

# Prevalence of *Bilharzia* in Zambia

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## INTRODUCTION

There has been a considerable accumulation of data in recent years enabling a more accurate assessment of the extent of bilharzia in Zambia than has been possible hitherto.

The data fall into two groups.

The first consists of the laboratory records of urine and stool examinations of the patients of some twenty-seven hospitals in the various provinces of the country. These have been collected with great diligence by Mr. Henderson (1969), Principal Health Inspector for the Ministry over a period of three years from 1966-8, and the total number of

specimens comprised 309,000 of urine and 195,000 of faeces.

The second consists of microscopic examination of urine specimens from normal population groups, comprising some 10,000 samples. Half of these were from school children and the remainder from various other sources — villages, normal pregnancy groups and normal adults from a prison and two factories. Some of the school studies have already been the subject of reports (Fine, Kitwe 1966; Bhagwandeem, Lusaka 1970). The others were communicated to me privately (Bakshi, Ndola schools 1972) or reported to the Ministry of Health (Mundia and Hashmi, Rufunsa School 1972).

**TABLE 1.**  
**URINARY BILHARZIA : HOSPITALS : ZAMBIA**

		1966			1967			1968		
PROVINCE	HOSPITAL	TOTAL SPECIMENS	POSITIVES No.	%	TOTAL SPECIMENS	POSITIVES No.	%	TOTAL SPECIMENS	POSITIVES No.	%
NORTHERN	Kasama	1,829	34	1.9	5,293	297	5.6	3,585	115	3.2
	Mbala	330	20	6	1,885	90	4.8	638	24	3.9
	Sh'gandu	556	5	1	582	8	1.3	714	5	.7
	Makasa	211	6	2.8	134	19	13.9	333	40	12.3
	Mporokoso				19	5	26.3	33	4	12
	Chilonga	2,815	45	1.6	3,462	41	1.2			
LUAPULA	Mansa	4,006	785	19.6	4,099	943	23			
EASTERN	Chipata	5,338	1,158	21.7	8,854	1,117	12.6			
	Petauke				280	133	47.5			
	Lundazi	889	287	32.3	2,451	800	32.5	2,644	883	33.4
	Minga	3,422	120	3.5	6,139	282	4.6	6,034	308	5.1
	Nyimba	562	199	35.4	1,001	213	21.2	1,273	293	23
	Nyanje St. Francis	856	385	45.7	3,697	546	16.2			
CENTRAL	Lusaka	21,396	1,605	7.5	25,727	1,431	5.6	17,354	2,499	14.4
	Kabwe	13,908	89	6.4	3,052	934	11.6	5,260	747	14.2
	Mumbwa	986	503	50.9				1,306	384	29.4
	Katondwe	771	298	38.7	793	296	37.4	967	235	24.3
WESTERN	Kitwe	9,427	462	4.9	12,796	870	6.8	11,964	1,293	10.8
	Ndola	8,220	345	4.2	8,033	506	6.3	13,360	920	7.2
N. WESTERN	Balovale	4,145	1,202	29	8,058	2,506	31.1	983	275	28.1
SOUTHERN	Batoka	5,986	383	6.4	5,196	525	10.1	5,098	673	13.2
	Choma	4,884	738	15.1	5,868	833	14.2	4,468	527	11.8
	Mazabuka	1,759	123	7	2,433	187	7.7	2,130	305	14.3
	Maema	3,775	506	13.4	3,948	571	14.4	2,308	596	25.8
	Chikankata	3,476	623	17.9	4,285	308	7.2	2,674	278	10.4
	Mtundere				163	139	85.2	691	461	66.1
<b>TOTAL</b>		<b>99,547</b>	<b>9,921</b>	<b>10</b>	<b>125,913</b>	<b>14,200</b>	<b>11.3</b>	<b>83,817</b>	<b>9,865</b>	<b>11.8</b>
<b>TOTAL</b>		1966-8			Specimens		309,277			
					Positives		33,986			
					% Positives		11.3%			

All the normal adult population studies were carried out at the Public Health Laboratory, Kitwe Central Hospital. An instructive bilharzia prevalence study was also carried out in a series of 1200 post mortem examinations, and this yielded important information on the relationship of incidence to age groups (Fine 1968).

