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Full Length Research Paper

The European union micro-projects program in water and sanitation and reduction in the incidence of some diseases in the rural communities of Imo State

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Many studies in the rural communities in Imo State have revealed that the levels of water and sanitation services are generally unsatisfactory. This has led to high prevalence of many diseases associated with water scarcity and poor hygiene. This study examined the role of the European Union Micro -Projects Program in water and sanitation in the reduction of the incidence of some of these diseases in the rural areas of Imo State. 540 subjects were randomly selected and interviewed in 15 rural communities that benefited from water and sanitation projects between 2003 and 2007. Impacts were evaluated in the areas of water supply and sanitation in terms of quality, quantity, incidence of diseases and their rate of reduction among the local population. Results showed considerable improvements in the quantity of water supply (62%), sanitation (52%), as well as reduction in the incidence of diseases (40%). The success recorded in this externally funded program resulted from many factors, of which the most important is the adoption of the participatory development model by the donor agency in project execution.

Key words: Diseases, donor agency, micro-projects, participation, sanitation, water.

INTRODUCTION

In January 2000, the federal government of Nigeria launched its National Policy on Water Supply and Sanitation with the aim of providing sufficient potable water and adequate sanitation to all Nigerians (FGN, 2000). At the local level, many state governments and their local government authorities (LGAs) have also complemented efforts of the federal government by creating different agencies (Water Boards, Rural Water Development Agencies, etc.) to provide water for the masses. Despite these efforts, recent studies have revealed that water and sanitation services within the country still remain generally unsatisfactory (Igwe et al., 2007; Onyenechere, 2004; Okereke, 2000; Uzoma, 1996; Lawal, 1997). In 2006, water supply coverage was 50% in urban areas, 20% in small towns and 10% in the rural areas (NBS, 2007a). Also, the World Health Organization and the United Nations Children and Education Fund Joint Monitoring Team (UNCEFMT, 2007) reported that access to improved drinking water sources in Nigeria generally increased from 49% in 1990 to 60% in 2002 and then decreased to 48% in 2006; it also decreased from 33% in 2002 to 31% in 2006 in the rural areas. In the sanitation sector, access to sanitation decreased from 33% in 1990 to 30% in 2004, but slightly increased to 33% in 2006. In a separate report, the United Nations (2006) revealed that total water availability per capita in Nigeria decreased from 2514 m^3 per year in 2000 to 2250 m^3 per year in 2005.

In recent times, a number of donor agencies have contributed in the provision of water supply and sanitation systems in Imo State where there are perceived gaps in access to these services. They have through different programs, engaged in the provision of water facilities in the rural areas. However, over the years, little attempts have been made to assess the general impacts of these projects. This study is aimed at assessing the role of water (boreholes) and sanitation projects financed by the European Union in the reduction in the incidence of some diseases prevalent in the rural communities of Imo State.

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Table 1. Population, land area and density of Imo State by localities.

Local government area (1)	No. of communities (1)	Population (1)	Area (KM^2) (1)	Population density (People per KM^2) (1)	Total No. of water and sanitation projects (2)
Aboh Mbaise	11	152187	185.30	821	04
Ahiazu Mbaise	17	128608	111.20	1157	05
Ehime Mbano	12	125950	139.70	902	04
Ezinihitte	15	11508	108.30	1122	06
Ideato North	13	170106	172.40	987	01
Ideato South	15	111892	90.33	1239	01
Ihitte Uboma	15	93547	104.50	895	02
Ikeduru	14	141377	183.60	770	12
Isiala Mbano	16	138618	203.30	682	07
Isu	5	77424	31.30	2474	01
Mbaitoli	13	195971	213.46	918	06
Ngor Okpala	17	122249	635.73	192	01
Njaba	7	108394	96.63	1122	04
Nkwerre	6	70313	28.65	2454	03
Nwangele	6	95768	72.35	1324	04
Obowo	11	84882	97.80	868	01
Oguta	16	114430	509.60	225	02
Ohaji/Egbema	9	157029	958.01	164	01
Okigwe	7	85685	337.60	254	02
Onuimo	4	83595	69.40	1204	04
Orlu	18	154366	154.60	998	05
Orsu	9	120405	55.20	2181	03
Oru East	9	109807	161.31	681	03
Oru West	10	87149	73.13	1192	03
Owerri Municipal	1	129245	24.88	1175	-
Owerri North	13	219179	165.83	1322	03
Owerri West	12	130362	305.18	427	-
Total	265	3,285,580	5,289.9	621	88

