

# **Leveraging rural water supply: demand management for sustainable healthcare delivery in south west Nigeria**

O. Ojo

*Osun State University, Department of Geography and Resource Management, Okuku Campus, Nigeria*

## **Abstract**

The study examines the status of rural water supply, demand management, and its implications for sustainable healthcare delivery in selected communities in South West Nigeria. The issue of water availability and accessibility on the one hand and water supply and sustainable healthcare delivery, particularly as related to sanitation and hygiene on the other, were also investigated. Basic data for the study were generated through the use of a questionnaire. Additional information and data were also obtained through pre-tested, qualitative and quantitative instruments and these were analyzed using relevant statistical techniques.

The implications of the observed water supply, demand system on sanitation and hygiene practices in the study area were analysed. Some of the challenges facing rural water supply, demand management and their impacts on healthcare delivery in general, and sanitation, and hygiene practices in particular in the study area were also highlighted. The results showed that the present situation of water supply and demand system in the study area is characterized by a substantial water demand deficit with serious implications for effective healthcare delivery in general and sanitation and hygiene practices in particular.

Arising from its findings, the study recommends a number of policy options for optimizing rural water supply and demand management for sustainable healthcare delivery in the area. These include the need to identify key variables that influence rural sanitation and hygiene practices, and mainstream such variables into the planning process.

*Keywords: rural water supply – demand system sustainable healthcare delivery.*



# 1 Introduction

Among the cardinal goals of the Millennium Development Agenda, access to save water and sanitation is perhaps the most pressing. Although the water and sanitation target features under Goal 7 of the MDG, (the environmental sustainability goal) the fact that it interfaces with virtually all the other goals attests to its strategic importance in the global developmental equation. Indeed, access to clean water and safe sanitation correlates closely with other critical goals of MDG targets such as child mortality, gender equity, enrolment in education and poverty eradication.

Apart from the direct impact of safe water and sanitation on the people, its multi-level impact on other sectors of the economy and, by extension, on the larger paradigm of poverty and productivity cannot be over-emphasized. As observed by Oyebande [1] by directly impacting key indicators in the health, education, agriculture, food security and environmental sectors, access to clean water, sanitation and sustainable hygiene delivery not only has a profound impact on the quality of life indicators but is also a major determinant of productivity and poverty levels, all of which are core to the attainment of environmental sustainability.

In most developing countries including Nigeria, access to safe water and sanitation has been one of the top priorities over the past four decades and to this end, billions of dollars have been invested in the pursuit of the goal of “universal service”. However, the general consensus at the 2002 United Nations World Summit on Sustainable Development was that the current realities as well as the situation expected in the near future, are far from the set goal (The Economist Sept. 7–13 [2]).

With respect to Nigeria, the situation gives cause for worry particularly, given the country’s current population of over 140 million people, more than half of which are youths and children (NPC [3]). A glaring implication of the nation’s youthful age structure is its propensity to create a momentum for future population growth with its attendant implication for resource utilisation including water supply and demand management (Aigbe [4]). No doubt, this scenario portends a grave situation for sustainable development which the MGD project seeks to address.

For a predominantly agricultural nation such as Nigeria, where over 70% of its population, (the majority of who reside in the rural areas), is engaged in agriculture and agriculture related activities (Ayoade [5]), the issue of access to safe water and sustainable healthcare delivery is of paramount importance. It is against the backdrop of increasing population and rising demand for safe water and sanitation in the country that the study examines the issue of rural water supply-demand management for sustainable healthcare delivery in South West Nigeria.

The aim of the study is to examine the water supply-demand situation in the study area and x-ray some planning/policy options for leveraging rural water supply-demand management for sustainable healthcare delivery in general and



sanitation and hygiene practices in the area. The specific objectives of the study are to:

- (a) Examine the current status of water supply and demand situation in the study area.
- (b) Analyze the implications of water supply demand systems on sanitation and hygiene practices in the area.
- (c) Identify some of the challenges facing the water supply-demand systems in the area.
- (d) Propose some policy/planning options for optimizing rural water supply-demand management for sustainable health care delivery in the area.

## 2 The study area

South West Nigeria is the wider context in which the study is situated, but Osun State is the spatial limit of attention. The study area covers 11 most vulnerable small towns located within seven (7) focal Local Government Areas of Osun state of south west Nigeria including; Ife Central, Olorunda, Ayedaade, Ejigbo, Odo Otin, Oriade and Ifedayo (LGAs) (Fig. 1) The State which is located in the Southwestern humid tropical zone of Nigeria, was carved out of the old Oyo State in 1991. South-west Nigeria comprises Lagos, Oyo, Ogun, Osun, Ondo and Ekiti States.