**Hospital Statistics**

Table 1 lists the findings for urinary bilharzia, and it can be seen that, although the individual hospital figures vary greatly — from 1 to 50.9%, the average annual figures varied very slightly for the three year period under review: 10% in 1966, 11.3% in 1967, 11.8% in 1968.

Table 2 summarises the figures for intestinal bilharzia and here too variation among individual hospitals may be noted, together with similarity in the annual averages: 1.8% in 1966, 1.6% in 1967, and 3% in 1968.

**Normal Population Statistics.**

Table 3 summarises the findings in schools and other normal population groups. The average prevalence for the normal urines was 22%, much higher than the average hospital figure.

This might have been expected from the inclusion of schools in the normal population groups: as will be shown later, the highest prevalence of bilharzia is in children of school age.

Calculated separately, the schools had a prevalence of 27% and the remaining normal groups 16%: the latter would have been even less (13%) but for a severe outbreak of bilharzia in the village of Fisenge at the time of the investigations.

**Causes of variation in incidence figures**

A number of reasons can be put forward to account for this.

One is the age group structure of the population studied. Thus basing an estimate of national

**TABLE 2.**  
**INTESTINAL BILHARZIA. HOSPITALS : ZAMBIA**

PROVINCE	HOSPITAL	1 9 6 6			1 9 6 7			1 9 6 8		
		TOTAL SPECIMENS	POSITIVES No.	%	TOTAL SPECIMENS	POSITIVES No.	%	TOTAL SPECIMENS	POSITIVES No.	%
NORTHERN	Kasama	679	9	1.4	5,866	82	1.4	3,172	6	.2
	Mbala	439	35	8.2	1,743	14	.8	333	32	9.6
	Sh'gandu	576	3	.5	545	4	.7	670	5	.7
	Makasa	161	1	.6	123	1	.8	416	16	39.1
	Mporokoso							48	2	4.1
	Chilonga	2,583	18	.7	3,107	15	.5			
LUAPULA	Mansa	1,007	13	1.3	3,819	30	.8			
EASTERN	Chipata	3,162	60	1.9	7,369	118	1.6			
	Petauke				117	8	6.8			
	Lundazi	1,980	36	1.8	2,081	36	1.8	1,448	43	3
	Minga	3,121	25	.8	5,998	66	1.1	4,429	106	2.4
	Nyimba	339	45	13.2	691	32	4.7	599	246	41
	Nyanje	101	3	2.9	363	69	1.9			
St. Francis				3,135	19	.6				
CENTRAL	Lusaka	11,076	376	3.4	14,092	296	2.1	10,424	354	3.4
	Kabwe	6,009	60	1.0	3,949	87	2.2	1,406	13	.9
	Mumbwa	506	1	.1	560	1	.1	726	6	.8
	Katondwe	45	10	22.2	40	10	25	56	24	42.1
WESTERN	Kitwe	6,203	25	.4	8,310	91	1.1	9,295	130	1.4
	Ndola	5,290	26	.5	8,350	17	.2	3,612	33	.9
N. WESTERN	Balovale	1,222	10	.8	2,401	38	1.6	763	24	3.2
SOUTHERN	Batoka	5,329	43	.8	3,189	204	6.4	3,276	298	9.1
	Choma	3,496	84	2.4	3,840	73	1.9	3,229	69	2.2
	Mazabuka	799	20	2.5	2,202	15	.7	1,695	8	.5
	Maema	980	21	2.1	1,050	6	.6	2,016	143	7.1
	Chikankata	3,569	143	4.0	3,881	58	1.5	2,318	56	2.4
	Mtondere				58	2	3.4			
<b>TOTAL</b>		<b>58,677</b>	<b>1,067</b>	<b>1.8</b>	<b>86,879</b>	<b>1,392</b>	<b>1.6</b>	<b>49,931</b>	<b>1,514</b>	<b>3</b>
<b>TOTAL</b>		<b>1966 - 8</b>		<b> :</b>		<b>SPECIMENS</b>		<b>195,487</b>		
						<b>POSITIVE</b>		<b>3,973</b>		
						<b>% POSITIVE</b>		<b>2%</b>		