Sources: National Population Commission (2006) and European Union Micro-Projects Program Office, Owerri (2008).

The study is based on the assumption that improved drinking water may lead to improved health patterns in a population only when the people concerned practice improved personal hygiene.

RESEARCH METHODOLOGY

Study area and population

Imo State was one of the nine states that benefited from the European Union Micro-Projects Program which commenced in 2003 and lasted for five years. It lies between latitude 4^0 45' and 6^0 15' North, longitude 6^0 30' and 8^0 09' East. It is bordered on the North by Anambra State, on the South and West by Rivers State and on the East by Abia State, with a total population of 3,285,580 (NPC, 2006). Between 2003 and 2007, a total of 88 water projects (modern boreholes with large water tanks) were executed in the state (Table 1). The study was carried out in 15 rural communities that benefitted from the projects which included Ezuhu Nguru (Aboh), Amuzi (Ahiazu), Ezoke (Ehime), Amudi Obizi (Ezinihitte), Umuago Urualla (Ideato North), Aboh Ebikoro (Ikeduru), Owu (Ikeduru), Ibeme (Isiala Mbano), Umuocham Ntu (Ngor Okpala), Ugbele-Aka (Njaba), Amaokpara (Nkwerre), Amuzi-na-Dim (Nwangele), Amato Alike (Obowo), Etioha (Ohaji/Egbema) and Ugwuntu-Ihube (Okigwe). Two major criteria were used for the selection of these communities, namely, they are all located far from major urban centers and had no other sources of water supply aside rain water, ponds, streams and water vendors.

Data collection

Data for this study was collected through the use of a structured questionnaire that contained multiple answers in which copies were directly administered to respondents. They were interviewed in English or in local vernacular (Igbo) within a period of four weeks. Our subjects were mainly farmers (58%), traders (18%), full housewives (12%), civil servants (6%), retired people (3%) and students (3%) cutting across different age groups. The greater majority were women and children, making up to 82%, and men, the remaining 18%. The questionnaire contained pertinent questions such as age, sex, quantity of water fetched per day, daily water needs, quality of water, incidence of water-borne (typhoid, cholera, diarrhoea) and water-related (malaria) diseases, impact on sanitation, among others. Respondents were also asked to list the diseases they suffered from in the past one year. A systematic

Table 2**.** Increased margin of household water supply.

Communities	Mean household water demand (liters)	Mean household consumption before project in 2002 (liters)	Mean household consumption after project in 2007 (liters)	% Increase in water supply
Ezuhu Nguru	1132	577	873	51.3
Amuzi	1051	538	852	58.4
Ezoke	1137	565	847	49.9
Amudi Obizi	995	473	899	90.1
Umuago Urualla	1031	508	705	38.8
Abo Ebikoro	950	411	710	72.7
Owu	950	462	735	59.1
Ibeme	1052	501	799	59.5
Umuocham Ntu	1004	506	851	68.2
Ugbele Aka	1163	511	838	63.9
Amaokpara	997	495	753	52.1
Amuzi-na-Dim	1009	492	802	63.0
Amato Alika	972	433	720	66.3
Etioha	1080	420	711	69.3
Ugwuntu Ihube	988	391	649	65.9
Mean	1037	486	782.9	61.9
SD	-8	-7	-1	-4

random sampling method was adopted in which each respondent was interviewed in one out of every three families in each community. For water quality assessment, samples were collected and properly analyzed.

