Journal of Research in Environmental Science and Toxicology Vol. 8(1) pp. 9-15, January, 2019
DOI: http:/dx.doi.org/10.14303/jrest.2019.024
Available online http://www.interesjournals.org/JREST

Full Length Research Paper

Effect of latrine utilization on diarrhea diseases in Abukako Kebele, Jimma, South west, Ethiopia

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Abstract

Introduction: Lack of sanitation facilities is a serious health risk and obliges people to practice open defecation, thereby increasing the risk of disease transmission. Despite the fact that household access is important, community sanitation coverage is even more important to improve health around the world. The best use of a well-maintained latrines can reduce the risk of diarrhea to almost the same extent as improved water supplies**.**

Objective: The study was designed to assess the effect of latrine utilization on diarrhea diseases in Abukako Kebele, Jimma Zone, South West, and Ethiopia.

Method: A community based cross-sectional study was conducted in all households that had latrine facilities in Abukako Kebele. Lottery method was used to get first house hold from the Kebele and systematic random sampling was used to select the households with latrine facilities from Kebele.

Result: About 87.8% households used pit latrine in this study. There were 408 under five children in 204 households. The prevalence of under 5 diarrhea was 54 (13.2% and the majority occur 6-11 month 38.9%).

Conclusion and Recommendation: Diarrheal diseases highly affect the family members who used the latrine rarely. This might be due to stay out of work, in some of open field is convenient. Among 254 households 84 (33.1%) respondents had diarrhea in past 6 months. Majority of 121 (54.2%) of the respondents explained that they were rarely using latrine. About 124 (48.8%) households replied that their main source of water was unprotected well.

It is recommended that the concerned bodies should give attention to improve latrine utilization providing community awareness through mass-media, health education and role modeling.

Keywords: Effect, Latrine, Diarrhea, Abukako Kebele, Ethiopia

INTRODUCTION

Background

The construction of latrine is a relatively simple technology that is used to prevent the spread of infectious diseases. Despite the fact that household access is important, society sanitation coverage is even more important to improve health through the regular use of well-maintained sanitation facilities (Zone et al., 2010). Studies have shown that latrine coverage has to reach 90% of a population to have an impact on community health (McConvile, 2003). However, 2.4 billion people, 40% of the total world population, lack improved sanitation worldwide and 80% of these people live in rural areas (Environmental Impact on Health, 2002). About 1.8 million people die every year due to diarrhea diseases, and children under the age of 5 years account for 90% of diarrhea deaths. Moreover, 88% of diarrhea diseases are attributed to unsafe water supply, inadequate sanitation, and poor hygiene (World Health Organization, 2004).

In Ethiopia, even though progress was made in reducing child mortality from 123 deaths of under five years of children per 1,000 live births in 2005 (Ethiopia Demographic and Health Survey, 2005) to 88 deaths

per 1,000 live births in 2011, children in the country still suffer from diarrhea diseases, respiratory problems, and malnutrition. According to Ethiopian demographic and health survey, the two week prevalence of diarrhea diseases was 13% among of children under five years of age (Ethiopia Demographic and Health Survey 2011). To improve sanitation and hygiene throughout Ethiopia, the National Sanitation Strategy establishes the goal of 100% Latrine coverage. In Ethiopia, according to Ethiopian Demographic and Health Survey 2011, about 38% of the households (16% Urban and 45% Rural) have no access to latrine facilities. The percentage of children with diarrhea who were taken to a health provider increased steadily from 13 percent in 2000 to 22 percent in 2005 and 32 percent in 2011 (Central Statistics Authority, 2012). Health improvement comes from the proper use of sanitation facilities, not simply their physical presence (World Health Organization, 2002). This is best achieved through regular use of clean and well maintained latrines. The proper use of latrines can reduce the risk of diarrhea to almost the same extent as improved water supplies, but the greatest benefit occurs when improvements in sanitation and water supply are combined and education is given on hygienic practices (Environment and Health, 1986).