**TABLE 3**  
**Normal Population Groups**

SCHOOLS	No. of urine specimens	No. containing ova	% pos.
Kitwe Primary and Secondary Schools	1,000	120	12
Kitwe Boys High School	321	52	16
Kafue Bridge	53	41	78
Mwambastu School, Garneton	323	301	62
Ndola Rural Schools	3,327	637	19
Rufunsa Primary Schools	500	150	30
Lusaka Schools	587	197	34
<b>TOTAL FOR SCHOOLS</b>	<b>5,111</b>	<b>1,398</b>	<b>27%</b>
<b>VILLAGES</b>			
Luano	159	9	5.5
Fizenge	675	254	38
Mofu Air Strip	100	0	0
<b>PREGNANCY POPULATIONS</b>			
Ante natal clinic Kitwe 1966	2,224	360	16
Ante natal clinic Kitwe 1971	620	62	10
Ante natal clinic Kitwe 1966	129	17	13
<b>ADULT POPULATIONS</b>			
Kamfinsa Prison	422	40	9.5
Factories : Sawtow Foundries	429	34	8
Denovan & Co.	100	3	3
<b>TOTAL NON-SCHOOLS</b>	<b>4,868</b>	<b>779</b>	<b>16%</b>
<b>TOTAL FOR NORMAL POPULATION GROUPS</b>	<b>9,977</b>	<b>2,177</b>	<b>22%</b>

incidence on school surveys alone will give an exaggerated picture of the extent of the infection.

Another factor is aridity of the soil, as a result of which bilharzia is greatly reduced or absent in some areas (e.g. Mofu Air Strip).

A third factor is seasonal change with fluctuation in rainfall. In the example below the incidence increases with the end of the heavy rainfall, to fall again as a period of drought sets in. The maximum figure of 66% was at the end of the rainy season.

**Relation of incidence to age**

This has been demonstrated by Clarke (1966) in population studies in Rhodesia: he has shown that incidence rises from a negligible value in infancy to reach a maximum at about age group fifteen to twenty, thereafter falling progressively with age.

A similar relationship was found in a necropsy population study I carried out in 1968 in which evidence of bilharzia was noted in 104 cases in 1200 post mortem examinations — a prevalence of 9%. The lesions were mainly in the bladder and consisted of granulomata and sandy patches: microscopic confirmation in the form of ova in scraping was obtained in all cases.

The figure of 9% corresponds to the average hospital prevalences of urinary bilharzia (11%).

**DISCUSSION**

The wide variation in prevalence found in the hospital and other population groups suggests differences in the localities studied which are probably more apparent than real.

If it were possible to study prevalence in each locality longitudinally i.e. over a period of time, it would probably be found that high figures represent a peak and low figures a trough in a sequence of changing values: consequently prevalence figures cannot be compared without a knowledge of the phase of out-break at which the survey was carried out.

When numerous population groups are studied and the prevalence figures averaged, the variations in phase probably cancel out and the result is a national prevalence value of important significance and a meaningful index of infection in the country as a whole. This is the probable explanation of the striking closeness of the three annual hospital prevalence figures for 1966-68 for both urinary and intestinal bilharzia despite the marked variation in individual hospitals.

On the basis therefore of the conception of national or annual average prevalence, Zambia may be said to enjoy, or suffer, a prevalence of 10% urinary bilharzia and 2% intestinal bilharzia.

A number of reasons can be put forward to account for this.

One is the age group structure of the populations studied. Thus basing an estimate of national incidence on school surveys alone will give an exaggerated picture of the extent of the infection.

Another factor is aridity of the soil, as a result of which bilharzia is greatly reduced or absent in some areas (e.g. Mofu Air Strip).

