Community Based Socio-Demographic and Environmental Health Survey in Kometa Sub-locality, Mizan-Aman Town, Bench Maji Zone, Southwest Ethiopia

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Abstract

Background: A range of environmental determinants of health play a key role in disease burden, particularly in developing countries. The quality of environment greatly associated with the health status and living standards of population. The aim of the study was to assess socio-demographic characteristics and environmental health aspects of Kometa sub-locality.

Methods: The study was conducted in Kometa sub-locality, Mizan-Aman town, south west Ethiopia from September to October, 2014. A Community based socio-demographic and environmental health survey was conducted. The sample was systematically drawn from all permanent residents of Kometa locality and the sample size was 384 which was determined by using single population proportion formula. The data were collected by well-structured standard questionnaires and entered electronically.

Result: The male represented 48.57% of participants and the mean age of individuals was 21.26 ± 14.72 years. Generally, 96(48.5%) of households were adequately accessing TV and Radio program but the rest were lacking. Housing structures with corrugated iron sheet was 171(86.36%) followed by concrete 14(7%) and thatched 9(4.6%). About two-third (63.64%) had good illumination. The type of kitchen in every houses also analyzed as 171(88%) separate, 11(5.6%) main house, and 7(3.6%) attached type of kitchen facility. Approximately 192(97.5%) of study participants report showed that they had sanitary facility whether it be private, neighbor-owned, or communal services. Of these, 183(94.8%) were private-owned latrine but only 5(2.5%) of households had totally no latrine. Among the sample 68.4% of households were disposing in open field, 53(27%) in pit, and 6(3%) use municipal services. The majority of water sources 132(66.7%) were located within average distance of less than 10 meters. However, a few households travelled more than 70 meters to fetch water

Conclusion: The housing conditions in this survey were predominantly substandard. Water consumption of greater than half of households in this survey was received from unprotected sources. There was unsanitary disposal of solid wastes from domestic activity. Many interventional measures that target increased accessibility of water services and preventing those causes of high risk problems effectively safeguards population.

Keywords: Socio-demography; Environmental health; Survey; Ethiopia

Introduction

A range of environmental determinants of health play a key role in disease burden, particularly in developing countries [1]. The quality of environment greatly associated with the health status and living standards of population. High sanitary measures lead to significant reduction of environmental determinants that adversely affect health of community and in turn reduce poverty, maternal risk factors, child death, and occurrence of diarrheal diseases. Globally, an estimated 24% of the disease burden (healthy life years lost) and an estimated 23% of all deaths (premature mortality) was attributable to environmental factors. Worldwide more than 1.5 million deaths annually from respiratory infections are attributable to the environment, including at least 42% of lower respiratory infections and 24% of upper respiratory infections in developing countries [1,2].

The mortality rate in children under five years of age from environmentally-mediated disease conditions is 180 times higher in developing countries. On average, children in developing countries lose 8-times more healthy life years, per capita, than their counterparts in developed countries from environmentally-caused diseases. In certain very poor regions of the world, however, the disparity is far greater; the number of healthy life years lost as a result of childhood lower respiratory infections is 800-times greater, per Capita, and 140-times greater for diarrheal diseases [3]. In terms of just diarrhea and lower respiratory infections, two of the most significant childhood killers, environmental interventions could prevent the deaths of over 2 million children under the age of five every year, and thus help achieve a key target of this MDG. Why such risk factors due to environmental quality are the main focus of millennium development goals or Ministry of health, Ethiopia and World Health Organization in global context. The impacts of environmental hazard do not end with negative health consequences of children. It also affects other vulnerable groups like pregnant women and elders. The aim of the

study was to assess socio-demographic characteristics and environmental health aspects of Kometa sub-locality.

Methods

Study area

Kometa sub-locality where this community based socio-demographic and health survey conducted is found in Eastern part of Aman subcity. The administrative town of Benchi Maji Zone, Mizan-Aman, is about 561 km far away from capital city Addis Ababa, Ethiopia. The sub-locality has 24 hour electric supply service (Figures 1 and 2).

Study design and study period

A Community based socio-demographic and environmental health survey was conducted in permanent residency of eastern part of Aman administrative town, Benj Maji Zone, SNNPR, Ethiopia. Primary data were collected from September to October, 2014. Basic determinants of environmental health and population characteristics were adequately measured and representativeness of the sample of population was sufficiently ensured by randomization techniques and standard tools application.

