

Water supply and the impact on human development in Nigeria

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Abstract The development of a society is incomplete without adequate water supply. Uncertainties and risks of pollution (industrial, human and bacterial contamination), land-use change, unhygienic human practices, climatic and seasonal variations are often prevalent in most communities, and consequently have adverse short- and long-term effects on the quality of water, and the living and health conditions of the inhabitants. This paper adopts an intensive field work survey and personal observations to examine some risks of water shortages, inadequate storages, rainfall variations, affordability and opportunity cost, as well as their effects in the development of water supply in three local government areas of Anambra State: Nnewi South, Idemili North and Idemili South. Solutions to minimizing these risks, as well as adequate measures to boosting water development in the state, are presented.

Key words uncertainties; rural; water supply; impact and development

INTRODUCTION

In rural areas of Nigeria, the major water needs are for domestic and agricultural purposes, and to a large extent, a greater percentage of the rural dwellers use domestic water for household purposes. The water problem is more acute due to an increasing rural population, limited social amenities, relatively low income, and limited expertise and skills to use existing or develop new water schemes. Water shortages, poor water quality and deteriorating health conditions of the rural dwellers are often the consequences. Scholz (2003) stated that despite efforts made towards developing water supplies in rural areas; poor health cases are rampant due to water shortages and use of polluted drinking water. UNUS (2005) reports that half of the world's population does not have access to a clean water supply; the unfortunate majority dwell in unsanitary conditions and are exposed to high disease risk. However, in Nigeria studies of water supply and demand in various parts of the country have shown that both municipal and rural water supply are grossly inadequate and unreliable (Ayoade *et al.*, 1998). As noted by Ayoade *et al.* (1998), various studies on water supply in the country have shown that Nigeria's available water resources, both surface and underground, though subject to seasonal and spatial variations, are quite abundant and can satisfy the country's demands for water in the foreseeable future. What is needed is proper planning and management to ensure convergence between water supply and demand over time and space.

Study area

The study covers Nnewi South, Idemili North and Idemili South Local Government Areas (LGA) of Anambra State, Nigeria. The sources of water in the area include rainfall harvest, rivers, streams, springs and boreholes. The challenges of climate and seasonal variations affect rain harvest, while distance and cultural issues are limiting factors against the use of rivers and streams as water supply sources in the study area. Water vending is also accepted in these communities, although this is not cost-effective.

METHOD

Field visits, random sampling distribution of questionnaires, focused group discussions, and personal interviews and observations were adopted to generate data of water shortages, sources, accessibility, pollution and associated diseases. The collected data was collated and analysed using simple percentages. Chemical water quality analysis (COD and BOD₅) and isolation of disease-causing micro-organisms, as well as health centre records, were also employed to help establish the impact on human development.

RESULT AND DISCUSSIONS

Table 1 shows that water shortage records are occasional, with average respondents of 73.06% over the study area. The periods of water shortages are mostly at dry periods (75.4%) when most water sources are limited. Factors responsible for water shortages vary from inadequate sources (36.7%), inadequate storages (30.5%), to rainfall seasonal variation (23.2%), amongst other factors. However, consumer satisfaction depends on adequate water quantity and excellent quality.

Table 1 Patterns of water shortages.

Shortages	Events	LGAs (1) Nnewi South	(2) Idemili South	(3) Idemili North	Av.(%) of total within LGAs
Water shortages	Always	17.6%	8.4%	15.0%	10.9
	Occasionally	58.0%	82.3%	78.9%	73.06
	Not at all	24.4%	9.4%	6.1%	13.3
Shortage periods	All year round	23.9%	7.9%	4.3%	12.03
	Dry months	61.3%	86.3%	78.7%	75.4
	Wet months	1.3%	1.6%	1.3%	1.4
	Irregular periods	13.5%	4.2%	15.7%	11.1
Shortage sources	Distant streams and rivers	45.1%	40.1%	19.8%	35.0
	Vendors and boreholes	41.5%	41.8%	74.9%	52.7
	Other sources	13.4%	18.1%	5.3%	12.3
Shortage factors	Inadequate sources	42.2%	19.1%	48.7%	36.7
	Inadequate storage	21.8%	40.5%	29.2%	30.5
	Rainfall seasonal Variation	20.4%	36.4%	12.8%	23.2
	Industrial consumption	2.0%	0.6%	2.6%	1.7
	Pipe leakages	5.4%	2.3%	2.1%	3.3
	Others	8.2%	1.2%	4.6%	4.7

Source: field work (2009).

