The Brazilian Leishmaniasis Control Program

Mariza Mendes Lacerda*

Fundação Nacional de Saúde, Coordenação de Controle de Zoonoses e Animais Peçonhentos, Ministério da Saúde, Anexo "A" sala 320, 70058-900 Brasília, DF, Brasil

The control methods used in Brazil for both cutaneous and visceral leishmaniasis by the Ministry of Health's National Health Foundation (Fundação Nacional de Saúde) are presented. Data referring to the programme between 1980 and 1991 is presented. There was an increase in the total number of notified cases of cutaneous leishmaniasis until 1987 and from this date onwards the number has remained between 23,000 and 26,000 per year. There were significantly fewer cases of visceral leishmaniasis during the same period and until 1991 the greatest number of cases reported in one year was 2,511 in 1985.

The overall picture is that it is difficult to evaluate to what extent the control methods employed have reduced the number of cases of either form of the disease. It is suggested that there is an urgent need for a closer approximation of research and health workers to review the actual control strategies and to define procedures capable of assessing accurately their impact.

Key words: control - cutaneous visceral leishmaniasis - Brazil

Some of the data presented in this paper has previously been published in an abbreviated form where it was used to discuss the cost of treatment and some control measures (Vieira et al. 1990). The present article reports in greater detail the control program related to cutaneous and visceral leishmaniasis coordinated by the Fundação Nacional de Saúde, Brazilian Ministry of Health. Also, the annual number of cases for both forms of leishmaniasis reported for the individual states is given,for the period 1980-1991. The numbers quoted refer to the cases notified by the state health authorities and as such are probably underestimates of the actual incidence.

AMERICAN VISCERAL LEISHMANIASIS (AVL)

In Brazil, AVL occurs in 17 states, distributed in the Northeast, Central, West and Southeast Regions. In the North, the two major foci are in the states of Pará and Roraima. The disease is generally spreading to new localities within the different endemic regions.

When speaking of AVL, it is important to remember that poor social-economic conditions favours the installation of the disease. With this in mind, it is just not sufficient to attack the transmission cycle, and it is necessary to deal with basic problems related to education, nutrition and sanitation. One major problem is that the people who migrate from the rural areas to the bigger cities to escape the drought take infected dogs with them which is probably important in establishing new foci in the poorer areas of the bigger towns. At the same time, their poor condition of health makes them more susceptible to infection.

With these points in mind, control programs must also involve political actions aimed at fixing the rural worker and giving him conditions to perform a profitable form of agriculture. Such an effort would demand unified action by different Governmental bodies and go beyond the boundaries of public health.

Campaigns aimed at controlling AVL began in the 1950's and were developed particularly in the States of Ceará and Minas Gerais. During the 60's the Program was unfortunately interrupted and only began again in 1980 when the Superintendência de Campanhas de Saúde Pública (SUCAM), Ministry of Health, detected an increase of the number of cases. Table I (Anon. 1992) shows the number of cases of AVL in the different states between 1980-1991. Fig. 1 shows the total number of cases per year for the whole country. The pie diagram in Fig. 2 shows the regional distribution of the cases in the decade, and from it we can see that more than 90% of the notified cases were from Northeast Region.

AVL CONTROL PROGRAM

The AVL control strategies in Brazil involve the following: (1) Elimination of the major reservoir (the infected domestic dog); (2) Controlling

* Present address: Câmara dos Deputados, Assessoria Legislativa, Anexo III, sala 50, 70160-900 Brasília, DF, Brasil

Received 5 July 1994
Accepted 5 August 1994

TABLE I

American visceral leishmaniasis notified cases per state and region
Brazil 1980-1991[a]