World Health Organization (WHO) estimates that diarrhea is responsible for child deaths; it accounts 35% of deaths. UNICEF estimates that diarrhea alone kills one child every 30 seconds. The vast majority of child mortality occurs among the world's poorest populations in low-and middle-income countries. Human feces are the main source of diarrhea pathogens. Most diarrhea diseases including viral gastroenteritis, cholera, Shigellosis, typhoid, polio and some forms of hepatitis being spread by fecal-oral means are often called fecal-oral diseases. Just one gram of human feces can contain 10 million viruses and one million bacteria. Evidence suggests that improved hand washing can have a major impact on public health in any country and significantly reduce the leading causes of childhood mortality-diarrhea disease. Because hand washing with soap can prevent the transmission of a variety of pathogens, it may be more effective than any single vaccine or hygiene behavior. So that hand washing is one of the most effective means of preventing diarrhea diseases, along with safe stool disposal and safe and adequate household water supply (Curtis, 2007).

Determinants of Diarrhea Diseases

Latrine: The hygienic disposal of excreta is important because the infective organisms for many diseases leave through feces and some through urine. One gram of faces may contain10 million viruses, 1 million bacteria, 1000 parasite cysts and a 100 worm eggs. The chief source of infection resulting in diarrhea disease is other people's excreta, including child-excreta. The etiological factors associated with diarrhea disease in children include microbial agents which are usually transmitted through food and water contaminated with human feces (World Health Organization, 2004). Various studies conducted in Bangladesh, Burma, Philippines, and Papa New Guinea were consistent with an association between a particular hygiene behavior and an increased risk of diarrhea, such behaviors include hand washing before food preparation, open defecation of children, inattention to proper disposal of faces, the method used by mothers to clean children after defecation, the manner of disposing of the faces of children and compound hygiene (VanDeslice, 1997). Reported usage of latrine in Lesotho by adults was 99%; however, the use of latrines for the disposal of children's faces was only 50% (VanDeslice, 1994); and only 39% disposed children's faces in the latrine in Philippines. Studies have shown that hygienic disposal of children's faces is associated with 30%-40% less risk of diarrhea. Maintenance and use of latrines at household level are related each other. The better they are maintained, the better they are used (Ethiopia Demographic and Health Survey, 2011).

Hand washing practices: The Global Public-private Partnership for Hand washing has brought together various organizations and sectors to promote hand washing with soap on a large scale hand washing is one of the most effective means of preventing diarrhea diseases, along with safe stool disposal and safe and adequate household water supply. Evidence suggests that improved hand washing can have a major impact on public health in any country and significantly reduce the two leading.

Causes of childhood mortality diarrhea disease: Because hand washing with soap can prevent the transmission of a variety of pathogens, it may be more effective than any single vaccine or hygiene behavior. Promoted broadly enough, hand washing with soap can be viewed as an essential *vaccine*. Almost every household in the world, regardless of economic status, has soap. Hand washing with soap at key times, however, is not widely practiced. If the millennium development targets for reduction in child mortality are to be met, hand washing habits must be improved along with access to safe water and sanitation (Ministry of Health, 2005).

Good hand-washing requires the use of soap (or a local substitute like ash, soil, leaves etc.), plenty of water, and careful cleaning of all parts of the hands (Environmental Impact on Health, 2002; World Health Organization, 2002). Simple hand washing with soap and water reduces diarrhea transmission by 35% (World Health Organization, 2002). A review of other available evidence suggests that hand washing with soap could reduce diarrhea incidence by 47% and save at least one million lives per year (World Health Organization, 2004).

Water supply: Families that have ready access to adequate and clean water for drinking and preparing food have fewer diarrheas than families whose access to water is difficult or heavily contaminated. Studies have shown that improvements in sanitation facilities have greater impacts on diarrhea prevalence than improvements in water supply (Huntley, 1997). Well-designed water supply and sanitation interventions typically reduce diarrhea incidence by about 25%. Children from homes with water supplies over 500 m from the house had incidence rates of diarrhea 34% higher than those of children from houses with their own water supply (Gorter, 1991). The study in Accra, Ghana showed that the presence of drinking water at a household level had a negative association with the incidence of childhood diarrhea. Therefore, lack of or inadequate access to potable water is associated with high incidence of diarrhea (Boadi, 1990).