Figure 1: Nigeria political and administrative divisions [states].

According to the 2006 *National Population Census*, the state has an estimated population of 3,423,535 while the population of the 11 small towns is about 71,092, making up 2.1 percent of Osun State total population. Osun State has 15 major water supply facilities thirteen of which are from surface water; one is from ground water while another one is from spring. The largest of the facilities is the Ede water scheme which has a total installed capacity of 160,000m<sup>3</sup>/day, but currently operating at a performance level of about 25%. The plant covers locations scattered in up to 10 LGAs of the State (Osun State Report of the National Baseline Survey [6]). Apart from this, there were many private/public boreholes and hand dug wells that provide basic water requirements to the people of the State.

### 3 Methodology and data collection

#### 3.1 Methodology

In addition to the application of basic statistical techniques, the production efficiency model was also employed in the analysis of data. The Production Efficiency Index (PEI) was employed in determining the level of capacity utilization of the water supply systems in the study area. The PEI relates the actual production of a water supply system to its maximum possible production potential (Ojo [7–9]). In quantitative terms the PEI can be expressed in the form;

$$PEI = 100P_a P_p^{-1} \quad (1)$$

where PEI = Production efficiency index

$P_a$  = Actual Production

$P_p$  = Potential Production

For the purpose of population projection, a growth rate of 2.83% was used in line with the recommendation of the National Population Commission (NPC), while a figure of 60 litres per person per day was used for computing water demand estimates based on the suggestion of the World Bank.

#### 3.2 Sources and types of data

The bulk of the data used in this study was purely primary, sourced through questionnaire and participatory observations on households. Data on population was obtained from the National Population Commission. The study developed, pre-tested and used qualitative and quantitative instruments, namely Key Informant Interview (KII) and Focus Group Discussion (FGD), transect /environmental walk, direct observation on issues of water, sanitation and hygiene (WASH). Gender was mainstreamed into the selection of respondents.

## 4 Results and discussions

### 4.1 Water supply-demand analysis

The water supply demand situation of the study area is examined in this section. Table 1 shows the water supply demand characteristics in the 7 focal local government areas in which the 11 communities used for the study are located. In the table, columns A, B, C, D, E, F and G respectively show:

- (a) The LGAs in which the 11 communities are located.
- (b) The population of the LGAs.
- (c) The water demand of the LGAs (litres/day).
- (d) The water supply of the LGAs (litres/day).
- (e) The water demand deficits of the LGAs (litres/day).
- (f) The water usage per capita in the LGAs (litres/day).
- (g) The % of water supply coverage in the LGAs.

Table 1: Water supply- demand characteristics in the 7 focal LGAs of the study area.

LGA	Population	Water demand (litres/day)	Water supply (litres/day)	Water demand deficit (litres/day)	Water usage per capita (litres/day)	% of Water supply coverage
A	B	C	D	E	F	G
Ife Central	167,254	10,035	4,616	5,419 (54%)	27.52	43.5
Olorunda	13,761	7,905	4,040	3,866 (49%)	293.60	33.3
Ayedaade	150,392	9,027	3,068	5,959 (34%)	20.40	16.5
Ejigbo	132,641	7,940	6,368	1,572 (20%)	48.01	14.3
Odo-Otin	134,110	8,047	2,977	5,070 (63%)	22.20	25.6
Oriade	148,617	8,917	1,025	7,892 (89%)	06.89	41.2
Ifedayo	37,058	2,223	0.497	2222.5 (99%)	0.01	19.9

It can be observed from table 1 that the water demand-supply situation in the study area is characterized by a lot of water demand deficits. For instance, Ifedayo recorded a deficit of 99% while Oriade recorded 75%. Similarly Ejigbo had a deficit of 84% while Ife Central had a deficit of 54%. The above situation,



no doubt, has a lot of implications for the sustainable health and well being of the inhabitants and therefore calls for concerted efforts of all the stakeholders to fast-track the provision of water to the affected communities.

## 4.2 Assessment of water supply systems

As in the case in many other parts of the world, the state of water supply in the study area is invariably related to the state of water production. In the present study therefore, the actual and potential water production as well as the

Table 2: Efficiency of water supply systems in Osun State, South West, Nigeria.