Year / State/Region	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991[a]
Brazil	144	359	1120	1127	1911	2511	1794	1038	834	1490	1622	1292
North	0	0	0	0	99	49	12	8	23	29	35	53
Rondônia	-	-	-	-	-	-	-	-	-	-	-	-
Acre	-	-	-	-	-	-	-	-	-	-	-	-
Amazonas	-	-	-	-	-	-	-	-	-	-	-	-
Roraima	-	-	-	-	-	-	-	-	-	5	6	41
Pará	-	-	-	-	99	49	12	8	23	23	22	12
Amapá	-	-	-	...	-	-	-	-	-	-	-	-
Tocantins	*b*	*b*	*b*	*b*	*b*	*b*	*b*	*b*	...	1	7	...
Northeast	132	337	1095	1095	1777	2403	1729	962	734	1320	1328	1162
Maranhão	...	...	41	159	569	422	135	38	42	172	91	61
Piauí	11	68	244	312	435	326	125	46	47	162	201	86
Ceará	75	176	447	443	294	475	259	116	107	169	140	150
R. Gde. do Norte	3	15	22	51	21	32	25	20	17	71	94	147
Paraíba	2	18	18	14	33	58	21	9	9	57	60	92
Pernambuco	13	6	25	26	107	188	120	68	22	106	97	80
Alagoas	8	6	15	26	23	48	54	59	22	60	58	32
Sergipe	16	32	35	24	58	106	109	80	60	47	82	78
Bahia	4	16	248	40	237	748	881	526	408	476	505	436
Southeast	9	16	12	8	24	27	36	40	67	125	243	76
Minas Gerais	...	1	4	...	9	22	30	26	52	112	226	62
Esp. Santo	...	2	...	...	10	1	3	13	14	9	15	13
Rio de Janeiro	9	12	8	8	5	4	3	1	1	4	2	1
São Paulo	-	1	-	-	-	-	-	-	-	-	-	-
South	0	0	0	0	0	0	0	0	0	0	0	0
Paraná	-	-	-	-	-	-	-	-	-	-	-	-
Santa Catarina	-	-	-	-	-	-	-	-	-	-	-	-
R. Gde. do Sul	-	-	-	-	-	-	-	-	-	-	-	-
Central & West	3	6	13	24	11	32	17	28	10	16	16	1
Mato G. do Sul	3	4	9	24	4	24	14	27	8	14	5	1
Mato Grosso	-	-	-	-	-	-	-	-	1	-	-	-
Goiás	...	2	4	...	7	8	3	1	1	2	11	...
Dist. Federal	...	...	...	...	...	...	...	...	...	...	...	...

[a]: data being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI
[b]: until 1988, Tocantins was part of the State of Goiás.

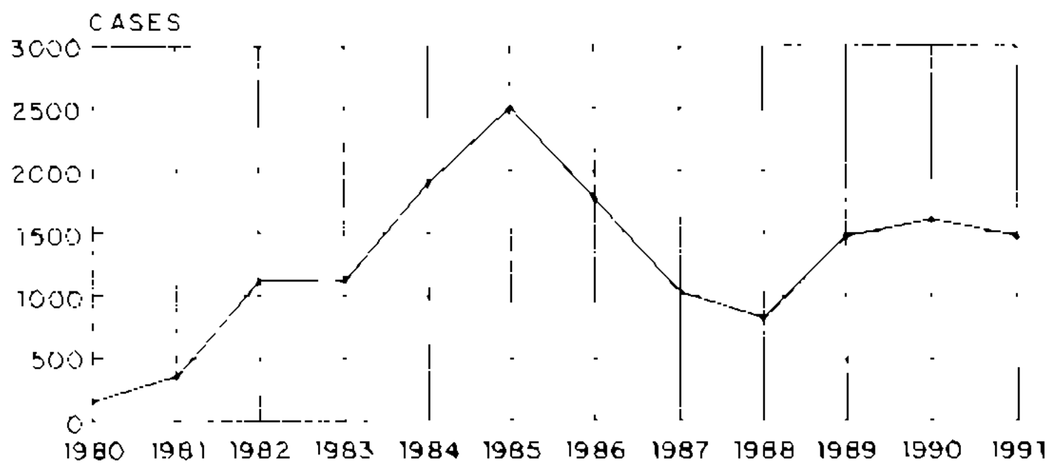

Fig. 1: American visceral leishmaniasis. Number of cases per year in Brazil between 1980-1991 (The data for 1991 is presently being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI).

