zone(24), outcome of ODF kebeles (P1) = 24.7%, outcome of NODF (P2)= 26.5%
 - 95% confidence interval
 - 80% Power of test
 - Ratio between ODF and non ODF kebeles =1

- By using the assumptions we are trying to detect odd ratio of 2 then the sample size is 332 after that we multiply by 1.5 for design effect since the procedure takes many steps and in order to minimize the effects of multiple steps and the sample size becomes 498 then with 10% contingency the total sample size was be 550 i.e. 275 NODF and 275 ODF.

- Under five year children residing in ODF and non-ODF households were identified through a house to house enumeration prior to the actual data collection by using family folder by health extension workers. If there were two or more children's in one household, we taken the youngest from them.

5.9. SAMPLING TECHNIQUES: A multistage sampling technique was applied that means first the region was selected purposively for sake of language and financial issues then after zone, and woreda was selected randomly by lottery method. After selecting the woreda, the woreda health office already have list of kebeles by their ODF status i.e. 12 NODF and 15 ODF found in the woreda, then the kebeles from each status were selected randomly by lottery method after selecting the kebeles, the samples were distributed proportionally by their number of under-five children's. After knowing the number of samples for each selected kebeles, the individual samples were taken randomly by data collectors. The stages I use were; 1st stage: select kebeles; 2nd stage: select Gotts randomly, 3rd stage: select households who have under five child then 4th stage was select sampled mothers from the total mothers who have U-5 child therefore my sampling unit is mothers who have under five child. Geographically some of the kebeles of ODF are adjacent with non-ODF kebeles.

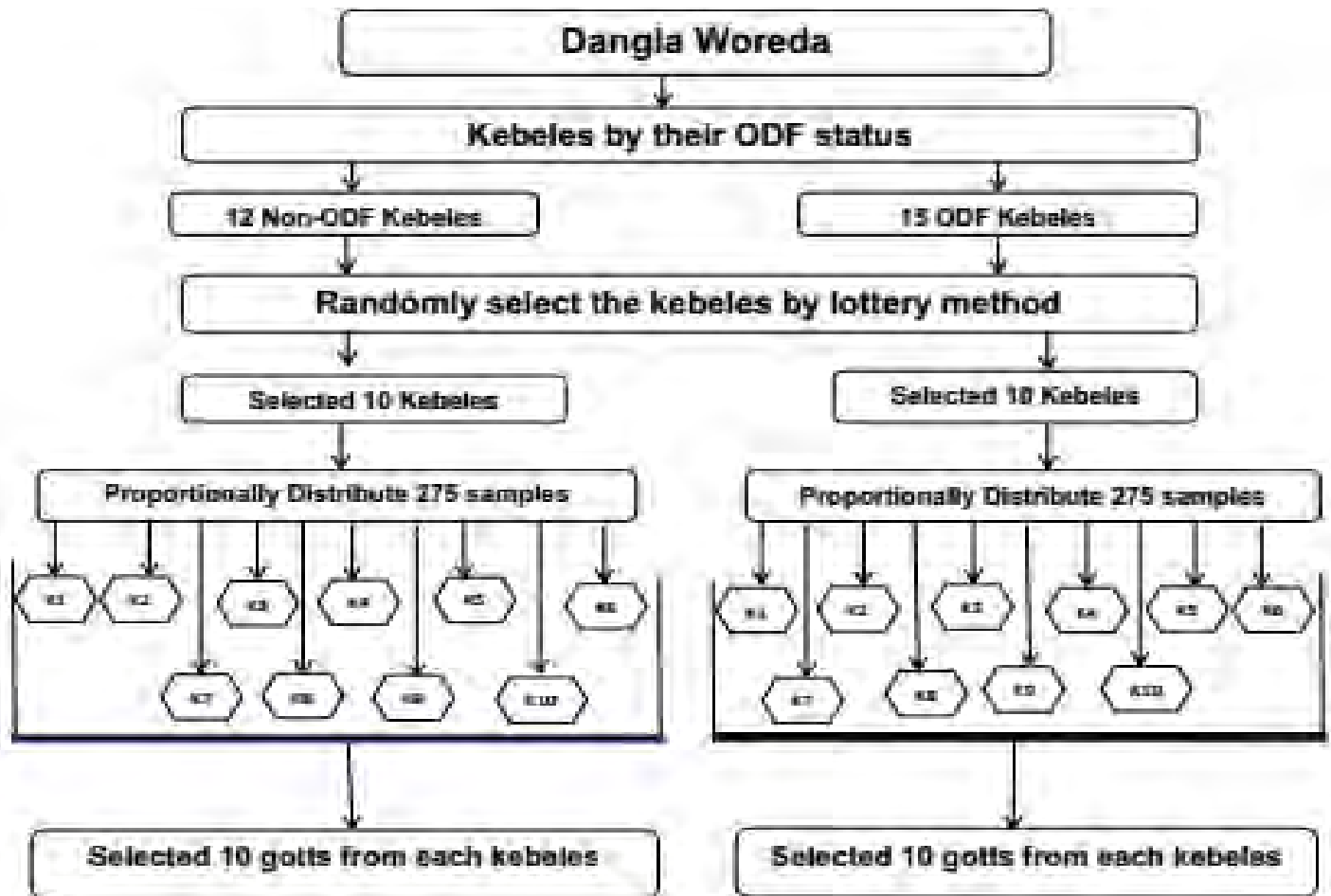


Fig.3. Sampling procedure of the assessment, Dangla District, 2016

Table 1: Proportionally distributed samples to selected kebeles by their under-five diarrhea number, Dangla District, 2016

Non-ODF KEBELES	Total U5	Sampled	Kebele code	ODF KEBELES	Total U5	Sampled	Kebele Code
Gult	605	23	K1	Afessa	588	24	K1
Dengeshita	926	35	K2	Wumbri	877	36	K2
Washa	559	21	K3	Ligaba	489	20	K3
Dimsa	448	17	K4	Muksi	807	33	K4

Abadira	1272	47	K5	Zunga	336	14	K5
Gissa	1174	44	K6	Gumdri	1122	46	K6
Kancen	1177	44	K7	East zelesa	339	14	K7
Zurzur	408	15	K8	Alefa	905	37	K8
May libach	338	13	K9	Dubi	594	24	K9
Badani	461	17	K10	Jibana	716	29	K10

5.10. DATA COLLECTION: The actual data collection was carried out in February 2016 by trained nurse students using a structured questionnaire administered to the heads of the house the under five children in the selected households and observation checklist was also apply to assess the latrine utilization.

5.11. DATA COLLECTION INSTRUMENTS: A structured questionnaire which is adopted from different literatures was administered to the mothers of the under five children in the selected households and observation checklist was also apply to assess the latrine utilization.

5.12. VARIABLES:

5.12.1. DEPENDENT VARIABLES: The dependent variable for the study is prevalence of diarrheal diseases in children under five years of age. The indicators for this variable is the incidence of diarrheal diseases in the under five children in two weeks preceding the study in accordance with WHO guideline.

5.12.2. INDEPENDENT VARIABLES: The association between the dependent and independent variable is examined in the study by:

- Household income(financial and material)
- Socio-cultural factors (education and cultural factors)
- Hygiene and sanitation variables (latrine and hand washing)
- Household water access, treatment and storage
- Hygiene and sanitation perception and practices (problems related with hygiene)
- Maternal and child health (MCH) factors (immunization, child caring, nutrition, food preparation and hygiene, mother's knowledge)

5.13. OPERATIONAL DEFINITIONS

- **Open defecation free (ODF):** is a status given by the woreda by their latrine, handwashing, household water access and safe storage coverages and practices as per the ministry of health ODF verification and certification criteria.

- **Diarrhea:** it is a disease characterized by frequent/>3 loose or watery stools in 24 hours, or a single stool with blood/mucus with a 14-day prior to study(20).
- **Respondents:** the person (preferably a parent to the index child) answering questions about the index child and other questions on diarrhea to the interviewer
- **Unimproved water sources:** Unprotected dug well, unprotected spring, cart with small tank or drum, surface water (e.g., river, dam, lake, pond, stream, canal or irrigation channel) and bottled water.
- **Improved water sources:** Piped water connection to household, public taps or standpipes, boreholes or tube wells, protected dug well, protected spring and rainwater collection.
- **Proper disposal:** is a way of disposal refuses that which included burning, burying in a pit or storing in a container and disposing in designed site, whereas disposing in open fields considered as unimproved disposal method(36).

5.14. DATA QUALITY CONTROL MEASURES: In order to prevent interviewer bias during data collection, kebeles was coded all field workers were trained prior to data collection and regular supervision was done during the field work. Each data collector checked the questionnaires for completeness before leaving each study participant. All filled questionnaires were reviewed at the end of the day by the supervisor. Original questionnaire was prepared in English and then translated in to Amharic and translated back to English to check consistency and pretesting was done on the data collection instrument before conducting the assessment to the quality of the data in 5% similar community.

5.15. DATA ANALYSIS AND MANAGEMENT:

Data were coded and entered into EPI/INFO version 7 and cleaned and checked for completeness. For advanced analysis, data were exported to SPSS Version 20 and Data were checked for missing values. Stratified analysis was conducted for variables having missing values and if there were no patterns observed they were not considered for further analysis. Variables were analyzed with appropriate statistical tests for their type. Data were initially analyzed by incorporating descriptive statistics. Bivariate and multivariate analyses were conducted sequentially. Statistical methods included frequency distribution, normality tests, Chi square test, logistic regression, odds ratio, p-values, and 95% confidence intervals. In all multivariate analyses an Enter model was used. Statistical significance was considered at $P \leq 0.05$. Adjusted odds ratios

with 95% confidence interval were calculated using a logistic regression model to control for known confounding factors. Tables and charts were used for data presentation

5.16. ETHICAL CONSIDERATIONS:The study was approved by the Ethical Review Committee of Addis Ababa University School of Public Health and Dangla woreda Administration grant permission to conduct the study.

- **Benefit of the study:**

- The result can be used as a baseline for further studies that can be done in this city.
- The result will be used in planning, resource allocation and monitoring purpose.
- This work also helps to appreciate the basics of ODF status in the prevention of diarrhea and also what changes can come after the ODF verification which in turn plays a major role in the proper planning and monitoring of sanitation & hygiene activities and programs.
- Children that were found sick during the study period were referred to the nearby health facility.

- **Harm of the study:** the study has no any harm without taking the participant's time during interview and discussion.

- **Rights of the participant hospital:**

- The participant can stop participating in the study at any time.
- During the interview the participant can ask questions which are not clear

- **Confidentiality:** - the secrecy of any information forwarded was maintained

- During data collection individuals will be informed about the purpose of the study, confidentiality, and the right not to participate or withdraw at any time.

5.17. DISSEMINATION OF RESULTS:The result of this thesis will be submitted to AAU school of public health, Dangla Woreda health office and Ministry of health. It will also be submitted for national and international journals for publication.

