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APPRAISAL OF WATER SUPPLY FACILITIES IN RURAL RIVERINE COASTAL AREAS OF LAGOS STATE

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ABSTRACT

The current study was carried out to investigate the state of water supply facilities in 43 communities of Ibeju-Lekki and Eti-Osa Local Government Areas of Lagos State. Formal and informal interviews, questionnaires, physical assessment, and secondary data from National Population Commission were used. The major water supply facilities used by the communities were mostly hand dug wells and boreholes which in most cases are fitted with either electrical or hand pumps. It was observed that all the boreholes fitted with hand-pumps had failed, while 86% of those fitted with electrical pumps had equally failed. In the case of the hand dug wells, more than 37% of all the hand dug wells had failed. Borehole failure was mostly due to people's ignorance, non-availability of spare parts, constant water failure, poor maintenance skill, and attitudes of the communities. The failure of the hand dug wells was mainly due to saltwater intrusion. From the survey assessment, sustainable water supply to the community could be enhanced through the use of hand-pump fitted boreholes. Hand-pump fitted boreholes appear more reliable with low operational technology, their cost effectiveness, affordability, and available spare parts. The study recommends the involvement of the community participation in the overall management of the water facilities in order to enhance sustainability.

Key words: water supply, facilities, boreholes, dug wells, hand pumps, communities.

INTRODUCTION

Human life, like all animal and plant life on the planet, is dependent upon water. Not only do we need water to grow our food, generate our power and run our industries, but also we need it as a basic part of our daily lives. Maguvu and Mutengu (2008) emphasized that communities and individuals can exist without many things if they have to. They can be deprived of comfort, shelter or food for a period, but they cannot be deprived of water and survive for more than a few weeks. Water supply to any community is, therefore, crucial. It is the determining factor in dictating the healthy condition of any community. Globally, 1.1 billion people lack access to safe drinking water, with 84% of this population living in rural areas. According to the World Health Organization (2000), Africa has the lowest total water supply coverage in the world, with only 62% of the population having access to improved water supply. This figure is based on estimates from countries that represented approximately 96% of Africa's total population (WHO/UNICEF, 2000).

In specific areas, such as the Sahara Desert in Africa, water is scarce, while in other cases, like the riverine area of Niger Delta in Nigeria, water is plenty, but of poor quality. For example, Orewole et al. (2006) stated that despite the abundance of water, a large percentage of the populations in Nigeria and other parts of the world hardly have enough to drink and meet the essential needs. As the provision of potable water has, for long, been a major problem, this is associated with poverty, a common stance in most developing nations of the world.

In Nigeria, the rural communities are neglected in the provision of potable water supply. Unfortunately, more than 68% of the nation's population resides in these rural communities. In the recent past, several government agencies, such as DEFRRI and OMPADEC, and other non-governmental organizations attempted to ameliorate the water problems through provision of potable water supply through boreholes. The use of boreholes by the Federal Government was initiated following its huge success in the rural areas of the former Eastern Nigeria in the early 1980's. In fact, the first national borehole construction program aimed at providing safe water supply to rural settlements was initiated in 1981 (Bob-Duru, 2001).

While these facilities have provided the needed succour initially, the sustenance of such facilities has often been short lived owing to the inability of government and its agencies to manage adequately such rural water schemes. Thus, it is imperative to periodically investigate or access the state and conditions of the water supply facilities in the rural communities' vis-à-vis their sustainability.

MATERIALS AND METHOD

Description of the Study Area

The study was conducted in Lagos State which is located in the South Western part of Nigeria, bounded in the south by the Atlantic Ocean, in the north and east by Ogun State, and in the west by the Republic of Benin. It occupies an area of about 3.577 square kilometres with a population of about 14 million. As stated by Longe and Williams (2006), about 80% of the population resides in the metropolitan Lagos, making the state the most urbanized in Nigeria. The remaining 20% of this population lives in the riverine rural communities.

Two Local Government Areas from the riverine areas were considered for this study viz: Ibeju-Lekki and Eti-Osa. The aim of the study was to assess the state of water supply facilities in 43 rural communities of Ibeju-Lekki and Eti-Osa Local Government Areas of Lagos State.

