

Shallow drum-lined wells for guinea worm eradication

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Treating ponds that are infested with guinea worm cyclops can be difficult in rural areas. A different and inexpensive method is to install a shallow, drum-lined well near the pond, so that the water is filtered through the ground before use, eliminating any cyclops that might be present.

GUINEA WORM IS endemic throughout Nigeria. A recent national survey indicated that of the 6112 villages tested, 5270 were found to have guinea worm, and Oyo State recorded 11 584 individual cases (12.6 per cent of its population). In the Ifeloju Local Government area of Oyo State, past efforts concentrated on providing alternative water supplies to badly affected communities, supplying monofilament nylon polyester gauze filters, treating water sources (usually ponds) with a chemical insecticide, Abate, and introducing health education. Of the various methods tried, the provision of a safe

water supply was found to be most effective in the control of guinea worm in the long run. But the provision of sanitary wells will cost money, and the major expenditure is the digging and lining. As a result people often try to economize on the lining, which often results in a poor quality structure that collapses. This article describes a project which provided shallow wells lined with used oil drums. The drums are easily available, and they protect the wells so that cyclops-free water can be obtained in the communities at almost the same site as the infested ponds.



A shallow drum-lined well in situ.

The survey area

There are about 50 hamlets in the Oyo Local Government area, each with similar populations and using ponds as water sources. During this study, from January to May 1989, one person in seven of the population had an attack of guinea worm. The communities, because of earlier health education interventions, were already using filtration (19.2 per cent), alum (25 per cent), and boiling (18.3 per cent) to treat their pond water. The mean water consumption was 27 litres per person per day. The pond water contained cyclops, the intermediate host of the guinea worm, in the range of 30 to 350 per litre of water. The communities also suffered from ring worm, diarrhoea, helminthic infections, and scabies.

The study was carried out in the three villages of Ajelaunwa, Iyalase, and Araromi, in the Ifeloju Local Government area of Oyo State. The population of the villages was 50, 60, and 50 people respectively, most of whom are farmers. In Ajelaunwa and Iyalase there are two ponds, and at Araromi there are three. In each village one pond, which is less than 1km from the residential areas, was used during the wet periods, and the other, which is about 1 to 2km away, during the dry periods. The communities were very willing to co-operate, as they suffered badly from guinea worm.

Building the wells

In siting the wells, factors such as nearness to the pond, flatness of the ground, perviousness of the soil, and relative elevation to the pond were taken into consideration. Using simple tools, such as a long iron crowbar and a hoe, a pit is dug and a 1m-high oil drum which has had the top and bottom cut out of it and any dents flattened is inserted into the pit. Depending on the depth, two or three drums can be placed one on top of the other, and the gaps sealed with cement, but the use of more than three drums is not feasible. One of the tops or bottoms is used as a lid, to which a lock is fixed. After arranging the drums, the gaps between the lining and the pit are filled with either soil or a gravel and sand mixture.

Several visits were made to the communities, and the project staff worked through the leaders in the communities. The senior adult in each of the 28 houses was interviewed to collect the basic information. The guinea worm eradication objectives were explained to them, and then information such as occupation, sex, guinea worm infection experience, water demand, and behaviour and attitude to the use of installed drum-lined wells was collected through discussions and questionnaires.

Water samples from each of the ponds and wells were collected in clean bottles and were examined for cyclops counts and water quality. Cyclops numbers were counted under a high-power microscope after large quantities (10 to 50 litres) of water was filtered through a 100-mesh nylon filter and the residue resuspended in a small quantity of cyclops-free pond water. The pH value, turbidity, suspended solids, alkalinity, hardness, and calcium, magnesium, and chloride levels were measured.

Results

The quality of the water in the ponds and in the newly dug drum-lined wells is given in Table 1. The results indicate that there are no cyclops in the wells. The hardness, alkalinity, and calcium levels were much higher in both the pond and the newly dug well in Iyalase than in the sources in the other hamlets because of the local geology. The levels of turbidity and suspended matter are high because of the high quantity of clay in the soils: the top



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Where there is no clean alternative people will have to use the polluted source.

80cm of soil had 34 per cent clay and the bottom 160 to 240cm soil had 22 per cent clay. The drum lining has not significantly affected the turbidity and suspended solids. At Ajelaunwa, on the other hand, the turbidity and suspended solids were higher in the wells than in

the ponds, because the clay content rose as the depth increased. The soils here contained 12 per cent clay in the top 1m, which increased to 25 per cent at 3 to 4m. At Araromi the soils had only 5 to 7 per cent clay. Another factor at Iyalase was rusting, which coloured the water initially but disappeared after a few day's use; the water was clearer when it was used regularly or in the mornings.

The rate of recharge of the wells (in litres/min) in dry and rainy periods was found to be Iyalase: 0.36 and 0.44; Ajelaunwa: 0.30 and 0.61; and Araromi: 0.44 and 0.55. From this and the water consumption pattern, it is deduced that the wells could meet at least one-third of the water demand in dry periods and slightly over half the water demands in rainy periods.

The cost of a drum-lined well is about half that of concrete-ring-lined wells. At the time of this study, a drum-lined well three drums deep had cost us Naira 350 (US\$35) which included labour, smoothing the drums, a cover lock, a bucket, and transportation. The cost can be further cut down if communities are encouraged to participate in more effective ways.

All the three communities responded positively to this new device.

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A hand-dug well is an improvement on an open pond, but it may be difficult to keep the sides intact.