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Water utilization and its health implications in Ilorin, Kwara State, Nigeria

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Summary

The problem of water utilization and its possible health hazard was investigated. The findings revealed that the demand and search for water as well as contact with it reached the peak between February and April, which coincided with the hottest and driest months of the year. During this adverse period, indications are sufficiently strong to conclude that potentials for the transmission and dissemination of infectious diseases of public health significance are enormous.

Key words: water problem; adverse period; health hazards; transmission potential; disease ecology; human activities; schistosomiasis; onchocerciasis; dracunculiasis; Operation Feed the Nation.

Introduction

One of the strongest and most inevitable association in nature is that which exists between man and water. Lack of water is responsible for the poor attraction of man to the desert and for the sufferings of hundreds of nomads in the West African's parched sahel. Cases of broken marriages related to problems of water scarcity, abound locally. A United Nation's report indicated that the majority of the world population lack reliable sources of drinking water. Although Bruce-Chwatt (1978) contended that water is the key to health, he recognized the potential danger of new water schemes being followed by rising incidence of diseases which are closely connected with aquatic vectors. Jordan and Unrau (1978) enumerated possible solutions to some of the health problems associated with water.

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The creation of Kwara State and the establishment of the state capital at Ilorin has greatly increased the demand for water to meet the needs of the population which seems to be growing faster than the provision of basic amenities. Although the Asa and Agba dams were constructed, Asa river, its tributaries and other streams flowing through the capital, remain the most important, the most readily available and the cheapest sources of water for a large proportion of the people. These include those living in sections without piped-water and those whose meagre and inadequate supplies are often interrupted when pipes are being damaged, such as during constructional projects, or during the dry-season water rationing.

Water shortage and demand reached the peak during the driest months when all the streams are reduced to stagnant ponds. Then, with no other alternative, the people are lured in large numbers to the vicinity of manageable but not necessarily safe water.

The fear of the potential danger of these water sites becoming foci for the acquisition and dissemination of infectious diseases, has stimulated the attempt made herein to correlate the pattern of water utilization with its possible health hazards.

Materials and methods

Ten water sites were selected for this study (Table 1). Two of these, the Asa and Agba Dams are man-made water reservoirs, while the rest are seasonal ponds and streams found at different locations in Ilorin, Kwara State capital. Ilorin (population 475,385) is an important commercial town that links the north and the south. It lies along Lagos – Kaduna highway on latidude 8½° N and longitude 5° E.

Observations on human activities at each site, and the frequency of their occurrence were noted and recorded daily from 9 a.m. to 6 p.m. between January and May, 1979. Representatives of these activities were photographed.

The selected water sources were examined for intermediate hosts of various parasitic diseases that breed in water such as, crustacea of the genus *Cyclops* (vector of *Dracunculus medinensis*), *Simulium damnosum* (vector of *Onchocerca volvulus*) and various species of snails that serve as vectors of mammalian schistosomiasis and fascioliasis. Snails were preserved in 70% ethanol and sent to the Department of Zoology, British Museum (Natural History), London for identification.

In addition, freshly deposited human feces, which, usually, were abundant and readily available at most sites were collected and examined under a compound microscope to determine types of intestinal parasites common among the water users.

Results

The demand, search, and contact with water reached the peak between February and April which coincided with the driest and hottest months of the year. During this adverse period, the major activities observed and the frequency of their occurrence are shown in Table 1.

Although no particular body of water was ear-marked for a specific purpose, activities in terms of varieties and frequencies of occurrence, were least

Table 1. Human activities and frequency* of their occurrence at various water sites in Ilorin

Activities and frequency of occurrence	Study sites									
	Asa Dam	Asa Stream	Yidi Road Pool	Asa River at:			Aluko Stream	Maraba Stream	River Oyun	Agba Dam
				Unity Road	Station	Amileghe				
Swimming	–	x	xxx	xx	xx	xx	xx	xx	x	x
Drinking	–	xx	x	xx	x	xx	x	xxx	x	–
Cloth-washing	–	xx	xxx	xxx	xxx	xxx	xxx	xxx	x	x
Car-washing	–	x	xxx	xxx	x	x	x	xx	x	–
Animal-washing	–	–	xx	xx	x	x	x	xx	–	–
Food-washing	–	xx	xx	xx	xx	xxx	xx	xxx	x	–
Bathing	–	xx	xxx	xxx	xxx	xxx	xx	xxx	xx	x
Farming	x	x	xx	xx	xx	xx	xx	xx	xxx	xx
Refuse disposal	–	–	xx	xx	xxx	xxx	xxx	xx	x	x
Defecation	x	xx	xxx	xxx	xxx	xxx	xxx	xxx	x	x
Fishing	x	x	x	x	x	x	x	x	xx	x
Recreation**	xxx	x	xxx	xxx	xxx	xx	x	xx	x	x
Building	–	xx	xx	xxx	xx	xx	x	xx	x	x
Religion***	–	x	xxx	xx	xx	xx	x	x	x	x