Reference and study populations

The sample of this study was systematically drawn from all permanent residents of kometa locality. The households come into sampling interval were included. All persons in this area considered to be temporary residents were excluded.

Sampling techniques

The households of Kometa locality in this community survey were drawn based on principle of systematic random sampling method. The sample frame of 1545 households in locality was used to determine length of sampling interval firstly, which denoted by K. The size of the households in Kometa locality was represented by N(N=1545) and n(n=384) was the size of the sample households, then the integer that was at least as large as the number N/n called the sampling interval (denoted by K,K=1545/384=4) was determined. In this study, the sampling interval partitioned the households into n zones, or strata, each consisting of k units. Out of n zones in sampling frame every k^{th} (K=4) household was interviewed to collect our data. In general; this systematic sampling was operationalized by selecting a random start between 1 and the sampling interval, k^{th}. That random start, j, and every subsequent k^{th} integer was then included in sample for study. Finally, the households selected into the sample were j, j+k, j+2k, j+3k…

Sampling size estimation

The sample size for this study was estimated by applying single population proportion formula. The effect size of clinically relevant measures was ensured through application of systemic random sampling procedures and representative sampling. The internal and external validities of the measurements to generalize/extend our finding were maintained in this survey by randomization participants with equal chance of being selected. Therefore, the sample size for this study was estimated mainly with special emphasis on three parameters: (i) variance or heterogeneity of study participants, (ii) the

desired level of confidence (95%) and (iii) the acceptable margin of error (5%). The sample size estimation was performed as follows.

$$N = Z_{\frac{\alpha}{2}}^2 P_{1-P} / W^2$$

=1.962*0.5*[1-0.5]/0.052

=384 subjects

Whereas sample size (N), Z-value at α=95% (Zα), population proportion (P), and margin of acceptance (W). Thus, the 192 households from this sample was included in our study because the study area was half of Kometa locality.

Data collection procedures

The data were collected by well-structured standard questionnaires in English version. These questionnaires were adopted from previous similar community based survey to collect useful population characteristics including socio-demographic, determinant of health, maternal, child, and TB related information. During data collection, the health professional made face to face contact with household to collect basic characteristics. The data quality was ensured through training of data collectors, developing standard tool, close supervision, checking of completeness of questionnaires and missing data, double entry and data cleaning, and careful data analysis.

Data analysis

The data were entered electronically. Independent continuous variables were statistically analyzed by using mean calculation with corresponding 95% confidence interval. Pearson correlation calculation also used to measure association of explanatory and outcome variables. Frequency analysis was appropriate statistics for most study variables which was applied extensively. In general, a vast majority of variables were analyzed descriptively and some were analyzed inferentially so that generalizable statistics could be drawn for study populations.

Ethical considerations

The ethical clearance was obtained from College of Health Sciences Ethical Committee, Mizan-Tepi University, and additional from administrative body of the study area. The participants or households respondents were made clear of the purpose of this study to increases quality of data and win their cooperation in data collection process. All data were collected, after informed consent was obtained from participants. Overall, the data were handled confidentially and anonymized in every process of study.

Operational definition

Household refers to a person or group of persons who occupy the same dwelling and do not have a usual place of residence elsewhere. The household may consist of a family group such as a census family, of two or more families sharing a dwelling, of a group of unrelated persons or of a person living alone. Household members who are temporarily absent on reference day are considered part of their usual household. A house and its occupants regarded as a unit.

Illumination-the level of illumination of households was measured based on criteria like reasonable distance between Housing structure, installation of right-sized window, internal wall color, and voltage of

recommended capacity. Household was categorized as very good if it fulfilled at least three, good if fulfilled two, fair if it fulfilled one, and bad if it fulfilled none of the criteria.

Cleanliness-the level of cleanliness was measured based on physical structure freedom from pollutants, unsightly conditions, malodorous or dirty matters. Better management of all wastes generated in domestic environment to make healthy conditions was careful examined.

Socio-economic status-the household was grossly categorized into low, middle, and high socio-economic status based on income level, occupation and educational status. The household income level was categorized into less than 10,000 birr, 10,000-40,000 birr and greater than 40,000 birr per year, respectively.

Latrine status-the pit content leveled at less than 1meter was filled, collapse of superstructure or slab immediately required repair and improper design or material for construction purposes.

