Texila International Journal of Public Health
Volume 7, Issue 1, Mar 2019

An Epidemiological Study to Assess Water, Sanitation and Hygiene Practices among Rural Communities of Gulu, Kano, Nigeria

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Abstract

Background: *Worldwide, 663 million people do not have access to improved drinking water supplies and 2.5 billion people lack access to improved sanitation including one billion who practice open defecation. Eighty-eight percent (88%) of deaths from diarrheal diseases are attributable to unsafe water, inadequate sanitation, and insufficient hygiene practices. So this study is aimed at assessing water, sanitation and hygiene practice among rural communities of Gulu Kano, Nigeria.* ***Methods:*** *A community based cross-sectional study was conducted in Gulu from January, 2019 to February, 2019. Data was collected using a pretested structured questionnaire. Descriptive analysis was performed to obtain the frequency distribution of the variables.* ***Results:*** *The result shows that 300 participants responded to the questionnaire. The majority of respondents used unprotected spring 70 (23.3%) followed by protected hand dug well 65 (21.7%) for all domestic use. Most of the respondents 205 (68.3%) had covered their stored water and practiced pouring method to withdraw water from the stored container. Majority 204 (68%) of households had access to water within a time of 30 minutes or less. House hold water treatment was not common in the study area, only 25 (8.3%) households practiced. About one hundred and ninety-nine (66.3%) households had latrine facility, of which 208 (69.3%) was open Pit latrine without slab. Of those households having latrine only 111 (37%) households had hand washing facility.* ***Conclusion:*** *This study revealed that most of the respondents had poor water, sanitation and hygiene practice. Thus, it underscores that there should be great attention and further research and interventions are required to search for other sources of water and mobilize and educate the community towards protecting the water sources.*

Keywords: *Water, Sanitation, hygiene, Gulu, Rural Community, Kano, Nigeria.*

Background of the study

Safe drinking water and basic sanitation is of crucial importance to the prevention of human health (WWC, 2015). Water can become a vehicle for transmission of feco- oral group of infections, because the fecal contamination of water is common and its avoidance and subsequent purification is vigilant (Gupta, 2007). One of the goal of Millennium Development Goals (MDG) states - Halve, by 2015, the proportion of people without sustainable access to an improved water source and sanitation (Park, 2012).

Access to safe water alone does not reduce diarrheal diseases significantly. Even if the source is safe, water become faecally contaminated during collection, transportation, storage and drawing in the home. Water, sanitation and hygiene are among the most important determinants of public health and an adequate supply of clean water is one of the most basic human needs and one that must be met (Khan, 1997).

Sanitation practices have a major effect on community and household water issues. In most rural communities, the use of on-site sanitation is a common tradition, which is not hygienic for health. As a result of this, there is a growing concern that the wide spread use of on-site sanitation systems will cause sub-surface migration of contaminants, ultimately resulting in disease transmission and environmental degradation. Surface waters such as rivers and ponds undergo such degradation as they

DOI: 10.21522/TIJPH.2013.07.01.Art017
ISSN: 2520-3134

are subject to biological and chemical contamination (Odai and Dugbantey, 2003).

About 2.4 billion people lack access to improved sanitation including one billion who practice open defecation. Moreover, nearly 1 in 4 people in developing countries were practicing open defecation (WHO, 2015). Approximately eighty-eight per cent of cases of diarrhea worldwide are attributable to unsafe water, inadequate sanitation or insufficient hygiene. The proportion of population in rural areas with access to safe drinking water and sanitary latrines has a direct impact on the health of the masses (Prüss-Üstün et al, 2008). Water sources and improper water handling practices constitute the socio risk factors of waterborne infectious diseases. In addition to water sources, water collection, water storage in appropriate vessel and point-of-use treatment have been shown to greatly reduce diarrhoea generally and cholera specifically (Clasen and Cairncross, 2004, Clasen and Mintz, 2004).

Globally 1.1 billion people lack access to safe drinking water, and 2.6 billion people lack access to adequate sanitation (WHO, 2004). Primarily from unsafe water and sanitation, approximately 5000 people die every day from diarrheal illness. The seventh of the eight United Nations Millennium Development Goals (MDGs) is to "halve by 2015 the proportion of people without sustainable access to safe drinking water" (MGDs, 2011). Despite the national commitment to supply safe drinking water, access to water is difficult especially in the rural areas (Pattanaik, 2005). Factors such as poor availability, affordability and distance between water source and home may lead households to depend on less safe sources and reduce the volume of water used for hygiene purposes, resulting in water-related infections (Howard and Bartram, 2005).

