Table 7C: Distribution of the adult disease suspects according to their places for treatment:

Place of treatment	TOTAL	
	N°	%
1- Hospital	156	75.7
2- Traditional healer	5	2.7
3- Herbs	13	6.3
4- Pharmacy	5	2.4
5- 1 & 3 above	11	5.3
6- None	16	7.8
TOTAL	206	100.0

The hospital was the main place for treatment as mentioned by the majority of the proportion of respondents (75.7%) who admitted to have had schistosomiasis symptoms.

Table 8 A: Distribution of the study population according to their knowledge of at least one partial self protective measure by age :

Knowledge of at least one self protective measure	AGE GROUP						TOTAL	
	15-29		30-59		60+			
	N°	%	N°	%	N°	%	N°	%
Yes	85	38.3	93	46	18	36.7	196	41.4
No	137	61.7	109	54	31	63.3	277	58.6
TOTAL	222	46.9	202	42.7	49	10.4	473	100.0

P< 0.5096.

There was no significant difference in the three age groups with respect to knowledge of self protective measures. However, the majority of the respondents (58.6%) did not know any self protective measure. Whatever was known by the minority implied partial protection only.

Table 8B: Distribution of the adult respondents according to their knowledge of self protective measures by sex:

Knowledge of at least one self protective measure	SEX				TOTAL	
	Males		Females			
	N°	%	No	%	No	%
Yes	96	43.6	100	39.5	196	41.4
No	124	56.4	153	60.5	277	58.6
TOTAL	220	46.5	253	53.5	473	100.0

Chi 0.8194.

P< 0.3996.

There was no significant difference between males and females with respect to knowledge of self protective measures .

Table 8C: Distribution of adult respondents according to their knowledge of at least one self protective measure by infection status for *S.mansoni*:

Knowledge of at least one self protective measure	*S.mansoni* inf. status*				TOTAL	
	Negative		Positive			
	N°	%	N°	%	N°	%
Yes	139	73.5	50	26.5	189	41.5
No	197	74.1	60	25.9	266	58.5
TOTAL	336	73.8	119	26.2	455	100.0

Chi 0.1518.

P< 0.9019.

* 2 people are excluded from this table of whom one had not involved himself in any activity and the other had no stool results.

However,there was no significant difference in *S.mansoni* infection status between the two groups.

Table 9A: Distribution of adult respondents by application of at least one self protective measure by age:

Application of at least one self protective measure	AGE GROUPS						TOTAL	
	15-29		30-59		60+			
	N°	%	N°	%	N°	%	N°	%
Yes	39	17.6	41	20.3	7	14.3	87	18.4
No	189	82.4	161	79.3	42	85.7	386	81.6
TOTAL	222	46.9	202	42.7	49	10.4	473	100.0

P< 0.9744.

There was no significant difference found between the three age groups with respect to the application of self protective measures. However, the majority (81,6%) applied nothing and whatever measures undertaken implied partial protection only.

Table 9B: Distribution of adult respondents by their application of at least one self protective measure versus *S.mansoni* infection status:

Application of at least one self protective measure	*S.mansoni* *				TOTAL	
	Negative		Positive			
	N°	%	N°	%	N°	%
Yes	60	72.3	23	27.7	83	18.2
No	276	74.2	96	25.8	372	81.8
TOTAL	336	73.8	119	26.2	455	100.0

Chi 0.1274.
P< 0.7211.

* 2 people are excluded from this table of whom one had not involved himself in any activity and the other had no stool results.

There was no significant difference in *S.mansoni* infection status between those applying and those not applying any self protective measures.

Table 9C: Distribution of adult respondents according to their application of at least one self protective measure by sex:

Application of at least one self protective measure	SEX				TOTAL	
	Males		Females			
	No	%	No	%	No	%
Yes	46	20.9	41	16.2	87	18.4
No	174	79.1	212	83.8	386	81.6
TOTAL	220	46.5	253	53.5	473	100.0

Chi 0.8194.

P< 0.2298.

There was no significant difference between the two groups with respect to the application of self protective measures.