Results

Socio-demographic differentials

A demographic and health survey was conducted in a total of 198 household units that constituted 840 individuals. The male represented 48.57% of participants and the mean age of individuals was 21.26 ± 14.72 years at 95% CI [20.26842, 22.26325]. As shown in population pyramid below, greater numbers of participants were in age category of 10-14 years. The analysis of marital status showed that 336(40%) of participants were married, 266(31.7%) single, 14 (1.7%) divorced, 3(0.4%) widowed and 221(26.3%) underage.

Generally, 96(48.5%) of households were adequately accessing TV and Radio program but the rest were lacking. Postal services and public phone services accessibility were very limited. 95% of household had no fixed phone services but almost all study participants reported they were using mobile. Greater than 50% of household were adequately accessing health media and information. The short coming of these services largely affects community health and population was highly at risk of preventable morbidity.
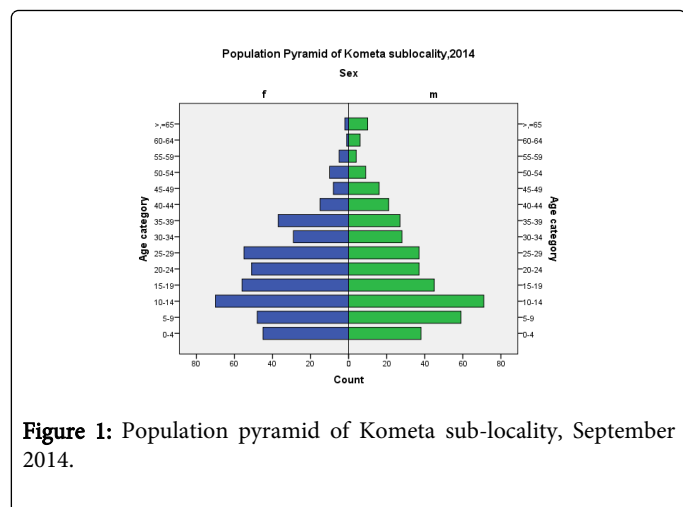

Figure 1: Population pyramid of Kometa sub-locality, September 2014.

Approximately 111(13.2%) of the study participants were reported as illiterate. Of all population, 61(7.3%) of them achieved higher education, 16(1.9%) preparatory level, 99(11.8%) secondary level and 436(50.9%) primary level. However, greater than 117(13.9%) populations were categorized as underage and has not yet started learning. Educationally, higher achievers in educational level were male population and the majority of primary level achievers and underage populations were female.

The socio-economic analysis showed that 69(34.8%) of households were low income, 95(47.9%) middle incomes and 34(17.2%). Approximately 76 households had 1-8 heads of cow and 28 households had 1-5 heads of Ox.
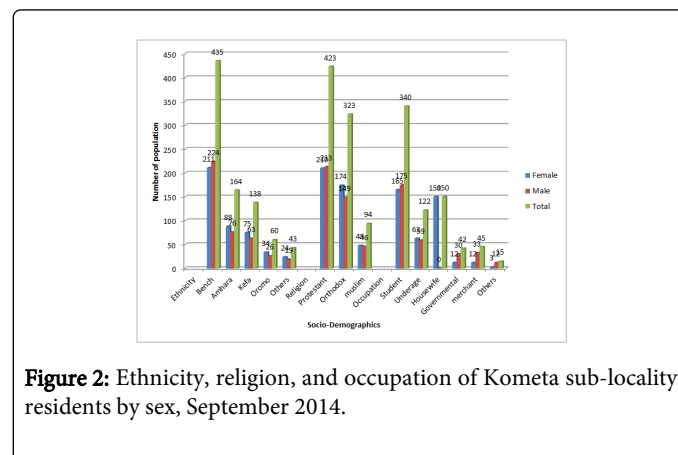

Figure 2: Ethnicity, religion, and occupation of Kometa sub-locality residents by sex, September 2014.

Housing

A greater proportion 155(78.28%) of the study participants were privately owned housing structure when compared to their rental counterparts 43(21.72%). Housing structures with corrugated iron sheet 171(86.36%) dominantly used, followed by concrete 14(7%) and thatched 9(4.6%),respectively. Almost all 180(90.9%) of their residential house wall were made of wooden materials and a few were made of concrete materials 9(9.09%). Approximately 146(73.74%) of houses were constructed with mud floor, 44(22%) were concrete and 8(4%) were wood materials. In most instances, the number of window per house was consistently increasing with room. Even though the every room had installed window, the level of illumination was found different from one to another, 126(63.64%) were good in illumination, 43(23.74%) very good, 24(12%) fair and only 1(0.5%) bad. The probable effects which influenced the luminous index of natural lightening system might be wall color and size of the house.