Statistical analysis

Prior to the execution of these projects a socio-economic baseline study was conducted by the Imo State government in all the rural communities in the state (2002), to ascertain the prevailing conditions in different sectors. The results from this study formed the basis for comparison with data obtained from our surveys. In the primary analysis, univariate statistics were used to present data on the variables studied (mean, range, standard deviation, liters). Categorical variables and percentages were presented as summary statistics for daily water needs, distance from sources, etc. In the secondary analyses, logistic regression was used to assess relationships between water supply, incidence of diseases and sanitation levels. The limit of statistical significance was set at 95% confidence level ($p < 0.05$). The data was analyzed using SPSS version 13.0 (SPSS; Chicago, IL; USA).

RESULTS

Increase in household water supply relative to demand

In most of the communities surveyed, there was a considerable percentage increase in the quantity of water supply relative to total household needs after the execution of the water projects. Table 2 shows that the highest percentage increase in water supply was recorded at Amuzi Obizi with over 90% among subjects, while the least was recorded at Umuago Urualla with slightly over 38%. Other communities that recorded high increase include Aboh Ebikoro (72.2%), Umuocham Ntu (68.2%), Ugbele Aka (63.9%), Amuzi-Na-Dim (63%), Amato Alike (63.3%), Etioha (69.3%) and Ugwuntu Ihube (65.9%). Two reasons accounted for this phenomenal improvement in water supply, namely, proper location of the projects which increased accessibility to water source, and increased water storage capacities in the families of subjects (more drums, water tanks, jerry cans, etc) . Also, water was made available for an average time of 7 h a day during which families fetches water at will. The low percentage increase in water supply at Umuago Urualla (38.8%) and Ezeoke (49.9%) was as a result of difficult terrain which reduced accessibility to water supply among subjects.

Improvement in the quality of water supply

Baseline data revealed that, over the years, these communities depended on four major sources of water supply, namely, rain water, ponds, streams and water vendors. Rain water was available during the rainy season that lasted only for five months (May to September) and the possibility of harvesting adequate water for the family was usually difficult. Few families provided themselves with underground water tanks and channeled rain water from roof tops into these tanks. A large majority who could not afford the luxury of such facilities resorted to sourcing water from either streams or ponds, within or outside their locality. In very remote areas (Umuago Urualla, Ugbele Aka), water vendors were the major water suppliers as shown in Table 3. This table

Table 3. Evolution of sources of water supply in sampled communities.

Communities	Sources before water project	Sources after water project
Ezuhu Nguru	Rain water, pond	Borehole, rain water.
Amuzi	Rain water, pond	Borehole.
Ezoke	Rain water, stream	Borehole, rain water.
Amudi Obizi	Rain water, pond	Borehole.
Umuago Urualla	Rain water, water vendors	Borehole, rain water.
Abo Ebikoro	Rain water, stream	Borehole.
Owu	Rain water, stream	Borehole.
Ibeme	Rain water, pond	Borehole, rain water.
Umuocham Ntu	Rain water, pond	Borehole.
Ugbele Aka	Rain water, water vendors	Borehole, rain water.
Amaokpara	Rain water, pond	Borehole, rain water.
Amuzi-na-Dim	Rain water, stream	Borehole.
Amato Alika	Rain water, stream	Borehole.
Etioha	Rain water, stream water	Borehole.
Ugwuntu Ihube	Rain water, pond	Borehole.

equally shows that before the execution of the water projects, 46.7% of the subjects sourced their water from rain water and ponds; 40% from rain water and streams and 13.3% from rain water and water vendors. However, after the execution of the projects, 68% of the subjects sourced their water only from the new facilities, while 38% depended on them and rain water. Results of laboratory analyses on water from these new boreholes indicated their high quality both in dry and wet seasons. This was primarily as a result of adequate sanitary measures taken by the communities at the project sites. The levels of coli forms present in the sampled borehole waters were less than 10 per 100 ml sample and number of fecal *E. coli* was equally less than 2.5 per 100 ml sample. Exceptions were the samples from Umuago Urualla and Amaokpara which indicated high levels of iron (2.8 mg/l) and sodium (485 mg/l), respectively. In these two cases, special devices were provided for water treatment before use. It was generally observed that the boreholes projects have greatly improved the water supply needs of the beneficiary communities.

