

Perception of Sources, Accessibility and Consequences of Domestic Water Supply in Mbaitoli Local Government Area of Imo State, Nigeria.

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Abstract:

The study focused on the accessibility and consequences of domestic water supply (DWS) in Mbaitoli L. G.A. Structured questionnaire was administered on 10 autonomous communities that were randomly selected. Sources of DWS evaluated includes : bore hole, stream, pond, rainwater, underground water, water vendor and pipe borne water. The results revealed that rainwater consumption has the highest percentage of 24% with pipe borne water having the lowest percentage of 1%. Accessibility study revealed that 26% travelled between 1-2km, 51% between 3-4km and 23% revealed above >4 km in search of water. The result hygienic condition shown that 69% affirmed the poor hygienic conditions of sources of DWS, while 48% do not treat water meant for drinking and provision of potable water is on self-help basis constituting 76%, with Government having 16%, and Non-governmental Organizations (NGOs) constituting 8%. Based on the results, Integrated Water Resources Management (IWRM) should be practiced to include Government and NGOs involvement in water supply, operation and maintenance (O&M) of rainwater harvesting (RWH) to: improves water availability, its proximity, its quantity and its quality in order to eradicate women's and girl's children burden of collecting water for domestic use and reduce the amount of rainwater that goes to the drainage in order to avoid the floods phenomena.

Keywords: Sources, Consequences, Accessibility, Domestic, Water.

1.Introduction

Water is made unsafe by an excess or deficiency of naturally occurring or man-made chemical substances, pathogenic micro-organisms or larger forms of worms (Carruthers, 1974). Large numbers of people in Nigeria, most of them living in the rural areas, do not have access to safe and reliable sources of water (Obeta, 2003; Okdigwe and Efe, 2009; Madu, 2009). According to UN/WWAP (2003), Lack of access to water increases sickness and morbidity, decreases available time and resources for productive activities, and thereby reduces population welfare in developing countries. Also, in rural areas of developing countries, due to inadequate access to safe drinking water and sanitation, there is high incidence of communicable diseases that reduce vitality and economy productivity (Cruikshank et al, 1975).

In Imo State water is mainly fetched by women often assisted by children (Kabonesa and Happy, 2003; Ugoanyanwu, 2009), and in some rural communities, a journey to fetch water means a round trip of several kilometers taking hours. This burden on women and children often manifests in poor health and physical exhaustion. In some situations families have had to expend their meager income to procure water of questionable quality from vendors leading to an increased in poverty level (Hausermann, 2002; Water Aid and Rights and Humanity, 2009).

Limitations of the sources of water supply include high susceptibility to pollution, long distances which people travel to fetch water, and poor nature of the approach roads (Phil-Eze and Ezenwaji, 2008). Similar studies have been conducted by the authors like : Ogbukagu (1986) in Njikola L.G. A. , Orji et al (2006), and Orji et al (2007) in Anambra State , Phil-Eze and Oforah (2008) in Dunukafia L. G. A., but did not identify consequences of sources of water consumed.

Imo State is richly endowed with abundant water resources. However, most of the surface water resources are heavily polluted/contaminated by anthropogenic activities (Phil-Eze and Ezenwaji, 2008; Ubuoh and Njoku, 2009), that required expensive and extensive chemical and biological treatment ((Ugoanyanwu, 2009). Groundwater also, because of its depth of occurrence, temperature, pressure and because it flows within the underground possesses a comparative small amounts of dissolved solids (Ocheri and Ahola, 2009).

According to Ugoanyanwu (2009) preliminary results of baseline survey of water supply facilities in Imo State carried out by Imo State Water Development Agency (IWADA) identified 725 water supply facilities in various communities. When this is added to the 33 new solar-power water projects (SPWP) being executed during 2009 by the Government of Imo State summed up to 760 water supply facilities across the state. With this, water supply facilities dotting the landscape of the state and their combined daily output of more than 100,000 m³ of safe water at least 70% of Imo communities should have access to safe water and sanitation, but reverse is true. Ume and Chukwuemeka (2009) observed sources of water supply in Owerri environ to include : boreholes, rivers, rooftops, wells and water vending. These water sources are heavily polluted (Ume, 2006). Several challenges militating against effective and sustainable service delivery in water supply and sanitation sector according to Ugoanyanwu (2009) include : policy issues, institutional issues, investment/ funding issues and technological issues, these have led to water supply per capita in the rural communities of Imo State below average.