WHO/UNICEF Joint Monitoring Programme for water supply and sanitation released in 2013, estimates that 36% of the world's population – 2.5 billion people lack improved sanitation facilities and 768 million people still use unsafe drinking water sources. Poor farmers and wage earners are less productive due to illness, health systems are overwhelmed and national economies suffer (WASH, 2011). According to data from WHO and UNICEF estimated in 2008 only 38% of total population had access for improved water supply (98% for urban areas and 26% for rural areas), 12% had access for improved sanitation (29% in urban areas, 8% in rural areas) (WHO/UNICEF, 2010).

People living in rural communities are the population sector most affected by hydro-transmissible infectious pathogen agents. Therefore, controlling of water quality is one of the essential issues of drinking water management (Sehar et al, 2011, Udousoro, I. and Umor en, 2014). Therefore, the objective of this study was to assess water, sanitation and hygiene practice among rural community of Gulu, Kano, Nigeria.

Methods and materials

Study area

The study was conducted in Gulu which is one of the Villages found in Rimin Gado local government Kano state. Gulu is bordered on the east by Dawakin Gulu, on the north by Dawakin Gulu, on the west by Kazode, and on the south by Gora. According to national housing and population census the projected estimated population of the Gulu was 40,000. Agriculture is the main livelihood of the population, with potato, maize, bean, are the main crops cultivated in the Gulu. There are only 2 health posts providing health service for the Gulu population. According to report of Gulu health office, the Gulu had 38.4% and 35.2% health service and latrine utilization coverage respectively. The report of Gulu water resource office showed that the Gulu had 105 functional improved drinking water sources which include 25 protected springs, 30 protected hand pumps dug well and 50 hands dug well. All these contribute 45.7% of improved water supply access in the Gulu.

Study design

A community based cross- sectional study was conducted using interviewer-administered questionnaire from January, 2019 to February, 2019.

Inclusion and exclusion criteria

Respondents lived at least for 6 month in the study area were included and respondents who were critically ill and other mental problems that prevents to get the required information were excluded from the study.

Study variables

Household water, Sanitation and hygiene practice, age, education, occupation and marital status of the respondent, ownership and availability of latrine, hand washing facility of latrine, water source, distance from house to water source, daily water consumption, ways of refuse disposal, types of floor and roof construction material and number of rooms, Latrine utilization, hand washing practice were variables included in the study.

Sample size determination

In this study, manual calculation of the sample size using Morgan and Krejcie (1970) formula was used for sample size determination as stated below:

$S= X^2NP (1-P) \div d^2 (N-1) + X^2P (1-P)$

Where:

S = Required sample size

X^2 = The table value of the chi-square at desired confidence **(3.841)**

N = Study Population size (**1367)**

P = Population proportion assumed to be **0.50** since this would provide maximum sample size

d^2= Degree of accuracy of the result expressed as proportion **0.050**

$$\frac{3.841\times1367\times0.5\times0.5}{0.0025\times1366+3.841\times0.5\times0.5}$$

$$\frac{1312.66175}{4.37525} = 300$$

Hence 300 respondents

Data collection tools and procedures

Data was collected using pretested structured questionnaire and observational check list. The questionnaire had three parts that was designed to cover socio-economic and demographic status, home and environmental health conditions and behavioral aspects of respondents. The questions were developed after reviewing of relevant literature and in addition to literature questions regarding to environmental factors were adapted from WHO core questions for drinking water and sanitation facilities. Respondents for the administered questionnaire were females that had lived in the household for the preceding six months. The interviewers physically observed the condition of house hold water, Sanitation and hygiene practices and utilization of sanitation facilities. The supervisors were fully responsible to lead and handle the whole session of data collection process along with the principal investigator.

Data analysis

Data were analyzed using SPSS software version 16.0 at that time with the help of the Statistician. The descriptive statistical method was used to analyze frequencies and percentages.

Ethical considerations

This study was conducted only after obtaining approval from Gulu District Head.