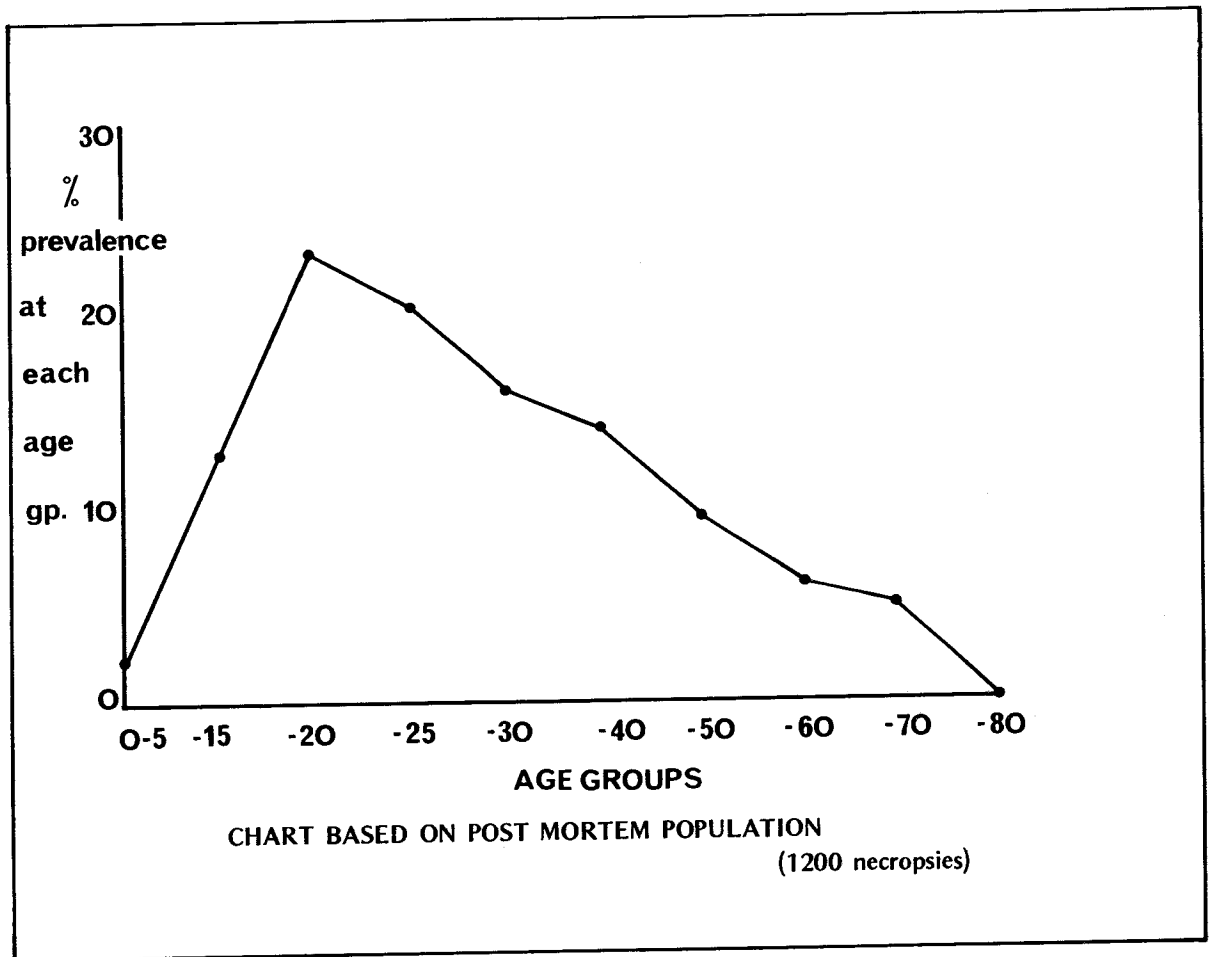
A third factor is seasonal change with fluctuation in rainfall. In the example below the incidence increases with the end of the heavy rainfall, to fall again as a period of drought sets in.

**Table IV:**  
**Seasonal fluctuation of incidence in Fisenge**

DATE	NO. OF CASES	OVA IN URINE	% POSITIVE	SEASON
19/12/68	122	40	33	rainy
20/12/68	138	49	36	"
23/12/68	120	33	28	"
3/ 1/69	139	63	45	"
26/ 3/69	50	33	66	end of rainy season
23/ 4/69	50	23	46	"
7/5 - 2/7/69	56	13	23	dry season
TOTAL	675	254	38	

The maximum figure of 66% was at the end of the rainy season

**Figure 1**  
**PREVALENCE OF BILHARZIA IN RELATION TO AGE GROUPS**



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**Fig. V**  
Age groups and percentage of cases showing bilharzia in 1200 necropsies

Age group	0-5	-15	-20	-25	-30	-40	-50	-60	-70	-80
No. of cases	470	62	44	97	125	185	127	65	18	6
No. of positive for ova	4	8	10	19	21	26	12	4	1	0
% positive	1	13	23	20	16	14	9.5	6	5	0

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