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A Study on Water Sources and Water Borne Diseases in Kona Community, Jalingo Lga Taraba State

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ABSTRACT:

This study aimed to identify water sources and water-borne diseases (WBD) in the Kona community. A descriptive survey was adopted for this research design methodology. A structured questionnaire was administered to randomly selected 202 households in the community using Cochran's method of sample size estimation. They were selected in order to access the method of water collection, transportation, storage, and treatment practices, 185 out of 202 questionnaires were successfully retrieved. Data were analyzed using a simple manual mathematical formula, results were presented in tables and charts. The result shows that the prominent water sources are well water (32.4%) and river/stream (31.89%) was the highest source of water for drinking and other domestic use followed by rain (22.2%), Borehole/pipe borne water 9(9.7%) and Dam (3.8%) respectively. The results of the prevalence of WBD were obtained from two sources of data; primary data revealed Typhoid (50.3%) was the most prevalent followed by Diarrhoea (38.4%), Dysentery (8.10%), Cholera (2.7%). The result of the Secondary data obtained (January – April 2021) shows that Typhoid (58.2%) was the most prevalent WBD followed by Diarrhoea (27.7%), Dysentery (12.1%), and Others (2.0%). The goodness of fitness test reveals that there is a significant difference that (H1)Waterborne is associated with various water sources in Kona χ^2= 61.9, The p-value is < 0.0001, Significance at .05.(H2) The physical quality of water is associated with waterborne disease' Result for hypothesis showed χ^2cal = 290.716, The p-value is < 0.0001, Significance at p< .05.(H3) There is a significant difference in the poor practice and treatment of water and waterborne disease, calculated χ^2 = 91.41 p-value 0.0001. Significant at p<.05. It implies that there is a need for the improvement of the practice of water collection, storage, and treatment at the household level to prevent the negative effects of WBD on human health.

Key Words: Diarrhoea, Jalingo, Kona, Water borne diseases, Water Sources,

INTRODUCTION

Water is life, but only when it's safe and wholesome otherwise it can cause disease and eventually lead to death, and therefore good water is an essential ingredient for the maintenance of life as well as safe and healthy environment. Water supply with consideration of quality requirement is very important irrespective of the source type, so that the benefits of improved water supplies can be achieved (WHO, 2018). Clean water and sanitation considerably lessen water-related diseases which kill thousands of children every day (UN, 2006). According to the World Health Organisation (WHO, 2004), 1.2 billion people lacked access to an enhanced water supply in 2002, and 2.3 billion people got ill from diseases caused by unhygienic water. Each year 1.8 million people die from diarrhoea diseases, and 90% of these deaths are of children under five years (WHO, 2004). In other to meet water supply and sanitation provisions of the reviewed 1997 United Nations declaration that which state "all people irrespective of their development, economic and social condition are entitled to have access to drinking water in good quality and quantities" the Federal Government of Nigeria directed and encouraged the establishment of State Water Supply Agency and Rural Water Supply and Sanitation Agency in each State (Ahmed *et al*., 2016).

Waterborne diseases are those diseases that are transmitted through the direct drinking of water contaminated with pathogenic microorganisms such as bacteria, viruses, protozoa etc. Contaminated drinking water when used in the preparation of food can be the source of foodborne disease through consumption of the same microorganisms. Most waterborne diseases are characterized by diarrhoea, which involves excessive stooling, often resulting to dehydration and possibly death (Nwabor *et al.*, 2015). The continuous reported cases of water-related disease over the years in many communities of developing nations due to exposure to poor quality water supply is so alarming (Pruss *et al.*, 2002; Moszynski 2019; WHO and UNICEF, 2014). According to a report by WHO and UNICE (2014) good water supply, sanitation, and hygiene issues account for a large part of the burden of illness with the most common waterborne disease as diarrhoea, having an annual incidence of 4.6 billion and cause 2.2 million deaths every year in developing countries including Nigeria (WHO 2010; UNICEF and WHO 2012). Ogwueleka (2014) expressed that the impact of anthropogenic activities (industrial wastewater discharge, municipal wastewater effluents, solid waste management practices and agricultural run-off) have affected access to quality water supply.

Therefore, the need for good quality water that would sustain lives continues to be on the increase globally (Clasen *et al.*, 2007; Olukanni and Ugwu 2013). The effect of the insufficiency in the supply of treated piped-borne water is that people in most communities' resort to accessing water from other sources such as unprotected hand-dug wells, buying water from carts with small tanks known as 'Mai-ruwa', boreholes (private and commercial), streams, ponds and springs (Brown and Sobsey 2010; UNICEF/WHO 2011; Olukanni, 2013). However, the water may become contaminated in the process of collecting, transporting and storage due to improper handling practices (Osibanjo 1994; Clasen & Bastable 2003; Stephen *et al.*, 2004; WHO 2010; Badowski *et al.*, 2011).