Data from this study showed that greater than half of households 125(62%) were good and only 43(21.7%) were very good in general hygienic conditions. The remaining proportion of the houses in this survey was fair 30(15.1%) but two houses (1%) were considered relatively bad in sanitary standards. About 49(25%) of sampled houses were immediately in need of maintenance and more than three-fourth were in good condition. The type of kitchen in every houses also analyzed as 171(88%) separate, 11(5.6%) main house, and 7(3.6%) attached type of kitchen facility, but 5(2.6%) houses had no kitchen facility. In cases of attached type of kitchen and cooking in main house, there might be high risk of respiratory problems and discomfort based on energy sources due to indoor air pollution. In Figure 3 below, the housing type for domestic animals in every household are summarized and water source of households in Figure 4.
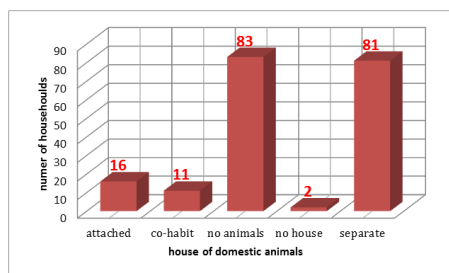
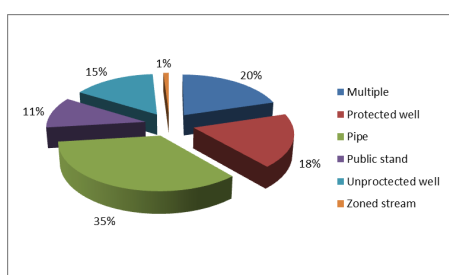**Figure 3:** Housing type for domestic animals by Kometa locality population, 2014.

Figure 4: Household distribution by source of water in Kometa sub-locality, 2014.
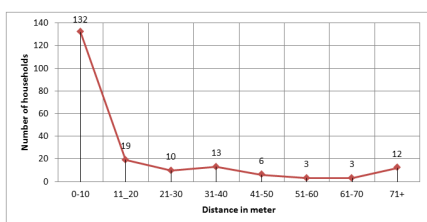

Figure 5: Average distance of water sources from households in Kometa sub-locality, 2014.

As shown in Figure 4 above, the majority of water sources 132(66.7%) were located within average distance of less than 10 meters. However, a few households travelled more than 70meters to fetch water. Approximately 35% of households receive adequate piped water supply nearby their compound, shorter than 10 meters (Figure 5).

For households 181(93.78%),the water sources were not requiring more than 10 minutes and 8(4.2%) of households water supply required 30-40 minutes. Analysis of average length of water storage time showed that 113(57.95%) for 1 day, 55(28.2%) for 2 days, 22(11.3%) for 3 days, 3(1.5%) for 4 days, 1(0.51%) for 5 days, and only one household for more than 15 days.

The summary in Table 1 below shows the type of container, practice of water handling in family, and per household water consumption rate of population of kometa sub-locality.

Variable	Number of households, n (%)
Water consumption (liter)	
0-10	67(34)
Nov-20	39(19.8)
21-30	40(20.3)
31-40	8(4.1)
41-50	14(7.1)
51-60	2(1)
61-70	8(4.1)
≥71	19(9.6)
Type of water storage method	
Bucket and Jar	181(91.88)
Pot	8(4.1)
Barrel	3(1.5)
Jar	3(1.5)
Others	2(1)
Cover for water container	
Yes	180(94.24)
No	11(5.76)

Table 1: Summary of container, storage, and water consumption of households in kometa sub-locality, 2014.

Waste disposal method

Approximately 192(97.5%) of study participants report showed that they had sanitary facility whether it be private, neighbor-owned, or communal services. Of these, 183(94.8%) were private-owned latrine but only 5(2.5%) of households had totally no latrine. In households with lack of sanitary facility, only 20(83.3%) were reported they had land for construction and 18(81.82) were reported they could afford construction. The ownership distribution and type of latrine are given below in Figures 6 and 7, respectively. In most case, the location of the latrines was uphill 89(48%) relative to water sources and 32(20%) were in immediate need of reconstruction and maintenance (Figure 8). Among the latrines located at uphill of water sources, 41(51.9%) were in less 10 meters and 15(18.9%) were within 10-20 meters but the remaining were in more than 20 meters. Most of the latrines at downhill were also closer to water sources or less than 10 meters 33(35.87%).

