

HEALTH IMPACT OF ABA RIVER ON RIVERINE COMMUNITIES IN ABA NORTH LOCAL GOVERNMENT AREA OF ABIA STATE, NIGERIA

BY

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ABSTRACT

Water is vital to our existence in life and its quality influences the health status of any population, hence this study. The aim of the study was to assess the impact of Aba River on the health of the inhabitants living along the river. Six sampling points were selected along the river using convenient sampling for water samples collection. Communities were selected purposively for health care outreach. Water samples were collected and analysed in the laboratory. Results were compared with SON and WHO standards. Findings reveal that 83% of the sampled population had skin diseases, 77% had abdominal cramps, 69% had abdominal pains and 52% suffered from diarrhoea (52%) which were prevalent in communities living close to the Aba River. This was attributed to the poor water quality of the river as a result of anthropogenic activities. The study recommends that the growth rate of urbanization should be slowed down within the Aba River catchment and be extended to areas outside the catchment since the catchment area is characterized by an increase in settlements, which include urban developments, sewage and industrial effluents that are major threats to the Aba River water quality and leads to diseases among the people living along the river.

Key words: Abdominal, Disease, Health impact, Riverine communities

INTRODUCTION

Water is among the essential resources on earth that support life (Usali and Hasmadi, 2010). Water is a valuable natural resource that is essential to human survival and the health of the ecosystems. Water is classified as marine, brackish and freshwater (lakes, river and groundwater). Freshwater environments cover less than one percent of the Earth's surface, but never the less contain approximately ten percent (10%) of all described species (Dudgeon, Arthington, Gessner and Kawabata, 2006; Strayer and Dudgeon, 2010; Kensa, 2012) making them local and global biodiversity hotspots. The environment, economic growth, and developments are all highly influenced by water; its regional and seasonal availability, and the quality of surface and groundwater. The quality of water is affected by human activities and is declining due to the rise in urbanization, population growth, industrial production, climate change and other factors (Amadi, 2012; Halder and Islam, 2015).

Today, with the advancement in science and technology, population increase, industries and agriculture activities, urban developments have grown up along the corridor or river banks of Nigeria. The resulting water pollution is a serious threat to the well-being of its population (Ezeama and Nwamkpa, 2002; Amadi, 2012; Nwankwoala and Ekpewerechi, 2017).

Man's health to a large extent is dependent on access to clean potable water. Unfortunately, not everyone on the planet has access to this precious resource. Some persons have access to water, but such water is polluted. Polluted water could be a carrier of many diseases and when it is ingested into the human system, it could have negative implications for human health. Persons who use polluted water are in danger of contracting water-borne, water-hygiene and water-contactor and water-habitat diseases (Danquah, 2010).

Waterborne infectious diseases are those in which the pathogen is present in water and ingested when the water is consumed. Most of the pathogens could be from human faeces and diseases transmitted by the consumption of faecal contaminated water and known as "faecal-oral" diseases. Examples of faecal-oral diseases include cholera, typhoid, amoebic dysentery and diarrhoea (Smet and Van Wijk, 2002; Danquah, 2010). The World Health Organization (WHO) estimates that as many as 80 percent of all infectious diseases in the world are associated with insufficient and unsafe water (Smet and Van Wijk, 2002).

Downstream, the Aba River has consistently and extensively been used for laundering, bathing, cooking, swimming, livestock watering, and irrigation during the dry season. It is also a source of waste discharge for industries (Egbonu, Atasi, and Sunday, 2018). With wastes from these industries and commercial establishments being discharged into Aba River, the water quality has become seriously affected. In turn, this has affected the social and economic activities in the area (Amadi, 2012; Amah-Jerry, Anyanwu, and Avoaja 2017; Nwankwoala and Ekpewerechi, 2017). This study is aimed at analyzing the health problems created by the pollution of Aba River by carrying out free healthcare programmes, examining the bio-physicochemical properties of water and activities of people living close to the river.

THE STUDY AREA

Aba River is a tributary of Imo River and is the major river that passes through Aba town. It is situated between Latitudes 5° 5'N to 5° 30'N and Longitudes 7° 15'E to 7° 40'E (Fig. 1) and is characterized by relatively low elevation and near flat topography (Uma, 1989) which enhances its runoff. The River flows in North-South direction and joins the Imo River (Ezeigbo, 1989). The river is recharged by precipitation and groundwater (Uma, 1989; Amadi, Olasehinde, Okosun, and Yisa, 2010).