Table 10A: Proportion of households with and without latrines by villages:

H/HOLD LATRINE	VILLAGES								TOTAL	
	Mabo-gini		Cheke-reni		Oria		Rau River			
	N°	%	N°	%	N°	%	N°	%	N°	%
Present	47	92.2	30	100.0	27	67.5	21	77.8	125	84.5
Absent	4	7.8	0	0	13	32.5	6	22.2	23	15.5
TOTAL	51	34.5	30	20.3	40	27.0	27	18.2	148	100.0

Chi 17.51.

$P<0.0006$.

There was a highly significant difference in latrine distribution among households in the different villages. (15.5% of households had no latrines).

Table 10B: Comparison of categories of latrines between the villages:

Categories of H/hold latrine*	VILLAGES								TOTAL	
	Mabo-gini		Cheke-reni		Oria		Rau River			
	N°	%	N°	%	N°	%	N°	%	N°	%
Good/clean	6	12.8	2	6.7	3	11.5	2	9.5	13	10.5
Satis-factory	27	57.4	17	56.7	13	50.0	17	81.0	74	59.7
Unfit (not usable)	14	29.8	11	36.6	10	38.5	2	9.5	37	29.8
TOTAL	47	42.5	30	22.4	26	19.4	21	15.7	124	100.0

Chi 13.16.
P< 0.0406.

* 1 h/hold latrine was not assessed.

There was a significant difference in latrine categories between the different villages.

29.8% of household had latrine whose condition cannot entertain any use.

Table 10C: Distribution of adult respondents according to places for excreta disposal when in the field by sex:

(i) URINE:

SEX	PLACES								TOTAL	
	Field		Drainage canals		Latrine		Bush			
	N°	%	N°	%	N°	%	N°	%	N°	%
Males	134	46.0	35	44.9	16	64.0	35	44.3	220	46.5
Females	157	54.0	43	55.1	9	36.0	44	55.7	253	53.5
TOTAL	291	61.5	78	16.5	25	5.3	79	16.7	473	100.0

Chi 3.338.
P< 0.3424.

There was no significant difference between males and females with respect to responses about places for excreta disposal.

OR High population proportions regardless of sex while in the fields dispose excreta indiscriminately in the fields themselves, drainage canals and nearby bushes.

(II) **STOOL:**

SEX	PLACES*								TOTAL	
	Field		Drainage canals		Latrine		Bush			
	N°	%	N°	%	N°	%	N°	%	N°	%
Males	58	45.3	53	46.9	36	61	73	42.4	220	46.6
Females	70	54.7	60	53.1	23	39	99	57.6	252	53.4
TOTAL	128	27.1	113	23.9	59	12.5	172	36.4	472	100.0

Chi 6.212.
P< 0.1017.

* 1 Female had no information recorded on this variable.

However, there was no significant difference in responses between the two sex groups. Generally excreta disposal was found to be indiscriminate.

Table 10D: *S.mansoni* infection status amongst users of the latrines of various categories:

S.mansoni infection status	Good/ clean		Satis- factory		Unfit for use		TOTAL	
	N°	%	N°	%	N°	%	N°	%
Negative	10	76.9	46	71.9	34	72.3	90	72.6
Positive	3	23.1	18	28.1	13	27.7	34	27.4
TOTAL	13	10.5	64	51.6	47	37.9	124	100.0

Chi-0.1406.
P< 0.09321.

S.mansoni infection status was not significantly different between users of the latrines of various categories.

9.0 DISCUSSION:

From the results, it is apparent that schistosomiasis is a public health problem in the Lower Moshi Rice Irrigation Scheme. Corresponding with the higher prevalence for *S.mansoni* of 30.9% in comparison with that for *S.haematobium* of 3.8%, *Biomphalaria* snail species were more encountered than *Bulinus* species from most of the water bodies surveyed. Similarly, some high but different prevalence rates for *S.mansoni* and *S.haematobium* were encountered in Qalyub Egypt, where the difference was attributed to an increased sensitivity of the diagnostic technique for *S.mansoni* whose rate was higher and not the abundance of respective intermediate hosts[38].

The prevalence for *S.mansoni* which was encountered in the Lower Moshi Rice Irrigation Scheme is high, although not as high as the previous findings reported in the neighbouring TPC. However, before the launching of a control program in TPC in 1967, infection was over 80% among field workers who had been employed over six months back, and 56.9% among newly employed workers[39]. Given time, such high prevalences are to be expected in the rice scheme area if no control measures are initiated. This must be foreseen, owing to the poor sanitary facilities existing in the study area.