6. RESULTS

6.1. Socio-Demographic and Economic Characteristics

A total of 525 (263 household from ODF and 262 from non-ODF) participants were interviewed making the response rate 95.45 %. Among the respondents 162(61.8%) from ODF kebeles and 112(42.6%) from non-ODF kebeles were females. The total respondents' age ranged from 17-75 years with mean age of 39.14 and standard deviation (SD) of ± 11.97 . More than 156(59.5%) in ODF and 182(69.2%) in non-ODF of the respondents were aged ≥ 35 whereas 31(11.8%) from ODF and 17(6.5%) from non-ODF kebeles were in age between 15 and 24. The majority of the respondents in ODF 228(87%) and non-ODF 235 (89.4%) were remarried whereas 8(3.1%) from ODF and 5(1.9%) from non-ODF were unmarried. The family size of the total respondents in the study area ranged from 2 to 13 people with mean of 5.53 and standard deviation of ± 1.90 . From the respondents in ODF kebeles more than half's 133(50.8%) have family size ≤ 5 but in non-ODF kebeles 168(63.9%) of the respondents have family size more than five. Most of the mothers in the household (175(66.8%) among ODF kebeles and 173(65.8%) among non-ODF kebeles) are illiterate whereas more than half fathers in the household 148 (56.5%) from ODF kebeles were literate but 143(54.4%) fathers in non-ODF kebeles were illiterate. The majority of the household, 184(70.2%) in ODF and 205(77.9%) in non-ODF kebeles, have a children in education and from those children who are in education majorities, 144(78.3%) in ODF and 153(74.6%) in

non-ODF were attending primary education. From the total households, majority of mothers (198(75.6%) from ODF and 207(78.7%) from non-ODF) and fathers (249(95.0%) from ODF and 251(95.4%) from non-ODF) were farmers. As shown in table 1 more than half children in non-ODF kebeles 153(58.2%) were immunized whereas 210(80.2%) of the children in ODF kebeles were immunized and the rest are not immunized. The majority, 177(67.6%) in ODF and 202(76.8%) in non-ODF kebeles, of surveyed households had monthly income of less than 1000 ETB whereas 8(3.1%) from ODF and 30(11.4%) from non-ODF kebeles had monthly income of above 2001 ETB. (See Table 1)

Table 2: Participants Characteristics in selected both ODF and Non-ODF kebeles in Dangla woreda, North West Ethiopia, 2016

		ODF		Non-ODF	
		No	%	No	%
Age (in Years)	15-24	31	11.80%	17	6.50%
	25-34	75	28.60%	64	24.30%
	35+	156	59.50%	182	69.20%
Sex	Female	162	61.80%	112	42.60%
	Male	100	38.20%	151	57.40%
Family Size (Mean=5.53)	≤5	133	50.80%	95	36.10%
	>5	129	49.20%	168	63.90%
Marital Status	Unmarried	8	3.10%	5	1.90%
	Married	228	87.00%	235	89.40%
	Divorced	10	3.80%	13	4.90%
	Widowed	16	6.10%	10	3.80%
Educational status of mothers	Literate	87	33.20%	90	34.20%
	Illiterate	175	66.80%	173	65.80%

Educational status of father	Literate	148	56.50 %	120	45.60%
	Illiterate	114	43.50 %	143	54.40%
Occupation of mother	Farmer	198	75.60 %	207	78.70%
	Housewife	64	24.40 %	56	21.30%
Occupation of father	Farmer	249	95.00 %	251	95.40%
	Private	13	5.00%	12	4.60%
Educated Child in household	No	78	29.80 %	58	22.10%
	Yes	184	70.20 %	205	77.90%
Educational level of child	Higher Education	19	10.30 %	35	17.10%
	Primary/secondary Ed.	144	78.30 %	153	74.60%
	Read/write	21	11.40 %	17	8.30%
Child Immunization (any type)	No	52	19.80 %	110	41.80%
	Yes	210	80.20 %	153	58.20%
Average monthly net income (in ETB)	<1000	177	67.60 %	202	76.80%
	1000 to 2000	77	29.40 %	31	11.80%
	2001 and above	8	3.10%	30	11.40%

As shown in the table 2, more than half of the children in both ODF and non-ODF kebeles were not getting any type of vaccine.

Table 3: Types of vaccines the child immunized at both ODF and non-ODF kebelesin Dangla woreda, North West Ethiopia, 2016

Type of vaccine	Status of Kebele			
	NODF (263)		ODF (262)	
BCG	96	36.5%	115	43.9%
PCV	93	35.4%	105	40.1%
Polio	96	36.5%	113	43.1%
Penta	99	37.6%	108	41.2%
Measles	92	35.0%	114	43.5%
Rota	21	8.0%	22	8.4%

6.2. Diarrhea Occurrences

As shown in table 3, the prevalence of diarrhea among ODF kebeles were 26(9.9%) whereas in non-ODF kebeles the prevalence is 121(36.1%) with $X^2=50.791$ and $P=0.000$. From the total

diarrhea cases, the majority 121(77.9%) of under-five diarrhea cases were from those non-ODF kebeles but the load of under-five diarrhea in ODF kebeles was 26(22.1%). The majority of respondents in both ODF (19(73.1%)) and non-ODF (69(72.6%)) responded that the diarrhea disease were persists less than 5 days and also 25(96.15%) children in ODF kebeles and 85(89.47%) children in non-ODF kebeles were cared by their mothers.

The majority of respondents in non-ODF kebeles prepared food as clean as possible 190(72.2%), care for the hygiene of the baby 209(79.5%) and take care for hygiene of the family 192(73%) but 17(6.5%) the respondents didn't do anything additional beyond the normal habit to the new comer baby. Among the respondents in ODF kebeles the majority 207(79%) making clean food for new baby,182(69.5%) of the respondents care for hygiene of the family member and 160(61.1%) gives care for personal hygiene of the child but 56.9% of the respondents didn't prepare special food for the child and 4(1.5%) doing nothing for child.

Table 4: Diarrhea occurrences among ODF and non-ODF kebelesin Dangla woreda, North West Ethiopia, 2016

		ODF		Non-ODF	
		No	%	No	%
D i a r r h e a Occurrence	No	236	90.1%	168	63.9%
	Yes	26	9.9%	95	36.1%
	% within Diarrhea Occurrence		22.1%		77.90%
Diarrhea persists	<=5Days	19	73.1%	69	72.6%
	>5Days	7	26.9%	26	26.3%
Care giver of the sick child	Mother	25	96.15%	85	89.47%
	sister	1	3.85%	10	10.53%
Perception on Sources of Diarrhea	Food	21	43.8%	51	41.1%
	Water	26	54.2%	71	57.3%
	Utensils	1	2.1%	2	1.6%
D i a r r h e a p r e v e n t i o n m e c h a n i s m s done for child	Nothing done	5	1.9%	18	6.9%
	Specialfood for child	113	43.1%	161	61.2%
	Clean food for child	207	79.0%	190	72.2%
	Carefor hygiene of Child	160	61.1%	209	79.5%
	Care for hygiene of family	182	69.5%	192	73.0%

As the respondents perceived, more than half of the under-five diarrhea cases 26(54.2%) in ODF and 71(57.3%) in non-ODF kebeles were cause by water sources whereas 1(2.1%) diarrhea case in ODF kebeles and 2(1.6%) of under-five diarrhea cases in non-ODF kebeles were caused by utensils.

The majority of the respondents in non-ODF kebeles perceived that treating water 225(85.6 %), use of latrine 213(81%) and hand washing with soap 210(79.8%) prevents child from diarrhea. Similarly, more than 70% of the respondent in ODF kebeles perceive treating water, use of latrine and hand washing with soap prevent child from diarrhea.

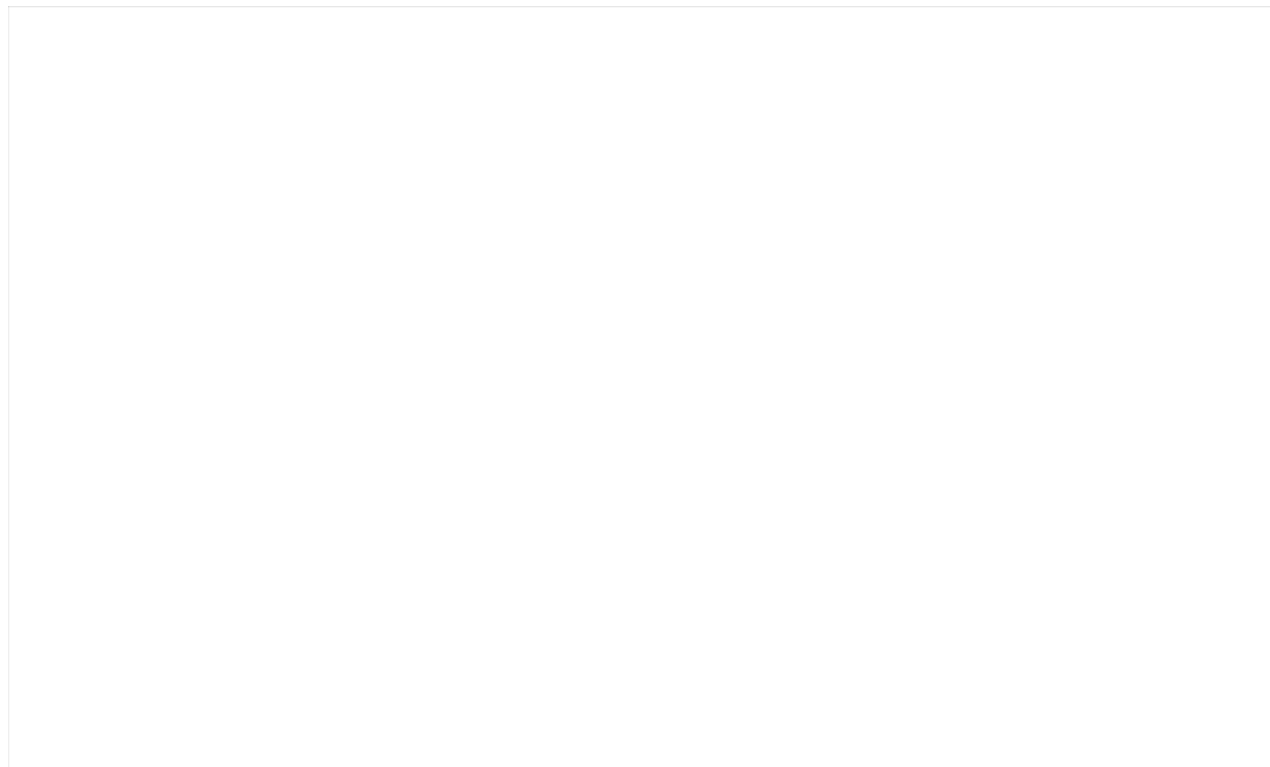


Fig 4: Household diarrhea prevention mechanisms for under-five Childs in both ODF and NODF kebeles in Dangla woreda, North West Ethiopia, 2016

6.3. Household water access, treatment and safe storage

As shown in the above table 4, 158(60.3%) from ODF and 188(71.5%) from non-ODF kebeles uses unsafe water sources. The majority of the respondents in both ODF 259(98.9%) and NODF

256(97.3%) kebeles use jerrycan as their main storage for drinking water. In regard to distance of water for drinking majority in both ODF 213(81.3%) and NODF 246(93.5%) kebeles access water with in 1km radius. According to sphere handbook of water, sanitation and hygiene for humanitarian charter and minimum standard in humanitarian response, nearly half 152(58%) of the respondents from ODF kebeles satisfy basic survival water need (7.5-15 li/day/person) whereas 98(37.7%)households in non-ODF kebeles satisfy the basic survival water need. From the total respondents majorities from ODF 203(77.5%) satisfy the minimum standard but in NODF 115(43.7%) didn't.

The majority 196(74.8%) in ODF kebeles responded that there is no water shortage whereas nearly half 128(48.7%) in NODF kebeles faces water shortage. Among thosewith water shortage, 28(42.4%) from ODF and 58(45.3%) from ODF kebeles faces shortage more than a week.