Water quality is a growing concern throughout the developing countries; drinking water sources are under increasing threat from contamination by natural and manmade influences with detrimental consequences on the health of individuals, families, communities and the Nation at large (WHO, 2015). The pollution of drinking water is responsible for a large number of morbidity and mortality from water borne diseases like typhoid, cholera, dysentery and hepatitis as well as many protozoa and helminthic infestations (Miner *et al.*, 2016). It is estimated that children under 5 mortality rate in Nigeria due to Diarrhoeal disease is 13.5% (WHO and UNICEF, 2014). Over the last decades access to potable water has been achieved in almost every part of the world (Miner C.A *et al.*, 2016). However safe drinking water still remains inaccessible to about one billion people and adequate sanitation is not accessible to over 2.5 billion people (WHO and UNICEF, 2014). It is also estimated that 41% of 160 million Nigerians do not have access to potable water supply, with rural areas having a higher proportion than those of the urban areas (WHO and UNICEF, 2014).

The reports by Water supply and Sanitation Baseline study (WSSBS) and UNICEF/WHO joint Monitoring Program (JMP) have shown that Nigerian water supply has not kept pace with meeting the Millennium Development Goal (MDG) target of 75% coverage for safe drinking water (Akpor and Muchie, 2011). When potable water is not sufficient in adequate quantity and quality for household consumption, people would be compelled to use contaminated water from less hygienic sources with resultant water related disease and outbreaks (Majua *et al.*, 2012).

Although great stride has been made meeting the challenges in terms of water supply provision services, the safety of many water supplies remains unknown and uncertain (Ince and Smith 2003). Drinking water sources is required to meet guidelines for microbial and chemical contamination (Ahmed *et al.*, 2016).

Water supply infrastructure consist of what is built to pump, diet, transport, store, treat and deliver safe drinking water, both the boreholes and pipe borne water supply facilities can deliver contaminated water, if adequate quality provisions are no effectively considered. Destruction of water supply and/or sewage disposal infrastructures after major catastrophes (floods, crises etc.,) poses the immediate threat of severe epidemics of water borne diseases, and several of which can be life threatening (Phalkey *et al.*,2010) and (Osei 2013).

MATERIALS AND METHOD

Study Area and Study Population

The area of study was a small community located in Jalingo local Government area of Taraba state, Kona is a small rural town with mostly inhabited by Jukun-kona. The village is surrounded by hills that become higher towards the east and end up in high mountains. The village has a Primary Health care facility. The population of the study is based on the number of households identified by the Displacement Tracking Matrix (DTM) the total number of houses in Kona is estimated to be 859 (DTM, 2018).

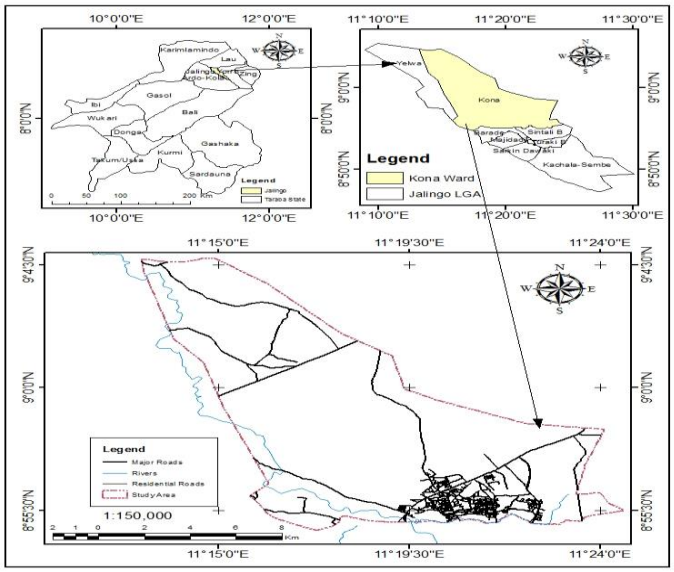

Figure 1: Map of Study area. Source: Office of the surveyor general, Taraba State, Nigeria (2021).

Research Design

This research essentially has taken a descriptive survey design; this is because this research is aimed at identifying characteristics, frequencies, and categories of water sources and water-borne diseases in the Kona community.

Sampling and Sample Size

Cochran's standard formula for sample size calculation was used to determine the sample size of this study. Two hundred and two (202) sample size were arrived at. Head of household becomes the respondent.

