39th WEDC International Conference, Kumasi, Ghana, 2016

ENSURING AVAILABILITY AND SUSTAINABLE MANAGEMENT
OF WATER AND SANITATION FOR ALL

Self-supply as a traditional model for the improvement of water supply in Onitsha, Nigeria

E. E. Ezenwaji & B. M. Eduputa (Nigeria)

REFEREED PAPER 2455

In the absence of conventional water supply system in Onitsha, Nigeria, self-supply model, which is a traditional method of water supply has become relevant as a replacement option. This paper examined the progress made in water supply in 5 years (2011 – 2015) in Okpoko Low Income Settlement of Onitsha. To achieve this aim, a questionnaire were designed and distributed to 6,024 households and other stakeholders between January and December 2015. Data achieved were analysed with simple statistical methods. The result shows an improvement in the condition of wells, new mode of well operation adopted reduced the level of water pollution, as well as the quantity of water supply which showed an increase. Challenges faced by the operators of the model in the study area, as well as lesson learnt were outlined and discussed.

Introduction

The low income districts in many Nigerian urban areas lack essential amenities of water supply, electricity and health facilities. Among these, water supply is most scarce. This observation contradicts the implied assumption by many western researchers that severe water supply shortages is only a feature of rural communities in developing countries (Sutton, 2008, Gelhard 2014). In Nigeria, public water supply in towns are in many cases restricted to the high and middle income areas, leaving the low income areas unserved. The households in these unserved areas are forced to provide their own water through the traditional self-supply option. Self-supply can be defined as incremental improvements of supply of WASH products, e.g water supply and sanitation structures by a household or a small group of households which are financed by their own effort and investment (Olschewski, *et-al*, 2015). This water service delivery option has been identified as an alternative service delivery model to a more highly subsidized community-level provision which is not available in some urban and rural communities. Self-supply is, therefore, a coping strategy at the household level for millions of unserved population to tackle their serious water supply problem. The incremental improvement which is embedded in the definition of the model is better described using the 'water ladder' technique that generally operate through four steps namely: (i) digging of wells with hand (hand dug) and extracting water from the rope and bucket (ii) installation of a hand pump on the hand dug wells (iii) constructing a borehole with electric or engine pump and (iv) connection to communal piped water supply (Holtslag and Mc Gill, 2015).

The Okpoko low income settlement of Onitsha is a place where the traditional self-supply of water supply thrives, as nearly 50% of the households own and manage their hand-dug wells. However, the need to ensure the improvement of these wells made the community to constitute a water committee at the community level and water point committees at the ward level.

Background

Okpoko low income settlement is the largest of such settlement in Onitsha. The primary source of water supply here is the hand dug well, while other complementary sources are rainwater, rivers and water vendors that are characterized by water of doubtful quality with wells having the worst quality. Okpoko has the 2014 projected population of 102,000 with 12,750 households living in an area of 12sq kms comprising 8 wards

and a population density of 8,500 persons per square kilometre (Table 1) (National Population Commission 2006, Onwumere, 2014).

Table 1. Basic statistics of the settlement

Ward	No of Wells	Total Population	No. of Households
Comprehensive	825	10,240	1,280
New Haven	588	14,211	1,776
East Niger	781	12,699	1,587
Industrial Habour	693	14,480	1,810
Head Bridge	742	15,332	1,917
Mkpikpa	873	12,812	1,600
Metallurgical	682	11,717	1,465
Ogbomanu	816	10,509	1,314
Total	6000	102,000	12,750

An estimated 98% of 12,750 households rely on water from hand dug wells for drinking and other household purposes. The water committees established in the community are helping to solve the problem of water supply in the following two ways; (i) improvement of water by households through loans from the funds provided by beneficiaries. (ii) funds collected are deposited in a Micro Finance Bank which provide credit lines to qualified households to be used to purchase simple and affordable equipment such as well cover, hand pump, motorized pump, chlorine and water filter to improve the standard of water quality from the wells etc. Loans are offered to households with regular income who can readily service their debt obligations within 2 years. For example, the cost of installing a hand pump is about ₦44,000 ($152) at the prevailing exchange rate of ₦290 to 1$. Training of artisans is undertaken where they learn simple ways of producing and installing technologies suitable for self-supply of water. Only trained artisans are allowed to be hired by households and their jobs are supervised by the Water Point Committee members at the ward who ensure that they perform according to the required guideline.