Socio-economic factors: Socio-economic factors do not directly affect the risk of diarrhea, but rather, influence family behaviors that alters the child's exposure to pathogens or susceptibility to infection. The impact of latrines on diarrhea was greater where the mothers had a higher level of education or worked outside the home (Daniels et al., 1990).

MATERIALS AND METHODS

The study was conducted at Abukako Kebele from May 1, 2018, to June 31, 2018, which is found in Jimma Zone, Oromia region, south west of Ethiopia. Abukako Kebele is found at 17 km South-East from Jimma town with total population of 3326 (1658 males and 1668 females) in 584 households. Jimma is located 357 km South West of the capital city of Ethiopia, Addis Ababa. All households in the Abukako Keble were used as a source population with a total sample size of 254.

Study Design

Institutional based cross-sectional study design was conducted with the total sample size 254 which was obtained by using single population proportion formula among households in the Abukako Kebele from May 1, 2018, to June 31, 2018, in JUMC.

Data Collection Methods

First questionnaires were prepared in English containing socioeconomic factor, hand washing practice, water supply and frequency of latrine utilization after exhaustive reviewing of different and relevant literatures and translated in to local language during data collection The data were collected using structured questionnaires through face to face interview methods from households in the Abukako Keble over the specified time period based on inclusion criteria from all selected households who had latrine in the Abukako Keble. Before commencing data collection, ethical clearance and approval were obtained from Jimma University, College Health Science and Medicine, Department of Nursing. Oral informed consent was secured from the involved participants for their participation after the nature of the study was fully explained to them. The right to refuse was respected and data was collected respectfully.

RESULT

Socio Demographic Characteristics

A total of 254 households were included in the study. Out of 254 households that were included in the study 10 (3.9%) of them had a family size of 2 persons and 80 (31.5%) of them had a family size of 5 persons. There were 408 under five children in 204 households. Majorities of respondents 239 (94.09%) were Oromo ethnicity. Out of 254 respondents, 240 (94.5%) Muslims, 8 (3.2%) orthodox, 4 (1.6%) protestants and 2 (0.8%) were others shown in Table 1.

Table 1. Socio-demographic distributions of respondents in Abukako kebele, Jimma Zone, South West Ethiopia.

Variables	Responses	Frequency	%
Number of family members	2	10	3.9
	3	48	18.9
	4	68	26.8
	5	80	31.5
	6 and above	48	18.9
Religion	Orthodox	8	3.2
	Muslim	240	94.5
	Protestant	4	1.6
	Others	2	0.8
Ethnicity	Amhara	9	3.54
	Tigray	4	1.57
	Oromo	239	94.09
	Others	2	0.79
Education level of mothers	Illiterate	213	83.9
	Able read and write	34	13.0
	If grade (1-8)	9	3.1
Educational level of the children	Illiterate	387	94.9
	Able read and write	21	5.1
Husbands educational level	Illiterate	200	82
	Able read and write	24	9.8
	If grade (1-8)	20	8.2
Family's income per month	Low income(<1623 birr)	220	86.6
	Medium income (1623-6389 birr)	28	11
	High income (>6389 birr)	6	2.4
Mothers job	Housewife	218	85.8
	Daily laborer	20	7.9
	Merchant	16	6.3
Marital status of the mother	Married	228	89.8
	Widowed	10	3.9
	Separated	7	2.8
	Divorced	9	3.5

Latrine

Among 254 respondents, about 223 (87.8%) respondents had latrine. All 223 (100%) types of available latrines were pit latrines. Majority 144 (64.6%) of latrines were constructed since 1-3 years. Two hundred thirteen (95.5%) latrines were functional. Of the functional latrines, 16 (7.2%) latrines required maintenance, of which 6 (37.5%) of superstructure and 5 (31.5%) of slab of the latrines required maintenance predominantly as shown in Table 2.