* Frequency of occurrence: x = occasional, xx = regular, xxx = frequent

** Site-seeing, relaxation and professional begging

*** Ablution, baptism, riverside mid-night prayers


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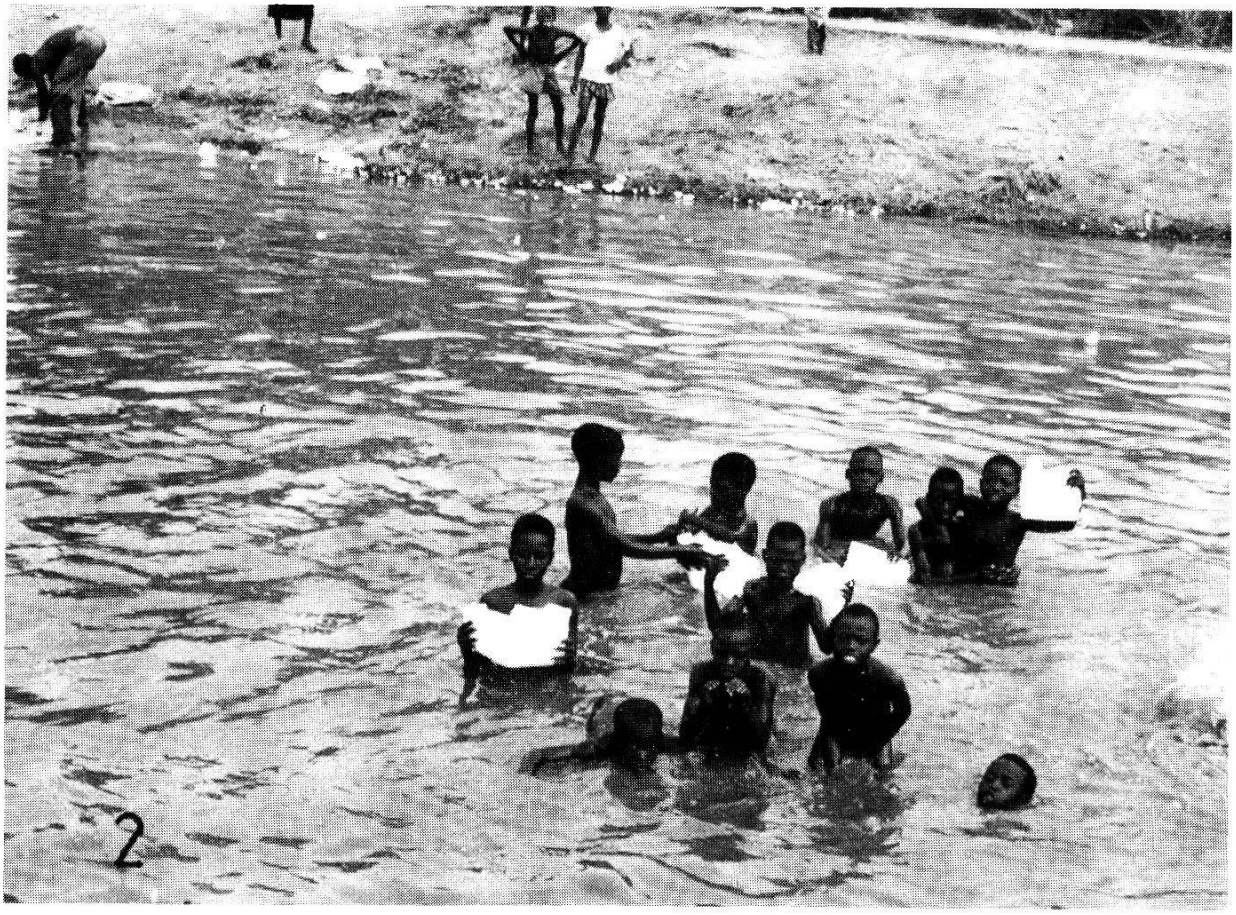
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pronounced around the two dams and River Oyun. Whereas farming was most intensive around R. Oyun, Maraba, stream and R. Asa at Unity, Amilegbe and Station roads, washing predominated at the Yidi pool and Asa tributaries.