Table 5: Households Main sources of drinking water in both ODF and non-ODF kebeles in Dangla woreda, North West Ethiopia, 2016

		ODF		Non-ODF		Chi-Square (P-Value)
		No	%	No	%	
Per capita water consumption (li/day)	<7.4	59	22.5%	115	43.7%	29.695 (0.000)
	7.5-15	152	58.0%	98	37.3%	
	>15.1	51	19.5%	50	19.0%	
Main sources of drinking water	Improved	104	39.7%	75	28.5%	3.26 (0.071)
	Unimproved	158	60.3%	188	71.5%	
Drinking water storage	Jerycan	256	97.3%	259	98.9%	
	Pot	20	7.6%	9	3.4%	
Distance of water source (meters)	<=1000	213	81.3%	246	93.5%	2.608 (0.106)
	>1000	49	18.7%	17	6.5%	
Do U treat water	No	222	84.7%	204	77.6%	4.4 (0.036)
	Yes	40	15.3%	59	22.4%	
Frequency of water treatment	Always	2	5.0%	2	3.4%	7.7 (0.051)
	Sometimes	30	75.0%	55	93.2%	
	Usually	8	20%	2	3.4%	
Water shortage	No	196	74.8%	135	51.3%	31.05 (0.000)
	Yes	66	25.2%	128	48.7%	
Frequency of water shortage	<1week	38	57.6%	70	54.7%	0.147 (0.71)
	>1week	28	42.4%	58	45.3%	

The majority of respondents in both ODF 222(84.7%) and NODF 204(77.6%) kebeles didn't treat water they use for drinking. Among those who treat water, the majority 30(75%) in ODF and 55(93.2%) in NODF kebeles treat the water sometimes and 33(82.5%) from ODF and 37(58%) from NODF kebeles treat water by chemicals but in both kebeles settings other kind of treatment methods have a minimum coverage.



Fig 5: Households type of water treatment in both ODF and non-ODF kebeles in Dangla woreda, North West Ethiopia, 2016

6.4. Hygiene and Sanitation Practices

The majority of respondents in both ODF 235(89.7%) and non-ODF 244(92.8%) have private latrine. From those households that have latrines, the majorities are traditional pit latrine (229(87.4%) among ODF and 231(87.8%) among non-ODF). Among the households latrine, 44(18%) in non-ODF and 41(17.4%) in ODF constructed 3 years and above while 13(5.3%) of latrines in non-ODF and 9(3.8%) of latrines in ODF kebeles are constructed less than one year. As shown in the below table 6, 30(12.8%) respondents from ODF and 79(30%) from NODF kebeles defecate openly after they construct latrine.

Table 6: households latrine ownership, type of latrine, years of latrines constructed and households latrine utilization practice in Dangla woreda, North West Ethiopia, 2016

		Kebele status				Chi-Square (P-Value)
		ODF		Non-ODF		
		No	%	No	%	
Latrine Presence	No	27	10.3%	19	7.2%	1.56(0.212)
	Yes	235	89.7%	244	92.8%	
Latrine type	Shared	6	2.3%	13	4.9%	3.97(0.137)
	Traditionalpit	229	87.4%	231	87.8%	
Years latrine construct	<1 year	9	3.8%	13	5.3%	0.79(0.852)
	1-2 years	72	30.6%	76	31.1%	
	2-3 years	113	48.1%	111	45.5%	

	3+ years	41	17.4%	44	18.0%	
Defecate openly after latrine constructed	No	205	87.2%	165	62.7%	27.74(0.000)
	Yes	30	12.8%	79	30.0%	

As shown in table 6, 120(45.8%) from ODF kebeles and 89(33.8%) from NODF kebeles have hand washing container, 113(43.1%) from ODF kebeles and 77(29.3%) from NODF kebeles households have water in the hand washing container and 82(31.3%) from ODF kebeles and 50(19%) households have soap/ash in hand washing facilities (73.8%) around privately owned latrine. In regard to hand washing practices, the majority (216(82.1%) in NODF and 238(90.8%) in ODF) of respondents wash their hands at meal time whereas 162(61.6%) from non-ODF and 160(61.1%) from ODF kebeles wash hands after toilet. The majority of respondents in both ODF (79%) and non-ODF (73.8%) kebeles uses soap/ash at hand washing time in 24 hour recall.

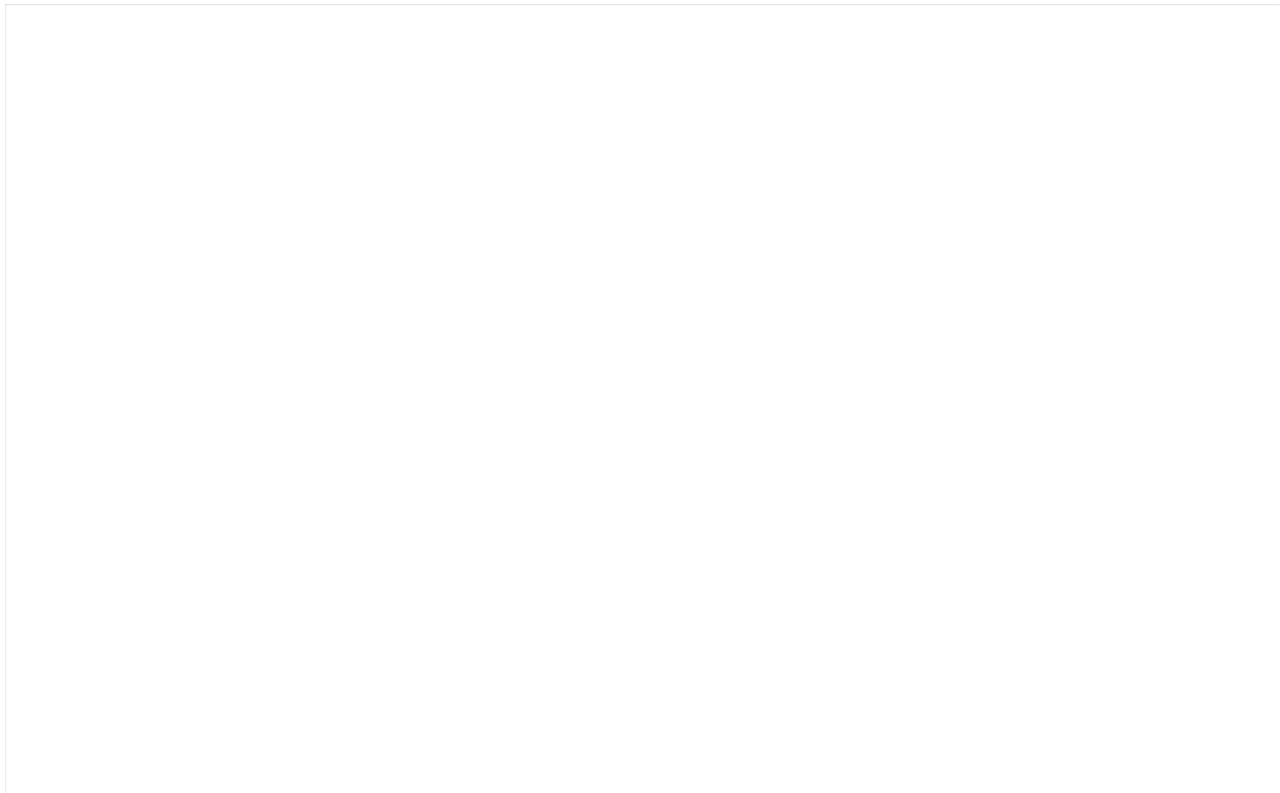


Fig 6: Observation checklist result of household that have latrine in Dangla woreda, North West Ethiopia, 2016

Table 7: Households handwashing presence and practice in Dangla woreda, North West Ethiopia, 2016

		Kebele status			
		ODF		Non-ODF	
		No	%	No	%
Hand washing facilities around latrine	Container	120	45.8%	89	33.8%
	Water in container	113	43.1%	77	29.3%
	Soap	82	31.3%	50	19.0%
Hand Washing	Meal time	238	90.8%	216	82.1%

times	Food Preparation time	177	67.6%	183	69.6%
	After toilet	160	61.1%	162	61.6%
	Early Morning	189	72.1%	205	77.9%
	At feeding child	94	35.9%	120	45.6%
	Other HW practice	2	.8%	2	.8%
Hand washing with soap	No	55	21.0%	69	26.2%
	Yes	207	79.0%	194	73.8%

As shown in the above table 7, 90(34.4%) of households from ODF and 156(59.3%) of households from non-ODF kebeles dispose openly their solid waste while 20(7.6%) from ODF and 117(44.5%) from non-ODF kebeles dispose their liquid waste openly.

Table 8: Households solid and liquid waste management in Dangla woreda, North West Ethiopia, 2016

		Kebele status				Chi-Square (P-Value)
		ODF		Non-ODF		
		No	%	No	%	
Liquid waste disposal	Improper	90	34.4%	156	59.3%	32.85(0.000)
	Proper	172	65.6%	107	40.7%	
Solid waste Disposal	Proper	242	92.4%	146	55.5%	92.43(0.000)
	Improper	20	7.6%	117	44.5%	

As shown in the above table 8, in regards to water treatment, from those who treat water for drinking 20% (P-Value=0.021 and chi-square=5.362) in ODF and 55.9% (P-Value=0.000 and chi-square=12.937) in NODF kebeles acquire diarrhea. The cross tabulation result showed that among those who use improved water sources for drinking, 9.6% in ODF kebeles (P-Value=0.018 and chi-square=0.892) and 16% in NODF kebeles (P-Value=0.000 and chi-square=18.411) acquire diarrhea. In regards to soap/ash utilization for hand washing after toilet in 24hr recall and under-five diarrhea 90.3% in ODF kebeles (P-Value=0.783 and chi-square=0.078) and 66.5% in NODF kebeles (P-Value=0.139 and chi-square=2.194) of the respondents who use soap/ash didn't get sick of diarrhea. As shown in the cross tabulation table, among those who have latrine 3% in ODF kebeles (P-Value=0.000 and chi-square=123) and 33.2% in NODF kebeles (P-Value=0.000 and chi-square=12.523) acquire diarrhea disease while among those no having latrine 70.4% in ODF kebeles (P-Value=0.000 and chi-square=123) and 73.7% in NODF kebeles got diarrheal disease (P-Value=0.000 and chi-square=12.523). The cross tabulation result shows that, 7.6% from ODF kebeles (P-Value=0.007 and chi-square=3.134) and 15% from NODF kebeles (P-Value=0.000 and chi-square=35.032) who dispose their liquid waste properly and from those who dispose solid waste improperly 75% from ODF kebeles (P-Value=0.000 and chi-square=102.58) and 66.7% from NODF kebeles (P-Value=0.000 and chi-square=85.221) acquire the disease.

Among those households having per capita water consumption less than 7.4lit/day, 72.9% in ODF kebeles didn't got diarrhea (P-Value=0.000 and chi-square=27) whereas 63. % from NODF kebeles acquires the disease (P-Value=0.000 and chi-square=66.603). The majority of household, 94.7% from ODF kebeles and 77.9% from NODF kebeles, who have less than 5 family size didn't acquire diarrhea with (X²=6.564 and P=0.01) and (P-Value=0.000 and chi-square=12.663) respectively. Among the mothers who are literate, 88.5% from ODF kebeles(X²=0.359 and P=0.549) and 54.4% from NODF kebeles(X²=5.277 and P=0.022) didn't acquire diarrhea whereas

from those mothers who are farmers, 9.1% from ODF($X^2=0.629$ and $P=0.428$) and 39.6% from NODF kebeles($X^2=5.137$ and $P=0.023$) acquire the disease. Among those households who have educating son/daughter, 9.2% from ODF and 34.1% from NODF acquire under-five diarrhea disease with $X^2=0.324$ and $P=0.569$ and $X^2=1.572$ and $P=0.21$ respectively. Among those households who have monthly income <1000ETB, 8.2% from ODF kebeles (P -Value=0.001 and chi-square=13.091) and 39.1% from NODF kebeles (P -Value=0.097 and chi-square=4.659) acquire diarrhea whereas from those who have monthly income 1000 to 2000 ETB 91.9% from ODF (P -Value=0.001 and chi-square=13.091) and 80.6% from NODF kebeles (P -Value=0.097 and chi-square=4.659) didn't acquire the disease. Among those households their water source >1000meter, 18.4% from ODF and 82.4% from NODF kebeles were acquire the disease with (P -Value=0.028 and chi-square=4.807) and (P -Value=0.000 and chi-square=16.835) respectively. In regard to water shortage, 30.3% of households from ODF and 60.9% households from NODF who face water shortage got diarrhea with (P -Value=0.000 and chi-square=40.991) and (P -Value=0.000 and chi-square=66.553) respectively.