Data Collection

The research design employed involved the use of physical surveys and interviews of the dwellers of the communities. The data obtained from the survey based on the observation made and personal interviews with the Local Government chairmen, councillors, community chiefs, and residents of the study area formed the primary data while those from the published material like annual reports of the Local Government and population data from the National Population Commission formed the secondary data. The survey was helpful in identifying the most appropriate and type of water supply facilities that is economically sustainable to the communities.

RESULTS AND DISCUSSION

Tables 1a and 1b present the three types of water supply facilities available in the 43 communities investigated, the number of each of facility in each community, current state of facilities as at the time of investigation, the nature of the problems facing the facilities, and the quality of water.

Table 1a: Water Supply Facilities and Characteristics

			BOREHOLES WITH HAND PUMPS				BOREHOLES WITH ELECTRICAL PUMPS				HAND DUG WELLS				QUANTITY	
S/No	*Community*	*Population*	Quantity	Number Functioning	Number Not Functioning	Reason for Non Functionality	Quantity	Number Functioning	Number Not Functioning	Reason for Non functionality	Quantity	Number Functioning	Number not Functioning	Reason for Non Functionality	Functional points	Non Functional Points
1	*Solu-Alade*	*2,330*	2	0	2	Failed pumping system	1	1	0	-	7	7	0	-	8	2
2	*Igando*	*4,506*	1	0	1	Failed pumping system	1	0	1	Uncompleted	9	9	0	-	9	2
3	*Debojo*	*1,540*	1	0	1	Failed pumping system	2	0	2	Faulty pump and damaged overhead tank	11	11	0	-	11	3
4	*Idado*	*2,209*	2	0	2	Failed pumping system	1	0	1	No electrical pump	4	4	0	-	4	3
5	*Badore*	*8,710*	0	0	0	-	1	0	1	Pump stolen	8	2	6	Salty and coloured water	2	7
6	*Eleko*	*10,824*	5	0	5	Failed pumping system	0	0	0	-	7	5	2	High iron level	5	7
7	*Museyo*	*4,900*	1	0	1	Failed pumping system	1	0	1	No pumping machine & generator	2	2	0	-	2	2
8	*Magbon Alade*	*14,221*	4	0	4	Failed pumping system	1	0	1	Uncompleted	7	5	2	Dried up	5	7
9	*Ilado*	*6,140*	1	0	1	Faulty pump	1	0	1	Faulty pump and No Power generating set	6	4	2	Dried up	4	4
10	*Orimedu*	*13,800*	0	0	0	-	1	0	1	No pumping Station	8	6	2	Coloured water	6	3
11	*Orofun*	*1,634*	1	0	1	Faulty pump	1	0	1	Uncompleted	5	3	2	Dried up	3	4
12	*Akodo*	*8,620*	0	0	0	-	0	0	0	-	15	10	5	Coloured water	10	5
13	*Tiye*	*4,260*	1	0	1	Faulty pump	1	0	1	Faulty pump, No electricity/generator	8	2	6	Coloured water	2	8
14	*Imobido*	*2,776*	2	0	2	Faulty pump	0	0	0	-	1	1	0	Coloured water	1	2
15	*Ilege*	*2,520*	1	0	1	Faulty pump	1	0	1	High iron and faulty pump	4	3	1	Coloured water	3	3
16	*Idaso*	*2,940*	1	0	1	Faulty and failed pump	1	0	1	Generator and pumping machine failed	6	5	1	Coloured water	5	3
17	*Magbon Segun*	*3,137*	1	0	1	Faulty pump	0	0	0	-	4	2	2	Coloured water	2	3
18	*Itoke*	*1,340*	1	0	1	Failed pumping system	0	0	0	-	3	3	0	-	3	1
19	*Idotun*	*3,760*	3	0	3	Faulty pump/coloured water	3	1	2	No Electricity	12	8	4	Coloured water	9	9
20	*Okun-Alasia*	*1,620*	0	0	0	-	0	0	0	-	1	1	0	-	1	0
21	*Okunraye*	*2,467*	2	0	2	Faulty pump	1	0	1	No power source	5	3	2	Coloured water	3	5
22	*Olomowewe*	*6,864*	1	0	1	Faulty pump	1	0	1	Coloured water and faulty pump later	3	2	1	Coloured water	2	3