The process of collection and storage of rainwater could lead to water contamination, especially when the receptacles and reservoirs are not properly protected from dust and other pollutants. In addition, water crisis could result during dry periods when people exhaust their stored rainwater. The seasonality of most rivers and streams, which overflow during the rains and diminish during dry seasons, further results in being problematic for most rural communities that depend heavily on them. Boreholes disorders and cases of abandoned borehole projects in the study communities also intensify water supply problem (Okeke, 2009) in the study area. On the average, 35% of the respondents indicate their shortage source to be from distance streams and rivers, 52.7% is from vendors and boreholes, while 12.3% indicate other sources. As indicated by the respondents, the vendors and borehole sources are more affected, especially during the dry

season. On the spatial note, Idemili North and South are more affected by water shortage with 78.9% and 82.3% respondents, respectively, claiming experiencing water shortage. Nnewi South on the other hand recorded 58% respondent claiming water shortage during deficit periods.

Impact on human development

Threats to domestic or drinking water sources are issues of major concern in both rural and urban areas. Pollution could result from industrial, human and bacterial contamination. Others include “land use change influence (land cover modification), extraction activities, various forms of recreation, sewage and septic system discharges, inadequate buffer zones and vegetation, soil erosion, discharges, geology (naturally occurring chemicals), unconfined and shallow aquifer (including groundwater under direct influence of surface water), inadequate wellhead protection, uncased or inadequately cased bores and unhygienic practices and climatic and seasonal variations (e.g., heavy rainfalls, droughts)” (WHO, 2004). These often have adverse short- and long-term effects on the quality of water, increase developmental and distribution costs, and if not treated cause poor health conditions.

In the study area, a lot of contaminants sources are known to exist. The impact of this contamination of the domestic water sources includes pollution and water resource degradation cases due to indiscriminate human waste disposal at the river banks, food processing, transportation, swimming, sand dredging and spiritual sacrifices peculiar to the area. Table 2 is a record of respondents to major pollution threat to rural water supply in the study area. The record shows about 72% respondents in Nnewi South indicate high liquid waste and an above average solid and liquid waste discharge of 53.7% in Idemili North LGA.

Table 2 Major pollution threats to rural water supply.

Constraints	LGAs			Av. (%) of total within LGAs
	(1) Nnewi South	(2) Idemili South	(3) Idemili North	
Poor and limited quantity/quality	33.3%	47.2%	33.0	37.8
Industrial pollution	4.0%	7.4%	3.8	7.6
Solid waste*	20.0%	22.5%	9.8	17.4
Liquid waste*	72.0%	45.0%	36.6	47
Solid and liquid waste*	8.0%	32.5%	53.7	31.4
Human pollution	17.5%	39.9%	40.5	32.6
Bacterial pollution	44.4%	2.5%	18.4	21.7
All of above	0.8%	3.1%	4.3	2.7

* Industrial pollution types. Source: field work (2009).

Non-point pollution cases, such as runoff from agricultural lands or seepage from septic tanks often occur in the area. It is estimated that each year 10 million people worldwide die from drinking contaminated water (Encarta, 2006). There are a number of health concerns associated with water supplied to consumers by water vendors. These include access to adequate volumes and concern regarding inadequate treatment or transport in inappropriate containers, which can result in contamination. In cases where the source of water is uncertain or the quality of water is unknown, water can be treated or re-treated in small quantities to significantly improve its quality and safety. Water quality studies conducted show high Biochemical Oxygen Demand values in Idemili North and South LGAs and high Chemical Oxygen Demand values for Nnewi South and Idemili North indicating presence of high organic matter contents in the water sources.