Focusing at household level, although latrine coverage before the floods was high 84.5%, (24.3% after the floods), quite a number (29.8%) were unfit for use. After the floods, only 4.8% of the original number of latrines remained in a satisfactory state whereas the rest became unfit for use. Such a situation greatly increases the chances for the transmission of *S.mansoni* and other excreta-borne helminths.

A few cases (0.5%) had both *S.haematobium* and *S.mansoni* infections together. Apart from schistosomiasis, *Ascaris* and hookworm were the second and third most prevalent excreta-borne helminths respectively and their prevalence rates are shown in Appendix IV.

The sanitation sector is more or less neglected in comparison with other essential public utilities (40). This was very evident particularly in the rice fields where no single latrine was found. This means that excreta disposal is indiscriminate since majority of households (79.1%) were located more than 1/2 km away from the rice fields. This was supported by most people's responses that defaecation took place in various places including the field (27.1%), the water drainage canals (23.9%) and the bush (36.4%). In contrast, only 12.5% of respondents mentioned that defaecation took place in latrines. In some drainage

canals, a few peasants were seen in the act of defaecating.

However, the absence of any significance in *S.mansoni* infection status between water contact and non-water contact for economic activities, as well as infection status versus cercarial maximal activity time among the people having various working time schedules, suggests that there were other water contact activities associated with infections in addition to the field-work. Among them, are washing (72.1%) and recreational activities such as swimming (68.5%) which are done in drainage canals and other potentially infected sites or water bodies. Water for domestic use is obtained by most people (62%) from public taps situated within 1/2 km. radius. Such a situation whereby water for domestic use is obtained from safe sources while washing and recreational activities are done in infected water bodies was also encountered in Zimbabwe[21].

As far as schistosomiasis is concerned, respondents seemed to be more aware of the passing of bloody stools (41.6%) than of haematuria (9.9%), although majority of the population were not aware of either of the two. The observed difference in awareness of the symptoms of the two diseases could be attributed to the marked difference in the prevalence rates for the two parasites. The prevalence for *S.mansoni* was almost eight times that of *S.haematobium*.

With respect to schistosomiasis haematobia, males (13.6%) were more aware of the disease symptoms than females (6.7%), $p<0.0137$. This difference may be explained by the ways in which males and females adopt to pass urine. This explains the fact that females (5.2%) had a higher sex specific prevalence rate for schistosomiasis haematobia than males (2.1%), $p<0.0199$.

However, it is also possible that people are lacking enough health education with respect to the symptoms of the two diseases, but surprisingly, most respondents perceived haematuria and the passing of bloody stools (88% and 66.7% respectively) as being due to schistosomiasis in contrast to the other causes. Whether schistosomiasis is recognized by a majority of lay respondents as a predominant cause of bloody stools would make little effect on the management of patients. However, if the recognition was by health staff the difference would matter.

Focusing on schistosomiasis haematobia alone, most respondents (67.2%) had correct perceptions about the modes of transmission of the disease, given a range of options. Almost similar findings were encountered in upper Egypt, despite Nile river water being perceived as `safe and healthful'[19].

A larger coverage could be expected from the study area, given that health education is done as a continuous process. This could be achieved by involving village health workers in their respective localities.

The impression obtained from the knowledge and practice of self-protective measures against schistosomiasis infection reveals that the respondents had inadequate knowledge and that knowledge was not linked with practice. The various group categories of people showed no significant differences in infection status ($P>0.05$), implying that partial protective measures were not useful in preventing infection.

Most people (75.7%) sought treatment from a modern health facility, although a small minority were treated by traditional healers (2.4%) or used local herbs (6.3%). A more or less similar trend was encountered in Egypt but with a more pronounced traditional healing component[19].