Table 1b: Water Supply Facilities and Characteristics

			BOREHOLES WITH HAND PUMPS				BOREHOLES WITH ELECTRICAL PUMPS				HAND DUG WELLS				QUANTITY	
S/No	Community	Population	Quantity	Number Functioning	Number Not Functioning	Reason for Non Functionality	Quantity	Number Functioning	Number Not Functioning	Reason for Non functionality	Quantity	Number Functioning	Number not Functioning	Reason for Non Functionality	Functional points	Non Functional Points
23	*Origanrigan 2*	*4,120*	1	0	1	Faulty pump	1	0	1	Faulty water/ coloured water	3	2	1	Coloured water	2	3
24	Origanrigan 1	2,976	1	0	1	Rusted hand pump	1	0	1	Salty water	3	0	3	-	0	5
25	Oshoroko	5,638	2	0	2	Rusted hand pump	1	0	1	No pumping machine	15	8	7	Salty and coloured water	8	10
26	Ebute-Lekki	1,640	2	0	2	Coloured water and faulty pump	0	0	0	-	5	3	2	Coloured water	3	4
27	Lekki	4,976	1	0	1	Faulty pump	1	0	1	Faulty pumping machine	19	17	2	Coloured water	17	4
28	Siriwon	2,680	2	0	2	Failed pump	0	0	0	-	8	4	4	Salty and coloured water	4	6
29	Igbekodo	1,790	1	0	1	Faulty pumps	1	0	1	Faulty pumps	4	3	1	Coloured water	3	3
30	Apakin	1,984	1	0	1	Failed pump blocked by sand	1	0	1	No pumping machine	6	2	4	Coloured water	2	6
31	Itamarun	2,076	3	0	3	Faulty pump	1	0	1	Faulty pumping machine	6	3	3	Water has colour and taste	3	7
32	Oriyanrin	1,950	1	0	1	Failed pump	0	0	0	-	5	3	2	Brpken rings, coloured water	3	3
33	Idata	2,356	2	0	2	Faulty pump	0	0	0	-	6	3	3	1-Dry and 2-coloured water	3	5
34	Ilagbo	1,970	3	0	3	Failed pumping system	0	0	0	-	8	3	5	Green coloured water	3	8
35	Otolu	3,210	2	0	2	Corrosion due to salt water intrusion	3	2	1	Faulty pump	8	5	3	Salty and coloured water	7	6
36	Igbolomi	2,890	3	0	3	Failed pumps	0	0	0	-	4	2	2	Coloured water	2	5
37	Okegelu	2,574	1	0	1	Damaged hand pump	0	0	0	-	4	1	3	Coloured water	1	4
38	Lepiya	4,740	4	0	4	Faulty pumps	0	0	0	-	4	2	2	Coloured water	2	6
39	Ikegun	3,143	2	0	2	Damaged hand pump	0	0	0	-	3	2	1	Coloured water	2	3
40	Folu	4,676	2	0	2	Faulty pumps	0	0	0	-	8	2	6	Coloured water	2	8
41	Ise	5,260	4	0	4	Faulty pumps	0	0	0	-	13	8	5	Coloured water	8	9
42	Okun-Ise	2,480	1	0	1	Faulty pump	0	0	0	-	3	2	1	Coloured water	2	2
43	Akodo-Ise	3,176	1	0	1	Faulty pump	0	0	0	-	5	2	3	Coloured water	2	4
SUMMARY			71	0	71	-	29	4	25	-	276	175	101	-	179	197

Population of the Community

Tables 1a and 1b present the population distribution among the communities investigated. It could be observed that the population ranged predominantly between 1,500 and 3,000. This is due to low rate of economic activities, especially at Okun-Alasia, Debojo, Itoke, and Igbekodo communities. However, the population of Badore, Akodo, Olomowewe, and Eleko communities ranged between 6,000 and 10,000. The noted increase in population is mostly due to the high rate of commercial activities taking place in these communities, thereby attracting settlers. Aside from this, Akodo, being the headquarters of Ibeju-Lekki Local Government Area, attracts a high level of commercial activities. The overall population of the entire 43 communities investigated was 177,423 representing 1.25% of the entire population of Lagos State.

Types and State of Water Supply Facilities

The communities depended mostly on boreholes mostly fitted with hand pumps and electrical pumps and hand dug wells. There were 376 of such facilities in the entire 43 communities. Hand dug wells were 276 in number, while boreholes fitted with hand-pumps and the ones fitted with electrical pumps are 71 and 29 respectively.