Therefore, problems of rural water supply are much in scale and complex that required a new approach and strategy for water resources sustainability in rural and urban environments. The major objective of this paper is to evaluate Sources , Accessibility and Consequences of Domestic Water Supply in parts of Imo State, Nigeria for water resources sustainability.

2. Materials and Methods

Study Area: Mbaitoli L. G.A. is Imo State of Nigeria The rainy season begins in April and lasts until October with annual rainfall varying from 1,500mm to 2,200mm (60 to 80 inches). An average annual temperature above 20 °C (68.0 °F) creates an annual relative humidity of 75%. With humidity reaching 90% in the rainy season. The dry season experiences two months of Harmattan from late December to late February. The hottest months are between January and March . It has population of 237,474, with 31 autonomous communities in which 10 were randomly picked for the study.

Sample Frame: For the scientific study of the sources and consequences of domestic water supply, 10 autonomous communities were randomly selected. Information for the study were gathered through the administration of 100 questionnaires , interview, personal observation. Questionnaire each was administered on each of the household in the selected autonomous communities (Table 1). The ‘household’ chosen followed that of Darr et al (1975) as a married person and family (children) or unmarried person of a age of 20 years living alone. This was done in order to find out the view of respondents concerning sources and consequences of water supply for domestic use . Two sampling techniques utilized were (stratified and simple random) (Ezenwaji, 2009), and information gathered were analyzed with simple statistical techniques.

3. Results and Discussion

The results of the survey are presented in Table 1- 5.

3.1 Sources of Domestic Water Supply(DWS).

Table 1: Sources of Domestic Water Supply (SDWS).

S/ N	AUTONOMOUS COMMUNITIES	SOURCES OF DOMESTIC WATER SUPPLY							Total
		*HP	*S	*P	*R	*RV	*WV	*PBW	
1	Nkalu	1	-	2	3	2	2	-	10
2	Azara-Obiato	2	2	-	2	2	2	-	10
3	Isi-Ogbaku	2	-	1	2	3	2	-	10
4	Eziama-Obiato	1	1	2	3	1	2	-	10
5	Ogbujioma	2	-	1	3	1	3	-	10
6	Ifakala	1	-	1	2	3	3	-	10
7	Ubahaeze- Orodo	2	-	1	2	2	3	-	10
8	Amaukwu-Orodo	3	-	1	3	2	1	-	10
9	Egbeada	3	2	-	2	1	1	1	10
10	Awo-Mbieri	3	1	1	2	1	2	-	10
Total		20	6	10	24	18	21	1	100
Percentage (%)		20	6	10	24	18	21	1	
Ranking		3 rd	6 th	5 th	1 st	4 th	2 nd	7 th	

Source: Author’s Field Survey, 2013. *HP: hand pump, S: stream. P:pond, R: rainwater, RV: River, WV: water vendor, PBW: pipe borne water

Result from Table 1 revealed that, 20% of respondents utilized water from rainwater harvesting that ranked 1st with 24%, water vendor 2nd that the source is not known by the consumers with 21%, hand pump 3rd with 20%, river 4th with 18%, pond and stream 5th, 6th respectively and the least being pipe borne water 7th constituting 1%.

3.2 Proximity of Sources of Domestic Water Supply(PSDWS)

Table 2: Showing Proximity of Sources of Domestic Water Supply

S/ N	AUTONOMOUS COMMUNITIES	DISTANCE (km)					Total
		1	2	3	4	>4	
1	Nkalu	1	2	2	2	3	10
2	Azara-Obiato	-	1	2	3	4	10
3	Isi-Ogbaku	1	1	1	3	4	10
4	Eziama-Obiato	1	2	2	3	2	10
5	Ogbujioma	1	1	3	3	2	10
6	Ifakala	1	1	3	4	1	10
7	Ubahaeze- Orodo	1	1	3	3	2	10
8	Amaukwu-Orodo	1	2	2	3	2	10
9	Egbeada	2	2	3	2	2	10
10	Awo-Mbieri	2	2	2	3	1	10
Total		11	15	22	29	23	100
Percentage (%)		11	15	22	29	23	

Source: Author's Field Survey, 2013

Proximity of households to sources of water supply is shown in Table 2. This ranged between 1- >4km. It is observed that respondents that travelled in search of water ranged from 2 -29 between distance 1- >4 km. Greater number of people seen in search of water fall between 3-.4km with the percentage of 22%, 29% and 23% respectively.

