

Latrine Utilization and Associated Factors in Rural Community of Chencha District, Southern Ethiopia: A Community Based Cross-Sectional Study

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Abstract The use of sanitation facilities is known to interrupt the transmission of fecal-to-oral related disease. Health improvement comes from the proper use of sanitation facilities, not simply their physical presence. This is best achieved through regular use of clean and well maintained latrines. A community based cross-sectional study was conducted to assess latrine utilization and associated factors in the rural community of Chencha district, Gamo Goffa Zone in February 2013. Sample population of 420 households with latrine facilities were selected from 5 sub districts (*Kebeles*). Multistage systematic random sampling method was used. The structured questionnaire was used for data collection. All types of available latrines were pit latrines. Of which 67.4% latrines were functional and from which 46.4% required maintenance. Among 415 households, overall latrine use was 60% and the remaining 40% households were not using latrine. However, over all persistent utilization was 31.08%. Main reasons for non-use or non-persistent use of latrine were lack of functional latrine, stay out for farming and lack of supra structure of latrine. self-initiation (AOR (95% CI) = 6.480(2.772-15.379), $p < 0.001$), peer influence (AOR (95% CI)= 3.111(1.470-6.584), $p = 0.003$), length of years since latrine was constructed ((AOR (95% CI) = 0.219(0.133-0.362) $P < 0.001$), and educational status of the heads of households ((AOR (95% CI) = 3.293 (1.969-5.506) $P < 0.001$) were the major predictors affecting utilization of latrines. In conclusion, Latrine status and utilization in rural community of Chencha district was found to be very low and needed attention to promote hygiene and sanitation behavior in the community.

Keywords: latrine utilization, Chencha, Ethiopia

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1. Background

Over 50 different infections are potentially transmitted from an infected person to a healthy one by various routes involving excreta. Lack of sanitation facilities compels people to practice open defecation and this increases the risk of transmission of diseases. The disease burden associated with poor water, sanitation, and hygiene is estimated to account for 4.0% of all deaths and 5.7% of the total disease burden in disability-adjusted life year (DALYs) in worldwide, principally through diarrheal diseases, schistosomiasis, trachoma, ascariasis, trichuriasis, and hookworm infection. The use of sanitation facilities is known to interrupt the transmission of fecal-to-oral related disease [1,2,3,4].

The global Millennium Development Goal (MDG) target for sanitation has been missed by almost 700 million people and 68% of the global population now uses an improved sanitation facility. The only developing

regions to meet the sanitation target were the Caucasus and Central Asia, Eastern Asia, Northern Africa and Western Asia. About 2.1 billion people have gained access to an improved sanitation facility since 1990 and 82% of the global urban population and 51% of the rural population, uses improved sanitation facilities. Seven out of ten people without improved sanitation facilities, and nine out of ten people still practicing open defecation, live in rural areas. The least developed countries did not meet the sanitation target, and only 27 % of their current population has gained access to improved sanitation since 1990. In 2015, 2.4 billion people still lack improved sanitation facilities [5].

Even though, Ethiopia had established the National Sanitation Strategy the goal of 100% latrine coverage to improve sanitation and hygiene in 2005, it was reported there was little improvement (less than 50%) coverage in 2015 [5,6].

Health improvement comes from the proper use of sanitation facilities, not simply their physical presence [2]. 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 [7,8].

The hygienic disposal of excreta is important because the infective organisms for many diseases leave through feces and some through urine [8]. One gram of feces may contain 10 million viruses, 1 million bacteria, a 1000 parasite cysts and a 100 worm eggs [9]. It seems clear therefore, that human excreta should be managed as a potentially dangerous material [10]. Young children are frequently infected with enteric pathogens and their stools are actually an important source of infection. Therefore, hygienic disposal of all feces including young children is an important aspect of disease prevention [7].