Aba falls into the climate belt that is often called the subequatorial climate, which is characterized by high temperatures and heavy rainfall. The rainy season usually begins in March or April as moist Atlantic air, known as the southwest monsoon, invades the country. The beginning of the rains is usually marked by the incidence of high winds and heavy but scattered squalls. By May or early June in most years, the rainy season is at its peak in Aba and lasts for about 10 months. There are two peak periods of heavy rain, one in July and the other in September, in-between is the period of relatively low rainfall called 'August break'. From December through February, however, the northeast trade winds blow strongly and often bring a load of fine dust from the Sahara. These dust-laden winds, known locally as the harmattan, often appear as dense fog and cover everything with a layer of fine particles. An occasional strong harmattan provides relief from high humidity. This period is characterized by dry, cold and windy weather, with little or no rainfall. The temperature is highest in December and lowest in February due to the harmattan. Aba is one of the cities in the southeast with a high annual total precipitation of between 2,000 and 3,000 millimetres

Free health care programmes were conducted in each of the 6 communities that fell into the sampling sites and one community that fell outside the sampling site as a control. Saturday 7th & 14th March 2020 were chosen as days that had more activities for the inhabitants, leading to more people being seen. Saturday gives room for a fair turn out of people for the free health care programme. The venue of the free health care programme was at the river bank for each sampling settlement. A total of ninety (90) people from all the 6 communities attended the free health care programmes and were interviewed on the different health diseases they were having, Seventy seven (77) persons voluntarily allowed their blood samples to be taken. Publicity was given in the 6 communities about the free health care programme, using the various town criers in the various communities. Also, the announcement was made in churches. The free health care programme was organized by the researcher and his team in collaboration with some churches. Three (3) doctors and a medical laboratory scientist conducted the medical outreach.

Interview was conducted on the ninety (90) people that attended the free health care programme through a semi-structured questionnaire, after written informed consent was obtained from all the people. The eligibility of respondents was determined by age. Persons above eighteen (18) years were served with the questionnaire.

Six different water samples were each collected into 1-L plastic bottles, at a depth of 1 meter below the water surface which had been adequately washed with detergents, rinsed several times with de-ionised water and conditioned, from six sampling points on Aba River on January 24th 2020. The samples were collected on the 24th of January 2020, which were the months of research, during these days the samples were collected early in the morning before 11am, during this period water bodies change very little (Onyekakeyah, 1990).

The thermometer readings were expressed in degrees centigrade (°C). These (6) samples were obtained from Okpolour Umuobu, Emmanuel Avenue, Umuoba Road, Ahia Udele, Peoples Roads 1 and Peoples Roads 2 along the Aba River course that falls within the Aba North Local Government Area. These sample points were the only points accessible along the river course. The water samples were analysed for temperature, pH, Turbidity, Electrical Conductivity, Total Dissolved Solids, Total Suspended Solids, *E. coli*, algae, Chemical Oxygen Demand, Total Hardness, Total Alkalinity, Nitrates, Nickel, Zinc, Copper, Iron, Lead, Mercury, Cadmium, Manganese, Arsenic and Sulphates in line with Ighalo and Adeniyi (2020).

The samples for heavy metal analysis were fixed immediately with Nitric acid (HNO₃) to pH of 2 before transportation to the Ceslab Global Services Analytical laboratory at Km 7, Ikot Ekpene Road Umuahia, Abia State for analyses. The water samples were immediately placed in an ice pack and transported to Ceslab Global Services Analytical laboratory at Km 7, Ikot Ekpene Road Umuahia, Abia State for analysis.

Retrieved questionnaires used for the study were first summarized using the statistical measures of central tendency and data were expressed as means \pm SD and they were subjected to statistical analysis using the non-parametric analysis of variance, and calculation of the correlation coefficient. The statistical significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

Table 1 shows the list of wards, the number of people that attended and the specific diseases identified during the free health care programme.

Table 1: Sampling Sites, Attendance, and Health Status at the Free Health Care Programmes

S/N	Communities	Date	No of doctors that participated	No of patients that attended	Specific diseases identified through Interviewing the participants
1	Okpolour Umuobu	7/3/2020	3	13	Skin disease, Acute abdominal pain, Diarrhoea, Fever, abdominal cramps
2	Emmanuel Avenue	7/3/2020	3	14	Skin disease, Diarrhea, Fever, Cough, Acute abdominal pain
3	Umuoba Road	7/3/2020	3	13	Skin Disease, Fever, Acute abdominal pain,
4	Ahia Udele	7/3/2020	3	12	Skin Disease, abdominal cramps, Cold and cough
5	People's Road 1	14/3/2020	3	13	Skin Disease, abdominal cramps, Diarrhea and Acute abdominal pain
6	People's Road 2	14/3/2020	3	13	Skin Disease, Diarrhea, abdominal cramps, Acute abdominal pain, Cold and cough
7	Aba-Owerri Road	14/3/2020	3	12	Cold, Cough, Fever, headache,
Total			3	90	