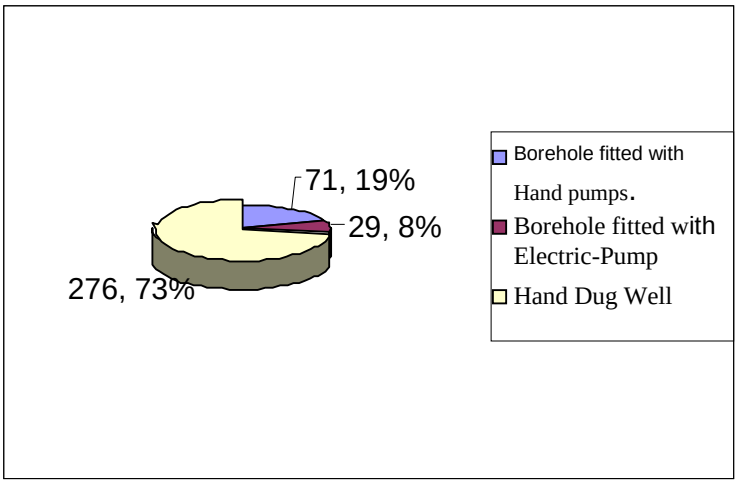

Figure 2: Facilities in the Communities

From observation, all the 71 boreholes fitted with hand pumps available in the communities were out of order (Figures 3 and 4). Boreholes fitted with hand-pumps did not fair well either, 84% of these boreholes had failed mostly due to failure of the pumping system as shown in Plate 1. However borehole failure could also be attributed to corrosion of hand pumps and effects of salt water intrusion.

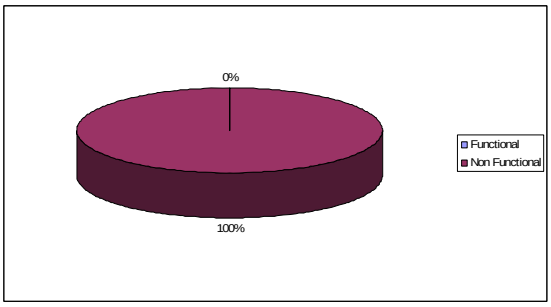

Fig. 3: Boreholes Fitted with Hand-Pumps

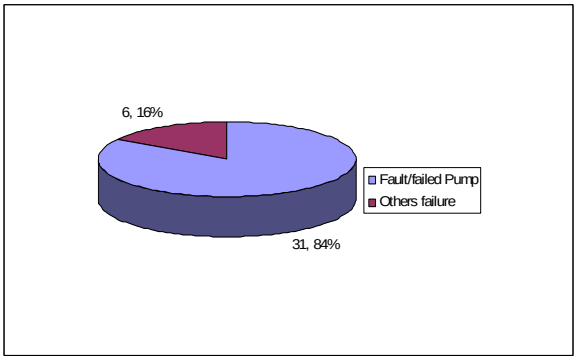

Fig. 4 Mode of Failure of Boreholes Fitted with Hand-Pumps

Plate 1: Abandoned Borehole Fitted with Hand Pump at Siriwon

Failure due to the latter represented about 16% of the failure borehole failure observed. Out of 29 boreholes fitted with electrical pumps, only 4 were functioning, while 25 were out of order. Figure 6 shows the mode of failure of boreholes fitted with electrical pumps. Common reasons for failure included faulty pumps (40%), no source of power (18%), absence of pumping machine (18%),

uncompleted (14%), and abandoned due to salty water intrusion represented 5% as indicated in Plate 2.