In Ethiopia, according to Demographic and Health Survey 2011, overall 38 percent of households have no toilet facility, 16 percent in urban areas and 45 percent in rural areas. The same data source indicated the proportion of households with private improved sanitation that are not shared with other households was only 8%, 14 percent in urban areas and 7 percent in rural areas. This is highly unacceptable given the national prevalence of diarrhea diseases 18%, among under-five children whose mortality is one of the decisive indicators in the MDG goals. Overall child mortality could be reduced by 55% with the provision of safe water, sanitation and hygiene [8,11].

However, the consistent utilization and associated factors of consistent latrine utilization on the community, particularly in rural community has not been assessed. This study has shown at what extent the study community has been using latrine and what affect their use.

2. Methods

2.1. Study Area and Period

A community based cross-sectional study was conducted in February 2013 in Chencha district Gamo Goffa Zone, Southern Ethiopia. The district is found in Gamo Goffa Zone of Southern Nations Nationalities and Peoples Regional State and located about 560 Km from Addis Ababa, and 60Km from Arbaminch town. Its climatic condition is cool zone (*Dega*). According census 2007 which was conducted by central statistics agency of Ethiopia, the total population of the district was about 111,686 and the district has 5 urban and 45 rural Sub districts (*Kebeles*) with a total of 50 Sub districts (*Kebeles*). There are 2 Health Extension workers in each Sub districts (*Kebeles*) of the district assigned in the Health Post. There is one preparatory school, 2 high schools and 50 elementary and primary schools in the district.

2.2. Operational Definitions

Latrine utilization: using latrine for excretion purpose of feces and urine including disposal of children excreta.

Functional latrine - latrine that provided services at the time of data collection even if the latrine required maintenance.

Latrine maintenance: maintaining the existing functional latrine in case of broken sub or superstructures without digging new hole.

Self-initiation: construction of latrine without any external influence by already aware households.

2.3. Sample Size Determination and Sampling Procedure

The sample size was determined by using the single population proportion formula based on the assumption of 50% proportion (p) that all latrine owners are utilizing latrines, at a confidence level of 95% and margin of sampling error tolerated 5%, minimum sample sizes was 384 and with 10% increase to allow non-response rate a total of 422 households with latrines.

Five Sub districts (11%) of 45 rural Sub districts (*Kebeles*) of the district were selected by systematic random sampling and included in the study. Once the study Sub districts (*Kebeles*) was identified, 422 households with latrines were selected by systematic random sampling after proportional allocation to the size of each Sub districts (*Kebeles*).

2.4. Data Collection

Structured questionnaire in which close ended questions with multiple options were developed reviewing relevant similar studies. Ten health extension workers for data collection and two sanitarians for supervision were selected and trained before data collection. Pre-test was conducted by 5% of the sample populations in 21 households with latrines in one of non-selected Sub districts (*Kebeles*) of the district which has similar backgrounds as selected Sub districts (*Kebeles*). During pre-test some respondents assumed latrine utilization for defecation only and this gap was solved during main data collection by informing that latrine utilization was both for defecation and urination. Heads of households who were considered as such by the members of the households were selected for interview. Face to face interview with individual respondents was carried out to assess whether all family members use or not use latrine and if use whether consistently or non-consistently and how they dispose excreta of under five children. In addition observation checklist was used for indicators of latrine utilization such as fresh feces around squat hole, foot-paths to latrine; and observed feces and urine smell in the compound.

2.5. Data Quality

The questionnaire was prepared originally in English and then translated in to Amharic and back to English to ensure reliable information. Data collection guideline was prepared and given for data collectors and supervisors. Pre-test of questionnaire and training of data collectors and supervisors were conducted to ensure the quality of data. Pre-test feedback was given for data collectors and supervisors before the start of actual data collection. Data collectors and supervisors were reviewed every questionnaire for completeness and for logical consistency,

and counter checked by the principal investigator at the end of each day in the field.

2.6. Ethical Consideration

The ethical approval and clearance was obtained from Ethical clearance committee of regional Ethical review Board. Permission was also obtained from the concerned bodies of Gamo Goffa Zonal Health Department and Chench Woreda Health Office. Oral informed consent was taken from each respondent. Information collected from each household was kept confidential and used only for the purpose of research.