Data from our survey showed that 134(68.4%) of households were disposing in open field, 53(27%) in pit, and 6(3%) use municipal services. Half of the participants reported that there was great nuisance of pest insect's population but half were not. Of the pest insects, common housefly in 25(38.4%), louse in 12(19%), cockroach in 58(72.5%), rat in 24(36.9%), and bedbug in 25(37.9%) of households were reported. High occurrences of other pest insects were also reported by most households in addition those mentioned above.

Some households also said that they were carelessly damping solid wastes generated in domestic activities.

Figure 6: Latrine distribution with ownership in Kometa sub-locality, 2014.

Figure 7: Type of latrine in Kometa sub-locality, 2014.

Figure 8: Relative location and status of latrine in Kometa sub-locality, 2014.

Discussion

The housing conditions in this survey were predominantly substandard according to WHO definition [4,5]. A fraction of housing structures were constructed with standard materials and hence, most could not fulfil the principle of sanitary code. Many literatures in different regions of Ethiopia are much consistent with such findings [4-6]. Not only the reports in Ethiopia context but also many literatures in outsides are in agreement with the findings. Failures of housing structures to meet design standards resulted in lack of sufficient illuminations in respective of number of windows per house. Most households in this survey were at greatest risk of indoor air pollution, which noted for respiratory problems. Almost all smoking's contain potentially dangerous particulate matters that are incriminated to produce various respiratory problems. A number of particulate matters scientifically documented to cause serious respiratory problems and predisposes to extraneous infectious diseases [6,7].

Water consumption of greater than half of households in this survey was received from unprotected sources. In most developing countries, lack of access to potable water supply is responsible for high morbidity and mortality rates. The occurrences of water associated diseases are higher in low socio-economic conditions. The average water consumption per capita for domestic purposes is much lower than required to live healthful life. The extent of water accessibility significantly affects the development of population and reduces quality of life. The distance of water sources in these study populations was considered better but low water consumption per capita was obviously noted. Water consumption per capita shows level of population health status and important indicators of hygienic practices. A poor water handling procedure was also one of risk factors that suggested increasing occurrences of disease events. Nearly half of households were consuming water stored longer than 2 days without disinfection. A fraction of households were not care for sanitary practices who were storing water without cover [8-12].

The main problem of the study participants was unsanitary disposal of solid wastes from domestic activity. Most reported that they were damping un-hygienically solid wastes in open field, which adversely affected the quality of the environment. Many studies also previously reported that the sanitary standard of different regions was very low and greater proportions of populations are being exposed to harmful hazards. The effects of unsanitary disposal are increasingly observed in rural or developing town of Ethiopia. The findings also supported by many studies conducted previously in Ethiopia and various reports from responsible body of environmental protection agency. Waste disposal problem were great concern of study area population. The problems reported that it was contributing to high occurrences of nuisance pest insects and unsightly condition of their environment [13-15].

This study revealed that 5.6% of house holds' kitchens were in the main house. Since this community use wood and charcoal for preparation of food they may be exposed to respiratory diseases due to indoor air pollution.
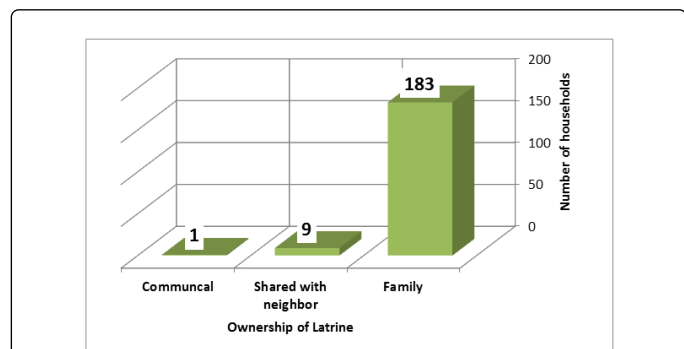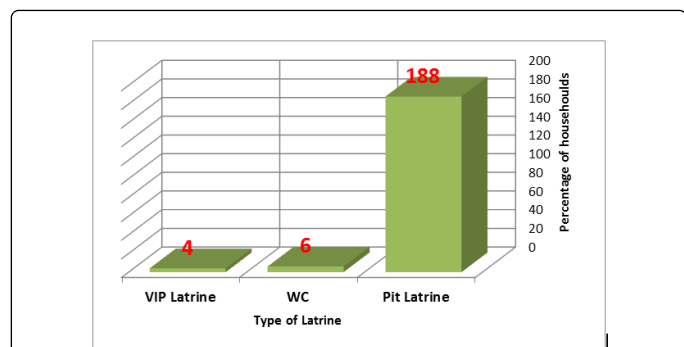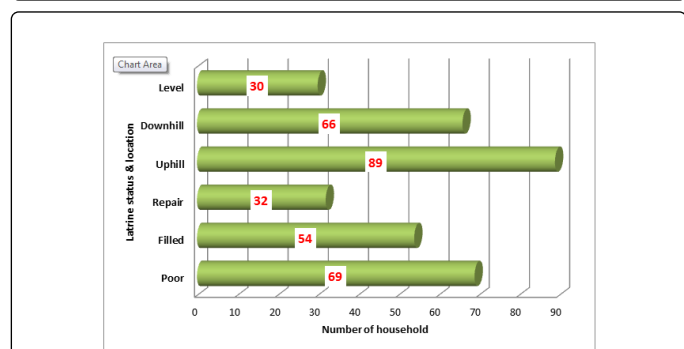
Problems of great priority