Table 9: Cross tabulation of diarrhea occurrence with some independent variables in Dangla woreda, North West Ethiopia, 2016

Variables		ODF kebeles					Non-ODF kebeles					
		Diarrhea Occurrence				X ²	P-value	Diarrhea Occurrence				X ²
		No		Yes				No		Yes		
No	%	No	%	No	%	No	%	No	%			
Use soap/ash yesterday	No	49	89.1	6	10.9	0.078	0.783	39	56.5	30	43.5	2.194
	Yes	187	90.3	20	9.7			129	66.5	65	33.5	
Per capita water consumption (li/d/p)	<7.4	43	72.9	16	27.1	27	0.000	42	36.5	73	63.5	66.603
	7.5-15	147	96.7	5	3.3	85	86.7	13	13.3			

	>15.1	46	90.2	5	9.8			41	82.0	9	18.0	
Family size	≤5	126	94.7	7	5.3	6.564	0.01	74	77.9	21	22.1	12.663
	>5	110	85.3	19	14.7			94	56.0	74	44.0	
Educational status of mothers	Literate	77	88.5	10	11.5	0.359	0.549	49	54.4	41	45.6	5.277
	Illiterate	159	90.9	16	9.1			119	68.8	54	31.2	
Occupation of mother	Farmer	180	90.9	18	9.1	0.629	0.428	125	60.4	82	39.6	5.137
	housewife	56	87.5	8	12.5			43	76.8	13	23.2	
Educated children in home	No	69	88.5	9	11.5	0.324	0.569	33	56.9	25	43.1	1.572
	Yes	167	90.8	17	9.2			135	65.9	70	34.1	
Average monthly net income (in Birr)	<1000	157	91.8	14	8.2	13.09	0.001	123	60.9	79	39.1	4.659
	1000-2000	68	91.9	6	8.1			25	80.6	6	19.4	
	2000-3000	11	64.7	6	35.3			20	66.7	10	33.3	
Main sources of drinking water	Improved	94	90.4	10	9.6	0.018	0.892	63	84.0	12	16.0	18.411
	Unimproved	142	89.9	16	10.1			105	55.9	83	44.1	
Water distance (in Meter)	≤1000	196	92	17	8.0	4.807	0.028	165	67.1	81	32.9	16.835
	>1000	40	81.6	9	18.4			3	17.6	14	82.4	
Water treatment	No	204	91.9	18	8.1	5.362	0.021	142	69.6	62	30.4	12.937
	Yes	32	80.0	8	20.0			26	44.1	33	55.9	
Water shortage	No	190	96.9	6	3.1	40.991	0.000	118	87.4	17	12.6	66.553
	Yes	46	69.7	20	30.3			50	39.1	78	60.9	
Latrine Presence	No	8	29.6	19	70.4	123	0.000	5	26.3	14	73.7	12.523
	Yes	228	97	7	3.0			163	66.8	81	33.2	
Solid waste Disposal	Properly	231	95.5	11	4.5	102.58	0.000	129	88.4	17	11.6	85.221
	Improper	5	25	15	75.0			39	33.3	78	66.7	
Liquid waste disposal	Improper	77	85.6	13	14.4	3.134	0.007	77	49.4	79	50.6	35.032
	Properly	159	92.4	13	7.6			91	85.0	16	15.0	

6.5. Bivariate and Multivariate regression analysis results

Bivariate and multivariate logistic regression analyses were done to identify the factors associated with diarrhea occurrence in ODF and Non ODF kebeles. In the bivariate logistic regression analysis, family size of greater than five showed a statistically significant association with diarrhea occurrence both in ODF (COR= 3.109; 95%CI: 1.260-7.674) and Non ODF (COR=2.774; 95%CI: 1.565-4.917) Kebeles. Both occupation and educational level of the mother was statistically insignificant predictor of diarrhea occurrence in ODF Kebeles while it was significant in Non ODF Kebeles.

Child immunization showed a statistically significant association with diarrhea occurrence both in ODF (COR=0.018; 95%CI: 0.005-0.065) and Non ODF (COR=0.051; 95%CI: 0.027-0.098) Kebeles. Similarly, latrine presence also showed a statistically significant association with diarrhea occurrence both in ODF (COR=0.013; 95%CI: 0.004-0.040) and Non ODF (COR=0.177; 0.062-0.510) Kebeles.

Main source of water showed statistically insignificant association with diarrhea occurrence in ODF Kebeles while it was significant in Non ODF Kebeles. In addition the variables distance of water source, per capita water consumption, water shortage in household and water treatment showed a statistically significant association with diarrhea occurrence in both ODF and Non ODF Kebeles. On the other hand soap/Ashe use after toilet has shown a statistically insignificant association in both ODF and Non ODF Kebeles.

Regarding waste disposal, solid waste disposal showed a statistically significant association with diarrhea occurrence in both ODF (COR=0.016, 95%CI: 0.005-0.052) and Non ODF (COR=0.066; 95%CI: 0.035-0.124) Kebeles. On contrary, liquid waste disposal has shown significant association only in Non ODF Kebeles (COR=0.171; 95%CI: 0.092-0.318).

Hierarchical logistic regression technique was used to assess the relative effect of the explanatory variable on the outcome variable. To avoid an excessive number of variables and unstable estimates in the subsequent model, only variables with a p-value less than 0.20 were kept in the subsequent analyses.

In multivariate logistic regression analysis child immunization, latrine presence, water shortage in household and solid waste disposal showed statistically significant associations with diarrhea occurrence in ODF Kebeles. In Non ODF Kebeles; the variables child immunization, per capita water consumption, water shortage in household and solid waste disposal were found to have a statistically significant association with diarrhea occurrence.

6.5.1. Multivariate analysis result in ODF Kebeles

The multivariate analysis result showed that child immunization, latrine presence, water shortage in household and solid waste disposal had statistically significant association with diarrhea occurrence in ODF kebeles.

Keeping other factors constant, immunized children were 67% less likely (AOR=0.037; 95%CI: 0.006-0.243) to have diarrhea as compared to non-immunized children and the association was statistically significant. Similarly, those households having latrine were 64% less likely (AOR=0.036; 0.006-0.233) to have diarrhea as compared to those who didn't have latrine and the association was statistically significant.

Regarding water shortage; holding other factors constant, households with water shortage had 8.7 times higher chance (AOR=8.756; 95%CI: 1.130-67.831) of diarrhea occurrence as compared to the reference category. Pertaining solid waste disposal, those who dispose safely were 86% less likely (AOR=0.143; 95%CI: 0.020-0.998) to have diarrhea as compared to those who dispose openly and the association was statistically significant.

6.5.2. Multivariate analysis result in Non ODF Kebeles

The multivariate analysis result showed that child immunization, water access at individual level, water shortage in household and solid waste disposal had statistically significant association with diarrhea occurrence in Non ODF kebeles.

Keeping other factors constant, immunized children were 68% less likely (AOR=0.032; 95CI:0.008-0.123) to have diarrhea as compared to non-immunized children and the association was statistically significant.

Regarding water access at individual level, water access of 7.5-15liter/day reduces the chance of diarrhea occurrence by 71% (AOR=0.029; 95%CI: 0.006-0.152) and water access of greater than 15liter/day reduces chance of diarrhea occurrence by 22% (AOR=0.068;95%CI:0.010-0.474) as compared to the reference category and the association was statistically significant.

Regarding water shortage; holding other factors constant, households with water shortage had 18 times higher chance (AOR=18.478; 95%CI: 4.692-72.760) of diarrhea occurrence as compared to households having water shortage. Pertaining solid waste disposal, safe disposal reduces the chance of diarrhea occurrence by 77% (AOR=0.023;95%CI:0.005-0.117]) as compared to open disposal and the association was statistically significant.

Table 10: Bi and multi-variate analysis of variables with under-five diarrhea among ODF and NODF kebelesin Dangla woreda, North West Ethiopia, 2016

Variables		ODF		NODF	
		COR[95%CI]	AOR[95%CI]	COR[95%CI]	AOR[95%CI]
Monthly Income (In Birr)	<1000	Ref		Ref	
	1000 to 2000	1.3(0.111,15.088)		0.374[0.147,1.002]	
	2001 to 3000	18.6(0.065,5173)		0.778[0.346,1.750]	
Family Size	<=5	Ref	Ref	Ref	Ref
	>5	3.109[1.260,7.674]	0.715[0.115,4.443]	2.774[1.565,4.917]	0.840[0.346,2.111]
Education of Mother	Literate	Ref		Ref	Ref
	illiterate	0.775[0.336,1.787]		0.542[0.321,0.917]	0.512[0.271,0.934]
Occupation of Mother	Farmer	Ref		Ref	Ref
	Housewife	1.429[0.589,3.462]		0.461[0.233,0.910]	2.431[0.983,5.949]
Child Vaccination	No	Ref	Ref	Ref	Ref
	Yes	0.018[0.005,0.065]	0.037[0.006,0.243] *	0.051[0.027,0.098]	0.032[0.008,0.124]
Latrine presence	No	Ref	Ref	Ref	Ref
	Yes	0.013[0.004,0.040]	0.036[0.006,0.233] *	0.177[0.062,0.510]	0.382[0.147,0.973]
Main source of water	Improved	Ref		Ref	Ref
	Unimproved	1.059[0.461,2.434]		4.150[2.100,8.201]	1.640[0.713,3.749]
Distance of water Source	<=1000	Ref	Ref	Ref	Ref
	>1000	6.320[2.253,17.726]	3.845[0.291,50.895]	9.506[2.656,34.019]	1.988[0.713,5.511]
Per capita water consumption (liter/day)	<7.4	Ref	Ref	Ref	Ref
	7.5-15	0.091[0.032,0.264]	0.332[0.046,2.405]	0.088[0.044,0.177]	0.029[0.008,0.104]
	>15.1	0.292[0.099,0.866]	0.527[0.060,4.600]	0.126[0.056,0.285]	0.068[0.021,0.216]
Water shortage	No	Ref	Ref	Ref	Ref
	Yes	13.768[5.232,36.229]	8.756[1.13,67.831] *	10.828[5.824,20.13]	18.478[4.471,77.111]
Water Treatment	No	Ref	Ref	Ref	Ref
	Yes	2.833[1.138,7.056]	1.884[0.268,13.271]	2.907[1.605,5.267]	0.858[0.346,2.111]
Soap/Ashe use yesterday	No	Ref		Ref	Ref
	Yes	0.873[0.333,2.293]		0.655[0.374,1.149]	
Liquid waste	Dispose openly	Ref		Ref	Ref

disposal	Dispose safely	0.484[0.214,1.095]		0.171[0.092,0.318]	0.435[0.214,0.853]
Solid waste disposal	Dispose openly	Ref	Ref	Ref	Ref
	Dispose safely	0.016[0.005,0.052]	0.143[0.020,0.998] *	0.066[0.035,0.124]	0.023[0.008,0.062]

N.B. “*” sign indicates statistically significant associated variables

7. DISCUSSION

This study was worked with the intention to answer the question about diarrhea prevalence between ODF and non-ODF kebeles by comparing the two settings. A total of 525 respondents were participated in the study with 95.45% response. The prevalence of diarrhea between the two have significant differences (AOR= 3.006 and 95% CI= 1.005, 8.563).