2.7. Data Analysis

Data were double entered in to SPSS software version 20, cleaned and analyzed. Frequency distribution and percentages were calculated as appropriate and displayed using tables and figures. Logistic regression for association was carried out to identify association of latrine utilization with predictor variables.

3. Results

3.1. Socio-economic Characteristics

There were a total of 415 (98.34 %) response rates. From 415 heads of household respondents 69.20% were males. The mean age of respondents were 41.47 with 8.03 SD. Majority of respondents 95.40% were Gamo by ethnicity and 55.60% of respondents were Ethiopian Orthodox Christians. Majorities (81.9%) of respondents were married. Mean household family size was 4.90 and 150 (36.10%) of households have under-five children, a total of 231 children. About 66.27% of heads of household were farmers and 62.41% of heads do not have any form of education (Table 1).

3.2. Type of Latrine and Status

Promotion of Latrine construction was facilitated in the district by the district Health Office with the help of UNICE. All types of available latrines were pit latrines. The superstructure and the floor (slab) of the pit latrine was designed to be constructed by locally available materials like wood and mud that initiate the acceptance, affordability and sustainability of the project by the community (Photo 1). The pit of the latrine was circular with a diameter of 1 meter and a depth of 3 meters. Height of the superstructure was 2 meters with 1.5 meters X 1.5 meters width and length. Size of the squat hole was designed to be 25cms width and 30cms length. From 280 functional latrines only 25(8.92%) had cover for squatting hole and 219(78.21%) of the covering slab (sanitation platform) were difficult to clean. There was no Hand washing facilities from locally available materials like gourd, pot, Jerry can etc. near to latrines to remind users to wash their hands after visiting latrines.

Table 1. Socio-demographic characteristics of heads of households and family selected Sub districts (*Kebeles*) in the rural community of Chench district February 2013

Variables	Frequency	Percent
Sex (n=415)		
Male	287	69.20
Female	128	30.80
Age range (n=415)		
20-30	22	5.30
31-40	183	44.10
41-50	154	37.11
51-60	51	12.29
61-70	5	1.20
Ethnicity (n=415)		
Gamo	396	95.40
Gofa	19	4.60
Religion (n=415)		
Orthodox	231	55.60
Protestant	178	42.89
Others	6	1.60
Family size (n=415)		
<5	174	42
5	91	21.90
>5	150	36.10
Presence of under five children (n=415)		
Yes	150	63.85
No	265	36.14
Marital status of head of households (n=415)		
Married	340	81.90
Widowed	56	13.40
Single	8	1.90
Divorced	6	1.40
Separated	5	1.20
Occupational status of head of households (n=415)		
Farmer	275	66.27
Merchant	34	8.19
Housewife	98	23.61
Other	8	1.93
Educational status of head of households (n=415)		
Illiterate	259	62.41
Read and write	72	17.35
1-6 grade	43	10.36
6-8 grade	23	5.54
8-10 grade	12	2.89
Above 10	6	1.45
Educational level of children(n=746)		
Illiterate	304	40.75
Read and write	32	4.25
1-8 grade	364	48.80
Above grade 8	46	6.20



Photo 1. Typical household pit latrine constructed from locally available materials in rural community of selected Sub districts (*Kebeles*) in Chencha district, February 2013



Photo 2. Household pit latrine with superstructure and roof that needs maintenance in rural community of selected Sub districts (*Kebeles*) in Chencha district, February 2013

Among 415 pit latrines 280 (67.4%) were functional. From 280 functional latrines 130 (46.4 %) required maintenance majorly for superstructure (Photo 2, Table 2). The remaining non-functional 135 (32.6%) latrines required reconstruction.

