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## Large scale irrigation scheme and the increase in the incidence of schistosomiasis: The situation in the Lake Chad Basin

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**ABSTRACT:** This investigation was carried out in the Chad Basin as a result of the establishment of large scale irrigation scheme by the Chad Basin and Rural Development Authority, Maiduguri and the Lake Chad Research Institute, Maiduguri around 1978. The study involved the collection of pre-irrigation clinical data and the survey of school children in the Chad Basin. The socio-economic interactions of the human population with the irrigation system were also studied. The clinical data showed an increase in the percentage incidence of schistosomiasis from almost 0.0% before irrigation (1975-1977). The survey of school children during the large scale irrigation stage (1981-1982) revealed a percentage incidence of 19.70 which is apparently high.

**Key Words:** Irrigation scheme; Schistosomiasis; Lake Chad Basin.

### Introduction

Agricultural mechanization has been known to be one of the factors that had made nations balance economically, educationally, culturally, politically and above all, technologically. In a bid to achieve this agricultural excellence, various techniques have been employed by different countries. Irrigation scheme has continued to rank very high amongst the available techniques for increased agricultural productivity.

However, the public health hazards arising from the establishment of dams and irrigation systems will continue to attract the attention of the parasitologist. Malaria and schistosomiasis continue to constitute a barrier to the establishment of irrigation system (Cowper 1963; Odei, 1978; Nasir and Thewani, 1981). This is because of the establishment of suitable intermediate hosts such as mosquitoes (for malaria) and Blunidi and Biophalarial snails (for schistosomiasis ) (Ezeugwu, 1983).

By Decree Nos.25 and 37 of 1976, the federal Government of Nigeria established eleven River Basin Development Authorities with the main purpose of boosting agricultural production. Majority of the basin authorities have large scale irrigation scheme particularly those located in the arid Savanna areas of

Nigeria, like the Chad Basin and the Rural Development Authority (CBRDA) where this study was carried out.

This study was consequently undertaken to evaluate the socio-economic interactions associated with the introduction of large scale irrigation in an arid environment, with special attention to schistosomiasis.

## Materials and Methods

The research area lies between longitude 14 10' and Latitude 12° 21' N. This study involves the study and comparison of pre-irrigation clinical data and the data during irrigation. The clinical data was collected directly from the hospital records of the clinics around the study area. Schistosomiasis incidence was computed as a percentage of the total attendance in the various clinics.

Examination of faecal and urine samples of primary school children was also carried out. The method of Chandler and Read (1961) was adopted for the examination of the urine samples. Faecal samples were also examined for schistosomiasis eggs and other parasites using both the Davey and Fullborns method as described by Wilcocks and Manson –Bahr (1972).

The socio-economic interactions of the human population with the irrigation system were equally investigated through direct interviews.

## Results and Discussion

Table 1 shows the percentage incidence of some diseases in Ngala L.G.A for the period 1975-1981. The was no reported incidence of schistosomiasis from 1975 to 1981, low incidence (1.18 and 1.28%) in 1978 and 1979, high incidence (7.01%) in 1980 and a drop (1.64%) in 1981. This drop was attributed to the intensive health education service to the community by the public health officers of the Lake Chad Research Institute , on the dangers of the irrigation. The data showed an increase in the incidence of schistosomiasis probably due to the establishment of the irrigation system around 1978.

Table 1: Percentage incidence of some diseases in Ngala L. G. A. for the period 1975 – 1981\*.

Diseases	1975	1976	1977	1978	1979	1980	1981
Conjunctivitis	41.25	46.38	40.66	40.00	41.03	22.29	27.87
Gonorrhoea	32.50	31.88	38.46	27.05	32.05	39.81	6.56
Malaria	22.50	17.39	14.29	27.06	24.36	27.07	18.97
Dysentery	2.50	2.90	3.30	1.18	0.00	2.87	19.67
Diarrhoea	1.25	1.45	3.30	3.53	1.28	0.96	25.29
Schistosomiasis**	0.00	0.00	0.00	1.18	1.28	7.01	1.64

\*Source: Ngala L. G. A. Health Statistics.

\*\*The disease being investigated.

Tables 2 - 4 show the incidence of *S. haematobium* and other parasitic infections among the pupils of Ngala primary school. There was 19.70% incidence of *S. haematobium* (urine examination), 28.79% incidence of other parasitic (Trichuris, Hookworm, *Ascaris* and *E. coli*) infections (stool examination) and 48.8% pooled incidence of *S. haematobium* and other parasitic infections. Table 2 shows that more males (22.50%) than females (15.38%) are infected with *S. haematobium* while the stool examination revealed that more females (30.8%) than males (27.5%) are infected with other parasitic diseases (Table 3). The age group of 8-9 years was most infected with *S. haematobium* (25.00%). This is probably due to the socio-economic, cultural and religious background of the natives of the research area where children (especially

the boys ) within this age are require to move out to acquire religious instructions. The study also showed 22.45%,20.00%, and 12.50% *S.haematobium* infection of the children of the farmers, traders and civil servants respectively (Table 5). This agrees with the views of Wilcocks and Manson–Bahr (1972) that noted that schistosomiasis is a rural disease affecting peasant farmers especially those that have ponds and streams as sources of drinking water.