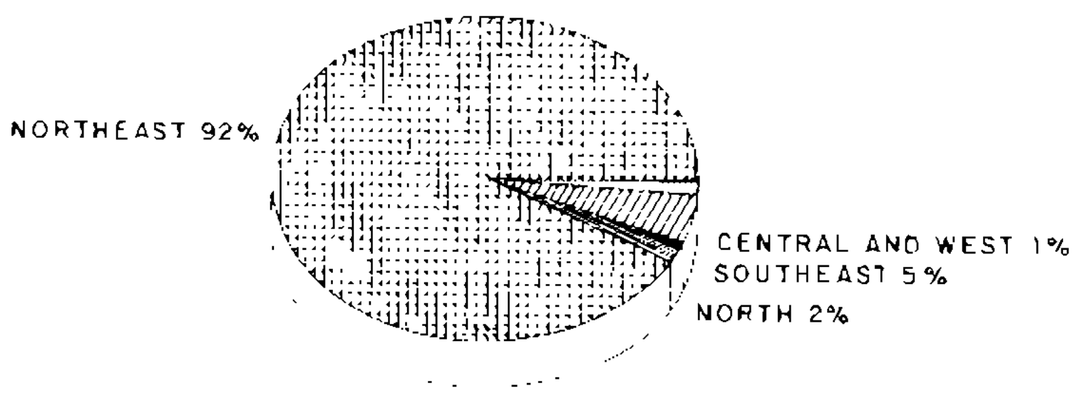

Fig. 2: American visceral leishmaniasis. Number of cases per region in Brazil between 1980-1991 (The data for 1991 is presently being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI).

of the vector by insecticide spraying; (3) Treatment and reduction of risk of infection of man.

In any control program it is essential that both educational and community actions are taken together.

The FNS Control Program has the following aims: (1) To implement the Control Program within SUS (the Unified Health System - Sistema Único de Saúde) regional centers in the endemic areas and other groups interested in control programs within five years; (2) To interrupt AVL urban transmission; (3) To reduce the incidence in rural areas to 5:100,000 inhabitants a year; (4) To reduce the lethality which is presently 10%.

RESERVOIR CONTROL MEASURES

The identification and elimination of serum-positive dogs is one of the major activities of the AVL Control Program. At present, sera are screened using the Indirect Immunofluorescence Test using a formalin-fixed promastigote antigen prepared by Biomanguinhos (FIOCRUZ).

The survey is based on a house-to-house sampling of dogs using blood collect on filter papers. In some instances, the sample size has been increased by collecting blood during rabies vaccination programs. This method is particularly useful as it introduces local health workers to the AVL Control Program.

So far, the collection of blood in collaboration with the rabies vaccination program is limited to the day of the vaccination. As such, its usefulness is limited to: (1) The identification of new areas which would have to be subsequently examined systematically; (2) Follow-up of areas under control to test if the positivity remains below 1%. If positivity is persistently 1% or below, the locality is considered to be effectively under control; (3) In areas which have been examined on a house-to-house basis a second sampling (to be performed within six months) may coincide with the vaccination program.

The FNS has tried to enlist the help of city authorities in the catching and sacrificing of stray and infected dogs specially in areas where positive dogs exist.

According to the data collected by Centro Nacional de Epidemiologia (CENEPI), FNS, (Table II), 4.030,762 dog blood samples were collected in the past ten years and 3.719,965 were examined. 111,791 were positive, and as a result of this, 3.01% of the dogs were identified as being infected. In this Table, it is interesting to notice that there is a reduction of positivity despite the increasing number of examinations. This strongly suggests that the control measures aimed at this canine reservoir were effective.

Table III shows that 137,243 dogs were sacrificed as part of the control measures, including serum-positive and stray dogs.

VECTOR CONTROL MEASURES

These are principally aimed at identifying vector populations (*Lutzomyia longipalpis*) and house-to-house spraying with residual insecticide in the endemic areas. Studies of the sandfly fauna are aimed at determining whether or not cases are autochthonous and defining seasonal fluctuations of the sandfly population.

Insecticide spraying is indicated during outbreaks in areas of urban transmission and rural outbreaks. The ideal procedure is to spray both houses, annexes and animal sheds. Ultra-low volume spraying is reserved for urban areas in which an immediate reduction in the sandfly population is required while house-to-house spraying is being performed.

According to data shown in Table IV, 399,179 sandflies were captured, and of these, 254,794 were identified. Insecticide campaign is summarized in Table V and shows that 485,617 houses were sprayed (ultra-low volume) with various commercial brands of organophosphorate insecticides and 518,194 were sprayed with insecticides of residual action (DDT or Deltamethrin).

MEASURES INVOLVING MAN

These basically involve the diagnosis and treatment of cases. The FNS purchases the quantity of pentavalent antimonial drug which is distributed by the CEME (Central de Medicamentos) network. Other diagnostic reagents (skin test Montenegro antigen, indirect immunofluores-

TABLE II

Results of national serological survey of dogs perfomed between 1980-1991[a] by the FNS using the indirect immunofluorescent test