Table 2. Location and status of the latrines in rural community of selected Sub districts (*Kebeles*) in Chencha district, February 2013

Variable	Frequency	Percent
Status of latrine (n=415)		
Need no maintenance	150	36.14
Need maintenance	130	31.33
Need reconstruction	135	32.53
Parts of latrine that needs maintenance (n=130)		
Supra structure	76	58.46
Roof	50	38.46
Other	4	3.07
Location of latrine from water well (n=24)		
Uphill	12	50.00
Downward	11	45.80
On the same level	1	4.20
Distance of latrine from water well (n=24)		
15 meter	4	16.66
15-30 meters	11	45.83
>30	9	37.50
The distance of latrine from house in meter (n=415)		
<6	95	22.89
6-10	158	38.07
>10	162	39.03

Three hundred thirty (77.1%) of latrines were > 6 meters far away from houses and remaining were ≤6 meters. Half of latrines were constructed uphill from water well (Table 2).

3.3. Perceived Reasons of Latrine Construction by Respondents

Two hundred thirty nine (57.59%) of the respondents who had latrines explained that they were advised by health workers to construct latrines but only 53 (12.7%) respondents said that they were imposed by other bodies like local administrators (Table 3).

Table 3. Reason of constructing latrine in selected Sub districts (*Kebeles*) of rural community of Chencha district, February 2013 (n=415)

Reason	Frequency	Percent
Advice from health worker	239	57.59
Self-initiation	70	16.86
Seeing others	53	12.77
Imposition from others	53	12.77

3.4. Use of Latrines by Family Members

Among 415 households, 249(60%) use latrine in some frequency and the remaining 40% households were not using latrine. Over all consistent latrine utilization was found to be only 120 (31.08%). There were fresh feces at squat hole indicating the recent use of latrines in 187 (66.78%) of households with functional latrine. However, in households with functional latrine 49 (17.5%) foot-paths to the latrines were covered with grasses (Photo 3). There were also observable feces in the compound of 90 (32.14%) households and 31 (11.07%) had smell of frequent open urination in the compound in households with functional latrine.

Major reasons for not-using latrine by family members ≥5 years old were non-functional latrine, stay out for farming and no superstructures for latrine. Other minor reasons were convenience of open filed, societal habit and large family size.



Photo 3. Household pit latrine with track to latrine covered with grass in rural community of selected Sub districts (*Kebeles*) in Chencha district, February 2013

3.5. Latrine Use by <5 children

Among households with under-five children only 4 (2.7%) heads of households responded their children were using latrines and the starting age of latrine use was at age of four years. The major reasons given by respondents for why <5 children did not use the latrines were large squat hole and floor was not safe to stand on (Table 4).

Table 4. Reason for not using latrine by <5 children in rural community of selected Sub districts (Kebeles) in Chencha district, February 2013 (n=146)

Reason	Frequency	Percent
Large squat hole	67	45.89
Floor not safe to stand on	61	41.78
Unreasonable bad smell	11	7.50
Latrine not clean	5	3.40
Others	2	1.36

From 146 households whose under-five children do not use latrine only 52(35.61%) of households dispose excreta of children who cannot use latrine by themselves at Pit latrine (Table 5).

Table 5. Disposal system of excreta of under five children in rural community of selected Sub districts (Kebeles) in Chencha district, February 2013 (n= 146)

Disposal	Frequency	Percent
Burying in the compound	56	37.67
Throwing feces out of house	35	23.97
Pit latrine disposal	52	35.61
Others	3	2.10

Table 7. The distribution of latrine utilization along with Predictors in selected Sub districts (Kebeles) of rural community of Chencha district, February 2013

Predictors	Frequency	Percent	Latrine utilization			
			Yes		No	
			Frequency	Percent	Frequency	Percent
Presence of school children (n= 415)						
Yes	353	85.10	220	62.30	133	37.70
No	62	14.90	29	46.70	33	53.30
Years since latrine was constructed (n= 415)						
> 2years	286	69	207	72.30	79	27.70
<2 years	129	31	42	33.00	87	67.00
Educational status of the heads (n= 415)						
Literate	156	37.60	117	75	39	25
Illiterate	259	62.40	132	51	127	49
Reason of latrine construction (n= 415)						
Advise by health extension workers	239	57.59	126	52.70	113	47.29
Self-initiation	70	16.86	63	90.00	7	10.00
Seeing others	53	12.77	40	75.50	13	24.50
Imposition from others	53	12.77	20	37.70	33	62.20

3.6. Perceived Reasons for Latrine Use

Majority of the respondents, 278(67%) explained that use of latrines was because they knew that excreta are dangerous to the health followed by no other place for excretion (20.35%) (Table 6).