7.1. Diarrhea Occurrences

The prevalence of diarrhea among ODF kebeles were 9.9%($X^2=50.791$, $P=0.000$) which was low as compared with the study done Sidama zone in ODF kebeles, SNNPR that is 24.7%($X^2=0.721$, $P=0.396$)(24)The reason behind the decrement of diarrhea prevalence in the study area may be due to the quality of ODF declaration, certification and follow-up after ODF declaration this follow-up may also related with the commitment of region, zone, woreda and Kebeles ODF verification and certification teams but this result of the study is much higher as compared with ODF kebeles diarrhea prevalence in India that is 2.72% with P-value=0.0001(2) that may be also related with the criteria's for ODF verification and certification and also the way of life of the two communities difference.The prevalence of under-five diarrhea in non-ODF kebeles is 36.1%($X^2=50.791$, $P=0.000$) which is high as compared with the study done is Sidama zone(24) that is 26.5%($X^2=0.721$, $P=0.396$) and much higher as compared with study in India which indicates the prevalence is 15.9%(2) in NODF villages but it's almost similar with national under-five diarrhea prevalence that ranges from 11% to 38% (17) In regards to NODF kebeles prevalence is much similar with the national prevalence but Sidama zone and Indian results difference may come because of the peoples way of life, educational levels of the community, the maternity care of child's, immunization and nutritional differences that are not related with status of being ODF or NODF. The prevalence of under-five diarrhea among ODF and non-ODF kebeles has significant difference with $X^2=50.791$ and $P=0.000$ but in the study in Sidama zone showed that there is no

significant difference between the two communities with $X^2=0.721$, $P=0.396$ rather the study in India showed that diarrhea morbidity was significantly higher (six times) in the NODF villages compared with ODF villages (2) which is similar with this study in which the diarrhea prevalence in ODF is 5 times much less than that of NODF ($OR=5.13$) this difference with a study in Sidama may come because of the differences in immunization, latrine, handwashing at critical times coverages and the quality of ODF status. From the total diarrhea cases, the majority (77.9%) of under-five diarrhea cases were from those non-ODF kebeles but the load of under-five diarrhea in ODF kebeles was (22.1%).

In the bivariate logistic regression analysis family size of greater than five showed a statistically significant association with diarrhea occurrence both in ODF and Non ODF Kebeles, the odds of developing diarrhoea was 3.109 times in ODF kebeles ($COR= 3.109$; 95%CI: 1.260-7.674) and 2.774 times in NODF kebeles ($COR=2.774$; 95%CI: 1.565-4.917) higher among children whose family size is greater than five when compared to children of families who have family size of less than five which is incomparable with the result from Hulet Eju enese District of Amhara region that indicates there is no statistically significant association between family size greater than five and diarrhea among under-five children's ($COR=0.51$, 95%CI= 0.23-1.14) (17) this difference between the two communities may come because of the economic status differences, birth space between consecutive child and also differences in the way of life and social set up of these communities.

Latrine presence has showed a statistically significant association with diarrhea occurrence both in ODF and NODF kebeles in which the odds of developing diarrhoea was 98.7% times in ODF kebeles ($COR=0.013$; 95%CI: 0.004-0.040) and 62.3% times in NODF kebeles ($COR=0.177$; 0.062-0.510) less among children whose families have latrine when compared to children of families who have no latrine this showed the diarrhea prevalence in ODF kebeles is not considered as a main factor the occurrence of the disease which is in line with ODF verification and certification guideline and CLTSH implementation guideline that indicated those kebeles to be labeled as ODF must have a minimum of traditional pit latrine and in those kebeles labeled as ODF kebeles have nearly 90% of households have latrine and around 92% from NODF have also but these result is also less as compared with the result from Amhara region ($COR=2.11$, 95%CI=1.39, 3.22) and Eastern Ethiopia ($COR=1.54$, 95%CI=1.14 - 2.07) (37) it also incomparable with result from Mali ($COR=0.93$, 95%CI=0.76, 1.14) (38). Similarly, those households having latrine were 64% less likely ($AOR=0.036$; 0.006-0.233) to have diarrhea as compared to those who didn't have latrine and the association was statistically significant that is consistent with Derashe district of

SNNPR The odds of developing diarrhea was 2.43 times higher among children of families who had no latrine when compared to children of families who had latrine [AOR: 2.43, 95% CI (1.19-4.87)] (39).

7.2. Household water access, treatment and safe storage

Among those respondents in both kebeles settings, 39.7% from ODF and 28.5% from NODF kebeles uses improved water sources as their main source of water which is much less than the national water supply coverage which is published in 2014 mini EDHS, that is 46% (40) of the rural households in have access to an improved source of drinking water but its slightly also less as compared with the study done in Hulet Eju Enese district which is 43.5% (17) this differences between the national coverage and the study coverage may happen because of the differences in investment on water sources in study area, communities handling of installed improved water sources and accessibility of the kebeles for installation of water sources. The majority 259(98.9%) of the respondents in ODF kebeles use jerycan/ narrow mouthed container as their main storage for drinking water which is much similar as compared with the study done in Sidama zone which showed 97.6%(24) of those household in ODF kebeles use jerycan/ narrow mouthed container as their main storage for drinking water whereas in non-ODF kebeles 256(97.3%) of the households use jerycan/ narrow mouthed container as their main storage for drinking water which is slightly higher as compared with the study done in Sidama zone that is 90% (24) this slight similarities in both ODF and NODF settings of the two kebeles may come after large campaign by FMOH, regional, zonal and woreda health sections since its programmed as part of the national CLTSH guideline for facilitation of ODF and improving WASH coverage. In regard to distance of water for drinking majority in both ODF 213(81.3%) and NODF 246(93.5%) kebeles access water with in 1km radius which is much better when we compare with the recommended water supply standard by WHO/UNICEF and national standard of Ethiopia that is supply of water within 1-1.5KM is considered as accessed. According to minimum standard in humanitarian response, majorities from ODF 203(77.5%) and 115(43.7%) from NODF kebeles satisfy the sphere handbook of water, sanitation and hygiene for humanitarian charter and minimum standard but 211(80.5%) households from ODF and 213(81%) households from NODF kebeles didn't satisfy national minimum standard of Ethiopia which is 15 l/p/d for rural dwellers this result is little better when we compare with the result from Sidama zone which showed in both settings, the quantity of water the all householders obtained per day is less than the national minimum standard of 15 l/p/d for rural dwellers(24). The majority 222(84.7%) ($X^2=4.4$, $P=0.036$) of respondents in ODF kebeles didn't treat water they use for drinking which is much higher as compared with the result from Sidama

zone that is 75.5% ($X^2=57.519, P=0.000$) (24) and from NODF kebeles 77.6% ($X^2=4.4, P=0.036$) didn't treat water they use for drinking which is much higher than that of study done in Sidama zone that is 58.1% ($X^2=57.519, P=0.000$) (24).

7.3. Hygiene and Sanitation Practices

As it's showed in two settings, 89.7% from ODF and 92.8% from non-ODF kebeles have private latrine ($X^2=1.56, P=0.212$) which is much higher as compared with the study done in Sidama zone in which 79.4% from ODF and 59.1% of the households have latrine (24) this difference may come because of the differences on the CLTSH implementation, commitment in both communities and officials and socio-economic and demographic characteristics differences. From those households that have latrines, the majorities are traditional pit latrine (87.4%) among ODF and (87.8%) among non-ODF) which is comparable with the result from a study from Kersa which is 91.7% of the total households have traditional pit latrine (41) this result also higher when we compare with 62% coverage of Elmera district of Timor-Leste (32) the similarities may be resulted as similarities in CLTSH implementation status because CLTSH recommends first simple pit latrine to be constructed as part of behavioral change component and difference with that of Timor-Leste may come because of the differences in CLTSH adoption, implementation of the adopted guideline and components of the guideline that consist type of latrine. Among the households latrine, 18% in non-ODF and 17.4% in ODF constructed 3 years and above which is much less as compared with the study done in Tigray region in which 54% of the latrines are constructed before 3 years (21) this may come because of the differences in the materials the two communities used that sustained longer which means those households who are in Tigray region uses stone for construction of latrine which used longer as compared with the materials used in Dangla district since they used wood and mud for construction of latrine.

In the study area, 45.8% from ODF kebeles and 33.8% from non-ODF kebeles households have hand washing facility which is much higher as compared with the result from Sidama zone which is 9.5% among ODF and 3.9% among NODF kebeles these difference may come because of the differences in promotion strategy of hand washing, full implementation of CLTSH packages, and follow-up of CLTSH implementation differences. The majority of respondents in both ODF (79%) and non-ODF (73.8%) kebeles uses soap/ash at hand washing time in 24 hour recall which is much higher in both settings as compared with the study done in sidama zone that showed 57.3% from ODF and 57.7% from NODF use soap/ash at hand washing time in 24 hour recall.

As shown in result, 34.4% of households from ODF and 59.3% of households from NODF kebeles dispose improperly their solid waste ($X^2=32.85, P=0.000$) which is less as compared with the study

in Sidama zone that showed 82.2% from ODF kebeles and 78.6% from NODF kebeles($X^2=3.597$, $P=0.058$)(24) this difference between the two communities may come as a result of differences in implementation of HEP, follow-up of HEP implementation, that is also may related with socio-economic and agro-ecological variations between these two communities.

All the above discussion is done as per the cross tabulation result which can strengthen and explained by the bi-variate and multi-variate regression findings.

Main source of water showed statistically significant association with diarrhea occurrence in NODF Kebeles ($COR=4.150[2.100,8.201]$) which is comparable with result from Derashe district of SNNPR i.e. the odds of developing diarrhoea was 1.98 times higher among children whose family used unimproved water source when compared to children of families who used improved water source [$AOR: 1.98, 95\% CI (1.16-2.23)$](39) and study done in Mecha district of Amhara region($COR=1.95$ and $95\%CI=1.22, 3.13$) this differences may come because of the differences in the implementation status differences of CLTSH and HEP, living condition of communities and agro-ecological differences .

The multivariate analysis result showed that child immunization, latrine presence, water shortage in household and solid waste disposal had statistically significant association with diarrhea occurrence in ODF kebeles and in NODF kebeles child immunization, water access at individual level, water shortage in household and solid waste disposal had statistically significant association with diarrhea occurrence.

With bi-Variate analysis, Child immunization showed a statistically significant association with diarrhea occurrence both in ODF ($COR=0.018$; $95\%CI: 0.005-0.065$) and Non ODF ($COR=0.051$; $95\%CI: 0.027-0.098$) Kebeles in which the odds of developing diarrhoea was 3.109 times in ODF kebeles ($COR= 3.109$; $95\%CI: 1.260-7.674$) and 2.774 times in NODF kebeles ($COR=2.774$; $95\%CI: 1.565-4.917$) higher among children whose have family size of greater than five when compared to children of families who have family size of less than five which is incomparable with a study done in Mecha district of Amhara region that indicates there is no statistically significant association between child immunization and under-five diarrhea ($COR=0.53, 95\%CI=0.59,3.83$).