Source: Field Survey, 2020

Table 2 shows that in Okpolour Umuobu, more males suffered from skin diseases (77%) while more females (85%) suffered from abdominal cramps. Findings of this study are similar to that of (Chaitali and Dhote, 2013) where most riverine communities suffer from skin diseases. In Emmanuel Avenue Community, the most suffered diseases are Diarrhoea (100%), skin diseases (64%), Fever (71%). Diarrhoea and Fever are suffered more by females in the community. This might be attributed to the polluted Aba River water being used by the people as shown in Table 3, where Nitrates, Sulphates and coliforms are above both SON and WHO maximum permissible limits. The result of this study is similar to the ones reported by WHO (2013), Owa (2013) and Alens (2014), where they opined that diarrhea is a predominant disease in water polluted environment.

Table 2: People affected by Waterborne Disease/Illness in the Six Communities

S/No	Communities	Diseases	Suffering / Sex		Total %
			Male (%)	Female (%)	
1	Okpolour Umuobu	Skin disease	77	23	100
		abdominal cramps	15	85	100
		Acute abdominal pain	46	54	100
		Diarrhoea	46	54	100
		Fever	31	69	100
2	Emmanuel Ave	Skin disease	64	36	100
		Acute abdominal pain	57	43	100
		Diarrhoea	0	100	100
		Cough	50	50	100
		Fever	29	71	100
3	Umuoba Road	Skin disease	85	15	100
		Acute abdominal pain	69	31	100
		Fever	46	54	100
4	Ahia Udele	Skin disease	92	8	100
		abdominal cramps	42	58	100
		Cough	67	33	100
		Cold	83	17	100
5	Peoples Road 1	Skin disease	23	77	100
		abdominal cramps	31	69	100
		Acute abdominal pain	62	38	100
		Diarrhoea	15	85	100
6	Peoples Road 2	Skin disease	15	85	100
		abdominal cramps	46	54	100
		Acute abdominal pain	31	69	100
		Diarrhoea	23	77	100
		Cough	46	54	100
		Cold	46	54	100

Source: Field Survey, 2020

Table 3: Bio-physicochemical Properties of Water in Aba River

Parameters	Level recorded / detected							Standard Deviation	Maximum Permissible Limits	
	Stn1	Stn2	Stn3	Stn4	Stn5	Stn6	Mean		**SON	*WHO
Temperature °C	30	28	27	30	27	28	28.00	1.90	25°C	25°C
pH	6.9	7.8	6.5	8.8	9.8	9.9	8.28	1.45	6.5–8.5	8.2–8.8
Turbidity NTU	9.96	11.33	9.71	10.38	12.56	14.3	11.37	1.77	5	≤1.5
Electrical Conductivity µs/cm	183.50	204.30	166.8	181.6	261.4	288.6	214.37	49.22	1000	1000
Total Hardness (mg/L)	21.50	20.42	19.33	24.15	16.55	18.4	20.06	2.63	150	500
Total Alkalinity (mg/L)	19.16	26.50	26.32	21.11	19.38	20.82	22.22	3.34	-	500
Dissolved Solids (mg/L)	128.6	166.8	133.4	202.4	286.1	255.8	195.52	64.88	500	1500
Suspended solids (mg/L)	472.8	547.8	485.2	441.9	538.6	662.6	524.82	78.55	-	-
Nitrates (mg/L)	126.5	133.2	128.6	142.3	155.3	183.4	144.88	21.63	50	50
Sulphates (mg/L)	235.3	244.8	228.5	246.4	281.3	264.3	250.10	19.51	100	400.0
<i>E.coli</i> (MPN/100mL)	13	18	14	22	19	9	20.50	4.51	0	0
Total Solids (mg/L)	621.4	714.6	618.6	644.3	824.5	918.4	723.63	123.26	-	-
COD (mg/L)	335.0	413.0	369.1	409.5	482.6	493.0	417.03	61.92	-	-

**Nigerian Standard for Drinking Water Quality, Standards Organisation of Nigeria (SON, 2015)

*WHO guidelines for drinking water quality fourth edition 2017.

The male inhabitants of Umuoba community suffered more from skin diseases (85%), acute abdominal pain (69%), and fever (69%) as seen in Table 2. Skin disease (92%), cold (83%) and cough (67%), are the most predominant male diseases in AhiaUdele community while females suffered more of abdominal cramps (58%). The skin disease that most males in the sampled population suffered from might be attributed to abattoir effluent and the long period of staying in the river during dredging activities (Table 4). The result of this study is similar to that of Govindarajalu (2003) and Akpan and Ajiayi (2016), in which they opined that skin diseases are common water polluted related diseases.