The implications of limited water quantity (water shortages), include limitation of suitability, contribution to indecent sanitation or poor hygiene and denial of children’s education rights due to

time spent in search of water. Poor water quality deteriorates health and may lead to water diseases and epidemic situations. The major causes include water shortages and scarcity, poor quality of water consumed and high rate of faecal and human pollution that is often accelerated by flooding. UNICEF (2006) reports that over one billion people still use unsafe drinking water sources and thus thousands of children die from diarrhoea and other water sanitation and hygiene related diseases daily, while many others suffer and are weakened by illnesses. This situation is evident in the study area, as hospital records show high rates of water-related disease.

Typhoid fever cuts across the study of LGAs, but importantly affects more than half of the people in Idemili North (58.1%) and Idemili South (50.4%) LGAs. Dysentery, diarrhoea and dermatitis are other common diseases, and unlisted diseases include malaria, intestinal worms, trachoma, schistosomiasis and hepatitis. Isolated micro-organisms in the areas are *Staphylococcus* sp., *Klebsiella* spp., *Bacillus* spp., *Alternaria* spp. and *Aspergillus* spp. Moreover, monthly reports of affected persons are high in Idemili North and Nnewi South (21–31 and <31, respectively). In severe cases, deaths were also recorded.

The impact of water supply and accessibility to the dwellers in the study area in Table 3 is experienced gender-wise in that children (51.5%) are the major water haulers.

Table 3 Water accessibility parameters.

Variables		LGAs			Av. % of total within LGAs
		(1) Nnewi South	(2) Idemili South	(3) Idemili North	
Water haulers	Children	48.7%	65.2%	40.7%	51.5
	Women	3.2%	1.5%	1.6%	2.1
	Men	1.1%	4.5%	5.3%	3.6
	Women and children	47.1%	28.9%	52.4%	42.8
Opportunity forfeited for buying water	Food items	65.8%	44.7%	35.7%	48.7
	Clothing	9.2%	12.6%	16.7%	12.8
	Shelter	5.3%	8.7%	7.1%	7.03
	Education	18.4%	32.0%	40.5%	30.3
	Miscellaneous	1.3%	1.9%	–	1.1
Weekly rural income (₦)	Below ₦5.33	8.2%	11.2%	10.3%	9.9
	₦5.33–7.99	52.5%	51.0%	52.5%	52
	₦8–11.33	19.0%	28.0%	22.3%	23.1
	above ₦11.33	17.3%	15.1%	13.2%	15.2

Source: Field work (2009).

This often leads to insecurity and spending of excess time on water collection. The implication of cost of water to the socio-economic life of any rural dweller is of great significance. This entails the options of affordability as well as forfeiting certain luxuries or necessities such as food items (48.7%) education (30.3%), clothing (12.8%) and shelter (7.03%) amongst others so as to have access to potable domestic water.

Affordability has a significant influence on the use of water as well as selection of water sources because high cost of water reduces the volumes of water used by households and may force rural dwellers to resort to cheap alternative sources which may be of poor quality. This may influence hygiene practices and increase disease risk. The average income of a rural dweller in the study area ranges from ₦5.33 to ₦7.99 weekly. Therefore, an average family of 4–6 persons spends ₦0.13 to ₦0.67 daily on water and will be spending between ₦0.93 and ₦4.67 weekly, automatically consuming more than half of their income on water. Cost of water and pricing; income and affordability as well as the quality of water are all variables that work in combination in determining a consumer's choice and quantity of water consumed.

CONCLUSION

Solutions to minimizing these risks, as well as adequate measures to boosting water development, are not limited to water provision and regulation, but involve water quality monitoring and treatment of contaminated sources, improved rainwater harvesting and storage techniques, as well as health security and healthy habits awareness campaigns, especially in the rural areas. Provision of potable water sources at affordable rates will also help families stay healthy and meet the basic needs such as education and food security.

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