S/n	Water supply system	Raw water source	Installed capacity m <sup>3</sup> /day (potential production )	Actual (average) production m <sup>3</sup> /day	PEI (%)
	(A)	(B)	(C)	(D)	(E)
1	New Ede Water works	River	180,000	45,000	25
2	Eko-Ende Water Scheme	River	13,100	3,799	29
3	Ilesha Water Scheme	River	2,700	0	0
4	Erin-Ijesha Waterfall Scheme	Spring	227	0	0
5	Esa odo Water Scheme	River	4,990	1,647	33
6	Ipetu-ijesha Water Scheme	River	2,180	436	20
7	Iwo Water Scheme	River	9,080	908	10
8	Ila Water Scheme	Stream	3,480	1,914	55
9	Asi Water Scheme	Stream	944	113.28	12
10	Asaba Artesian Well	River	288	201.60	70
11	Igbajo Water Scheme	Boreholes	1,000	500	50
12	Ifetedo Water Scheme	Stream	360	216	60
13	Mokuro Water Scheme	Stream	1,000	0	0
14	Ifewara Water Scheme	Stream	120	102	85
15	Old Ede Water Scheme	River	20,000	0	0

PEI = Production Efficiency Index.



production efficiencies of the available water systems have been computed using the concept of production efficiency index details of which have been discussed under methodology. (See eqn. (1)) It can be observed from table 2 that out of the 15 water supply systems in the State, only 5 were producing at above 50% while the production efficiency of the remaining 10 falls between 0% and 33%. For instance, Ilesha, Erin-ijesha, Mokuro and old Ede water schemes recorded a production efficiency index of 0%. The table also shows that none of the 15 water supply systems attained optimum production. The analysis thus shows that the water supply demand situation of the area is characterized by a lot of water demand deficits with a substantial percentage of the population being impacted by water shortages.

### **4.3 Challenges of water demand situation on sanitation and hygiene practices**

In order to identify the major constraints of the water supply-demand systems in the study area, officials of the state water agencies were interviewed in the course of this study. Some of the identified constraints include inadequate/erratic power supply, inadequate funding and poor maintenance culture of the facilities. These constraints do hamper, to a large extent the effective functioning of the water supply systems and this negatively affect the water supply-demand situation. No doubt, the resulting water demand deficits translate to acute water shortages which in turn affect the state of sanitation and hygiene in the study area.

## **5 Sanitation facilities and hygiene practices in the study area**

### **5.1 Inventory of sanitation facilities**

The inventory of available excreta disposal facilities in the 11 focal communities is presented in Table 3. It can be observed from the table that in the 11 focal communities, there were about 10,530 households, and only 403 which is about 4% of the total number of households had excreta disposal facilities, and these are mainly traditional pit latrines, which are classified as unimproved according to the MDG definition of basic sanitation.

### **5.2 Hygiene knowledge and practice in the study area**

The status regarding the knowledge and practice of hand washing with soap among the residents of the eleven focal communities is presented in table 3. It can be observed from the table that in about 76 quarters/villages/settlements comprising the 11 focal communities, 62 quarters/villages (81.6%) knew about hand washing and the importance of hand washing with soap at critical times such as before feeding babies, after defecation and before eating food or fruits. However, only 38 quarters/villages (61.3%) actually practiced any form of hand washing at all. Concerning the need for hand washing, the study revealed that though the people were aware of the need for hand washing, just a fraction (less



than 5% of them) really observed and practiced it as a way of life. Most of the respondents agreed to observing hand washing, not necessarily with soap before eating.

Table 3: Distribution of excreta disposal facilities in the eleven communities.

Community	No of households	No of households with latrines	% of households with latrines
Ife Odan	243	14	5.76
Masifa Ile	114	4	3.50
Oke ila	1363	17	1.24
Eekosin	1155	33	2.86
Ilupeju	580	6	1.03
Orisumbare	510	6	1.18
Ajebamidele	343	200	58.30
Oba Oke	1649	20	1.21
Oba Ile	2865	56	1.95
Erino ijesha	830	22	2.5
Owena Ijesha	878	25	2.84
Total	10530	403	3.83
Mean value	957.3	36.6	3.82

Table 4: Knowledge and practice of hand washing by residents of the 11 focal communities in Osun State.

Community	No of quarters/villages	Knowledge	Practice
Ife Odan	11	5	3
Masifa Ile	8	1	1
Oke Ila	6	6	0
Eekosin	6	5	5
Ilupeju	9	9	1
Orisumbare	8	8	2
Ajebamidele	10	10	10
Oba Oke	5	8	6
Oba Ile	5	6	6
Erino Ijesha	4	0	0
Owena Ijesha	4	4	4
Total	76	62	38
Mean value	6.9	5.6	3.5



### 5.3 Implications of water supply-situation on sanitation and hygiene practices

The observed water supply and demand situation as reflected in the substantial water demand deficits recorded in the study area has far-reaching implications for sustainable sanitation and healthcare delivery. For instance, lack of accessibility to safe water and sanitation could trigger a substantial increase in water related diseases a number of which are already prevalent in the study area. Some of the water related diseases identified in the study area include malaria, schistosomiasis, onchocerciasis, trypanosomiasis, yellow fever, finariasis, drancuncuiliasis, dysentery, diarrhea, cholera and typhoid/paratyphoid fever. Of these diseases, malaria is not only the commonest but it also cuts across all ages. It is followed by diarrhea which was found to be more prevalent in children particularly of ages five years and below.