Decrease in the incidence of water-borne and water-related diseases

The incidence of water-borne and water -related diseases in these communities was high before the execution of the projects. As water was fetched from unhygienic sources and stored in the most unhygienic manner, some diseases such as diarrhea (13%), cholera (2%), typhoid (7%) and malaria (100%), were highly prevalent. While these diseases were most common among the most vulnerable groups (children, aged), only typhoid, hepatitis and malaria were common among adults. Our study revealed a considerable reduction in the incidence of these diseases among subjects after the execution of the projects. For example, diarrhoea was reduced to 4%, cholera (0%), typhoid (3%) and malaria (78%). Also, the levels of significance of these diseases were greatly reduced: Amuzi (0.33), Ibeme (0.38) Amaokpara (0.32) Owu (0.31), Ugbele Aka (0.32), Etioha (0.37) and Umuago Urualla (0.41). Among these communities, Umuago Urualla and Ezeoke recorded the highest number of disease victims with 48 and 45 cases respectively, while Owu and Amuzi-Na-Dim recorded the least of 31 cases each, respectively. These reductions were as a result of the provision of regular and potable water supply from the new water projects which helped to improve the general health of the subjects.

Improvement in sanitation among rural families

A month before the completion of any of these projects, a workshop on water and sanitation was organized in each of these communities to sensitize and educate selected community representatives (women leaders, youths, housewives, members of project management committees), on the importance of water and sanitation in a rural setting. The workshop afforded the opportunity to create awareness among users on the benefits of their new projects and the health hazards posed by indiscriminate disposal of human wastes. This was complemented by a practical demonstration of how to construct a modern ventilated pit latrine. Our study revealed that after the completion of the projects, 52% of the heads of households among our subjects reported that they have already provided their families with this latrine, which is simple to build, highly affordable and suitable for rural areas especially where water is scarce. While there was improved sanitation among 52% of subjects, 25% of them

had plans to provide their families with these facilities in the nearest future and the remaining 23% preferred to be using their old pit latrines for lack of resources. Observations showed that the general dimensions for these latrines are 3.5 m deep with an effective average volume of 3.05 m^3, equivalent to twenty years use by a family of six (Morgan, 1990).

DISCUSSION

Rural water and sanitation problem in Imo State is characterized by acute water shortage which forced people to consume water from unhygienic sources. In some areas heavy rains forced traditional pit latrines to collapse, sometimes sweeping their contents into streams and ponds (Chima, 1989; Briscoe and Ferranti, 2005; Gleick, 2002). Many residents relied on water from these sources for domestic use which in most cases are not boiled before use (United Nations, 2001; Triche, 2002; Ume, 2006) . These have led to the multiplication of different diseases that are related to water scarcity and the attendant social distress (Booth and Cutting, 1985, Agbonlahor, 2002). Baseline data in 2002 indicated that average mortality rate among infants and children in these communities were 69 and 108 per 1000 live births as against the South-East regional averages of 66 and 103 (NBS, 2007b) in an environment where health systems are worse than regressive (NDHS, 2003).