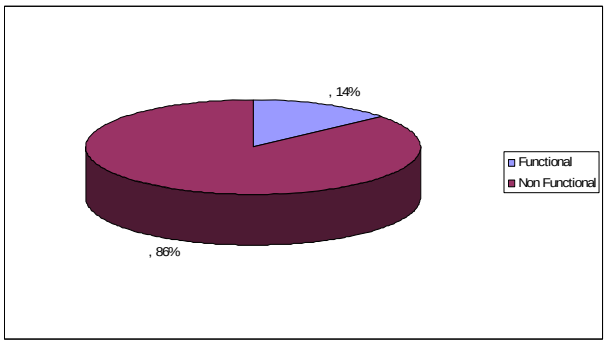

Figure 5: State of Boreholes Fitted with Electrical Pumps

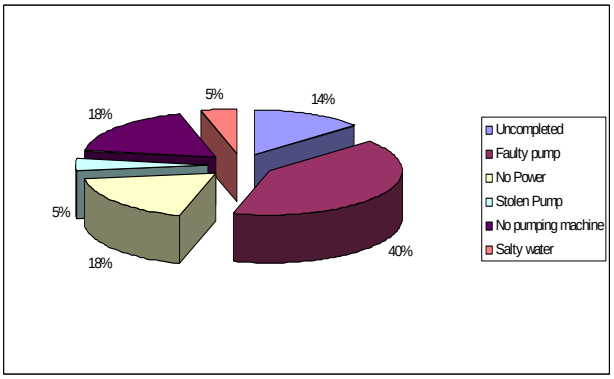

Figure 6: Mode of Failure of Boreholes Fitted with Electrical Pumps

Plate 2: An Abandoned Borehole Fitted with Electrical Pump at Ebute-Lekki

From Figure 7, 37% of the hand dug wells were not functioning due to salt water intrusion, which increased the iron content and created a dry well situation (Plate 3), while 63% were functional. It was also observed that the people resorted to hand dug wells due to failures of government water

supply schemes through boreholes. In addition, noted was the deteriorating water quality from boreholes, mostly due to saltwater intrusion and high iron concentration with no adequate treatment measures.