Results and discussion

A total of 300 respondents were interviewed, giving 100% response rate. The majority, 165 (55%) of the respondents were females. Among all, 75(25%) of respondents were 31-35 years of age. Of the study subjects, 195 (65%), were married. The socio-economic characteristics of the study showed that, among all respondents, 180(60%) of respondents attended formal education, among this 145(48.3%) of respondents were primary school completed, 35(11.7%) of respondents were secondary school completed, while 120(40%) of respondents reported that they were took informal education (were illiterate and only read and write). Similarly, results of occupational status of respondents indicated, 200(66.7%) of respondents were farmers, 5 (1.7%) were Government employee, 70(23.3%) were Merchants and 25(8.3%) were House wives (Table 1).

DOI: 10.21522/TIJPH.2013.07.01.Art017
ISSN: 2520-3134

Table 1. Socio demographic characteristics of the respondents (n=300)

Characteristics	Frequencies	Percentages %
Gender N=3000		
Males	135	45
Females	165	55
Ages N= 300		
20-25	40	13.3
26-30	65	21.7
31-35	75	25
36-40	72	24
41+	48	16
Marital Status N=300		
Married	195	65
Single	85	28.3
Divorce	8	2.7
Widowed	12	4
Education N=300		
Illiterate	75	25
Can read and write	45	15
Primary	145	48.3
Secondary and above	35	11.7
Occupation N=300		
House wife	25	8.3
Farmers	200	66.7
Government employee	5	1.7
Merchants	70	23.3

The major source of water supply for the study household were Unprotected spring 70 (23.3%) followed by Protected hand dug well 65 (21.7%) and contributes 135 (45%) improved water supply access of study households. This is consistent with a study conducted in rural Dire Dawa communities, Ethiopia (Amenu et al, 2013).

Adult women 160 (53.3%) followed by 60 (20%) female child (under 15 years) were responsible for the collection of water for domestic use. The study revealed that the most 189 (63%) commonly preferred type of water collection container was Jerri can. This finding is in agreement with similar study done in Dire Dawa rural communities and Kolladiba Town (Amenu et al, 2013, Sharma et al, 2013). From the total respondents, the majority 178 (59.3%) and 185 (61.7%) were clean their container and wash their hands before collection of water respectively. In addition, majority 195 (65%) of the respondents were cover the collection container during transportation (Table 2).

Table 2. Water source and water collection practice among households (n=300)

Characteristics	Frequencies (n=300)	Percentages (%)
Sources of Drinking Water		
Public tap/standpipe	35	11.7
Protected hand dug well	65	21.7
Protected Spring	40	13.3
Unprotected dug well	30	10
Unprotected Spring	70	23.3
Surface Water (River, Lake, Dam)	60	20
Time taken to obtain drinking water (round trip)		
<30min	204	68
>=30min	96	32

Person who collect drinking water		
Adult Woman	160	53.3
Adult Man	60	20
Female child (under 15 years)	60	20
Male child (under 15 years)	20	6.7
Water collection container		
Clay pot	60	20
Plastic bucket	21	7
Iron bucket	30	10
Jerry can	189	63
Washing hand before water collection		
Yes	178	59.3
No	122	40.7
Collection container rinsing or washing		
Yes	185	61.7
No	115	38.3
Covering of water collection container		
Yes	195	65
No	105	35

One hundred and eighty-four (61.3%) of the households used Jerri can have followed by clay pot 98 (32.7%) to store water at household and About 112 (37.3%) of the respondents used separate containers to store water for drinking purposes. This is used in many African countries storing water using Jerri can (CDC, 2010). Similarly, majority 205 (68.3%) of the households covered the storage containers during data collection time but the sanitation near to the storage containers was poor and only 68 (22.7%) drinking water storage containers kept as WHO recommendation (40 cm above the floor) (Howard, 2002). Pouring method for drawing water from storage containers was used commonly by 189 (63%) of the respondents and separate cane for taking drinking water from the storage container used by 122 (40.7%) respondents. After use, drinking utensils were mostly kept on table by 169 (56.3%) followed by floor 105 (35%) respondents. This finding is in line with a study done in Bahirdar city and Adama town (Milkiyas et al, 2011, Temsgen and Hameed, 2015).

Two hundred and eighty-seven (95.7%) respondents wash water storage container before storing water, of which 148 (49.3%) washed every day followed by 96 (32%) every other day and the majority 180 (60%) of households stored water for one day. Treating water was not common in the study area; only 25 (8.3%) households practiced water treatment method of which around 7 households used chlorine to treat drinking water (Table 3). This is finding is similar with a study done in Sidama zone, southern Ethiopia (Abebe and Dejene, 2015).