The logic enshrined in the model employed by the present European Union Program was that Community-Driven Projects (CDPs) will not only help in providing the much needed social facilities to the rural population, but will also help in reducing rural poverty, improving health conditions and protecting the environment (Streeton, 2003; Churchill, 2005). From a low point of 15% in 2002, this program raised the rate of water supply in these communities to an average value of 62%. The availability of potable water and improved sanitation practices helped to reduce the incidence of infant and child mortality attributable to diseases associated with water to minimal levels as earlier noted. This significant achieve-ment was possible through the involvement of communi-ties in planning, execution, management, operation and maintenance of their facilities. Part of the success of this strategy was the creation of the Community Project Management Committees (CPMCs) in each of the beneficiary communities. These local structures played essential role in ensuring the success and sustainability of the projects. Members of these committees, often numbering 6 to 12, are men and women of proven integrity (retired lawyers, teachers, traders, farmers, etc) collectively chosen by community members by open selection. These committees adopted participatory strategies to sustain their projects, instead of out-right sale of water to community members (water was obtained free of charge in all the communities studied).

These strategies included contributions in cash and in kind from generous donors, voluntary labor for project maintenance and operation, fund raising/lunching activi-ties during festive periods, annual levies on adult males both at home and in diaspora, women “August Meetings”, etc. Some communities also went the extra mile to establish productive ventures such as block molding industries (Ibeme, Ezeoke Amuzi), production of packaged water of 5 ml for sale in urban areas (Amuzi-Na-dim, Ugbele Aka, Ezuhu Nguru), while others embarked on the construction of town halls (Ezeoke, Amuzi) and civic centers (Etioha, Ibeme) to enable the organization of social functions to generate revenue. Part of the proceeds was channeled to cover operation and maintenance costs of water projects. In fact, improved accessibility to water sources had led to average daily gains of about 58% in time, which was invested in agriculture (increase in farm size up to 18%), new economic ventures such as cooperative societies (Owu, Ibeme, Etioha), petty trading (12% of subjects especially in Amudi Obizi, Umuocham Ntu, Amato Alike) and construction activities in all communities as more water was made available. On the sanitation aspect, there was improvement of hygienic and sanitary practices among subjects.

Many families provided themselves with improved ventilated pit latrines, others upgraded their traditional pit latrines while the use of water cisterns (WCs) was encouraged for those who could afford them. Other important health interventions by the donor agency included systematic awareness and containment cam-paigns on the spread of water-borne and water-related diseases, HIV/AIDS and other sexually transmitted diseases. Emphasis was also placed on food hygiene, safe water storage, and general health education. The integrated water and sanitation program was equally introduced in the primary and secondary schools to promote health and hygienic education for an improved standard of living among pupils and students. All these interventions conformed to the National Health and Sanitation Policy and international practices.

Conclusion

This paper has tried to analyze the role of the European Union Micro-Projects Program in water and sanitation in the reduction of the incidence of some diseases in the beneficiary communities in Imo State. Results obtained have explicitly shown how micro-projects in water and sanitation sector can greatly improve the conditions of living of rural inhabitants and contribute to their development process. They have also shown that if the rural populations are given the opportunity to participate in decision-making, planning, implementing and operating projects that touch them directly, the projects end up being well-managed and sustainable. The success

recorded in this program was as a result of many factors including the use of simple and appropriate technology in service delivery, local capacity building, regular maintenance of water systems, provision of reticulated water systems, regular water sample analyses to monitor the level of water quality, increased intervention in sanitation and basic hygiene education as well as the mobilization of local forces for the sustainability of projects. Our results corroborate the idea that the provision of improved drinking water will result in an improved health pattern in a population only when individuals practice improve personal hygiene (Ram, 1979; Esrey, 1996; Nwosah, 2003). The study also demonstrated that decentralized planning and decision-making in water and sanitation management offer potential benefits relating to increased responsiveness to local demands and needs and hence increased willingness of communities to contribute for increased services (Parkinson and Taylor, 2003). The replication of such a community-based program in water and sanitation in other rural communities in Imo State is urgently needed as this will go a long way in reducing the incidence of diseases associated with water and sanitation in these areas in the future.

REFERENCES

Agbonlahor DE (2002). Laboratory Scientists brainstorm on Food and Water-Borne Diseases. In Seminar Report, LabNews, August, 2002.

Booth IW, Cutting WAM (1985). Current Concepts in the management of acute Diarrhoea in children. Postgraduate Doctor Africa April 1985 p. 118-125.

