

*Full Length Research Paper*

# Prevalence of waterborne infections in Northwest Nigeria: A retrospective study

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Northwest Nigeria is frequently beset with inadequate water supply. The safety of drinking water to the people in this part of the country has been of major concern as a result of frequently reported incidences of waterborne infections. To ascertain incidences of waterborne infections in this study, patient medical records in several primary health care centres in Sokoto, Shuni and Tambuwal towns in Northwest Nigeria were examined to collect data on incidences of waterborne infections and bio-data of the patients. Simple statistical analysis (Percentage) of collated data was carried out. The records showed that there are high incidences of waterborne infections namely typhoid, cholera, dysentery, diarrhoea and gastroenteritis in the three towns, and that these are more frequent in children below the age of 5 years. Gender distribution of diarrhoea and dysentery cases in 2004 and 2005 showed on average that more female than male residents contracted the infections. The number of cases of waterborne infections in the three towns increased from 10.03% in 2004 to 14.14% in 2005. Diarrhoea, constituting 6.23% in 2004 and 10.04% in 2005 was the most commonly reported cases of waterborne infection in the three towns. Shuni recorded the highest (8.95%) incidences of diarrhoea infection in 2004, followed by Tambuwal (6.23%) and Sokoto had the least (4.81%) while in 2005 Sokoto had the highest (11.99%) followed by Tambuwal (10.23%) and Shuni had the least (7.55%). Pre-study investigations have shown that people in this part of the country lack wholesome drinking water, government should therefore endeavour to make potable water abundant and accessible to its people.

**Key words:** Waterborne infections, drinking water, diarrhoea, Northwest Nigeria.

## INTRODUCTION

Water is essential to life and health; however, more than one billion people worldwide do not have access to safe drinking water (WHO, 2000). Waterborne diseases have been estimated to cause more than two million deaths and four billion cases of diarrhea annually (WHO, 2000). Infectious diarrhea is responsible for the greatest burden of this morbidity and mortality (Pruss et al., 2002) and children less than five years of age are the most severely affected (WHO, 2000). In 2001, infectious diseases accounted for an estimated 26% of deaths worldwide (Kindhauser, 2003). Gastro - intestinal water - borne

infections are among the most emerging and re-emerging infectious diseases throughout the world. They are infections that affect mainly the stomach and the Gastro-intestinal tract. They are mostly endemic with a worldwide distribution and they have a heterogeneous aetiology (Onyango and Angienda, 2010).

In Africa, it has been estimated that every child has five episodes of diarrhoea per year and that 800,000 children die each year from diarrhoea and dehydration. According to Wittenberg (1998), infective diarrhoea is predominantly a disease of poverty, overcrowding and environmental contamination. He noted that within the southern African subcontinent, large-scale epidemics involving *Shigella dysenteriae* type 1 and *Vibrio cholerae* have occurred.

In Nigeria, contaminations of drinking water with pathogens have also been reported in several towns (Biu

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et al., 2009; Adekunle et al., 2007; Ibrahim et al., 2000). Waterborne outbreaks of enteric disease have occurred either when public drinking water supplies were not adequately treated after contamination with surface water or when surface waters contaminated with enteric pathogens have been used for recreational purpose (Johnson et al., 2003). The grazing of cattle and land application of animal waste may lead to the occurrence of enteric pathogens in nearby surface and ground waters (Yang et al., 2004). Hubbard et al. (2003) reported that grazing animals and pasture production can affect water quality both positively and negatively often posing serious threat to public health.

Instances of diseases outbreak due to contamination of drinking water with microbes have been reported in the study area (Raji et al., 2010a; Junaidu et al., 2001). In their report, Raji et al. (2010a) stated that the drinking waters sampled from Sokoto, Shuni and Tambuwal towns were found to contain *E. coli*, *Salmonella*, *Shigella* and *Vibrio* species far above the WHO (2003) allowable limit and therefore not potable. Raji et al. (2010b) also showed in their work that drinking waters in Sokoto metropolis contained heavy metals at concentrations harmful to human health. While incidences of waterborne infections in Sokoto metropolis have been reported, incidences of such infections in adjoining towns of Sokoto metropolis, such as Shuni and Tambuwal, have not been adequately investigated and reported. This study was set out primarily to evaluate the incidences of waterborne infections in these two towns and compare it with those of Sokoto metropolis by surveying hospital and primary health centres records on waterborne infections. Although not all waterborne infections are reported to and treated by government agencies, hospitals and other health institutions remain the verifiable and reliable sources of records of incidences of waterborne infections in these localities and the zone in general.