Failure to subject oneself to a hospital for treatment in the study area was attributed to non-availability of drugs and intermittent symptomatology which were probably never thought to be serious enough for any attention. Drug shortage was most likely the real reason for not seeking attention in most dispensaries in the rural set-up. Dispensaries are supplied with Essential Drugs Program (EDP) kits. In them, there is no drug included for treating any form of

schistosomiasis. Most dispensaries depend on supplements of drugs from their respective district or regional pharmacies where drug supplies are irregular. From the results, it is obvious that most *S.mansoni* positive cases had a previous history of passing bloody stools in contrast to the negative cases ($P<0.0000$), and that *S.mansoni* infection was most likely to occur in respondents presenting with current history of passing bloody stools in contrast to those without ($P<0.0000$). Therefore, history of passing bloody stools alone in schistosomiasis endemic areas could be used to predict the disease suspects, especially those with heavy infection. For current history the sensitivity is 46% and the specificity is 76%, whereas for previous history the figures are 66% and 67% respectively.

Using the **Youden's Index** [41]; $J=1-(\alpha + \beta)$, where α is the rate of false positives so that $1-\alpha$ is the specificity of the test. The rate of false negatives is given by β and $1-\beta$ is the sensitivity of the test. We can therefore find the following indices:

For current history of passing bloody stools,

$J= 1-(0.54 + 0.24)= 0.22$

whereas for previous history,

$J= 1 - (0.34 + 0.33)= 0.33.$

Therefore the latter has a higher reliability.

When one observes such disease endemicity, together with its morbidity, mortality and economic

loss, it will be unwise not to include a schistosomicide in the EDP kits, to carter for cases of schistosomiasis as a control measure in one way or another. Control studies done elsewhere have shown that the comparison of the current treatment regimes for schistosomiasis affecting man; metrifonate, oxamniquine and praziquantel, the latter is more cost effective in circumstances demanding high delivery costs (42,43).

10.0 SUMMARY:

The prevalence for *S.mansoni* was 30.9%, while that for *S.haematobium* was found to be 3.8%. About 0.5% cases harboured both parasites. Both *Biomphalaria* and *Bulinus* snail species co-existed in the water bodies surveyed, in which the former was the more predominant species.

Before the April 1990 floods, latrine coverage among the 148 households studied was 84.5% (15.5% of households had no latrines). Among the encountered latrines, 10.5% were good and clean, 59.7% were satisfactory and 29.8% were unfit for use. The observed coverage for household latrines was lowered by the floods to 24.3% among the same households. Only 4.8% of latrines remained in satisfactory state and the rest became unfit for use. No single latrine could be sighted in the rice fields throughout the study period.

With respect to schistosomiasis symptoms, 9.9% of the respondents were aware of haematuria, where males for some reasons were more aware than females, ($P<0.0137$). No significant difference in awareness of this symptom was found between the different age categories, ($P<0.1094$). Among the possible causes of haematuria, schistosomiasis was perceived by 88% of respondents. Again 41.6% of respondents were aware of

the passing of bloody stools and among the possible causes of this symptom, schistosomiasis was perceived by 66.7% of respondents. No significant difference in awareness of this symptom was found with respect to age and sex. Past or present history of bloody stools was significantly associated with *S.mansoni* infection ($P<0.0000$).

About 67.2% of respondents knew at least one source of schistosomiasis infection. Whereas 41.4% of respondents knew at least one self-protective measure, only 18.3% claimed to practice. Similarly, whereas domestic water was collected from safe water sources (public taps) by most respondents (62.4%), washing (72.1%) and recreational activities such as swimming (68.1%) were conducted in potentially infected sites. There was no significant difference in schistosomiasis infection status between those with water contact occupations and those having non-water contact occupations. Similarly, there was no significant difference between those practicing at least one partial self-protective measure and those without any self-protection, implying that partial protection is useless. Most respondents sought treatment from a modern health facility in case of illness. *Ascaris* and hookworm were the other intestinal parasites mostly encountered and whose details are summarised in Appendix IV.

11.0 CONCLUSIONS:

1. Schistosomiasis, especially *S.mansoni*, is endemic in the Lower Moshi Rice Irrigation Scheme. Although the prevalence for *S.haematobium* was low, a few cases were observed to harbour both parasites. It was also observed that high prevalences of other excreta-borne helminths such as *Ascaris* and hookworm occurred.