Microscopic examination of wet and stained faecal specimens collected at various sites revealed that hookworm, trichuriasis, ascariasis, schistosomiasis mansoni, taeniasis, and amoebiasis were the predominant intestinal parasites of these water users. In all, 348 slides, eleven of which contained eggs of *Enterobius vermicularis* were examined.

Although only two life cases of dracunculiasis were seen, different species of the genus *Cyclops (C. leuckarti, C. aequatorialis* and *C. nigerianus)* previously incriminated in the transmission of guineaworm (Onabamiro, 1952; Muller, 1968) were found in most of the samples examined. The highest recoveries were from samples taken at New Yidi Road (Fig. 1), Maraba stream (Fig. 5) and the stream adjacent to Asa Dam. Various species of aquatic snails of the genus *Bulinus, Biomphalaria, Gyraulus, Melanoides, Potadoma, Lanistes,* and *Lymneae* as well as larvae and pupae of disease-borne mosquitoes, also, were found in abundance.

The potential for transmitting onchocerciasis was present at River Oyun where large numbers of larvae, pupae and adult *Simulium damnosum* were collected and at the stream adjacent to Asa Dam with steep and stony course physically conducive for the breeding of blackflies during the rainy months.

In terms of the extent of pollution from organic and inorganic wastes, and the degree of related health risks, the Aluko stream, Maraba stream, Yidi pool, and Asa tributaries, appeared potentially most hazardous.

Discussion

Information is scanty and at times unavailable on how human activities enhance the ecology of diseases or influence the transmission and dissemination of parasitic infections in this country. Gordon (1971) gave a general account of how various factors, including human activities, have altered the pattern of disease transmission in the tropics. In this study, poor management and unhealthy human activities are largely responsible for the abundance of vectors of disease found breeding in these water sources.

The extent of pollution from automobile oil and other substances at these sites (Figs. 3 and 4), appeared considerable although its effect on man, fish, and

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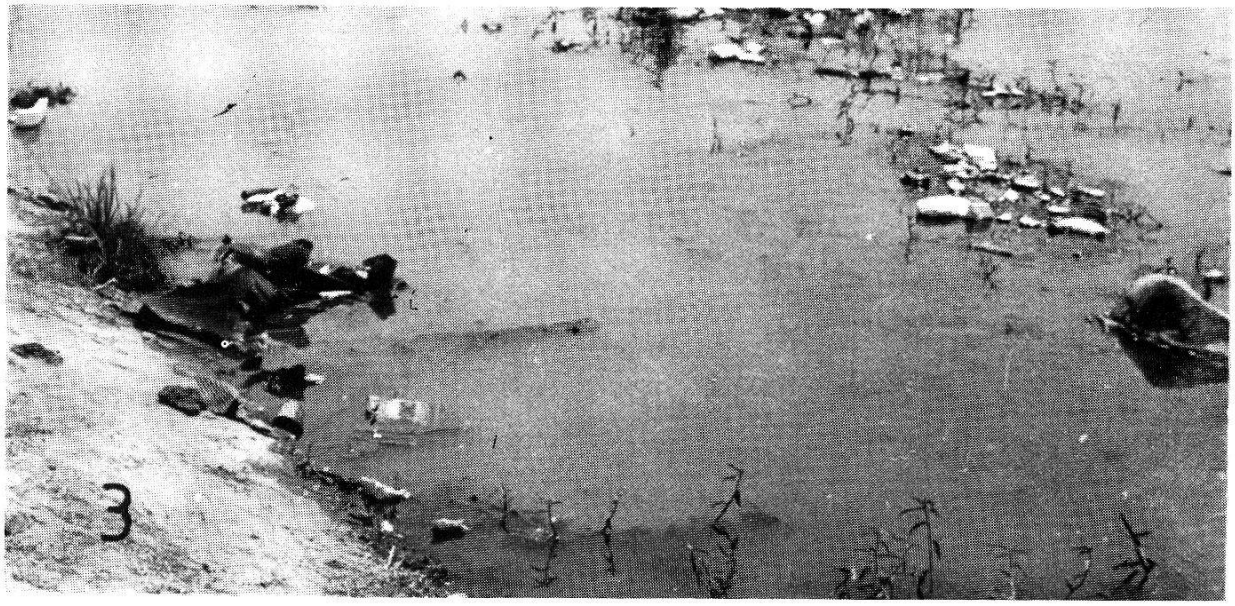
Fig. 1. Washing, drying, and playing at the New Yidi stream. The mother and her kids off-shore chatting with an acquaintance are standing close to deposits of human faeces, while the two boys near the bicycle sell detergent, bread, and refreshments. Note the presence of a dense aquatic vegetation which provides an ideal breeding habitat for aquatic vectors.