The 16 - man Water Committee is elected every two years, two from each of the 8 wards, while the Water Point Committees are established in each ward with not more than ten members elected from members of households that own wells. Another role of the Water Committee is to co-ordinate the activities of eight Water Point Committees who attend to the immediate needs of the well owners at the ward level. Members of the Water Committee and Water Point Committees are paid ₦20,000 ($69.00) each and the amount of money required to pay all members every month is ₦320,000 ($1,103), while ₦10,000 ($34.50) is for a member of Water Committee or ₦800,000 ($2,759) monthly for all of them. The Water Committee, however, has the responsibility of giving detailed account of monthly expenditure at every monthly meeting. The available fund is sourced from ₦500.00 ($1.7) monthly contribution from well owners.

Methodology

Data collection

Field work for this paper was conducted between January and December 2015 with the aid of 6,024 questionnaires structured to elicit information on the conditions of the wells, mode of well operation, quantity of water supplied from the wells, pollution level of the wells etc. Furthermore, field observations and published materials were equally utilized. One questionnaire was administered to each household having hand-dug well water source, one to each of the 16 members of the Water Committee as well as 8 to the chairmen of Water Point Committees in all the ward. 8 research officers were employed to administer and retrieve questionnaire from respondents in the eight wards.

Data analysis

Data collected were analysed with simple descriptive statistics method, while bar graphs were employed to deduce patterns and relationships. The analysis was carried out according to various aspects of wells such as their condition, mode of operation, level of water pollution and quantity of water supply from the wells.

Results

From the analysis of data gathered, the following results were obtained when the authors compared the self-supply in the start-up year 2011 with the situation 5 years later (2015).

Condition of the well

At the start-up year 2011, of the 6,000 wells studied 5,913 or 98.6% were unprotected while only a total of 87 or 1.4% were protected. This situation was inverted with the application of the 'water ladder' method which are stage by stage introduction of measures to accelerate WASH self-supply of water. In 2015 as a result of these measures the number of unprotected wells decreased to 2,116 indicating a reduction of 64% over the 2011 situation. (Figures 1 and 2). Furthermore, the wells that dry up decreased from 2,400 to 476, and, the number of wells that dry up in each month of 2011 and 2015 are shown in figures 1 and 2.

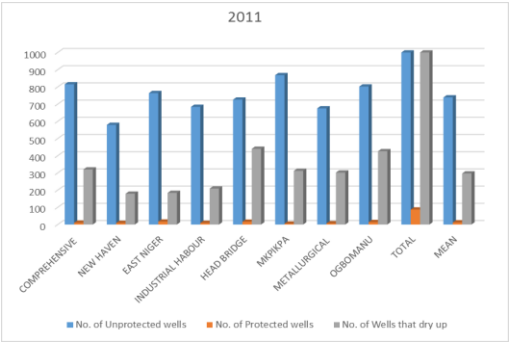

Figure 1. Condition of the Wells in 2011

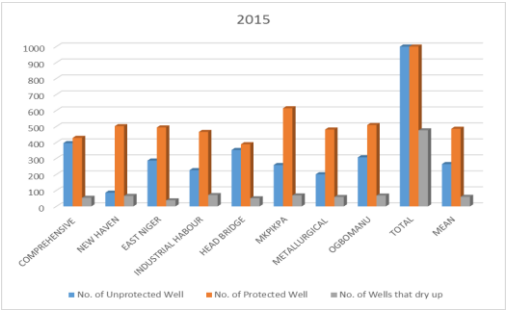

Figure 2. Condition of the Wells in 2015

Mode of well operation

Mode of well operation concerns the extraction of water from the wells either by means of rope and bucket, hand pump or motorized pump. Number of wells operated with rope and bucket decreased from 4,689 in 2011 to 1,962 in 2015, (Table 2) showing a percentage decrease of 58.2%, while the number of wells with hand pump increased from 946 in 2011 to 3,291 (Tables 2) showing a percentage increase of 248%, an outstanding improvement. Finally, the number of wells with motorized pump increased from 260 in 2011 to 759, in 2015, a percentage increase of 192%.

Table 2. Model of well operation 2011 and 2015

Ward	2011			2015		
	No. of Wells with Hand pump	No. of Wells with Motorized pumps	No. of Wells with Rope & Bucket	No. of Wells with Hand pump	No. of Wells with Motorized pumps	No. of Wells with Rope & Bucket
Comprehensive	275	50	500	499	110	216
New Haven	130	30	428	300	74	214
East Niger	161	10	610	400	91	300
Industrial Habour	74	27	592	414	100	179

Head bridge	36	5	701	372	107	263
Mkpikpa	105	38	730	439	114	320
Metallurgical	130	24	528	401	57	224
Ogbomanu	140	76	600	466	106	244
Total	**946**	**260**	**4,689**	**3,291**	**759**	**1,962**

Reduced pollution level of well water

Incremental improvement in the supply of WASH water product through improved mode of operation (From rope and bucket system, to hand pump and finally to motorized operation) has greatly improved the quality of well water in the community. This is in addition to households boiling and filtering of water before domestic uses. All these have reduced the number of wells with contaminated water from 5241 or 87% of the wells in 2011 to 2,969 or 49% reduction in 2015 (Table 3). Contamination of water in the area is mostly from biological sources.