Table 6. The reason of latrine use in adults in rural community of selected Sub districts (Kebeles) in Chencha District, February 2013 (n= 415)

Reason	Frequency	Percent
Excreta are dangerous to health	278	66.98
Convenient/privacy	47	11.32
No other place for excretion	84	20.24
Others	6	1.44

3.7. Predictors of Latrine Utilization

The predictors of latrine utilization as presented below at Table 7 are years since latrine was constructed till time of the study, literacy level of heads of households and the reason of latrine construction. The latrine utilization was associated with self-initiation for latrine construction ((AOR (95% CI) = 6.480(2.772-15.379), $p < 0.001$), peer influence for latrine construction ((AOR (95% CI) = 3.111(1.470-6.584), $p = 0.003$), length of years since latrine was constructed ((AOR (95% CI) = 0.219(0.133-0.362), $p < 0.001$), and educational status of the heads of households ((AOR (95% CI) = 3.393 (1.969-5.509), $p < 0.001$). However, we did not find significant association the presence of school children in household with extent of latrine utilization ((AOR (95% CI) = 0.646(0.340-1.226) $P = 0.181$) and family size of the households ((AOR (95% CI) = 1.363(0.839-2.214), $p = 0.211$) (Table 8).

Table 8. Logistic regression summary of factors affecting consistent latrine utilization in the rural community of Chencha district, February 2013

Factors		COR (95% C.I.)	P value	AOR (95% C.I.)	P value
Reasons for constructing latrine	Advise by health extension workers	1		1	
	Self-initiation	8 (3.551-18.347)	<0.001	6.480(2.772-15.379)	<0.001*
	Peer influence	2.7 (1.405-5.421)	0.003	3.111(1.470-6.584)	0.003*
	Imposed by others	0.54 (0.295-1.001)	0.050	0.487 (0.243-0.978)	0.043*
Years since latrine was constructed	>2 years	1		1	
	<2years	0.184(0.117-.289)	<0.001	0.219(0.133-0.362)	<0.001*
Educational status of the heads of households	Literate	2.88(1.86-4.46)	<0.001	3.293 (1.969-5.506)	<0.001*
	Illiterate	1		1	
Presence of school children in household	yes	1		1	
	No	0.531(0.309-.915)	0.023	0.646(0.340-1.226)	0.181
Family size	Less than 5	1.5(1.026-2.363)	0.038	1.363(0.839-2.214)	0.211
	5 and above	1		1	

COR=Crude odds ratio, AOR = Adjusted odds ratio.

4. Discussion

4.1. Type of Latrine and Status

All types of available latrines at study area were pit latrines. From 280(67.47%) functional latrines, 130 (46.42%) required maintenance. From total 135 (32.53%) non-functional latrines required reconstruction. This finding is lower when compared with study conducted in northern Ethiopia in which functional latrines were 86.7%, need reconstruction were only 13.3% and need maintenance were 47.2% [12]. However, it was better than a study in Indian in which 47% latrine were functional even though type of latrine are not similar [13]. Latrines that need maintenance of supra-structure were 76(58.46%) and roof were 50(38.4%). Latrines without roof might imply that the economic situation of the people and environmental sanitation awareness. Since latrines without a roof causes problems during the wet season, more emphasis should be given to convince the community about roofing their latrines in order to keep the water flow to the latrines as low as possible.