3.3 Hygienic Condition of Sources of Domestic Water Supply(HSDWS)

Table 3: Showing Hygienic Condition of Sources of Domestic Water Supply.

S/N	AUTONOMOUS COMMUNITIES	RESPONDENTS		Total
		Hygienic	Unhygienic	
1	Nkalu	3	7	10
2	Azara-Obiato	4	6	10
3	Isi-Ogbaku	2	8	10
4	Eziama-Obiato	3	7	10
5	Ogbujioma	1	9	10
6	Ifakala	3	7	10
7	Ubahaeze- Orodo	4	6	10
8	Amaukwu-Orodo	4	6	10
9	Egbeada	4	6	10
10	Awo-Mbieri	4	6	10
Total		31	69	100
Percentage (%)		31	69	

Source: Author's Field Survey, 2013

According to WHO (2005) water can be made unsafe by unhygienic transportation, storage and usage and this is largely influenced by human behavior.

From Table 3, it is affirmed that respondents sourced their domestic water supply from hygienic sources, constitutes 31% and 69% revealed that they sourced water for domestic uses from unhygienic due to lack of hygienic water sources that usually resulted to water borne diseases which eventually leads to people going to hospital and some occasions always result to death of people .

3.4 Water Treatment Methods for Domestic Water Supply (WTMDWS)

During the research, water treatment methods considered include sedimentation, no treatment methods,

boiling and chemical (Table 4).

Table4: Showing Treatment of Water from Different Sources

S/ N	AUTONOMOUS COMMUNITIES	WATER TREATMENT METHODS				Total
		Sedimentation	No treatment	Boiling	Chemical	
1	Nkalu	1	5	2	2	10
2	Azara-Obiato	2	6	2	-	10
3	Isi-Ogbaku	1	6	3	-	10
4	Eziama-Obiato	3	6	1	-	10
5	Ogbujioma	2	5	3	-	10
6	Ifakala	3	5	2	-	10
7	Ubahaeze- Orodo	3	5	2	-	10
8	Amaukwu-Orodo	3	4	3	-	10
9	Egbeada	1	3	4	1	10
10	Awo-Mbieri	2	3	4	1	10
Total		23	47	26	4	100
Percentage (%)		23	47	26	4	

Source: Author's Field Survey, 2013

From Table 4, the result shows that methods adopted in the treatment of rural water supply include sedimentation that constitutes 23%, which is the process of causing heavier solid particles in suspension, both organic and inorganic to settle by retaining water in the basin (Duggal, 1996). Respondents that do not treat water before using constitute 47 % , signifying that greater population in the area do not treat their water . Hence prevalence of water related diseases which usually leads them to sicknesses and eventually total death. Twenty six percent (26%) of sampled population agreed that harvested water from water sources are boiled before using because sources of water are suspected to be of doubtful, while very few respondents of 4% used chemical before using because of the awareness created based on their level of education.

3.5 PROVISION OF POTABLE WATER

Table 5 showing Provision of Portable Water

S/ N	AUTONOMOUS COMMUNITIES	Domestic Water Providers			TOTAL
		GOVERNMENT	NGO	INDIVIDUAL	
1	Nkalu	1	1	8	10
2	Azara-Obiato	1	1	8	10
3	Isi-Ogbaku	1	-	9	10
4	Eziama-Obiato	2	1	9	10
5	Ogbujioma	1	-	8	10
6	Ifakala	1	-	8	10
7	Ubahaeze- Orodo	1	1	8	10
8	Amaukwu-Orodo	2	-	8	10
9	Egbeada	2	1	7	10
10	Awo-Mbieri	4	3	3	10
Total		16	5	76	100
Percentage (%)		16	8	76	

Source: Author's Field Survey, 2013

Table 5 shows efforts made by various bodies such as non-governmental organizations (NGO), individual or private and government in the provision of portable water supply. Out of the respondents sampled in the ten autonomous communities, 16% affirmed the effort of government in the provision of domestic water supply, 8% ascertained that water supply is made by NGOs and 76% which is the highest percentage of individuals that provided domestic water supply.

4. Discussion:

According to Ushurhe (2009), numerous rural communities in Nigeria are served by one or more rivers, streams, ponds or lakes as their major source of water supply. In the eastern Nigeria, one or more communities may claim ownership of a stream as their source of water supply for drinking and other domestic uses. The volume and quality of such water very much fluctuate with the seasons. Sources of domestic water supply considered in the study include: bore, stream (drinking water collected from streams in Nigeria is not regulated by the Federal and State Agencies) and typically does not receive the same monitoring and treatment as drinking water supplied from Government provided boreholes, this situation leaves streams users at risk (Obeta and Ajaro, 2009), pond, rainwater, river, water vendor and pipe-borne water (Table 1).