Table 3. Pollution level of well water 2010 and 2015

Ward	2010			2015	
	No. of wells	**No of polluted wells**	**No of unpolluted wells**	**No of polluted wells**	**No of unpolluted wells**
Comprehensive	825	709	116	401	424
New haven	588	529	59	242	346
East Niger	781	679	102	350	431
Industrial Habour	693	593	100	374	319
Head bridge	742	644	98	336	406
Mkpikpa	873	768	105	445	428
Metallurgical	682	598	84	316	366
Ogbomanu	816	721	95	405	411
Total	**6,000**	**5,241**	**759**	**2,969**	**3,131**

Improvement in the quantity of water supplied

Self-supply has also increased the quantity of water supplied to households from the hand dug wells from 5,377,000 litres per day (LD) in 2011 to 7,548,687 LD in 2015, a significant increase. This is important since WASH does not only consider improvement in the quality of water, but also increase in supply quantities. However, the water supply situation for 2011 and 2015 per ward is presented in Figure 3.

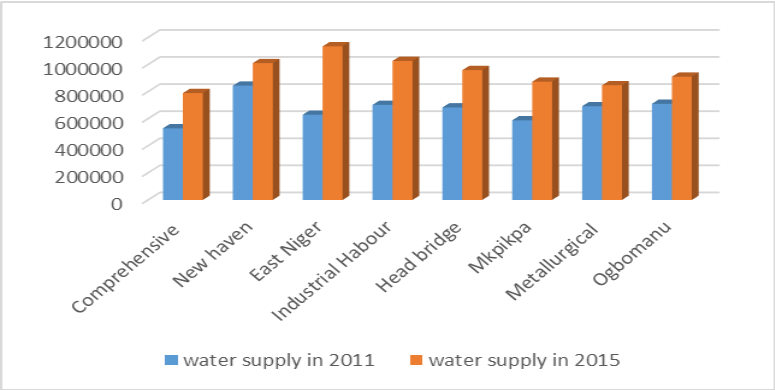

Figure 3. Increase in water supply as a result of self-supply acceleration

Source: Field work, 2015.

Figure 3 shows that there is a significant increase in the quantity of water supply in each of the 8 wards between 2011 and 2015.

Discussion

From the findings, it can be seen that the Water Committee established for the area with its affiliate Water Point Committees have done well. On the condition of wells, there is a manifest improvement in the number of protected wells. Well covers are important in that they prevent people and animals from falling inside the wells, and with appropriate well covers, open wells according to (Holtslag and Mc Gill, 2015) always become improved water sources. Again, the number of wells that dry up has significantly reduced because households engaged in the annual deepening of wells which usually take place in the dry season. This resulted in sharp decrease in the number of wells dry up in 2015 because most wells that are deepened no longer go dry despite the seasonal water level fluctuations.

On the mode of operation of wells, findings from this study indicate that bucket and rope system is gradually giving way to hand pump and motorized systems and these contribute to the increase in water supply quantity as well as quality. This is an encouraging result which was made possible as a result of the acquisition and proper use of new technologies by households. The motorized pumps draw water faster thereby overcoming the limitations of bucket and rope system which include very slow processes of drawing water, consumption of a lot of energy, as well as, its general inconvenient nature especially to children, elderly and pregnant women (Oluwasanya *et-al*, 2012). In absolute term, Comprehensive ward has the highest number of wells (499) with hand pump, while New Haven (300) has the least. For wells that are operated with motorised pumps, Mkpikpa (114) has the highest number, while Metallurgical (57) has the least. Water supply quantity, however recorded increases in the wards, because of improved condition of the wells as well as better operation method. Quantity of water supply to households increased by about 3 million litres per day between 2011 and 2015, and this increase will undoubtedly translate to better sanitation and hygiene of the household. Again the huge time and energy that are lost by women and children engaged in fetching water are greatly reduced. It is important to say that one initial information between 2011 and 2015 is the high level of deaths in the area as a result of occasional cholera outbreaks.