Table 3. Household water storage practice among households in rural Communities of Gulu, Kano, Nigeria (n=300)

Characteristics	**Frequencies (n=300)**	**Percentages (%)**
Water storage container		
Clay pot	60	20
Plastic bucket	21	7
Iron bucket	30	10
Jerry can	189	63
Separated drinking water storage container		
Yes	112	37.3
No	188	62.7

DOI: 10.21522/TIJPH.2013.07.01.Art017
ISSN: 2520-3134

Drinking water kept above floor level (40cm)		
Yes	68	22.7
No	232	77.3
Drinking water storage container have a narrow mouth		
Yes	194	64.7
No	106	35.3
Drinking water storage container have a cover		
Yes	205	68.3
No	95	31.7
Water drawing technique from storage container		
Pouring	189	63
Dipping	111	37
Separate cane for taking drinking water from storage container		
Yes	122	40.7
No	178	59.3
Placement of drinking utensils		
Table or shelves	169	56.3
Inside the container	6	2
Storage covers	20	6.7
Floors	105	35
Wash water storage container before storing water		
Yes	287	95.7
No	13	4.3
Frequency of washing		
Every day	148	49.3
Every other day	96	32
Every week	51	17
Every month	5	1.7
Duration of water stored in the container		
Less than one day	23	7.7
One day	180	60
Greater than day	97	32.3
Treat water to make it safer to drink		
Yes	25	8.3
No	275	91.7
Treatment methods		
Boiling	95	31.7
Chlorination	7	2.3
Let it stand and settle	198	66

From the total households, 285 (95%), 225 (75%) and 279 (93%) had dwelling with mud floor,

corrugated roof, Timber and mud wall respectively. Two hundred and thirty (76.7%) dwelling houses had three and more living rooms and 136 (45.3%) households shared their living rooms with animals.

About one hundred and ninety-nine (66.3%) households had latrine facility, of which 208 (69.3%) pit latrine without slab followed by 81 (27%) open pit latrine and 231 (77%) had privately owned. The extent of the latrine utilization habit of households in the study area was improper, only 135 (45%) of the households used latrine properly. Of the households having latrine 259 (86.3%) used latrine for disposal of child feces.

In addition of those households having latrine, only 111 (37%) of households had hand washing facility, of which water and soap were available only in 145 and 140 households respectively. Regarding to hand washing practice habit at five critical times, 210 (70%) were claimed to poor hand washing practice. From those practicing hand washing, above half of 138 (46%) the respondent used only water to wash their hands. Open field 105 (35%) followed by private pit 85 (28.3) were the common methods for the disposal of solid waste in the study area (Table 4).

Table 4. Housing condition and sanitation practice among household in rural communities of Gulu, Kano, Nigeria (n=300)

Characteristics	**Frequencies (n=300)**	**Percentages (%)**
Types of floor material		
Mud	285	95
Others	15	5
Types of roof material		
Corrugated iron sheet	225	75
Thatched	75	25
Types of wall material		
Timber and mood	279	93
Others	21	7
Number of living room for humans		
1	25	8.3
2	45	15
>=3	230	76.7
Separate kitchen		
Yes	250	83.3
No	50	16.7
Animal live with human		
Yes	136	45.3
No	164	54.7
Latrine facility available		
Yes	199	66.3
No	101	33.7
Type of latrine		
Pit latrine with slab	11	3.7
Pit latrine without slab	208	69.3
Open latrine	81	27
Ownership of latrine		
Private	231	77
Shared	69	23
Latrine utilization		
Proper	135	45
Improper	165	55
Disposal system of feces of		

DOI: 10.21522/TIJPH.2013.07.01.Art017
ISSN: 2520-3134

children		
Proper	259	86.3
Improper	41	13.7
Hand washing facility		
Yes	111	37
No	189	63
Soap near to hand washing facility		
Yes	145	48.3
No	155	51.7
Water inside the hand washing facility		
Yes	140	46.7
No	160	53.7
Hand washing practice		
Good	90	30
Poor	210	70
Hand washing material		
Only water	138	46
Soap & water	125	41.7
Ash &water	37	12.3
Method of refuse disposal		
Private pit	85	28.3
Communal pit	40	13.3
Composting	50	16.7
Burning	20	6.7
Open field	105	35

Conclusion

The present study revealed that the water, Sanitation and hygiene practice of the community was very poor, which showed that supply of safe water alone cannot guarantee that the water in the household for drinking purpose is safe as well. Sanitation practice in rural household is still very far from the recommended level. So efforts will be required to increase awareness regarding the components of household water, Sanitation and hygiene (WASH) practice.