2. The absence of an adequate number of hygienic sanitary facilities, both at household level and in the rice fields, would facilitate transmission of helminthic infections including schistosomiasis and thus increase the exposure risk to the infections.

3. Occupations and people's working time schedules in the rice fields could not be linked with schistosomiasis suggesting therefore that infection was also being contracted through other activities such as washing and recreational water contact activities. Partial self protection proved to be useless.

4. From the finding that few people were aware of schistosomiasis symptoms and that majority of the people perceived haematuria or the passing of bloody stools to be due to schistosomiasis, people seem to be aware of the presence of the disease but cannot relate the mode of transmission, the symptoms and ultimately, the self-protective measures to the disease.

5. Whereas the scheme's construction of the main and secondary canals appeared to discourage colonisation by snail vectors, the tertiary canals, the rice fields and the drainage canals all harboured *Bulinus* and *Biomphalaria* snail species.

There was neither mollusciciding by the scheme authority nor community participation in control activities such as regular clearing of the canals.

6. Health experts seemed to have been excluded in the whole process of siting the scheme here. This may be attributed to the absence of a National Schistosomiasis Control Program. Although guide-lines were laid down in 1986, by the Ministry of Health, a control programme is yet to be established.

12.0 RECOMMENDATIONS:

For schistosomiasis control to become possible, the following pre-requisites need to be fulfilled:

1. Socio-ecological research aiming at controlling the disease should be given priority in the study area and in different localities whereby, emphasis should be made on community participation, people's perceptions, levels of appropriate latrinization, water supply and its use for domestic, animal, and recreational purposes. There is need to review the environmental sanitation status in the whole of the study area as part and parcel of control measures against helminthic infections. Also there is need to introduce Ventilated Improved Pit (VIP) latrines in this area and elsewhere with a similar situation. Latrine pits in areas with clay soil should be reinforced with burnt clay bricks so that they don't collapse in case of heavy rains or floods, as occurred in the study area.

2. Finding out the extent of the disease at district level with particular attention to its public health importance and its socio-economic and mortality effects.

3. Training of health workers in the study area. These will disseminate health education in their respective villages with respect to the mode of transmission of the disease, the required self protective measures to the disease and what should be done in case of suspected infection. This should go hand in hand with the availability of cheap screening methods as well as treatment in health facilities catering for this disease-endemic area.

The currently recommended drugs are metrifonate (against *S.haematobium*), oxamniquine (against *S.mansoni*) and praziquantel (against all schistosomes affecting man). According to the availability and the delivery costs of each drug, the government is urged to maintain a regular supply of the most cost-effective regime according to different endemicity circumstances.

4. There is a strong need for doing baseline surveys on the sanitation status, water-related as well as other excreta-borne helminthic diseases in places being proposed for the construction of water development projects before the construction work is undertaken. This will caution the concerned authorities to carry out control measures against the existing diseases in time.

13.0 **REFERENCES:**

1. Koch, K.R. (1962). *Theodor Bilharz 1825/1862* Bayer and Company - Germany, pp 4-8.

2. Manson-Bahr, P.E.C. and Apted, F.I.C. (1982). *Manson's Tropical Diseases*. 18th Ed. Bailliere Tindal, London, pp 206-228.

3. Iarotski, L.S. and Davis, A. (1981). Schistosomiasis problem in the world: Results of WHO questionnaire survey. *Bull. Wld. Hlth. Org.* 59 (1): 115-127.

4. Sturrock, R.F. (1965). The development of irrigation and its influence on transmission of Bilharzia in Tanganyika. *Bull. Wld. Hlth. Org.* 32 (2): 225-236.

5. Matovu, D.B. (1978). Prospects of schistosomiasis in the proposed Lake Mtera in Tanzania. *Trop. Geogr. Med.* 30 (2): 193-197.

6. Matovu, D.B., Ndalahwa, J.B. and Nditi, H.P. (1982). The prevalence and incidence of schistosomiasis and the projected impact of the development in the Lower Rufiji Valley. *The Rufiji Basin Development Authority Final Report Sept. 1982.*

7. Rugemalila, J.B. (1990). Schistosomiasis in Tanzania.
Abstract: The National Institute for Medical Research 1980-1990, Conference and Workshop - October, 1990. Dar-es-Salaam.