Sources of Data

There are basically two data sources used in this work and these include primary and secondary data. Primary data are those data collected through the administration of well-structured questionnaires. The secondary data are data which were collected from the Primary Health Care Centre at Kona, Jalingo, Taraba State.

Data Analysis

The data collected were analyzed using a simple manual mathematical formula; Results were presented in the form of tables, pie charts, and bar charts. Frequency distribution tables were generated from the variables. Chi-square test for comparison and the test of hypothesis with the expected values less than five (5). The level significance will be set at $p<0.05$

RESULT AND DISCUSSION

A total of 185 questionnaires were received out of 202, however, only 17 questionnaires were missed, and poorly filled in this study. This represented 91.6% of the expected population.

Data from the demographic section yielded information about respondents' demographic characteristics. The majority of the respondents were females (60.54%) while (39.45%) were males. The majority of the respondents based on age were in the range between 31-40years (34.05%) and 41-50years (22.16%) while 60years and above (9.19%) and 20 years below (4.32%) were the least respondents. Most of the respondents in the occupation were unemployed (33.51%), farmers/traders (27.56%), Employed (14.59%), Business (11.35%), and Students (8.10%) respectively. The majority of the responses of educational levels were secondary (54.59%), primary (31.89%), tertiary 8.64%) no formal education (none) (4.86%), and the least.

Result of Water sources

Water Source	Frequency	Percentage (%)
Rain	41	22.2
Well	60	32.4
Borehole/pipe water	18	9.72
River/streams	59	31.9
Dams	7	3.78
Total	**185**	**100**

From the results obtained, the most available water sources in the community are Well water 32.4%, river/stream 31.9% and rain 22.1%. from the researcher's field observation the well which is a community well is not covered and hence the water becomes exposed to contamination, on the other hand, river and stream as source of drinking water and other domestic activities has greater risk of contamination due to unhygienic humans activities such as open defecation, rearing of livestock among others, thus these contribute to the factors of WBD in Kona community and thus this explains on the poor physical quality of the community water. Obi *et al*., (2012) in their study in a semi-urban area identified that well water was the most available source of water. According to various literature, the result of the most available sources of water differs from geographical location David *et al.,* (2019) identified that River water was the most used source of water in their research, and Clasen T and Bastable (2013) identified that Public well and Streams were the most available water supply in a rural community in South Africa.

Prevalence of WBD

WBD	Response	Percentage (%)
Typhoid	93	50.3
Diarrhoea	71	38.4
Dysentery	15	8.10
Cholera	5	2.7
Total	**185**	**100**

Prevalence of WBD in Kona PHCC

Month	Typhoid	Diarrhoea	Cholera	Dysentery	Others	Total
January	81	42	-	15	-	138
February	62	38	-	22	-	122
March	93	64	-	23	3	183
April	106	19	-	11	9	145
Total	**342(58.2%)**	**163(27.7%)**	**-**	**71(12.1%)**	**12(2.0%)**	**588(100%)**

Source: PHCC Kona 2021

From the result it is observed that there is high prevalence of Typhoid in the community which is above average (50%>). This result is confirmed by the report of WHO (2018) that Typhoid fever is the most prevalent WBD in Africa. From the result in table collected from PHCC reveals that a higher prevalence occurs in April compared to the other months, these can be attributed to the beginning of the raining season where water bodies and sources are contaminated by the washing away of human and animal faeces and dumping of waste in water bodies other factors that contribute to water contamination. Han A *et al.,* (2015) and Ogwueleka, T. C. (2014) also reveals that open surface water sources are mostly contaminated during raining season.

Practice on water storage and treatment

S/N	Variable	Frequency	%
O1	What type of container do you use to fetch or store water		
	Plastic	104	56.2
	Clay	36	19.7
	Stainless steel	45	24.1
	Total	**185**	**100**
02	How do you take the water home		
	Head	109	58.9
	Vehicle	5	2.7
	Rolling	2	1.1
	Wheelbarrow	68	36.7
	Animals	1	0.55
	Total	**185**	**100**
03	Where is the storage container kept		
	Indoors	62	33.6
	Outdoor	123	66.5
	Total	**185**	**100**
04	How often is the storage container cleaned and emptied?		
	Daily	40	21.6
	Weekly	127	68.6
	Monthly	15	8.1
	None	8	4.3
	Total	**185**	**100**
05	Do you treat the water before drinking		
	Yes	34	18.4
	No	151	81.6
	Total	**185**	**100**
06	If yes, How Do you treat water before drinking?		
	Boiling	5	14.7
	Filtrating	11	32.4
	Adding chemicals	3	8.8
	Settlement of water	**15**	**44.1**
	Total	**34**	**100**