Table 2: Urine examination of primary school pupils at Ngala.

Age Group (Years)	% Infection		Total Infection (%)
	Male	Female	
6 – 7	25.00	14.29	21.05
8 – 9	22.22	28.57	25.00
10 – 11	16.67	10.00	13.64
12 – 15	28.57	0.00	22.22

Table 3: Stool examination of primary school children at Ngala.

Age Group (Years)	Parasites Recovered	Individual Parasites (% Infection, M & F)	Total Infection (%)
6 – 7	<i>Trichuris</i>	5.3	21.1
	Hookworm	0.0	
	<i>Ascaris</i>	5.3	
	<i>E. coli</i>	10.5	
8 – 9	<i>Trichuris</i>	0.0	31.4
	Hookworm	6.3	
	<i>Ascaris</i>	18.8	
	<i>E. coli</i>	6.3	
10 – 11	<i>Trichuris</i>	4.5	27.2
	Hookworm	4.5	
	<i>Ascaris</i>	4.5	
	<i>E. coli</i>	13.6	
12 – 15	<i>Trichuris</i>	0.0	44.4
	Hookworm	0.0	
	<i>Ascaris</i>	33.3	
	<i>E. coli</i>	11.1	

Percentage infection by sex: Male = 27.5%, Female = 30.8%  
Grand Total = 28.8%

Table 4: Pooled results of the urine and stool examination at Ngala Primary School.

Age Group (Years)	% Infection		Total Infection (%)
	Male	Female	
6 – 7	50.00	28.57	42.11
8 – 9	33.33	85.71	56.25
10 – 11	50.00	30.00	40.91
12 – 15	57.14	50.00	55.56

Percentage infection by sex: Male = 50.00%, Female = 46.15%  
Grand Total = 48.48%

Table 6 shows the incidence of schistosomiasis tied up with the stages in the development of the irrigation system in the Ngala L.G.A. of the Chad Basin. Increase in schistosomiasis tallied with the time that the irrigation projected has been fully completed and put full use.

It can be inferred from Table 6 that if adequate public health education is not extended to all nooks and corners of the Chad Basin, there is the possibility of the health hazard assuming an epidemic proportion. If adequate control measures for these diseases are not provided, a great number of the labour force will be affected, thereby diminishing the agropotential of the scheme (Ugonabo *et al* 1991). It is therefore suggested that the solutions to the various public health hazard resulting from large scale irrigation systems should be incorporated into the feasibility studies of such projects by the government. If possible, a pilot project could be carried out before the full application on a large scale. Such solutions, access roads to the rural areas to enable the health extension officers to reach the local communities whose low level of literacy in conjunction with their usually poor sanitary environment encourage the spread of the disease.

Table 5: Parent's occupation and incidence of *S. haematobium* infection in Ngata Primary School pupils.

Parent's Occupation	Infected Pupils (%)
Farming	22.45
Civil Servants	12.50
Trading	20.00

During the course of this study, it also observed that the people lack adequate medical centers. In fact, some of the villagers in the basin areas are located about fifty kilometers away from what can be broadly called "first aid posts" while most of the villagers are about one hundred kilos from a general hospital. The government is therefore called upon to come to the aid of these unfortunate communities by the provision of the social amenities highlighted above, especially now that the present administration is placing emphasis on making life worth living at the rural level.

Table 6: Incidence of schistosomiasis and irrigation levels in Ngala L. G. A.

Incidence (%)							
No Irrigation		Canal construction still on		Skeletal Irrigation		Full Scale Irrigation	
1975	1976	1977	1978	1979	1980	1981	1982
0.00	0.00	0.00	1.18	1.28	7.01	1.64	19.70

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## References

- Chandler, A.C. and Read, C.P. (1981). Introduction to Parasitology, 10<sup>th</sup> ed., John Willey and Sons, Inc., New York, pp. 277-298.
- Cowper, S. G. (1963). Schistosomiasis in Nigeria, Ann. Trop. Med. Parasit., 57:307
- Ezeugwu, S.M.C. (1963). Ecological and Parasitological studies on the Lake Research Institute rice irrigation scheme at Ngala (Borno State), Nigeria with particular reference to *Bulinus globosus* and *B. forskali*, M. Sc. Thesis University of Benin, Benin-City. pp 118.
- Nassir, J.K. and Thewani, A.J. (1981). Some immunological findings in patients with hydatidosis or schistosomiasis, Ann. Trop. Med. Parasit, 76(1); 71-76.
- Odei, M.A (1976). Seasonal changes in vector snail population in different habitats and the timing of molluscicide applications, Ghana Med. J; 6(4); 120-125.
- Ugonabo, J.A.C., Ezeugwu, S.M.C. and Okafor, E.C. (1991). Water resources management and control of communicable diseases in the north-eastern sahel region of Nigeria. In : Arid Zone Hydrology and Water Resources (Gadzama, N.M., F.A., W.S., Thambyahpillay, G.G.R. eds.), University of Maiduguri, Press, pp. 211-218.
- Wilcocks, C. and Manson-Bahr, P.E.C., (1972). Manson's Tropical Diseases, 17<sup>th</sup> ed., Billiere Tindol, London. Pp. 295-319.