8. Kiwelu, I and Maembe, A. (1989). Schistosomiasis and rice for all.
Abstract: Proceedings - Tanzania Public Health Association (TPHA) seminar November 1989 Dar-es-Salaam.

9. Kihamia, C.M. (1989): Integrated Family Planning, Nutrition and Parasite Control. (Unpublished data).

10. Jordan, P. (1977). Schistosomiasis - Research to control. *Am. J. Trop. Med. Hyg.* 26: 877-886.

11. Masaba, S.C. (1983). Man-made dams acting as a source of bilharzia in Onganga village, Kyarulo location, South Nyanza. *E.Afr. Med.J.* 60: 860-862.

12. Gaddal, A.A.E. (1985). Blue Nile Health Project: A comprehensive approach to the prevention and control of water-associated diseases in the irrigation scheme of Sudan. *J. Trop. Med Hyg.* 88 (2): 47-56.

13. Smith, C.G.E. (1975). Changing pattern of disease in the tropics: In Stanley & Alpers (Eds) *Man-made lakes and human health* Academic Press- London, New York, San Fransisco. pp 345-361.

14. Jordan, P. (1975). Schistosomiasis Epidemiology, clinical manifestations and control: In Stanley and Alpers (Eds) *Man-made Lakes and Human Health*: Academic Press. London, New-York, San Fransisco. pp. 35-50.

15. Edungbola, L.D. (1980). Water utilization and its health implications in Ilorin, Kwara State, Nigeria. *Acta Tropica*. 37: 73-81.

16. Helmut, K. (1985). Water resources development and schistosomiasis ecology in Awash valley, Ethiopia. *Soc. Sci. Med.* 20 (6): 609-625.

17. Hunter, J.M., Rey, L. and Scott, D. (1982). Man-made dams and man-made diseases towards policy resolution. *Soc. Sci. Med.* 16: 1127-1145.

18. Chowdhry, A.W. (1975). Potential effects of irrigation on spread of bilharzia in Kenya. *E. Afr. Med. J.* 52 (3): 120-126.

19. Helmut, K., Sidrak, W., Michael, A.A.M., Mahareb, E.M. and Higashi, G.I. (1982). Disease concepts and treatment practices relating to *S.haematobium* in Egypt. *J. Trop. Med. Hyg.* 85: 99-107.

20. McDonald, G. (1965). The dynamics of helminthic infections with special reference to schistosomes. *Trans. Roy. Soc. Trop. Med Hyg.* 59: 489-506.

21. Taylor, K., Chandiwana, S.K., Govere, J.M. and Chombo, F., (1987). Knowledge, attitude and practice in relation to schistosomiasis in a rural community. *Soc. Sci. Med.* 24 (7): 607-611.

22. Helmut, K.M., Higashi, G.I., Catani, J.A., Schlinski, V.D., Mansour, N.S. and Murrel, K.D. (1983). Water contact behaviour in an Upper Egyptian village, *Soc. Sci. Med.* (17) (9): 545-562.

23. Lwihula, G.K. and Suster, R. (1987). Human water contact activities in relation to snail and cercarial densities in Kikwawila village, Ifakara area. *Parasitosis in Tanzania* (1987). International College for Health Cooperation in Developing Countries - PADOVA - ITALY. pp. 19-46.

24. Husting, E.L. (1983). Human water contact activities related to transmission of Bilharzia (Schistosomiasis). *J. Trop. Med. Hyg.* 86 (1): 23-35.

25. Cheesmond, A.K. and Fenwick, A. (1981). Human excretion behaviour in a schistosomiasis endemic are of the Gezira, Sudan. *J. Trop. Med. Hyg.* 84 (3): 101-107.

26. Helmut, K. and Lemma, A. (1977). Schistosomiasis in irrigation schemes in the Awash valley, Ethiopia. *Am. J. Trop. Med. Hyg.* 26 (5): 899-908.

27. Helmut, K., DeSole, G. and Lemma, A. (1981). Intestinal parasitism in semi nomadic pastoralists and subsistence farmers in and around irrigation schemes in the Awash valley, Ethiopia, with emphasis on ecological and cultural associations. *Soc. Sci. Med.* 15B (4): 457-469.