Acknowledgments

I am grateful to thank the study participants and acknowledge the team of research assistants.

References

[1].Abebe, B. and Dejene, H. Bacteriological and Physicochemical Quality of Drinking Water Sources and Household Water Handling Practice Among Rural Communities of Bona District, Sidama Zone-Zouthern, Ethiopia. Science Journal of Public Health, (2015). 3 (5): p. 782-789.
[2].Amenu, D., Menkir, S., and Gobena, T. Assessment of water handling practices among rural communities of Dire Dawa Administrative Council, Dire Dawa, Ethiopia. Science, Technology and Arts Research Journal, (2013). 2 (2): p. 75.
[3].CDC. The Safe Water System. (2010); Available from: https://www.cdc.gov/safewater/.
[4].Clasen, T. F. and Cairncross, S. Household water management: refining the dominant paradigm. Tropical Medicine & International Health, (2004). 9 (2): p. 187-191.
[5].Clasen, T. F. and Mintz, E. D. International network to promote household water treatment and safe storage. Emerging infectious diseases, (2004). 10 (6): p. 1179.
[6].Gupta P. Text book of preventive and social medicine. New Delhi: CBS publishers and distributors (2007).
[7].Howard, G. Water quality surveillance a practical guide (2002).

[8].Howard G, Bartram J. Effective water supply surveillance in urban areas of developing countries. J Water Health (2005); 3:31.
[9].Khan, A. H., The sanitation gap: Development's deadly menace. The progress of nations, (1997): p. 5-13.
[10]. Milkiyas, T., Mulugeta, K and Bayeh, A. Bacteriological and Physico-Chmical Quality of Drinking water and hygiene- sanitation practices of the consumers in Bahirdar city, Ethiopia. Ethiop J Health Sci., (2011). 21 (1): p. 22-26.
[11]. Millennium Development Goals Indicators .Available at: http://mdgs.un.org/unsd/mdg/host.aspx?Content=in dicators/officiallist.htm. Accessed on February 9th (2011).
[12]. Morgan DW and Krejcie, RV. (1970). Determining Sample size for research activities of Minnesota: USA.
[13]. Odai, S. and Dugbantey, D. Towards pollution reduction in peri-urban water supply: A case study of Ashanti region in Ghana. In Diffuse Pollution Conference, Dublin. (2003).
[14]. Park K. Preventive and social medicine. Jabalpur: Banarsidas Bhanot publishers;(2012)
[15]. Pattanaik BK. Safe drinking water for all. Kurukshetra (2005); 53:53-7.
[16]. Prüss-Üstün, A., et al., Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health. (2008): World Health Organization.
[17]. Sehar, S., et al., Monitoring of Physico-Chemical and Microbiological Analysis of Under Ground Water Samples of District Kallar Syedan, Rawalpindi-Pakistan. Research Journal of Chemical Sciences. ISSN, (2011). 2231: p. 606X.
[18]. Sharma, H. R., et al., Water Handling Practices and Level of Contamination Between Source and Point-of-Use in Kolladiba Town, Ethiopia Environ. We Int. J. Sci. Tech., (2013). 8: p. 25- 35.
[19]. Temsgen, E. and Hameed, S. Assessment of Physico- Chemical and Bacteriological quality of drinking water at sources and Household in Adama town, Oromiya Regional State, Ethiopia. African Journal of Environmental Science and Technology, (2015). 9 (5): p. 413-.
[20]. Udousoro, I. and Umor en, I. Assessment of Surface and Ground Water Quality of Uruan in Akwa Ibom State of Nigeria. Journal of Natural Sciences Research, (2014). 4 (6): p. 11-27.
[21]. Water, sanitation and hygiene (2011). Available from: www.unicef.org/wash/ Retrieved on 2/10/2013
[22]. WHO. Progress on sanitation and drinking water – (2015) update and MDG assessment (2015).
[23]. WHO/UNICEF (2010). Joint Monitoring Program for Water Supply and Sanitation 2008 estimates.
[24]. World Health Organization (WHO) (2004). Guidelines for Drinking-water Quality, Third Edition. Volume 1: Recommendations. Geneva: World Health Organization
[25]. World Water Council (2015). Water Supply and Sanitation. Available from:www.worldwatercouncil.org