## MATERIALS AND METHODS

### Study area

The area of study is Sokoto metropolis and the adjoining towns of Shuni and Tambuwal. Sokoto, the capital of Sokoto State and the largest town in the state, has a population of 427,760 by the 2006 National Census (NPC, 2006). It is a generally arid region that gradually merges into the desert across the border in Niger republic; it has limited rainfall from mid-May to mid-September and is subjected to the Sahara's Harmattan (dry, dust-laden wind) from November to March. Shuni (Dange) and Tambuwal towns are 26 and 97 km away from Sokoto with populations of 194,546 and 224,931 (NPC, 2006) respectively and they have similar features with Sokoto metropolis.

### Materials

Hospital records kept in the Primary Health Care Centres in the three towns were used to determine incidences of waterborne infections.

## Methods

In order to ascertain incidences of waterborne infections in the study area, hospital records of patients were analysed. Patient medical records kept in the Primary Health Care Centres in each of the three towns (Sokoto, Shuni and Tambuwal) from 2004 to 2005 were assessed. Data such as patient's age, sex and diagnosed infection were collated for further analysis.

Records available showed that stool and blood specimens from patients presumptively diagnosed of gastro-intestinal tract infections were cultured and positive cultures subjected to biochemical tests and microscopy. Results of the bacteriological analysis were sent to the physicians for further action and copies included in the patients' medical files that were later assessed in this study.

## RESULTS AND DISCUSSION

The distribution of infectious diseases reported in the primary health centres in the three towns in 2004 as presented in Table 1, showed that waterborne infections constituted 10.03% of the reported 8,353 diagnosed infections in the three towns with Sokoto having the highest percentage of 11.26% as against Tambuwal with the least percentage of 9.01%. In general, diarrhoea was the most reported case of waterborne infection, accounting for 62.17%, followed by dysentery with 24.58%. Other waterborne infections were comparatively very low.

Incidences of waterborne infections in 2005 in the three Basic Health Centres in these towns were slightly higher than that of 2004 (14.14 Vs 10.03%). Incidences of dysentery were generally low in Shuni town in the two years, compared with incidences in Sokoto and Tambuwal. Diarrhoea also accounted majorly with 71.05% for the waterborne infections in these towns followed by dysentery with 20.58% (Table 2).

Data presented in Table 3 on gender distribution of diarrhoea and dysentery cases in 2004 and 2005 showed on the average that more female than male residents contracted the infections. Though there was no much difference in the number of male residents with diarrhoea and dysentery cases compared with their female counterparts in the three towns but the number of females almost doubles that of males in Tambuwal town in 2005. Increase in number of females with diarrhoea and dysentery cases generally might be as a result of cross-infection of the mothers by their children (it was later shown in this work that children below the age of 5 years had highest percentage of infection) being closer to them than their male counterparts.

Age distribution of diarrhoea cases obtained in the basic health centres showed that, out of 1,061 cases of diarrhoea recorded in 2004 and 2005 in the three towns, children of five years and below, accounted for the highest proportion (67.01%) of age group with diarrhoea cases, followed distantly by young adults (age of 18 to 30 years) with a percentage of 13.57% (Table 4).

In case of dysentery, out of 359 cases diagnosed and treated in the basic health centres of the three towns in 2004 and 2005, children at 5 years of age and below also

**Table 1.** Frequency of waterborne infections in the three towns in 2004.

Infection	Towns			Total no. of cases (n = 8353)
	Shuni (n = 2000)	Sokoto (n = 2700)	Tambuwal (n = 3653)	
Diarrhoea	179 (8.95)	130 (4.81)	212 (5.80)	521 (6.23)
Dysentery	11 (0.55)	98 (3.63)	97 (2.66)	206 (2.47)
Gastroenteritis	4 (0.20)	41 (1.52)	0 (0.00)	45 (0.54)
Others (schistosomiasis, worm infestation, etc.)	11 (0.55)	35 (1.30)	20 (0.55)	66 (0.79)
Total	205(10.25)	304(11.26)	329(9.01)	838(10.03)

Percentage is in parenthesis.