Apart from the likely impact on the health of the residents, inadequate water supply in the area has a lot of socio-economic implications. For instance, lack of access to safe water often condemn women and children to spend hours on water collection thus denying them of the time that could instead have been utilized for income generation and education especially for female children. As observed by Madeleen and Kamminga [10], given the importance of water availability and accessibility to sustainable human development, the need to frontally confront the associated challenges cannot be over-emphasized. Indeed, provision of safe water and sanitation should be seen as an integral component of general socio-economic development.

## 6 Conclusion and recommendations

The study revealed that the water supply and demand situation in the 11 focal communities is characterized by a substantial water demand deficit. In addition, the study also showed that very few rural communities had access to safe water supply. This situation no doubt, has far-reaching implications for the well being of the residents in general and sustainable healthcare delivery in particular. With regard to sanitation and hygiene practice, the study further revealed that majority of the residents of the study area did not have access to standard sanitation facilities and majority still engage in open ground surface defecation with its attendant health challenges particularly as related to effective sanitation and hygiene practices.

Arising from the findings of this study, a number of planning/policy options which are aimed at leveraging rural water demand-supply management for sustainable water and sanitation delivery are proposed. The thrust of the recommendation is hinged on the identification of some key variables that influence the provision of sustainable water supply and hygiene practices. These variables include power supply, funding, maintenance, education, community mobilization and enlightenment, poverty alleviation and empowerment, gender mainstreaming and political will.



With respect to power supply, inadequate/erratic power supply was identified as a major constraint towards the effective functioning of the water supply systems. In order to ensure that existing water supply systems in the area function optimally, alternative power sources including solar and wind should be explored and developed. In the course of this study, the issue of poor funding of the water and sanitation sector was also identified as a major constraint. To this end, the government should ensure adequate funding of this critical sector for sustainability to be achieved. It is recommended that the issue of funding should not be left to the government alone. Rather, the private sector should also be mobilized to support the water and sanitation sector of its corporate social responsibility. In the same vein, there must be transparency and accountability in the disbursement of available funds as this will encourage the international donor agencies to increase their support. As the ultimate beneficiaries, the residents should be fully mobilized to take ownership of these projects and ensure their sustainability.

It is pertinent to stress that all the above listed variables do act jointly or severally in influencing effective water supply, sanitation and hygiene practice as was reflected in the findings of this research. In developing appropriate policy options therefore, these factors should not only be identified but must also be integrated into the planning process. With four years left to the target date of the Millennium Development Goals (MDGs), concerted effort must be made to address the identified constraints in achieving sustainable water supply, sanitation and healthcare delivery.

## Acknowledgements

The support given by the European Union Water Supply and Sanitation Sector Reform Programme Unit (EU-WSSSRP) of the Ministry of Water Resources and Rural Development, Osun State, Nigeria is gratefully appreciated. Also, I am grateful to Prof. Oyediran Ojo, Department of Geography, University of Lagos, Nigeria for his comments and suggestions towards the completion of the study.

## References

- [1] Oyebande, L State of the Nigerian environment: Inland Waters: In Ojo O. *et al.* (2004), Federal Ministry of environment/UNDP publication.
- [2] The Economist Sept. 7–13, 2002.
- [3] National Population Commission Census Report (2007)
- [4] Aigbe, G O (2000): Fundamentals of Population Geography Jehovah Shammah Publishers Lagos, Nigeria.
- [5] Ayoade J.O. (1988) Tropical Hydrology and Water Resources; MacMillan, Ibadan, Nigeria.
- [6] Osun State Report of the National Baseline Survey, (2007).
- [7] Ojo Olukayode, (1993): Towards Optimization of the Water Resources Potentials of Lagos State: Problems and Prospects. LASU Journal of Social Science Vol. 3.



- [8] Ojo, Olukayode, (1997) Water Environment and Sustainable Development In Tola Adejuwon and A.O.K Noah (Eds) Perspectives on Education, Women and Environment in Nigeria; Central Educational Services, Lagos Chapter 42 PP 279-286
- [9] Ojo Olukayode, (2000) Social Issues of Sustainable Water Supply Management in Tayo Odumosu (Ed) Social Problems and Social Work in Nigeria, Centre for Planning Studies, LASU.
- [10] Madeleen W. and Kamminga (2003) Water Supply, Sanitation, Hygiene and HIV/AIDS: the unrecognized links, *Aids Analysis Africa* 14(1)

