Assessment of Results of Experimental Control Programmes

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In any scheme for the large scale control of a disease such as bilharziasis, the accurate assessment of results is of paramount importance. Unforunately this is no simple matter because of both human and parasitological problems. Those concerning humans arise from the movement of population, sociological customs and habits of the people and the difficulty in obtaining comparable specimens. The difficulties of a parasitological nature concern the accurate diagnosis of the disease in infected persons and a spontaneous cure rate which varies with the parasite, the worm load and the age of the host. (Farooq et al. 1966).

In the past, assessment of control of bilharziasis has been attempted by means of prevalence surveys carried out to show the proportion of people positive in different age groups at a particular time. If this can be shown to decline significantly over a period of time during which some control measures are effected, it should be possible to draw conclusions as to the degree of success of those measures. There are two main disadvantages to this form of assessment. First, large samples are needed from each age group of the population if a reliable estimate of the proportion of people infected in that age group is to be made.

Second, there is a variation of sampling and although simple facts about each individual can be determined — such as length of permanent residence in the area — it is difficult to determine details of each person's movements in and out of the controlled area and his association with water during these movements. For example, snail control has been carried out over the past five years in the Norton-Selous Intensive Conservation Areas, some 712 square miles of European-owned farmland. The degree of snail control achieved has been excellent over the whole area. This was demonstrated by a dramatic decrease in numbers. However, assessment of results based on prevalence surveys carried out in 1965 and 1968 are shown in Table I. In the age groups examined there is little evidence of change of prevalence in the three years covered by the surveys.

This may be due to two reasons, either inadequate snail control, or movement of people into uncontrolled areas. The latter reason is most likely because the degree of snail control achieved in this area is superior to that in any other experimental control region, even Kyle catchment, the success of which will be discussed below.

It has been established that large numbers of African labourers in the Norton I.C.A. have wives whose homes are in the surrounding Tribal Trust Areas of Mondoro, Zwimba and Zowa. These women together with the children up to the ages of 12 or 13 move from their tribal homes to European farms and back several times a year. They are quite likely to be exposed to and contract bilharziasis while at home. Detailed questioning of positive cases diagnosed in the recent (1968) survey has authenticated the unsettled state of the younger section of the population with their mothers.

It would seem that age prevalence studies without detailed information of individual movements has little relation to the state of transmission within the Norton I.C.A.

TABLE I.

Prevalence of *S. haemotobium* infections in age groups of the communities of the Norton and Selous I.C.A. in 1965 and 1968.

	Age group					
	Under 4	4-6	7-9	10-12	13-15	16-20
1965						
No. examined	8	39	84	109	123	24
% passing eggs	—	51.2	65.4	70.6	68.3	54.2
1968						
No. examined	9	111	252	88	33	2
% passing eggs	—	54.9	51.9	67.0	78.7	—

Kyle Catchment

A second area of experimental control was formed by the entire catchment of Lake Kyle, an area of some 1,400 square miles. Snail control operations were introduced to this area in 1960 and were continued until 1967 when the experiment ceased.

The catchment of Lake Kyle comprises a patchwork of European-owned farms, African-owned farms and tribal land. A large majority of the labourers and their families living on the European-owned farms come from the surrounding tribal lands. In this way the majority of the population spent most of their time in areas where snail control measures were in operation.

Age prevalence surveys were carried out in the controlled area three times during the experiment, in 1960 to establish the base line, in 1962 and in 1966. The results of these surveys are given in Table II. Apart from the overall reduction in each age group, it is significant that there was a progressive absence of infection in the younger age groups.

An alternative method of interpretation of prevalence data is by comparison of field data with theoretical results assuming interruption of transmission. MacDonald (1965) investigated the theoretical pattern of the worm load in a population with a certain level of exposure, miracidial production, snail population and cercarial bombardment. He has shown that in the absence of controlling factors a computed parameter, the mean worm load per head of population rises to an asymptotic value which is related to the transmission factors. If these are increased, the value of the asymptote increases. Similarly, he computed the fall of the mean worm load per head of population if one transmission factor (snail population) was reduced to 1/15th. This progress is seen in Fig. 1.

The mean worm load/head of the population sampled in Table II has been calculated from MacDonald's computer data and transposed on the graph for 1960, 1962 and 1966. It can be seen that the reduction achieved is reasonably close to the theoretical.

In this latter instance the prevalence data have been of value in assessing results of snail control albeit over a long period of time. However, in the light of recent information, particularly that of Farooq and Hairston, 1966, and this morning from Barnish, it seems that a numerical estimate of the incidence on the rate at which negative persons become positive is more meaningful epidemiologically.

It is our contention that much excellent control work in many parts of the world has been lost because of inefficient assessment of result.

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TABLE II.

Prevalence of *S. haemotobium* infections in age groups of the communities of the Kyle Catchment Area in 1960, 1962 and 1966. Control commenced in 1960.

	Age group						
	Under 4	4-5	6-7	8-9	10-11	12-13	14-15
1960							
No. examined	403	590	611	578	209	144	106
% infected	5	5	33	56	71	64	65
1962							
No. examined	117	160	367	504	657	731	441
% infected	0	3	22	35	44	46	57
1966							
No. examined	17	20	75	187	276	275	113
% infected	0	0	17	20	32	48	43