Majority of the functional latrines 219(78.21%) in the selected Sub districts (*Kebeles*) had covering slab (sanitation platform) which were not suitable to clean and 255(91.07%) of latrines do not have squat hole cover. Also there is no any kind of hand washing material after utilization. Despite all these problems, considerable numbers of the latrines were constructed very near to house. However, it was recommended to build latrine with a minimum of 6 meters distance from the home in order to avoid the associated health risk and inconvenience [14]. On top of that 12(50.00%) of the latrines were constructed uphill from water well (Table 2). This will give good opportunity for breeding of houseflies and can harm the health of community by contaminating food and drinking water [7,8].

4.2. Latrine Utilization

The findings of this study revealed that reported over all usage of latrine by family members above age of 5 was found to be 60.00% and only 129(31.08%) of total

assessed households consistently use latrine. This is lower than two studies conducted in Northern Ethiopia (61%) and rural community of Bangladesh (57.4%) [12,15,16].

In this study, family whose children were using latrine reported that they began to use latrine at the age of 4 years. However, only 4(2.74%) of households under five children were using latrine. The majority of households with under-five children had unhealthy disposal of child excreta. From 146 households whose under five children do not use latrine, 35(23.97%) threw away from the house either in the bush or in the garden and 56(37.67%) burying in the compound which is too shallow to protect contamination. Only 52(35.61%) correctly dispose in pit latrine (Table 5). The use of latrine for safe disposal of children feces lower when compared with study in Northwest Ethiopia in which 8.8% of children aged 3-5 use latrine and 68.3% had sanitary disposal of child excreta [16]. However, it is better than study conducted in India in which less than 21% of children excreta disposed safely [17].

4.3. Perceived Benefits of Latrine Utilization

Even though, majority 278(66.98%) of respondents knew that excreta are dangerous to health, significant number of respondents do not have awareness about danger of excreta. Forty seven (11.32%) responded latrine utilization was due to it is a convenient place for defecation, particularly for girls and women in a community that defecation during day time is dishonor and 84(20.24%) considered latrine utilization is due to in absence of other place to defecate. This clearly shows that there is gap on awareness in community about importance of latrine utilization. This gap is higher compared study conducted in Gojam in which 84.2% respondents use latrines because of their understanding about the danger of excreta to health [12].

Major reasons that deter latrine use by the households were non-functional latrines, stay out for farming and no superstructure; which is similar to the study conducted in Ethiopia by Ministry of Health in 1997 except staying out for farming [18] and study in Gojam in which non-functionality of latrines and staying out for work were the main reasons for not utilizing a latrine [12]. However,

study in Northwest Ethiopia and India reported different reason in both of which the major reasons for not using latrine by the households were long live habit and considering open defecation is comfortable [13,16].

4.4. Predictors of Latrine Utilization

The extent of latrine utilization was associated with self-initiation, peer influence, length of years which latrine was constructed and educational status of the heads of households. Self initiation for latrine construction was 6.5 times more likely to use latrine than mere education given by health education workers. Observation of models from their neighbors also 3 times more likely to use latrine and imposition from others was 51% less likely than mere education given by health extension workers. Hence rather imposing individuals and simply informing what to do, it is better to provide and promote role models from whom community adopt and reshape their health behavior like 1-to-5 organization. This result is similar with a study result in Gojam [12]. The recent (<2 years) since latrine constructed to data collection period was 78% less likely to use latrine than the households owning latrines for >2 years. The study conducted in India supports this result that when years since latrine was constructed increase the utilization of latrine was being increased [13]. This may be due to behavioral change in community may take some period of time. Hence, education, support and monitoring of sanitary activity need maintained until community behavioral change observed rather informing in short intermittent campaigns. The likely hood of latrine utilization in households with literate head was found to be 3.3 times more than households with illiterate head. Similar result was reported by study in India [15]. We did not find significant association between presence of school children in household and extent of latrine utilization when adjusted to other factors. This may be due to only 46(6.16%) of children are above grade 8 to influence family (Table 1). Family size also not associated with latrine utilization.