Year	Number of counties	Number of localities	Number of houses	Blood samples Number collected	Number examined	Number positive	%
1980	1	3	...	526	526	20	4
1981	5	641	...	10169	10169	1299	13
1982	31	1904	50832	23492	21670	1444	7
1983	79	5645	241414	88201	77280	8373	11
1984	158	6924	336590	123379	107784	6137	6
1985	167	8171	526385	198643	173359	7856	5
1986	117	12369	635422	305039	220360	7135	3
1987	112	10028	586745	253303	251998	13162	5
1988	152	11728	624160	299632	295788	9780	3
1989	149	24409	538262	593631	371658	12456	3
1990	431	55250	781912	991617	1001104	20605	2
1991[a]	...	59237	914485	1143130	1188269	23524	2
Total	1402	196309	5236207	4030762	3719965	111791	3

[a]: data being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI

TABLE III

Reservoir Control Measures, Brazil, 1980-1991[a] - Dog eliminations

Year	Number of counties	Number of localities	Number of houses	Number of dogs sacrificed
1980	15	95	356	387
1981	14	89	454	484
1982	26	229	1716	2053
1983	62	2115	8704	10847
1984	128	2139	13081	13072
1985	141	2151	11167	13315
1986	91	1781	6985	11939
1987	97	1734	4628	5937
1988	148	2236	7702	10152
1990	95	4799	7073	18751
1989	165	8530	9716	26513
1991[a]	...	8821	9037	23793
Total	982	34719	80619	137243

[a]: data being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI

TABLE IV

Vector control measures, Brazil, 1980-1981[a] - Entomological survey

Year	Number of counties	Number of localities	Number of houses	Number of Sandflies Captured	Classified	*Lu. longipalpis*
1980	37	186	...	12980	12000	...
1981	20	143	...	7515	...	...
1982	34	795	5053	20587	18276	7641
1983	63	445	4494	21832	17025	5575
1984	116	809	9069	52635	49802	36738
1985	120	891	8142	28988	28374	15102
1986	51	1667	12606	38896	8551	3751
1987	40	561	6789	22240	7402	6016
1988	49	540	5275	15064	9438	1809
1989	97	1060	11585	15284	16533	11435
1990	126	1312	15696	50790	31739	25301
1991[a]	...	...	12446	112368	55654	32246
Total	...	8409	91155	399179	254794	145614

[a]: data being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI

cence reagents) are produced and distributed by Biomanguinhos.

A handbook on diagnosis, treatment and control for Brazilian health workers is in its final stage of preparation and will serve to orientate workers involved in the control program. It will also serve as a basis for the elaboration of a training manual to be used for teaching public health officials who are either studying or already working in the field.

Emphasis is also given to early diagnosis which will result in the disease being treated earlier, and consequently, a reduction in the fatality.

TABLE V

Vector control measures, Brazil, 1980-1991[a] - Insecticide spraying

Year	Number of counties	Number of localities	Number of houses sprayed: Ultra-low volume	Number of houses sprayed: Residual action
1980	14	97	...	11196
1981	12	98	...	11430
1982	11	76	...	12512
1983	21	128	...	27393
1984	33	270	42649	51262
1985	74	946	82265	78260
1986	32	761	71701	26074
1987	38	645	42751	19758
1988	86	271	20011	18278
1989	32	445	226240	70189
1990	42	2138	...	191842
1991[a]	...	963	32472	43748
Total	395	6838	518089	561942

[a]: data being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI

Attempts are being made to stimulate collaborative ties between Ministry of Health's Nutritional Support Programs, especially Alternative Food Program to raise nutritional status among population at risk in endemic areas.

AMERICAN CUTANEOUS LEISHMANIASIS (ACL)

In Brazil, the morbidity of ACL, has been increasing since 1987 (Table VI, Fig. 3), and the annual number of cases now exceeds 20,000. The increase in the number has coincided with the gold-mining boom and several agricultural projects in forested areas. From Fig. 4 it can be seen that the highest number of cases during the past 10 years are from the North and Northeastern Regions, although an expressive number of cases occur in the Central, West and