Briscoe J, Ferranti D (2005). Water for rural communities: Helping people help themselves. Washington D. C., The World Bank.

Chima GN (1989). Rural Water Supply in Ngwa Local Government Area of Imo State, Department of Geography, Univ. of Nigeria, Nsukka.

Churchill A (2005). Rural Water Supply and Sanitation: Time for change. Washington D. C., The World Bank.

Esrey SA (1996). Water, Waste, Well-being: A multi-country study. Am. J. Epidemiol. 143(6 : 608-623.

Federal Government of Nigeria (2000). National Water Policy: First Edition Jan.2000. Abuja, Nigeria: Fed. Min. Agric. Nat. Resour.

Federal Ministry of Water Resources (2000). National Policy on Water Supply and Sanitation. Abuja, Nigeria: Fed. Min. Water Resour.

Federal Government of Nigeria (2000). Water Supply and Sanitation Interim Strategy. Abuja, Nigeria.

Gleick PH (2002). Dirty Water : Estimated deaths from water-related diseases 2000-2020. Pacific Institute for studies in Development, Environment and Security. www.pacinst.org.

Igwe CF, Afolabi SB, Adeyemo AM (2007). Inequality in the service provision between the coastal and hinterland areas in the Niger Delta Region. In, Trop. J. Env. Man. 2(2): 156-167.

Lawal I (1997). Water distribution system: Associated problems and solutions in Ibadan. Paper presented at a workshop on Water Resource Management, Ibadan, Nigeria, 4th June.

Morgan P (1990). Rural water supplies and sanitation. A text from Zimbabwe. Blair Research Laboratory. Harare, Macmillan Edu. Ltd. p. 248.

National Bureau of Statistics, NBS (2007a). Nigeria Poverty Assessment (In Collaboration with The World Bank), Abuja Dec. 2007.

National Bureau of Statistics, NBS (2007b). Annual Abstract of Statistics, Abuja www.nigeriastat.gov.ng.

National Population Commission (2006). National Population Census Estimates, 2006. Abuja, Nigeria.

Nwosah GC (2003). Options for small town water supply and sanitation in Nigeria. Paper presented at the 29th WEDC International Conference on Towards the Millennium Development Goals. Abuja Nigeria:10th -14th, August.

Okereke PA (2000). The Water Problem in Old Imo State. Paper presented at the National Conference on Housing and Environment (CEENACON), Owerri, Imo State University 23 - 24 March.

Onyenechere EC (2004). Water supply measures used by rural people of Ebonyi and Enugu States, Nigeria. In, J. Water Supply Res. Technol. AQUA 53(6): 425 - 431.

Parkinson J, Taylor K (2003). Decentralized water management in Peri-urban areas in low income countries. Environment and Urbanization 15(1): 75-89.

Ram ER (1979). Safe water: Essential to health. In CONTACT 52 Christian Med. Commission, World Council of Churches. Geneva, Switzerland. August 1979 p. 23.

Streeton P (2003). First Thing First: Meeting basic human needs in developing countries. London: Oxford University Press.

Triche T (2002). Private partnership in the delivery of Nigeria's water supply services, working paper, The World Bank: Infrastructure and Urban Development.

Ume NC (2006). A Geographic concentration of common water-related diseases in Imo State. Unpublished Ph.D Dissertation. Faculty of Environmental Sciences, Imo State University, Owerri, Nigeria.

United Nations (2001). Water: A Key to sustainable Development New York: United Nations.

United Nations (2006). United Nations World Water Development Report. New York: United Nations.

Uzoma EC (1996). Rural water supplies in Enugu State: A comparative analysis. MSc. Thesis, Department of Geography, Univ. of Nigeria, Nsukka.

World Health Organization/ United Nations Children Education Fund (2007) Joint Monitoring Program for Water and Sanitation: Global Water Supply and Sanitation Assessment, 1-80, 2007 WHO and UNICEF.