Priority setting for main health problems in study population is given in below Table 2.

S. No	Problem	Magnitude	Severity	Feasibility	Concern	Priority
1	Solid waste disposal	5	4	5	5	19(1st)

2	Lack of latrine	4	5	3	3	15(3rd)
3	Low water consumption per capita	5	4	2	3	14(4th)
4	Substandard housing conditions	5	5	3	4	17(2nd)
6	Pest insects	4	4	3	3	14(4th)
7	Low socio-economic conditions	5	4	1	3	13(5th)

Table 2: Priority setting for main health problems in study population.

Limitation of the Study

Limitation of this study includes cross-sectional nature of the study design and the majority of the respondents being young population.

Conclusion and Recommendations

In this study, number of problems were reported by the study participants and statistically approved that the problems are much of concern. The high occurrences of much disease are scientifically ascribed to environmental determinants that need great attention by governmental bodies. Solid waste disposal method shall need responsible body to safe the community from environmental diseases. As well, the knowledge, attitude and practice of the community shall need attention and included in highly prioritized one main way to control high risk problems should focuse on community active participation and increase awareness of community about health issues.

Many interventional measures that target increased accessibility of water services and preventing those causes of high risk problems effectively safeguards population. Progress in previous years to reduce environmentally-produced diseases should continue to achieve desired level. The municipality of Mizan-Aman town shall take the lion share in environmental management of the locality.

Conflict of Interest

The authors declare that there is no conflict of interests.

Acknowledgements

References

1. Neira M (2006) Preventing disease through heal thy environments; towards an estimate of the environmental burden of disease. Public Health and Environment World Health Organization.

2. NSW Department of Health 2010. Public Health Classifications Project–Determinants of Health Phase Two: Final Report.

3. Begashaw G Community health, water supply and sanitation. Ministry of Health, Addis Ababa, Ethiopia.

4. Federal Democratic Republic of Ethiopia Ministry of Health. Health Sector Development Program IV 2010/11 – 2014/15.

5. WHO (2010) International Workshop on Housing, Health and Climate Change: Developing guidance for health protection in the built environment mitigation and adaptation responses Geneva. Meeting report.

6. Abelti G, Brazzoduro M, Gebremedhin B (2012) Housing conditions and demand for housing in urban Ethiopia. Central statistical authority (CSA) Addis Ababa, Ethiopia. Ethiop. J Health Dev 26: 72-76

7. Kumie A, Berhane Y (2002) Crowding in a traditional rural housing ("Tukul") in Ethiopia. Ethiop J Health Dev 16: 303-308

8. Water Supply and Sanitation in Ethiopia: Turning Finance into Services for 2015 and Beyond.

9. Beshah Mogesse B (2012) Ways for Sustainability of Rural Water supply and Sanitation Service Delivery in Ethiopia.

10. (2005) Federal Democratic Republic of Ethiopia Ministry of Health National Hygiene and Sanitation Strategy.

11. Addisie MB (2012) Assessment Of Drinking Water Quality And Determinants Of Household Potable Water Consumption In Simada District, Ethiopia.

12. Social Assessment of the Water Supply and Sanitation Program-II WaSH–II.

13. (2012) Central Statistical Agency [Ethiopia] and ICF International. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International.

14. WHO (2009) Global Health Risks Mortality and burden of disease attributable to selected major risks.

15. Central Statistical Agency (2005) Ethiopia. Ethiopia demographic and health survey. Preliminary report.