The result is unconfirmed with the finding of Yusuf (2009), who observed that rainwater is ranked 2nd, well water ranked 3rd and tap water ranked 5th. He further explained that, people do not have access to rainwater except during rainy season when they collect water in pots, basins, buckets and others which is opportunistic or informal rainwater harvesting (Uwazie et al, 2009; Ubuoh, 2012). He suspected that this must have affected the ranking. That however, it is revealed that during the peak of the rainy season, rainwater is the major domestic water (Yusuf, 2009). This is inconsonant with the findings of Usherhe (2010), Okadigwe and Efe, (2010), Ubuoh (2012) who observed that most rural dwellers in Nigeria depend on rainwater from roofs. Although rainwater is seasonal, its quality is still preferred to that of well water (Ubuoh, 2011b). Although rainwater quality is affected by low pH and high concentrations of NO₂, SO₃, colour and other parameters due to incessant gas flaring, if rainwater is properly harnessed, it could be used by rural dweller since it is preferred to other sources (Ubuoh, 2012). This is because rainwater harvesting in rural settlements has advantages. Atmospheric pollution in the rural areas is quite low and rainwater here is generally of high quality. It is often free from primary contaminations compared to shallow wells that are often contaminated by E-coli bacteria (Yelah et al, 2003). Women constitute the largest group of direct users of water and beneficiaries of improved water services and are mainstream interest group in water management (Kabonesa and Happy, 2003; Ali, 2009). Their involvement includes maintenance of shared water sources and facilities. While women and children are mostly involved in supplying water for households, men use the water and dominate in its management in the public sphere even though they are not involved or required to collect water for domestic uses (Ali, 2009). According to Enugu State Government (2002), reported that females in the State undertook 74.5% of provision of water. The result in Table 2 is in conjunction with the observation that many communities do not have access to nearby source of water. This has resulted to long travelling to far distances in the area (Mohammad, 2008). The result is consistent with the finding of Ali (2009) who observed that in most of the rural communities in Enugu State, the nearest water sources are very far from many households and women suffer a lot in reaching them, and they travelled in search of water at the distance of 4.02km with a standard deviation of 1.25km. Also the average time spent in search of water was found to be 2 hours with a standard deviation of 0.41hour. In some rural communities, a journey to fetch water means a round trip of several kilometers taking hours (Ugoanyanwu (2009).

From Table 3, the result is in consonant with the finding of Okeke (2009) who observed that consumption of poor water results in poor health, and in severe cases, the death of affected persons. Prevention of deaths due to water borne diseases can be done through access to safe drinking water, sanitation and good hygiene (UNICEF, 2006). From Table 4, greater number of respondents do not treat water before being used constituting 48%. This is consistent with the findings of author like Ubuoh (2012): who observed that rural dwellers do not treat their drinking water because of ignorance of implications of impurities. Ezenwaji (2010), also observed that lack of maintenance of traditional sources of water have combined to create the problem of inadequate and unsafe drinking water supply in the rural areas and scarcity of water has created a yawning gap between demand and supply. 26% adopted boiling and as few as 3% adopted chemical methods respectively. Boiling of water is a very effective method of purification and very simple to carry out. Boiling water for 10 to 15 minutes is enough to remove all biological contaminations. For example, rainwater used in hot water systems set at >52°C has been found to be compliant with drinking water standards (IWSC, 2006).

From Table 4, greater people do not treat water for domestic uses. Water treatment is necessary in order to ensure that water meant for consumption is pollutants free. Unclean sources of water have been responsible for diseases such as diarrhea, cholera, guinea worm, typhoid and intestinal worms which killed more than eight million people throughout the world each year (WHO, 2011).