From multi-variate analysis, Keeping other factors constant in ODF Kebeles, immunized children were 67% less likely ($AOR=0.037$; $95\%CI: 0.006-0.243$) to have diarrhea as compared to non-immunized children and the association was statistically significant which is much comparable with result from NODF kebeles that showed the odds of immunized children were 68% less likely ($AOR=0.032$; $95\%CI:0.008-0.123$) to have diarrhea as compared to non-immunized children and the association was statistically significant. These similarities between these two settings come

because of the socio-economic, agro-ecological, MCH services and way of life similarities since they are administered in one district which is incomparable with a result from Eastern Ethiopia(COR=1.21,95%CI=0.93 - 1.58) (37).

Regarding water shortage in NODF kebeles; households with water shortage had 18 times higher chance (AOR=18.478; 95%CI: 4.692-72.760) of diarrhea occurrence as compared to households having water shortage which is much higher as compared with the result in ODF kebeles, that indicates households with water shortage had 8.7 times higher chance (AOR=8.756; 95%CI: 1.130-67.831) of diarrhea occurrence as compared to the reference category. Results from both settings are not comparable with a result from Derashe district of SNNPR(COR=0.85, 95CI=0.47, 1.57) in which diarrhea among childs have no statistically significant association with water shortage(39).

According to sphere handbook of water, sanitation and hygiene for humanitarian charter and, minimum standard, Multi-variate analysis result from NODF kebeles showed that those households who got minimum standard (7.5-15liter/day) water access at individual level have reduces the chance of diarrhea occurrence by 71% (AOR=0.029; 95%CI: 0.006-0.152) this result is linked with the recommendation from the book that average water use for drinking, cooking and personal hygiene in any household is at least 7.5-15 litres per person per day which means those household who got the water and care for their drinking, cooking and personal hygiene can prevent their child from diarrhea that can be transmitted by drinking water, cooking materials contamination and by not keeping their personal hygiene safely and water access of greater than 15liter/day reduces chance of diarrhea occurrence by 22% (AOR=0.068; 95%CI: 0.010-0.474) as compared to the reference category and the association was statistically significant which is incomparable with the result from ODF kebeles that indicates those households having 7.5-15 litres per person per day (AOR=0.332, 95%CI=0.046,2.405) and households who access 15 liters per person per day (AOR=0.527, 95CI=0.060,4.600) that have no statistically significant association with under-five diarrhea.

Multi-variate analysis of solid waste disposal showed that, those in ODF kebeles who dispose properly were 86% less likely (AOR=0.143; 95%CI: 0.020-0.998) to have diarrhea as compared to those who dispose improperly and the association was statistically significant which is comparable with that of the result from NODF kebeles in which safe disposal reduces the chance of diarrhea occurrence by 77% (AOR=0.023; 95%CI: 0.005-0.117]) as compared to open disposal and the association was statistically significant.

8. Conclusion

- ODF status results in reduced diarrheal disease in rural kebeles of Dangla District.
- The overall prevalence of under-five diarrhea among the individuals living in the ODF villages was reduced compared with the NODF villages.
- The percentage of latrine in ODF villages that is less than NODF kebeles indicates that individuals living here are still practicing open defecation and in the true sense these are not ODF villages.
- Child immunization, Latrine presence, water shortage in household and solid waste disposal in ODF kebeles and per capita water consumption/water access at individual level, water shortage in household child immunization, and solid waste disposal in NODF kebeles had statistically significant association with diarrhea occurrence in Dangla district.

9. Recommendations

To Ministry of Health

- The ministry is better to work together with line ministries, regions, zones, woreda health structures, government partners, and local NGO`s to improve child immunization, latrine presence at household, water shortage in household and solid waste disposal practices
- Health-workers and local authorities must give health education and sensitization for the community to improve this open defecation.
- It`s recommended that the Ministry is better to re-consider the certification process of the kebeles which can be based on the sustainability.

To Woreda Health OFFICE

- The district health office should do better to improve services i.e. vaccination, latrine presence at household, water shortage in household and solid waste disposal practices, that are directly linked with under-five diarrhea

To Researchers

- The researchers are better to do further investigate the impact and role of being ODF as comprehensive package on diarrhea occurrences.

10. Limitation of the study

- Shortage of scientific literatures on the topic makes discussion to purely depend on some guidelines and manuals and writing from WHO, WSP-Ethiopia, UNICEF, water aid Ethiopia
- The study design (cross-sectional) which measure the exposure and out come at the same time, which cannot measure the cause and effect relationship.
- The use of random walking data collection system, which does not give equal chance to all children to be included in the survey.

11. Strength of the study

- Probably this is the first study in its type in the area trying to explore factors that have association with diarrhea in both ODF and NODF kebeles
- Observation has been carried out to assess practice of latrine utilization

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13. ANNEXES

13.1. QUESTIONNAIRE IN ENGLISH

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

Questionnaire ID _____

Kebele's Name _____

ODF Status _____

13.1. INFORMATION SHEET TO GET PERMISSION FOR THE RESEARCH

This sheet is to be read for the participants of the study.

Good morning/afternoon, my name is ----- and I am one of the data collectors for the study being conducted by Addis Ababa University, College of Health Sciences, School of Public Health on assessment of diarrhea in under five children in open defecation and open defecation free settings in Dangla district. This woreda is selected scientifically to be participant of this study if you give me consent after you have understood the following information sheet:

Title of the study: ASSESSMENT OF DIARRHEA IN UNDER-FIVE CHILDREN: A COMPARATIVE CROSS-SECTIONAL STUDY IN OPEN DEFECATION AND OPEN DEFECATION FREE RURAL SETTINGS IN DANGLA DISTRICT, NORTH WEST ETHIOPIA

Background: Open defecation is a widespread problem in the developing world. India constitutes almost 60% of the practice. Around 49 million people do not have access to toilets in Ethiopia. This practice facilitates the transmission of diarrheal diseases – one of the leading causes of mortality in children under 5 in sub-Saharan Africa.

Objective:To assess diarrheal morbidity in under-five children in ODF and non-ODF kebeles in Dangla district, north-west Ethiopia.

Benefit of the study:

- The result can be used as a baseline for further studies that can be done in this city.
- The result will be used in planning, resource allocation and monitoring purpose.
- This work also helps to appreciate the basics of ODF status in the prevention of diarrhea and also what changes can come after the ODF verification which in turn plays a major role in the proper planning and monitoring of sanitation & hygiene activities and programs.

Harm of the study: the study has no any harm without taking the participant's time during interview and discussion.

Rights of the participant hospital:

- The participant can stop participating in the study at any time.
- During the review and interview, the participant can ask questions which are not clear

Confidentiality: - the secrecy of any information forwarded will be maintained

Persons to contact:

This research project will be reviewed and approved by the institutional review board of Addis Ababa University. If you want to know more information you can contact the Committee through the address below. If you have any question you may contact the following individuals.

Principal Investigator: Abireham Misganaw : Addis Ababa University, College of Health Sciences, School of Public Health, Tel -0913094802, P.O.BOX 1234, Email: -gudukasa7@gmail.com

Advisors:

Mr. Worku Tefera (BSc, MPH, PHD fellow): Addis Ababa University, College of Health Sciences, School of Public Health.

Mr. Samson Wakuma (BSc, MPH, PHD fellow): Addis Ababa University, College of Health Sciences, School of Public Health.

13.2. INFORMED CONSENT FORM

Title of the study: ASSESSMENT OF DIARRHEA IN UNDER-FIVE CHILDREN: A COMPARATIVE CROSS-SECTIONAL STUDY IN OPEN DEFECTION AND OPEN DEFECTION FREE RURAL SETTINGS IN DANGLA DISTRICT, NORTH WEST ETHIOPIA

Good morning/afternoon, my name is ----- and I am one of the data collectors for the study being conducted by Addis Ababa University, College of Health Sciences, School of Public Health on assessment of diarrhea in under five children in open defecation and open defecation free settings in Dangla district.

I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no any risk. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted nobody will impose me to explain the reason of withdrawal. I have assured that the right to ask information that is not clear about the research before and or during the research work and to contact

Addis Ababa University School of public health: Secretary Office Tel. 0115157701

Investigator: Mr. Abireham Misganaw Tel: 0913094802 (Mobile)

Advisor: Mr. Worku Tefera and Mr. Samson Wakuma School of Public Health, Addis Ababa University; Mobile: 0913620514 and Office: 011-5157701

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation by signing the consent.

Name of the participant _____

Agreed to participate in the study: Yes /No (mark one of them for verbal consent)

Signature _____ (if written consent)

Name of witness signature _____(Data collector, supervisor, any third person)

Signature _____ Date _____

For Written Consent form

I, the undersigned, confirm that, as I give consent to participate in the study, it is with a clear understanding of the objectives and conditions of the study and with recognitions of the study and with recognition of my right to withdraw from the study].

PART A: BACKGROUND OF THE RESPONDENT

1. Sex of the respondent: 1. Male 2. Female
2. Age of the respondent: _____ (years)
3. Family size: _____ (persons per household)
4. Education status (grade completed): _____
5. Number of under-five children in the HH: _____
6. What is your marital status?
 - a. Married
 - b. Single
 - c. Divorced
 - d. Windowed

7. What is Educational status of mothers?

- a. Read and write
- b. Illiterate
 - c. Higher education(12+)

8. What is Educational status of father?

- a. Read and write
- b. Illiterate
 - c. Higher education(12+)

9. Is there any educated son/daughter in household? A. Yes B. No

10. If Yes for number 9, what is the education level of the son/daughter?

- a) Read and write
- b) Primary/secondary
- c) Higher education

11. What is Occupation of mother?

- a) Housemaid
- b) Farmer
- c) Private
- d) Others (specify)

12. What is Occupation of father?

- a) Farmer
- b) Private
- c) Others (specify

13. Is the child immunized? A. Yes B. No

14. If Yes for question number 11, which type of vaccines the child vaccinated?

- a) BCG
- b) PCV
- c) Polio
- d) Pentavalent
- e) Measles
- f) Others.....

15. What is the average monthly net income from you and your spouse's earnings?

- a. Below 1000 birr
- b. 1001-2000
- c. 2001-3000
- d. 3001 and above.