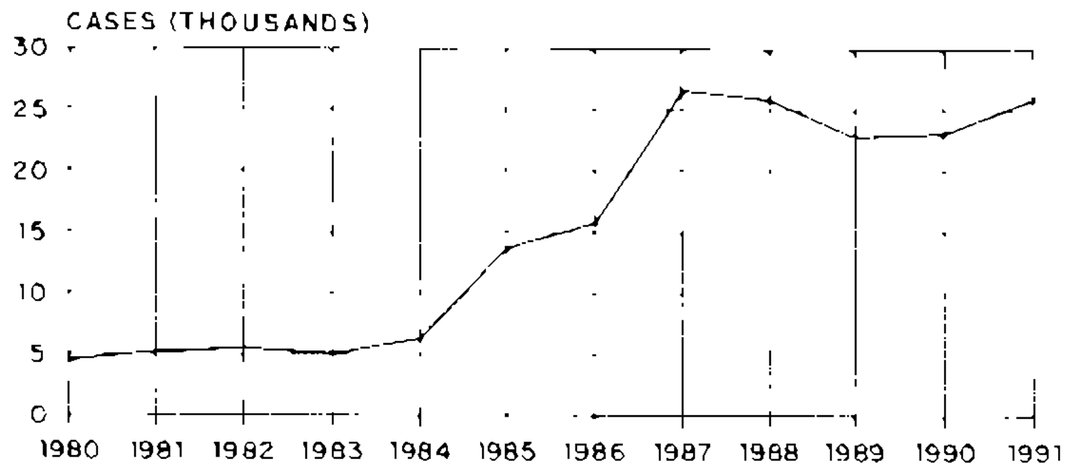

Fig. 3: American cutaneous leishmaniasis. Number of cases per year in Brazil between 1980-1991 (The data for 1991 is presently being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI).

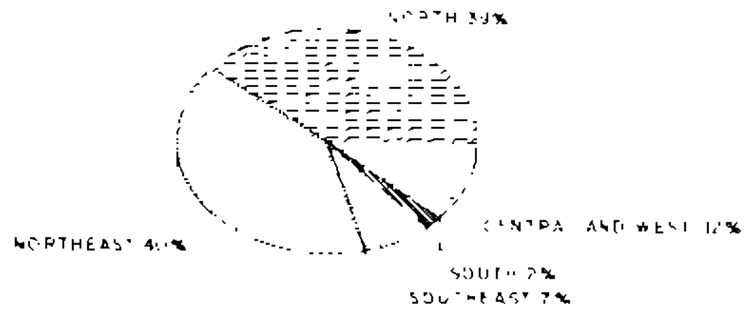

Fig. 4: American cutaneous leishmaniasis. Number of cases per region in Brazil between 1980-1991 (The data for 1991 is presently being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI).

Southeast Regions. There are ACL foci in practically every Brazilian state.

THE ACL CONTROL PROGRAM

Up until a short time ago the transmission most commonly occurred in rural forested areas and control measures were thus centred most exclusively around treatment, health education and self protection against infection. However, changes have been noted in the transmission patterns and it would appear that peri-urban foci now exists. With this innovation in the epidemiology, more direct measures of vector and reservoir control become feasible. To identify methods of controlling such foci is now one of the Program's major objectives.

CONTROL MEASURES RELATED TO MAN

First and foremost is the early diagnosis and treatment, aimed at avoiding the development of mutilating sequelae. The strategy can be divided into three phases: (1) Early and accurate diagnosis; (2) Complete treatment; (3) Adequate follow-up to assess cure.

Diagnostic reagents and drugs are supplied exactly in the same way as for AVL.

Special emphasis is given to encourage local public health units to both diagnose and treat the disease and also to notify the cases to central authorities.

An ACL Control Guide has already been published by the Ministry of Health, and its purpose is to orientate diagnosis, treatment and control for Brazilian health workers. In the future it will serve to prepare another training manual to be used for teaching public health officials either studying or actively working.

RESERVOIR CONTROL MEASURES

Leishmania (Viannia) braziliensis infections have been found in dogs, rodents and equines in some endemic areas of the Southeast and Northeast. Such findings have led to the following control measures: (1) The seral screening of dogs for infection and the elimination of any positive animals with skin lesions; (2) Relocation of large peridomestic equines to sandfly-free areas; (3) Reduction or elimination of domestic and peridomestic rodents.

TABLE VI

American cutaneous leishmaniasis notified cases per state and region
Brazil, 1980-1991[a]