The table above shows the result of the community water collection, storage, and treatment practice. The result indicates that (56.2%) representing the majority use plastic containers to fetch or store their water followed by stainless steel containers (24.1%), and clay 19.7%. In the mode of transportation (58.9%) of respondents, the majority follow wheelbarrow carriers (36.7%), vehicle (2.7%), rolling (1.1%), and use of animals (Donkey) 1.1% respectively. (66.5%) respondents keep their water storage container outside and 33.6% keep it indoors. The majority of the respondents 68.6% cleaned and emptied

the water storage container in a week period of time.81.6% do not treat their water and only 18.4% do. In the water treatment at the household level 44.1% use Settlement of water as a water treatment process, filtration 32.4%, boiling 14.7%, and using chemicals 8.8% respectively.

Result from table above clearly summarize the practice of poor water storage in the study area 66.5% of respondents do keep and store their domestic water outdoors and possibly opened, the practice of water treatment at the household level is poor as, filtration, adding chemicals, settlement of water particles do not kill the microbes in water (WHO, 2017). A different study by Nwabor O. F, (2015) , Sobsey M. D (2003), Stevens, G. (2014), and David *et al.,* (2019) concluded that poor practice of water collection, storage, and treatment is the greatest factor for the prevalence of WBD irrespective of the water source and contamination.

The water sources identified in Kona are unhealthy due to the contamination of the water sources by human activities such as open defecation, dumping of refuse, etc. and the poor practice of water collection, storage, and treatment at households has contributed to the prevalence of WBD especially Typhoid, Diarrhoea and dysentery in the community.

Results of chi square hypothesis test

Chi square hypothesis test, Hypothesis 1 shows the result of the hypothesis on ''Water borne disease is associated with various sources of water in Kona'' Result for hypothesis showed X^2cal = 61.9, Using 95% (0.05) CI, χ^2 tab = 9.49. Since χ^2cal (61.9) > χ^2 (9.49) tab, therefore, we reject the null hypothesis implying that there is significant difference in Water borne diseases associated with various sources of water in Kona.

Hypothesis 2 shows the result of the hypothesis on 'The physical quality of water is associated with waterborne disease'' Result for hypothesis showed X^2cal = 290.716 Using 95% (0.05) CI, X^2 tab = 7.81 *significance at p<.05. p- value 0.0001* Since χ^2cal (290.716) > χ^2 (7.81) tab, therefore, we reject the null hypothesis implying that there is significant difference in the physical quality of water is associated with waterborne disease.

Hypothesis 3 shows the result of the hypothesis Result '' there is no significance difference in the poor practice and treatment of water and water borne disease'' Result of the hypothesis showed that chi – square calculated = 91.41 Using 95% CI, Chi–square tabulated = 9.49.significance at *p*<.05. *p- value 0.0001* Since Chi – square calculated is greater than chi – square tabulated we reject the null hypothesis implying that there is significant difference in the poor practice and treatment of water and water borne disease.

Conclusion

The water sources identified in Kona is unhealthy due to the contamination of the water sources by human activities such as open defecation, dumping of refuse etc. and the poor practice of water collection, storage and treatment at household has contributed to the prevalence of WBD especially Typhoid, diarrhoea and dysentery in the community.

Recommendation

The following actions are also recommended to the agencies involved as a way forward for any intervention policy formulation in order to find a sustainable solution to the health and sanitation problem in the study area. These agencies include the Local Area Council, the District Assembly, NGOs, Community Water and Sanitation Agency, Educational institutions, Ministry of Information and the Environmental Health Division of the MOH.

Sanitation Facilities: The District Assembly, Community Water and Sanitation Agencies and NGOs should all help the communities to build household toilet facilities and institute better mechanisms of refuse disposal systems at reduced subsidies. This will reduce the risk of contamination of water in the communities. When this is supported by education to change behaviour towards the proper and consistent use of these facilities the incidence of public health diseases may reduce.

Health Education: Education must be promoted across the study area and all its surrounding villages. Some of the resources invested in water and sanitation facility provision must be channelled into formal education promotion. The study has shown decrease in the level of education, education can positively influence sanitation conditions and improve of households water practices.

Environmental Health Inspection: Environmental sanitation in the community should be stepped up with more local and environmental health officers employed. The prosecution of environmental health offenders should serve as a deterrent to ensure that people behave appropriately with regards to household and community hygiene especially in acts that may contaminate and pollute the water sources. They can also be agents of information flow for health education messages in the communities.

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