PART B. DOMESTIC WATER SUPPLY AND HH PRACTICES

1. What are the main sources of water for drinking for the Household? (Multiple response)

- A. Piped system
- B. Spring
- C. Well
- D. River/stream water

2. Average walking distance of the water source from the community: ____ (meter)
3. Amount /quantity of water collected by the HH per day: _____(litre)
4. Do you treat water used for drinking? A. Yes B. No
5. If yes for question number 4, how often you treat water?
 - a. Always
 - b. Usually
 - c. Sometimes
 - d. Other

6. If yes for question number 4, what did you do *to treatwater*?

- A. Do nothing
- B. Boil
- C. Add chemicals
- D. Filter

7. Type of water storage container: A. Jerry cans B. Pot C. Other. _____

8. Do you experience water shortage/rations A. Yes B.No

9. How frequent is the water shortage?

A. Less than three days

B. 3 days to 1 week

C. More than one week

D. Others

PART C DIARRHOEA INCIDENCES

1. Was your under-five children has diarrhea in the past 15 days?
 - A. Yes
 - B. No

2. How many days the diarrhea persists?.....(days)

3. Would you mention your perception on how one get diarrheal diseases?

- A. By contaminated food
- B. By contaminated water
- C. By using unclean utensils
- D. Other specify; _____

4. Who give car for sick child

- a. Mother
- b. Sister
- c. Servants
- d. Others

5. What are you doing for your child to prevent from diarrhea?

- a. Nothing especial done
- b. Prepare Special food
- c. Prepare clean food
- d. Give attention for hygiene of child
- e. Give attention for hygiene of family

6. Would you mention how to prevent diarrheal diseases?

- A. Use latrine to defecate
- B. Dispose children's feces
- C. Drink clean water
- D. Treat water
- E. Wash your hands with soap
- F. Environmental sanitation

PART D SANITATION AND HYGIENE PRACTICES

1. Is a toilet available in the home/house?

- a. Yes
- b. No

2. If available, what type of latrine does your household have?

1. Traditional pit-latrine
2. Compost latrine
3. Shared latrine
4. Other (Specify): _____

3. If the household has a latrine, observe the following (observation checklist)

- A. Fresh foot path leading to the latrine?1. Yes 0. No
- B. Splash of urine or water on the latrine slab/floor?1. Yes 0. No
- C. Fresh stool in the latrine pit?1. Yes 0. No
- D. Fecal matter about full in the pit (< 50 cm below slab)? 1. Yes 0. No
- E. Does the latrine have wall for privacy?1. Yes 0. No
- F. Does the latrine have cleanable floor?1. Yes 0. No
- G. Does the latrine have roof?1. Yes 0. No
- H. Does the latrine/slab pose danger to user?1. Yes 0. No

4. Years since latrines constructed

- A. < 6 months
- B. 6 months to 2 years
- C. 2-5 years
- D. > 5Years

- 5. Do you defecate after latrine constructed?** A. yes B. No
- 6. How you dispose household's solid waste?**
- a. Dispose openly
 - b. Dispose privately
 - c. Dispose to communal latrine
 - d. Others

7. How you dispose household's liquid waste?

- a. Dispose openly
- b. Dispose privately
- c. Dispose to road dish
- d. Others

8. Presence of Items/facilities for hand washing.

- A. Hand washing container resented within 5m of latrine?1. Yes 0. No
- B. Water present in the container?1. Yes 0. No
- C. Is there Soap/ash placed?1. Yes 0. No

9. When do you wash your hand yesterday?

- a. Meal time
- b. Food preparation
- c. After toilet
- d. Morning
- e. Feeding the child
- f. Others

10. Do you use soap/ash in yesterday hand washing? A. Yes B. No

Thank You

10.3. Questionnaire in Amharic

አዲስ አበባ ዩኒቨርሲቲ

ጤና ሳይንስ ኮሌጅ

የህብረተሰብ ጤና ትምህርት ቤት

የመጠይቁ መለያ ቁጥር _____

የቀበሌው ስም _____

ለሚጠናው ጥናት ማብራሪያ መስጫ ቅጽ

መግቢያ፣ ይህ የመረጃ ቅጽ የሚዘጋጀው ለሚጠናው ጥናት አስፈላጊ ማብራሪያ ለመስጠት ነው። የጥናቱ ዋና አላማም ምርምር ምሩብ ሚካኔድ በትኩረት አካባቢ በዳንግ ላወረዳው ስጥብ ሚገኙ ከአምስት ዓመት በታች ያሉ ህፃናት ላይ የሚከሰሱ ረተውን የተቀማ ጥበቃ አካላት ለማስወገድና ለመቆጣጠር ነው። ለዚህም ስራ ለማስፈጸም ለሚጠናው ጥናት ማብራሪያ መስጫ ቅጽ ላይ የሚከሰሱ ረተውን የተቀማ ጥበቃ አካላት ለማስወገድና ለመቆጣጠር ነው። ለዚህም ስራ ለማስፈጸም ለሚጠናው ጥናት ማብራሪያ መስጫ ቅጽ ላይ የሚከሰሱ ረተውን የተቀማ ጥበቃ አካላት ለማስወገድና ለመቆጣጠር ነው።

የጥናቱ ዋና አላማ፡ አቶ አብርሃም ስጋነው

የጥናቱ አማካሪዎች፡ አቶ ወርቁ ተፈራ እና አቶ ሳምሶን ዋቁማ (የአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ትምህርት ቤት መምህራን)

ለጥናቱ የገንዘብ ድጋፍ የሚደርገው አካል፡ አዲስ አበባ ዩኒቨርሲቲ

ተመራማሪው ትምህርት ቤቱን የሚከታተልበት ዩኒቨርሲቲ፡ አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ፣ የህብረተሰብ ጤና ትምህርት ቤት

ይህን የመረጃ ቅጽ ተዘጋጅተው ከላይ ስሙ የተጠቀሰው ተመራማሪ ሲሆን የጥናቱ ዋና አላማም ምርምር ምሩብ ሚካኔድ በትኩረት አካባቢ በዳንግ ላወረዳው ስጥብ ሚገኙ ከአምስት ዓመት በታች ያሉ ህፃናት ላይ የሚከሰሱ ረተውን የተቀማ ጥበቃ አካላት ለማስወገድና ለመቆጣጠር ነው። ለዚህም ስራ ለማስፈጸም ለሚጠናው ጥናት ማብራሪያ መስጫ ቅጽ ላይ የሚከሰሱ ረተውን የተቀማ ጥበቃ አካላት ለማስወገድና ለመቆጣጠር ነው።

ምክንያት ሊከሰት እንደቻለ ለማወቅ እና ለችግሩ መፍትሄ ለመጠቀም የሚያስችል ነገራዊ ሁኔታ ለማጥናት ነው።

የጥናቱ ተመራማሪዎች የሚህበረሰብ ጤና የሁለተኛ ዲግሪ ተመራቂ ተማሪ እና አንድ የአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና አጠባበቅ ክፍት ናልም ድያላቸው ባለሙያዎች ናቸው።

የጥናቱ ዓላማ:

የጥናቱ ዋና ዓላማ ምርምር በሚካሄድበት አካባቢ በዳንግ ለወረዳው ስጥብ ሚገኙ ከአምስት ዓመት በታች ያሉ ህፃናት ላይ የሚከሰረውን የተቅማጥበብ ስታክ አርኒባቢ ሆኑና ባልሆኑ ቀበሌዎች መካከል ያለውን ልዩነት ማየት/ማነፃፀር ሲሆን እንዲሁም በምንምክንያት ሊከሰት እንደቻለ ለማወቅ እና ለችግሩ መፍትሄ ለመጠቀም የሚያስችል ነገራዊ ሁኔታ ለማጥናት ነው። ከጥናቱ የሚገኘው ጤነ-ምርመራ ለመለከታቸው አካላት በማድረስ ስለችግሩ መፍትሄ የሚሆን የትግበራ እቅድ ዝግጅት እንዲያደርጉ በመረጃ የተደገፈ ሙያዊ አስተያየት በመስጠት በተቅማጥበብ ስታክ ላይ ህፃናትን ለመታደግ እንዲያገዛ ደጋፊ ለማድረግ ነው።

በጥናቱ መሳተፍ ስለሚያስገኘው ጠቀሜታ

በጥናቱ እርስዎ በመሳተፍ ዎስሁን የሚገኝ/የሚሰጥ የቅም እንደሌለ ልግ ልጅ ለዎት እውዳህ ሁነገር ግን ይህ ጥናት ተጠናቶ ካለ ቀበሌ ላይ ለሆኑ ህፃናት ለመረጃ መሰረት አድርጎ የሚመለከታቸው አካላት እንዲያውቁት በማድረግ አስፈላጊ የሆኑ ችግሩን የሚፈታ የእቅድ እና የአተገባበር እስትራቴጂ ዝግጅት እንዲደረግ ሙያዊ ደጋፊ ለማድረግ ዝግጁ መሆናችንን እንገልጻለን።

በጥናቱ መሳተፍ ሊፈጥረው የሚችለው ተፅዕኖ/ምቹት ስለመኖሩ

በጥናቱ እርስዎ በመሳተፍ ዎ/ፉ ምንም ዓይነት ችግር እንደማያመጣለሙ ጠቀስ እውዳህ ፣ ምን አልባት የማቀርብ ልዎትን ጥያቄዎች ለመመለስ የተወሰነ ሰዓት ልወስድብዎት እችላለሁ፣ በጥያቄዎቹ የሚሰጡኝን ማንኛውንም ዓይነት መረጃ ለማንም የማይደርስ መሆኑን እና ሚስጥራዊነቱ የተጠበቀ መሆኑን ልግ ልጅ ለዎት እውዳህ ።

ማንኛውንም ዓይነት ጥያቄ በፈለጉ ጊዜ ለመጠየቅ እንዲያገዛዎት የሚረዳ አድራሻ፤

ይህ ጥናት ሳይናሳ ወይንቱ እና ለህብረተሰቡ የሚጠቅም መሆኑን በአዲስ አበባ ዩኒቨርሲቲ የሚገኝ የጥናት እና ምርምር ደህንነት ፈቃድ ሰጪ ኮሚቴ የሚታይ እና የሚፀድቅ መሆኑን በመግለፅ ማንኛውንም ዓይነት ጥያቄ ለኮሚቴው ማቅረብ አልገብኩም ተብሎ ለህብረተሰብ አድራሻዎች መጠቀም የሚችሉ መሆኑን እንገልጻለን።

የጥናቱ ተመራማሪ

አ ቶ አ ብ ር ሃ ም ም ስ ጋ ና ው ፡
አዲስአበባዩኒቨርሲቲቴሌኖንስኮሌጅየህብረተሰብጤናአጠባበቅትምህርትተቋምየማህበረሰብጤናትም
ህርትክፍልስልክ - 0913094802, የፖስታሳጥንቁጥር 1234, ኢሜልአድራሻ: - gudukasa7@gmail.com
የ ጥ ና ቱ አ ማ ካ ሪ ፡
አቶወርቁተፈራኤአቶሳምሶንዋቁማ(የአዲስአበባዩኒቨርሲቲየህብረተሰብጤናትምህርትቤትመምህራን
)

የተሳታፊው የፈቃደኝነት ቅጽ

ከዚህ ቀጥሎ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ በትክክል ተረድኝያለሁ

- ይህ ጥናት በአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት ድጋፍና አስተባባሪነት ተማሪ አብርሃም ምስጋናው ለምረቃ ጽሁፍ ጥናቱን እንደሚያካሂዱ
- የጥናቱ ርዕስ በወረዳ 03 ውስጥ በሚኖሩከአምስት አመት በታች ባሉህጻናት ቤተሰብ ውስጥ ከተቅማጥ ጋር ተያያዥ የሆኑ መንስኤዎችና ከአምስት አመት በታች ያሉ ህጻናት ተቅማጥ በተመለከተ የዳሰሳ ጥናት ማድረግ
- የጥናቱዋናአላማምርምሩበሚካሄድበትአካባቢበዳንግላወረዳውስጥበሚገኙከአምስትዓመትበታችያሉህጻናትላይየሚከሰረተውንየተቅማጥበሽታከአርነባበሆኑናባልሆኑቀበሌዎችመካከልያለውንልዩነትማየት/ማነፃፀርሲሆንእንዲሁምበምንምክነያትሊከሰትእንደቻለለማወቅእናለችግሩመፍ ተሄለመጠቆምየሚያስችልነባራዊሁኔታለማጥናትነው።
- የምስጣቸው መረጃዎች በሚስጥር እንደሚያዙ
- ጥናቱ ምንም አይነት ጉዳት እንደማያደርስብኝ
- ጥያቄወ ካልተስማማኝ ማቋረጥ ወይም ወደሌላ ጥያቄ መዘለል እንደምችልና ማንም ሰው ሊያስገድደኝ እንደማይችል
- በጥናቱ ምክንያት ምንም አይነት ጉዳት ሊያደርስብኝ እንደማይችል
- ጥናቱን በተመለከተ ያልገባኝን ነገር ቀጥሎ በተሰጠኝ አድራሻ ጠይቁ መረዳት እንደምችል ተገንዚቤአለሁ

አዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ሳይንስ ት/ቤት 011 51 57 7 01

የአጥኝው ስም: ያሪድ ታደሰ 09 11 649824

የጥናቱ አማካሪ ስም: አቶ ወርቁ ተፈራ (MPH, PhD Candidate) እና

አቶሳምሶንጥቁማ(MPH, PhD Candidate)

ከላይ የተሰጠኝን መረጃ በሚገባኝ ቋንቋ አንብቤ ወይም ተነቦልኝ በትክክል ከተረዳሁ በኋላ በጥናቱ ለመሳተፍ ፈቃደኛ ሆኛለሁ።

የተሳታፊ ስም _____ ፊርማ _____

የአጥኝው ስም _____ ፊርማ አድራሻ ስልክ /ኢ.ሜል/

የምስክር ስም _____ ፊርማ _____

ክፍል ሀ: አጠቃላይ መረጃ

16. ያታ: _____ 1 ወንድ _____ 2. ሴት _____

17. ዕድሜ: _____ (በዓመት)

18. የቤተሰብ ብዛት: _____ (በአንድ ቤት የሚኖሩ)

19. የትምህርት ደረጃ (የተጠናቀቀ ክፍል): _____

20. በቤት ውስጥ ያሉ ከ5 ዓመት ዕድሜ በታች ህፃናት: _____

21. የትዳር ሁኔታ?