The quality of water supplied from wells improved through reduced use of bucket and rope system. A combination of improved condition of well (increase in number of protected wells), mode of well and water treatment measures have helped to reduce the number of contaminated wells by 38% (87% in 2011 to 49% in 2015). The Water Committee and Water Point Committees encourage households to purchase the new technology and ensure that artisans who maintain the wells comply with acceptable guidelines. However, in spite of the above successes, there are a number of challenges in relying on this traditional model for the provision of water to household. Some of them are outlined below:

(i) Some of the wells continue to have water of low quality even when they are fitted with well covers hand pumps or even motorized pumps. This is in line with the findings of Butterworth, *et-al* (2013)

that water from most of the traditional wells in Ethiopia is contaminated despite improvements made in them. This needs to be studied closely to ascertain the reason.

(ii) Some operators raise concerns that self-supply does not encourage environmental sustainability. This is because increasing draw down of groundwater levels is almost always associated with it.

(iii) Not all households have enough financial capacity to acquire simple technology necessary for self-supply.

(iv) Current water policy in the country does not support self-supply as a relevant alternative in meeting water and sanitation needs of people in water shortage areas, therefore that source of water supply is not recognized by government.

(v) Some households do not have interest in participating in the training usually organized by the Water Committee to build capacity of households on self-supply.

(vi) There is our view that this low cost water supply solution is competing instead of complementing the conventional water supply authorities and this should be discouraged.

Lessons learnt

(i) A good water governance structure exists in the area where the Water Committee which is the final authority in water administration within the community make policy and supervises the water point Committees who implement them.

(ii) The regular training of local artisans are undertaken to enable them offer cheap maintenance service to households. This has helped in the sustenance of water supply from self-supply system.

(iii) The establishment of a credit line by the water committee with a Micro Finance Bank (MFB) in the area through which the invested households can purchase simple and affordable equipment has helped to grow this model in the settlement.

(iv) The increase in the quantity of water supply and great improvement in water quality observed over 5 years will enhance sanitation and hygiene of the inhabitants.

(v) Self-supply promoted as a complementary service delivery model according to Gelhard (2014) can help in supporting the government in filling the water supply gap. This will help to achieve the SDG 6 on clean water and sanitation especially in developing countries.

(vi) Much as the method of operation of self-supply in Onitsha may fit into so many areas but the peculiarity of an environment may require that such method be context specific.

Conclusion

The self-supply model of providing water to households in Okpoko Low Income Settlement of Onitsha is pivotal to the improvement of water and sanitation in the area. The fact that about 50% of the households now own and manage their wells in the area is an indication of the bright future of water supply in the settlement. The home grown water governance structure already in place as well as the smooth financial mechanism combine to assure the success of the traditional model. It is, therefore, of utmost importance for government to key into this model by providing the enabling policy that would support the model, encourage flexibility and scale up to other rural and urban communities. This will no doubt ensure the realization of the Sustainable Development Goal (SDG) 6 in the area by 2030.

References

Butterworth, J., Sutton, S., Mekonta, L. (2013). Self-Supply as a complementary water services Delivery model in Ethiopia. *Water Alternatives* 6(3), 405 -423.

Gelhard M. (2014): *WASH Self-supply in Sierra Leone: Perspectives and Options* Water Aid Publication.

Holtslag H, Mc Gill J. (2015). *Improving Self-supply Water Sources as a Key to reach the Water Related SDG*. Paper presented at 38th WEDC International Conference, Loughborough, University, UK.

National Population Commission (2006) *Bulletin of 2006 Population*, Abuja.

Olschewski, A, Donk Van M & Maillo J. (2015). *Innovative Mechanism for Improving Self-supply Services*. Paper presented at 38th WEDC International Conference, Loughborough, University, UK.

Oluwasanya G, Smith J., and Carter R. (2011). Self-supply systems: Urban Hand Dug Wells in Abeokuta, Nigeria, *Water Science and Technology Water Supply* 11:172 – 178.

Onwumere J. (2014) *Okpoko Area of Onitsha, Nigeria*, Ochei Press, Enugu.

Sutton S. (2008). "An Introduction to Self-supply: Putting the User First, Incremental Improvements and Private Investment in Rural Water Supply". *RWSN Self-Supply (SS) Flagship*.

Contact details

Dr. Emma Ezenwaji lectures in the Department of Geography and Meteorology of Nnamdi Azikiwe University, Awka, Nigeria, and specialise in hydrology and water resources. He has contributed papers to WEDC conferences held in Nigeria, Kenya and Loughborough – UK. Bede Eduputa is a lecturer in the Department of Environmental Management, Nnamdi Azikiwe University, Awka, Nigeria.

E. E. Ezenwaji
Department of Geography and Meteorology
Nnamdi Azikiwe University, Awka, Nigeria.
Tel: +2348033609088
Email: emmaezenwaji@gmail.com

B. M. Eduputa
Department of Environmental Management, Nnamdi Azikiwe University, Awka, Nigeria.
Tel: +2348037777702
Email: bedeeduputa@yahoo.com