Table 2. Frequency distribution of Latrine utilization in Abukako kebele, Jimma Zone, South west Ethiopia.

Variable	Response	Frequency	Percent
Type of latrine	pit latrine	223	100%
year since latrine is Constructed	1-3 yrs	144	64.6
	4-6 yrs	50	22.4
	7-10 yrs	19	8.5
	>10 yrs	10	4.5
Functional latrine	yes	213	95.5
	No	10	4.5
Status of latrine	Maintained	197	92.5
	Need maintenance	16	7.5
Latrine part that needs maintenance	Superstructure	6	37.5
	Slab	5	31.3
	Roof	2	12.5
	Latrine pit	3	18.8
Presence of Pipe water around home	No	198	78
	Yes	56	22

Use of latrines by family members

Majority of 121 (54.2%) of the respondents explained that they were rarely using latrines. This was because of open field defecation was convenient which accounts 78 (64.5%). About 125 (56.1%) pit latrines were seen fresh feces through the squatting hole as shown in Table 3.

Table 3. Distribution of Utilization of latrine by family members above 5 years old in Abukako Keble, Jimma Zone,South Ethopia.

Variables	Response	Frequency	Percent%
Frequency of latrine utilization	Rarely	121	54.2
	Mostly	80	35.9
	Always	22	9.9
Reason why latrine is used always	Excreta are dangerous to health	5	22.7
	Convenient	14	63.7
	No other place to defecate	3	13.7
Reason why latrine is used rarely	No superstructure	8	6.6
	Bad smell	7	5.8
	Open field is convenient	78	64.5
	Stay out for work	28	23.1
fresh feces seen	yes	125	56.1
	No	98	43.9

Latrine utilization by <5 children

About 204 (80.3%) households responded that they had <5 children with the total number of 408. About 104 (51%) used latrine. Majority of 83 (79.8%) the children started to use at the age of 3-4 years. One hundred sixty seven (81.86%) households disposed their children's faces in the pit latrine. The major reasons given by respondents for why <5 children did not use the latrines were, being just a child 38 (38%), large squat hole 27 (27%), latrine is not clean 7 (7%), floor was not safe to stand on 23 (23%) and bad smell was 5 (5%) as shown in Table 4.

Table 4. Frequency distribution of Utilization of latrine by under 5 children in Abukako Keble, Jimma zone, South west Ethiopia.

Variables	Response	Frequency	Percent
Family's having under5 children	yes	204	80.3
	No	50	19.7
Age of children (No=408)	0-5 months	100	24.5
	6-11 months	238	58.3
	12-23 months	45	11
	24-35 months	18	4.4
	36-47 months	4	1
	48-59 months	3	0.7
Households having <5 children use latrine	yes	104	51
	No	100	49
Age of under 5 using latrine	3-4 yr	40	38.5
	5 yr	64	61.5
Reasons for not using the Latrine by <5 children	Floor not safe to stand on	23	23
	Large squat hole	27	27
	Latrine not clean	7	7
	Unreasonable bad smell	5	5
	Being a child	38	38
Disposal means feces of children who do not start using Latrine	Disposal by burying	8	3.92
	Pit latrine disposal	167	81.86
	Disposal outside house	29	14.22

Under 5 diarrheas

There were 408 under five children, 54 (13.2%) of them were affected by diarrhea and 354 (86.8%) were not affected. The more prevalence of diarrhea was in age 6-11 months which accounted 21 (38.9%) as shown in Figure1 below.

Water Source

About 124 (48.8%) households replied that their main source of water was unprotected well. About 96 (37.8%) households from river, 10 (3.9%) from protected well, 20 (9%) from pipe water and 4 (1.6%) rain water of them was their water source.