Fig. 2. Children swimming at a site where numerous snails containing schistosome cercariae were found. The white objects (polystyrene) which litters the shore and which the boys use as "swim aids" provide attachment for snails.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other aquatic fauna is yet to be determined. However, it is a significant public health danger that these substances could end up in man either directly or via the food chain by gradual accumulation in tissues of fish and cattle prior to slaughtering for sale and consumption. Although not directly water-borne, Sofoluwe et al. (1971) reported poisoning related to automobile wastes in Nigeria.

Of a greater concern and significance is the presence of intermediate hosts of some major parasitic diseases in these streams. Different species of *Bulinus* and *Biomphalaria* known to be the intermediate hosts of human schistosomiasis (Odei, 1961), and species of *Lymnaea* previously incriminated as the African vector of fascioliasis (McCullough, 1965), were found. The presence of these vectors and promiscuous contamination of these water bodies and their surrounding vegetable gardens with human and animal wastes (Fig. 6), could pose serious health problems with regard to the transmission of schistosomiasis, ascariasis, and fascioliasis. Preliminary findings showed that many of the snails collected harboured lopho- and furcocercariae. Also, at least eight students of a secondary school that used Maraba stream (Fig. 6) for washing and sometimes for drinking, are known to have haematuria and the characteristic terminal spines of *Schistosoma haematobium* ova in their urine. While it is desirable to ascertain the prevalence of schistosomiases haematobium and mansoni locally, work is in progress to confirm experimentally species of cercariae shed by the snails.

At present, dracunculiasis is not known to be a health problem in Ilorin but several areas of high endemicity exist around the state capital (Edungbola, 1979). In this regard, the introduction of guineaworm into some of these ponds is feasible since appropriate species of vector *Cyclops* are present and since there is daily influx of people into the state capital from endemic areas. That life cases of dracunculiasis were seen in two boys from Babanloma and Ikponrin at Maraba and New Yidi respectively, further attest to this possibility.

The potential for transmitting onchocerciasis was present only in River Oyun where numerous larvae, pupae and adults of *S. damnosum* were collected. Coincidentally, the most intensive farming activities occur along this river. At present there is no record on the prevalence of onchocerciasis at Ilorin, but the frequent emigration of people from highly endemic areas (Edungbola, 1979), the involvement of many more inhabitants in farming following the launching

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Fig. 3. Highly polluted water by motor oil, rags, food cans, papers, polystyrene, old tyres, and human faeces. A number of used condoms were recovered at this site.

Fig. 4. River Asa at Unity road is reduced to a polluted stagnant pool by motor oil, and dryness. The engine at the background is used for pumping water into tankers for sale and building purposes.

Fig. 5. This dirty and faecal contaminated pond is an important source of drinking water. It contains *Cyclops*, snails and mosquito larvae. Several small farms and vegetable gardens are present around the pond.


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of the Operation Feed the Nation to boost food production, and the increase in the number of transient visitors, are important indications that onchocerciasis could become a major health problem.

Minimal activity recorded in the two man-made water reservoirs is largely due to the promulgation and enforcement of the order prohibiting promiscuous swimming (Fig. 2), fishing, bathing, car and clothes washing in these dams. This measure has the potential advantage of interrupting transmission of schistosomiasis by reducing man-water contacts at these sites.

Smith (1971) contended that the rapidly changing ways of life in the tropics, although poorly recorded or analyzed, must have many effects on diseases pattern. It is hoped that observations made herein will enhance better understanding of ways in which water-related human activities affect the ecology and transmission of diseases in the developing countries.

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Fig. 6. A man defecating at Maraba stream. The entire surrounding is littered with human faeces. Fresh grasses are obtained here to feed domestic animals. Students of the secondary school in the background wash, bathe, and occasionally drink at this site.

Fig. 7. A man performing ablution in one of the streams. The gutter on the left drains wastes directly into the stream. Vectors of schistosomiasis and dracunculiasis are numerous here.