The result on the water treatment methods shown that 48% of the sampled population do not apply any of the water treatment methods in the communities and only 3% use chemical treatment method for water treatment. These signify that water used in the area is highly polluted because of ignorance of the water users. According to David (2003), the numerous diseases and other ailment associated with collection, storage and use of untreated stream water include skin infections, malaria, diarrhea, eye infection, intestinal worms, gynaecological infection, ear and throat infection, typhoid, body pains, hypatitis, toothache, marasmus, and migraine. A sick school child cannot read his or her books, cannot go to school or do school assignments and cannot concentrate in class, and this adversely affects the child's academic performance. Villagers will remain high venerable to parasitic infections such and schistosomiasis (Bilharzias) and guineaworm if they continue to use raw water from ponds and streams for laundry and personal hygiene as well as farming activities (Ike-Obiora and Ikwuegbu, 2009). If such water quality is consumed could lead to persons suffering from water related diseases which may eventually results to actual deaths (Agunwamba, 1994).

5 Conclusion :

This study has examined the sources, accessibility and consequences of domestic water supply in Mbaitoli Local Government of Imo State using questionnaire and field observations. It was observed that majority of people in sampled autonomous communities sourced their water from harvested rainwater through opportunistic means, followed by water vendor which is suspected to be water of questionable quality (Ugoanyanwu, 2009), with the least source being pipe borne water. The result also shown that, people in the communities travelled to far places in search of water for domestic uses that involved women and children, and greater number of people do have water from sources that are unhygienic due to unavailability of portable water from pipe borne water in the area. It is observed that, there are people that do not treat water fetched due to ignorance of contaminants, and very few treated water chemically to eradicate microbes that could result to water-borne diseases. Ultimately, the result further indicated that water supply in the area is on individual basis that do not sound well in the present dispensation. Therefore Imo State Water Development Agency (IWADA) should wakeup to challenges of domestic water supply for her people.

6. Recommendations:

Based on the above results, it is recommended that:

- (i) Since rainwater seems to be available and accessible to people in the area, rainwater harvesting (RWH) should be encouraged in order to harness it in the area where other sources of water are lacking. Rainwater harvesting reduces the drudgery on women and children to fetch water from far off sources. This is in line with MDGs 1, 3 and 7:
 - **1:** RWH eradicates extreme poverty
 - **3:** RWH eliminates women's and children's burden of collecting water for domestic purposes
 - **7:** RWH is for ecosystem/environmental sustainability.
 - There should be serious awareness-raising and enlightenment programme on formal rainwater harvesting among rural communities in Imo State (Plate 1). There is evidence that the first flush (FF) of water during rain event washes the roof catchment and hence may contain higher than average amounts of accumulated dust, bird and animal droppings, leaves and other debris (Clark, 1987; Yaziz et al. 1989; Coombes et al. 1999, 2002b, Ubuoh, 2012). Therefore, after-first flush (AFF) in RWH should be practiced whereby, rainwater is harvested when the atmosphere and rooftops are cleansed during the peak of the rain in July (Ubuoh, 2012).

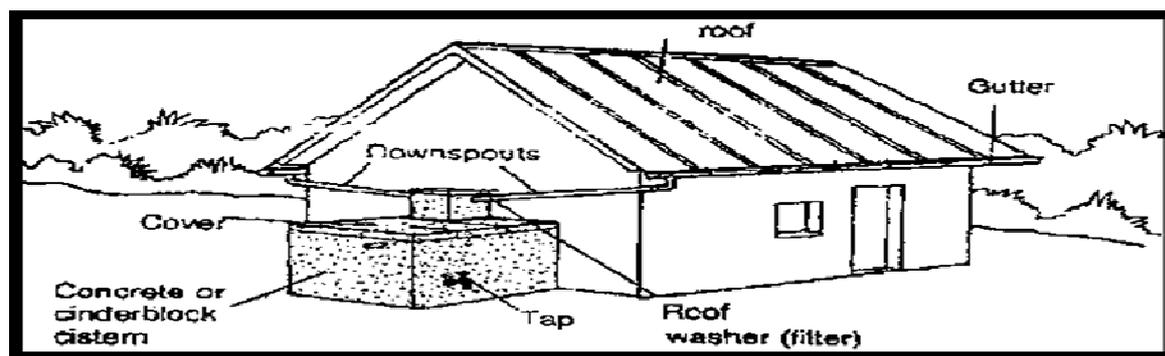


Plate 2: Schematic of a Formal Rainwater Catchment Systems

Source: José Payero, (2010) Pg.2

- (ii) Government should provide potable water for her people in order to eradicate water borne diseases in the area.
- (iii) Communities should be encouraged to treat water in order to eliminate contaminants that are hazardous to health.
- (iv) Government must effectively and continuously monitor water quality in all sources of water by approved agencies to ensure potable water for human consumption.

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