Hand Washing

Among 254 house hold respondents, 76 (29.9%) washed their hands after defecation. Those who didn't wash their hands were at higher risk for the diarrheal diseases. About 23 (9.1%) of the respondents had soap for hand washing after defecation. This means that individuals who did not use soap in were at high risk than those who did use as

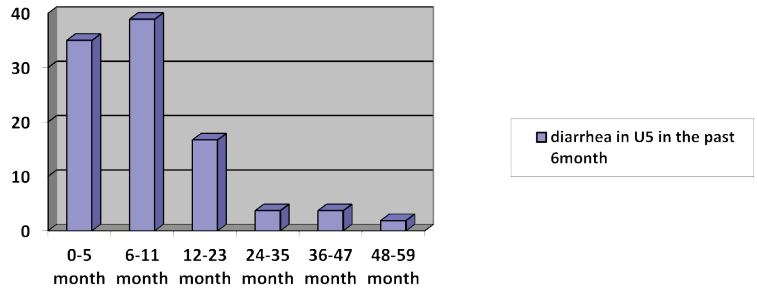

Figure 1. Diarrheal diseases distribution in <5 year children in Abukako Keble, Jimma zone, South west, Ethiopia.

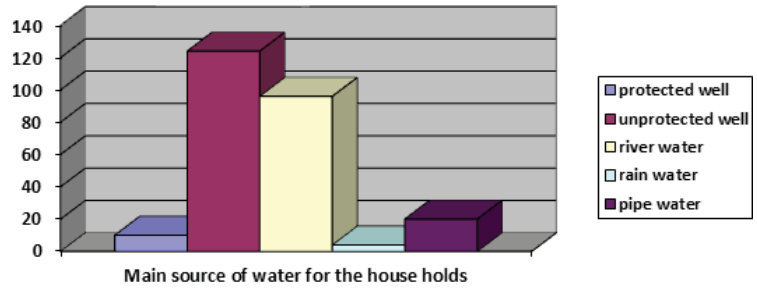

Figure 2. Frequency distribution of Water source house-hold in Abukako Kebele, Jimma zone, South west, Ethiopia.

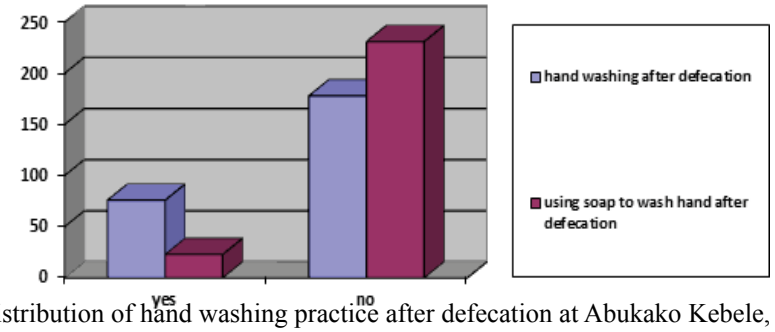

Figure 3. Frequency distribution of hand washing practice after defecation at Abukako Kebele, Jimma Zone,South west, Ethiopia.

shown in Figure 3.

DISCUSSION

The findings of this study revealed that the rate of latrine utilization in rural community of Abukako Kebele was about 87.8%. It is lower than the study commissioned in reported usage of latrine in Lesotho by adults was 99%; however, the use of latrines for the disposal of children's faces was only 50% (Boadi et al., 2005).The disparity might be due to difference in study area, and socio-cultural variations. In the present study district, there is no organized and continuous community led total sanitation and participatory hygiene and sanitation transformation intervention carried out except the advice and education provided by health extension workers, local administrators and local NGO's .