In People's Road 1 community, more females suffered from skin diseases (77%), abdominal cramps (69%), and diarrhoea (85%), than males. Similarly, in People's Road 2, more females suffered from skin diseases (85%), diarrhoea (77%), acute abdominal pain (69%), and abdominal cramps (54%). The situation in both communities might be attributed to the fact that the area is enveloped by urban activities where the men go to work outside the area leaving the females to do more of the domestic duties, which involves using water from the this part of the Aba River, seeing activities involved by people of the community in Table 4. The result from this study is similar to that of Govindarajalu (2003), Owa (2013), WHO (2013), Alens (2014), Akpan and Ajiayi (2016), where they opined that diarrhea and skin diseases are predominant diseases in water polluted environment.

Table 4: Human Activities carried out at the Sampling Sites

S/NO	Sampling Site	Land use	Key Uses of Water	River water colour	Type of crops Cultivated	Other activities
1	Okpour Umuobu	Piggery, industries and farming	Irrigation and for Piggery	Light brown	cassava, maize and vegetables	Fishing, Car workshops, dredging and Battery charging, piggery.
2	Emmanuel Ave.	Residential	Laundry	Light brown	Plantain, Bananas and Cassava	Laundry, Swimming, and Car workshops
3	Umuoba Road	Residential	Laundry and Swimming	Greenish	Maize and Vegetables	Laundry, Swimming, dredging activity, fetching water for domestic uses and Car workshops
4	Ahia Udele	Industrial, residential and commercial (Abattoir)	Abattoir activities	Greenish and reddish in some area		Swimming, dredging activity, carwash, laundry, open defecation, and electroplating and battery charging.
5	Peoples Road 1	commercial, residential and industrial	Domestic uses	Greenish and reddish in some area	-	Refuse dump, swimming, dredging activity, fetching water for domestic uses, electroplating and battery charging.
6	Peoples Road 2	Commercial and residential	Domestic uses	Greenish	Cassava and maize	Laundry, dredging activity, defecation, swimming, electroplating, car workshops and car washing.

Source: Field Survey, 2020

The result from Table 5, which is the control station, shows that more males suffer from headache (85%). The headache may be attributed to the high noise pollution of the area; Aba–Owerri road is a highly commercialized area in Aba. No person that was sampled suffered from skin diseases, abdominal pain or cramps in Aba–Owerri Road, which is the control station. Fever (75%) and Cough (75%) are the illnesses suffered by the sampled population and more males are affected with these diseases. The cough might be attributed to the smoke raised by the power generating plants of the different commercial and industrial companies in the area. This result is similar to that of Ibeto and Okoye (2010) where they noted that cough might not be seriously attributed to water-related diseases.

Table 5: People affected by Waterborne Disease/Illness in Aba - Owerri Road Community as a Control Station

Communities	Diseases	Suffering / Sex				Total %
		Male		Female		
		F	%	F	%	
Aba Owerri Road	Cough	9	75	3	25	100
	Cold	6	46	7	54	100
	Headache	11	85	2	15	100

Source: Field Survey, 2020

Table 6, a summary of diseases been suffered by the sampled population from the five communities, showed that skin disease has the highest number of people suffering from it (83%), followed by abdominal cramp (77%), acute abdominal pain (69%) and diarrhoea (52%). While in the control station (Aba - Owerri Road), the sampled population suffered from headache (100%); which can be said not to be water-related disease, cough (75%), and cold (50%). These were attributed to the polluted river used by residents close to the river and the high noise pollution in the control station.

Table 6: People suffering from waterborne diseases in the sampled communities

S/No	Diseases	Suffering		None Suffering	
		F	%	F	%
1	Skin disease	75	83	15	17
2	Abdominal Cramps	69	77	21	23
3	Acute abdominal pain	62	69	28	31
4	Cold	45	50	45	50
5	Diarrhoea	47	52	43	48
6	Cough	44	49	46	51
Control Community: Aba - Owerri Road					
1	Cough	9	75	3	25
2	Cold	6	50	6	50
3	Headache	12	100	0	0

Source: Field Survey, 2020

CONCLUSION

The study has established that skin diseases, acute abdominal pain, abdominal cramp, diarrhoea, cold and cough were prevalent among the communities that are along the Aba River. It was medically accepted that polluted water has a significant influence on these diseases, while the fact that headache is not related to waterborne diseases can be seen from this study. In order to address the identified problems in communities living along the Aba River, it is suggested that the growth rate of urbanization should be slowed down within the Aba River catchment and be extended to areas outside the catchment so as to reduce the pollution of the river. Since the Aba River is polluted, the local, state and federal governments should improve their monitoring of industries, small and medium scale enterprises (SMEs) and household owners to ensure that they comply with all relevant rules and laws governing wastewater discharge into the river.

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