- a) ያገባ
- b) ያላገባ
- c) የተፋታ
- d) በሞት ምክንያት የፈረሰ ትዳር

22. የእናት የትምህርት ደረጃ?

- a) ማንበብና መጻፍ የሚችል
- b) ያልተማረ
- c) ከፍተኛ ትምህርት (12+)

23. የአባት የትምህርት ደረጃ?

- a) ማንበብና መጻፍ የሚችል
- b) ያልተማረ
- c) ከፍተኛ ትምህርት (12+)

24.ቤት ውስጥ የተማረ ልጅ አለ ወይ a. አዎ b. የለም

25.ለጥያቄ 2 አዎ ከሆነ ትምህርት ደረጃውስ

a. ማንበብና መጻፍ የሚችል

b. አንደኛ/ሁለተኛ ደረጃ

c. ከፍተኛ ትምህርት (12+)

26. የእናት ስራ?

- a) የቤት እመቤት
- b) አርሶ አደር
- c) የግል
- d) ሌላ (ቢገለፅ)

27. የአባት ስራ?

- a) አርሶ አደር
- b) የግል
- c) ሌላ (ቢገለፅ)

28. ልጅዎ ክትባት ተክትቧል ወይ? (የክትባት ካርዱን ተመልከት) a. አዎ b. የለም

29. ለጥያቄ 13 አዎ ከሆነ ምን ምን ክትባቶችን ወስዷል?

a. የቲቢ መከላከያ

b. ፕሲቪ

c. ፖሊዮ

d. ፀረ-5

e. ከፍኝ

f. ሌላ.....

30. የቤተሰቡ አማካኝ ወርሃዊ ገቢ ስንት ነው?

- a) ከ 1000 ብር በታች
- b) ከ 1000-2000
- c) ከ2001-3000
- d) 3001 እና በላይ

ክፍል ለ.የቤት ውስጥ ውሃ አቅርቦትና አጠቃቀም

10. ለመጠጥ ውሃ የምትጠቀሙበትን ውሃ የምታገኙት ከየት ነው? (ከአንድ በላይ ምርጫ ይቻላል)

- a) ቧንቧ ውሃ
- b) ምንጭ
- c) ውሃ ጉድጓድ
- d) ወንዝ/ወራጅ ውሃ

11. ለመጠጥ የምትጠቀሙት ውሃ ከቤታችሁ ምን ያህል ይርቃል _____ (በሜትር)

12. ለቤት በቀን ምን ያህል የውሃ መጠን ታገኛላችሁ (በሊትር): _____

13. ለመጠጥ የምትጠቀሙትን ውሃ ታክሙታላችሁ a. አዎ b. የለም

14. ለጥያቄ ቁጥር 4 መልስዎ አዎ ከሆነ ፣ በምን ያህል ጊዜ ውሃውን ታክማላችሁ

a. ሁል ጊዜ

b. አልፎ አልፎ

c. በተወሰነ ጊዜ

d. ሌላ ይጠቀስ

15. ለጥያቄ ቁጥር 4 መልስዎ አዎ ከሆነ ፣ከውሃ ምንጩ የምታገኙትን ውሃ ለመጠጥነት ለመጠቀም ምን አይነት የውሃ ማከም ስራዎችን ትሰራላችሁ?

- a) ምንም አናደርግም
- b) ማፍላት
- c) ኬሚካል መጨመር
- d) ማጥለል

16. ለውሃ ማጠራቀሚያ ምን ትጠቀማላችሁ:

a) ጀሪካን

b) ቶፋ/አንስራ

c) ሌላ(ቢገለፅ)_____

17. የውሃ እጥረት አጋጥሟችሁ ያውቃል ወይ A. አዎ B. አይደለም

18. የውሃ እጥረቱ ምን ያክል ይደጋገማል?

- a) ከ3 ቀን ያነሰ ጊዜ
- b) ከሳምንት በላይ
- c) ከ 3 ቀን እስከ 1 ሳምንት
- d) ሌላ(በ.ገለፅ)_____

ክፍል ሐ: የተቅማጥ በሽታ ክስተት

7. ባለፉት 15 ቀናት ከ5 ዓመት በታች ከሆኑት ህፃናት ውስጥ በተቅማጥ የታመመ አለ ወይ?

- a) አዎ
- b) አይደለም

8. ተቅማጡ ምን ያህል ጊዜ ቀይቶበታል? _____ (በቀን)
9. የጥያቄ 1 መልስ አዎ ከሆነ፣ ህፃኑ እንዴት ተቅማጡ እንደያዘው ሊገለፁልን ይችላሉ?
- a) በተበከለ ምግብ
 - b) በተበከለ ውሃ
 - c) በተበከለ ማብሰያ በመጠቀም
 - d) ሌላ (ጊገለፅ); _____

10. ህፃኑ በተቅማጥ በታመመበት ወቅት እሚንከባከበው ማን ነበር?

- a) እናት
- b) እህት
- c) ቤት ሰራተኛ
- d) ሌላ; _____

11. ልጅዎ በተቅማጥ በሽታ እንዳይያዝ ምን ምን እንክብካቤ ታደርጉለታላችሁ

- a) ምንም አናደርግለትም
- b) የተለየ ምግብ እናዘጋጅለታለን
- c) ምግቦቹን በንፅህና እንይዛለን
- d) የእኛ የግል ንጽህና እንጠብቃለን
- e) የእሱ/ሷን ንፅህና እንከታተላለን
- f) ሌላ(ይገለፅ): _____

12. የተቅማጥ በሽታን እንዴት መከላከል እንደሚጫል ቢጠቅሱልን?

- a) ሽንት ቤት በመጠቀም
- b) ንፁህ ውሃ በመጠጣት
- c) ውሃን በማከም
- d) እጅን በሳሙና በመታጠብ
- e) የእካባቢ ንፅህናን መጠበቅ

ክፍል መ: የሃይጅንና ንፅህና ልምዶች

11.በቤት ውስጥ/አካባቢ ሽንት ቤት አለ ወይ?

- a) አለ
- b) የለም

12. ለጥያቄ ቁጥር 1 አለ ከሆነ መልሱ፣ ምን አይነት ሽንት ቤት ነው ያለው?

- a) ባህላዊ መፀዳጃ ቤት
- b) የኮምፖስት ሽንት-ቤት
- c) የጋራ መፀዳጃ ቤት
- d) ሌላ (ይገለፅ): _____

13. ለጥያቄ ቁጥር 1 አለ ከሆነ መልሱ፣ የሚከተሉትን ተመልከት

- a. ወደ ሽንት ቤት የሚወስድ አዲስ የእግር ዳካ?a. አዎ b. የለም
- b. በሽንት ቤቱ ወለል ላይ የተረጨ ሽንት?a. አዎ b. የለም
- c. ትኩስ ሰገራ በሽንት ቤቱ መኖሩን...a. አዎ b. የለም
- d. ሰገራ ከሽንት ቤቱ አፍ 50 ሳንቲ ሜትር ድረስ መድረሱን? a. አዎ b. የለም
- e. ሽንት ቤቱ ለነፃነት የሚሆን ግድግዳ መኖሩን?a. አዎ b. የለም
- f. ሽንት ቤቱ ወለሉ የሚፀዳ ነወይ?a. አዎ b. የለም
- g. ሽንት ቤቱ የቤት ጣራ አለው ወይ?a.አዎ b. የለም
- h. ሽንት ቤቱ ተጠቃሚዎችን ለአደጋ የሚያጋልጥ ነወይ...a. አዎ b. የለም

14. ሽንት ቤቱ ከተገነባ ስንት ዓመት ሆነው

- a) < 6 ወር
- b) <2 ዓመት
- c) 2-5 ዓመት
- d) 5 ዓመት

15. ሽንት ቤት ከሰራችሁ በኋላ ሜዳ ላይ ተጸዳድተው ያውቃሉ። a. አዎ b. የለም

16. የደረቅ ቆሻሻ እንዴት ነው የምታስወግዱት?

- a) መሬት ላይ ነው የምንጥለው
- b) በቆሻሻ ማጠራቀሚያ ሰብስቦን እና ከድነን
- c) ሰብስቦን ወደ ቆሻሻ ማቃጠያ መውሰድ
- d) ሌላ (ቢገለፅ)_____

17. የፈሳሽ ቆሻሻ እንዴት ታስወግዳላችሁ

- a) ሜዳ ላይ እንደፋለን
- b) ማስወገጃ ሰርተን እንጠቀማለን
- c) ቆሻሻ ማስወገጃ ቦይ ውስጥ
- d) ሌላ (ቢገለፅ)_____

18. የእጅ መታጠቢያ በሽንት ቤቱ አካባቢ ስለ መኖሩ

- a) የእጅ መታጠቢያ ከሽንት ቤቱ በ5 ሜትር ርቀት አለ ወይ? a. አዎ b. የለም
- b) የእጅ መታጠቢያው ውሃ አለው ወይ?a. አዎ b. የለም
- c) የእጅ መታጠቢያው ሳሙና አለው ወይ?a. አዎ b. የለም

19. ትላንትና እጅዎን ምን ምን ሲያደርጉ ታጠቡ

- a. ምግብ ስመገብ
- b. ምግብ ሳዘጋጅ
- c. ከሽንት-ቤት መልስ
- d. ጠዋት
- e. ልጅን ስመግብ

20. እጅዎን ሲታጠቡ ሳሙና/አመድ ተጠቅመዋል a. አዎ b. የለም

አመሰግናለሁ

20.4. DECLARATION

I, the undersigned, Public Health student declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Master of Public Health.

Name of the student: Abireham Misganaw

Date: June, 2016

Signature: _____

Place of submission: School of public Health, College of Health Sciences, Addis Ababa University.

Date of Submission: June, 2016

This thesis work has been submitted for examination with my/ our approval as university advisor(s).

Advisors:

Name**Signature****Date**

- | | | |
|------------------|-------|------------|
| 1. Worku Tefera | _____ | June, 2016 |
| 2. Samson Wakuma | _____ | June, 2016 |