Year / State/Region	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991[a]
Brazil	4408	5096	5477	5009	6235	13697	15739	26611	25948	22846	23067	259929
North	2082	2679	2969	2788	2618	6086	4933	10473	10932	9418	7004	8079
Rondônia	301	261	659	372	33	279	919	3156	3794	3570	1346	474
Acre	41	66	65	75	54	214	410	684	369	209	59	447
Amazonas	1355	1357	1281	1272	1352	3428	1524	2581	2493	1179	1419	2597
Roraima	...	...	77	67	57	72	113	134	333	474	170	525
Pará	258	450	564	427	581	1374	1580	3326	3304	3066	3269	3176
Amapá	127	545	323	575	541	719	387	592	639	508	185	405
Tocantins	[b]	[b]	[b]	[b]	[b]	[b]	[b]	[b]	...	412	556	455
Northeast	1503	1521	1685	1298	1680	4464	7582	11693	8866	8723	11266	11128
Maranhão	42	388	259	176	415	1655	3352	3897	2483	2259	3109	4318
Piauí	61	65	43	36	51	57	95	150	146	123	249	251
Ceará	899	883	1068	841	572	839	1837	4052	2456	2748	3848	2862
R. Gde. do Norte	...	..	2	2	2	2	8	600	32	17	21	7
Paraíba	23	61	72	173	336	251	272	450	231	186	80	160
Pernambuco	14	17	32	29	184	263	189	300	287	443	683	478
Alagoas	18	20	13	27	33	9	13	84	43	36	28	54
Sergipe	16	4	3	5	7	47	70	162	30	15	55	54
Bahia	430	83	193	9	80	1341	1746	1998	3158	2896	3193	2944
Southeast	525	416	406	519	582	746	857	910	1775	2162	2282	3058
Minas Gerais	421	189	125	130	251	350	456	539	1423	1439	1338	1989
Esp. Santo	62	78	124	251	224	279	254	294	278	585	672	722
Rio de Janeiro	42	70	129	136	100	103	127	73	68	136	229	319
São Paulo	...	79	28	2	7	14	20	4	6	2	43	28
South	168	195	197	151	203	421	448	654	528	168	54	129
Paraná	168	195	197	149	200	419	447	652	517	168	54	129
Santa Catarina	-	-	-	1	-	1	-	-	11	-	-	-
R. Gde. do Sul	-	-	-	1	3	1	1	2	-	-	-	-
Central & West	130	285	220	253	1152	1980	1919	2881	3847	2375	2461	3535
Mato G. do Sul	...	...	...	18	91	187	181	155	120	158	214	156
Mato Grosso	76	138	73	152	747	1208	1356	2373	3268	1931	2021	3198
Goiás	54	147	147	83	314	585	382	353	459	286	226	181
Dist. Federal	...	...	...	...	...	...	...	...	...	...	...	...

[a]: data being reviewed. Source: Brazilian Ministry of Health, FNS/CENEPI
[b]: until 1988, Tocantins was part of the State of Goiás

In areas where peridomicilliary *L.(V.) guyanensis* occurs, opossum control may be considered.

VECTOR CONTROL MEASURES

In areas where peridomicilliary transmission is occurring and has been supported by entomological observations the following procedures may be attempted: (1) Spraying of houses with residual insecticide; (2) Screening of windows and doors; (3) Use of repellents when working in forested areas; (4) Covering exposed parts of the body by the use of long-sleeve shirts and trousers.

GENERAL PROCEDURES

It is essential that health workers emphasize that people should avoid being bitten by sandflies by the use of any suitable protective method.

In the case of housing located in forested areas it is recommended that they should be located at least 300 meters away from the forest.

To supply water and adequate sanitation so that it is unnecessary to individuals to enter the forest.

Recently cleared areas should not be settled until the sandflies have had a chance to return to their normal food sources in the neighbouring forest.

CONCLUDING REMARKS (AVL AND ACL)

A greater approximation between research institutes and organs involved in specific control measures is needed. This is particularly applicable to the following areas: (1) Alternative therapeutic methods; (2) Chemoprophylaxis; (3) Evaluation of control programs; (4)Evaluation of man as a source of infection; (5) Vector biology.

More precise information on the above mentioned subjects will help in the elaboration of more adequate control measures.

It is very important for us to remember that all the institutions involved in the unified health system (SUS) are responsible for monitoring and controlling leishmaniasis in Brazil and that the longed-for reduction in the death rate of AVL will easily be achieved if we have: (1) Community participation; (2) Institutional priority of their control; (3) Sufficient number of trained health workers; (4) A guarantee of adequate drugs and supplies; (5) A more agile and accurate information service; (6) Establishment of inter-institutional groups who are responsible for implementing and following up control programs and to systematically evaluate their impact.

ACKNOWLEDGEMENTS

To Prof. Jeffrey Shaw for his helpful comments on earlier versions of this paper, and Mário Tércio Lyra for editing the graphs and tables.

REFERENCES

Anon. 1992. *Informe Epidemiológico do SUS 1:* 32-33.

Vieira JB, Lacerda MM, Marsden PD 1990. National Reporting of Leishmaniasis: the Brazilian Experience. *Parasit Today 10:* 339-340.