The means of disposal of <5 children feces varied among respondents about 167 (81.86%) in the pit, 29 (14.22%) dispose outside the house, while 8 (3.92%) by burying. The use of pit latrine for safe disposal of children feces is better when compared with study only 39% disposed children's faces in the latrine in Philippines. This might be due to the advice and education provided by health extension workers, local administrators and local NGO's. Studies have shown that hygienic disposal of children's faces is associated with 30%-40% less risk of diarrhea. Maintenance and use of latrines at household level are related each other. The better they are maintained, the better they are used (Ethiopia Demographic and Health Survey, 2011).The 2005 Ethiopia Demographic and

Health Survey (EDHS) reported that 18% of <5 children experienced diarrhea in the two weeks prior to survey. Various studies conducted in Ethiopia also revealed that a two weeks diarrhea incidence rate of 16%, 25% of <5 children in SNNPR and 33.5% of <5 children in Jimma Zone (World Health Organization, 2002). But in this study the 6 month prevalence rate of <5 diarrheal diseases was 13.2% which is less than comparatively. This might be due to sample size variation and time of study.

Diarrheal diseases highly affect individuals who use the latrine rarely. This might be due to stay out of work, and in some of open field is convenient. The Global Public-private Partnership for Hand washing has brought together various organizations and sectors to promote hand washing with soap on a large scale hand washing is one of the most effective means of preventing diarrhea diseases, along with safe stool disposal and safe and adequate household water supply. Evidence suggests that improved hand washing can have a major impact on public health in any country and significantly reduce the two leading causes of childhood mortality diarrhea disease. Because hand washing with soap can prevent the transmission of a variety of pathogens, it may be more effective than any single vaccine or hygiene behavior. Promoted broadly enough, hand washing with soap can be viewed as an essential vaccine. Almost every household in the world, regardless of economic status, has soap.

Hand washing with soap at key times, however, is not widely practiced. If the millennium development targets for reduction in child mortality are to be met, hand washing habits must be improved along with access to safe water and sanitation (Ministry of Health, 2005).

Good hand-washing requires the use of soap (or a local substitute like ash, soil, leaves etc.), plenty of water, and careful cleaning of all parts of the hands (Environmental Impact on Health, 2002; World Health Organization, 2002). Simple hand washing with soap and water reduces diarrhea transmission by 35% (World Health Organization, 2002). A review of other available evidence suggests that hand washing with soap could reduce diarrhea incidence by 47% and save at least one million lives per year (World Health Organization, 2004). Usually soap is protective but in this study respondents who didn't use soap after toilet were highly affected by diarrhea this might be due to presence of microorganisms in their hands which might contaminate the food and water.

CONCLUSION

This study concluded that majority of the households used pit latrine. Diarrheal diseases highly affect family members who used the latrine rarely. This might be due to stay out of work, and in some of open field is convenient. Usually soap is protective but in this study respondents who didn't use soap to wash hand after defecation were highly affected. This might be due to presence of micro-organisms in their hands which might contaminate the food and water. Majority of the households had no hand washing facility near to the toilet. Evidence suggests that improved hand washing can have a major impact on public health in any country and significantly reduce the two leading Causes of childhood mortality diarrhea disease.

ACKNOWLEDGMENT

We are grateful to Jimma University, College of Health Science, department of nursing and midwifery and Jimma University medical center for covering cost for the study. We also would like to thank the Abu kako Kebele administrator who supported us on giving information about the Abu kako Kebele and the study respondents at large for their wholesome effort and contribution in provision of the information. And at last but not least, we would like to thank the survey supervisors and data collectors for their effort to accomplish data collection with due effort and passing all hard time.

FUNDING

Jimma University covered only survey cost for this study and there is no any funding organization.

AVAILABILITY OF DATA AND MATERIALS

Due to no consent from the study participants to disclose raw data, this data could not be made available in order to protect the participants' identity.

AUTHORS CONTRIBUTION

Desalew Tilahun, Tolasa Takele and Abdisa Eba conceived and designed the protocol. Abdisa Eba was leader. Desalew Tilahun contributed on data analysis, wrote the draft and prepared manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All participants received a letter describing the purpose and procedure of the study. The letter also stated that their participation was voluntary, that the study records would be kept confidential, and that their contributions would be unidentifiable in the final report. The study was explained and participants were asked by the Kebele administrator to participate after a Kebele issue meeting. All participants then signed a consent form.

CONSENT FOR PUBLICATION

Not applicable.

COMPETING INTERESTS

All authors declare that they have no competing interests.

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