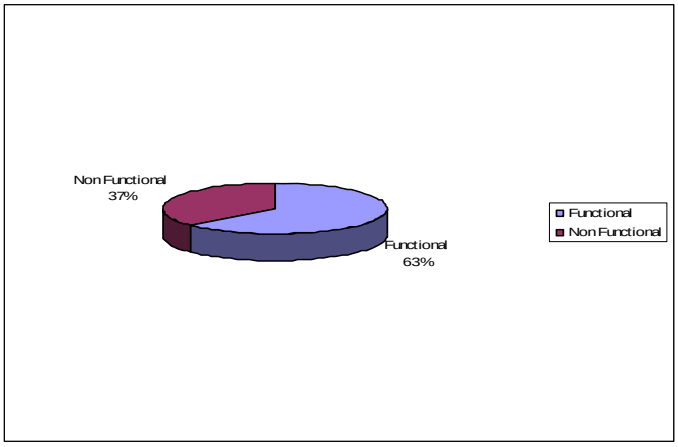

Figure 7: State of Hand Dug Wells

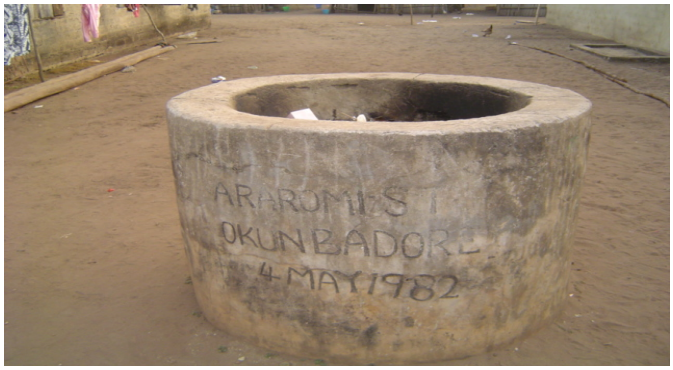

Plate 3: A Dried Well at Okun Badore

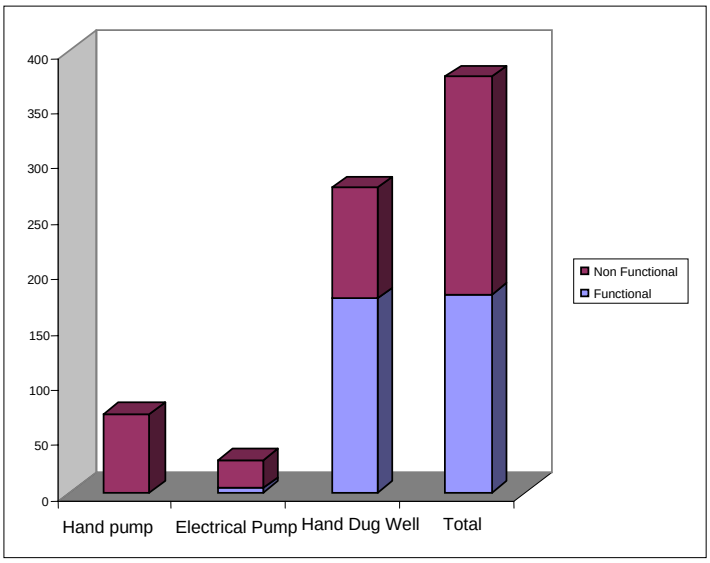

Figure 8: Global View of the Facilities in the Communities

Globally, out of 376 water supply facilities, 179 of the facilities representing only 47.6% of the entire facilities were functional while 197 representing 52.4% were non-functional. From Figure 8, hand dug wells performed better than the boreholes fitted with hand-pumps.

Management of Existing Facilities

Good management and maintenance enhances sustainability of any infrastructure. Poor and nonexistence of administrative, technical support, and lack of funds are usually associated with causes of failure of many rural water supply facilities in Nigeria. Investigation was made on the factors responsible for the failure of some of the facilities, especially the boreholes fitted with hand-pumps, where none of the 71 numbers available were functioning.

Table 2: Factors Preventing Maintenance of Water Facility in the Project Area

Factor	Percentage
Not Responsible	65.2%
No Spares Part	9.1%
Too Damaged to repair	8.3%
Government Responsibility	6.1%
Expensive	4.1%
Other reasons	7.2%

From Table 2, 65.2% of the users stated that they were not responsible for maintenance of the facility, 9.1% cited lack of spare parts, 8.3% stated that they were too damaged for repair, 6.1% of the response indicated that it was the Government that was responsible, while 4.1% submitted that

the facilities were too expensive to maintain, and others (7.2%) were indifferent. It, therefore, indicates that the total collapse of the facilities was due to total neglect and unconcerned attitude of the community.

Adequacy of the Facilities

As stated earlier, there are generally a total number of 376 water supply facilities in the 43 communities, with a total population of 177,427. This indicates that if all the facilities were to function properly, 472 people would depend on only one water supply facility. This is, however, not the case as more than 900 people depended on just one facility.

Sustainable Water Supply to the Communities

Sustainability of water supply depends on the adequate availability of the resource with little or no treatment cost, affordable and inexpensive cost of development. This has to bear in selecting the preferable source of water. Choices for sources of water supply should depend on the quality of raw water, as well as the adequacy of reliability of the sources, from a quantitative point of view together with the potentialities for expansion in future (WHO/UNICEF, 2000). Rainwater is not a reliable source of water supply for this community due to non-point source of air pollutants from industrial activities in Lagos metropolis. Surface water sources can serve as alternative sources of water supply, but are polluted and salty and requires expensive and extensive treatment technology. However, the only option that can meet the requirement for a sustainable water supply is groundwater. This is due to its abundance, availability, reliability, convenience, and cost effectiveness in harnessing it.

Hand dug wells were the most widely available facility among other facilities. Although this is simple and cheap, high risk to groundwater pollution does exist. Water table aquifer is equally prone drying during the dry season as noted in Magbon-Alade, Ilado Orofun and Idata communities. Incidences of saltwater intrusion are equally a common phenomenon in Badore, Oshoroko Siriwon, and Otolu.

Even though the hand pump operated boreholes in these communities are not functioning, hand pumps remain the best option to improved rural water supply. When the hand pump borehole is operating well, it can easily penetrate deeply into the water-bearing strata, extract water easily from a greater vertical depth, is affordable in cost, and requires low maintenance skill. It is the one that can

be adopted to provide sustainable water supply from the aquifer for the communities both in short and long term.

CONCLUSION

Water supply facilities of 43 communities were appraised and investigated in the rural riverine areas of Ibeju-Lekki and Eti-Osa Local Government Areas of Lagos State. People in the 43 communities made use of boreholes (fitted with hand-pumps and electrical pumps) and hand dug wells for harnessing their water supply. The hand dug wells failed mainly due to saltwater intrusion while the boreholes failed due people's ignorance, non-availability of spare parts, constant water failure, poor maintenance skill, and the attitudes of the communities. It is, therefore, recommended that hand-pump boreholes should be provided since it is the only facility that can be sustained by the people due to its reliability, cost effectiveness, low operational technology, and affordability and it can only be made feasible with the provision of adequate spare parts, trained personnel, and community participation.

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