28. Polderman, A.M. (1975). Transmission of intestinal schistosomiasis in Begemder Province, Ethiopia. *Acta. Leid.* 42: 1-193.

29. Kihamia, C.M., Van Praag, E. and Mbembati, N.A.A. (1983). A baseline survey of water related diseases in the Bahi depression of the Rift Valley in Dodoma/Singida region of Central Tanzania. In Tukei and Njogu (Eds). *Current Public Health Research in the Tropics*. Kenya Medical Research Institute (KEMRI) and Kenya Trypanosomiasis Research Institute (KETRI). pp. 26-35.

30. Sturrock, R.F. (1965). Bilharzia transmission on a New Tanzanian irrigation Scheme. *E. Afr. Med. J.* 43 (1): 1-6.

31. Rugemalila, J.B. (1979). The impact of urinary schistosomiasis on the health of two community populations living in endemic areas in Tanzania. *Trop. Geogr. Med.* 31 (3): 375-387.

32. Forsyth, D.M. and Mac Donald G. (1965). Urological complications of endemic schistosomiasis in school children in Usagara - Mwanza. *Trans. Roy. Soc. Trop. Med. Hyg.* 59: 171.

33. Kitinya, J.N., Lauren, P.A., Eschleman, L.J., Paljarvi, L. and Tanaka, K. (1986). The incidence of squamous and transitional cell carcinomas of urinary bladder in Northern Tanzania in areas of high and low levels of endemic *S.haematobium* infection. *Trans. Roy. Soc. Trop. Med. Hyg.* 80: 935-939.

34. Forsyth, D.M. (1969). A longitudinal study of endemic urinary schistosomiasis in a small E. A. Community. *Bull. Wld. Hlth. Org.* 40: 771-783.

35. Mac Donald, G., Forsyth, D.M. and Rashid, C. (1968). Urological complications of endemic schistosomiasis school children Part 4 as modified by treatment. *Trans. Roy. Soc. Trop. Med. Hyg.* 62 (6): 766-781.

36. "Measurement of the Public Health Importance of Bilharziasis". Report of a WHO Scientific group, (1967). *Wld Hlth. Org. Techn. Rep. Ser.* No. 349: pp. 46.

37. Fenwick, A. (1972). The Costs and Cost-benefit analysis of an *S.mansoni* control programme on an irrigated sugar estate in Northen Tanzania. *Bull. Wld. Hlth. Org.* 47: 573-578.

38. El-Alamy, M.A. and Cline, B.L. (1977). Prevalence and intensity of *S.haematobium* and *S.mansoni* infection in Qalyub, Egypt. *Am. J. Trop. Med. Hyg.* 26 (3): 470-472.

39. Foster, R. (1967). Schistosomiasis on an irrigated Estate in E. Africa. 2 Epidemiology. *J. Trop. Med. Hyg.* *70*: 159-168.

40. Shaban, M. (1988). Ecology, water and sanitation in relation to child survival.
Abstract: The child and media workshop Institute of Development Management (IDM) Mzumbe Morogoro 30/5/88 - 3/6/88.

41. Armitage, P. & Berry, G. (1987). *Statistical Methods in Medical Research*. (Second edition) Blackwell Scientific Publications: pp. 472-473.

42. Mgeni, A.F., Kisumku, U.M., McCullough, F.S., Dixon, H., Yoon, S.S. & Mott, K.E. (1990). Metrifonate in the control of Urinary schistosomiasis in Zanzibar. *Bull. Wld. Hlth. Org.* 68 (6) 721-730.

43. Korte, R., Schmidt-Ehry, B., Kielmann, A.A. & Brinkmann, U.K.(1986). Cost and effectiveness of different approaches to schistosomiasis control in Africa. *Tro. Med. Parasit.* 37: 149-152.

44. Mott, K.E. (1983). A reusable polyamide filter for diagnosis of *S.haematobium* by urine filtration. *Bull. Soc. Pathol. Exot. Filiales* 76 (1): 101-104.

45. Teesdale, C.H. and Amin, M.A. (1976). Comparison of the Bell technique, a modified Kato thick smear technique and a digestion method for the field diagnosis of Schistosomiasis mansoni. *J. Helminthology* 50: 17-20.