**Table 2.** Frequency of waterborne infections in the three towns in 2005.

Infection	Towns			Total no. of cases (n = 5327)
	Shuni (n = 1721)	Sokoto (n = 2051)	Tambuwal (n = 1555)	
Diarrhoea	130 (7.55)	246 (11.99)	159 (10.23)	535 (10.04)
Dysentery	3 (0.17)	66 (3.22)	86 (5.53)	155 (2.91)
Gastroenteritis	4 (0.23)	16 (0.78)	0 (0.00)	20 (0.38)
Typhoid Fever	0 (0.00)	2 (0.10)	0 (0.00)	2 (0.04)
Others (Schistosomiasis, worm infestation, etc.)	5 (0.29)	21 (1.02)	15 (0.97)	41 (0.77)
Total	142(8.25)	351(17.11)	260(16.72)	753(14.14)

Percentage is in parenthesis.

**Table 3.** Gender distribution of diarrhoea and dysentery cases in the three Towns in 2004 and 2005.

Town	Number of diarrhoea and dysentery cases			
	2004 (n = 960)		2005 (n = 783)	
	Male	Female	Male	Female
Shuni	98	92	65	68
Sokoto	108	121	157	175
Tambuwal	255	286	112	206
Total	461(48.02)	499(51.98)	334(42.66)	449(57.34)

Percentage is in parenthesis.

**Table 4.** Age distribution of diarrhoeal cases in the three towns in 2004 and 2005.

Age (years)	Town						Total no. of cases (%)
	Shuni		Sokoto		Tambuwal		
	2004	2005	2004	2005	2004	2005	
<5	152	108	107	197	84	63	711 (67.01)
6-10	11	4	3	12	21	15	66 (6.22)
11-17	2	4	2	8	11	8	35 (3.30)
18-30	3	7	9	17	59	49	144 (13.57)
31-50	3	-	2	10	25	17	57 (5.37)
>50	-	1	2	1	6	2	12 (1.13)
Unclassified	9	6	4	-	12	5	36 (3.39)
Total	180	130	129	245	218	159	1061 (100.00)

**Table 5.** Age distribution of dysentery cases in the three towns in 2004 and 2005.

Age (years)	Town						Total no. of cases (%)
	Shuni		Sokoto		Tambuwal		
	2004	2005	2004	2005	2004	2005	
< 5	4	1	63	48	68	45	229 (63.78)
6-10	-	-	4	4	5	11	24 (6.69)
11-17	-	-	3	1	4	2	10 (2.79)
18-30	1	1	18	19	11	3	53(14.76)
31-50	1	1	7	8	5	3	25 (6.96)
> 50	1	-	1	2	3	2	9 (2.51)
Unclassified	4	-	-	4	1	-	9 (2.51)
Total	11	3	96	86	97	66	359(100.00)

accounted for 63.78%, followed distantly by the age bracket of 18 to 30 years (Table 5) which accounted for 14.76%.

This is in accordance with the findings of Mazari-Hiriart et al. (2005) which stated that the effects arising from contact with water borne pathogens vary depending on the volume of the water ingested by an individual and the individual's immune status, with the children and elderly being the most susceptible. The higher incidence of waterborne infections among children might be attributable to lack of well developed immune system and lack of personal hygiene by the children. Previous researches in the study area (Ibrahim et al., 2000; Junaidu et al., 2001) had shown that sources of drinking water available to the residents in the study area were not fit for drinking. These un-fit drinking waters being consumed by the people were suspected to be the cause for prevalence of diarrhoea in Sokoto, Shuni and Tambuwal towns in Northwest Nigeria.

## Conclusion

Female than their male counterparts contracted diarrhoea and dysentery infections and children of age of 5 and below accounted for highest proportion of diarrhoea cases in 2004 and 2005 in these towns. It is recommended that Government should make drinking water in the communities fit for drinking and people should be enlightened on the importance of personal hygiene.

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