The limitations of the study were as being cross-sectional study in nature, it may not address actual situation of the seasonal difference in consistent latrine utilization and there might have tendency of respondents to over report positive hygiene behavior in the interview.

4.5. Conclusions and Recommendations

This study concluded that latrine utilization was found unsatisfactory. Self-initiation and peer influence for construction of latrine, length of years since households owned latrine and educational status of the heads of households were the major predictors affecting utilization of latrines. Since inconsistency of latrine use and un-functionality of latrine were the major problems, sustainable and model approach needed to promote hygiene and sanitation behavior in the community.

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Conflict of Interest

Investigators disclose that there is no conflict of interest.

References

- [1] World Health Organization, 2000. PHAST step by step Guide: Participatory approach for the control of diarrheal diseases; pp. 13-16.
- [2] World Health Organization, 2002. Healthy villages: A guide for communities and communities' health workers, pp.19-70.
- [3] WHO/10 facts on sanitation: URL: <http://www.who.int/features/factfiles/sanitation/facts/en/index1.html>.
- [4] Prüss A, Kay D, Fewtrell L, et al, 2002. Estimating the Burden of Disease from Water, Sanitation, and Hygiene at a Global Level. *Environ Health Perspect* 110(5): 537-542.
- [5] Progress on sanitation and drinking water – 2015 update and MDG assessment. UNICEF and World Health Organization 2015.
- [6] Federal Democratic Republic of Ethiopia, Ministry of Health. National Hygiene and Sanitation Strategy, Addis Ababa, Ethiopia. 2005; 2-17.
- [7] World Health Organization, 1993. Prevention of diarrhea (unit 8) - Medical Education: Teaching Medical Students about diarrheal diseases; CDD/SER/93.3. Available from: URL: <http://www.who.int>.
- [8] Community Health Book. The environment and health, 1986; chapter 8; pp. 17-187.
- [9] World Health Organization, 2004. Inheriting the world. The Atlas of children's health and the environment, pp. 8-16.
- [10] McConville J, 2003. Field engineering in the developing world: How to Promote the Use of Latrines in Developing Countries. Available at: www.cee.mtu.edu/peacecorps.
- [11] Central Statistical Agency [Ethiopia] and ICF International. 2012. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International.
- [12] Andualem Anteneh, Abera Kumie, 2010. Assessment of the impact of latrine utilization on diarrhoeal diseases in the rural community of Hulet Ejju Enessie Woreda, East Gojjam Zone, Amhara Region. *Ethiop. J. Health Dev.* 24(2): 110-118.
- [13] Sharmani Barnard, Parimita Routray, Fiona Majorin, et al, 2013. Impact of Indian total sanitation campaign on latrine coverage and use. *PLoS ONE* 8(8): e71438.
- [14] Federal Democratic Republic of Ethiopia, Ministry of Health: Construction Usage and Maintenance of Sanitary Latrine Extension Package. Addis Ababa; 2004. Available at: http://cnhde.ei.columbia.edu/training/documents/Sanitary_Latrine.pdf.
- [15] Tahera Akter, Abu RMM Ali, Nepal C Dey, 2014. Transition overtime in household latrine use in rural Bangladesh: a longitudinal cohort study. *BMC Public Health* 14: 721.
- [16] Yimam Tadesse Yimam, Kassahun Alemu Gelaye, Daniel Haile Chercos, 2014. Latrine utilization and associated factors among people living in rural areas of Denbia district, Northwest Ethiopia, 2013, a cross-sectional study. *Pan African Medical Journal* 18:334.
- [17] Fiona Majorin, Matthew C. Freeman, Sharmani Barnard, Parimita Routray, Sophie Boisson, Thomas Clasen, 2014. Child Feces Disposal Practices in Rural Orissa: A Cross Sectional Study. *PLoS ONE* 9(2): e89551.
- [18] Federal Ministry of Health, 1997. Environmental Health Department. KAP study on water supply, environmental sanitation and hygienic practice in the selected Woredas of Ethiopia.